International Journal of Applied Economics (IJAECO)
Volume 1, Issue 1, Jan-Dec 2024, pp. 1-19, Article ID: IJAECO_01_01_001
Available online at https://iaeme.com/Home/issue/IJAECO?Volume=1&Issue=1
Journal ID: 2514-4545, DOI: https://doi.org/10.5281/zenodo.14257861

THE ROLE OF SKILLED LABOR IN ATTRACTING FOREIGN DIRECT INVESTMENT

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ABSTRACT

The aim of this study was to demonstrate the existence of a possible link between workforce quality and foreign direct investment inflows. We used a panel model to control for the heterogeneity of the observations in their individual dimensions, by taking into account a specific effect assumed to be certain. The results of this fixed-effects model show that FDI inflows are greater in countries where there is a movement of labor from low-productivity to high-productivity economic activities. This movement is possible when the labor force varies in qualitative intensity. It also emerges that an influx of FDI is linked to the ease of cross-border trade, which requires a focus on institutions, particularly those aspects that affect the expense, ease and reliability of doing business in a country.

Keywords: Quality Workforce, Foreign Direct Investment Inflow, Human Capital, Structural Transformation.

JEL Code: O12, O15, F21.

Cite this Article: Léon MAYEKO, The Role of Skilled Labor in Attracting Foreign Direct Investment, International Journal of Applied Economics (IJAECO) 1(1), 2024. pp. 1-19.
https://iaeme.com/MasterAdmin/Journal_uploads/IJAECO/VOLUME_1_ISSUE_1/IJAECO_01_01_001.pdf

1. INTRODUCTION

In a world where production requires both capital and labor, Krugman (2000:73) believes that "...foreign investment is becoming increasingly important and is having a very visible influence on the global economy". This influence on the global economy manifests itself in the fragmentation of production processes, and in a growing range of goods and services that can now be produced far from the markets they are intended to serve (IMF, 2007: 177).

In the 1980s, structural adjustment programs advocated the removal of barriers to make African countries more attractive. The same arguments were put forward by the Heavily Indebted Poor Countries Initiative (HIPC). However, African countries are not a destination for foreign investment. The low attractiveness of foreign investment in certain regions of the world is due more to a lack of sources of efficiency than to real barriers.

Reflecting on the new capitalism, Plihon (2009: 14) elaborates on the conditions favorable to investment, pointing out that in the industrial world, the two sources of corporate efficiency are technical creativity and commercial know-how. Thus, it is interesting to note that the rise in offshoring in advanced countries mainly concerns imports of inputs from sectors with qualified labor rather than from sectors with unskilled labor (IMF, 2007: 182).

The transformations brought about by this new capitalism therefore generate complexity in production and/or progress in physical and/or human capital. Foreign direct investment inflows, for example, go hand in hand with organizational change, which requires recipient countries to develop high-performance education systems. According to Crifo (2003: 352), "organizational change goes hand in hand with the employment of a skilled workforce, benefiting from greater autonomy, training resources and versatility, while at the same time requiring new individual skills". And permanent innovation, since in this process of convergence, innovation is a joint production of human capital accumulation, according to Van Elkan (1996)[1].

For Krugman (2000: 76), "the export of capital to the Third World attracts attention because it exudes a perfume of exoticism, but the sums are small compared with those of the budget deficits of developed countries". By way of illustration, Africa's average annual[2] share of the world's net foreign direct investment (FDI) inflows is 3.14% over the period 1970-2019, with 0.89% for northern Africa and 2.25% for sub-Saharan Africa. While West Africa received 1.02%, FDI inflows were evenly distributed between the other regions, with 0.41% for East and Central Africa and 0.40% for Southern Africa.

Data on FDI inflows to Africa show that the proportion of sub-Saharan Africa (70.8%) is higher than that of northern Africa (29.2%). West Africa ranks first with 30.7%, followed by Central Africa (14.4%), East Africa (14.0%) and Southern Africa (11.6%).

Looking at the regional economic communities recognized by the African Union (AU), we note that the Community of Sahel-Saharan States (CEN-SAD) ranks first for FDI inflows worldwide (1.7%), followed by the Economic Community of West African States (ECOWAS) and the Common Market for Eastern and Southern Africa (COMESA) with the same percentage (1.0%). Next come the Southern African Development Community (SADC) (0.8%), the Economic Community of Central African States (ECCAS) (0.4%), the Arab Maghreb Union (AMU) (0.4%), the Intergovernmental Authority on Development (IGAD) (0.2%) and the East African Community (EAC) (0.1%).

With the global spread of high technology and the low cost of labor in the Third World, the global economy is tending to become a network of multinational enterprises [....], with production activity itself increasingly localized in low-wage countries (Plihon, 2009, p. 16). However, Plihon's analysis seems to be contradicted by the low proportion of FDI inflows to African countries presumed of low-wage economies, and the overwhelming preponderance of industrialized countries (USA, Europe and Japan) both as a place of origin and as a host for FDI.

[1] Cf. Olivier Basdevant (2002), "Croissance, R&D et formation une revue de la littérature", Problèmes

[2] Author's calculation based on UNCTAD STAT data.

This concentration of FDI in developed countries requires us to draw on what Plihon (2009, p. 15 and 16) writes, "the engine of wealth creation by the firm is its intellectual capital […], which is the main ingredient of high value-added products". Plihon explicitly links skilled labor and wealth creation, and implicitly skilled labor and FDI, and thus contributes to the theoretical analyses of previous eminent economists[3].

The great success of FDI inflows in the countries of the Central African Economic and Monetary Community (CAEMC), in 2018 and 2020, particularly in Congo and Gabon[4] and their focus on the primary sector, particularly oil, raises the question of whether these countries can channel significant FDI flows into other sectors.

If it is accepted that FDI inflows are linked to the skilled labor force of the host country, the subject of this paper is to see whether this relationship holds in the context of the CAEMC oil countries, using, in the empirical approach, the UNCTAD composite indices. As a result, we avoid using a Gaussian mixture model (GMM), as Sadeghi, Pegah, et al (2020, p. 168) do, as this saves us from reconstructing missing data.

