

## The Impacts of Migrants' Transfers of Funds on Economic Growth and Living Standards in the WAEMU Zone

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**Abstract:** *This study examines the impacts of migrants' transfers on economic growth and social welfare in the WAEMU zone. A model of simultaneous equations in panel data is developed to compensate for the endogeneity and simultaneity of the variables, and whose estimation is performed by the two-stage least squares techniques using instrumental variables. In addition, a composite social welfare indicator was constructed on which the impacts of migrants' transfers of funds were assessed. The results indicate that financial development is the main channel for indirect transmission of the effects of migrant transfers on economic growth. However, we did not detect a direct effect in one direction or the other between growth and transfers. Nonetheless, they have positive and very significant impacts on the welfare of the population. Also, the democratic variables introduced into the models impact positively economic growth and the standard of living in the WAEMU zone.*

**Keywords:** *migrant transfers, social welfare, economic growth, double least squares, UEMOA, panel.*

**J.E.L:** F22; J60; O15; O43

### 1. Introduction

In recent years, the international scene has been agitated by concerns about the migration in the world. The international mobility of persons has increased considerably as a result of the security situation and the search for better economic conditions.

However, international labor migration is not a new phenomenon. Economists have been interested in this, like any other question of the mobility of factors of production. Liberal thinking views it on a global scale as a reallocation of resources, and thus as a means of gaining productivity according to Faini (2002). Hamilton and Whalley (1984) cited by Faini (2002) estimate that in terms of global output, gains in free movement of labor have accounted for at least 20% and perhaps up to 40% of global GDP. Nevertheless, the pattern of international migration has changed over the years, especially at the political level, as Faini (2002) points out. This author observes that cross-border migratory flows in terms of globalization have been greater than those observed in the early 2000s, despite the increase in economic incentives. Whereas in the 19th century the migration was free and sometimes even encouraged, the current trend is to restrict it to skilled workers. For example, Carrington and Detragiache (1998) and Faini (2007) found that people with or without a low level of education have limited chances of international migration and that migrants are increasingly the most educated.

Thus, the migration of skilled workers from developing countries to the developed countries of Europe and America is a serious problem of brain drain not only because of the externalities that it creates between the countries of origin and destination, but also and above all because it slows down and complicates the process of structural transformation necessary for the take-off of these economies. For example, Stalker (1994) shows that at least 700 thousand scientists, engineers, doctors and other skilled workers migrated from developing to developed countries between 1961 and 1983; that between 1960 and 1987, Sub-Saharan Africa lost 30 percent of its skilled labor force; and 90 percent of doctors trained in Zimbabwe in the 1980s left their country. Similarly, Carrington and Detragiache (1998) found that more than 60% of Egyptian, Ghanaian and South African nationals emigrated to the United States have a higher level of education. These figures are still alarming until today since according to Unesco, in 2008, more than 30 thousand African graduates with a post-graduate degree would live outside the continent, and 25,000 scholarship holders who came to study in the European Union did not return to their countries (Maingari, 2011). According to the

author, the starting causes of highly educated intellectuals range from the precariousness of working conditions to political opposition and low wage levels in their countries of origin.

Contrary to the policies of repatriation of expatriates, which paid off between the 1950s and 1980s, migrant return conditions have gradually deteriorated and the lack of political will or political capacity today complicates matters. Nevertheless, the emigrants keep close relations with their countries of origin in the absence of a definite return. Actions in this direction are collective as well as individual. Collectively, the approach consists in mobilizing a contributing diaspora (Maingari, 2011). The aim is to create the conditions for their involvement in the development of their country of origin by avoiding a temporary or permanent physical return. Individual emigrants make periodic trips to their countries of origin where they are still considered to be full members of their families. As such, they contribute to social life and economic status of family members who have remained in Canada through periodic and non-recurring transfers. The economic literature shows that these funds constitute levers in the countries of origin to overcome imperfections in capital markets and a means of diversifying risks (Faini, 2002).

Indeed, the objectives pursued by the expatriate populations through these transfers to the country of origin can be multiple. In some cases, the amount transferred is intended to support the consumption needs of the emigrant's families. In other cases, these funds may be directed towards the construction of housing or the financing of creative projects undertaken (Diagne and Diane, 2008). In both cases, these transfers are therefore expected to have positive effects on economic growth either through investment or demand or even through the accumulation of human capital if they are used to finance education and health. But as Ben Mim and Mabrouk (2011) point out, the relationship between economic growth and transfers of migrants can be directed in the opposite direction. This is explained when the analysis takes into account the reasons for the transfers. Of course, transfers often depend on growth dynamics in migrant countries of origin. In a recession, for example, it is likely that the number of transfers will increase to compensate for the effect of the economic situation on household incomes. Thus, the overall effect of transfers on growth is *a priori* ambiguous (Ben Mim and Mabrouk, 2011).

Statistics show that migrant transfers generate significant financial flows throughout the world. For developing countries, these migrant transfers are an important source of foreign exchange (Faini, 2002) and sometimes even indispensable for the easing of the balance of payments deficits (Glytsos, 2002). The amounts of these flows are large and exceed either official development assistance or foreign direct investment and are stable (Rocher and Pelletier, 2008). According to these authors, a number of migrants' transfers to Sub-Saharan Africa almost doubled between 2000 and 2006, reaching US \$ 9 billion, representing 1.3% of GDP in the region. Moreover, these funds have been increasing since the early 1990s, while official development assistance (ODA) and foreign direct investment (FDI) have been subject to strong fluctuations (Rocher and Pelletier 2008, Ndiaye, 2008). In Senegal, they represent 459.1 billion CFA Francs in 2007 and over 1,000 billion in 2014. According to Gupta et al. (2007) as reported by Ndiaye (2008), in 2005, Senegal was one of the top ten beneficiaries of transfers in Sub-Saharan Africa; 3rd country in terms of absolute amounts of resources transferred by migrants; 4th country when these transfers are measured as a percentage of GDP, and 5th country with the ratio of money transfers to exports.

