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Economic freedom and industrialization in Africa

By

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Abstract

Industrialization is an important concern in Africa for at least three reasons: first, there is a positive link between industrialization and growth. Second, African countries' economies rely on export of commodities. The volatility of commodity prices exposes them to pro-cyclical budget and cannot lead to any development program. Third, African countries need to diversify their economies through the processing of primary products to add them greater value. This would generate more employment and help reduce poverty. This paper aims to identify the determinants of industrialization in Africa. Specifically, it seeks to determine the effect of economic freedom on industrialization in 48 African countries between 1995 and 2013. A dynamic panel data analysis is used to account for dynamics aspects of industrialization. The results indicate a positive effect of economic freedom on industrialization in African countries. There is also a positive link between Foreign Direct Investment, GDP per capita and industrialization. Financial development and human capital have no significant effect on industrialization.

Key words: economic freedom, industrialization, panel data, GMM, Africa

1. Introduction

African countries have recorded a high economic growth rate in recent years. However, poverty is not declining and inequalities are widening among the population. According to World Development Indicator (WDI), in 1981, developing countries from East Asia and Pacific had the highest poverty rate in the developing world (77.18%). Between 1981 and 2010, the region has experienced a decrease of 84% in the poverty rate. But sub-Saharan Africa region have experienced only 6% decrease in the same period. In 2010, its poor population is 4 times more than in East Asia and Pacific. However, in 1981 the poverty rate was 1.5 times higher in East Asia and Pacific than in sub-Saharan Africa. Figure 1 shows the evolution of poverty rate around the developing world between 1981 and 2010.

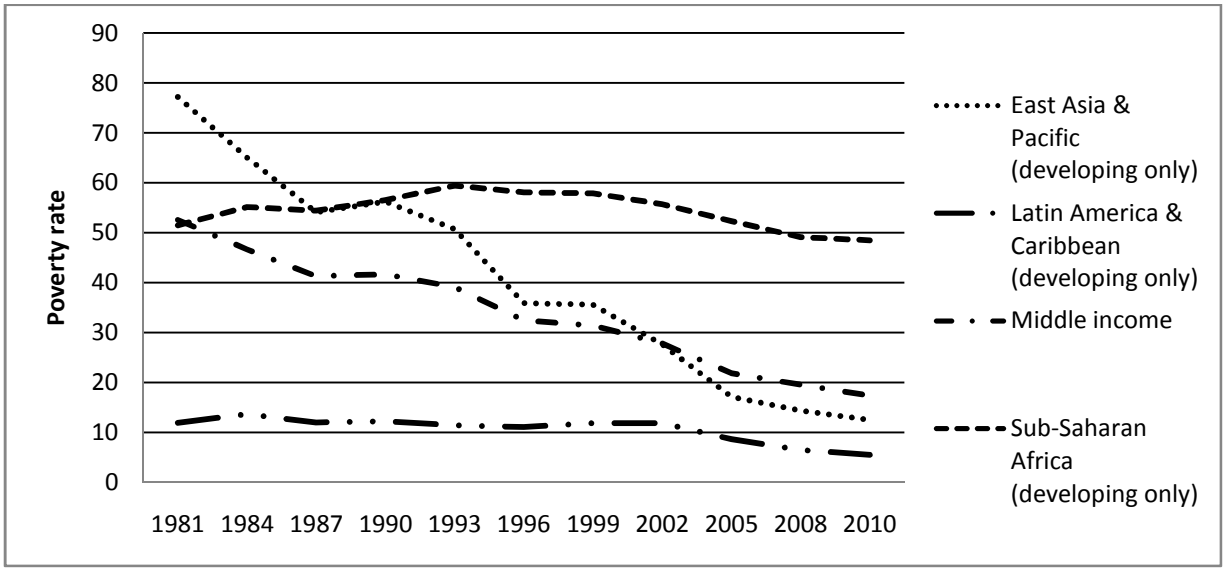

Figure 1 : Evolution of poverty rate in the developing world between 1981 and 2010.

Source: WDI, 2015

Sub-Saharan Africa's situation, in terms of poverty reduction, can be explained by the fact that its growth is not generating enough employment because it is largely based on the extraction and export of agricultural and mineral commodities. In some cases, a single product account for more than 9/10 of export earnings. For example, according to UNCTAD statistics (2014), fuels accounted for 98% of export earnings in Algeria and for 94% in Nigeria in 2013. The developing regions which have experienced the highest poverty rate reduction also experienced high level of manufactured products in their total exports. For example, on average between 1980 and 2011, exports of manufactured goods accounted for 60% of total exports in East Asia and the Pacific and 50% in Latin America and Caribbean. But in Sub

Saharan Africa, they accounted for only 25% of total merchandise exports. Industrialization seems to have played an important role in poverty reduction. Figure 2 below indicates the evolution of the share of manufactured exports in total exports in three developing regions between 1980 and 2011.