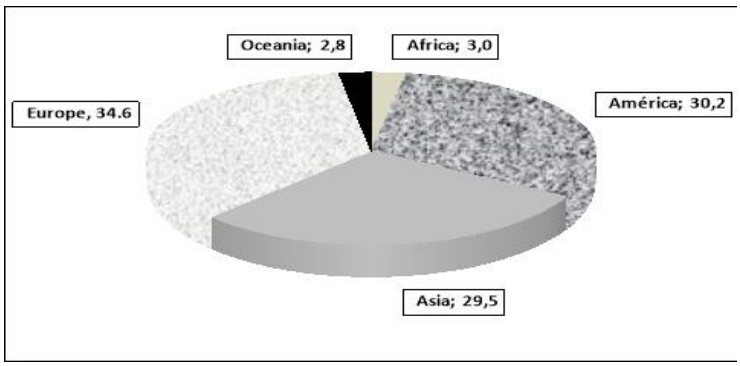
We will therefore use the panel model, which allows us to control the heterogeneity of the observations in their individual dimensions by taking into account a specific effect that is assumed to be certain (fixed effects). The second part of the report presents the figures for FDI inflows. The third part attempts to highlight ideas on skilled labor. The fourth part attempts to show the link between skilled labor and foreign investment. The fifth deals with the econometric approach. Finally, the last section discusses the implications for economic policy.

2. ANALYSIS OF FOREIGN DIRECT INVESTMENT INFLOW STATISTICS

2.1. Share of FDI inflows worldwide

The inflow of foreign direct investment is a major challenge for African economies, as this capital creates wealth. However, Africa is not a destination for FDI compared to other regions of the world. Between 1990 and 2022, FDI inflows to Africa averaged less than 3% of global FDI inflows. Across all continents, Europe is the leading destination, accounting for an average 34.6% of inflows. It is followed by the Americas with 30.2%.

Graph 1: FDI inflows as a proportion of world FDI inflows from 1990 to 2022



Source: Author's calculations based on UNCTAD_STAT data

[3] The following publications are instructive: 1)- Robert.E & Lucas J-R (1988) "why doesn't capital flow from rich to poor countries?" American Economic Review, n°2, Vol 80. 2)- Romer, P.M. (1986), "Increasing Returns and LongRun Growth", Journal of Political Economy, Vol. 94, N°. 5, pp. 1002-1037. 3)- Lucas, R. (1988), "On the Mechanisms of Economic Growth", Journal of MonetaryEconomics, Vol. 22, N°. 1, pp. 3-42. 4)- Mankiw N.G., Romer D. and Weil D.N., "A contribution to the empirics of economic growth, quarterly", Journal of Economics, vol.107, no2, 1992.

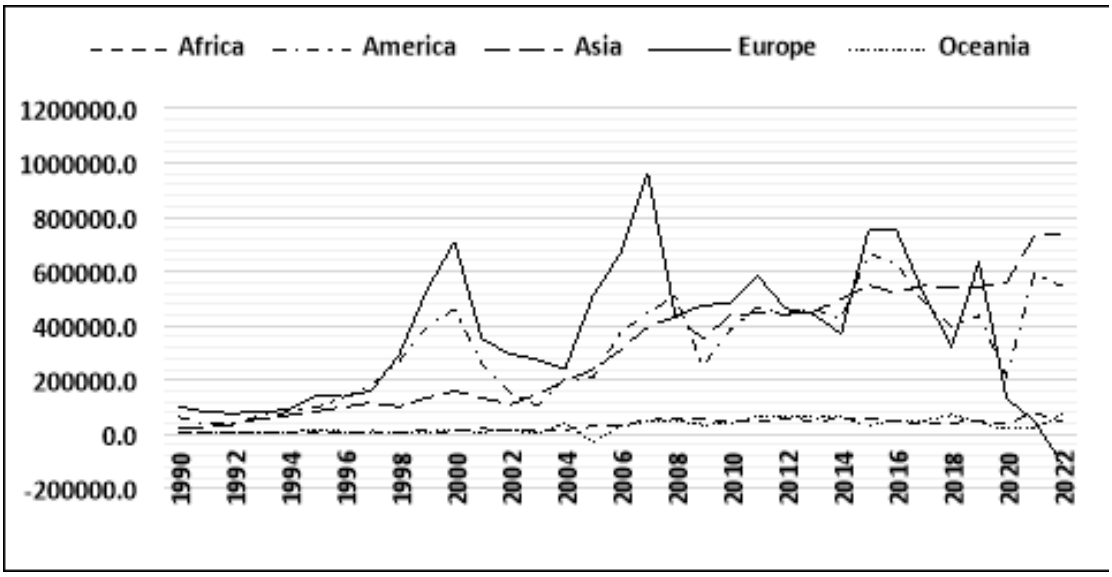
[4] Cf. UNCTAD STAT

Western Europe is the destination region for foreign direct investment flows into Europe (41.8%). This situation can be explained, among other things, by the absence of discriminatory barriers to foreign investment in new businesses or mergers and acquisitions. Indeed, capitalism has never ceased to evolve, and the driving force behind a company's wealth creation, according to Plihon (2009, 11), is its intellectual capital.

2.2. FDI inflows worldwide over the period 1990-2022

FDI inflows (in millions of current dollars) averaged 1,053,445.1 worldwide. These inflows, for the different continents, were $364,284 million for Europe, $318,181.6 million for the Americas, $310,469.0 million for Asia, $31,296.0 million for Africa and $29,214.5 million for Oceania.

Graph 2: FDI inflows over the period 1990-2022



Source: Author based on UNCTAD_STAT data

The graph shows that Asia is the continent where FDI inflows follow an upward trend over the entire period. In Africa and Oceania, FDI inflows remained stable until 2004, and increased slightly from 2006 onwards. Despite the high volume of FDI inflows in Europe and the Americas, the trend has been erratic.

