

# Private Investment Effect on Exports Diversification: Evidences from Sub-Saharan African Countries

Nodjadoum Tolnan<sup>1,2\*</sup>, Jean Hugues Nlom<sup>3</sup>, Alexandre Turpin Iroume A. Bouebe<sup>3</sup>, Charles Alain Bit<sup>1,2</sup>

<sup>1</sup>Faculty of Economics and Management, University of Ngaoundéré, Ngaoundéré, Cameroon

<sup>2</sup>Laboratory of Economic Analysis (LEA)-University of Ngaoundéré, Ngaoundéré, Cameroon

<sup>3</sup>Faculty of Economics and Applied Management, University of Douala, Douala, Cameroon

Email: \*nodjadoumtolnan215@gmail.com, nlmhugues@gmail.com/nlmhugues@yahoo.fr, doniroume@yahoo.fr, bitacharles@yahoo.fr

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## Abstract

This article aims to evaluate how private investments (PIs) affect exports horizontal diversification (DH) in 41 Sub-Saharan African (SSA) countries over the period 2009-2022. To achieve this, the method of moments generalized in system is applied on a dynamic panel data to address the potential endogeneity issues and providing robust outcomes. Findings are fivefold: First, IPs has a positive and significant impact exports horizontal diversification. Particularly, 10% increase in PIs increases leads to improve by 0.428% the DH. Second, IP-DH nexus is appeared as an inverted U-sharped, meaning that there is a IPs' threshold from where exports horizontal diversification begin to be mitigated. Third, by addressing the heterogeneity issues, findings remain valid for both rich-resource countries and middle/higher income countries sample, contrary to non-natural resources and lower income countries samples. Four, by looking for the transmission channels, findings suggest that foreign direct investments, economic growth, political stability, lead to mitigate the positive effect of IP on DH. Then, the adverse direct effect observed from a certain threshold of IP would be related to the relatively higher concentration of IP inflows and economic growth on extractive sectors, lower institutional qualities; all of these lead to reduce the potential of economic diversification and global trade participation of SSA. Therefore, the SSA's governments would be wise to introduce a technical training policy that involves investing in training centres aligned to the needs of the market and to incorporate modern technologies to promote practical learning related to industrialization and local requirements.

## Keywords

Private Investment, Export Diversification, SGMM, SSA

## 1. Introduction

The economic diversification issue is always addressed by policymakers and academicians of both poor and rich nations. It is also highlighted as an important challenge for the sustainable development goals (global meetings held by the World Trade Organization, WTO). Many scholars agree that if a nation aims to keep its economies sustainable, they are needs to promote structural transformations and economic diversification. This means making them modern by extending the ranges of goods and services to domestically produce on the one hand, and launching exporting to new destinations, on the second hand (Bahajji, 2023).

Then trough the global value chain integration and supply chain management at the global level, exports are almost all manufactures, which make up just over 70% of all global trades. Natural resources like the raw stuff, oil and minerals are equally important but only fill a limited share (UNCTAD, 2019). Instance, by following this way, the Asian's share in global trade has increased up to 35% - 40% (Trading Economics, 2025). According to the same source, economists agree that great bulks of exports are manufactured goods. Also, European's share in world trade is quite important and estimated between 30% - 33%; suggesting the deeper degree the European Union involvement into the global economic system (Eurostat, 2025). The share of global trade for the United States, which straddle between 15 and 18%, is less than that of Europe but greater than the rest of the world combined. The USA economies, Canada, Mexico and Brazil mainly export raw goods and energy and high-tech (OECD, 2025a). In sub-Saharan Africa, this decline drops to just 2% - 3%. These countries generally export raw materials like the oil, minerals and agricultural produce, which is reason enough for an urgent structural change in strengthening their diversification of their exports.

The importance of economic diversification was emphasized by Omgba (2014), who argued that it is often seen as critical for mitigating the impact of external shocks while helping to greening the economy. Furthermore, Imbs & Wacziarg (2003) provided a similar requirement observing that greater is an economic diversified, better is the reduction of macroeconomic vulnerability with greater mitigation of sectorial economic chocks. Deeping the investigation, Gamariel et al. (2022) observed that economic vulnerability issues are linked to almost two main risks. The first is called the Dutch disease, and the second is price commodity instabilities, which is mainly related to the natural resource abundance. Further, the UN's report indicated that in 2019 nearly 85% of countries over the word were under-developed, and among then, 89% was dependent on raw income sources. Both trends combined will cause rapid deindustrialization, which in turn will raise the costs of the remaining raw material exports. It is therefore critical for most

second and third stage countries with reliance on raw income to adopt diversification strategies to develop long-term liability.

In this case, [Omgbra \(2014\)](#) pointed out how important it is to have a variety of ways of making money. She stated that having many different sources of income through economic diversification will ease the effect of changes that happened outside of the country. Also, author found that variability of income can cause serious development problems. Besides, [Gamariel et al. \(2022\)](#) explained that the future risks of climate change will be caused by three major vulnerabilities: the Dutch disease, proportionally high reliance on exports of raw income sources, and the ability to rely on other sources of income.

Adding to these issues, recent geopolitical risks related to the global financial crisis, COVID-19 pandemic and Russian-Ukrainian tensions, have seriously impacted international trade ([Muneer and al. 2024](#)). Indeed, comparatively to the developed and emerging countries, these international shocks demonstrated most insecurity and vulnerability of poor countries like SSA ones to face to external shocks, since they mostly depend on harvesting and selling raw materials ([Essingone and al 2021](#)). It therefore suggests the importance to diversify SSA economies, but it need to be carried out costly investments in economic key sectors. However, lacking sufficient investments and public financial supports it has highlighted as one of most important SSA's development constraints. Considering as an alternative solution to challenge this constraint, private investments have been observed as a relevant financial support to leverage the economic development.