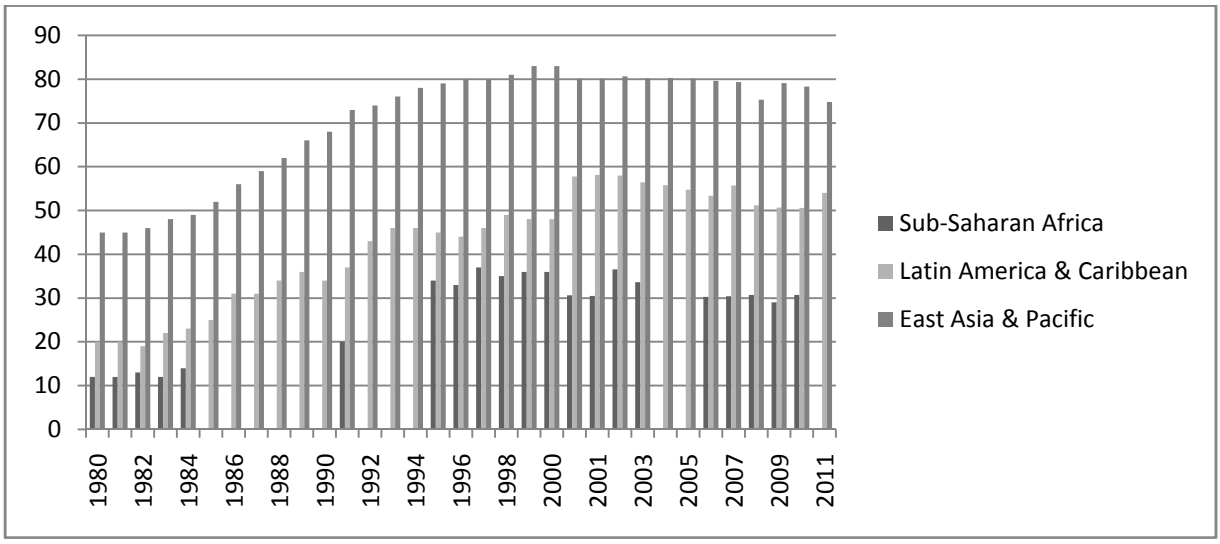

Figure 2: Evolution of the share of manufactured exports in total export in the developing world between 1980 and 2011.

Source: WDI (2015)

Industrialization is an important concern in Africa for at least three reasons: first, several studies establish a positive relationship between industrialization and growth (Rodrik, 2009; Szirmai 2009; Szirmai and Verspagen, 2011; Akplogan, 2014…). Second, African countries' economies rely on export of commodities. The volatility of commodity prices exposes them to pro-cyclical budgets and cannot lead to any development program. Third, African countries need to diversify their economies through the processing of primary products to add them greater value. This would generate more employment and help reduce poverty.

Given the importance of industrialization for economic transformation in Africa, it is important for policy makers to know its determinants. The study focus on the role of economic freedom. Our research question is: what is the effect of economic freedom on industrialization in Africa? The paper aims to identify the determinants of industrialization in Africa. Specifically, it seeks to determine the effect of economic freedom on industrialization in Africa.

Several studies have focused on industrialization in developing countries (Jalilian, and Weiss, 2000; Jalilian, Tribe and Weiss, 2000; Weiss, 2002; Guadagno, 2012). But the effect of economic freedom is neglected. Verner (2015) deals with economic freedom and its effect on national competitiveness, but he did not place emphasis on industrialization.

According to Miller, Holmes and Feulner (2012), economic freedom is the fundamental right of every human to control his or her own labor and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please with that freedom both protected by the state and unconstrained by the state. In economically free societies, government allows labor, capital and goods to move freely, and refrain from coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself. To measure economic freedom, we use the index of economic freedom calculated by the Heritage Foundation and published in its annual report since 1995.

The term industrialization refers to the structural change that backward countries experience in their development process from an agricultural to an industrial economy, with the profound changes in the society that this entails (Kuznets, 1973). For the measurement of industrialization we use data from World Development Indicators (WDI, 2015). Industrialization is measured by value added in mining, manufacturing, construction, electricity, water, and gas.

We use a dynamic panel data to analyze the effect of economic freedom on industrialization in Africa. This model is used to account for the dynamic aspect of industrialization. In fact, historical evidences show that the movement of resources toward manufacture is a persistent and unidirectional process (Herrendorf, Rogerson and Valentinyi, 2013). The recent development in GMM panel regression suggested by Arellano and Bond (1991) and Blundell and Bond (1998) is used. The data cover the period from 1995 to 2013 and 48 African countries. The results indicate a positive effect of economic freedom on industrialization in Africa.

The remainder of the paper is organized as follow. Section 2 presents a literature review on the industrialization in Africa. Section 3 presents the methodology and section 4 presents the results of the study. Finally, section 5 provides conclusions and policy recommendations.

2. Literature review

The contribution of industrialization in economic growth economic is a well-established concern. Since 1950, there were in world-wide level, a strong statistically relationship between industries importance and economic growth (Rodrik, 2008, 2009). Virtually all cases of high, rapid, and sustained economic growth in modern economic development have been associated with industrialization, particularly growth in manufacturing production (Szirmai 2009). Indeed, economic development requires structural change from low to high productivity activities and the industrial development which is a driver of this structural change is a key engine of growth in the development process.

In a recent paper focused on African countries, Akplogan (2014) found a positive link between industrialization and economic growth. In these conditions, African countries need to implement policies which will promote industrialization process for achieving a high, rapid, and sustained growth. Therefore, identifying the key determinants of industrialization process is an important stake for policy makers.

There are several studies which addressed the fundamentals determinants of industrialization process. Basically, many factors are identified to promote or hinder industrialization process. These factors can be socio-economic, financial and institutional (Beji and Belhadj, 2014)

2.1.Socio-economic factors and industrialization

The literature on socio-economic determinants of industrialization is quite large and concerns essentially, macro stability, demand conditions (internal and external), economic openness and human capital. Beji and Belhadj (2014) argued that macro environment stability encourages growth given that it leads firms to act in a rational manner. That's because, in a context of low inflation, suitable deficit and public debt, more risk-averse investment behavior is limited and access to financial and capital markets is less difficult. This is especially important in African countries where there may be a dearth of entrepreneurship (Reinhart and Rogoff, 2003). Rodrik (2008), by using both inflation and terms of trade as additional exogenous covariates in a panel model explaining economic growth in manufacturing, finds a negative and significant relationship between growth and inflation in developing countries.