2.3. FDI inflows: a Community and regional breakdown

Table 1 shows that the Community of Sahel-Saharan States (CEN-SAD), with an average annual share of 49.6%, and the Common Market for Eastern and Southern Africa (CMESA), with 38.1%, accounted for the highest shares of FDI inflows over the 2010-2019 period. The countries of the Central African Economic and Monetary Community (CAEMC), all members of ECCAS, accounted for the bulk of ECCAS FDI inflows over the period, on an annual average basis. The countries of the West African Economic and Monetary Union (WAEMU), on the other hand, are not a destination for FDI inflows from ECOWAS countries.

Table 1: Share of FDI inflows from communities (% of total FDI inflows from Africa)

	2010	2011	2012	2013	2014	2015	2016	2017	2018
UMA	15,9	15,1	15,2	15,9	12,3	7,3	10,7	13,0	13,6
CEN-SAD	54,4	49,4	53,1	50,7	40,6	41,0	50,6	56,2	49,9
CEPGL	6,8	4,0	6,3	4,7	4,4	3,6	3,3	4,1	4,1
CMESA	44,6	23,1	38,6	35,9	31,4	33,9	42,2	49,0	43,9
CAE	8,2	8,1	8,4	7,5	7,1	5,7	5,4	8,3	10,1
ECCAS	9,8	5,5	7,0	-3,4	16,6	32,2	11,2	4,1	6,8
ECOWAS	25,5	40,2	27,2	26,7	21,6	17,0	26,8	25,6	20,7
IGAD	9,3	10,8	9,8	10,1	10,2	10,8	14,8	19,0	18,2
SADC	25,1	26,5	33,3	32,3	40,9	41,0	21,3	5,8	16,7
CAEMC	9,8	8,1	3,3	6,1	5,4	10,9	8,2	17,8	15,1
WAEMU	4,9	7,2	4,5	5,6	4,9	4,2	4,7	6,7	6,9

Source: Author's calculations based on UNCTAD_STAT data

The economic communities in the top two places have the largest number of member countries, with 29 countries for CEN-SAD and 19 for COMESA[5] . In 2010, CEN-SAD alone attracted more than half (54.4%) of total FDI inflows to Africa. The same was true in 2012 (53.1%), 2013 (50.7%), 2016 (50.6%), and 2017 (56.2%). These figures indicate the extent of these communities' markets. However, it seems risky to explain FDI inflows by the number of member countries.

Over the period, we note that the CEPGL has not managed to reach the 2010 level of FDI inflows. The same is true of the UMA, which has failed to reach the 2013 level. On the other hand, CEN-SAD is the only community to have attracted more than half of FDI inflows to Africa.

Table 2: Share of FDI inflows (% of Africa's inflows)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Northern Africa	33,3	16,0	27,3	25,0	21,9	21,4	30,0	32,9	34,7	30,0	25,0	11,9	33,2
Sub-Saharan Africa	66,7	84,0	72,7	75,0	78,1	78,6	70,0	67,1	65,3	70,0	75,0	88,1	66,8
East Africa	23,1	26,8	27,2	32,7	28,1	24,5	27,9	32,2	27,7	24,3	26,4	17,6	26,4
central Central	9,1	5,1	6,6	-3,8	15,5	31,1	10,6	3,0	5,7	9,6	18,3	2,2	-1,2
Southern Africa	9,1	11,9	10,4	18,3	12,6	5,6	6,1	6,3	13,6	11,3	7,7	52,1	22,8
West Africa	25,4	40,3	28,5	27,8	21,9	17,3	25,4	25,7	18,2	24,8	22,6	16,3	18,8

Source: Author's calculations based on UNCTAD_STAT data

FDI inflows also show that certain regions manage to attract a significant proportion of FDI inflows to Africa (table 2). Over the period 2010-2022, Sub-Saharan Africa (73.7%) has accounted for a higher proportion of FDI inflows than North Africa (26.3%) over the past ten years.

East Africa (26.5%) is the sub-region with the highest average proportion of net FDI inflows, followed by West Africa (24.1%). Southern Africa and West Africa accounted for only 14.4% and 8.6% respectively of net FDI inflows over the 2010-2022 period.

These figures show that, for the past 7 years, Central African countries have been struggling to reach the 2015 level of FDI inflows. West African countries have been unable to reach the 2011 level (40.3%) for over 10 years.

[5] Africa Regional Integration Index, 2016 Report, Economic Commission for Africa

3. IDEAS ABOUT SKILLED LABOR

3.1. Definition of skilled labor

According to the 2014 Larousse dictionary, "the workforce is a set of employees, especially workers, of an establishment, a region, a country". However, this definition is very restrictive if we want to grasp the importance of labor in the productive mix.

The question of manpower lies at the heart of social life in every country. Adam Smith (1776)[6] already pointed out that "perfected dexterity, in a workman, may be considered under the same point of view as a machine or instrument of industry which facilitates and shortens labor, and which, notwithstanding the expense it has cost, returns that expense with a profit."

However, the workforce includes not only workers (employees or salaried workers), but also individuals of working age seeking employment. The "work" referred to in this labor force is work that has been done (or is yet to be done), which goes well beyond its market dimension in terms of employment.

A country's ability to internalize and promote innovation depends, among other factors, on the skills of its workforce. And this qualification of the workforce can only be understood once it is inscribed in the specific context in which it is produced. Thus, we can attempt to define a skilled workforce as a category of individuals of working age engaged in paid work, or seeking paid work of an intellectual and/or technical nature requiring in-depth knowledge in a particular given field.

For the OECD (2009: 40), the highly-skilled workforce is measured by the proportion of the working population with tertiary education, i.e. short, medium or long university degrees.

3.2. Skilled labor and human capital

The notion of skilled labor refers us to the concept of human capital, which "designates a stock of physical and intellectual characteristics that enable an individual to participate in productive activity. This stock is made up in part of acquired characteristics (knowledge resulting from education, training, know-how acquired through productive activity, etc.)" (Beitone et al., 2019: 57).

