Diaspora as Driver of Agricultural Structural Transformation in West Africa

Moukpè Gniniguè[†]&Nadege Essossolim Awade[*]

Abstract
The structural transformation is recognized as a key driver of sustainable economic development by researchers and international development agencies. However, it is lagging in West Africa, whereas the diaspora is recognized as a vector for the structural transformation of African economies. Thus, this paper analyzes the contribution of the diaspora to the structural transformation of the economies of the Economic Community of West African States (ECOWAS). The structural transformation is measured by the reallocation of labor from the agricultural sector. Diaspora is measured by the total emigration rate and the high education emigration rate. The Least Squares Dummy Variable Corrected (LSDVC) method applied to a dynamic specification was used on 15 ECOWAS countries from 1990 to 2010. The results revealed that the diaspora attracts labor to the agricultural sector in ECOWAS. While supporting the industrial sector, the diaspora should invest in modern techniques in the agricultural sector, leading to improved productivity gains in this sector and fostering the structural transformation desired by the African Union.

Keywords: Diaspora; structural transformation; ECOWAS; LSDVC

JEL Classification Codes: F15, F22, O15, O41.

[†] University of Kara, Faculty of Economics and Management, Department of Economics, Email: moukpe.gninigue0@gmail.com, https://orcid.org/0000-0002-2667-3137
[*] University of Lomé, Faculty of Economics and Management, Department of Economics, Email: nadegeaw@gmail.com

1. Introduction

Many recent studies reveal that structural transformation is one of the key factors of economic development (Ali and Gniniguè, 2022; Mühlen and Escobar, 2020; Mamba et *al.,* 2020; Cadot et *al.,* 2016; Cadot and Melo, 2016; De Vries et *al.,*2015; McMillan et *al.,*2014). Better yet, it is central to the 10-year strategy of the African Development Bank (AfDB) and a priority of the United Nations Economic Commission for Africa (UNECA). As such, profound changes in the production structures of economies are necessary for African countries to achieve middle-income status (De Vrie et *al.,* 2015). Indeed, flows of labor and other resources from low productivity activities to high productivity activities increase the economy even if there is no productivity growth in the sectors (McMillan et *al.,* 2014). This transfer of resources to high productivity activities referred to as structural transformation, can leverage the beneficial effects of the diaspora to effectively contribute to the increase in the overall productivity and income and then enable countries to become wealthier.

The various theories of the effect of diaspora on structural transformation, and thus economic development, have their basis in neoclassical migration theory (Lewis, 1954; Todaro, 1969; Harris and Todaro, 1970) and the new migration theory (Stark, 1991). According to Todaro (1969), for example, the migration of labor from agricultural areas to cities and industrial areas within or outside a country is a factor of development. By moving from low-productivity activities to high-productivity activities, workers, through migration, increase overall productivity and help offset productivity and wage differences within an economy (Braun and Kvasnicka, 2014). Analysis of the influence of the diaspora on structural transformation distinguishes two main trends and focuses on according to Gnimassoun and Anyanwu (2019) on the brain drain, which corresponds to the emigration of highly educated individuals. The first trend suggests that emigration negatively affects the economy of sending countries (Bhagwati and Hamada, 1974; Miyagiwa, 1991) while the new trend emphasizes the beneficial effects of emigration on sending countries (Stark et *al.,* 1997; Giuliano and Ruiz-Arranz, 2009; Agrawal et *al.,* 2011).

Furthermore, today, migration flows have increased around the world. According to the United Nations Department of Economic and Social Affairs (2017a), the international migration rate was 3.4% of the world's population in 2017. The same statistics indicate for the same year that south-south migration accounted for 38% of migration flows while south-north migration accounted for 35%. According to the United Nations Conference on Trade and Development (UNCTAD, 2018), the intra-African emigration rate is estimated at 53% compared to 47%, the international emigration rate from Africa in 2017. After Central Africa, which records the intra-regional emigration rate of 79%, follows West Africa that ranks second in Africa with an emigration rate of 72% within the region. Based on statistics from Brücker, Capuano, and Marfouk (2013), the average total emigration rate from ECOWAS countries to Organization for Economic Cooperation and Development (OECD) countries was 1.93% in 1980 and 4.08% in 2010. Following the emigration rate by education level, the rate of highly skilled labor from ECOWAS countries to OECD countries was higher and estimated at 16.59% in 1980 and 21.52% in 2010.

However, this evolution of the emigration rate contrasts with that of the structural transformation of West African economies, despite the importance of the diaspora in structural transformation recognized by UNCTAD (2018). Indeed, based on WDI (2018), structural transformation indicators in ECOWAS countries show poor performance from 1980 to 2017. Over this period, the

service sector contributed on average to 47.76% of GDP, followed by the agricultural sector at 28.95% of GDP and finally the industrial sector at 19.99% of GDP. Over the same period, the agricultural sector is on average the largest provider of employment (57.44% of total jobs), followed by the service sector, which accounts for 31.89% of total jobs, and finally the industrial sector with 10.67% of total jobs. It can be seen that agriculture, which is a major provider of jobs, is not the sector that contributes most to GDP in ECOWAS countries. Moreover, the same data showed that over the period 1990 to 2017, the allocation of labor in the agricultural sector is estimated at -0.11%; that of labor in the industrial sector at 0.02%, and that of the service sector at 0.13%. These statistics show that the agricultural sector is the least productive sector and that labor has shifted from the agricultural sector to the service sector in ECOWAS. These statistics also suggest that the agricultural sector does not provide intermediate goods for industrial production and that the service sector fails to create an enabling environment for developing the manufacturing sector in West Africa (Mamba et *al.,* 2020).