Maintaining stable exchange rates prove to be important insofar as it affects long run growth. Indeed, avoiding exchange rate misalignments could protect exporters from an overvaluation phenomenon that affects competitiveness as well as importers from undervaluation that

affects purchases and investment programs. Moreover, exchange rate volatility makes difficult and expensive for developing countries to hedge their exchange rate risks, especially small and medium sized firms. Greenwald and Stiglitz (2006) show that, in developing countries, low exchange rates help export sectors like manufacturing to compete, especially sectors which have higher learning elasticity and generate more learning externality. That's way many countries have managed to lower their real exchange rate for an extended period of time, and have done so at the same time that they have promoted growth.

The demand condition is relatively important for economic activities especially, for manufactured ones since it is well known that the production decision is made when firms anticipate demand for their products. Therefore, there is a significant positive relationship between manufacturing expansion and internal demand so that, other things being equal, larger countries tend to have a higher manufacturing share. In others words, as incomes per capita raise, share of manufacturing in national income increases. At relatively low income levels, individuals spend a significant part of their income on food. As income rises, this share tends to decline, whereas demand for manufactures rises (Kniivilä, 2007). However, small countries are often open, so, level of economic activity in developed economies could have a major impact on growth prospects in developing countries, particularly through changes on export demand. Hence, changes in formers economies' GDP could influence industrial activity in the latter ones. Guadagno (2012), basing on Cornwall (1977) model in order to estimate a manufacturing growth equation for a sample of developing countries, shows that the size of the domestic market is a constant determinant of industrialization.

Openness's impacts on industrialization are much debated in the literature. Two views emerge from the literature which addressed the issue of industrialization and openness. Following the first view, openness may have positive effects on industrialization process. Chu (2001) provides a theoretical framework for analyzing the link between industrialization and trade openness in developing economies. Based on this framework, he concludes to a positive link of trade openness on industrialization in developing countries. Indeed, as argued by Beji and Belhadj (2014), following outward-looking industrial strategy allow access to large markets and a growing demand which encourage a large scale industrialization programs (case of East Asian New Industrialized Economies such as Hong Kong, Singapore, Taiwan and Korea). Moreover, trade liberalization allows access to imported inputs at free trade prices, access to technology and capital as well as a more competitive exchange rate which boost industry growth (Weiss 2002). In the other hand, flow of FDI, especially in manufacturing, by

transferring capital, technology, management, stable financing and marketing techniques could act positively on growth and exports and then reinforce the industrialization process for the host country. By contrast, in a relatively closed or protected economy, enterprises will be both less aware of technical change internationally and will have less incentive to adopt best practice innovation. Fostering obsolete technology and high cost activities lead to low attractiveness of FDI and hamper the opening to the world markets which affects negatively the industrialization process.

There is no consensus on the positive effect of openness on industrialization among economist. There were views which postulate that openness hinder industrialization process particularly for economic in their first state of industrialization. This is one of the arguments put forward to justify protectionism in many developing countries. The explanation is that, trade openness may expose the infant industries to the international rivalry while they have not a sufficient capacity to face it. In these conditions, it's necessary to protect infant industries in order to raise its capacity by profiting from local demand before their insertions in international competitions. List (1904) is one of the pioneer studies in the side of infant industries protection. One other prominent argument against free trade is that it would cause undesirable effects of domestic des-industrialization for developing countries (Chu, 2001).

Development of the human capacity is necessary for industrial development. Large gaps in labor productivity are a fundamental determinant of existing gaps between industrialized and developing countries. Education, health and skills acquisition are thus essential for improving the productive capacities of countries (EAC and AC, 2013). Human capital development in the form of sufficient technically and scientifically qualified personnel allows coping with the increase of demands and industrial development. Indeed, creating immobile national assets, notably through education, training and healthcare spending could provide the base for competitive industrial sector and improve the attractiveness of investments. Therefore, increasing government support to education, improving vocational training and guaranteeing access to healthcare are prerequisites for any form of industrialization (Beji and Belhadj, 2014).

Zelleke and al. (2013), by using growth accounting approach to identify the sources of economic growth and by resorting to Pritchett (2001) and Weil (2013) conceptual frameworks, show that human capital have positive effects in SSA countries but much lower than in high-income countries.

2.2. Financial factors and industrialization

Research on the role of financial development in growth can be traced back at least to Bagehot (1873) who claims that large and well-organized capital markets in England enhanced resource allocation towards more productive investment. Other historical antecedents before 1970 include, among others, Schumpeter (1911), Hicks (1969) and Goldsmith (1969). Schumpeter (1911) emphasizes the critical role of a country's banking system for economic development in mobilizing savings and encouraging productive investment. Hicks (1969) highlights the importance of financial ma rkets in the process of industrial revolution with an observation that the development of financial systems facilitates the applications of new technologies and innovations. The presence of financial institutions insuring better allocation of resources could affect the industrialization process. In particular, existence of efficient banking system insuring careful financing to firms, notably small and medium sized firms, reinforce domestic entrepreneurship capabilities (Liedholm and Mead, 1999)

Much attention could also be given to the functioning of financial markets and the ability of firms to obtain adequate financing. Generally, a well-developed system of financial institutions could transfer efficiently funds from savers to investors and monitor the effectiveness of investments (Beji and Belhadj, 2014)

Ghirmay (2004) for instance, provide evidence of the existence of a long-run relationship between financial development and economic growth in almost all (12 out of 13) of SSA countries using a Vector autoregression (VAR) framework based on the theory of cointegration and error-correction representation of cointegrated variables.

