Foreign Direct Investment and Export Diversification in Africa: The Role of Institutional Quality

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Abstract

This article investigates the role of institutional quality in host countries in facilitating the export diversification improvement effect of foreign direct investment (FDI) in African countries. The analysis is based on the assumption that the mixed results of existing empirical studies may be due to institutional heterogeneity. It proposes that improved institution quality should enhance the benefits associated with FDI with varying impacts across countries and/or over time.
To achieve this objective, we used a two-step linear and dynamic panels with interaction terms on a sample of 30 African countries covering the period 1996-2019. The sample is divided into subgroups according to their natural resource endowment.

The results show that FDI has a positive effect on export diversification in mineral-rich and oil-producing countries. These results contradict the predictions of Asiedu and Lien (2011) and Gylfason and Zoega (2006), who argue that FDI should create either a crowding-out effect on investment in the natural resource sector and/or favorable wage differentials in the natural resource sectors, resulting in a concentration of exports in these sectors. Similarly, the quality of institutions has a direct negative effect on export diversification, partly confirming the literature that, with an abundance of strategic natural resources (such as oil), the quality of institutions is no longer an indicator of FDI attractiveness (Asiedu, 2013, Aleksynska and Havrylchyk, 2012, and Feulefack and Ngassam, 2020). On the other hand, the indirect effect of institutional quality on export diversification through FDI is positive. Countries that improve their institutions can attract more investment and strengthen their international competitiveness, which can lead to greater export diversification. Given that the quality of institutions still needs to be improved in African economies, they are unable to attract sufficient FDI to promote the diversification of their exports. Under these circumstances, it is imperative that African countries create an institutional environment that attracts sufficient FDI in order to diversify their exports.

Keywords: Export diversification, FDI, Institutional quality, Africa
JEL: F14; F21; O11; O43; O55;

1. Introduction

One of the salient facts about globalization over the last three decades is the strong upward trend in foreign direct investment (FDI) and its importance for economic growth in developing countries. From US$204,905 million in 1990, FDI inflows reached US$1,582,310 million in 2021, passing through US$1,371,919.3 million in 2010, and reaching its highest level of US$2,041,770 million in 2015. The overall amount of FDI has therefore increased more than fivefold between 1990 and 2019 (UNCTAD WIR, 2022). FDI can play an important role in an economy's development efforts, particularly by supplementing the generally low in African countries in order to finance the investment projects needed to accelerate growth and development (Dupasquier and Osakwe, 2006; Anyanwu, 2006) domestic savings, promoting job creation and growth through an inflow of additional capital to the host country (Dupasquier and Osakwe, 2006; Anyanwu, 2006). It improves exports and promotes integration into global value chains (Dupasquier and Osakwe, 2006; Rodrik, 2006; Klinger and Lederman, 2006). It also ensures the transfer of modern technologies from foreign companies with superior technology to domestic companies, which leads to an improvement in the skills of the local workforce efficiency (Dupasquier and Osakwe, 2006). Despite these certain potential effects and an upward trend in flows, Africa is struggling to attract enough. Between 1990 and 1999, African attracted only 6% of FDI flows to developing countries, while Latin America attracted 33%, Asia 61% and China 25% over the same period. Between 2000 and 2009, its attractiveness improved only slightly, to around 9%, while China alone attracted 20%. From 2010 to 2019, attractiveness was much more consistent across regions (UNCTAD WIR, 2020)[1]. As a result, many countries[2] in the African region are working to implement FDI-friendly policies in order to reap the potential benefits (Ekodo et al., 2020). However, each country must meet certain essential conditions such as basic infrastructure (energy, transport), the macroeconomic and institutional environment, international integration, and human resources in order to achieve a significant increase in FDI flows (Ekodo et al., 2020; Sabir et al., 2019).

At the same time, the economic performance of Asian countries[3] , based on trade openness and strong export diversification coupled with an ability to attract FDI, has reignited the debate on whether developing countries should diversify their exports to achieve higher economic growth or specialize in order to benefit from a comparative advantage. The answer, according to the economic theory first advocated by Ricardo (1817) and later by Heckscher (1949) and Ohlin (1934), is that specialisation[4] based on comparative advantage is the basis for gains in international trade. This theoretical position was challenged first by the work of (Graham, 1923)

[1] Data compiled in WIR, 2020 from UNCTAD, FDI/MNE database.

[2] The main countries that attracted the most FDI were: Egypt, South Africa and Nigeria in 2005; Egypt, South Africa, Nigeria, DR Congo and Ethiopia in 2010; Angola, South Africa, Nigeria, Ghana, Liberia, Morocco and Egypt in 2015; Mauritius, Egypt, Algeria; Morocco, Côte d'Ivoire, Botswana, South Africa and Senegal in 2025.

[3] Hong Kong, Singapore, China, Vietnam, Bangladesh. These countries have the highest trade openness rates in the world and are also the most attractive in terms of FDI. Taking an average between 2010 and 2019, the above-mentioned Asian countries recorded the following levels of openness: Hong Kong (400%), Singapore (344%), Vietnam (141%), Cambodia (124%), Lao PDR (90%); in terms of FDI attractiveness measured by net inflows as a percentage of GDP: Hong Kong (36%), Singapore (23%), Cambodia (12.5%), Lao PDR (6%), Vietnam (5%) (source: calculations based on WDI, 2022).

[4] Concentration of production on a limited number of products

, and then by that of (Prebisch, 1950) and Singer (1950). The idea focused on the obstacles to growth linked to the export of primary products. Taking a dynamic approach to comparative advantage, (Graham, 1923) showed that not all specializations are equal in the long term. Some (industrial activities) are conducive to increasing returns and therefore decreasing costs, leading to an increase in terms of trade; others (agricultural activities), on the other hand, face decreasing returns and increasing operating costs, leading to a gradual reduction in terms of trade. Similarly, Prebisch, (1950) and Singer, (1950), according to the hypothesis known as *the* "*Prebisch-Singer hypothesis*", argue that a high degree of specialization in primary products in the exports of developing countries hinders growth, reduces the terms of trade and exacerbates income instability. To avoid income instability, these two authors, as well as suggest diversifying the export portfolio by expanding production sectors and/or destination markets. Due to the downward trend over time in the terms of trade between primary products and manufactured goods, specialization is not the best option for the economies of developing countries. This assertion is based on evidence that developing countries are heavily dependent on the production and export of primary products[5] . This is why the Economic Report on Africa (2007) presents diversification as a new paradigm for Africa's development and argues that diversification is a prerequisite for achieving positive development on the continent.

The theoretical argument in favor of export diversification for sustained economic growth has been largely confirmed by empirical work in this area. Among others, see the work of Yamagata (2006) on Cambodia, Kabeer and Mahmud (2004) on Bangladesh, Razafimahefa (2005) on Madagascar, Agosin (2007) on Asian and Latin American countries; Brenton and Newfarmer (2007) on a group of 99 countries; and Dizaji and Badri (2014) on Iran, all conclude that export diversification has beneficial effects for economies in terms of higher and more stable export revenues, effects on job creation and learning, and the development of new skills and infrastructure facilitating the development or discovery of new export products (Al-Marhubi, 2000).

The economic literature on export diversification has highlighted a number of determinants of export diversification, two of which are of particular interest to us. These are FDI, as discussed in the works of (Banga 2006; Tadesse and Shukralla 2013; Zhu and Fu 2013; Elhiraika and Mbate 2014; Fonchamnyo 2015; Giri, Quayyum, and Yin 2019) ; and institutional quality, as studied by Hausmann, Hwang and Rodrik (2007), Levchenko (2007), Nunn (2007); Zhu and Fu (2013); Elhiraika and Mbate (2014); IMF (2015); Giri et al., (2019). The particularity of these two factors lies not only in the fact that they are both determining factors in export diversification, but also in the fact that they reinforce each other. According to Dunning (1988), the attractiveness of FDI depends on three elements summarized under the OLI paradigm[6] , one of which refers to the conditions or advantages offered by the host country (location). These conditions may be related to labor productivity, factor endowments, market size or attractiveness policies pursued by local authorities (Mucchielli, 1998). The quality of

[5] Coffee, cocoa and oil in Côte d'Ivoire; gold, cocoa and oil in Ghana; uranium in Niger; gold and cotton in Mali and Burkina Faso; bauxite in Guinea; oil in Nigeria, Angola, Congo, Gabon and Chad; diamonds in Botswana, Sierra Leone, etc.

[6] OLI *Ownership (*the company's ownership of a specific asset)*,* Location (the advantages or conditions offered by host countries) and Integration (the comparison between internationalization and exportation in terms of costs and benefits for the relocated company)

institutions and infrastructure is also a determining factor in FDI location decisions, particularly in developing countries (Blonigen, 2005). Institutional quality is one of the necessary conditions for attracting and benefiting from FDI. At the same time, the inflow of FDI strengthens institutional quality in host economies, as shown by empirical studies such as those by Asiedu (2006); Busse and Hefeker (2007), Ali et al. (2010), Farole and Winkler (2014), Mahmood et al. (2019), and Owusu-Nantwi (2019). This suggests that institutional quality has an amplifying effect on export diversification through foreign direct investment.

With all these advantages linked to export diversification and the multiple efforts made by African countries to attract more FDI on the one hand, and the positive effect of FDI on export diversification on the other, one may wonder how FDI influences export diversification in an institutional environment whose quality remains poor in African countries. The main objective of this paper is therefore to analyze the effects of FDI on export diversification in Africa, with *institutional quality* as the target catalyst. Indeed, economic theory and empirical data confirm that, apart from the level of technology and the relative abundance of factors, a country's institutional framework is a source of comparative advantage. Studies show in particular that differences between countries in the means of enforcing contracts – and therefore in the proportion of incomplete contracts – influence the structure of trade (Levchenko, 2007; Nunn, 2007). Another important point is the link between countries' economic institutions and trade policies (including regulation, intellectual property rights protection and investment). Thus, the quality of institutions determines which countries companies choose to relocate to (Grossman and Helpman, 2005). In developing countries capable of enforcing contracts, investment will be higher and the production costs of intermediate goods will be lower than in countries with poor institutions. Furthermore, the quality of the institutional framework is an important determinant of whether companies choose to integrate a particular stage of production or outsource it. If the economic institutions of the developing country are strong, it is likely that contracts between suppliers of intermediate goods and the producer of the final product will be enforced. This means that strong economic institutions make offshoring more likely and also influence the relative importance of FDI or international outsourcing (Antras and Helpman, 2004). A much more recent analysis Miranda and Wagner (2015) shows that the quality of institutions explains exports as much as the sum of physical and human capital.