Indeed, large firms can be major drivers of wide well-organized economic growth ([OECD, 2005b](#)). Private investments spark economic growth when many elements come together to form a favourable setting. Specifically private investments are most likely to cause rapid and sustained economic growth as follows: PI serves as the engine of the machinery that propels economy by helping entrepreneurship to come to a store of resources needed to support an efficient production in the long run. Moreover, engaging private business and investments-increases productivity so future investments can increase. Promoting private business also led to support employment creation and new innovations in technological and management sectors, especially with inter international exchanges and foreign-investments. Furthermore, we need well-tailored markets for competition in developing economies as this fosters innovation and diversification that make possible entrepreneurial activities and ease entry and exit of enterprises while shaping global private commercialization markets by creating institutions and levelling the rules of the game for private businesses.

These international financial markets also bounds there community or about space by creating lot systems in an economic sense thereby extending the reach of growth processes to vulnerable populations then it is getting a condition to support will be absent. The promotion of investments from private investors (Private Sector) emerges as a central theme what matters for employment, growth and poverty-reduction. The scope of this study centres on the contribution of private in-

vestments in diversifying economies.

According to the World Bank report, export diversification is a process aimed to extending and improving the ranges of product or service lines and exploring new international market, while rebalancing national production for fostering local productivity. This definition of PI is linked to the economics structural transformation et enhancing economic resilience regarding the external shocks. However, statistically, exportation diversification is a composite index including horizontal diversification and vertical diversification (Ali et al., 1991; Samen 2010; Herzer & Nowak-Lehmann 2006).

A range of literature demonstrates that lower degree of exports diversification results of a combination of factor as SSA economies are featured by obsolete technologies, limited modern infrastructure and human resources (Lee & Zhang, 2019). Especially, the limited accesses to foreign finance investments have been pointed out as the mayor barrier to African economies' integration in the world trade (Agostino et al., 2023; Tian & Lin 2019). Added to this, recent contributions of PI to exports diversification revealed that are greatly related to institutional environment to provide a competitive business climate and ensure the quality of exported product are related to international market requirements. African countries are known to be among those with weaker institutional quality. Over these constraints experimented, the specialization and comparative advantages offered some possibilities to Africa economies to leverage the technological improvement of small aspects of the fragmentation and comparative advantages of the market (UNCTAD, 2020; Ajide, 2023).

Empirically, a lot has been written regarding private investment- export diversification nexus and there were mixed results. Investigation this nexus for East Asia case, several authors found that, while private (investment) is seen as a key driver of both horizontal and vertical export diversification, the impact was arose only significant on horizontal diversification index for ASS (Rodrik, 2004; Hausmann et al., 2007; Zakariyaou et al., 2020, Houngbédji, 2022). Also, while in countries arable land had a significant and positive impact on both vertical and horizontal diversification; oil wealth had a negative effect on export diversification (Alemu, 2008). One more thing, some studies looked at the impact of trade aid on global export diversification, but also on horizontal and vertical diversification in ASS and Asia countries, and in Asia. The evidence pointed out by the authors suggest the positives nexus, through income, capital, trade increasing, and population growth. According to Vellem & Matezo (2021), external capital inflow as a measurement of foreign aid leads to significantly mitigate export diversification. Moreover, both inflation and foreign direct investments have been found critical driver of export diversification (Bomani & Mapeto, 2021).

Then, the current study contributes to seek mechanisms likely to reduce the export concentration rate and increase in level of export diversification in SSA. The existing economic literature regarding the determinants of export diversifications in ASS remains scarcity. Recently, Houngbédji (2022) and Zakariyaou et

al. (2020) have both addressed this issue and the evidence demonstrated that high dependency on natural resources limits the vertical diversification which in turn leads mostly to a horizontal diversification (DH). Nonetheless, we grabbed other two among them: they both jointly analyse the horizontal and vertical dimensions but they respectively conclude that, admittedly, the horizontal diversification over the period 1995-2017 has insignificantly affect the export sophistication.

However, although prior have highlighted structural constraints as the most important barrier to exports diversification in SSA, none of them did not specifically examine how private investments (IP) are related to exports horizontal diversification.

The current study takes the advantage over the prior ones by addressing the nexus between IP and DH in SSA countries, which to the best of our knowledge has not been investigated until the date. Although the economic impact of investments has recently received increasing attention from scholars, private investment and diversification nexus have received little attention. Indeed, many have been done regarding how private investment affects the global trade, but distinguishing the particular case of exports diversification has not been sufficiently studied. Also, contrary to vertical exports diversification, the drivers of horizontal one has poorly documented, especially in SSA. Then, the current study goes beyond accounting for the previous determinants of diversification and investment in the special context of resource dependence in African countries. Previous studies have highlighted the special interest of IP for trade in Africa (Otchia & C.S. 2025), economic development (Bodaya & Sharma, 2025), sustainability (Arthur et al., 2024). However, no study has evaluated the empirical link regarding the relationship between IP and DH in SSA. It is expected that the outcomes of the relationship between these macroeconomic variables will help improve trade and global value chain participation, but also the structural transformation in Africa through the government policies targeting the channelization of private investment toward specific sectors.

The methodological approach taken to test the hypothesis of the study led us to use the method of system generalized moment (GMM) in a dynamic panel data. Therefore, this methodology is more suitable because it allows us to identify country specific effect and check the endogeneity bias. Data used from the World Bank, from the United Nations Conference on Trade and Development and from Policy IV. So, the results of this research show that private investment contributes positive on the horizontal diversification of exports in the SSA countries. These results provide us with two contributions. First, it proves that effects of private investment on the horizontal diversification are mostly affected by the economic environment quality and the financial inclusion level. Second, it shows that the effect of private investment on the horizontal diversification of exports, is heterogeneous regarding natural resource availability or the stage of economic development. Moreover, we find a nonlinear nexus, especially an inverted U-shaped, suggestion the negative effect of IP on DH from a certain IP's level. And then, economic de-

velopment, foreign direct investments and political stability, are the critical channels through which this last finding occurs.