2.3. Institutions and industrialization

Institutions and its changes play fundamental role in economic development. Alia (2014) points out that this fundamental role of institutions and institutional changes in the process of economic development have been for a long time recognized in the growth and development literature (North 1971, Acemoglu, Simon and James, 2001 and 2002, Spolaore and Wacziarg, 2013). On the one hand, hood institutions encourage physical and human capital accumulation along with the development and the adoption of better technologies essential for sectorial productivity improvement. On the other hand, weak institutions discourage investment, particularly foreign investment and limit domestic innovation as well as innovation transfer from abroad. This limit effect of bad institutions hurt all sectors in the economy but the

negative effect are particularly more pronounced for the industrial and commercial sectors. Aron (2000) argues that good institutions lower transaction costs and investment risks while and when institutions are weak, economic activities are restricted to interpersonal exchanges and resources locked in low productive sectors. Thus, institutions can also play an important role the allocation of resources in the economy and in the process of structural change through industrialization.

The above studies have treated many aspects of industrialization process. But the effect of economic freedom is neglected in the analysis of the industrialization process. Verner (2015) deals with economic freedom and its effect on national competitiveness, but he did not place emphasis on industrialization. This paper deals with the role of economic freedom in industrialization process in African countries.

3. Methodology

3.1.Econometric model and estimation techniques.

To examine the relationship between economic freedom and industrialization, a panel data analysis is performed. The literature (Hsiao, 2003; Baltagi, 2005; and Verner, 2015 for example) lists a number of panel data's benefits: (i) controlling for individual heterogeneity, (ii) give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency, (iii) are better able to study dynamics of adjustment, (iv) are better capable to identify and measure effects that are simply not detectable in pure cross-section or pure time series data, (v) allow to construct and test more complicated behavioral models than purely cross-section or time series data and thus allow a researcher to analyze a number of important economic questions that cannot be addressed using one dimensional data, and limitations, e.g. (i) design and data collection problem, (ii) distortions of measurement errors or (iii) selectivity problem.

Following Verner (2015), simple linear panel data model can be written as:

$$Y_{it} = \alpha + \beta X_{it} + u_{it} \qquad (1)$$

Where Y represents the dependent variable, X a vector of explanatory variables and subscript i denotes cross-section dimension (groups of countries) whereas t time series dimension (1995-2013), α, β are coefficients and u is a random disturbance term. The fixed effects or the random effects method can be carried out to estimate this model by means of ordinary.

These two methods allow us to capture the differences among units; hence the random disturbance term u is given by:

$$\mu_{it} = \mu_i + v_{it} \quad (2)$$

Where i denotes unobservable individual-specific effect which is time-invariant and is responsible for any individual-specific effect that is not contained in the regression (one-way error component). The random disturbance term u from (1) is sometimes expressed as so-called two-way error component:

$$\mu_{it} = u_i + \tau_t + v_{it} \quad (3)$$

Where τ_t represents individual-invariant and it accounts for any time-specific effect not included in the regression. According to Baltagi (2005), in case of fixed effect it is assumed to be fixed parameters to be estimated whereas in case of random effect it is assumed to be random and v_{it} denotes remainder disturbance which varies over individuals and time. For fixed effect model we can apply standard F-test under the null hypothesis that all the constants are the same. In random effect model it is assumed zero correlation between explanatory variables and the unobserved effect. Hausman test (Hausman, 1978) is used to find out if this assumption is fulfilled under the null hypothesis: random effects are consistent and efficient. Moreover, it should fulfill the assumptions for standard ordinary least squares error terms, i.e. the remained disturbance is homoskedastic, serially and spatial uncorrelated.

But the above model misses to integrate the dynamic aspect of industrialization. In fact, historical evidences show that the movement of resources toward manufacture is a persistent and unidirectional process (Alvarez-Cuadrado and Poschk 2011; Herrendorf, Rogerson and Valentinyi, 2013). We incorporate a dynamic into the model by enriching equation (1) with a lag term of the dependent variables as follows:

$$Y_{it} = \alpha + \gamma Y_{it-1} + \beta X_{it} + \mu_{it} \quad (4)$$

The extension of the model introduces an additional complication in its estimation. In fact, due to the presence of the lag of the dependent variable Y_{it-1} in the right hand side of the equation (4), the residuals from taking the first difference to remove the fixed effect are serially correlated and the standard panel estimation will be inconsistent (Arellano and Bond 1991). The recent development in GMM panel regression suggested by Arellano and Bond (1991) and Blundell and Bond (1998) is used to solve this problem.

According to Roodman (2006), the Arellano and Bond (1991) and Blundell and Bond (1998) dynamic panel are general estimators designed for situations with (i) few time periods and many individuals; (ii) a linear functional relationship; (iii) a single left-hand-side variable that is dynamic, depending on its own past realizations; (iv) independent variables that are not strictly exogenous, meaning correlated with past and possibly current realizations of the error;(v) fixed individual effects; and (vi) heteroskedasticity and autocorrelation within individuals but not across them.

Arellano and Bond (1991) estimation starts by transforming all regressors, usually by differencing, and uses the Generalized Method of Moments (Hansen 1982), and so is called Difference GMM. The Blundell and Bond (1998) estimator augments Arellano-Bond (1991) by making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects. This allows the introduction of more instruments, and can dramatically improve efficiency. It builds a system of two equations (the original equation as well as the transformed one) and is known as System GMM (Roodman, 2006). This paper uses the system GMM estimators. Using Monte Carlo simulations, Blundel and Bond (1998) showed that the system GMM estimator is more efficient than in first difference which gives biased results in small samples when the instruments are weak.

There are two ways to get Blundell and Bond (1998) system GMM estimators: the one-step and two-step estimator. The two-stage estimation provides asymptotically more efficient estimators in case of heteroscedasticity of the error term, but it provided biased estimators in small samples (Blundell and Bond, 1998). Both the one-step and the two step methods are used.