The literature on the impact of migrant transfers in WAEMU economies has grown relatively steadily over the years. In general, in WAEMU, as elsewhere in the world, studies fall into two categories: those concerned with the microeconomic effects such as household welfare or poverty, and those addressing macroeconomic impacts. Hence, Diagne and Diane (2008) studied the impacts of migrants' transfers on poverty in Senegal. Similarly, Ndiaye (2008) examined how financial development influences the impacts of transfers on economic growth in Senegal. Also, Gbenou (2015) studied the macroeconomic impacts of transfers from migrants in WAEMU countries. However, the debate on the impacts of migrants' transfers in WAEMU countries remains open and is essentially an empirical question, as the results vary with the methods adopted by the authors. In particular, approaches to controlling the problem of endogeneity of variables are not always the most appropriate. Studies that have dealt with this kind of problem have mainly dealt with it only from a statistical point of view, whereas the question arises above all from the economic

point of view. Tankari (2015) had the merit of proposing a theoretical analysis by a panel VAR model. But again, the very dynamics of its model does not capture any structural or contemporary effect.

In this study, we propose to analyze the impacts of migrants' transfers in the WAEMU countries on welfare and economic growth. We propose a model with simultaneous equations in panel data to answer this question while taking into account the economic endogeneity of related phenomena. In the rest of the work, we present a brief review of the literature on the effects of migrants' transfers in Section 2. Section 3 examines the methodological approach with the presentation of the study data followed by some stylized facts on the topic in the countries of the Union. Section 4 presents the main results of the estimates. Finally, section 5 concludes the study.

## 2. Literature review

This section presents a review of the literature on the impacts of migrants' transfers. It is divided into two subsections. On the one hand, a theoretical review of the impacts of international migration and transfers will be made, and an overview of the work done on impacts of migrants' transfers will be presented.

### 2.1 Theoretical Review

Internal and international labor migration, from an economic point of view, is just a form of mobility of factors of production. From this point of view, liberal thinking rules that the international or internal reallocation of factors leads to greater market efficiency. However, the issue of the distribution of efficiency gains in the case of international migration between the originating and destination economies remains questionable. Also, there are authors in the literature who are skeptical and even pessimistic about the gains that would result from the migration of the workforce.

Thus, Faini (2002) suggests that internal migration may in some cases go hand in hand with an increase in unemployment, and even cause losses in global production. Moreover, he says, the mobility of the labor force can lead to the depopulation of entire regions, with a clear reduction of well-being for the immobile labor force. This is particularly the case when the rural exodus is able to empty the rural environment of its able-bodied arms leaving only the aging population on the spot. On the international level, the analogy phenomenon is called the brain drain and is manifested by the emigration of skilled and dynamic people. For Faini (2002), however, the negative impact of emigration could be offset by transfers or the return of emigrants, so the ultimate impact of migration is an empirical issue. Its graphics representation shows three distinct effects: a loss of well-being in the country of departure on those who did not emigrate, a net gain of well-being in the host country, and a net gain of emigrants far more important than the loss of well-being suffered by their peers who remained in the country of departure. Thus, they can compensate the latter by a redistribution of the gains of emigration. But in fact, the definitive impact of migration on countries of origin depends as much on the structure of migration (temporary or permanent emigrants) as on the extent of compensation in the form of sending migrants' transfers.

This analysis of international migration, especially when it is related to the brain drain, hides externalities. First, skilled workers who migrate may be the source of significant positive externalities in production in their country of origin where their departure becomes *de facto* a negative externality. Secondly, since the costs of education are borne by the country of origin, the benefits of education are lost for that country when the educated workers emigrate and the benefits of which are recovered by the host countries (Faini, 2002). For example, in a study conducted in 2011 and published in the *British Medical Journal*, it was estimated that for nine countries in Sub-Saharan Africa with the highest HIV prevalence rates (Ethiopia, Kenya, Malawi, Nigeria, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe) the total losses incurred in training emigrant doctors are between 2.13 billion and 2.21 billion dollars (of which 1.41 billion dollars for South Africa alone). At the same time, the countries of destination of these migrations realized gains trained, 846 million dollars for the US and 2.7 billion dollars for England. However, Faini (2002) argues that the standard empirical result is that migration affects negatively the growth of the host country unless the per capita capital of immigrants is identical or higher than that of the native whereas the reverse is true for the country of departure. The explanation is that immigration can be assimilated in the host country to an

increase in the rate of population growth. It will, therefore, lead to a reduction in the level of income per capita in the regular state, and consequently a slower growth during the transition to the new regular state.

Regarding the effects of migrants' transfers to their countries of origin, the literature puts forward several channels. The first mechanism is that these transfers allow beneficiaries to overcome the problems of financial constraints for consumption and expenditure on education and health (Rocher and Pelletier, 2008). But opinions on the effectiveness of this channel are shared. Some consider these expenditures to be unproductive expenditures ( Ben Mim and Mabrouk, 2011) because they do not increase productive capacity. However, spending on education and health can in many ways be seen as an accumulation of human capital, the effects of which should be expected to be expected over time (Gleizes, 2000). But for this to happen, recipients of funds that have improved their levels of study do not decide to emigrate (Ben Mim and Mabrouk, 2011). On the other hand, consumer spending is able to stimulate growth through demand. But again, according to the author, macroeconomic effects depend on the structure of demand. If import goods are important in the basket of consumption of the households receiving the transfers, they will instead contribute to raising the level of imports, and possibly fueling inflationary pressures. However, even if they are used to finance current consumption and do not promote economic growth, transfers can help improve the welfare of their beneficiaries.

The second channel is the accumulation of capital or investment. In this sense, migrants' transfers should be used for large expenditures such as the acquisition of new technologies or investment in real estate (Brown, 1994). Other channels through which migrants' transfers can influence economic growth are the development of the financial sector (Ndiaye, 2008), the reduction of income volatility (Gbenou, 2015) and the improvement of the productivity of labor (Chami et al., 2008). According to other authors, migrants' transfers lead to a reduction in labor market participation, hampering growth and development (Faini, 2007). Similarly, Ben Mim and Mabrouk (2011) shows that migration by depriving the countries of the departure of their most skilled workers diminishes their ability to adopt new technologies, which has a negative impact on inflows of external capital.

The literature also foresees an inverse relationship between migrant transfers and economic growth. Indeed, it is intuitive and easy to understand that income growth in a country is a key factor in limiting emigration (Faini, 2002). For example, the countries of southern Europe would have undergone a complete transition from emigration to host country. But in the short term, it is also possible that the increase in income is a factor energizing emigration. This is possible because the increase in incomes makes it possible to postpone the budgetary constraints which limit the financing of travel inherent to emigration. Finally, the literature shows that the effects of emigration can be similar to those of demographic transition in many ways.