The World Bank (2009:146), points out that "skilled labor, which embodies human capital, personal education, skills and talents, generates higher economic profitability where it is abundant."

It is accepted that investment in education enables each individual to accumulate human capital, made up of knowledge, know-how and experience (Guerrien (1996) and Bialès et al. (1999))[7]. For an individual, this investment in human capital involves expenditure on education, vocational training or health (Beitone et al., 2019).

The World Bank has recently developed a human capital index that measures the contribution of health and education to the productivity of a country's next generation, based on microeconometric studies. It reflects a country's productivity level in relation to its potential. On the other hand, a human capital index has been published by UNCTAD on its "unctactad statistics database" site since the 2000s.

[6] Quoted by Delas (2008), page 266, an extract from Recherches sur la nature de la richesse des nations, Paris, Gallimard, page 134.

[7] Cf. Mayéko (2019), Investment in education and development process in Congo, International Journal of Current Research in Life Sciences, Vol. 08, No. 01, pp.2983-2990, January.

These UNCTAD statistics show that Tunisia is the only African country to have recorded a human capital index[8] above 50 since 2002, with an average index of 53.8 over the period 2000-2018. Algeria has recorded a human capital index above 50 since 2012. Mauritius and Morocco respectively recorded human capital indices above 50 from 2013 and 2017. However, from 2001 to 2018, all these countries have a human capital index above 40. Of the 49 African countries, just 8 have a human capital index above 40 over the period 2000-2018, namely: Tunisia, Mauritius, Algeria, Seychelles, Libya, South Africa, Egypt and Botswana. These include Tunisia, Mauritius, Algeria, Seychelles, Libya, South Africa, Egypt and Botswana. Morocco's index has been above 40 since 2001, with an average index of 46.1.

Schultz T. W. (1981)[9], pointed out that "there is little doubt that investment, which improves people's capabilities, creates differences in economic growth and in satisfaction with consumption. We now know that the neglect of human capital skews the analysis of economic growth."

A number of works have been inspired by Schultz's understanding that progress in health and education are key variables in explaining economic development in the 20th century. This work has attracted a great deal of interest, judging by the number of Nobel Prize winners among its main authors[10].

The new growth theories teach us that the differences observed in both GDP per capita and productivity growth rates (in the short and medium term) from one country to another are largely due to differences in research and development (R&D) systems and policies, and also to differences between education systems insofar as these systems condition the supply of skilled labor capable of generating technical progress (Aghion P. and Cohen E., 2004: 20).

An illustrative example of the role of education and research in technology diffusion is that of the "green revolution". Starting with a fundamental innovation in the hybridization of plant seeds, the developing countries with the most highly qualified workers, research facilities and universities were the best placed to produce new qualities of rice and wheat adapted to local conditions (Aghion P. and Cohen E., 2004: 20).

By associating an individual's level of qualification with the probability of efficiently carrying out a productive task, Kremer (1993: 551) revives the economics of micro-development. However, as Krugman (2000: 214) points out, governments don't necessarily act in the national interest, especially when it comes to cutting-edge microeconomic interventions. After all, half of the wealth produced in our societies is publicly appropriated or redistributed. So, if such sums are not capable of resolving pauperism, it's because we lack the political will to do so (Cohen, 1997: 165).

The situation of impoverished populations in certain oil-rich or resource-rich countries is not the result of a real gap between the official discourse of the political authorities and the various actions taken. Improving this situation therefore depends on the real aims pursued by the political authorities, in particular political will.

In Central Africa, for example, economic growth has not significantly reduced unemployment and inequality. In 2018 the unemployment rate reached 4.7%, in line with the CEMAC oil countries, Gabon with an unemployment rate of 20%, followed by Congo (11%), Equatorial Guinea (7.6%), Chad (5.9%) and Cameroon (4.2%) (AfDB, 2019: 17).

[8] Cf. UNCTAD STAT.

[9] Cf. Mayéko (2019), Investment in education and development process in Congo, International Journal of Current Research in Life Sciences, Vol. 08, No. 01, pp.2983-2990, January.

[10] These include Solow R. M. (Nobel Prize 1987), Becker G.S. (Nobel Prize 1992), Lucas R.E. (Nobel Prize 1995), Sen A.K. (Nobel Prize 1998), Heckman J.J (Nobel Prize 2000), and Spence A.M. (Nobel Prize 2001).

A model of society that keeps a large part of the population in poverty can have a considerable impact on the quality of the workforce, since this category of the population is unable to invest in education and health.

Poverty is a deprivation of capabilities. And capability is a set of vectors of functioning which indicate that an individual is free to lead such and such a life (Sen, 2000: 77). Sen's notion of capability promotes the freedoms of each individual, and makes it the duty of every society to encourage them, so that poverty and inequality can be reduced.

As a person's capability has a relevant relationship with his or her well-being (Sen, 2000: 77), a poor household, deprived of capability, cannot achieve well-being, since it cannot assemble all the vectors of functioning. For this author, it's a question of rethinking inequality through the fight against social inequalities in order to achieve real equality.

Progress in the field of education is recognized as an essential variable, as the strengthening of the education system conditions the supply of skilled labor. An illustrative example of the role played by education and research in technological diffusion in developing countries is the "green revolution" (in China, for example). Similarly, countries rich in natural resources (e.g. oil) that have succeeded in raising their level of development are those that have strengthened their human capital (e.g. the Netherlands).

However, according to Transparency International, oil-rich African countries are among the most corrupt. In 2020, there are ten (10) countries among the major African oil producers[11] , with only Tunisia ranking 69th (score of 44). Libya is the leading producer, ranking 173e (score of 17), Nigeria 149e (score 25), Algeria 104e (score 36), Angola 142e (score 27), South Sudan 179e (score 12), Egypt 117e (score 33), Congo 165e (score 19), Gabon (score 30), Chad 160 (score 21), Sudan 174e (score 16) and Equatorial Guinea 174e (score 16).