The main contribution of this article is not to explore new determinants of export diversification that could be used to make new policy recommendations, but to analyze the role that the quality of institutions can play in the relationship between FDI and export diversification. In previous analyses, the objective was either to analyze the determinants of export diversification, including FDI and institutions , or to analyze the conditions for attracting FDI, incorporating the quality of institutions, such as the work of Elhiraika and Mbate (2014) on 53 African countries, Espoir (2020) on SADC countries, Mahmood et al. (2019) on Canada, Nicet-Chenaf and Rouiger (2008) on Mediterranean countries, Osakwe, et al., (2018) in sub-Saharan Africa, Owusu-Nantwi (2019) in South America, Tadesse and Shukralla (2013). This research focuses primarily on investigating the direct effects between different variables. This paper complements the analysis of the determinants of diversification by examining the role of institutional quality on diversification through FDI from a perspective, indirect similar to the study by Kamuganga (2012), which used conditional logit analysis and data on bilateral trade flows and found an indirect

effect of FDI on economic diversification. This could mean that foreign investment in Africa does not translate only directly into export but also through the quality of diversification institutions The interest of research in this area lies in the fact that it has certain specific characteristics: (i) low participation in global exports, (ii) poorly diversified exports (still concentrated on a few products), (iii) low capacity to attract FDI, (iv) institutional quality still needs improvement. In addition, the study uses data over a relatively long period to better take into account the dynamic dimension in the analysis of the role of institutions in the relationship between FDI and export diversification.

The rest of this article is organized as follows. Section 2 reviews the literature, section 3 discusses the conceptual framework, section 4 provides a descriptive analysis of the key variables, section 5 describes the methodological approach, and section 6 presents and discusses the results before concluding.

2. Literature review

There are several studies in the literature on the determinants of export diversification and FDI. This literature will be explored in order to deduce the role that institutional quality may play in the relationship between diversification and FDI.

2.1. FDI and institutional quality: two determinants of export diversification

Theoretically, FDI has a positive impact on the level of diversification and sophistication of exports through direct and indirect channels. Foreign companies or joint ventures that engage in the production and export of new and/or improved products directly affect the composition of the host country's total exports, making them more diversified[7] and sophisticated. In addition, the entry and activity of multinational enterprises (MNEs) can potentially lead to the transfer of new and/or more sophisticated production capabilities to local firms, thereby indirectly affecting the composition of exports. - As firms in host countries acquire and accumulate these production capabilities, they will be able to produce and export a greater variety of products and more sophisticated products than before. Here, capabilities refer to capital goods, know-how, specific labor skills, work practices, etc. (Hidalgo et al. 2007). The indirect effect of FDI is more commonly referred to as the spillover effect, and has been the main focus of research in the literature. FDI therefore plays an important role in discovering new methods of producing new products and in changing the technological content of exports (Iwamoto and Nabeshima 2012; Rodrik 2006; Klinger and Lederman 2006; Imbs and Wacsziarg 2003).

Addressing the relationship between institutions and export diversification, the literature considers that institutional quality is also a determining factor in the structure of trade (and therefore export diversification). Institutions indirectly impact the structure of trade and therefore the structure of exports through the channel *of trade costs*, but also through the channel *of investment costs and their coordination*. Institutions can also be understood as a factor of production; they then directly impact the structure of trade by helping to determine the comparative advantages of economies. In a context of trade involving multiple governance systems, institutional efficiency aimed at securing and strengthening property rights is a determinant of transaction costs (de Groot *et al*, 2004). High-quality institutions influence the cost of trade because they create a climate of trust and reduce uncertainty about contract enforcement (Yu, 2010). Another case that requires high-quality institutions is the trade of complex and/or highly sophisticated products resulting from R&D. These types of products have characteristics that are difficult to transcribe into contracts, which then tend to be incomplete (Williamson, 2000), requiring institutions that can facilitate trade (Berkowitz *et al*, 2006; Levchenko 2007, Martincus and Gallo 2009).

The theoretical proposals on the relationship between export diversification and its two determinants are of interest for this paper. Various techniques have been applied according to the objectives of the analyses and the types of variables used to capture export diversification (Theil index, the normalized Herfindhal Hirschman Index (HHI), or an indicator based on the Herfindhal index of export concentration and the number of products exported), or to capture FDI (flows and/or stock) or the quality of institutions (approximated by the WGI or ICRG

[7] Harding and Javorcik (2009) argue that if foreign-owned factories only export products that the host country already exports intensively, FDI can lead to more specialized rather than more diversified exports.

governance indicators). Iwamoto and Nabeshima (2012) used both flows and stock relative to GDP to capture FDI; an export diversification index calculated from the Herfindhal export concentration index to capture diversification. The estimates were based on a dynamic panel (system GMM estimation technique) of a large sample of 177 countries over the period 1980-2007. The results showed that FDI flows lagged by five years have a positive effect on export diversification and sophistication, and that FDI stock contributes positively to sophistication. The same estimation technique was used by Elhiraika and Mbate (2014), but on a sample of 53 African countries over the period 1995-2011. Diversification was captured by the normalized Herfindhal Hirschman Index (HHI), while government efficiency and the rule of law from WGI were used to capture the quality of institutions. The authors also found that the institutional framework is one of the long-term determinants of export diversification. The International Monetary Fund (IMF, 2014) also reached a similar conclusion on Africa, focusing on property rights and the rule of law as key indicators of institutional quality that positively affect trade performance. In this research, the Theil indicator is used to capture export diversification, and property rights and the rule of law are the institutional indicators used.

In summary, Giri et al. (2019) analyzed the main determinants of export diversification using a different estimation technique from the previous ones. The method used is *Bayesian Model Averaging*, which has the advantage of considering a large number of potential determinants and ranking them in order of explanatory power. They used the Theil index (which has the advantage of being decomposable into intensive and extensive margins) to capture export diversification. The sample covered 92 countries[8] over the period 1990-2015. The results show, among other key determinants, FDI and the quality of institutions. They found that increased foreign direct investment (FDI) appears to be associated with a higher degree of specialization or low levels of export diversification, mainly the extensive margin, although the correlation is weaker in emerging markets and developing countries. This is because FDI tends to be directed towards sectors where countries have a comparative advantage and probably strengthens these sectors compared to others. This could be particularly true for the mining sector in commodity-exporting countries with a narrow export base. They also found that better institutional quality[9] is associated with a higher degree of export diversification (largely at the extensive margin), and that poor institutional quality is associated with a concentration of exports on a smaller number of products.

As the objective of this paper is to highlight the role of institutional quality in the relationship between FDI, it uses a dynamic (linear) panel estimation method. As the results obtained in the literature are not sensitive to the indicators used, we choose the normalized Herfindhal Hirschman Index (HHI) to capture diversification and the WGI indicators to capture institutional quality.

2.2. Institutional quality: a factor in attracting FDI and its role in the relationship between FDI and export diversification

[8] The sample of 92 countries includes subgroups: Emerging markets and developing economies (73 countries), Emerging markets and developing economies that are commodity exporters (28 countries), and Emerging markets and developing economies that are diversified exporters (45).

[9] Institutional quality is measured by the ICRG Institutional Quality Index. It is the average of the corruption, public order and bureaucratic quality indices, normalized to one.

For many developing countries, there is a consensus in the literature that FDI has a positive impact on economic and export sector performance, job creation, and economic growth (Anyanwu, 2006; Bhattarai, and Negi, 2020; Dupasquier and Osakwe, 2006; Ekodo et al., 2020; Klinger and Lederman, 2006; Sabir et al., 2019; Yimer, 2022). Consequently, most developing countries attempt to attract foreign investment. However, it is recognized that candidate countries must meet certain conditions, such as basic infrastructure, macroeconomic environment, human resources, integration into global and regional value chains, political stability and institutional quality, in order to achieve a significant increase in FDI flows.

Institutional quality is one of the determining factors in the location of FDI (multinationals, for example). It partly guarantees the predictability of the profitability of investment projects, which allows investors to choose among candidate countries when relocating. The choice of location for FDI depends on an institutional environment that includes rules and regulations governing the entry and activity of foreign investors (*freedom of capital transfers and exchange regime*), standards for the treatment of foreign subsidiaries (*tax and trade policy, social legislation, administrative flexibility, social security*) and rules for the functioning of markets (*competition policy; legal, regulatory and judicial system*). For example, corruption imposes additional costs on investors and increases uncertainty about future investment costs and returns (Belgibayeva and Plekhanov, 2015). Similarly, poorly defined property rights, impartiality of justice and the risk of expropriation have also been significant deterrents (Warrick and Hallward, 2005). Similarly, political instability increases uncertainty about returns on investment, forcing foreign investors to choose other destinations (Brada et al., 2017). Overall, the literature suggests that strong institutions are positively correlated with FDI inflows, while weak institutions are associated with lower levels of FDI. Several empirical studies, using various methods, confirm this link between institutions and FDI in various groups of countries and individual countries, using various indicators to capture the quality of institutions. This was the case for Asiedu (2006), who used corruption and the effectiveness of the rule of law (from the ICRG) as institutional variables in a sample of 22 countries in sub-Saharan Africa over the period 1984–2000; Busse and Hefcker (2007) used a dynamic approach (temporal change in institutional variables) GMM in a system, with ICRG (PSR Group) indicators as institutional variables; Kurul (2017) used a non-linear approach (*dynamic panel threshold*) on a sample of 126 countries over the period 2002–2012 to analyze whether a certain level of institutional quality must be achieved in order to attract more FDI. The institutional indicators are taken from WGI; Ahmad et al. (2018) analyzed the impact of institutional quality on FDI in the primary, manufacturing and service sectors in Pakistan for the period 1980-2015 using an ADRL methodology; Owusu-Nantwi (2019) used 2SLS and fixed-effect ordinary least squares on a group of Latin American countries.

When discussing the attractiveness of FDI in Africa, it would be wise to take into account the presence of natural resources. Indeed, the continent is well endowed with natural resources: oil (Algeria, Angola, Libya, Nigeria, Sudan, Chad, Gabon, Congo, etc.), gold (Ghana, Mali, Burkina Faso, Chad, DRC, Tanzania, etc.), copper (Zambia, DRC, etc.), other minerals, and forestry resources. The importance of taking natural resources into account stems from the fact that they can influence the destination country of FDI and, above all, its sectoral orientation, which can affect the diversification or concentration of exports from beneficiary countries.

From a theoretical perspective, Dunning (1993) highlighted the positive effect of a country's natural resource endowment on FDI inflows, based historically on the need for industrialized countries in North America and Europe to secure a reliable supply of raw materials. UNCTAD (2007) reinforced this idea by highlighting the predominance of multinational companies in the exploitation of natural resources due to the high cost of capital and capital intensity, which domestic investors could not bear. Such an orientation of FDI would therefore be independent of the quality of institutions. This seems to be borne out by data from certain countries that are plagued by conflict and terrorism, with poor institutional quality, but which attract sufficient FDI, mainly directed towards the extractive sectors[10] . Certain analyses also seem to show this (Asiedu, 2013, Aleksynska and Havrylchyk, 2012, and Feulefack and Ngassam, 2020). Aleksynska and Havrylchyk (2012) argue that foreign investors are discouraged by poor institutional quality, but that their fears are sometimes offset by abundant natural resources. Feulefack and Ngassam (2020) show that increased dependence on natural resources neutralizes the negative effect of institutional quality on extractive FDI and, conversely, absorbs the positive effect on non-extractive FDI. Furthermore, in the presence of abundant resources, the quality of institutions is no longer important, so resource-rich countries do not need institutional reforms to attract FDI in the extractive sector, but in order to diversify their economies, improving their institutions would enable them to attract more non-extractive FDI. These findings show that institutional quality is necessary to attract FDI in non-extractive sectors (manufacturing and services), which are the sectors par excellence for export diversification. On the other hand, low-quality institutions can also attract FDI, but this tends to be directed towards extractive sectors. Under these conditions, FDI would contribute little to export diversification.