At the follow of the section 1, the literature review is addressed in section (2), while section (3) is focused on the methodological approach; results and discussion is in section (4), and end, the conclusion and policy implications are presented in section 5.

## 2. Literature Review

### 2.1. Theoretical Framework

The theoretical debate of the private investment effect on the diversification of exports focuses on the traditional theory of international trade and the new theory of international trade.

First, the traditional theory of international trade, which is based on absolute advantage hypothesis argues that the absolute advantage occurs when there is lower unit cost in a given production sector for an economy comparatively to others economies over the world. This arises through the work division, which will lead this country to import such as the products for which it has an absolute disadvantage regarding the local factor production costs. In this view, [Smith \(1776\)](#) shown that nation has the interest to specialize on productions for which it has an absolute advantage. Indeed, through specialization, marginal productivity and increase of the competitiveness in the global value chain related to this sector may be supported ([Eichhoff, 1974](#)).

However, some critical limits have been addressed to this theory, conducting to the emergence of a new approach based on comparative advantage theory, which has been developed [Ricardo \(1817\)](#). In *Principles of Political Economy and Taxation*, [Ricardo \(1817\)](#) revealed that even the allowance of a country to disposes of in every commodity is lead to a net gain; countries must specialize in the production in which they have the “comparative advantage”. The core argument of this approach establishes that only market mechanisms, meaning competitions, are the main driver of the economies’ specialization and the equilibrium prices [Ricardo \(1817\)](#).

Second, classical and neoclassical models have been proved limited given that they globally based on factors immobility among and within economies. Therefore, [Heckscher, Holing and Samuelson \(1919, 1933, 1948\)](#) developed a new approach postulating that within countries, production factors are mobiles, while they are static across borders. In addition, contrary to Ricardo’s model which includes only labour as production factors, the HOS model considers both capital and labour, and assumes further identical technologies across countries. The main consequence from this contrast has been elaborated by the new international trade theory advocates including [Krugman \(1980\)](#), [Helpman & Krugman \(1985\)](#), [Linder \(1961\)](#), [Chamberlin \(1929\)](#), [Hotelling \(1929\)](#), [Lin \(2011\)](#), [Lin & Treichel \(2014\)](#). These authors were opposed to the concentration phenomenon, which indicated the concentration of the raw materials and markets, and are seen as one the most

important factor of the instability of export earnings.

Many have been provided in order to contribute to formalization and advancement of the economic model of [Krugman \(1985\)](#). First to all, the model is related to internal and external economies scale hypothesis:

Regarding the traditional approach, the driver factors of scale economies in a firm may result from gains related to an optimal firm's management within the firm, or from the existence the fixed costs of the production.

However, Alfred Marshall remained pessimist regarding this conclusion and declared that scale economies cannot really exist whatever the level of production in a country. Indeed, a firm goes through three phases regarding internal effects of scale economies (increasing, constant, decreasing), explaining the U-shaped forms of the economic costs curves. This also confirms the findings from [Imbs & Wacziarg \(2003\)](#) showing that sectorial concentration-economic development nexus is a U-sharped curve. Meaning that, at first stage, the economies diversify their activities when developing, but at a certain income/GDP threshold, they start to specialize again.

Unlike traditional international trade theories were focused on within-firm trading based on benefits from the comparative advantages, [Helpman & Krugman \(1985\)](#) nuanced this argument and pointed out this occurs between local and foreign countries that have similar income levels. Based on this way, promoting trades may help cut down the economy concentration and supporting diversification in its whole aspects. Moreover, by considering the market size constraint in the analysis, authors showed that countries featured by a larger local market tend to be more specialized in a particular sector of production. Also, [Chamberlin \(1933\)](#) interested to monopolistic competition and developed the foundation of the product differentiation principle.

However, [Ruffin \(1974\)](#) and [Krugman \(1985\)](#) provided opposed argument by including the uncertainty in their development process. Indeed, the real world is featured by multiform uncertainties then, exports diversification should appear as the political best choice rather than specialization ([Ruffin, 1974](#)). Similarly, [Krugman \(1985\)](#) by examining how scale economies and competitive advantages affect the trading structure, and conclude that it close to horizontal diversification (selling of many similar goods) or vertical diversification (producing goods/services at higher value added).

Further arguments are related to the natural resource abundance and diversification/specialization issues. [Auty \(1990\)](#) looked deeper into a notion of Dutch disease in the link to the resource curse, and explained that the resource curse is used to put light on how the nexus between natural resource management and structural transformation is occurring, and that it not systematically related to a negative or low economic growth. Consequently, the Dutch disease should not be analysed as an adverse economics' driver, but as a process to move from an economic equilibrium to other one ([Davis, 1995](#); [Gylfason, 2008](#); [Nülle & Davis, 2018](#); [Mien, 2023](#)), without having damage effects on the thing as a whole.



Next to general argument about trade, other theoretical approaches are developed such as both diversification and private investment theories. It includes dynamic capacity theory, learning technology theory and production fragmentation theory. In this perspective, the dynamic capacity theory supports the adaption to international market; improve innovation and competitiveness (Teece & Pisano, 1994). In this view, this author looked to show that one of most important consequences from the firm's dynamic capacities resulting in promotion of their exports diversification. Besides, the learning technology theory assumes as the main firms' exports diversification, the skill accumulation and global value chain involvement. Salama & Driss (2025) shown from their analysis that artificial intelligence promotion enables to strengthen and foster firm's decision through the financial industries development.