Because of the above, the fundamental question is what is the contribution of the diaspora to the structural transformation of ECOWAS economies? The main objective of this research is to study the contribution of the diaspora to the structural transformation of the economies of ECOWAS countries. Specifically, it aims to i) analyze the overall effect of emigration on the reallocation of labor from the agricultural sector in ECOWAS countries and ii) study the effect of emigration of highly educated people on the reallocation of labor from the agricultural sector in ECOWAS countries.

The contribution of this research to the economic literature is that most empirical work examines the determinants of structural transformation with a focus on foreign direct investment (Mühlen and Escobar, 2020; Mamba et al., 2020; UN, 2013; Farole and Winkler, 2014), institutional quality (UN, 2013; Carraro and Karfakis, 2018; UNECA, 2016), infrastructure (UN, 2013), natural capital (UN, 2013; Auty, 1993), economic openness (UN, 2013). Importantly, Braun and Kvasnick (2014) studied the effect of emigration on the structural transformation in Germany. However, their findings do not a priori apply to the West African space. Thus, the potential role that the West African diaspora could play in the continent's march toward the structural transformation of its economy has long been ignored. It is therefore intending to fill this gap in the development economics literature that this article focuses on the effect of the diaspora on the structural transformation of ECOWAS economies.

The remainder of the article is organized as follows. Section 2 presents a brief review of the literature. Section 3 presents the methodology. The analyses of the econometric results are presented in Section 4. Finally, a conclusion summarizes the article.

2. Literature Review

2.1. Diaspora as an engine of structural transformation: an overview of theoretical work

The contribution of the diaspora to structural transformation, and thus economic development, in the literature, is still mixed and two main trends can be identified. The first trend suggests that emigration negatively affects the economy of sending countries (Bhagwati and Hamada, 1974; Miyagiwa, 1991). Based on the endogenous growth theory that knowledge accumulation is one of the main drivers of growth (Romer, 1986; Lucas, 1988), advocates of this view (Bhagwati and Hamada, 1974; Dos Santo, 2006; Johnson, 1967; Lucas, 2005; Dayton-Johnson and Xenogiani, 2007; Miyagiwa, 1991; Mountford, 1997) argue that the emigration of a skilled individual reduces

human capital accumulation. Nonparticipation in public finances and limited access to certain services such as health and education are all consequences of the departure of a skilled worker from the country of origin.

Thus, the brain drain is a loss for developing countries as increasing international mobility pushes high-skilled workers from poorer countries to negotiate higher wages, and low-skilled workers respond by adjusting their wage demands (Bhagwati and Hamada, 1974). According to Dos Santo (2006), the departure of skilled workers limits the accumulation of knowledge in the country of origin and is thus damaging to the economic development of that country. Indeed, Lewis (1954) shows the importance of technology in the industry. However, the industrial sector, which is critical in the process of structural transformation (Rodrik, 2009), requires quality human capital to facilitate the adaptation of new technologies. The loss of human capital then prevents industrial development and consequently handicaps the process of structural transformation.

In contrast to the previous literature, a new trend is emerging highlighting the beneficial effects of emigration on host countries (Stark et *al.*, 1997; Giuliano and Ruiz-Arranz, 2009; Spilimbergo, 2009; Agrawal et *al.*,2011; Docquier et *al.*, 2016). Indeed, knowing that human capital is better remunerated in countries that value education, the prospect of emigration provides an incentive for individuals to train to a level that is socially desirable for the countries of origin (Bhagwati and Hamada, 1974; Stark et *al.*, 1997; Beine et *al.*, 2001). Thus, in the perspective of future emigration and based on human capital theory, families are encouraged to invest more in their children's education and eventually increase the skills of the domestic workforce in case they do not migrate. Indeed, the neoclassical approach to the importance of human capital in the process of structural transformation argues that human capital accumulation and the development of new products and processes through innovation are factors of economic growth (Grossman and Helpman, 1991; Aghion and Howitt, 1992). In this context, encouraging the accumulation of human capital with a view to future emigration can promote industrial development and lead to the effective structural transformation of economies.

Similarly, according to De Haas (2010), migrant-sending countries today place their hopes in the diaspora, recognizing its investment and development potential. Indeed, the effective contribution of labor to economic development is rooted in the flexibility of the labor market. The choice of a job by a migrant in his or her host country is independent of the cost of transferring from one activity to another, unlike natives who are already employed, which favors the reallocation of labor between sectors of activity. Migration can then improve the efficiency of the labor market and stimulate the convergence of wages between different regions of the world. Piché (2013) argues to this effect that migration has positive effects. In the same vein, Solimano (2001) argues that migration reduces differences between different areas and promotes development. Indeed, the free movement of labor within a liberalized labor market leads to its reduction, which translates into higher marginal labor productivity and higher wages in the sending area (De Haas, 2010). It is in this spirit that for Massey (1988), migration destroys the pre-industrial society and frees up workers for new jobs in the cities. Migration is then the answer to the new urban needs of the workforce and therefore, promotes the process of structural transformation.

2.2 Empirical evidence of the diaspora's contribution to structural transformation

Hypothesis testing of the driving role of the diaspora in the process of structural transformation and thus economic development remains controversial in the economic literature. Empirically, Braun and Kvasnicka (2014) analyzed the effect of immigration on the intersectoral reallocation of labor in West Germany. They show through a bi-sectoral model that the immigration of East European Germans accelerates the structural transformation in West Germany after World War II. According to Borjas (2001), the convergence of wages between US states is faster in the period of high immigration from 1950 to 1990. The results of Gibson et *al.*'s (2013) analysis revealed that permanent migration from Samoa to New Zealand reduced poverty rates for family members who remained in the sending country. According to them, average consumption increased by about 17%, income by 23%, and the basic needs poverty rate decreased by 62%. Similar results were found by Murard (2017) and Sharma and Zaman (2009). According to Murard (2017), migration from Mexico to the United States increases household consumption by 25% in the sending countries.