[10] See Feulefack and Ngassam (2020) for more details.

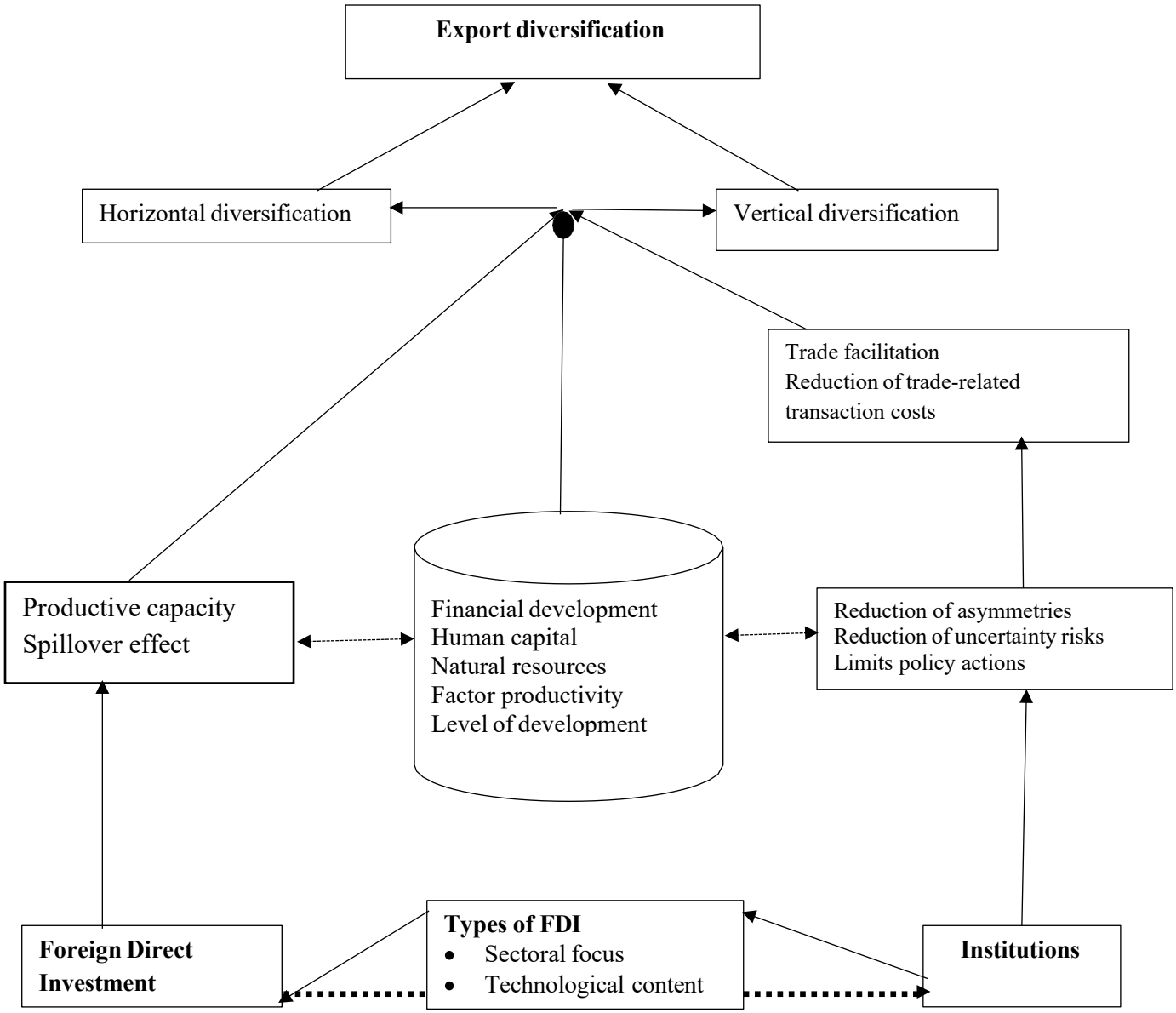
3. Conceptual framework

The purpose of this framework is to summarize the various relationships between the different concepts studied in this paper, namely: export diversification, foreign direct investment and institutional quality.

Export diversification can be seen as a change in the composition of an economy's existing export structure. It can take the form of a change in the share of goods produced in total existing exports, which is referred to as *'intensive'* diversification. When it includes either new products or new trading partners in the export portfolio, it is referred to as *'extensive'* diversification " (Dennis and Shepherd, 2007; Samen, 2010). In other words, "*horizontal diversification*" refers to changes in new export industries within the same sector, and "*vertical diversification*" refers to a shift from primary products to manufactured products or products with higher added value (Thi Anh Dao et al 2017; IMF, 2014). Several indicators exist to measure export diversification. The most important are the Theil index and the Herfindhal-Hirschman index. The Theil index has properties that allow diversification to be separated into intensive and extensive margins. The Herfindhal-Hirschman diversification index indicates whether the product structure of exports or imports of a country or group of countries diverges from the product structure observed at the global level. Alternative measures[11] , have been proposed by Hummels and Klenow (2005) and Brenton and Newfarmer (2007). Its determining factors include: FDI, human capital, level of development, productivity of production factors, financial development and natural resources. FDI contributes to improving productive capacity through the introduction of new products, products of higher quality, or products with higher technological content. It can also contribute through new production methods. The effect of FDI is assumed to be broadly positive on export diversification.

[11] Hummels and Klenow (2005) define the intensive margin as the market share of the country's exports in global exports of the same goods, and the extensive margin as the share of the country's exports in total global exports. Brenton and Newfarmer (2007) introduce the "index of export market penetration" (IEMP), which measures whether the country is exploiting all market opportunities. This indicator provides information on geographical diversification and measures the share of possible destinations covered by the country.

Figure 1: **Links between export diversification, FDI and institutions**



Source: author. **Note**: *dashes indicate probable links in the literature but will not be analyzed in this paper*.

Institutions are also assumed to be a determinant of export diversification. Institutions are defined as the formal and informal rules (value and belief systems, representations, social norms, etc.) that determine the cost, profitability and feasibility of an economic activity by exerting behavioral constraints and incentives on naturally opportunistic agents with limited coordination capabilities North (1990). They therefore cover formal and informal rules of behavior, means of enforcing these rules, mediation procedures in the event of disputes, sanctions for breaches of the rules, and organizations providing support for commercial operations. Institutions can act in several ways: (i) *they reduce information asymmetries by transmitting information on market conditions, products and actors*; (ii) *they reduce risk by defining and enforcing property rights and contracts that specify beneficiaries, assets, and*

transaction dates; (iii) *they limit the actions of politicians and interest groups by holding them accountable to citizens*. Institutions, as defined above, affect both foreign direct investment and trade in general, and export diversification in particular.

The quality of a country's institutions is an indicator that is often taken into account when choosing the destination for FDI and/or relocation. The institutional environment makes the profitability of investment projects more or less predictable. It therefore shapes the attraction of FDI in terms of quantity, quality and sectoral orientation. In an environment of relatively low institutional quality, FDI, even if attracted in quantity, will be more oriented towards natural resource sectors (mining and oil) where the quality of institutions has little impact. The reason for this is that natural resource endowments (raw materials for industries in developed countries) are a factor in attracting FDI, even in an institutional environment that is considered weak. Similarly, the production of complex manufactured goods and/or goods with a high level of technological content requires a high-quality institutional environment, especially in the establishment and enforcement of contracts, given that these contracts are often incomplete.

By reducing the risks of uncertainty and asymmetries, the quality of institutions reduces the transaction costs associated with trade, which are likely to affect the structure of trade through trade facilitation. It also determines the degree of integration into global value chains, with complex chains requiring a conducive institutional framework. In addition to the two isolated factors we are interested in in this paper, other factors affect the trade structure of an economy. These include the level of human capital, factor productivity, the presence or absence of natural resources, financial development and the level of development. These factors affect and are also affected by FDI and institutions.

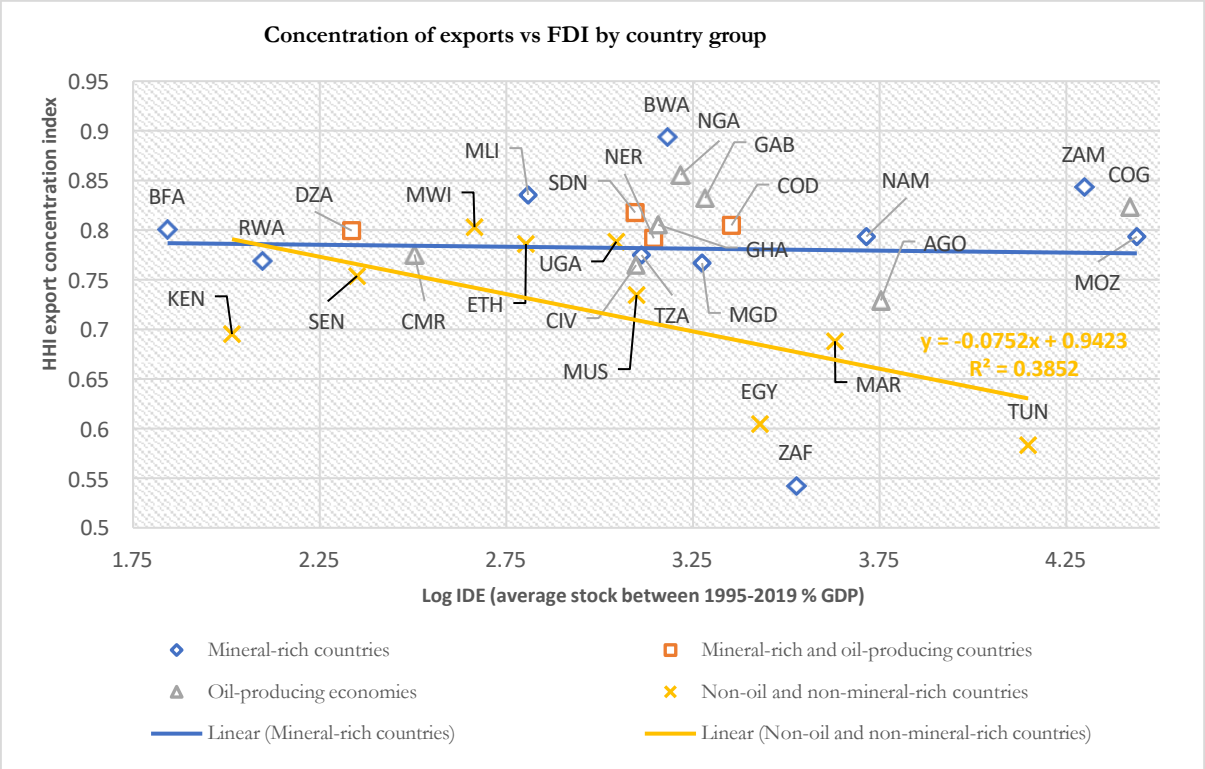
4. Descriptive analysis of keys variables

This section aims to provide more information on the various key variables of the study in the African context. It analyses the relationships between export diversification, FDI attractiveness and institutional quality, placing them in the context of natural resources given their importance in African economies. To do this, we distinguish between four categories of African countries (in our sample). Oil-producing countries, mineral-rich countries, mineral-rich and oil-producing countries, and non-mineral-rich and non-oil-producing countries (Table A2 in the appendix shows the countries in each category)[12] . In this section, the variables are taken as their averages over the period 1995-2019. The export concentration indicator used is the Herfindhal-Hirschman Index (HHI), which *usually varies between 0 and 1. Values close to 0 indicate that exports are weakly concentrated (i.e. highly diversified), while values close to 1 indicate that exports are highly concentrated on a small number of products (in this case, there is low diversification).* FDI is measured by stock as a percentage of GDP. The quality of institutions is measured by the simple average of the six indicators that make up the World Bank Governance Index (WGI).