## 2.2. Empirical Background

From an empirical view point, a clear consensus has not yet been reached by academicians on whether private investment affects the horizontal exports diversification in developing countries with special focus on Sub Saharan Africa (SSA). Some researchers have shown the positive effects, while others have pointed out the opposite. Still, other scholars argued that the effect of private investment on export diversification largely depends on the host economics' dynamic and government's behaviours. Therefore, Alemu (2008) indicated that domestic investment has a positive influence both on both the vertical and the horizontal diversification in East Asian countries. Authors observed that this arises as a direct consequence of the investment heavily in education, health and infrastructure sectors, which enhance the countries' attractiveness for foreign direct investment inflows.

Vellem and Matezo (2021) investigated the nexus between foreign private investment and exports diversification as well as in SSA and a selected Asian developing country, and revealed that in the Asian sub-sample, foreign aid has shown a negative effect on both the vertical and horizontal exports diversification. In contrary, Mazengia et al. (2023) has putted forward the time effect in his analysis of the driver factors of exports diversification in Ethiopia. Findings shown that in the short-term, that financial development, external debt and real gross domestic products have a positive and significant impact on export diversification in Ethiopia, while in the long-term, author observed the similar conclusion, and revealed that trade openness further significantly support both the export performance and the stability of the macroeconomic balance in the long run. Conversely, Melitz (2003) argued that financial development and especially the development of the capital market can negatively influence the economic diversification. This is related to the protectionist policies which tend to enable private investors to dominate the existing and competitive sectors. The level of risk-taking by investors then determines the level of diversification ability.

Fosu & Abass (2018) highlighted the particular importance of domestic credit in the context of diversification of exports in SSA. From a comparative analysis,



authors' suggestions aim to support the key role of domestic credit for African economies, but it remains marginal for other regions. Furthermore, it arises that human capital, governance quality and landlockedness have all as predicted significant effects on export diversification. However, except for governance quality, when accounting for the interaction term between the domestic credit and the dummy variable "Africa", these variables and domestic credit generally did not have significant effects on exports diversification in other region than Africa one. These findings highlight the dominance of domestic credit in Africa as compared to other regions of the world.

As conclusion, the research conducted by [Alemu \(2008\)](#) on the influencing factors of both vertical and horizontal exports diversification in East Asia has shown that education, health, income per capita, population size, infrastructure development, and economic openness are crucial for inventiveness of both diversification process. Yet in Sub-Saharan Africa (SSA), all those factors only assist in increasing the vertical exports diversification.

Overall, it appears on the matter of private investment effect on export diversification, there is no clear consensus from the empirical literature. Some researchers believe that private investment increases export diversification, but other argue against it. Still, some economists claim that the effect of private investment also depends on the specific behaviour or featured of each domestic economy. Within the context of our study focusing on SSA, we examine the impact of private investment on the export diversification of exports in the period 2009-2022, by emphasizing horizontal diversification. The main hypothesis of this study is private investment shifts positively the horizontal export diversification of Sub-Saharan economies.

### 3. Methodology

This methodological section is divided into three parts. The first presents the models, and variables used in this study. The second part introduces the definitions of the variables followed by the last part that details the estimations methods used.

#### Model and Variables

- Dependent variable

This study uses as dependent variable export diversification index (DH), which is empirically known as the normalized Hersfindahl-Hirschman index (IHH). Globally, DH is statistically defined as the sum squared of the share of any exchange product in the total export for country. This index has been used by [Nassir Ul \(2024\)](#) in order to investigate the determinants of exports diversification. Using this index is related to its advantages as revealed by several authors.

- Independent variables

The independent variable is Private investment includes all financial contributions made by private entities, whether national or international. Indeed, the di-

rect injection of capital is incorporated as a control variable in order to measure its specific effect on export diversification (Diallo et al., 2020a). Increase in IDE inflows allowing host to integrate new market (Markusen, 1984). In the same way, Napo & Adjande (2019b) shown the SSA countries should diversify their IDE inflows in several sectors, which may lead to create an important opportunities road for the potential exportations. Furthermore, Essehou & Igue (2022) shown that IPs in the un-extractive activities enabling horizontal diversification through the duplication of similar activities in several economic sectors. Similar, Diallo et al. (2021) suggested two mechanisms through which the nexus between IDE and PI occurs. On the one hand, IDE is known as both capital and investment sources in the long run; resulting in economic development by economic activity agglomeration. On the other hand, IDE may lead to global inflation and exchange rate increasing; resulting in mitigating economic competitively and private investments. In the case of SSA, the advantage from foreign direct investments on private domestic investments can also relate to countries characteristics (abundance of natural resources, quality of institutions, government expenditures, human capital, ect.).

Moreover, a relatively higher correlation between *trade openness* and exports diversification in SSA is mainly related to their global market involvement. The integration into global market enables to local firms to make larger their productive potential in the similar sectors and productivity in the long run. In this vein, Millago et al. (2024a) revealed that trade openness leads to support exports horizontal diversification, especially whether in the context of the better institutions. Indeed, the New trade theory assumes that trade openness is favourable not only to the static gains (similarly to the prediction from the traditional trade theory), but also to dynamic gains.

However, these gains both are not a panacea, as trade openness is likely to the more speculation in less dynamic sectors in domestic countries; resulting in a negative impact on economic development in the long term (Rodríguez & Rodrik, 2000).

Furthermore, Ramey (1995) and Miles (2006) asserted that institutions stability and the competitive of exchange rate are the drivers of domestic economic capacity to diversify the productive sector. Then, a flexible regime indirectly enables to increase in economic progress by reducing the global product volatility. In contrast, a fixed regime supports horizontal diversification through the macroeconomic stability environment and within-regionals trade improvement.