3.2. Data

This section describes the data used in the empirical analysis. Following Verner (2015), we use the index of economic freedom calculated by the Heritage Foundation and published in its annual report since 1995 to measure the economic freedom (*EF*). The Heritage Foundation defines the economic freedom as the fundamental right of every human to control his or her own labor and property (Miller, Holmes and Feulner, 2012). In an economically free society, individuals are free to work, produce, consume, and invest in any way they please with that freedom both protected by the state and unconstrained by the state. In economically free societies, government allows labor, capital and goods to move freely, and refrain from

coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself.

The Index consists of ten components: property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom, financial freedom, which are grouped into four categories: (i) rule of law, (ii) limited government, (iii) regulatory efficiency and (iv) open markets (see Miller, Holmes and Feulner (2012) for more details).

The range of the index is from 0 to 100, where 100 represent the maximum degree of economic freedom. Countries with an index of economic freedom between:

- 0-49.9 are repressed,
- 50-59.9 are mostly unfree,
- 60-69.9 are moderately free,
- 70-79.9 are mostly free,
- 80-100 are free.

For the measurement of industrialization (INDUS) we use data from World Development Indicators (WDI, 2015). Industrialization is measured by value added in mining, manufacturing, construction, electricity, water, and gas.

The others variables used in our regression are the following:
dev_fin: Financial development. This indicator is approximated by the share of domestic credits provided by the financial sector. It includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations. Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.
FDI: Foreign Direct Investment in net inflows as share of GDP. Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) from foreign investors, and is divided by GDP.

gdp: GDP per capita in current dollar is a proxy for the economic development. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

human: Human capital indicator. It is approximated by the gross secondary school enrollment ratio. It is the share of number of actual students enrolled at secondary school by number of potential students enrolled.

gov: Government Effectiveness: this reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).

All variables are extracted from World Development Indicators database (2015) except governance which is extracted from World Governance Indicator WGI (2014).

4. Results and discussion

Table 1 below summarizes the results of the panel model as presented by equation (1). The Hausman test cannot choose between the fixed and random effect models since the p-value of the test lies above 10%. The results of both fixed and random effects are then presented. In both cases they indicate a positive effect of economic freedom on industrialization in Africa. The results also indicate that Foreign Direct Investment, GDP per capita and financial development have a positive effect on industrialization while government effectiveness has a negative effect. By contrast, human capital does not have any effect on industrialization.

Tableau 1 : Results of fixed effects and random effect s models

	Fixed effects	Random effects
Economic freedom	**.0815**	**.095****
	(0.06)*	**(0.03)**
Human Capital	.0008	.0003
	(0.97)	(0.989)
Foreign Direct Investment	**.275*****	**.268*****
	(0.00)	**(0.00)**
Financial Development	**.0318****	**.0281****
	(0.02)	**(0.03)**
GDP per capita	**.0017*****	**.002*****
	(0.00)	**(0.00)**
Government Effectiveness	**-1.938*****	**-1.778*****
	(0.00)	**(0.00)**
Constant	**14.92*****	**14.12*****
	(0.00)	**(0.00)**
Sigma_u	7.3215	6.6298
Sigma_e	4.64	4.6398
Rho	.7135	.6712

Note: values in bracket are the probabilities. ***, **, * denote respectively significance at 1%, 5% and 10%. The dependent variable is the manufactured value added in percentage of GDP.
Source: Author's estimations

But as indicated in section 3, the model presented in equation (1) misses to integrate the dynamic aspect of industrialization. Table 2 below summarizes the results of the system GMM analysis as indicate by equation (4). The column 2 presents results obtained by the one-step system GMM estimators while the column 2 presents those obtained when the two-step system GMM is performed.

We first discuss the relevance of our empirical strategy. The Arellano-Bond test for AR (2) suggests absence of second order autocorrelation for both estimations since the p-values are upper than 10%. Also, the Sargan/Hansen test p-values are highly above the critical level of 10%, suggesting therefore instruments' validity. As suggested by Roodman (2006), the Hansen test's p-value is superior to 25%. Other point which justifies the use of system GMM is the fact that the initial industrialization's coefficient is less than unity. Since the coefficient associated to the initial industrialization is significant for both estimations, the dynamic panel choice for analyzing the relationship between the industrialization process and economic freedom in African countries looks appropriate. This confirms the dynamic characteristic of industrialization process.

The positive impact of the initial industrialization on the industrialization process in African countries may not be a surprise. Indeed, as the economy becomes industrialized, it generates more resources which can be used to ensure the industrialization process. This is particularly true since as economic becomes industrialized, more sustainable revenue for growth is obtained and sustained growth through industrialization (more specifically through manufacturing) has contributed significantly to rapid economic transformation in many countries and regions (Athukorala and Menon 1996; Lall, 1999).

Like the fixed effects and the random effects models presented above, evidence shows a significant positive link between the industrialization process and economic freedom in African countries. Although this relationship is robust to the two estimations techniques, it looks weak as the economic freedom coefficient is low. The weakness of economic freedom's positive impact on industrialization process in African countries can be explained by the state of economic freedom in these countries. Indeed, data show that African countries are in average mostly un-free. African countries have to make more effort for making their economies free in order to enhance their industrialization.

Other variables have a significant impact on African industrialization process. Foreign direct investment and GDP per capita still have a positive effect on industrialization process in African countries. The positive link between these two factors and the industrialization may not be surprise. The foreign direct investment can look as a good way for financing economic activities. If an economy attracts more foreign direct investment, it will be able to develop its manufacturing sector. Beji and Belhadj (2014) found also a positive impact of direct investment on industrialization in African countries. Talking about the positive relationship between GDP capita, we can explain it by the fact that its rose can lead to demand enhancement since the per capita GDP rose can lead to revenue enhancement. Indeed, the GDP per capita is a proxy of revenue and allows us to have an indication on economy's relative good health.