## 2.2 Empirical review

Theoretically, the effects of migrants' transfers on economic growth are ambiguous. The merit, therefore, comes back to empirical analyzes, and some authors recommend case-by-case studies. However, the results of the empirical analyzes are also far from unanimous.

Overall, one can distinguish empirical microeconomic studies that highlight the impacts of these transfers on household welfare, inequality and poverty, and macroeconomic ones that analyze rather the effects of transfers on aggregates macroeconomic factors such as growth rate, investment, or financial development.

Hence, Brown (1994) uses survey data to study the uses of workers' transfers in the South Pacific. The results show that these transfers are not only used to finance immediate spending but are also used for savings and investment. Similarly, Brown et al. (1995) show that migrants' transfers in their countries of origin are sensitive to the real interest rate of the banking system. Diagne and Diane (2008) studied the impact of migrants' transfers on poverty in Senegal. The results show that these transfers have a positive impact on per capita expenditure at the national level. This advantage of migrants' transfers is more than proportionally concentrated in urban areas, especially in Dakar, to the detriment of rural areas. Moreover, the study shows that these transfers benefit more the better-off. Overall, the effect is a reduction in the incidence and depth of poverty, accompanied by worsening extreme poverty.

Also, in the case of Algeria, Benallaoua (2009) studied the impact of migrants' transfers on the monetary welfare of households in Lower Kabylia. The author pointed out that monetary poverty is significantly lower among households receiving migrants' transfers than those who do not. While the incidence of total poverty at the first level is 5.4%, it is up to 17.5% among the latter. The authors' probit modeling shows that benefiting from a transfer increases per capita expenditure in households by 29% and reduces the probability that the household will be poor by 7.2%. The main limit of this study in our opinion is related to the method of analysis itself. Indeed, analyzing migrants' transfers as a binary phenomenon causes loss of information and undeniably affects the results found. Thus, for example, in this study, a household that receives 300,000 dinars is treated the same way as another who receives only 100,000 dinars.

At the macroeconomic level, Glytsos (2002) focuses on the dynamic effects of migrants' transfers on economic growth in the countries of the Mediterranean. By a dynamic macroeconomic model of Keynesian inspiration, it finds an asymmetric impact of changes in these funds in that the positive effect on the growth of the increase in transfers is not as great as the negative effect of the removal of these transfers.

Faini (2002) examines the role of internal and international migration. Its results show that there is a positive correlation between internal reallocation of labor and economic growth on the one hand. On the other hand, the results indicate that emigrants' transfers favor growth but in a decreasing relationship on the part of skilled individuals within the emigrant workforce. This result suggests that the negative impact of the brain drain may be offset only by larger transfers. Similarly, Faini (2007) studied the impacts of migrants' transfers in countries of origin. The results show first that migration is generally associated with a loss of welfare in the countries of origin unless the transfers are high enough. Second, transfers are a decreasing function of the degree of qualification of the emigrant workforce. Third, the results largely corroborate the hypothesis that transfers contribute positively to growth.

In addition, Ben Mim and Mabrouk (2011) studied the impacts of migrants' transfers on economic growth, highlighting the channels of transmission. Based on data from 27 countries, they have implemented an SGMM type estimate. The results indicate that the migrants' transfers have a positive effect on economic growth. The main channel is the accumulation of human capital. The investment channel proved to be inconclusive. Nevertheless, the human capital channel has an indirect effect on investment. To pay particular attention to the methodological rigor and to remedy the endogeneity problem of the explanatory variables, the authors estimate their model using three alternative approaches: OLS, random effects panel and the CMMS method of panel data. After diagnosis, the last method seems to be the most suitable. It should be noted, however, that this way of controlling the problem of endogeneity is only statistically specific, whereas, as set out in the study, this problem is above all of an economic nature.

Ndiaye (2008) also focused on the financial development channel. His empirical analysis on Senegal between 1974 and 2005 consisted of a regression of linear models by the double least squares method to remedy the endogeneity of explanatory variables such as transfers and financial development. The results reveal a positive and significant interaction between transfers and financial instruments. These results also suggest that transfers stimulate economic growth in Senegal by maintaining a link of complementarities with financial instruments. For the WAEMU zone, Gbenou (2015) studied the impacts of transfers of migrants. It analyzes the impacts of these funds on real per capita production, domestic private demand, as well as monetary and financial variables using an error correction vector panel. The estimates support the hypothesis of the stabilizing role of migrants' transfers in the way that they are contra-cyclical in relation to the volatility of the output gap. On the other hand, these funds have a positive impact on real per capita production, private consumption, private investment and credit to the economy. However, they are a source of upward pressure on price increases and tend to cause, *ceteris paribus*, an appreciation of the real effective exchange rate. In the same vein, Tankari (2015) proposes a panel autoregressive vector model (PVAR) for the study of the impacts of transfers of migrants in the WAEMU. It concludes that transfers of migrants overall have positive and significant impacts on the economic growth of the countries of the Union, which is transmitted to the growth of the Union by three channels: the exchange rate (competitiveness), consumption and investment. However, the positive impact of transfers on the Union's economic growth is limited by the real exchange rate channel.

A study by Duval and Wolff (2009) examined the effect of migrants' transfers on deforestation in developing countries. It looked at a sample of 102 countries between 1990 and 2005. The results indicate that the share of the migratory transfers received in the GDP reduces the rate of deforestation for all the countries considered.

In sum, the question of the effects of migrants' transfers on the recipient economies of these funds has been widely studied in the literature. Overall, the results show a positive effect. But the question of simultaneity in the determination of the aggregates correlated with these transfers, and the endogeneity in the models are not completely removed. Our study presents two particular points which, to our best knowledge, have not been emphasized in the literature on the topic. The first point concerns the specification of this simultaneity of determination of the endogenous variables. Second, we construct a synthetic multidimensional social welfare indicator in which we assess the impacts of transfers.