Then, this conclusion is also approved by Essehou & Igue (2022), who are found a positive association between horizontal diversification added value, but authors added that this hypothesis remains valid if economic growth reaches a certain threshold.

Regarding Natural resource influence, it appears that horizontal diversification is correlated to natural resources through an extended of agri-food outcomes. In contrast, traditional natural resource limits the potential of countries to diversify

their exportation, notably whether the quality of institutions is weak (Niass, 2020).

According to Ben Hammouda (2009), IHH allows us to appreciate the economic diversification degree through the trade concentration.

The mathematic formula of IHH is presented as follows:

$$H_{ij} = \frac{\sqrt{\sum_{i=1}^n (xi/X)^2}}{1 - \frac{1}{\sqrt{n}}} - \frac{1}{\sqrt{n}}$$

where:  $H_{ij}$  is DH index for good/service  $i$  in country  $j$ , and its value is ranking from 0 to 1, which indicates highest and lowest diversification degree, respectively;  $xi$ , the exports value for good/service  $i$ , and  $n$  is the sum of all exchanged goods/services

$$\text{Then, } X = \sum_{i=1}^n xi$$

However, there is a growing literature regarding the exports diversification issue, including diverse methodologies and data in heterogeneous contexts. One of the most recommended is the dynamic estimator of a two-step system generalized method of moments (SGMM) based on Arellano & Bover (1995) and Arellano and Bond (1991). This estimator is further based on the difference GMM estimator, which has weak instrumentation and does not reduce the impact of weak instruments (Blundell & Bond, 1998).

SGMM arises a suitable approach for addressing the endogeneity issues regarding the variable set and the model. Bidirectional causality may arise since trade has been trade or global value chain involvement has been found as a financial source for African's private firms (Meka'a et al., 2024; Noufelie & Djamen, 2025). Moreover, indeed, PI may appear endogenous to horizontal export diversification, given that it enables to drive economic dynamics through providing needed resources to private investors in order to foster goods/services production. Also, the omission variables issues can be another endogeneity source, given that our model specification does not include all variables likely to significantly influence DH. Additionally, some independent or omitted variables such as the quality of institutions, economic stability, public infrastructures, which simultaneously affect both PI and DH, which can significantly bias the results.

The estimator has several advantages. First, it solves endogeneity issues by considering and building our model as a system of equations in the first difference and levels. Second, it is efficient in solving econometric problems, such as endogeneity, validity, and over-identification. Third, GMM estimators usually include unobserved factors such as geopolitical risks, which usually affect the development and flows observed in national and international GVC. And fourth, compared to difference GMM estimations, System GMM is better for unbalanced panels because it eliminates the flaws in accentuating gaps (Roodman, 2009). Despite these advantages, system GMM can lead to overfitting of endogenous variables and weakening Hansen's test, and in this case, produce biased estimates by generating many instruments (Roodman, 2009). As recommended by Roodman (2009), we

tackle this issue by limiting the number of lags, and we consider all explanatory variables potentially linked with our explained variables.

In the similar way, [READ \(2020\)](#) shown that industry development leads increase the formal job creation and productivity; inversely, this last is potentially enabling to improve wellbeing through the increase in income and government revenue.

SGMM technical has been experimented by [Malick \(2019\)](#), [Gamariel & Hove \(2019\)](#) and [Gamariel et al. \(2022\)](#) in investigating the driver of the economics diversification. The equation (1) of DH is inspired to investigations from [Malick \(2019\)](#), [Gamariel & Hove \(2019\)](#) and [Gamariel et al. \(2022\)](#), which have used further SGMM approach in their respective analyses. Then, we express the equation of DH associated to PI and control variables as follow:

$$LDH_{it} = \alpha'_1 + \beta_1 LIP_{it} + \beta_2 LIDE_{it} + \beta_3 LIN_{it} + \beta_4 LVA_{it} + \beta_5 LIF_{it} + \beta_6 LRN_{it} + \beta_7 LOUV_{it} + \beta_8 LPIB_{it} + \beta_9 LSP_{it} + \beta_{10} LTC_{it} + \beta_{11} LCH_{it} + \varepsilon_{it} \quad (1)$$

Each variable presented in this equation is defined in [Table 1](#). Above we have provided a deeper explanation for our dependant variable means DH indicator. Furthermore, the main independent variable is Private investments (IP)/IP is defined as the aggregated domestic investment including local and foreign investors ([Lahimer, 2009](#)). It is captured in GDP share. According to [Ben Hammouda et al. \(2006\)](#), government investments represent a relevant driver of an economics diversification, meaning that an important public investment enables to incentive diversification since public investments are an IP attractiveness source.

**Table 1.** Descriptives statistic.

| Variable |                            | Obs | Mean                    | Min        | Max        | Source    |
|----------|----------------------------|-----|-------------------------|------------|------------|-----------|
| LHD      | Horizontal diversification | 641 | −0.2745378<br>0.1666215 | −1.445675  | −0.0642164 | UNTADstat |
| LPI      | Private investment         | 535 | 3.048207<br>0.3494991   | 1.749331   | 4.35672    | WDI       |
| LPIB     | Gross domestic product     | 612 | 7.462156<br>1.191362    | 5.293795   | 11.02149   | WDI       |
| LOU      | Trade openness             | 619 | 14.43311<br>1.504988    | 10.46504   | 17.38675   |           |
| LIDE     | Foreign direct investment  | 590 | 19.62447<br>2.051244    | 10.92336   | 25.45166   |           |
| LVA      | Added value                | 624 | 3.140133<br>0.466484    | 1.471418   | 4.35754    |           |
| LTC      | Exchange rate              | 643 | 4.876627<br>2.101391    | −0.3327384 | 9.165874   |           |

Note: Under the coefficient's mean value are standard deviations. Source: Authors.