Financial development and human capital have no significant effect on industrialization in African countries. The absence of link (especially a positive one) between financial development and industrialization process in African countries can be due to the nature of African financial sector and particularly, the nature of credit financial institutions provide to economic agents. In Africa, much of the credit provided by financial institutions to private is mostly, the short time ones and in many cases is intended to habitation construction.

Therefore, African financial sector does not contribute effectively to financing economic activities and consequently, have none impact on industrialization process. Particularly, the fact that the credit are short time ones, does not allow economic agents investing in long run project whereas industrialization needs time to generate revenue. In the case of human capital, the absence of link between this variable and industrialization in African countries can be due to the choice of the indicator used as proxy of this variable. In this paper, due to lack of data, we use only the education indicator to capture human capital which include normally, more components like health.

Finally, findings show that the government effectiveness is not sufficient in Africa countries for influencing positively the process. The coefficient associated to the government effectiveness is not significant with the both estimations techniques. We can explain this by the existence of a critical level that countries should reach before profiting from its positive effects and likely, African countries have to make effort to reach this level.

Tableau 2 : Results of system GMM estimations

	One-step System GMM	**Two-step System GMM**
Initial industrialization	**.78325*** (0.00)**	**.7817*** (0.00)**
Economic freedom	**.04839** (0.04)**	**.05337* (0.06)**
Human Capital	-.0143 (0.61)	-.01656 (0.56)
Foreign Direct Investment	**.1728* (0.07)**	**.165* (0.08)**
Financial Development	-.0065 (0.59)	-.00599 (0.63)
GDP per capita	**.0011** (0.026)**	**.001** (0.04)**
Government Effectiveness	-.396 (0.31)	-.26 (0.75)
Constant	1.515 (0.375)	1.5838 (0.40)
Arellano-Bond test for AR(2), (p-value)	-0.63 (0.525)	-0.64 (0.525)
Sargan test of overid. restrictions, (p-value)	103.46 (0.682)	103.46 (0.682)
Hansen test of overid. restrictions, (p-value)	44.54 (1.0)	44.54 (1.0)

Note: values in bracket are the probabilities. ***, **, * denote respectively significance at 1%, 5% and 10%. The dependent variable is the manufactured value added in percentage of GDP.

Source: Author's estimations

5. Conclusion and policy implications

Industrialization is important for African countries for at least three reasons: first, there is a positive relationship between industrialization and growth. Second, African countries' economies rely on export of commodities and the volatility of commodity prices exposes them to pro-cyclical budgets and cannot lead to development program. Third, poverty and youth unemployment rates remain high in African countries. The processing of primary products would generate more employment and help reduce poverty. Since industrialization is important for economic transformation, it is important for policy makers to know its determinants. The paper aimed to identify the determinants of industrialization in Africa. Specifically, it determines the effect of economic freedom on industrialization in Africa. A dynamic panel data analysis is used to account for dynamics aspects of industrialization.

The results indicate a positive link between the industrialization and economic freedom. There is also a positive link between Foreign Direct Investment, GDP per capita and industrialization. Financial development and human capital have no significant effect on industrialization. Finally, findings show that the government effectiveness is not sufficient in Africa countries for influencing positively industrialization.

These results imply that more effort must be made in African countries to make their economies free in order to enhance their industrialization. Individuals must fill free to work, produce, consume, and invest in any way they please. Labor, capital and goods must also be allowed to move freely. Governments should devote more efforts to education and training in order to have a critical mass of qualified human resources to support the industrialization process. Governments should also devote their efforts to ensure political stability, promote good governance and attract more FDI.

References

Acemoglu, D., Simon J. and James R. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, 91(4). p. 1369-1401.

Acemoglu, D., Simon J. and James R.. (2002). Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. *Quarterly Journal of Economics*. 118(4), p. 1231-1294.

Akplogan, M. L. (2014). Secteur Manufacturier, Ressources Naturelles et Croissance Economique en Afrique: Une Approche par les Panels Dynamiques. in *Conférence Économique Africaine, Abidjan, Novembre 2014.*

Alia, D. Y. (2014). Institutional change, industrialization and structural change out of agriculture. in *African Economic Conference*, 2014.

Alvarez-Cuadrado, F. and Poschke M. (2011). Structural change out of agriculture: Labor push versus labor pull. *American Economic Journal:Macroeconomics.* 3, 127-158.

Arellano, M., and S. Bond. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies.* 58. p 277-297.

Aron, J. (2000). Growth and Institutions: A Review of the Evidence. *The World Ban Research Observer*, 15(1). p. 99–135.

Athukorala, P. and Menon J. (1996). Foreign Investment and Industrialization in Malaysia: Exports, Employment and Spillovers. *Asian Economic Journal.* p.29-44.

Bagehot, W. (1873). *Lombard Street: A Description of the Money Market*. London: Henry S. King.

Baltagi B. H. (2005). *Econometric Analysis of Panel Data*, 3rd ed. Chichester: John Wiley & Sons.

Beji, S. and Belhadj, A. (2014). What are the determining factors of Industrialization in Africa? Freit Working Papers, Papers/Development/FREIT773.pdf

Blundell, R., and Bond S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics.* 87 (1). p. 115-143.

Chu, T. (2001). Vertical Specialization with Heterogeneous Entrepreneurs: Can Trade Promote Industrialization of Developing Countries?. *University of Minnesota Thesis.*

Cornwall J. (1977), *Modern Capitalism. Its Growth and Transformation*. New York, St. Martin's Press.

Economic Commission for Africa and African Union Commission (2013). Industrialization for an Emerging Africa, in *issues papers Sixth Joint Annual Meetings of the ECA Conference of African Ministers of Finance, Planning and Economic Development and AU Conference of Ministers of Economy and Finance, Abidjan 2013*

Ghirmay, T. (2004). Financial development and economic growth in Sub-Saharan African countries: evidence from time series analysis. *African Development Review*. 16. p. 415-432.