The first relationship concerns export diversification and FDI. According to predictions in the literature, FDI should promote export diversification if it is directed towards sectors with high diversification potential, such as manufacturing, rather than the primary sector. **Figure 1** below shows that African economies remain concentrated on a few export products. These economies are therefore not very diversified, with most of them having HHI concentration indices above 0.7, which is closer to 1 than to 0. A few countries stand out and are relatively more diversified than the others. These are South Africa, Egypt, Tunisia and, to a certain extent, Morocco and Kenya. Of these five countries, only South Africa is rich in minerals; the others are not rich in natural resources. Countries such as Zambia, Mozambique and Congo, on the other hand, have the highest FDI stocks on the continent (more than 70% of GDP), but at the same time are among the least diversified countries (HHI concentration index above 0.75) and are either oil producers (Congo) or rich in minerals (Zambia and Mozambique). Export diversification does not seem to be correlated with FDI in countries rich in natural resources (minerals and/or oil), but is positively correlated in countries that do not have natural resources (the trend line shows that in these countries, FDI inflows promote export diversification). This suggests that other factors internal to the economies hosting FDI may be the cause.

[12] The categorization follows that of UNCTAD in the presentation of statistical data.

Figure 1: Relationship between export concentration and FDI

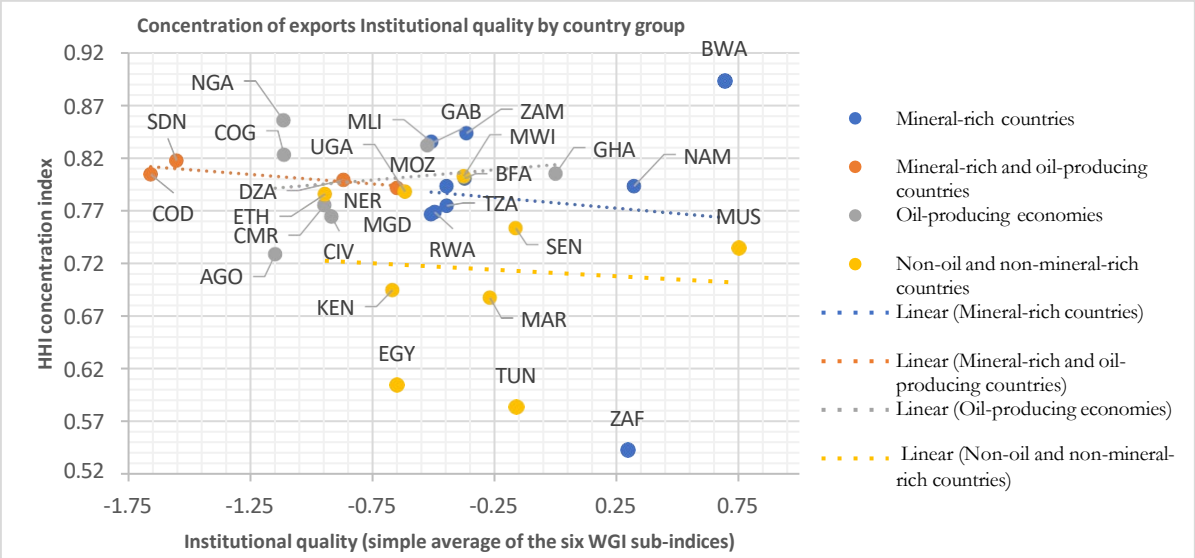


Source: author based on UNCTAD data

The second relationship is that between export diversification and institutional quality. According to the literature, institutional quality should affect export diversification by reducing trade-related transaction costs and thus facilitating trade. We therefore expect to see a positive correlation between the two variables.

Figure 2 below shows that a few countries have relatively high institutional quality (between 0 and 0.75): South Africa, Mauritius, Botswana, Namibia and Ghana. Of these countries, only Mauritius is not rich in natural resources. Apart from South Africa, these countries are not diversified in terms of exports. The relatively diversified countries (Tunisia, Egypt, Kenya, Morocco) do not have the best institutions in the sample either. In three of the four subgroups in the sample, the graph shows a negative trend, indicating that an improvement in institutional quality (an index value tending towards 2.5) leads to a decrease in the concentration index (a value tending towards 0) and therefore greater diversification. This general trend confirms the predictions in the literature, and thus good institutional quality may be necessary for greater export diversification in African countries. The positive trend observed for oil-producing countries contradicts this prediction. In these countries, even an improvement in institutional quality leads to greater export concentration. The graph also shows that the countries (Sudan, DRC, Congo, Angola, Nigeria) with low-quality institutions in the group are the least diversified and are oil-producing or oil-producing and mineral-rich countries.

Figure 2: Relationship between export concentration and institutional quality

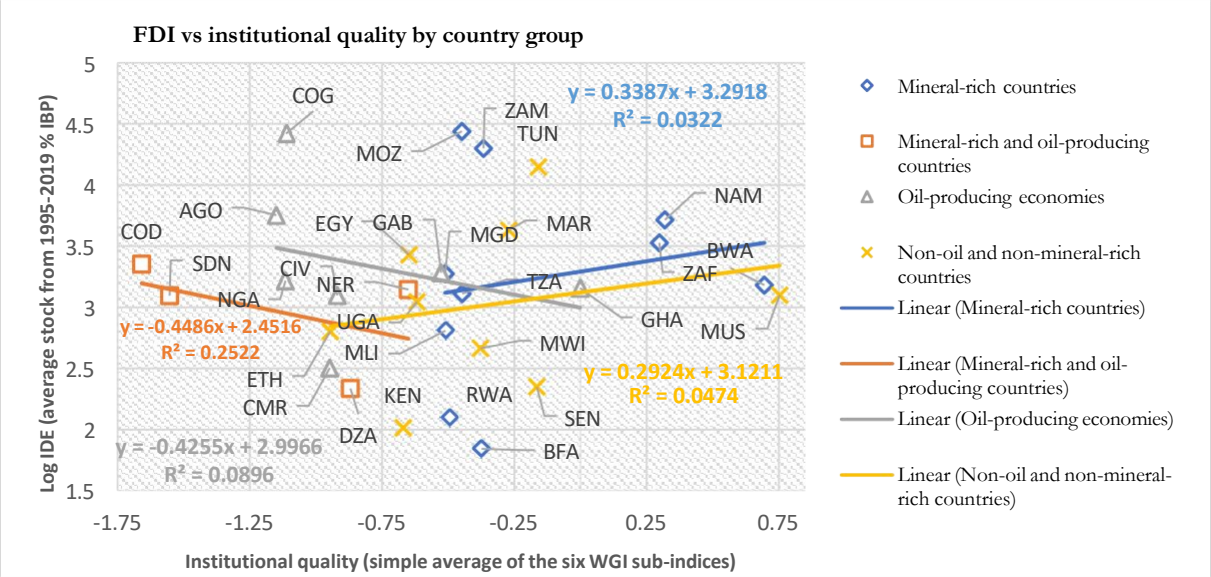


Source: author based on UNCTAD data and WGI[13] (2021)

The third relationship concerns the link between institutional quality and FDI. According to the theoretical literature, the quality of institutions in host countries is a determining factor in attracting FDI. Thus, high-quality institutions should attract more FDI, and therefore countries that attract FDI should be those with high-quality institutions. However, **Figure 3** below shows the opposite in certain subgroups. Depending on the category of country, the relationship is either positive or negative. In mineral-rich countries and those without natural resources, the relationship is positive. This suggests that improving the quality of institutions in these countries encourages FDI inflows. On the other hand, in oil-producing countries or countries with other minerals in addition to oil, the relationship is negative. This confirms part of the literature which also suggests that in countries with strategic natural resources (such as oil), the quality of institutions is no longer an indicator of FDI attraction (Asiedu, 2013, Aleksynska and Havrylchyk, 2012, and Feulefack and Ngassam, 2020). This may explain, for example, the level of FDI in countries such as the DRC, Sudan, Angola, Congo and Côte d'Ivoire, which have attracted FDI but whose institutions remain weak. All these countries are in the subgroup of oil-producing countries.

[13] World Bank Global Governance Indicators (WGI)

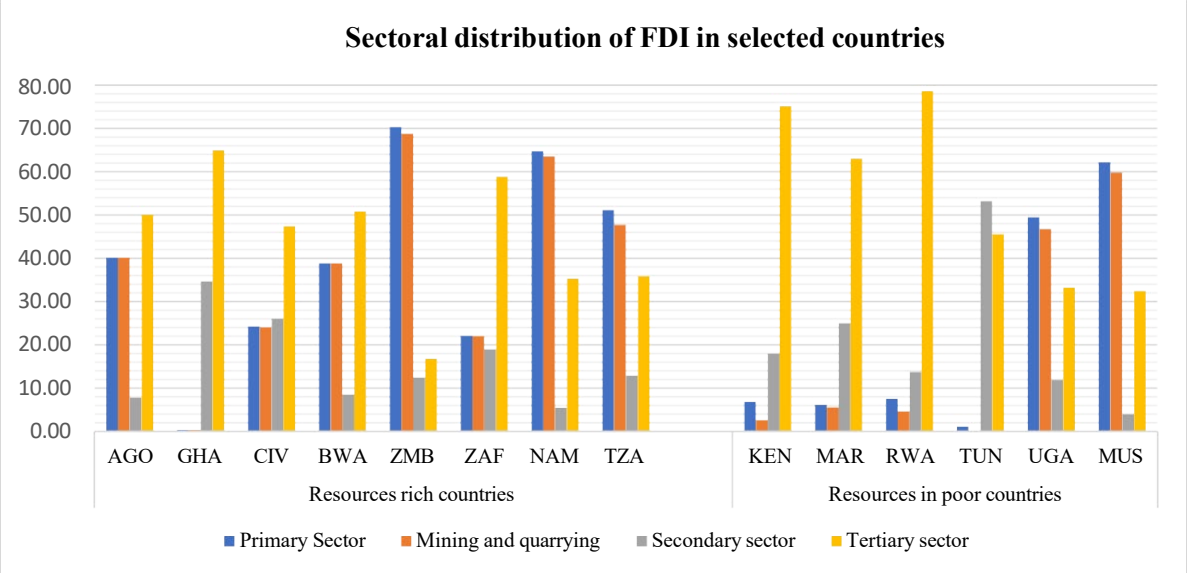
Figure 3: Relationship between FDI and institutional quality



Source: author based on data from UNCTAD and WGI (2021)

Another interesting element of the analysis would be to take into account the sectoral orientation of FDI attracted to the continent using data from the countries in our sample. However, due to the unavailability of data for the entire sample, certain countries were selected.