### 3. Methodology

The literature review highlights a potentially bi-directional relationship between migrants' transfers and economic growth, or between migrants' transfers and welfare. Hence, we can suspect not only a simultaneous determination of these effects but also direct and indirect effects through different channels of transmission that are distinguished in the literature. To better represent these theoretical relationships, we propose a model of simultaneous panel equations. Next, a composite indicator of social welfare is constructed from several variables each accounting for a particular aspect of the social welfare. The weighting method used for this purpose is purely statistical and is based on multidimensional factor analyzes, in this case, the Principal Component Analysis (PCA). The field of study here covers WAEMU countries with the exception of Guinea Bissau for which data are not sufficiently available. The period under review extends from 1985 to 2015. But for the welfare analysis, this period was reduced to 1990-2015 due to lack of data for some variables. The data are extracted from the electronic sources of the databases of the *World Development Indicators* (2016) of the World Bank and the Central Bank of the WAEMU countries (BCEAO).

#### 3.1 The specification of the model

##### 3.1.1 Simultaneous panel equations

First, we consider final aggregate consumption as the indicator of the social welfare at the macroeconomic level.

##### 3.1.1.1 System Overview

The first model is as follows.

$$\text{LogGDP}_{i,t} = \alpha_{1,i} + \beta_1 \text{RTM}_{i,t} + \beta_2 \text{LogGFCF}_{i,t} + \beta_3 \text{LogFC}_{i,t} + \beta_4 \text{RTO}_{i,t} + \varepsilon_{1,it} \quad (1)$$

$$\text{RTRSF}_{i,t} = \alpha_{2,i} + \gamma_1 \text{LogGDP}_{i,t} + \gamma_2 \text{FD}_{i,t} + \gamma_3 \text{NER}_{i,t} + \varepsilon_{2,it} \quad (2)$$

$$\text{LogFC}_{i,t} = \alpha_{3,i} + \delta_1 \text{LogGDP}_{i,t} + \delta_2 \text{RTM}_{i,t} + \delta_3 \text{INF}_{i,t} + \varepsilon_{3,it} \quad (3)$$

$$\text{GFCF}_{i,t} = \alpha_{4,i} + \sigma_1 \text{GDP}_{i,t-1} + \sigma_2 \text{RTM}_{i,t} + \sigma_3 \text{INT}_{i,t} + \sigma_4 \text{FD}_{i,t} + \sigma_5 \text{QDI}_{i,t} + \varepsilon_{4,it} \quad (4)$$

$$\text{FD}_{i,t} = \alpha_{5,i} + \tau_1 \text{GDP}_{i,t} + \tau_2 \text{RTRSF}_{i,t} + \tau_3 \text{INT}_{i,t} + \tau_4 \text{NER} + \tau_5 \text{IPR}_{i,t} + \varepsilon_{5,it} \quad (5)$$

Thus, we have a system of five equations that represent in a relatively simplified way the theoretical interrelations between our variables. These include:

**LogGDP:** this is the logarithm of real GDP. The variable is explained in equation (1). It is also an explanatory variable in the equations of the migrants' transfers (equation 2), the final consumption (equation 3), investment (equation (4)) and financial development (equation (5)); **RTM:** this is the ratio of the transfer of migrants to GDP. The overall trend that emerges from the literature is that this variable positively

influences economic growth. It is explanatory in equation (1), but it is explained in equation (2) where we seek to see to what extent it is simultaneously determined by economic growth. It is, therefore, an endogenous variable; GFCF and LogGFCF: this is the ratio of investment (measured by the Gross Fixed Capital Formation) to the GDP and the logarithm of the GFCF. The expected effect of LogGFCF on growth (LogGDP) is positive (equation 1). In equation (4), GFCF variable is itself explained, and we try to capture to what extent it is possibly influenced by migrants' transfers and to deduce indirect effects on growth; NER is the nominal exchange rate between the US dollar and the CFA Franc; FD: this is the level of financial development. We think that the ratio of money supply to GDP, which is often used in the literature, is not a good indicator of the level of financial development. In fact, the money supply is directly controlled by the Central Bank. And even in some countries such as Zimbabwe, which have experienced unprecedented inflation rates, this ratio can explode without the country experiencing an improvement in its financial system. Rather, we measure financial development by the ratio of bank deposits to money supply (M2), which reflects the degree of use of financial institutions by individuals. This variable is explanatory in equation (1) where its expected impact on growth is positive. Also, it is explained in equation (5); INF: inflation, measured by the change in the GDP deflator index. It is expected to have a negative effect on economic growth (equation 1), final consumption (equation 3), investment (equation 4) and financial development (equation 5), a positive effect on migrants' transfers (equation 2). Inflation is assumed to be exogenous here because it is an objective of monetary policy in the WAEMU zone; LogFC is the actual final consumption (in logarithm). It is a variable explained in equation (3) where we try to evaluate its relationship to the transfers of the migrants; INT: this is the interest rate of the bank loan. The indices  $i$  and  $t$  represent respectively the countries and dates;  $\alpha_{g,i}$  is the unobservable individual effect of country  $i$  in equation  $g$ . It makes it possible to take account of the individual heterogeneities which exist between the countries from the economic point of view. These effects are *a priori* assumed to be fixed from the moment when our sample of countries can make no inference and the different countries have their own specificities; QDI is a measure of the quality of democratic institutions. The value of the index is between (-10) and (+10). The higher the index, the better the quality of democratic institutions. It is extracted from Freedom House's Policy 4 database; The IPR variable refers to the index of political rights obtained from the same source. It makes it possible to take into account the crucial importance of political factors in democracy. According to the Freedom House, a high index reflects a high political risk, which is not conducive to democracy. Finally, the rate of trade openness is measured by the ratio of the sum of exports and imports to GDP (nominal). Its expected sign on economic growth is positive.

We also used some instrumental variables such as the real exchange rate. It is measured for a given country by the product of the official nominal rate (NER) of US Dollar against the CFA Franc and the US Consumer Price Index and Consumer Price Indices in that country; the public capital expenditure; the money supply, measured by M2; the human capital, measured by the enrollment rate in education; the dummy 1994 indicator, for the devaluation of the CFA Franc in January 1994; the bank loans granted by banks; the ratio of FDI to GDP; and the ratio of domestic saving to GDP.

### 3.1.1.2 System identification

Identification consists of studying the determination of the system of equations. It is a question of verifying that the system is solvable, or if necessary, identifies the equations that are solvable. Consider a linear system, like ours, with  $g$  equations or endogenous variables and  $k$  exogenous variables. In each elementary equation, there may be one or more endogenous variables as explanatory. For a given equation  $j$ ,  $g_j$  is the number of endogenous variables that appear as explanatory,  $k_j$  the number of exogenous variables that are included in it, and  $r_j$  the number of linear restrictions, if any, on its coefficients. Then the order condition for identification, (see Bourbonnais, 2000; Wooldridge, 2008), of this equation is such that:

If  $g - 1 > (g - g_j) + (k - k_j) + r_j$ , then the equation  $j$  is said to be under-identified; If  $g - 1 = (g - g_j) + (k - k_j) + r_j$ , then the equation  $j$  is said to be just-identified;

If  $g - 1 < (g - g_j) + (k - k_j) + r_j$ , then the equation  $j$  is said to be over-identified.