Goldsmith, R. W. (1969). *Financial Structure and Development*. New Haven, CT: Yale University Press.

Greenwald, B. and Stiglitz, J.E, (2006). Helping Infant Economies Grow: Foundations of Trade Policies for Developing Countries. *American Economic Review*: *AEA Papers and Proceedings*. 96 (2), p.141-146.

Guadagno, F (2012). The determinants of Industrialization in Developing Countries, 1960-2005. mimeo, UNU-MERIT and Maastricht University. p. 26.

Hansen, L. (1982). Large sample properties of generalized method of moments estimators. *Econometrica* 50 (4). p 1029-1054.

Hausman J. A (1978). Specification tests in econometrics. *Econometrica*, 46 (6). p. 1251-1271.

Herrendorf, B., Rogerson R. and Valentinyi A. (2013). Growth and structural transformation. Handbook of Economic Growth.

Hicks, J. R, (1969). Automatists, Hawtreyans, and Keynesians. *Journal of Money,Credit and Banking*, 1(3). p. 307–317.

Hsiao C. (2003). *Analysis of Panel Data*, 2nd ed. Cambridge: Cambridge University Press, 2003.

Jalilian H, Tribe M and Weiss J (2000). *Industrial Development and Policy in Africa: Issues of De-industrialisation and Development Strategy*. Cheltenham, Edward Elgar.

Jalilian, H. and Weiss, J. (2000). De-Industrialization in Sub-Saharan Africa: Myth or Crisis. *Journal of African Economies*. 9(1). p. 24-43.

Kniivilä, Matleena (2007). Industrial development and economic growth: implications for poverty reduction and income inequality. in *Industrial Development for the 21st Century: Sustainable Development Perspectives*. United Nations publication, Sales No. 07.II.A.1.

Kuznets S. (1973). Modern Economic Growth: Findings and Reflections. *American Economic Review*. 63. p 247-258.

Lall S., (1999). Government, Globalization and International Business. in *J. Dunning. Oxford: Oxford University Press.*

Liedholm, C. and Mead D, (1999). *Small Enterprises and Economic Development*. London, Routledge.

List, F. (1904). *National Systems of Political Economy*. New York: Longmans Green.

Miller, T., Holmes K.R., and. Feulner E.J. (2012). 2012 Index of Economic Freedom. Washington, D.C.: The Heritage Foundation.

North, D. (1971). Institutional Change and Economic Growth. *The Journal of Economic History*, Vol. 31(1). p. 118-125.

Pritchett, L. (2001). Where has all the Education gone?. *World Bank Economic Review*. 15(3). p. 367–391

Reinhart, C. and K. Rogoff (2003). FDI to Africa: The Role of Price Stability and Currency Instability. *IMF Working Paper, 10.*

Rodrik, D. (2008).The Real Exchange Rate and Economic Growth. *Brookings Papers on Economic Activity, 39(2). p. 365-412.*

Rodrik, D. 2009. The Real Exchange Rate and Economic Growth. in *Brookings Papers on Economic Activity*. Fall 2008, ed. D. W. Elmendorf, N. G. Mankiw, and L. H. Summers, 365–412.Washington, DC: Brookings Institution.

Roodman, D. (2006). How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata. Center for Global Development Working Paper No. 103.

Schumpeter, J. A. (1911). *The Theory of Economic Development*. Cambridge MA, Harvard University Press.

Spolaore, E. and Wacziarg R..(2013). How Deep are the Roots of Economic Development? *Journal of Economic Literature*. 51 (2). p. 325 –369.

Szirmai and Verspagen, (2011). Manufacturing and Economic Growth in Developing Countries, 1950-2005. UNU-MERIT Working Paper. 2011-069.

Szirmai, A. (2009). Industrialisation as an engine of growth in developing countries. UNU-MERIT Working Paper. 2009-010, Maastricht.

Verner T. (2015). The Effect of Economic Freedom on National Competitiveness: Causality from a Panel of Countries. *Journal of Economics, Business and Management*. 3 (1). p. 150-155.

Weil, D. N. (2013). *Economic Growth.* Prentice Hall (3rd Edition), 2013, p. 592.

WEISS, J (2002). *Industrialization and Globalization: Theory and Evidence from Developing Countries*. London, Routledge.

Zelleke, G., Sraiheen, A. and Gupta, K (2013). Human Capital, Productivity and Economic growth in 31 Sub-Saharan African Countries for the Period 1975–2008. *International Journal of Economics and Finance*. 5(10). p. 1-17.

Appendix

Appendix 1: List of countries in the sample

Algeria	Egypt. Arab Rep.	Libya	Sao Tome and Principe
Angola	Equatorial Guinea	Madagascar	Senegal
Benin	Eritrea	Malawi	Seychelles
Burkina Faso	Ethiopia	Mali	Sierra Leone
Burundi	Gabon	Mauritania	South Africa
Cabo Verde	Gambia.	Mauritius	Sudan
Cameroon	Ghana	Morocco	Swaziland
Central African Republic	Guinea	Mozambique	Togo
Chad	Guinea-Bissau	Namibia	Tunisia
Congo. Dem. Rep.	Kenya	Niger	Uganda
Cote d'Ivoire	Lesotho	Nigeria	Zambia
Djibouti	Liberia	Rwanda	Zimbabwe