Dzansi (2013) finds a statistically significant positive relationship between migrant remittances and relative growth in manufacturing sectors over a sample of 40 countries from 1991 and 2004. Coulibaly et al., (2018) build on Higgins and Williamson's (1997) model and analyze international migration and global imbalances over 157 developed and developing countries over a period from 1990 to 2014. To capture the heterogeneity of migration according to the level of development of economies, the authors decompose the panel between advanced and developing countries. The results suggest that an increase in migration improves national savings and the checking account balance in the destination country, while it has opposite impacts in the country of origin. These effects are particularly strong in developing economies and mitigated by migrant remittances. According to Clemens (2013), Indian employees of software companies who migrate to the United States earn $58,000 more per year than lottery losers doing the same job in India. Gibson et al., (2011) find that Tongans who migrated at the end of high school exams earned between $700 and $1,200 per week while similar individuals who did not migrate earned only $246 per week. According to Gibson and McKenzie (2014), the per capita income of Tongan and Nigerian households with seasonal migrants in New Zealand increases by more than 30%.

Focusing on the bidirectional relationship between emigration and development, Docquier (2017) argues based on stylized facts that by helping poor countries to develop, populations can be relieved of credit constraints leading to increased migration that can stimulate the brain drain and global inequality. Under these conditions, emigration seems to reduce the accumulation of human capital and, in turn, economic development in the countries of departure, thus accentuated global inequalities. Indeed, to migrate, individuals must have the financial means, so easy access to credit can facilitate the migration of individuals who aspire to migrate. As a result, development policies may reduce the effectiveness of restrictive immigration policies.

Using Frankel and Romer's (1999) model of international trade, Gnimassoun and Anyanwu (2019) show that the African diaspora contributes positively and significantly to the improvement of real per capita income in Africa. According to them, the higher the educational level of the emigrant, the greater the effect of emigration on economic development in Africa. In the same vein of ideas, Okey (2019) concludes from a dynamic specification that the total average rate of emigration positively and significantly affects industrial development in Africa and that emigration of the average education level has a larger effect on industrial development in Africa. When the emigrant has a high level of education, it is easy for him to adapt and acquire new knowledge and technology

in his host country. Then, through his return or monetary or knowledge transfers to his country of origin, the emigrant contributes to the accumulation of human capital or investment that stimulates productivity changes within individual sectors and the factor reallocation effect leading finally to a structural transformation of economies.

In summary, the various empirical studies presented do not specifically focus on West African countries and remain mixed. In this context, it is appropriate to study the contribution of the diaspora to the structural transformation of West African economies.

3. Economic Modeling and empirical estimation

3.1 The basic specifications and definition of variables

To measure the contribution of the diaspora to the structural transformation of ECOWAS economies, an annual time series of labor allocation to the agricultural sector is generated to serve as a dependent variable. In this framework, this indicator measures structural transformation and tests whether or not the diaspora favors labor allocation to the agricultural sector. It is derived from a productivity decomposition framework used in the recent literature on structural transformation, including work by McMillan *et al. (*2014), De Vries et *al. (*2015), Mühlen and Escobar (2020), and Ali and Gniniguè (2022). It is calculated as follows:

$$\mathrm{TS} = \sum_1^n (\mathrm{S_i^1} - \mathrm{S_i^0})\mathrm{P_i^0} \quad (1)$$

TS is the structural transformation, P_i^0 is the productivity of sector i (agricultural sector) at date 0, S_i^1 is the employment of sector i (agricultural sector) in the employed population at date 1, S_i^0 is the employment of sector i (agricultural sector) in the employed population at date 0, and n is the number of sectors. Following the work of Mühlen and Escobar (2020), who explored the effect of foreign direct investment on structural transformation in Mexico, our empirical model can be presented as follows:

$$TS_{it} = \alpha + \beta DIASP_{it} + \Theta' Z_{it} + \lambda_{it} \quad (2)$$

Where TS_{it} is the structural transformation in country i at a period t; $DIASP_{it}$ is the diaspora; $Z_{it}$is the vector of control variables and Z_{it} is the error term. Furthermore, the economic literature emphasizes the dynamic nature of the structural transformation process. Lectard and Rougier (2018) argue that the structural transformation is a slow process, its current state strongly depends on its past states. Under these conditions, it is, therefore, necessary to consider these hysteresis phenomena by using a dynamic model. This model is characterized by the presence of the lagged explained variable among the explanatory variables and is as follows:

$$TS_{it} = \phi_0 + \phi_1 TS_{it-1} + \beta DIASP_{it} + \Theta' Z_{it} + \lambda_{it} \quad (3)$$

In this specification, TS_{it} is the agricultural structural transformation, TS_{it-1} is the lagged variable of one period of agricultural structural transformation. Diaspora ($DIASP_{it}$) is measured by the total emigration rate and the emigration rate of highly educated individuals. The total emigration rate is the sum of emigrants from a West African country to OECD countries at a given point in time

divided by the native population of that country. The emigration rate of highly educated individuals is the sum of emigrants of high educational level from a West African country to OECD countries divided by the native population of that country. According to the theoretical literature, emigration can positively or negatively influence the economic development of sending countries, but its influence on the structural transformation remains ambiguous.