Then, the main hypothesis of this study is follows: *IP positively affects DH in Sub-Saharan African countries.*

The control variables set is described in **Table 1**. Furthermore, variables used are collected from several sources, which are carefully presented in **Table 1**. Finally, the dataset is spanning over the period 2009-2022, and the choice of variable and period were related to the ongoing literature and data availabilities.

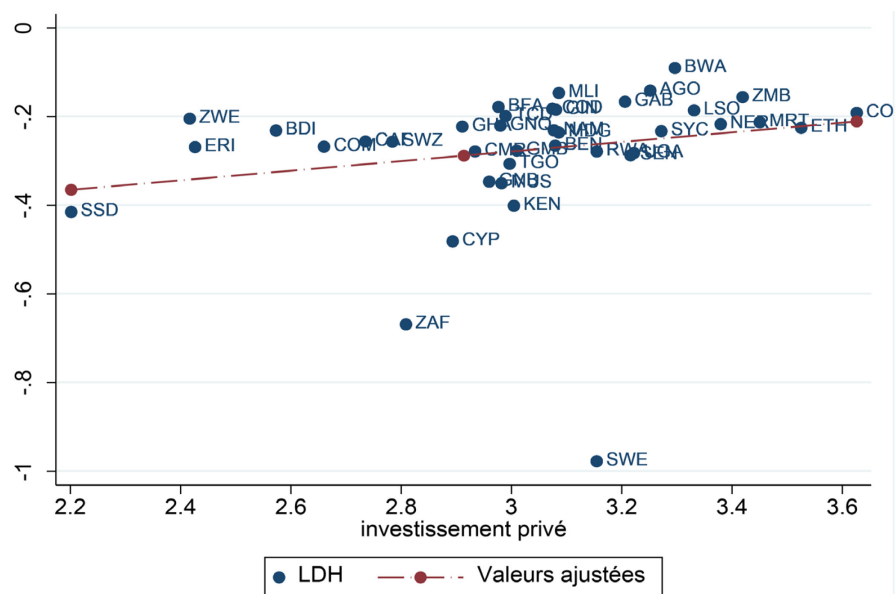
## 4. Results

### 4.1. Descriptive Analysis and Diagnostic Tests

First to all, we provide a descriptive analysis followed by the presentation and comments of results.

**Table 1** aims to describe all variables used in this study and their sources. As we can see, the logarithm of horizontal diversification is established to 0.274 implying a relatively lower diversification degree for SSA countries. Furthermore, we find the standard deviation of DH is 0.166% indicating a relative homogeneity in exports DH among the selected SSA countries. Regarding the summary for private investments (IP), it appears total IP in SSA reaches nearly 3% of GDP, while the standard deviation is 0.35, then the distribution of IPs are relative homogenous among the selected countries.

Moreover, **Figure 1** draws the trend between exports DH (vertical axis) and IP (horizontal axis). The overall trend leads to support the positive nexus between DH and IP. **Figure 1** depicts further the heterogeneity in distribution in each variable among the countries selected. Countries group including Botswana (BWA), Angola (AGO) and Zambia (ZMB), are the lowest diversified countries, contrary to highest diversified ones such as Swaziland (SWE), South Africa (ZAF).