Figure 4: Sectoral distribution of FDI in selected African countries



Source: author based on ITC data (2022)

Note: *The data refer to the average FDI inflows (as a percentage of total FDI inflows) in the countries over the period 2014-2019. For some countries, the latest available data are from 2018 or 2017. For South Africa, Namibia and Mauritius, the breakdown of stocks is available. The countries selected depend on the availability of data breakdowns in the International Trade Centre (ITC) database. Countries considered resource-rich are those with either oil, minerals or both.*

Figure 4 above shows the sectoral breakdown of FDI inflows into African countries for which this data is available. For most countries, FDI data exists but sectoral breakdowns do not. The

existing data show that, apart from Tunisia, FDI is mainly directed towards the tertiary and primary sectors. Only in Tunisia is FDI mainly directed towards the secondary sector. In almost all countries, the graph shows that FDI directed towards the primary sector actually concerns mining and quarrying (i.e. the extraction sector). The data also show that in some countries (South Africa, Morocco, Kenya, Angola, Botswana, Ghana), FDI is mainly directed towards the services sector. For the majority of countries, FDI is therefore not directed towards the secondary sector (the manufacturing sector), which is likely to have a significant impact on export diversification.

5. Methodology

5.1. Data

In order to test the effect of FDI on export diversification conditioned by the quality of institutions, the stock of FDI (as a percentage of GDP) and the Herfindhal-Hirschman Index (HHI) of export concentration available in the UNCTAD database are used. The institutional indicators used are taken from the World Bank's World Governance Indicators (WGI). The institutional quality indicators used include the rule of law (LAW), regulatory quality (REQ), governance effectiveness (GOV), control of corruption (CORR), political stability (POS) and voice and accountability (VOA). A set of control variables suggested by the literature is also used. These variables are: per capita income (GDP), which captures the level of development; human capital (HUK); total factor productivity (TFP); labor force growth (LQG); the financial development index (FINDEV); the financial institution efficiency index (FIEI); and inflation (INF). The variables are described in **Table A1** in the appendix. The sample covers 30 African countries (see **Table A2** in the appendix) with annual observations from 1996 to 2019 (a period of 24 years). The size is dictated by the availability of data in the various databases (UNCTAD, WDI, Penn World Table, and Conference Board Total Economy Database).

5.2. Empirical model

This article uses a gradual methodological approach, ranging from the estimation of simple linear relationships between key variables to much more complex non-linear and dynamic relationships. The simple linear approach is based on the relationships identified in the literature and summarized in the conceptual framework, while the dynamic non-linear approach takes into account the interactions between variables in a dynamic model.

The linear approach is carried out in two stages, following a method borrowed from Blimpo et al. (2012). First, we will evaluate the relationship between export concentration and FDI according to the following equation:

$$EEEEEE_{iiii} = \beta\beta_{11}FFEEFF_{iiii} + \beta\beta_{22}FFIIIIII_{iiii} + \delta\delta_{ii} + \vartheta\vartheta_{ii} + \gamma\gamma EE_{iiii} + \varepsilon\varepsilon_{iiii} \quad [1]$$

In this equation,$EEEEEE_{iiii}$ refers to the indicator of concentration of exports for the countryii during the periodtt ,$FFEEFF_{iiii}$ refers to the indicator of foreign direct investment for the countryii during the periodtt ;$FFIIIIII_{iiii}$ is the indicator of the quality of institutions for the countryii during the periodtt .$\delta\delta_{ii}$ is the fixed effect that includes all other unobservable factors for the countryii .$\vartheta\vartheta_{ii}$ refers to the time fixed effect ;EE_{iiii} is a matrix of control variables and$\varepsilon\varepsilon_{iiii}$ is the error term. If export diversification is directly improved by FDI, then the coefficient$\beta\beta_1$ will be negative and significant. Furthermore, if export diversification is improved by the quality of institutions, the coefficient$\beta\beta_2$ will be negative and significant.

In a second step, our approach consists of seeking the determinants of FDI while focusing on the indicator of institutional quality according to the following equation:

$$FFEEFF_{iiii} = \alpha\alpha FFIIIIII_{iiii} + \delta\delta_{ii} + \vartheta\vartheta_{ii} + \lambda\lambda EE_{iiii} + \mu\mu_{iiii} \quad [2]$$

In this equation,$FFEEFF_{iiii}$ is the FDI indicator for the countryii in the periodtt ;$FFIIIIII_{iiii}$ refers to the institutional quality indicator for the countryii in the periodtt ;$\delta\delta_{ii}$ is the fixed effect that includes all other unobservable factors for the countryii .$\vartheta\vartheta_{ii}$ refers to the time fixed effect;EE_{iiii} is a control

variable matrix and$\mu\mu_{iiii}$ is the error term. In equation [2], we expect the coefficient$\alpha\alpha$ to be positive and significant, since the quality of institutions is assumed to affect FDI through its impact on the business environment (reduction of asymmetries, reduction of uncertainty risks, limitation of policy actions).

The dynamic approach uses equation [1], but this time incorporates the dependent variable delayed by one period ($EEEEEE_{iiii-1}$), and the interaction terms($FFEEFF_{iiii} \times FFIIIIII_{iiii}$) used to highlight the conditional role of FDI often involve a linear interaction between FDI and institutions to drive export diversification. This means that an improvement in institutional quality will always have the same impact on the marginal effect of FDI throughout the period and will be consistent across the countries in the sample. The implicit threshold therefore only indicates the point at which this accumulated marginal effect will eventually become positive. The equation to be estimated in this case is given by:

$$EEEEEE_{iiii} = \beta\beta_0 + \beta\beta_1 EEEEEE_{iiii-1} + \beta\beta_2 FFEEFF_{iiii} + \beta\beta_3 FFIIIIII_{iiii} + \beta\beta_4 (FFEEFF_{iiii} \times FFIIIIII_{iiii}) + \sum_{jj=1}^{JJ} \gamma_{jj} ZZ_{jjiiii} + \theta\theta_{ii} + \mu\mu_{ii} + \varepsilon\varepsilon_{iiii} \quad [3]$$

In this equation,ZZ_{jjiiii} is the set of control variables that are similar to those in the model of equations [1] and [2].$\theta\theta_{ii}$ is a country-specific fixed effect and$\mu\mu_{ii}$ is a time effect. Estimating this equation using the generalized method of moments in a system (*GMM-System*) makes it possible to control for any endogeneity in the specification. It also corrects a number of problems caused by first difference estimation[14] .

6. Results

The results first present the preliminary tests, namely the stationarity test, and then summarize the results of the regressions based on institutional quality indicators.

6.1. Unit root test

In order to analyze the stationary properties of the data, we test whether the data have a unit root using panel unit root tests. Given that the panel is non-cylindrical, we adopt second-generation tests, which are more suitable in this case. Thus, stationarity results are estimated using the Maddala and Wu (1999) Panel Unit Root (MW) test with and without trend. The results in **Table 1** below show that all variables in the study are I(0) processes.

[14] According to Blundell and Bond (1998), the difference GMM estimator may be non-convergent and biased because the application of the moment conditions of this estimator poses a number of problems, namely: *the weakness of the instruments chosen and the elimination of inter-country variations by first differentiation*. To resolve these problems, Blundell and Bond (1998) developed the system GMM estimator, with additional moment conditions. The system generalized method of moments estimators developed by Arellano and Bover (1995) and Blundell and Bond (1998) make it possible to address endogeneity problems and take dynamic specification into account.

Table 1: Maddala and Wu (1999) Panel Unit Root (MW) Test

Variable		Without trend		With trend	
	Lags	Chi_sq	p-value	Chi_sq	p-value
EXD	0	195.889***	0.0000	197.2788***	0.0000
FDI (log)	0	146.2291***	0.0000	91.9624***	0.005
CORR	0	109.4408***	0.0001	146.0416***	0.0000
GOV	0	109.7282***	0.0001	94.9025**	0.0027
POS	0	145.1294***	0.0000	106.2709***	0.0002
REQ	0	78.3280*	0.0562	124.6749***	0.0000
LAW	0	65.0584	0.3051	116.7270***	0.0000
VOA	0	135.3689***	0.0000	115.6354***	0.0000
HUK	0	391.7490***	0.0000	160.4696***	0.0000
FINDEV	0	147.0147***	0.0000	209.9757***	0.00
FIEI	0	224.7937***	0.0000	253.0267***	0.0000
TFP	0	490.3417***	0.0000	482.4730***	0.0000
TNR	0	96.5536**	0.0019	67.1109	0.2465
IQ	0	79.4169**	0.0474	132.1347***	0.0000
LQG	0	369.4129***	0.0000	314.2360***	0.0000

Note: *Null hypothesis for MW tests: the series is I(1). The MW test assumes cross-sectional independence. (***), (**) (*) indicate significance levels of 1%, 5% and 10%, respectively .*

6.2. Results of linear model estimates

The results of the estimates of equation [1] presented in **Table 2** below show that FDI has a significant direct effect on export diversification. The coefficient is significant and positive, regardless of the institutional quality indicator chosen. This implies that as the country accumulates FDI, the HHI concentration indicator decreases (diversification increases (approaches 1)), resulting in a higher concentration of exports on a smaller number of products and/or on a few markets. This result indicates that an increase in FDI stock has a positive effect on export concentration (and therefore a negative effect on export diversification). This result contradicts theoretical predictions that FDI should promote export diversification. **Graphs A1 and A2** in the appendix represent partial regressions often used to visualize the relationship between a predictor variable (FDI stock and institutional quality) and the response variable (HHI export concentration index) while controlling for the effects of other predictor variables (the other control variables). This type of graph is useful in identifying non-linear relationships and outliers. **Graph A1** in the appendix shows that the relationship between export concentration and FDI stock is positive (the slope of the line) and significant, while graph A2 confirms that the relationship between export concentration and institutional quality is negative but not significant. For both graphs, some data for Angola and, to a certain extent, Ethiopia (for some years) can be considered extreme (as they are detached from the scatter plot). However, excluding these countries does not fundamentally alter the results obtained. On the other hand, institutional quality does not significantly affect export diversification directly, except in cases where institutional quality is captured by government efficiency (GOV).