In countries with high levels of corruption, spending on education is lower. As a result, these countries are unable to promote research and development (R&D) systems and policies, as well as education and healthcare systems that condition the supply of skilled labor.

For D. Acemoglu and J. A. Robinson, inclusive economic institutions "also pave the way for the two engines of prosperity, technology and education" (Beitone and al., 1999: 347). However, inclusive economic institutions must be set up by the state, by promoting the creation of market institutions, building infrastructure and providing public services. In the vast majority of African countries, especially those with a high level of corruption, the state has been divesting itself of these functions for decades.

In this context, the promotion of a skilled workforce depends on each household's ability to finance the training of its members. According to the World Bank (1995: 44), households do not hesitate to invest in the health and education of their members, as the benefits generally outweigh the costs. Thus, all other things being equal, the higher the per capita final consumption expenditure of households, the greater the human capital and therefore the more abundant the skilled workforce for these households. However, the World Bank (1995: 44), underlines households often under-invest in human capital.

While education is a good thing for training a skilled workforce, according to the World Bank (2009: 155), education also has the effect of increasing the speed of mobility of skilled workers, and this migration has been on the rise since the 1970s in the developing countries of Africa, the Caribbean and Central America.

[11] Statiscal Review of World Energie 2020, 69e Edition.

With the African world suffering from education problems and seemingly condemned to remain in unskilled labor sectors, there is no guarantee that foreign investment will flow into these economies, especially as the few skilled workers migrate[12] abroad.

4. LINKS BETWEEN SKILLED LABOR AND FDI INFLOWS

Weber[13], while not ignoring other factors, considers transport cost to be a synthetic factor that has made it possible to propose a general theory of industrial location. However, the restrictive assumptions[14] of this theory, which make location independent of production, have meant that successive theories have sought to deepen the theory of production. Yet the study of production, according to the Marshallian approach, is a highly complex issue (Jessua, 1991, p. 386) (histoire de la théorie économique, PUF, Paris 1e Edition), since we have to start from the sources of production and try to explain how their prices are formed.

For investors in general, production costs represent the total expenditure required to obtain a given quantity of product. Since production combines several factors (labor, capital and raw materials), it's a matter of finding the best possible combination of these factors. In this way, production determines the price of goods. It was therefore necessary to identify the links between the international mobility of companies and the costs of the various factors.

Initially, the relationship between labor and FDI inflows was captured through the price of labor. FDI could locate in a country if the price of labor was low or falling (cheap labor), and in the opposite case when the price of labor was rising (or expensive labor). Lucas (1993, p. 392), in a model of derived demand for foreign capital by a multi-product monopolist estimated for seven Asian countries, shows that FDI inflows are less elastic in relation to capital costs than in relation to wages (labor costs).

However, the very functioning of production is a source of the cycle in the evolution of quantities. In a cycle, there can be periods of strong growth marked by pressure on production capacity, followed by periods of unemployment and under-utilized capital. This Keynesian vision shows that a company's investment mechanism depends exclusively on anticipated outlets[15]. (Daniel (2022, p. 82-83), La politique économique, PUF/Humensis, Paris, 6e Edition).

If, for Keynesians, expected outlets (the ability to maintain or win market share) are the condition for a company's investment, this means that the company is constantly transforming itself through innovation. Indeed, innovation is the key driver of productivity and income growth (OECD, 2012, p. 56 Unleashing Business Innovation). This innovation can originate from within the company itself, but it can also take place outside the company.

Can also involve the use of knowledge and technologies acquired from other companies or organizations. As such, it is an integral part of doing business. (OECD, 2006, p. 82 Innovation and economic performance).

[12] The ageing of the population in Northern countries appears to be an opportunity for skilled African workers to find better-paid employment

[13] Often considered the father of industrial localization.

[14] Cf. Weber A. (1909), Über den Standort der Industrien, Erster Teil: Reine Theorie des Standorts, Tübingen, J.C.B. Mohr, 223 p., trans. by C. J? Friedrich, Alfred Weber's Theory of Location of Industries, Chicago, University of Chicago Press, 1929, 256 p.

[15] For Keynesians, the determination of investment is represented by : $I(t) = a[R(t-1)-R(t-2)]$, i.e. investment depends on savings, which is simply the difference between the incomes of the two preceding periods, with t the reference period. Based on Say's Law, supply creates its own demand: $Y(t) = R(t)$. In equilibrium, supply equals demand: $Y(t) = C(t) + I(t)$. As consumption is a function of income, we have : $C(t) = cR(t- 1)$. Combining the four equations gives the evolution of production over time: $Y(t) - (c + a)Y(t-1) + aY(t-2) = 0$.

In a subsection devoted to the issues of human capital, research & development (R&D) and economic growth, Belze and Gauthier (2000, p. 67, Innovation et croissance économique : rôle et enjeux du financement des PME, Revue internationale des PME, Vol. 13, N° 1, pp. 65-86), citing Logossah (1994), for whom, in the light of the literature, a strong correlation seems to emerge between the average level of human capital, the degree of knowledge and the productivity of the activity, believe that this argument is not sufficient to explain the sustained growth in total factor productivity.

However, the stock of intangible capital (education, training, R&D, health) is now more important than the stock of tangible equipment. The key growth variable is now knowledge intensity, defined as the proportion of knowledge workers. And the "social return" of knowledge is a source of positive externalities (Plihon, 2009, p. 14-15 ; Le nouveau capitalisme, La Découverte, Paris, 3e Edition).

These knowledge workers, who represent the skilled labor force, enable the company to differentiate itself from others through the personalization of its production, thus strengthening its ability to retain or win market share.

Cleeve et al. (2015, p. 1), indicate that empirical evidence on the link between human capital and FDI remains thin. Furthermore, using panel data to estimate a model, covering up to 35 subSaharan African countries these authors show that all measures of human capital have a significant influence on FDI, as do traditional variables. But, over time, there is no evidence of the growing importance of human capital on FDI. This contradicts Noorbakhsh et al (2001), whose empirical results show that human capital, although a statistically significant determinant of FDI inflows and one of the most important determinants, has increased in importance over time.