The basic model is completed by the following control variables (Z_{it}). Thus, Following Fetahi-Vehapi *et al*., (2015), human capital is measured by the total working population comprising people aged 15 years and above. Authors such as Lucas (1988); Mankiw *et al*, (1992) have shown the importance of human capital in economic development. According to Okey (2019), human capital positively and significantly affects industrial development in Africa, and for Gnimassoun and Anyanwu (2019), it contributes to economic development. In its form of skills, human capital facilitates technological adoption and innovation (Squicciarini and Voigtländer, 2015) and in turn stimulates structural transformation. This variable can positively influence the structural transformation of ECOWAS economies. Financial development, as measured by the ratio of credit to GDP to the private sector. The level of financial development may encourage the diaspora to support investments in development programs aimed at the structural transformation. Measuring structural transformation by manufacturing value-added, Lo and Ramde (2019) show that credit to the private sector contributes positively to structural transformation in franc zone countries in the long run. Investment is measured by gross fixed capital formation relative to GDP. Investment is necessary to finance high-value-added sectors of activity to promote and sustain structural transformation. Investment can positively affect structural transformation.

The sum of workers' remittances and wage earners' remuneration as a proportion of GDP measures migrant remittances. Private capital can be used as a lever to support the structural transformation of developing countries economies. However, the contribution of remittances to economic development is still controversial (Sobiech, 2019; Urama et *al.*, 2019). This variable can positively or negatively influence the structural transformation. Following Lectard and Rougier (2018), the number of cell phone subscribers as a percentage of people measures communication infrastructure. Communication can facilitate knowledge transfer between workers in different industries and strengthen human capital. This variable can positively affect the structural transformation. Natural capital is the rent from all-natural resources as a percentage of GDP. The specialization in the primary sector hinders the process of structural transformation, leading to the natural resource curse (Auty, 1993). Trade openness is the sum of exports and imports as a percentage of GDP. According to Grossman and Helpman (1991), the effect of new technologies on economic development is greater when they are accumulated through global trade rather than locally generated. However, with international competition, if technologically weak countries specialize in traditional activities, trade openness negatively affects economic development.

Foreign direct investment (FDI) is net inflows relative to GDP. Farole and Winkler (2014) show that FDI is a catalyst for output change. U.S. dollar official development assistance (ODA). To finance their development projects, developing countries need aid. Cadot and Melo (2016) argue that ODA is an effective tool for development if it is used to support the structural transformation. The real exchange rate can have adverse effects on African economies. Indeed, African countries are endowed with natural resources and primary products (Mcmillan et *al.*, 2014). For these countries that have a comparative advantage in natural resources, opening up to the global economy accentuates their specialization in traditional sectors. Macroeconomic instability is measured by

the inflation rate. This is the growth rate of the GDP deflator. If the general level of domestic prices is high relative to foreign prices, the national economy has low competitiveness and vice versa through the real exchange rate. Gross domestic product per capita (GDP). Economic development can stimulate structural transformation to the extent that in developed countries labor migration between sectors is easy.

3.2 Description of the data

The data cover emigration from 15 ECOWAS countries (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo) to 20 OECD countries (Australia, Austria, Canada, Chile, Denmark, Finland, France, Germany, Greece, Ireland, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States) over the period 1990 to 2010. Emigration rates are available every five years from 1980 to 2010. Following Gnimassoun and Anyanwu (2019), all other variables in the model are built on the five-year averages (1990–1994, 1995-1999, 2000-2004, 2005-2009, 2010-2014) to obtain a panel data structure with a time dimension of five and a country dimension of fifteen.

3.2.1 Sources

The dependent variable is the structural transformation. It is generated based on the shares of real value-added and employment of the agricultural sector. These data come from the World Development Indicators (WDI, 2020). The variables of interest are the total emigration rate and the emigration rate of high education. They are taken from Brücker et al., (2013) whose emigration rates are calculated by age (25 years and older), gender, and five-year education level from 1980 to 2010. The real exchange rate is from UNCTAD (2020) and all other control variables are from (WDI, 2020).

3.2.2 Descriptive statistics

Table 1: Overall description of model variables

Variables	Obs.	Average	Standard deviation	Min	Max
Structural transformation	62	-0,110	0,378	-2,147	0,799
Total emigration rate	75	3,478	7,773	0,050	33,630
High education emigration rate	75	19,624	18,849	1,690	71,580
Private Sector Credit	75	13,872	10,466	1,608	63,895
Migrant remittances	71	4,521	4,744	0,006	20,053
GDP per capita	75	818,090	607,821	215,888	3376,244
Cell phone subscribers	75	19,717	28,790	0,000	94,785
Natural Resource Annuity	75	13,185	12,441	0,502	64,421
Commercial opening	74	67,018	27,505	33,123	229,638
Foreign direct investment	75	4,175	6,656	-0,227	45,788
Official Development Assistance	75	5,48e+08	5,98e+08	4,84e+07	4,51e+09
Working population	75	5690442	9884737	120574,6	5,15e+07
Real exchange rate	54	104,010	21,692	60,800	200,700
Inflation	75	10,186	12,035	-0,904	66,635

Table 1 presents the main descriptive statistics of the variables used in the model. The average labor allocation of the agricultural sector is estimated at -0.11% for all ECOWAS countries from 1990 to 2010, indicating that labor has left the agricultural sector for other sectors of the economy. This average is volatile and is measured by its standard deviation in the order of 0.378%. The average emigration rate for the high education level is 19.62% while the average total emigration rate is estimated at 3.47%.