Table 2: Estimates for the export concentration index (linear model)

	(1) IQ	(2) CORR	(3) GOV	(4) POS	(5) REQ	(6) LAW	(7) VOA
FDI	**0.0155*****	**0.0152*****	**0.0155*****	**0.0143*****	**0.0151*****	**0.0155*****	**0.0155*****
	(4.58)	**(4.57)**	**(4.67)**	**(4.19)**	**(4.53)**	**(4.62)**	**(4.54)**
INST	0.00989	0.0156	**0.0226**	-0.00478	0.00654	0.0130	0.0059
	(0.78)	(1.51)	**(2.08)**	(-0.98)	(0.61)	(1.19)	(0.64)
TNR	**-0.00155*****	**-0.00156*****	**-0.00148*****	**-0.00160*****	**-0.00157*****	**-0.00152*****	**-0.00157*****
	(-3.87)	**(-3.92)**	**(-3.70)**	**(-4.02)**	**(-3.94)**	**(-3.80)**	**(-3.93)**
HUK	**-0.0784*****	**-0.0794*****	**-0.0701*****	**-0.0830*****	**-0.0765*****	**-0.0791*****	**-0.0828*****
	(-3.95)	**(-4.05)**	**(-3.47)**	**(-4.21)**	**(-3.67)**	**(-4.03)**	**(-4.17)**
TFP	-0.000141	-0.000140	-0.000122	-0.000174	-0.000144	-0.000116	-0.000176
	(-0.22)	(-0.22)	(-0.19)	(-0.27)	(-0.23)	(-0.18)	(-0.28)
LQG	0.000726	0.000738	0.000733	0.000750	0.000733	0.000745	0.000723
	(0.81)	(0.83)	(0.83)	(0.84)	(0.82)	(0.84)	(0.81)
FINDEV	0.0581	0.0712	0.0592	0.0598	0.0584	0.0603	0.0572
	(0.80)	(0.97)	(0.82)	(0.82)	(0.80)	(0.83)	(0.79)
FIEI	-0.0376	-0.0382	-0.0392	-0.0418	-0.0370	-0.0386	-0.0391
	(-1.49)	(-1.52)	(-1.56)	(-1.65)	(-1.45)	(-1.53)	(-1.55)
GDP	-0.0309*	-0.0315*	-0.0358*	-0.0250	-0.0306	-0.0330*	-0.0282
	(-1.99)	(-2.10)	(-2.34)	(-1.68)	(-1.94)	(-2.12)	(-1.90)
Constant	1.118***	1.127***	1.145***	1.082***	1,111***	1,136***	1,106***
	(11.88)	(12.36)	(12.48)	(12.13)	(11.88)	(11.86)	(12.18)
N	626	626	626	626	626	626	626
R-sq	0.0966	0.0992	0.102	0.0971	0.0962	0.0978	0.0963
F-stat	6.974	7.181	7.429	7.017	6,946	7,072	6,950

Note: t statistics in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. The dependent variable is the export concentration index. All models include country and year fixed effects. The robust option is applied to all estimates.

Considering the control variables, natural resource rent (TRN), human capital (HUK) and level of development significantly affect export diversification. A high level of natural resource rent has a negative effect on export diversification, meaning that the presence of natural resources promotes export concentration. The exploitation of these natural resources, which are abundant in Africa, enables countries to intensify their exports to traditional markets and/or conquer new markets (intensive diversification), but not extensive diversification, which consists of introducing new products to markets. This result contradicts the predictions of Asiedu and Lien (2011); and Gylfason and Zoega (2006), who found that the presence of natural resources should have a negative effect on export diversification due to the crowding-out effect of investments (including FDI) from the natural resource sector, with implications such as a reduction in investments in other sectors and political instability, which has a repellent effect on investments in non- extractive sectors. Furthermore, Gylfason and Zoega (2006) estimate a thatboom in the primary sector leads to higher wages in that sector, thereby attracting labor from other industries or imposing higher wage costs on them. As a result, the presence of natural

resources changes the composition of exports to the detriment of exports of manufactured goods and services, which can contribute more to export diversification and economic growth.

The negative sign of the human capital coefficients implies that improving the level of human capital is conducive to export diversification (i.e. a decrease in export concentration). Indeed, a high level of human capital allows for better assimilation of sophisticated innovations in production and thus greater export diversification. The negative sign of the GDP variable, which captures the level of development, has a positive effect on export diversification. This confirms the results obtained in the literature, which argue that in the earliest stages of development, economies specialize in a few products, but as the country develops, the economy diversifies (in terms of exports) and becomes specialized again at an advanced level of development.

Table 3: Estimates for FDI (linear model)

	(1) IQ	(2) CORR	(3) GOV	(4) POS	(5) REQ	(6) LAW	(7) VOA
INST	**-0.744*****	-0.114	**-0.249**	**-0.315*****	-0.121	**-0.388****	**-0.606*****
	(-4.93)	(-0.89)	**(-1.85)**	**(-5.47)**	(-0.92)	**(-2.89)**	**(-5.61)**
TNR	-0.000618	0.00162	0.000668	-0.0000488	0.00160	0.0000862	0.000437
	(-0.13)	(0.33)	(0.13)	(-0.01)	(0.32)	(0.02)	(0.09)
HUK	**1.415*****	**1.651*****	**1.536*****	**1,439*****	**1,581*****	**1,591*****	**1,785*****
	(6.04)	**(7.07)**	**(6.33)**	**(6.22)**	**(6.33)**	**(6.83)**	**(7.82)**
TFP	-0.0107	-0.0104	-0.0106	-0.0112	-0.0104	-0.0112	-0.00731
	(-1.39)	(-1.32)	(-1.35)	(-1.47)	(-1.33)	(-1.44)	(-0.95)
LQG	-0.0164	-0.0176	-0.0175	-0.0155	-0.0175	-0.0177	-0.0158
	(-1.52)	(-1.59)	(-1.59)	(-1.44)	(-1.59)	(-1.61)	(-1.47)
FINDEV	-0.174	-0.142	-0.0651	0.205	-0.0724	-0.154	-0.133
	(-0.20)	(-0.16)	(-0.07)	(0.23)	(-0.08)	(-0.17)	(-0.15)
FIEI	0.475	0.616*	0.621*	0.428	0.583	0.596	0.575
	(1.55)	(1.98)	(2.00)	(1.40)	(1.85)	(1.92)	(1.89)
GDP	**0.657*****	**0.419***	**0.481**	**0.509****	**0.452***	**0.560****	**0.485****
	(3.52)	**(2.26)**	**(2.55)**	**(2.84)**	**(2.32)**	**(2.94)**	**(2.72)**
Constant	-4.869***	-3.348**	-3.663**	-3.673***	-3.446**	-4,369***	-4,281***
	(-4.32)	(-2.98)	(-3.24)	(-3.44)	(-2.99)	(-3.74)	(-3.95)
N	626	626	626	626	626	626	626
r2	0.270	0.241	0.245	0.277	0.241	0.251	0.279
F	27.25	23.37	23.80	28.17	23.38	24.62	28.43

***Note**: t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The dependent variable is FDI stock as a percentage of GDP.* All models include country and year fixed effects. The robust option is applied to all estimates.

The results of the estimates of equation [2] presented in **Table 3** above show that the quality of institutions has a significant overall impact on foreign direct investment. The overall indicator and the sub-indicators of institutional quality that are significant have a negative impact on FDI. This result indicates that the institutional environment in Africa is not conducive to attracting FDI ; in fact, it is hostile to it. Institutional quality remains low and is improving only slowly, with the result that the region is unable to attract sufficient FDI to bridge the investment and technology gap. Referring to the results of the descriptive analysis (**Figure 3**), we see that this negative trend was observed in two of the four subgroups formed from the countries in the sample: these are oil-producing countries and countries that have other mineral resources in addition to oil. **Figure A3** in the appendix shows a partial regression, often used to visualize the relationship between a predictor variable (institutional quality) and the response variable (FDI stock) while controlling for the effects of other predictor variables (other control variables). This type of graph is useful for identifying non-linear relationships and outliers. **Graph A3** in the appendix shows that the relationship between FDI stock and institutional quality is negative (the slope of the line) and significant. Some data from Congo (DR), Gabon, Rwanda, Sudan and Mozambique (for certain years) can be considered extreme (as they are detached from the scatter plot). However, excluding these countries does not fundamentally

alter the results obtained. The plausible explanation is that, apart from Ethiopia (a country with no natural resources but low institutional quality) and Ghana (an oil-producing country but one of the countries with high institutional quality in the group), all the countries in the two subgroups have the lowest institutional quality in the sample. This also confirms part of the literature according to which, in countries with strategic natural resources (such as oil), the quality of institutions is no longer an indicator of FDI attraction (Asiedu, 2013, Aleksynska and Havrylchyk, 2012, and Feulefack and Ngassam, 2020). This may explain, for example, the level of FDI in countries such as the DRC, Sudan, Angola, Congo and Côte d'Ivoire, which have attracted FDI but whose institutions remain weak. All these countries are in the subgroup of oil-producing countries.

Among the control variables, we note the positive effects of human capital and the level of development. Indeed, economic literature argues that FDI is an important vehicle for technology transfer and growth promotion only when the host country has a minimum threshold of human capital (Borensztein, De Gregorio, and Lee 1998) and also, (Grossman and Helpman 1991) argue that FDI accelerates economic growth by strengthening human capital development.

If we combine the results from the estimates of equations [1] and [2], we see that the quality of institutions negatively affects foreign direct investment in Africa; at the same time, FDI negatively affects export diversification. On the other hand, the quality of institutions does not significantly affect export diversification. These results contradict the predictions of the literature on these two subjects. A closer analysis of the results shows that these unexpected results are due to data from certain countries that present extreme values. These countries are oil-producing countries and/or have mineral resources, and they also have the lowest levels of institutional quality.

Group validity test

$pp - vvvvvvvvvvpp$The objective is to test the relevance of the country groups formed, i.e. to see whether it is relevant to perform the analysis by country group (group heterogeneity) or whether the groups should be considered homogeneous. To do this, a Wald comparison test is performed on several groups, which consists of introducing indicator variables for each group and interacting them with the relevant explanatory variables, then testing the joint significance of these interaction terms. This tests the null hypothesis that the coefficients of these interaction terms are all equal to zero, implying that there is no significant difference in the effect of the explanatory variables between the specified groups. The test results provide a Fisher statistic and a p-value. A small p-value (usually below the usual thresholds of 0.01, 0.05, and 0.10) indicates rejection of the null hypothesis, suggesting that there are significant differences in the effect of the explanatory variables between groups.