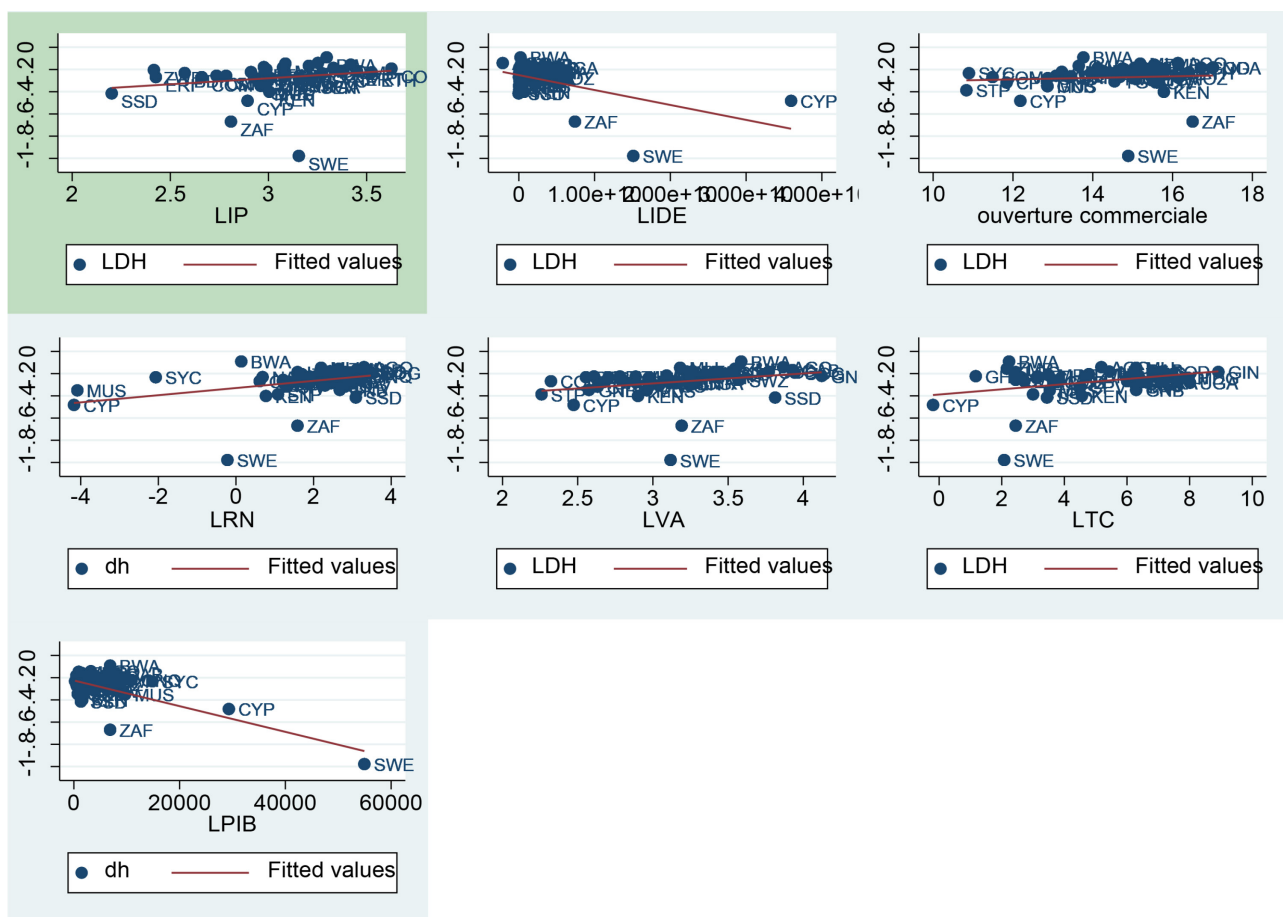


Source: Authors.

**Figure 1.** Relation between horizontal diversification and private investment.

Besides, Congo democratic (COD), Ethiopia (ETH) and Mauritius (MRT) depicted highest IP, while South Sudan (SSD), Zimbabwe (ZWE) and Eretria (ERI) are underscoring lowest. To this end, the greater the increase in private investment, the more horizontal diversification improves. This improvement reflects the mobilisation of private capital by Sub-Saharan African countries, which in turn leads them to broaden their range of exported products. The closer countries are clustered around this oblique line, the more positively correlated they appear. Conversely, countries that deviate from this line are positioned either above or below it. Thus, when countries lie above the oblique line, this indicates a higher level of diversification, explained by a highly effective industrialisation policy. However, when countries fall below this line, it reflects weaker horizontal diversification. This weakness in diversification clearly demonstrates the situation of Sub-Saharan African countries.

Regarding the correlation with exports DH and the control variables, **Figure 2** depicts that DH is positively correlated with trade openness and, added value and change rate (TC), while DH is negatively associated to Foreign direct investment (IDE) and economic growth (PIB).



Source. Authors.

**Figure 2.** Relation between exports DH and control variables.

The majority of Sub-Saharan African countries are concentrated along the oblique lines, which demonstrates that these countries are positively correlated. The higher the level of private investment, the greater the improvement in the horizontal diversification of exports. Gross Domestic Product (GDP) measures the economic size and productive capacities, which in turn enhance the horizontal diversification of exports. Indeed, [Chenery \(1980\)](#) confirms this relationship by showing in his theory that horizontal diversification reduces vulnerability to external shocks, broadens the productive base, and increases GDP. [Figure 2](#), which represents the relationship between Foreign Direct Investment (FDI) and horizontal diversification, reveals a strong correlation between these variables. This strong correlation is explained by economic dynamics linked to the structural transformation of African economies, which rely on market penetration strategies. Such strategies demonstrate that horizontal FDI often aims to produce locally the same goods as in the countries of origin in order to access new markets ([Markusen, 1984](#)). In the same vein, the work of [Napo & Adjande \(2019b\)](#) showed that Sub-Saharan African countries must diversify FDI across several sectors, thereby enabling them to create a larger number of potential export lines conducive to growth.

Private investment (PI) plays a leading role in economic development in Sub-Saharan Africa. According to [Essehou & Igue \(2022\)](#), private investment in non-extractive sectors encourages horizontal diversification through the duplication of similar activities across several economic sectors. This is illustrated in [Figure 2](#), which shows a strong correlation between PI and horizontal diversification. Similarly, [Diallo et al. \(2021\)](#) highlight that the impact of FDI on private investment can be explained from two perspectives. On the one hand, FDI is recognised as a source of capital and long-term investment, fostering economic development through the agglomeration of economic activities. On the other hand, FDI may lead to price increases and currency appreciation, which can reduce competitiveness and crowd out domestic private investment. In the case of Sub-Saharan Africa, the beneficial impact of FDI on domestic private investment may also crucially depend on country-specific characteristics in developing economies, such as weak institutional quality or limited financial development.

The strong correlation between trade openness and horizontal diversification in Sub-Saharan Africa is explained by integration into global markets. This integration enables local firms to broaden their productive base in similar sectors. Thus, according to [Millago et al. \(2024b\)](#), trade openness fosters horizontal diversification of exports provided that institutional quality is sound. Indeed, according to new trade theories, trade openness generates not only static gains, as in traditional trade theories, but also dynamic gains. However, these gains are not always guaranteed, and openness may push countries towards speculation in less dynamic sectors, with a negative impact on long-term economic growth ([Rodríguez & Rodrik, 2000](#)).

Exchange rate stability and competitiveness are factors influencing the capacity



of local economies to broaden their productive base in similar sectors. A flexible regime indirectly enhances growth by reducing volatility in aggregate output (Ramey, 1995; Miles, 2006). Conversely, a fixed regime promotes horizontal diversification through macroeconomic stability and intra-regional trade. **Figure 2** shows a positive correlation between value added and the horizontal diversification of exports. This positive correlation is explained by an increase in value added in the manufacturing sectors, which encourages the expansion of the range of African economies. This enables the production and export of a variety of similar goods, thereby fostering horizontal diversification. This analysis is also confirmed by **Essehou & Igue (2022)**, who argue that value added has a positive effect on horizontal diversification, provided that economic development reaches certain thresholds.