3.3 Estimation method

The emigration rate variables are potentially endogenous and suffer from measurement errors (Okey, 2019). Additionally, the lagged dependent variable is highly correlated with the error term, so the Ordinary Least Squares (OLS) and Least Squares Dummy Variable (LSDV) estimator are biased (Nickell 1981). To correct for endogeneity problems with the emigration rate and other variables in the model and to account for the dynamic effect of structural transformation, the generalized methods of moments (GMM) of Arellano and Bover (1995) and Blundell and Bond (1998) are appropriate. GMMs address endogeneity problems related to reverse causality omitted explanatory variable bias problems, and simultaneity bias problems. However, these methods are used for a panel of a large sample size. In this paper, the sample size is insignificant, so the GMM estimator is not suitable. The appropriate technique for a small dynamic panel is the LSDVC estimator developed by Bruno (2005). This technique is more efficient than GMMs on small non-cylindrical panels (Flannery & Hankins, 2013), such as the case in this paper.

Bond (2002) points out that the estimate of the coefficient of the lagged explained variable by the OLS estimator is upwardly biased; however, this coefficient is downwardly biased when estimated by the LSDV estimator. These estimators then provide bounds on the coefficient of the lagged

explained variable and allow us to assess the performance of the model estimated by the LSDV (Montmartin, 2013). In this paper, all coefficients of the lagged variable are significant and the coefficient of the LSDVC estimator of the lagged variable is between that of the LSDV estimator and that of the OLS estimator in each estimate (Tables 2; and 3). The LSDVC estimator is then suitable for econometric analysis. To solve the problem of multi-colinearity between the different emigration rates, the estimates are performed according to each emigration rate.

4. Analysis of Economic Results

Table 2: Results of the overall emigration rate

Variables	(LSDV) Structural transformation	(LSDVC) Structural transformation	(MCO) Structural transformation
(Structural transformation)$_{-1}$	0.625**	0.872***	1.120***
	(0.291)	(0.034)	(0.354)
Total emigration rate	0.350	0.318***	-0.009
	(0.210)	(0.037)	(0.017)
Migrant remittances	-0.045	-0.042***	0.006
	(0.035)	(0.003)	(0.012)
Ln(Gross domestic product per capita)	-2.066*	-1.733	0.224
	(1.031)	(1.270)	(0.264)
Cell phone subscribers	-0.015**	-0.014***	0.001
	(0.006)	(0.001)	(0.001)
Natural Resource Annuity	-0.040*	-0.040	-0.023*
	(0.019)	(0.038)	(0.011)
Commercial opening	-0.002	-0.002	0.002
	(0.002)	(0.012)	(0.002)
Foreign direct investment	0.041	0.041	0.004
	(0.029)	(0.051)	(0.013)
Ln(Official development assistance)	0.423*	0.408***	-0.0608
	(0.206)	(0.141)	(0.085)
Credits granted to the private sector	0.005	0.004	-0.007
	(0.007)	(0.005)	(0.012)
Ln(Labour force)	2.971	2.757***	0.067
	(1.690)	(0.526)	(0.067)
Real exchange rate	0.002	0.002	0.003
	(0.004)	(0.008)	(0.003)
Inflation rate	0.020	0.020***	0.006
	(0.013)	(0.007)	(0.00587)
Constant	-39.49*		-1.480
	(22.13)		(1.664)
R^2	0.647		0.571
Number of countries	15	15	15

Standard deviations are in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

The total emigration rate, official development assistance, labor force, and inflation attract labor to the agricultural sector. This can be explained by the positive sign and significance at 1% associated with the coefficients of these variables (Table 2).

The positive effect of the overall emigration rate on labor reallocation is explained by the fact that emigration can contribute positively to economic growth in ECOWAS countries through structural transformation. This result is consistent with a recent theory on the positive effect of emigration on the development of sending countries. Similar results were obtained by Gnimassoun and Anyanwu (2019) of the overall effect of emigration on economic development in Africa. In Africa, the industrial sector is not performing well (Mama and Ongono, 2019; De Vries et *al.,* 2015; Mcmillan et *al.,* 2014) and therefore can not hire workers who leave the agricultural sector to support the structural transformation process. However, in his studies on the effect of emigration on industrial development, Okey (2019) finds that emigration positively affects industrialization in Africa. This result is very relevant insofar as emigration stimulates development within the industrial sector to prepare it to receive the labor force that will come from the agricultural sector and boost structural transformation.

Official development assistance positively affects the reallocation of labor from the agricultural sector since developing countries, in general, need public assistance to finance their agricultural sector and initiate the process of structural transformation. It is in this context that Cadot and De Melo (2016) argue that public aid effectively contributes to development if it is used to support the structural transformation of the African continent. Human capital promotes the reallocation of labor to the agricultural sector. The mechanization of agriculture requires infrastructure that is often complex to implement and requires advanced technology. When human capital takes on the technological dimension (Nelson and Phelps, 1966), it becomes the engine of innovation and the capacity to adopt new technologies to support the structural transformation. The positive influence of inflation on structural transformation can be explained by the fact that the general level of domestic prices is low compared to that of foreign prices, which strengthens the competitiveness of ECOWAS countries. This competitiveness can boost the demand for industrial goods and services in ECOWAS, eventually attracting labor that is locked in the agricultural sector and promoting the structural transformation.

In contrast, the coefficients associated with migrant remittances and communication infrastructure are negative and significant at the 1% level in ECOWAS (Table 2). Indeed, remittances strengthen domestic investment in the agricultural sector, improving productivity gains in this sector. Eventually, labor leaves the agricultural sector for other sectors of activity in ECOWAS. Mobile telephony stimulates labor outflow from the agricultural sector to other sectors of activity. This result is explained by the fact that communication between workers in different sectors of activity allows for the transmission of knowledge, which in turn promotes the transfer of labor from the least productive sector (agriculture) to the most productive sectors.