There are conditions for the overall identification of the so-called rank conditions system. We prefer the identification equation by equation because this approach offers the advantage of being able to estimate the model partly in the case where some equations would be under-identified. Only just-identified or over-identified equations are estimable.

Thus, Table 1 shows that all the equations of our model are just or over-identified. There is no linear restriction on the coefficients.

Table 1: Identification of the system of equations

$g = 5; \quad k = 5; \quad z_j = (g - g_j) + (k - k_j) + r_j$			
Equation	Explained Variable	Explanatory Variables	Identification
1	<i>LogGDP</i>	<i>RTM, LogGFCF, INF</i>	$g_1 = 2, k_1 = 1, r_1 = 0$ $z_1 = 7$ <b>Just – identified Equation</b>
2	<i>RTM</i>	<i>LogGDP, NER, FD</i>	$g_2 = 2, k_2 = 1, r_2 = 0$ $z_2 = 7$ <b>Over – identified Equation</b>
3	<i>LogFC</i>	<i>LogGDP, RTM, INF</i>	$g_3 = 2, k_3 = 1, r_3 = 0$ $z_3 = 7$ <b>Over – identified Equation</b>
4	<i>GFCF</i>	<i>LogGDP(-1), RTM, INT, FD</i>	$g_6 = 3, k_6 = 1, r_6 = 0$ $z_6 = 5$ <b>Over – identified Equation</b>
5	<i>FD</i>	<i>LogGDP, RTM, INT</i>	$g_7 = 2, k_7 = 1, r_7 = 0$ $z_7 = 6$ <b>Over – identified Equation</b>

### 3.1.2 Effects on the social welfare

In a second step, we construct a social welfare indicator (called SWI) and take up equation (3) by replacing consumption by this indicator and by adding to the equation the index of democracy (called DEM). The SWI measures better the social welfare than the FC. Hence, the social welfare equation can be written as:

$$SWI_{i,t} = \alpha_{3,i} + \delta_1 LogGDP_{i,t} + \delta_2.RTM_{i,t} + \delta_3.INF_{i,t} + \delta_4.DEM_{i,t} + \varepsilon_{3,it} \quad (3\_2)$$

In fact, the social welfare is multidimensional. Considering consumption as its measure is quite limiting. Our indicator thus combines several simple indicators: per capita consumption, access to drinking water, electricity and sanitation, infant mortality, life expectancy at birth, use of mobile phone, internet, (as measured by the primary school enrollment ratio) and access to socio-community infrastructure (approached by public capital expenditure). The weights are determined using a principal component analysis. In equation (3\_2), DEM is the index of democracy in Freedom House's Policy 4 database. It varies from (-10) for the less democratic regimes to (+10) for the most democratic regimes. It can also influence the behavior and the well-being of the population.

### 3.2 Estimation method

To estimate our system of simultaneous equations, we have adopted the two-stage least squares method with individual panel fixed effects. Endogeneity and simultaneity were taken into account by the use of instrumental variables to counter the inefficiency of the estimators. By specification, a lagged explained variable that appears as explanatory in an equation becomes endogenous, because of its obvious correlation with the unobserved individual effect. It cannot, therefore, be regarded as predetermined. The endogeneity bias, in this case, is corrected as in the case of other endogenous variables by means of instrumental variables. The method of instrumental variables in panel data was discussed by Wooldridge (2012). But before moving on to the model estimation, we studied the stationery of our variables to avoid the risk of fallacious regression.



Hence, the structure of our data revealed a very strong correlation between certain variables for different countries. In order to anticipate similar correlations between unit root test errors in the individual dimension, we carried out the second-generation Cross-sectional of I'm, Pesaran and Shin test proposed by Pesaran (2003). Some variables are stationary in level (INF, FD, INT, GFCF), and the others are integrated into order one (I (1)). These last variables were therefore differentiated in order to be stationary.

### 3.3 Stylized facts on funds transfers, living standards and economic growth in WAEMU

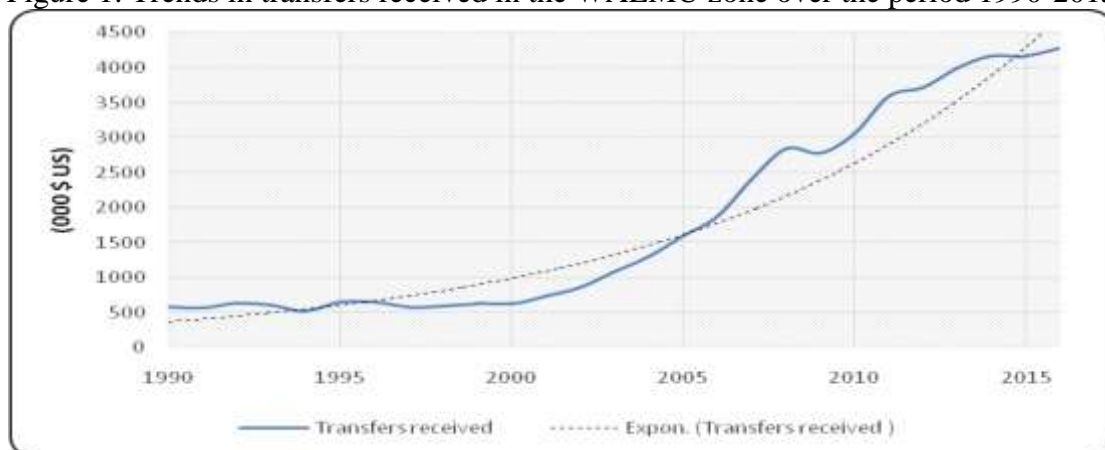
#### 3.3.1 Evolution of transfers in WAEMU

According to the literature, several factors may explain migration flows in WAEMU countries. These factors include, for example, access to employment in a host country, potential salary and the existence of networks. But these migratory flows, which constitute a brain drain, have an impact on countries of origin, such as transfers from migrants.