Table 4: Results of group validity tests

	IDE	**TNR**	**IQ**
F statistic	2.50	2.22	1.12
PPPPPPPP > FF	0.0457	0.0806	0.3812

In this paper, the validity test is performed using three explanatory variables: foreign direct investment, total natural resource rents, and institutional quality. The results show that the

categorization (the four groups) is valid at 5% for FDI and 10% for natural resource rents, but not valid for institutional quality. This means that the four groups chosen are not homogeneous in terms of their attractiveness to FDI. **Table 5** below presents the results of the estimates of equation [3], which is a dynamic panel. The results are presented for the four categories of countries in the sample (PRM, PRMP, PPP, NPPM)[15] for three indicators of institutional quality: *IQ (the simple average of the six WGI governance indicators), the corruption control sub-indicator, and the rule of law*. In mineral-rich and oil-producing countries (PRM and PPP), FDI has a positive effect (negative signs) on export diversification. An increase in FDI leads to a decrease in the HHI indicator of export diversification, which indicates greater export diversification. In the other two categories (PPP, and NPPM), FDI does not significantly affect export diversification. The quality of institutions captured by IQ (the simple average of governance indicators) directly and negatively affects export diversification in country groups where its coefficient is significant (PRM, PPP, and NPPM). This contrary result can be explained by the extreme data from two countries, Angola (an oil-producing country) and Ethiopia (a country with no mineral or oil resources), as shown in **Figure A2** in the appendix. Graphs A1-A2 in the appendix show the relationships between export diversification (the dependent variable) and FDI, and the quality of institutions (independent variables). Graph A3 (appendix) shows the relationship between FDI and the quality of institutions. The results are obtained by considering the other variables as constant. The slope of a graph of added variables (the trend line) indicates the degree of influence of an independent variable on the dependent variable. These graphs are also useful for identifying outliers, which is the main reason for their use here. Looking at graphs 1 & 2, we see that some data from Angola in particular, and to a certain extent Ethiopia, stand out from the rest. These data can be considered outliers (or extremes) that may influence the results and provide an explanation for the negative relationship found.

On the other hand, in all country groups where this coefficient is significant, the interaction term between institutional quality and FDI positively affects (negative sign) export diversification. These latest results show that the indirect effect of institutional quality on export diversification through FDI is positive. Countries that improve their institutions can attract more investment and strengthen their international competitiveness, which can lead to greater export diversification. Furthermore, the change in sign with the introduction of the interaction term suggests the existence of an implicit threshold above which the cumulative marginal effect will eventually become positive. The structure of the results remains the same when changing the institutional quality indicator to use corruption and the rule of law as alternative indicators.

[15] . PRM = Mineral Rich Countries, PRMP = Mineral and Oil Rich Countries, PPP = Oil Producing Countries, NPPM = Non-Mineral and Oil Producing Countries.

Table 5 : Estimates for the concentration index (Dynamic panel - GMM)

	Quality of institutions (IQ)				Corruption (CORR)				Rule of law (LAW)			
	PRM	**PRMP**	**PPP**	**NPPM**	**PRM**	**PRMP**	**PPP**	**NPPM**	**PRM**	**PRMP**	**PPP**	**NPPM**
L.EXD	**0.827*****	**0.920****	**0.635*****	**0.677*****	**0.824*****	**0.920****	**0.643*****	**0.678*****	**0.824*****	**0.924****	**0.639*****	**0.678*****
	(10.14)	**(9.78)**	**(10.43)**	**(13.78)**	**(9.82)**	**(10.49)**	**(11.13)**	**(13.49)**	**(9.61)**	**(10.57)**	**(10.95)**	**(13.26)**
FDI	**-0.0105***	0.00879	**-0.0252**	0.00343	**-0.00512**	0.00846	**-0.0269**	0.00450	**-0.0104**	-0.00582	**-0.0232**	**0.00500**
	(-2.91)	(0.96)	**(-1.86)**	(1.34)	**(-2.04)**	(1.43)	**(-1.92)**	(1.08)	**(-2.07)**	(-0.86)	**(-2.20)**	**(2.18)**
INST (IQ)	**0.0661****	-0.0201	**0.107**	**0.0574****								
	(3.90)	(-1.07)	**(1.75)**	**(4.94)**								
FDI # INST (IQ)	**-0.0241*****	0.00837	**-0.0368**	**-0.0225****								
	(-5.26)	(1.26)	**(-1.90)**	**(-4.22)**								
INST (CORR)					**0.0490**	-0.0195	**0.0859**	**0.0407**				
					(2.88)	(-0.78)	**(1.68)**	**(1.78)**				
FDI # INST (CORR)					**-0.0168****	0.00852	**-0.0317**	**-0.0130**				
					(-3.73)	(1.36)	**(-1.92)**	**(-2.24)**				
INST (LAW)									**0.0650***	-0.0148	**0.0943**	**0.0543***
									(2.93)	(-0.89)	**(2.18)**	**(2.67)**
FDI # INST (LAW)									**-0.0199**	-0.00283	**-0.0321**	**-0.0209**
									(-2.91)	(-0.51)	**(-2.29)**	**(-2.08)**
GDP	0.0361*	-0.00428	-0.00137	-0.0399***	0.0374*	-0.00491	-0.00223	-0.0429***	0.0301	-0.0124	-0.00135	-0.0405***
	(2.46)	(-0.46)	(-0.24)	(-8.39)	(2.56)	(-0.68)	(-0.37)	(-7.87)	(2.43)	(-1.27)	(-0.24)	(-7.82)
HUK	**-0.0178**	**0.0575**	**0.0459**	**-0.0228****	**-0.0214**	**0.0600**	**0.0468***	**-0.0174**	**-0.0152**	**0.0413**	**0.0465***	**-0.0183***
	(-1.95)	**(1.92)**	**(3.08)**	**(-5.05)**	**(-2.15)**	**(2.35)**	**(3.68)**	**(-1.85)**	**(-1.60)**	**(1.33)**	**(2.78)**	**(-3.23)**
FINDEV	-0.173	-0.258	0.298**	0.0264	-0.196	-0.445	0.276**	0.0365	-0.175	1.114	0.291**	0.0379
	(-1.87)	(-0.13)	(4.07)	(1.14)	(-1.95)	(-0.35)	(4.15)	(1.11)	(-1.81)	(0.64)	(4.11)	(1.56)
FIEI	0.00832	-0.0150	-0.0871	-0.0711*	0.0118	0.0231	-0.101	-0.0545	0.0135	-0.159	-0.0850	-0.0664
	(0.31)	(-0.05)	(-1.31)	(-2.51)	(0.46)	(0.12)	(-1.44)	(-1.84)	(0.42)	(-0.65)	(-1.25)	(-2.18)
LQG	0.00079	0.00353	0.00026	0.00072	0.000817	0.00342	0.000065	0.00061	0.00078	0.00398	0.00015	0.00102
	(1.76)	(2.34)	(0.09)	(1.18)	(1.77)	(2.64)	(0.02)	(0.85)	(1.73)	(2.61)	(0.05)	(1.69)
TFP	0.00069	0.00056	-0.00066	-0.00018	0.000374	0.00046	-0.00059	-0.00021	0.00069	0.00067	-0.00088	-0.00030
	(0.78)	(0.26)	(-1.03)	(-0.31)	(0.39)	(0.22)	(-0.97)	(-0.35)	(0.78)	(0.30)	(-1.27)	(-0.53)
TNR	-0.00023	-0.0023	-0.00060	-0.00167*	-0.00029	-0.00225*	-0.00057	-0.00160*	-0.00011	-0.0021*	-0.0006	-0.00156*
	(-0.34)	(-4.75)	(-0.83)	(-3.10)	(-0.39)	(-5.37)	(-0.78)	(-2.78)	(-0.15)	(-5.46)	(-0.91)	(-2.94)
INF	0.00019	-0.00029**	0.00009	-0.00081*	0.00003	-0.00028**	0.00013	-0.00079	0.00016	-0.00027*	0.0001	-0.00080*
	(0.33)	(-5.92)	(1.13)	(-3.34)	(0.05)	(-6.30)	(1.62)	(-3.47)	(0.27)	(-5.45)	(1.18)	(-3.15)
Constant	-0.0293	0.0493	0.296	0.588***	-0.0430	0.0457	0.306**	0.590***	0.00975	0.0918	0.287	0.575***
	(-0.67)	(0.66)	(3.46)	(8.27)	(-1.20)	(0.63)	(3.75)	(7.70)	(0.38)	(1.07)	(3.59)	(7.41)

Obs.	**184**	**73**	**130**	**152**	**184**	**73**	**130**	**152**	**184**	**73**	**130**	**152**
No. C.	**10**	**4**	**7**	**9**	**10**	**4**	**7**	**9**	**10**	**4**	**7**	**9**
AR (1)	**0.013**	**0.110**	**0.291**	**0.008**	**0.012**	**0.110**	**0.292**	**0.008**	**0.012**	**0.109**	**0.292**	**0.008**
AR (2)	**0.168**	**0.195**	**0.340**	**0.805**	**0.173**	**0.196**	**0.339**	**0.796**	**0.169**	**0.181**	**0.341**	**0.793**

t statistics in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. The robust option is applied to all estimates. PRM (mineral-rich countries), mineral- and oil-rich countries PRMP (), PPP (oil-producing countries), NPPM (non-oil- and countries non-mineral-producing). The dependent variable is the HHI concentration index (description in Table A1 in the appendix).

Among the control variables, there is a significant effect regardless of the indicator of institutional quality used for human capital. The effect of this variable is positive (negative sign) in mineral-rich countries and countries that do not produce minerals or oil. This suggests that a high level of human capital quality improves the level of export diversification. The effect is negative (positive sign) in mineral- and oil-rich countries and oil-producing countries.

Conclusion

In order to meet development challenges, African countries are relying heavily on foreign direct investment to diversify their exports and avoid income instability. Recent literature has shown that the economic gains from FDI (growth, export diversification, job creation, etc.) are not simple and straightforward, but rather depend on the local circumstances of the host countries. Thus, the role of institutional quality and the institutional factors that determine FDI flows are integral parts of these local circumstances.

The objective of this article is therefore to analyze the conditions under which FDI can promote export diversification in African countries. To this end, we used a two-step linear panel and a non-linear dynamic panel with interactions on a sample of 30 African countries covering the period 1996-2019. The sample was subdivided into four subgroups: mineral-rich countries (PRM), mineral-rich and oil-producing countries (PRMP), oil-producing countries (PPP) and countries with neither minerals nor oil (NPPM).

The results show that FDI has a positive effect on export diversification (based on the latest estimate) in mineral-rich and oil-producing countries, but is not significant in other country subgroups. Given that FDI is generally directed towards the extractive and oil sectors, these groups of countries benefit from it in terms of diversifying their exports. The last category of countries, which do not have natural resources, are therefore unable to attract sufficient FDI to help them diversify. The results also show that the quality of institutions can affect diversification indirectly through its role in attracting FDI. Under these conditions, it is imperative that African countries create an institutional environment that attracts sufficient FDI to the manufacturing sector, which could enable them to further diversify their exports.