Table 3 presents the results of the effect of high education emigration on the structural transformation of ECOWAS economies.

Table 3: Emigration rate results for high education level

Variables	(LSDV) Structural transformation	(LSDVC) Structural transformation	(MCO) Structural transformation
(Structural transformation)$_{-1}$	0.759*	0.946***	1.111***
	(0.399)	(0.023)	
			(0.354)
High education emigration rate	0.963	1.267***	0.019
	(0.785)	(0.102)	(0.627)
Migrant remittances	-0.0348	-0.0325***	0.00534
	(0.0333)	(0.00691)	(0.0161)
Ln(Gross domestic product per capita)	-1.281	-0.933	0.143
	(0.958)	(1.242)	(0.266)
Cell phone subscribers	-0.0119*	-0.0116***	0.000650
	(0.00675)	(0.00120)	(0.00169)
Natural Resource Annuity	-0.0356	-0.0310	-0.0234**
	(0.0234)	(0.0420)	(0.0113)
Commercial opening	-0.00178	-0.00242	0.00247
	(0.00337)	(0.0124)	(0.00189)
Foreign direct investment	0.0272	0.0257	0.00261
	(0.0290)	(0.0541)	(0.0132)
Ln(Official development assistance)	0.241	0.231*	-0.0528
	(0.143)	(0.125)	(0.0754)
Credits granted to the private sector	0.0108	0.00847	-0.00848
	(0.00815)	(0.00628)	(0.0120)
Ln(Labour force)	2.561	2.260***	0.0991
	(1.789)	(0.557)	(0.0845)
Real exchange rate	0.00161	0.00230	0.00407
	(0.00471)	(0.00956)	(0.00591)
Inflation rate	0.0160	0.0159**	0.00678
	(0.0122)	(0.00808)	(0.00567)
Constant	-33.78		-1.711
	(22.48)		(1.890)
R^2	0.611		0.568
Number of countries	15	15	15

Standard deviations are in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

The high education emigration has a positive and significant impact on structural transformation at the 1% level. Official development assistance, labor force, and inflation positively affect the allocation of labor to the agricultural sector at 10%, 1%, and 5% thresholds, respectively. These results are similar to those of Docquier (2017) of the positive effect of emigration on economic development in most low-income countries. Similarly, Gnimassoun and Anyanwu (2019) mounted that the higher the level of the emigrant, the greater its effect on economic development. Thus,

knowing the importance of migration in reallocating resources across sectors of activity, the World Bank Group (2016) argues that poverty and inequality exist in several countries because of labor that remains stuck in low productivity sectors. Migrant remittances and communication infrastructure negatively affect the structural transformation at the 1% threshold as before.
In summary, the diaspora attracts labor to the least productive sector, which is the agricultural sector in ECOWAS. This result can be explained by the weak coordination between the different sectors of activity in ECOWAS to take advantage of the beneficial effects of the diaspora.

5. Conclusion

This paper analyzed the effect of diaspora on the structural transformation of the economies of ECOWAS countries. Specifically, it examines the overall effect of emigration and the effect of highly educated emigration on structural transformation. The structural transformation is measured by the allocation of labor in the agricultural sector. The LSDVC method applied to a dynamic specification was used on 15 ECOWAS countries from 1990 to 2010. Data were taken from (WDI, 2020), Brücker et al., (2013) and UNCTAD (2018). The results revealed that the diaspora attracts labor to the least productive sector which is the agricultural sector. As economic policy implications, any migration policy must take into account the production structures of ECOWAS countries to optimize the effects of the diaspora on the reallocation of labor between these sectors. This can be done by encouraging the diaspora to invest in modern techniques in the agricultural sector, leading to an improvement in the productivity of this sector. In concrete terms, the diaspora can invest in the mechanization of agriculture, in the use of improved seeds and fertilizer, for example. With this investment, the agricultural sector would require fewer workers for the same or higher production. This situation leads the agricultural sector to free up labor for new sectors, especially the industrial sector, whose demand for goods increases with the level of development. Migration policies should also focus on the development of the industrial sector by encouraging the diaspora to not only support any policy that focuses on industrial development but also encourage the return of skilled migrants to work and help attract labor to the sector. Future research will take into account heterogeneity in migration by dividing ECOWAS countries into two subgroups: those in the West African Economic and Monetary Union (WAEMU) and those outside WAEMU.

References

AGHION P., HOWITT P. (1992) A Model of Growth Through Creative Destruction. *Econometrica, 60*(2), 323-351.

AGRAWAL A., KAPUR D., MCHALE J., OETTL A. (2011) Brain drain or brain bank? The impact of skilled emigration on poor-country innovation. *Journal of Urban Economics, 69*, 43-55.

ALI E., GNINIGUE M. (2022). Global value chains participation and structural transformation in Africa: Are we advocating environmental protection?. *Journal of Cleaner Production, 366*, 132914.

ANDERSON T., HSIAO C. (1982) Formulation and estimation of dynamic models using panel data. *Journal of Econometrics., 18*, 570-606.

ARELLANO M., BOVER O. (1995) Another look at the instrumental variable estimation of errorcomponents-components models. *Journal of Econometrics, 68*(1), 29–51.

AUTY R. (1993) Sustaining Development in Mineral Economies: The Resource Curse Thesis. Routledge. London and New York.

BEINE M., DOCQUIER F., ZDEN C. (2001) Diasporas. *Journal of Development Economics, 95*, 30-41.

BHAGWATI J., HAMADA K. (1974) The brain drain, international integration of markets for professionals and unemployment. *Journal of Development Economics, 1*, 19-42

BLUNDELL R., BOND S. (1998) Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*(1), 115–143.