Figure 1 shows the evolution of transfers of migrants in the WAEMU, excluding Guinea-Bissau, over the period 1990-2015.

Over the period 1990-2015, transfers from migrants' funds have grown exponentially and reached the US \$ 4166 million, more than 7 times their value in 1990. Over this period, Senegal, which received an average of 37.5% of transfers in this zone, proves to be the country receiving the most migrant transfers.

Figure 1: Trends in transfers received in the WAEMU zone over the period 1990-2015



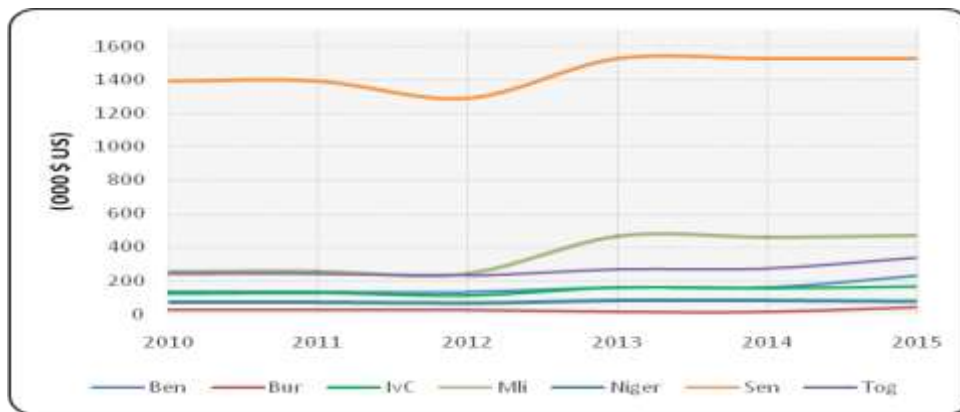
Source: WDI, Authors' calculations

In sub-Saharan Africa, and particularly in the WAEMU zone, there is a close correlation between colonial powers and colonies, especially in terms of colonial and cultural ties in the framework of international trade relations. Indeed, all WAEMU countries, except Guinea-Bissau, are French colonies. Thus, over the period 2010-2015, the transfers of migrants to the WAEMU mainly come from the countries of the European Union, notably France, Italy and Spain.

In Africa, over the period 2010-2015, the main emitting countries are Nigeria and Gabon. The Gambia and Mauritania are also countries transmitting transfers to the WAEMU countries, but send more than 90% of these funds to Senegal. This could be explained by the fact that these countries share the same borders with Senegal.

Over the period 2010-2015, transfers received in the zone mainly go to Senegal. This can be explained by a large number of migrants available to Senegal outside Africa or the zone. Senegal is followed by Mali, Togo, Benin, Ivory Coast, Niger and Burkina Faso. Over this period, transfers to Senegal represent on average 73 times those to Burkina Faso. Transfers to Niger and Burkina Faso remained more or less constant over this period as shown in Figure 2.

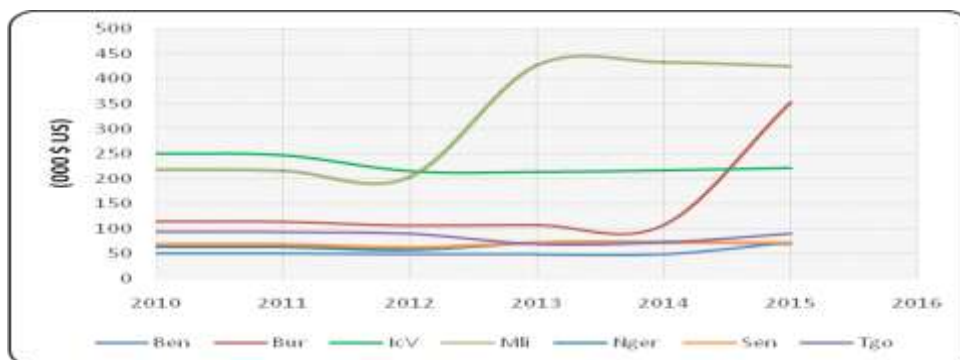
Figure 2: Changes in transfers received over the period 2010-2015 in each WAEMU country from the rest of the world



Source: WDI, authors' calculations

With regard to intra-area transfers, there is a large difference between transfers issued and those received over the period 2010-2015. Until 2012, Côte d'Ivoire was the country receiving the most transfers from within the zone. But from 2012 this place is occupied by Mali. By 2015, transfers from the zone to Burkina Faso are more than 3 times higher than in 2014. Yet, Burkina Faso saw a fairly constant transfer value over the period 2010-2014. Benin is the least recipient of transfers from other WAEMU countries (see Figure 3).

Figure 3: Trends in transfers received intra-zone over the period 2010-2015



Source: WDI, authors' calculations

As shown in Figure 4, within the zone, and over the period 2010-2015, Ivory Coast is the country sending more transfers to the other countries of the zone. It is followed by Burkina Faso. Transfers issued by Ivory Coast to the other countries of the zone over the period 2010-2015 have been increasing over the years. But those of the other countries to the zone have remained more or less constant.

Figure 4: Trends in intra-area transfers over the period 2010-2015



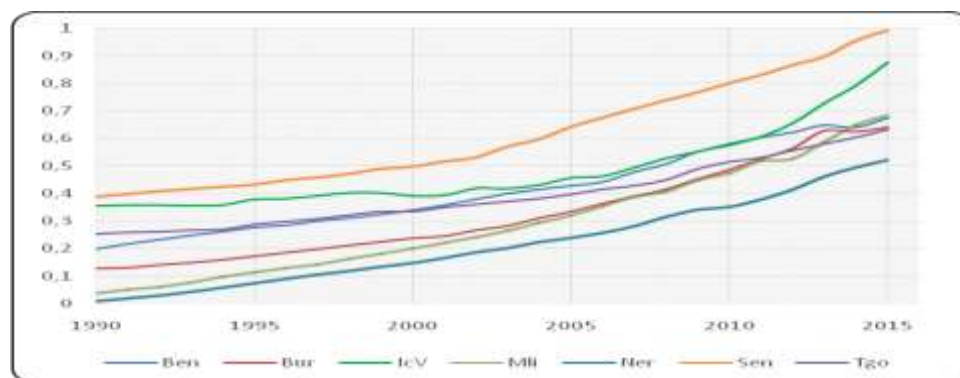
Source: WDI, authors' calculations

### 3.3.2 Evolution of the standard of living in the WAEMU

A social welfare indicator was constructed for WAEMU countries over the period 1990-2015. The variables used to construct this indicator are those that account for the welfare of the population. These variables are: the number of people with access to drinking water, the number of people with access to electricity, access to sanitation, the number of people with access to the Internet, the expected life at birth, infant mortality, per capita consumption, public capital expenditure, the gross primary school enrollment rate and the telephone subscriber rate. Details on the construction of the indicator are presented in Appendix 7.1.