In a recent empirical analysis, Sadeghi, Pegah, et al (2020, p. 168) evaluate the dynamics of foreign direct investment flows using dynamic panel GMM estimators. They find that economic complexity[16] is one of the main determinants of FDI inflows, with statistically and economically robust positive effects on FDI inflows in host countries. These results also explain why countries with equal human capital endowments perform differently in attracting FDI.

From all the above, theoretical and empirical analyses try to show the relationship between human capital (skilled labor) and FDI inflows, even if this relationship remains tenuous for some authors. One difficulty, especially for empirical analyses, is the use of alternative indicators or composite indices. Indeed, the difficulty of capturing the human capital, which for some authors is limited to the level of education[17], means that we are seeking to use a composite index, since human capital also includes health issues, etc.

There's no need for this work to criticize this approach, as we know, the authors are often faced with the problem of data reliability. However, the facts support our analysis. UNCTADstat's analysis of FDI inflows in 2022 shows that Japan, South Korea, China, Germany, the USA, Denmark, Sweden, Canada, the UK and Switzerland accounted for 51.4% of global FDI inflows. In addition, Japan, South Korea, China, Germany and the USA alone accounted for 41.4% of global FDI inflows. One feature is that these countries, according to U.S. News & World Report 2022, are respectively the top five of the top 10 countries with the most skilled labor in 2022.

[16]Economic complexity, on the one hand, measures knowledge intensity, worker skills and the quality of human capital, and on the other, implicitly indicates the quality of infrastructure and social institutions.

[17]Two people may have the same level of education, but not the same knowledge content

5. ECONOMETRIC APPROACH

The aim here is to show the possible links between the explained variable (foreign direct investment inflows) and the various explanatory variables.

While the explained variable is known, the explanatory variables are difficult to grasp, since the authors are not unanimous. However, it has been shown that large FDI inflows are concentrated in countries where the conditions for FDI are favorable (World Bank, 2009). These conditions include a skilled workforce, linked to education and health systems (D. Acemoglu and J. A. Robinson)[18]. New motivations for FDI inflows include the presence of information and communication technologies (ICT), energy (IMF (2007), World Bank (2009)) and structural change (Amable et al., (1997), World Bank (2009)). Among the oldest motivations for FDI inflows are those associated with control over raw materials (natural capital) and those linked to Vernon's product life cycle, including the presence of a private sector (presence of domestic and/or foreign companies), energy and transport (quality of infrastructure).

5.1. Explanatory variables for foreign direct investment inflows

The United Nations Conference on Trade and Development (UNCTAD), through its UNCTAD STAT database, has developed a number of indicators, including the eight categories of the Productive Capacity Index: human capital, natural capital, energy, transport, ICT, institutions, private sector and structural change. The productive capacity index is the geometric mean of the values of the eight categories that enable a country to achieve maximum production.

Our sample comprises five countries: Cameroon, Central African Republic, Chad, Congo and Equatorial Guinea. The sample is based on macroeconomic data covering the period 2000 to 2022.

The gravity model, which has been very successful in explaining regional trade flows, has been used by some authors[19] to explain FDI inflows. However, while in trade flows goods move from one country to another, capital flows from one country (investor) to another (recipient), and the distance is zero, since financial transactions take place via open-ended investment companies, mutual funds and bonds[20] .

Yang (1999: 43), seeking to model the impact of human capital on the geographical distribution of FDI in China, used a Cobb-Douglas production function with a constant-return technology of the form $y=Ax\beta$ where y and x represent income per worker and capital per worker respectively.

A well-known simple function is consumption as a function of income ($C=aY$), to which we associate autonomous consumption. This function can be used to explain FDI inflows. Assuming that FDI inflows represent consumption for the recipient country, and that favorable conditions have to be met, which in the consumption function represent income. Autonomous consumption can be assimilated to FDI inflows intended to serve regional markets.

[18] Cited by Bialès et al (1999), on inclusive economic institutions, page 161.

[19] Examples include Driss (2007), L'attractivité des investissements directs étrangers industriels en Tunisie, Région et développement, n° 25, page 144.

[20] The investment is not based on capital, but on debt, which is often more secure. In fact, the income generated is fixed.

5.2. Model presentation

Thus, the model to be specified can be written as follows:

$EIDE_{it} = f\ (CH_{it}, CN_{it}, EN_{it}, TP_{it}, TIC_{it}, INS_{it}, SP_{it}, CS_{it})$

With,

$EIDE_{it}$, FDI inflows from country i at time t as a percentage of FDI inflows to Africa ;

CH_{it}, the human capital of country i at time t ;

CN_{it}, the natural capital of country i at time t ;

EN_{it}, the energy of country i at time t ;

TP_{it}, transportation in country i at time t ;

TIC_{it}, the information and communication technologies of country i at time t ;

INS_{it}, the institutions of country i at time t ;

SP_{it}, the private sector of country i at time t ;

CS_{it}, the structural change in country i at time t.

5.3. Model application

Model verification and validation are carried out by means of tests, in particular model verification tests and model validation tests. Pre-tests include stationarity, if possible, cointegration and model selection.

5.3.1. Study of variable stationarity

Unit root tests are used to analyze the stationarity of time series. However, the application of these tests to panel data is recent. The most frequently used tests are those of Levin and Lin (LL) and Im, Pesaran and Shin (IPS).

The Levin and Lin test is based on estimating the long-term variance of residuals using a Bartlett-type kernel function and a truncation parameter common to all countries (Levin, Lin and Chu, 2002). This test is only robust when its kernel function is modified by the method of Newey and West (1994). Thus, Levin and Lin's test leads to a rather counter-intuitive result (Christophe Hurlin and Valérie Mignon, 2006).