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Appendices

Table A1: Description and definition of variables

Variables	Description/Definition	Source
FDI	FDI stock (as a percentage of GDP)	UNCTAD
EXD	Herfindhal-Hirschman Index (HHI) of export concentration. This index usually varies between 0 and 1. When the value tends towards 0, exports are weakly concentrated (i.e. highly diversified) and when it tends towards 1, exports are concentrated on a small number of products (i.e. weakly diversified).	UNCTAD
GDP	Per capita income is gross domestic product divided by the population at mid-year. GDP is the sum of the gross value added of all resident producers in the economy plus taxes on products and subsidies not included in the value of products.	WDI
TRN	Total natural resource rent is the sum of oil rents, natural gas rents, coal rents, mineral rents and forest rents.	WDI
HUK	The level of human capital based on the average number of years of schooling according to Barro and Lee (BL, 2013) and an assumed rate of return on education based on estimates from the Mincer equation.	Pwt 10.0
TFP	Total factor productivity is also defined as the arithmetic mean of labor productivity weighted by the share of wages in value added and capital efficiency weighted by the share of profits in value added. It measures the efficiency of the productive combination. The methodology used takes into account not only labor as an input, but also the contributions of physical, human and other intangible capital to the production of goods and services.	Conference Board Total Economy Database
LQG	Labor force growth	Conference Board Total Economy Database
FINDEV	The Financial Development Index comprises two sub-indices that measure financial institutions and the financial market. Financial institutions include banks, insurance companies, mutual funds and pension funds. Financial markets include stock and bond markets. Financial development is defined as a combination of depth (market size and liquidity), access (the ability of individuals and businesses to access financial services) and efficiency (the ability of institutions to provide financial services at low cost and with sustainable returns, and the level of activity in capital markets).	IMF
FIEI	The Financial Institutions Efficiency Index sub-index is based on three aspects of bank efficiency: (i) the efficiency of intermediation from savings to investment, measured by the net interest margin and the spread between loans and deposits; (ii) measures of operational efficiency, such as non-interest income relative to total income and overhead costs relative to total assets; and (iii) measures of profitability, such as return on assets and return on equity.	IMF
GOV	Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and its degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to those policies.	WGI
CORR	Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including small and large	WGI

	forms of corruption, as well as the 'capture' of the state by elites and private interests.	
LAW	The rule of law captures perceptions of the extent to which agents trust and respect the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence.	WGI
REQ	Regulatory quality captures perceptions of the government's ability to formulate and implement sound policies and regulations that enable and encourage private sector development.	WGI
POS	Political stability and absence of violence/terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.	WGI
VOA	Voice and accountability captures perceptions of the extent to which citizens of a country are able to participate in selecting their government, as well as freedom of expression, freedom of association and media freedom.	WGI

Source: author

Table A2: List of countries in the sample according to the subgroups formed

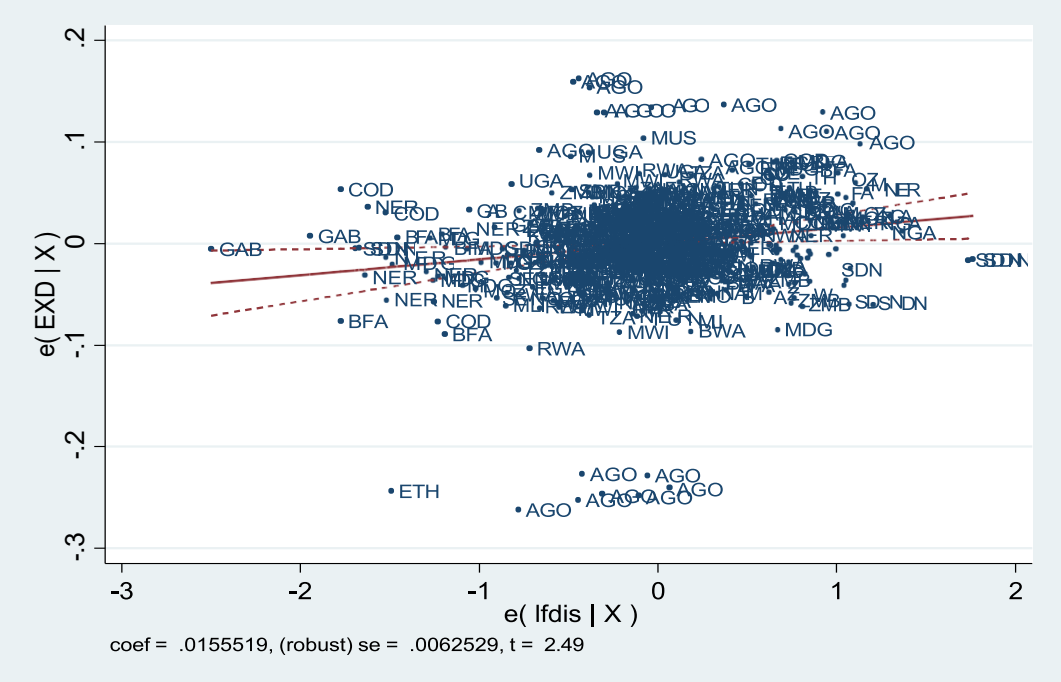
Mineral-rich countries	**Mineral-rich and oil-producing countries**	**Oil-producing countries**	**Countries not rich in oil and minerals**
Botswana	Algeria	Angola	Egypt
Burkina Faso	Democratic Republic of Congo	Cameroon	Ethiopia
Madagascar	Niger	Congo	Kenya
Mali	Sudan	Ivory Coast	Malawi
Mozambique		Gabon	Mauritius
Namibia		Ghana	Morocco
Rwanda		Nigeria	Senegal
South Africa			Tunisia
Tanzania			Uganda
Zambia			

Table A3: Descriptive Statistics

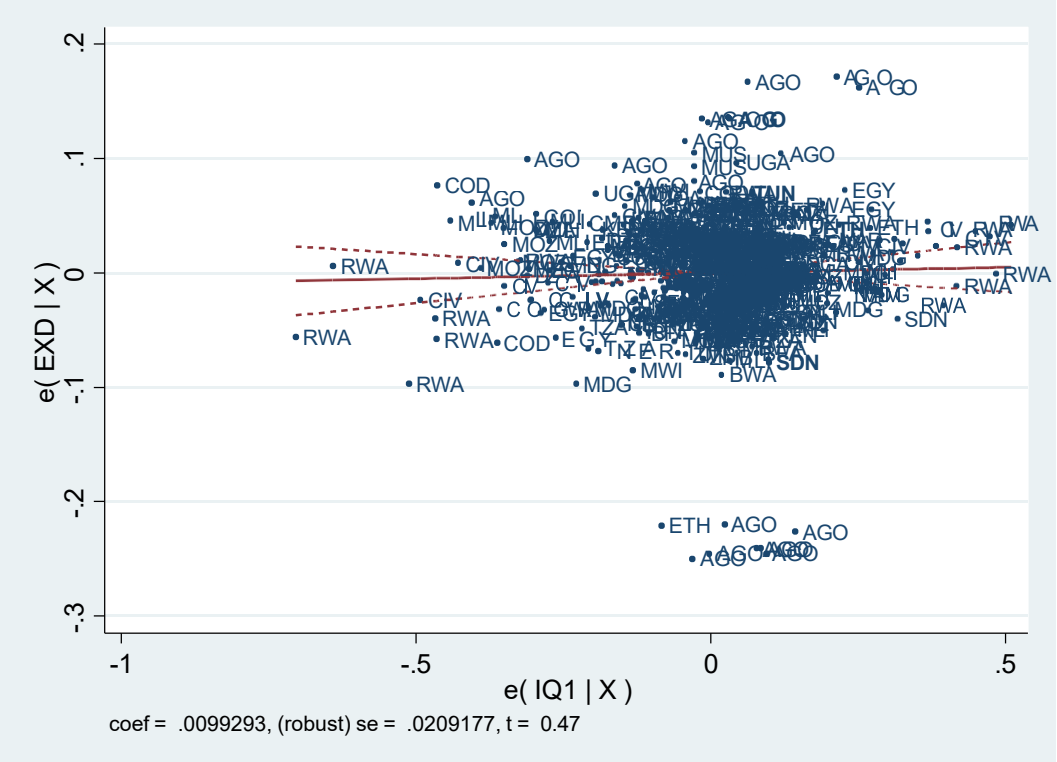
Variable	Obs	Mean	Std. Dev.	Min	Max
EXD	720	.769	.092	.454	.936
HUK	720	1,801	.455	1,053	2,939
FINDEV	720	.162	.122	.017	.646
FIEI	720	.554	.132	.111	.86
LQG	720	2,618	2.308	-8.2	22.211
TFP	720	1,603	37,429	-22,156	1000
TNRr	720	11,181	11,065	.001	58.65
INF	699	17,938	160,975	-8,484	4,145,106
LGDP	720	7,263	1,012	5,234	9,388
IQ	630	-.515	.581	-2.1	.88
VOA	630	-.491	.679	-1.859	1.007
LAW	630	-511	.599	-2.13	1.077
REQ	630	-.469	.56	-2,298	1.127

POS	630	-.556	.883	-2,845	1.2
GOV	630	-0.527	.573	-1.884	1.057
CORR	630	-535	.579	-1.723	1.217

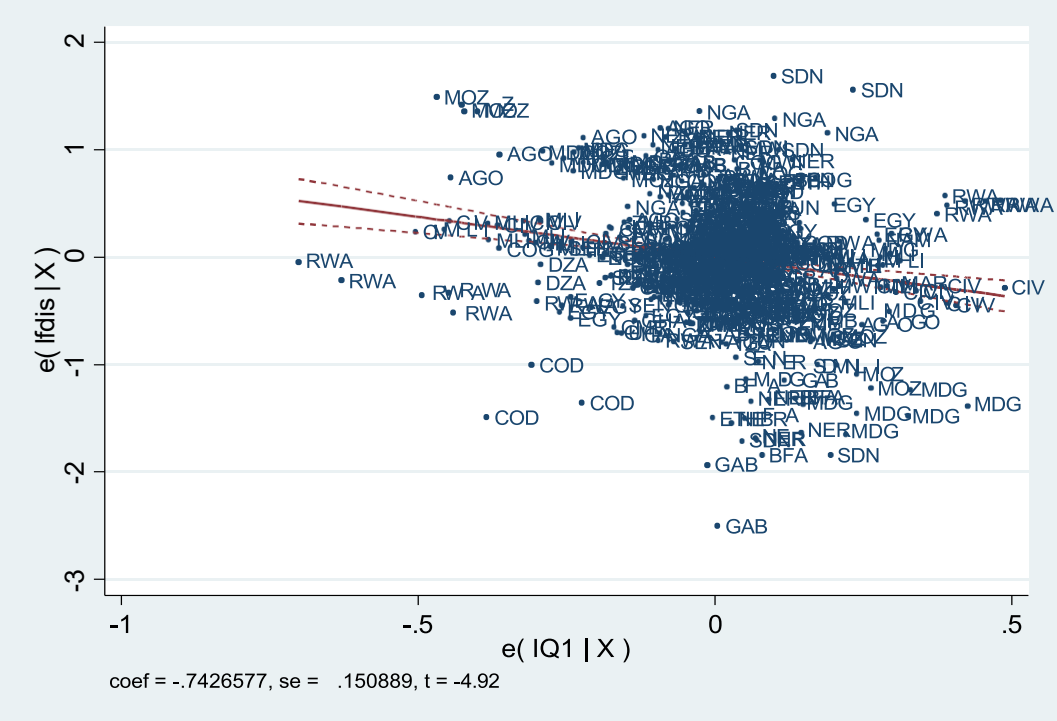
Graph A1.



Graph A2



Graph A3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e(IQ1 | X)
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SDN
NGA
AGO
EGY
RWA
DZA
CIV
COD
MOZ
MDG
GAB
BFA
NER

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