According to Figure 5, welfare in the zone has improved over the years 1990-2015. Indeed, it is experiencing a growing trend over this period. Senegal is the country in the WAEMU zone where welfare is highest over the period 1990-2015. Niger is the country where it is the lowest in the area over this period.

Figure 5: Evolution of the welfare indicator

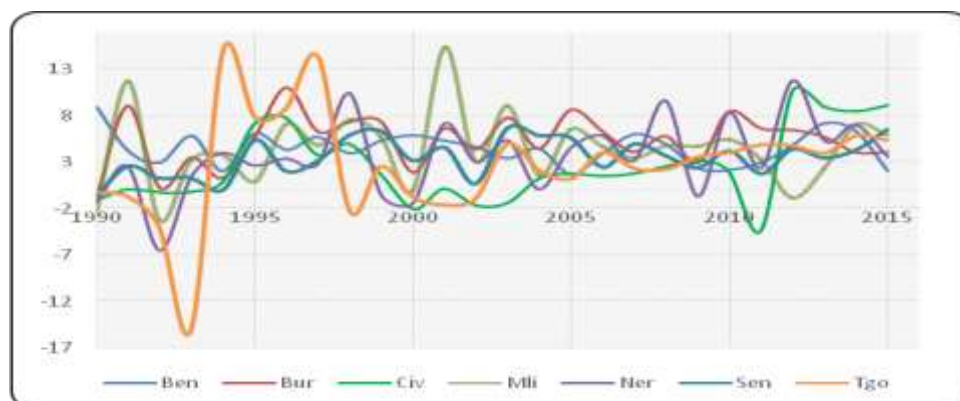


Source: WDI, authors' calculations

### 3.3.3 Trends in economic growth in WAEMU countries

Growth in the WAEMU zone does not show a stable trend over the period 1990-2015. It shows peaks and troughs of different amplitudes over this period, as illustrated in Figure 6. The main trend of growth in WAEMU is an erratic evolution. Moreover, the cyclical variations are almost identical for all the countries of the Union. One can, therefore, suspect a synchronization of the cycles of the member countries which are supposed to follow the same monetary policy and the convergence of their fiscal policies.

Figure 6: Evolution of growth in the WAEMU zone



Source: WDI, authors' calculations

## 4 Results of the estimate

### 4.1 The system of simultaneous equations

Table 2: Results of estimation of the system of simultaneous equations

Explanatory Variables	Explained Variables				
	LogGDP	RTM	LogFC	GFCF	FD
RTM	1.4497 (0.5724)		-2.6791 (0.2239)	-20.5857 (0.0924)	7.5307 (0.0036)
LogGFCF	0.4182 (0.0003)				
LogFC	0.5356 (0.0000)				
RTO	-0.1028 (0.0632)				0.1937 (0.0010)
LogGDP		0.0039 (0.6810)	1.0967 (0.0000)		-0.1471 (0.2161)
FD		0.0269 (0.0349)		1.0303 (0.0466)	
NER		1.1018E-5 (0.0153)			-0.0002 (0.0016)
INF			-0.0043 (0.0002)		
LogGDP(-1)				0.0086 (0.9692)	
INT				-0.0076 (0.0292)	-0.0039 (0.0062)
QDI				-0.0183 (0.0625)	
IPR					0.0218 (0.0011)
Global Significativity (P>)	0.0000	0.0094	0.0000	0.0240	0.0000
Sargan (P>) Over Identification Test	0.9680	0.3093	0.2740	0.2329	0.1937

Source: authors' calculations

Parentheses are the critical probabilities

All equations of the system of simultaneous equations are globally significant at the 5% threshold. Similarly, Sargan's over-identification test validates instruments in all equations.

In the first column, investment and consumption positively impact real GDP at the 1% threshold, but the positive direct effect of migrants' transfers growth is not statistically significant. The negative impact of trade openness on economic growth is also noted. This result is logical of the significance, and the positive sign of the GFCF and final consumption coefficients show that the global demand channel is driving economic growth in the Union. Thus, trade openness constitutes a leak in demand, since these countries import more structurally than they export.

In the second column, the positive direct effect of real GDP growth in migrants' transfers is not statistically significant. On the other hand, the latter is positively impacted by financial development and the nominal exchange rate at the 5% threshold. The increase in bank deposits relative to the money supply by one point leads to an increase in transfers of migrants compared to nominal GDP of 0.04 percentage points. The final consumption is impacted at the threshold of 1% positively by income and negatively by inflation. However, migrants' transfers do not have a significant direct impact on final consumption (column 3).

In the fourth column, the negative direct impact of migrants' transfers on investment is not significant. On the other hand, the impact of financial development on investment is positive and significant at the 5% threshold, while the interest rate has a negative effect on investment as expected. The negative sign of the coefficient of the variable QDI shows that the democratic institutions in the WAEMU countries are not of good quality. Finally, in the last column, we note a very marked positive impact of migrants' transfers on financial development. An increase by 1 point leads to an increase in bank deposits relative to the money supply by 7.5 points. This result corroborates those of Ndiaye (2008) who pointed out that financial development is a channel for transmitting the effects of transfers from migrants' funds on economic growth. Indeed, this is an indirect effect since transfers positively impact financial development, which positively impacts investment, which in turn positively impacts economic growth (transmission effect). The interest rate and the nominal exchange rate (the depreciation of the FCFA against the USD) negatively impact the financial development. The coefficient of the variable IPR is not only negative, but it is low, which translates into a lower political risk for WAEMU countries.

#### 4.2 Equation of the social welfare indicator

Table 3: Results of the estimation of the social welfare equation

SWI	Coef.	Std.Err.	z	P>z
LogGDP	0.0019	0.0531	0.0400	0.9720
RTM	2.8958	1.2162	2.3800	0.0170
INF	-0.0004	0.0005	-0.8300	0.4060
DEM	0.0015	0.0007	2.0300	0.0420

Source: authors' calculations

The model is globally significant at the 1% threshold, and Sargan's over-identification test confirms the validity of the instruments.