Appendix 2: Results of the fixed-effects model

```
. xtreg indus EF human gov dev_fin FDI gdp, fe

Fixed-effects (within) regression               Number of obs      =       960
Group variable: id                              Number of groups   =        48

R-sq:  within  = 0.0693                         Obs per group: min =        20
       between = 0.2292                                        avg =      20.0
       overall = 0.1630                                        max =        20

                                                F(6,906)           =     11.24
corr(u_i, Xb)  = 0.2405                         Prob > F           =    0.0000

------------------------------------------------------------------------------
       indus |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          EF |   .0815486   .0431417     1.89   0.059    -.0031206    .1662179
       human |   .0008346   .0255306     0.03   0.974    -.0492714    .0509406
         gov |  -1.938933   .6177289    -3.14   0.002    -3.151279   -.7265873
     dev_fin |   .0318273   .0133496     2.38   0.017     .0056275    .0580271
         FDI |   .2749819   .0721519     3.81   0.000     .1333776    .4165862
         gdp |   .0016774   .0004159     4.03   0.000     .0008612    .0024936
       _cons |     14.924   2.618555     5.70   0.000     9.784863    20.06314
-------------+----------------------------------------------------------------
     sigma_u |  7.3215914
     sigma_e |  4.6398162
         rho |  .71347179   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 906) =    40.81                 Prob > F = 0.0000
```

Appendix 3: Results of the random-effect model

```
. xtreg indus EF human gov dev_fin FDI gdp

Random-effects GLS regression                   Number of obs      =       960
Group variable: id                              Number of groups   =        48

R-sq:  within  = 0.0687                         Obs per group: min =        20
       between = 0.2582                                        avg =      20.0
       overall = 0.1835                                        max =        20

                                                Wald chi2(6)       =     77.34
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

indus	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
EF	.095031	.0426584	2.23	0.026	.0114221	.1786399
human	.0003507	.025523	0.01	0.989	-.0496733	.0503748
gov	-1.778193	.6116824	-2.91	0.004	-2.977069	-.5793175
dev_fin	.0281366	.0131819	2.13	0.033	.0023005	.0539727
FDI	.2680744	.0720749	3.72	0.000	.1268103	.4093385
gdp	.0020101	.0004045	4.97	0.000	.0012173	.0028028
_cons	14.12438	2.763721	5.11	0.000	8.707584	19.54117
sigma_u	6.6298209					
sigma_e	4.6398162					
rho	.67124161	(fraction of variance due to u_i)				

Appendix 4: The Hausman Test

```
. hausman random fixed

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |   random       fixed       Difference          S.E.
-------------+------------------------------------------------------------
          EF |   .095031    .0815486       .0134824               .
       human |   .0003507   .0008346      -.0004839               .
         gov |  -1.778193   -1.938933       .1607402               .
     dev_fin |   .0281366   .0318273      -.0036907               .
         FDI |   .2680744   .2749819      -.0069075               .
         gdp |   .0020101   .0016774       .0003327               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        2.90
                Prob>chi2 =      0.8213
```

Appendix 5: Results of the one-step system GMM

Dynamic panel-data estimation, one-step system GMM

Group variable: **id**			Number of obs	=	**912**
Time variable : **year**			Number of groups	=	**48**
Number of instruments = **119**			Obs per group: min	=	**19**
F(**7**, **47**)	= **92.62**		avg	=	**19.00**
Prob > F	= **0.000**		max	=	**19**

indus	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
indus						
L1.	.7832521	.0700533	11.18	0.000	.6423231	.9241812
EF	.0483947	.0234216	2.07	0.044	.0012764	.095513
human	-.0143115	.0280478	-0.51	0.612	-.0707364	.0421134
FDI	.1728303	.0931581	1.86	0.070	-.0145797	.3602403
dev_fin	-.0064898	.0120747	-0.54	0.593	-.030781	.0178015
gdp	.0011051	.00048	2.30	0.026	.0001395	.0020707
gov	-.396	.3888264	-1.02	0.314	-1.178218	.3862179
_cons	1.515409	1.693138	0.90	0.375	-1.890745	4.921564

Arellano-Bond test for AR(1) in first differences: z = **-3.50** Pr > z = **0.000**
Arellano-Bond test for AR(2) in first differences: z = **-0.63** Pr > z = **0.525**

Sargan test of overid. restrictions: chi2(**111**) = **103.46** Prob > chi2 = **0.682**
(Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(**111**) = **44.54** Prob > chi2 = **1.000**
(Robust, but weakened by many instruments.)

Appendix 6 : Results of two-step system GMM

Dynamic panel-data estimation, two-step system GMM

Group variable: **id**			Number of obs	=	**912**
Time variable : **year**			Number of groups	=	**48**
Number of instruments = **119**			Obs per group: min	=	**19**
F(**7**, **47**)	= **90.71**		avg	=	**19.00**
Prob > F	= **0.000**		max	=	**19**

indus	Coef.	Corrected Std. Err.	t	P>|t|	[95% Conf.	Interval]
indus						
L1.	.7817218	.0720308	10.85	0.000	.6368146	.9266291
EF	.0533748	.0279965	1.91	0.063	-.0029468	.1096965
human	-.0165682	.0283678	-0.58	0.562	-.0736368	.0405004
FDI	.1650815	.092947	1.78	0.082	-.0219038	.3520668
dev_fin	-.0059978	.0125356	-0.48	0.635	-.0312161	.0192205
gdp	.0010385	.0004904	2.12	0.040	.0000519	.0020251
gov	-.2600645	.8351998	-0.31	0.757	-1.94027	1.420141
_cons	1.583837	1.878285	0.84	0.403	-2.194785	5.362459

Arellano-Bond test for AR(1) in first differences: z = **-3.00** Pr > z = **0.003**
Arellano-Bond test for AR(2) in first differences: z = **-0.64** Pr > z = **0.525**

Sargan test of overid. restrictions: chi2(**111**) = **103.46** Prob > chi2 = **0.682**
(Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(**111**) = **44.54** Prob > chi2 = **1.000**
(Robust, but weakened by many instruments.)