The most suitable test is the IPS test, as it takes into account the heterogeneous dimension of the autoregressive root (Christophe Hurlin and Valérie Mignon, 2006). Applying the IPS test to the study variables, we note the rejection of non-stationarity whatever the hypothesis formulated on the deterministic component (model with individual effects with or without deterministic trends). And the test on first difference variables reassures us that, in general, the variables are stationary to degree 1 (integrated to order 1).

However, it should be noted that the rejection of non-stationarity does not imply the stationarity of the variables of the five countries in the sample, but means that there is at least one country for which there is no unit root.

Table 3: Stationarity test for study variables

Variables	Level variables		First difference variables	
	Trendless model	Trendy model	Trendless model	Trendy model
CH	0.9999	0.1114	0.0000	0.0009
CN	0.2527	0.6898	0.0001	0.0105
CS	0.4266	0.2349	0.0000	0.0000
EIDE	0.0902	0.4450	0.0000	0.0000
EN	0.4050	0.6019	0.0017	0.0614
INS	0.3316	0.3085	0.0000	0.0000
SP	0.3453	0.0167	0.0002	0.0348
TIC	0.9939	0.8423	0.0002	0.0211
TP	0.1064	0.0021	0.0000	0.0000

Source: Author, using the IPS test

5.3.2. Study of the cointegration of variables

The existence of stationarity for all panel variables leads us to study the existence of a longterm relationship between these variables. In other words, we study the existence of a cointegrating relationship by applying Kao's cointegration tests to panel data[21] . These tests consist in testing for the presence of a unit root in the estimated residuals.

Table 4: Cointegration test

ADF	t-Statistic	Prob.
	-1.737950	0.0411
Residual variance	0.000299	
HAC variance	0.000214	

Source: Author, using the Cointegration Test

From the results of the cointegration tests, we see that all the statistics are below the critical value of the normal distribution for a threshold of 5% (-1.74). As a result, all these tests require the existence of a cointegrating relationship. Since the aim is to carry out cointegration tests on panel data and obtain an estimate of the cointegrating vectors, it is necessary to apply an efficient estimation method, particularly one that takes into account the long and short term.

5.3.3. Choosing the right model

Panel models make it possible to control the heterogeneity of observations in their individual dimensions, either by taking into account a specific effect assumed to be certain (fixed effects), or by taking into account a specific unobservable effect (random effects). The choice between the fixed-effects model and the random-effects model is made using the Hausman test. Applying the Hausman test, our results show that the P-value is less than 5%. This means that the null hypothesis of the test has been rejected. In other words, we accept the hypothesis that the fixed-effects model is the consistent model.

[21] We couldn't do the Pedroni test because we have at least eight (08) study variables.

Table 5: Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq.d.f.	Prob.
Period random	34.038729	17	0.0083
**WARNING: estimated period random effects variance is zero			

Source: Author, using the Hausman test

After running the fixed-effects model, the result is as follows.

Table 6: Model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CH)	-0.001418	0.000946	-1.499715	0.1373
D(CN)	-0.000379	0.000685	-0.553311	0.5815
D(EN)	-0.000146	0.000588	-0.248256	0.8045
D(TP)	-0.000599	0.000275	-2.176201	0.0322
D(TIC)	-0.000513	0.000652	-0.786999	0.4334
D(INS)	-3.92E-05	0.000681	-0.057620	0.9542
D(SP)	1.95E-05	0.000687	0.028373	0.9774
D(CS)	0.000469	0.000204	2.295497	0.0241
C	0.008788	0.040460	0.217209	0.8285
EIDE(-1)	-0.641663	0.090472	-7.092367	0.0000
CH(-1)	-0.000791	0.000701	-1.127699	0.2625
CN(-1)	-0.000772	0.000476	-1.622323	0.1083
EN(-1)	-0.000715	0.000492	-1.452435	0.1499
TP(-1)	-0.000540	0.000203	-2.655694	0.0094
TIC(-1)	865-05	0.000430	0.201108	0.8411
INS(-1)	0.000262	0.000588	0.444983	0.6574
SP(-1)	0.002010	0.000526	3.819564	0.0002
CS(-1)	0.000352	0.000117	3.011609	0.0034

Source: Author, using the method: panel EGLS (Cross-section SUR)

The Jarque-Berra test and the non-correlation test on the model residuals show that they follow the normal distribution (Appendix 1) and are non-correlated (Appendix 2). The results of the model can therefore be interpreted.

5.3.4. Interpretation of results

Analysis of the model results reveals that :

- In the short term, only transport and structural change have a negative and positive effect respectively on FDI;

- In the long term, we note that the correction mechanism governing the dynamics of the variables is indeed present, as the coefficient of the model's restoring force is significantly negative and less than 1 in absolute value. The results show that only three variables out of eight significantly explain long-term FDI. These are transport (negative impact), private sector and structural change. The last two variables explain FDI positively.

6. ECONOMIC POLICY IMPLICATIONS

In view of the results of the econometric estimates, a number of economic policy implications can be envisaged. The results show that, in both the short and long term, structural change has a positive effect on FDI inflows.

According to the OECD[22] , the indicator structural change refers to the movement of labor and other productive resources from low-productivity to high-productivity economic activities. This shift is currently reflected in the sophistication and variety of exports, fixed capital intensity and the share of industry and services in total GDP.

African countries therefore need to implement the best policies to encourage the emergence of the sectors most likely to bring about the productive transformation of the economy as a whole.

Lectard (2017: 21), indicates that export diversification and sophistication have emerged as the two indicators for measuring and quantifying industrial transformation. However, over the period 1995-2020, UNCTADstat data on extra- and intra-Community exports of manufactured goods and intra-group trade in goods as a percentage of total trade confirm the difficulties of Central African countries highlighted by de Sylviane Guillaumont Jeanneney and Patrick Guillaumont (2017: 1).

Structural transformation also means achieving economies of scale, and therefore reducing production costs. These production costs can be captured through the real effective exchange rate (REER). Indeed, the calculation of the real effective exchange rate (REER), "aims to compare the evolution of production costs of internationally traded goods at home and abroad" (Patrick and Sylviane Guillaumont, 1988: 77).