In this equation, GDP is not significant in determining the standard of living. On the other hand, transfers of migrants are at the threshold of 5%. Inflation is not significant, and the democracy index has a positive impact as expected. This impact is significant at the 5% level.

Transfers have a significant positive impact on the standard of living of individuals, certainly through other channels such as education and health, and we have seen that they do not have an impact on final consumption. Here the absolute value of the coefficient cannot be interpreted because the constructed

standard of living indicator is effective only for a comparison in time or space. This means that an isolated value of this indicator does not mean much. The positive sign of the coefficient of the democracy index shows that this variable is a determinant of social welfare. However, this index is low indicating that the regimes of WAEMU countries remain less democratic. Indeed, according to Rivera- Baltiz (2002), “democracies allow populations to peacefully and regularly oust inept, inefficient, and corrupt government administrations while allowing people to keep more efficient, successful regimes, thus tending to make the quality of governance on average higher in the long run ”.

In sum, our results show that there are no direct relations between the transfers of migrants and economic growth in the WAEMU countries. But there are intermediate channels. Transfers of migrants have a positive impact on the level of financial development, which in turn promotes investment, and finally, investment positively impacts economic growth. But there is a direct impact of transfers on social welfare.

## 5. Conclusion

In this study, we examined the impacts of migrants’ transfers on social welfare and economic growth. To compensate for the endogeneity and simultaneity of the variables, a system of simultaneous equations is used, the estimation of which is done by double-squares using instrumental variables. Our results confirmed that financial development is the main channel for transmitting the effects of migrants’ transfers. However, we did not detect any direct effect in one direction or the other between growth and transfers. But these have a significant direct positive impact on the well-being of the populations. These analyses show that in order to achieve their long-term sustained growth objectives, WAEMU governments should not favor a mass migration policy, but rather they should develop financial services and encourage investment.

Another aspect of our work is the introduction of democratic variables. The positive impacts of these explanatory variables on economic growth and living standards show that WAEMU migrants in their transfers also take into account the quality of democratic institutions, as do international institutions.

The specificity of our study lies in the use of a model of simultaneous panel data equations to answer somewhat to the question of simultaneity and endogeneity in the determination of the aggregates correlated with the transfers of the migrants of the WAEMU zone. Thus, a synthetic multidimensional social welfare indicator is constructed to assess the impact of migrants’ transfers.

Finally, we believe that further works can contribute to the improvement of the debate on the broad literature on the issue of transfers by migrants through other models.

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## 7. Appendices

### 7.1: Construction of the Synthetic Welfare Indicator

Construction follows a series of steps that require significant methodological choices. Given the quantitative nature of the variables selected, a Principal Component Analysis (PCA) appears to be the most appropriate method for constructing the indicator. The aim of this method is to construct an indicator that describes the common component of the variables whose movements are highly correlated and which contribute to the realization or not of a single phenomenon that is social welfare. The advantage of this method is that it provides weights, which reflect the variability of the data. Thus, it is preferable to do a standardized PCA insofar as the variables come from different domains and therefore present a heterogeneity of the units of

measurement. The welfare indicator here corresponds to the first main component which is the one that by construction summarizes most of the information contained in the data.

**Functional form of the indicator**

The welfare indicator is in the following form:

$$I_{be} = \sum_{i=1}^K C_i * V_i$$

where *K* is the number of selected variables, *C<sub>i</sub>* is the coordinate of the variable *i* on the first main component; *V<sub>i</sub>* is the value of the variable *i*.

**Standardization of the indicator**

The indicator was then standardized by the following Max-min method:

$$I'_{be} = \frac{I_{be} - \min I_{be}}{\max I_{be} - \min I_{be}}$$

Normalization allows the indicator to vary only between values 0 and 1, which facilitates interpretation.

**7.2 Consistency of the constructed indicator with the measure of well-being**

To verify the consistency of our social welfare indicator with the reality we have constructed the matrix of the correlation of the latter with the variables of its construction. It is presented in Table 4. There is a strong correlation with all the variables, with the expected signs. In particular, the indicator is negatively correlated with the infant mortality rate.

Table 4: Correlation of the social standard of living with the variables

Country	Access to electricity (% of population)	Improved sanitation facilities (% of population with access)	Improved water source (% of population with access)	Mortality rate, infant (per 1,000 live births)	Life expectancy at birth, total (years)	Mobile cellular subscriptions (per 100 people)
Ben	0.981	0.991	0.986	-0.981	0.991	0.926
Bur	0.968	0.983	0.960	-0.993	0.985	0.934
IC	0.831	0.907	0.912	-0.943	0.386	0.965
Mali	0.985	0.989	0.986	-0.982	0.988	0.883
Niger	0.968	0.991	0.986	-0.968	0.992	0.906
Sen	0.970	0.976	0.973	-0.982	0.990	0.966
Togo	0.978	0.310	0.977	-0.974	0.795	0.961

Country	Individuals using the Internet (% of population)	Capital Expenditure	Per Head Consumption	Gross enrollment ratio, primary, both sexes (%)WDI
Ben	0.933	0.938	0.949	0.985
Bur	0.835	0.954	0.873	0.989
IvC	0.914	0.913	0.553	0.893
Mali	0.816	0.899	0.791	0.885
Niger	0.926	0.869	-0.285	0.980
Sen	0.958	0.995	0.524	0.883
Togo	0.972	0.900	0.571	0.857

Source : authors' calculations



**7.3 Stationarity tests on variables in the WAEMU zone**

Table 5: Stationarity tests

Tests in level				First difference tests		
Variable	CIPS Calculated	5% threshold	Decision	CIPS Calculated	5% threshold	Decision
RTM	-1.17	-2.19	No Stationary	-5.228	-2.22	I(1)
INF	-5.943	-2.22	I(0)			
LogGDP	-1.929	-2.25	No Stationary	-5.694	-2.22	I(1)
FD	-2.388	-2.19	I(0)			
INT	-2.308	-2.19	I(0)			
LogGFCF	-2.06	-2.19	No Stationary	-5.321	-2.22	I(1)
GFCF	-2.412	-2.19	I(0)			
SWI	-1.383	-2.22	No Stationary	-3.696	-2.25	I(1)