BOND S. (2002) Dynamic Panel Data models: a guide to micro data methods and practice. *Portuguese Economic Journal, 1*, 141-162.

BORJAS, G. J. (2001) Does immigration grease the wheels of the labor market? Brookings papers on economic activity. *1*(1), 69-133.

BRAUN, S., KVASNICKA, M. (2014) Immigration and structural change: Evidence from post-war Germany. *Journal of International Economics, 93*(2), 253-269.

BRUCKER H., CAPUANO S., MARFOUK A. (2013) Education, gender and international migration: insights from a panel-dataset 1980-2010. Methodology Report.

BRUNO G. (2005) estimation and inference in dynamic unbalancd panel-data models with a small number of individuals. *The Stata Journal, 5* (4), 473-500.

CADOT O., DE MELO J. (2016) Introduction. Vers une transformation structurelle en Afrique. *Revue d'economie du developpement, 24*(2), 5-17.

CADOT O., DE MELO J., PLAN P., WAGNER L., WOLDEMICHAEL M. -T. (2016) Industrialisation et transformation structurelle: l'Afrique subsaharienne peut-elle se développer sans usines?. *Revue d'economie du developpement, 24*(2), 19-49.

CARRARO, A., KARFAKIS, P. (2018) Institutions, economic freedom and structural transformation in 11 sub-Saharan African countries. FAO Agricultural Development Economics Working Paper 18-01. Rome, FAO.

CEA. (2016) Le cadre macroéconomique de la transformation structurelle des économies africaines, Addis-Abeba (Éthiopie).

CLEMENS, M. A. (2013) Why do programmers earn more in Houston than Hyderabad? Evidence from randomized processing of US visas. American Economic Review, 103(3), 198-202. *American Economic Review, 103*(3), 198-202.

CNUCED (2018) Le développement économique en Afrique. Rapport 2018 : les migrations au service de la transformation structurelle. Nations Unies. New York et Genève.

COULIBALY, D., GNIMASSOUN, B., MIGNON, V. (2018) The tale of two international phenomena: International migration and global imbalances. *Economix*(2018-02).

DAYTON-JOHNSON J., XENOGIANI T. (2007) Immigration, développement et arbitrage entre politiques. *revue d'économie de développement, 21*, 97-138.

DE HAAS, H. (2010). Migration and development: A theoretical perspective. *International Migration Review, 44*(1), 227-264.

DE VRIES G., TIMMER M., DE VRIES K. (2015) Structural transformation in Africa: Static gains, dynamic losses. *The Journal of Development Studies, 51*(6), 674-688.

DOCQUIER F. (2017) The emigration-development nexus: Recent advances from the growth theory perspective. *Revue d'economie du developpement, 25* (3), 45-68.

DOCQUIER F., LODIGIANI E., RAPOPORT H., SCHIFF M. (2016) Emigration and democracy. *Journal of Development Economics, 120*, 209-223.

DOS SANTOS M. (2006) Attraction des élites et exode des cerveaux: les enjeux économiques d'une concertation entre pays d'origine et pays d'accueil. *Horizons stratégiques, 1*, 18-27.

DZANSI, J. (2013). Do remittance inflows promote manufacturing growth? *The Annals of Regional Science, 51*(1), 89-111.

FAROLE T., WINKLER D. (2014) Making foreign direct investment work for Sub-Saharan Africa: local spillovers and competitiveness in global value chains. The World Bank.

FETAHI-VEHAPI M., SADIKU L., PETKOVSKI M. (2015) Empirical analysis of the effects of trade openness on economic growth: an evidence for South East European countries. *Procedia Economics and Finance, 19*, 17-26.

FLANNERY, M. J., & HANKINS, K. W. (2013). Estimating dynamic panel models in corporate finance. *Journal of Corporate Finance*, *19*, 1-19.

FRANKEL J., ROMER D. (1999) Does trade cause growth? *American Economic Review, 89*, 379–399.

GIBSON, J. M. (2013). Accounting for selectivity and duration-dependent heterogeneity when estimating the impact of emigration on incomes and poverty in sending areas. Economic Development and cultural change. *Economic Development and cultural change*, *61*(2), 247-280.

GIBSON, J., MCKENZIE, D., STILLMAN, S. (2011) The impacts of international migration on remaining household members: omnibus results from a migration lottery program. *Review of Economics and Statistics, 93*(4), 1297-1318.

GIULIANO P., RUIZ-ARRANZ M. (2009) Remittances, Financial Development and Growth. *Journal of Development Economics, 90*, 144-152.

GNIMASSOUN B., ANYANWU J. -C., (2019) The Diaspora and economic development in Africa. *Review of World Economics*, 1-33.

GROSSMAN G. -M., HELPMAN E. (1991) Quality Ladders and Product Cycles. *The Quarterly Journal of Economics, 106*(2), 557-86.

HARRIS, J. R., TODARO, M. P. (1970) Migration, unemployment and development: a two-sector analysis. *The American Economic Review, 60*(1), 126-142.

HIGGINS, M., WILLIAMSON, J. G. (1997) Age structure dynamics in Asia and dependence on foreign capital. *Population and Development Review*, 261-293.

JOHNSON H. G. (1967) Some economic aspects of the brain drain. *Pakistan developpement review, 7* (3), 379-411.

LECTARD P., ROUGIER E. (2018) Can Developing Countries Gain from Defying Comparative Advantage? Distance to Comparative Advantage, Export Diversification and Sophistication, and the Dynamics of Specialization. *World Development, 102* , 90–110.

LEWIS W. -A.(1954) Economic development with unlimited supplies of labour. *Manchester school, 22*, 139-191.