With the exception of Gabon, the evolution of the REER from 1995 to 2016 indicates difficulties for the other CEMAC countries in their efforts to reduce the production costs of exported manufactured goods, particularly over the period 2012 to 2016. This situation may explain the wide disparity highlighted by authors Sylviane Guillaumont Jeanneney and Patrick Guillaumont (2017: 1) for the trade performance of CEMAC and UEMOA countries.

In the long term, the private sector has a positive impact on FDI inflows. According to UNCTAD, the private sector is defined by the ease of cross-border trade, which includes the time and monetary costs of exporting and importing, and business support in terms of domestic credit, speed of contract execution and time to start a business.

CEMAC countries therefore need to improve their business environment in order to attract more FDI. However, initiatives to improve the business climate have been taken at both African (NEPAD[23]) and regional (CEMAC and UEMOA) levels.

However, these initiatives have not focused on the institutions that form part of the business climate, namely those aspects that affect the expense, ease and reliability of doing business in a country (Carlin and Seabright, 2008: 32). Similarly, these aspects may be known, but difficult to address adequately because of poor governance. Corruption, for example, one of the social factors affecting the business climate, is a weapon of political management for some African decision-makers. According to Transparency International, the CEMAC countries[24] have low corruption perception indices, which means that they are countries with high levels of corruption.

[22] See definition of indicators in UNCTADstat.

[23] The New Partnership for Africa's Development argued that to achieve a growth rate of 7% and halve the number of poor people, Africa would have to mobilize more resources of its own, in part by improving the conditions for investment, i.e. the business climate.

[24] The most corrupt CEMAC country is Equatorial Guinea (17), followed by Chad (19), Congo (21), CAR (24) and Cameroon (26). Gabon is the least corrupt CEMAC country, with an index of 29.

As CEMAC countries are underdeveloped, the disincentives associated with infrastructure investment and opportunism are constraints that cost economic agents (companies and households), as they have a negative impact on the economy as a whole. The risk of opportunism increases transaction costs, i.e. the cost of negotiating a contract (Abecassis, 1997: 13). As a result[25], contracts will most often be incomplete, failing to consider all possible events.

7. CONCLUSION

This study validated the analyses of micro-development economics, in particular the behavioral problem that characterizes bad faith behavior aimed at individual gains beyond the normal profit of the exchange.

The results confirm that FDI inflows are greater in countries where there is a movement of labor and other productive resources from low-productivity to high-productivity economic activities. This movement of labor is only possible when it varies in qualitative intensity. And it is this skilled workforce that is most in demand in manufacturing - a sector more capable of bringing about the productive transformation of the economy as a whole.

The results also show that an inflow of FDI is linked to the ease of cross-border trade, which includes the time and monetary costs of exporting and importing, and business support in terms of domestic credit, speed of contract execution and the time needed to start up a business. For these factors, the imperative is to focus on institutions, particularly those aspects that affect the expense, ease and reliability of doing business in a country. However, poor governance and the disincentives associated with infrastructure investment and opportunism are constraints that cost economic agents (businesses and households) because they have a negative impact on the economy as a whole.

Skilled labor is therefore a lever for FDI inflows, as it is more in demand in manufacturing, a sector more likely to bring about the productive transformation of the economy as a whole.

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Citation: Léon MAYEKO, The Role of Skilled Labor in Attracting Foreign Direct Investment, International Journal of Applied Economics (IJAECO) 1(1), 2024. pp. 1-19

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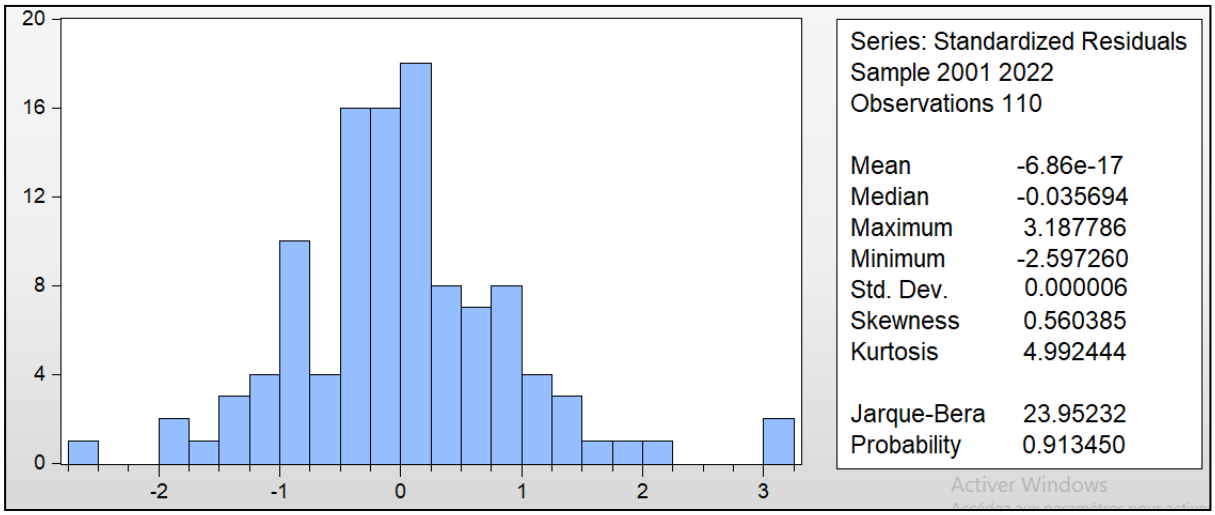
APPENDICES

Appendix 1: Residual normality test



Appendix 2: Residual non-correlation test

Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in weighted residuals
Equation: Untitled
Periods included: 22
Cross-sections included: 5
Total panel observations: 110
Cross-section effects were removed during estimation

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	1.829730	10	0.9975
Pesaran scaled LM	-1.826928		0.0677
Bias-corrected scaled LM	-1.945976		0.0517
Pesaran CD	0.237412		0.8123