LO S. -B., RAMDE F. (2019) Développement financier et transformation structurelle des pays africains de la zone Franc: une approche panel-VAR. *Revue Interventions économiques. Papers in Political Economy, 61*.

LUCAS R. -E. (1988) On the mechanics of economic development. *Journal of monetary economics, 22*, 3-42.

LUCAS R. -E. (2005) Migrations internationales vers les pays à haut revenu. Quelles conséquences pour le développement économique des pays d'origine ? *De Boek université/Revue d'économie de développpement, 19*, 123-171.

MAMA T., ONGONO P. (2019) La zone Franc entrave-t-elle la transformation structurelle des économies des pays membres? *Revue Interventions économiques. Papers in Political Economy,* (61).

MAMBA , E., GNINIGUE , M., ALI, E. (2020) Effect of foreign direct investment on structural transformation in West African Economic and Monetary Union (WAEMU) countries. *Cogent Economics & Finance, 8*(1), 1783910 .

MANKIW N. -G., ROMER D., WEIL D. -N. (1992) A contribution to the empirics of economic growth. *The quarterly journal of economics, 107*(2), 407-437.

MASSEY, D. S. (1988) International migration and economic development in comparative perspective. Population and Development Review, 14(3), 383-414. *Population and Development Review, 14*(3), 383-414.

MCKENZIE, D. (2017) Poverty, inequality, and international migration: Insights from 10 years of migration and development conferences. *Revue d'Economie du Développement, 25*(3), 13-28.

MCMILLAN M., RODRIK D., VERDUZCO-GALLO I. (2014) Globalization, Structural Change, and Productivity Growth, with an Update on Africa. *World Development, 63*, 11-32.

MIYAGIWA K. (1991) Scale economies in education and the brain drain problem. *International Economic Review, 32*, 743-759.

MONTMARTIN B. (2013) Intensité de l'investissement privé en R&D dans les pays de l'OCDE: impact et complémentarité des aides financières à la R&D. *Revue économique, 64* , 541-550.

MOUNTFORD A. (1997) Can a Brain Drain Be Good for Growth in the Source Econ- omy? *Journal of Development Economics, 53*, 287-303.

MÜHLEN, H., ESCOBAR, O. (2020) The role of FDI in structural change: Evidence from Mexico. *The World Economy, 43*(3), 557-585.

Murard, E. (2017) Less Welfare or Fewer Foreigners? Immigrant Inflows and Public Opinion towards Redistribution and Migration Policy.

NELSON R., PHELPS E. (1966) Investment in humans, technol ogy diffusion, and economic growth. *American Economic Review, 56* (2), 69-75.

NICKELL S. -J. (1981) Biases in Dynamic Models with Fixed Effects. *Econometrica, 49*, 1417-1426.

OKEY, M. -K. (2019) Does International Migration Promote Industrial Development? Evidence from Africa 1980–2010. *International Economic Journal, 33*(2), 310-331.

ONU. (2013) Diversification and sophistication as a lever for the structural transformation of North African economies.Rabat: ECA/SRO-NA.

PICHE, V. (2013) Les théories migratoires contemporaines au prisme des textes fondateurs. *Population, 68*(1), 153-178.

RAPOPORT H. (2017) Migration et développement: les externalités de la diaspora. *Revue d'Economie du Developpement, 25*(1), 31-61.

ROCHER E., PELLETIER A. (2008) Migrant workers' remittances: what is the impact on the economic and financial development of Sub-Saharan African countries? *Quarterly Selection of Articles, 13*, 103- 120.

RODRIK, R. (2009) Industrial policy: don't ask why, ask how. *Middle East Development Journal, 1*(1), 1-29.

ROMER , P. (1986) Increasing Returns and Long-Run Growth. *Journal of Political Economy*, 1002-1037.

SHARMA, M., ZAMAN, H. (2009) Who migrates overseas and is it worth their while? An assessment of household survey data from Bangladesh. The World Bank.

SOBIECH, I. (2019) Remittances, finance and growth: does financial development foster the impact of remittances on economic growth? *World Development, 11*, 44-59.

SOLIMANO, A. (2001) International migration and the global economic order: An overview. The World Bank.

SPILIMBERGO A. (2009) Foreign students and democracy. *American Economic Review, 99*, 528-543.

SQUICCIARINI M. -P., VOIGTLANDER N. (2015) Human capital and industrialization: Evidence from the age of enlightenment. *The Quarterly Journal of Economics, 130*(4), 1825-1883.

STARK, O. (1991) The Migration of Labor, Cambridge, Massachusetts: Blackwell.

STARK O., HELMENSTEIN C., PRSKAWETZ A. (1997) A brain gain with a brain drain. *Economics Letters, 55*, 227-234.

TODARO, M. P. (1969) A model of labor migration and urban unemployment in less developed countries. *The American Economic Review, 59*(1), 138-148.

CNUCED, (2018) Nations Unies. Genève. Disponible sur statistics@unctad.org.

United Nations Department. Of Economic and social Affairs (2017a) International migrant stock : the 2017 revision. New York.

URAMA N. -E., EDEH H. -C., URAMA E. -C. (2019) Do Migrant Remittances Cause Dutch Disease in Nigeria? *International Migration*, 57, 151-166/

VALETTE J. (2018) Do migrants transfer productive knowledge back to their origin countries? *The Journal of Development Studies, 54*(9), 1637-1656.

WORLD BANK GROUP (2016) *Migration and Development.* Washington, DC.

WORLD BANK (2020) World Development Indicators. World Bank: Washington. Available on https://donnees.banquemondiale.org/pays