The correlation between natural resources and horizontal diversification is explained by the broadening of the range of products in the agricultural sector, which can foster horizontal diversification. Conversely, non-renewable natural resources act as a brake on horizontal diversification when institutions are of poor quality (**Niass, 2020**).

Second, we move to examine the correlation degree among variables listed above. It appears that DH and PI are positively correlated, although the correlation degree is relatively low (0.116). Similar observations are arising between DH with added value (0.23) or trade openness (0.30). Overall, the highest correlation coefficient (0.615) is established between Economic growth (PIB) and Foreign direct investments (IDE), see **Table 2** below.

**Table 2.** Correlation matrix.

|      | LDH     | LIP     | LPIB    | LIDE    | LVA    | LTC    | LOU    |
|------|---------|---------|---------|---------|--------|--------|--------|
| LDH  | 1.0000  |         |         |         |        |        |        |
| LIP  | 0.1168  | 1.0000  |         |         |        |        |        |
| LPIB | -0.4672 | 0.0873  | 1.0000  |         |        |        |        |
| LIDE | -0.3241 | 0.2830  | 0.4669  | 1.0000  |        |        |        |
| LVA  | 0.2305  | 0.3714  | 0.1588  | 0.2973  | 1.0000 |        |        |
| LTC  | 0.3082  | -0.0521 | -0.6156 | -0.3374 | 0.0793 | 1.0000 |        |
| LOU  | -0.0240 | 0.1964  | -0.3716 | 0.4083  | 0.3469 | 0.2165 | 1.0000 |

Source: Authors.

However, the value remains relatively low, since it under the recommended value (0.8), while it inconclusive yet regarding the potential multicollinearity threat. The existing relatively high correlations do not automatically suggest strict evidence of multicollinearity (**Field, 2000**). To address this issue, we follow the recommendations from **Noufelie & Djamen (2025)** and **Meka'a et al. (2024)** and proceed to the Variance Inflation Factor (VIF) and tolerance (1/VIF) tests (**Table 3**). The general thumb's rule used to validate the potential presence of multicol-

linearity assumes that multicollinearity occurs if the VIF is less than 10 (or greater than 0.1) (Miles, 2014).

**Table 3.** Multicollinearity test.

| Variable | VIF  | 1/VIF    |
|----------|------|----------|
| LPIB     | 3.47 | 0.288217 |
| LOU      | 2.75 | 0.363666 |
| LIDE     | 2.69 | 0.372312 |
| LTC      | 1.74 | 0.573409 |
| LVA      | 1.53 | 0.653376 |
| LIP      | 1.22 | 0.820470 |
| Mean VIF | 2.23 |          |

Source: Authors.

Regarding the values in **Table 3**, it is apparent that average of VIF is less than 10 (2.23) and the tolerance values are greater than 0.1. This indicates that a serious multicollinearity threat does not occur, and the regression estimations in this analysis are reliable.

**Table 4.** Unitroot test.

|      | Trend included | Without trend | Trend included | Without trend |
|------|----------------|---------------|----------------|---------------|
|      | I (0)          |               | I (1)          |               |
| LDH  | 379.2098***    | 337.9062***   | -              | -             |
| LIP  | 126.2999***    | 514.5141***   | -              | -             |
| LPIB | 115.8265**     | 114.557**     | -              | -             |
| LOU  | 76.6754        | 91.0607       | 393.539***     | 268.027***    |
| LVA  | 86.1701        | 73.6764       | 365.920***     | 253.744***    |
| LTC  | 39.0496        | 88.611        | 427.643**      | 254.351***    |

Source: Authors.

**Table 4** displays the test for unit root, which is relevant in choosing process of the best econometric approach and providing unbiased outcomes. This test is conducted under the null hypothesis that all the series are nonstationary. The findings show that the integration order of series is mixed. Especially, we found that Exports DH, PI, and PIB are integrated in level means I (0), the null hypothesis of cannot be rejected at levels. However, all variables are strongly stationary in the first difference, I (1). Thus, the unit root tests (**Table 4**) reveal that certain variables are stationary in levels (I (0)), while others only become so after differencing (I (1)). This heterogeneity renders conventional estimation methods unsuitable, as they generally assume homogeneity of stationarity. The System GMM, by com-

binning equations in first differences and in levels, makes it possible to address these characteristics simultaneously and to ensure the consistency of the estimations.

#### Empirical findings:

After investigating the necessary preliminary diagnostic analysis, the emphasis now moves toward the empirical part of the study regarding the direct effects of PI on exports DH. For this purpose, three baseline model are used including OLS, Fixed effect (FE) (The choice between FE and RE have been make through the Hausman's discrimination test, which is based on Wald statistic) and two steps GMM (SGMM) and the findings are presented in **Table 5**.

**Table 5.** Private investment and exports horizontal diversification.

| Variables    | OLS<br>(1)            | FE<br>(2)             | MMGS                  |                     |                    |                     |                       |                       |
|--------------|-----------------------|-----------------------|-----------------------|---------------------|--------------------|---------------------|-----------------------|-----------------------|
|              |                       |                       | (3)                   | (4)                 | (5)                | (6)                 | (7)                   | (8)                   |
| L.LDH        |                       |                       | −0.1407***<br>(0.052) | −0.0619<br>(0.062)  | 0.0758<br>(0.078)  | 0.0255<br>(0.072)   | −0.0746<br>(0.109)    | −0.2077***<br>(0.054) |
| LIP          | 0.0412**<br>(0.020)   | −0.0358**<br>(0.016)  | 0.0324<br>(0.023)     | 0.0193<br>(0.025)   | 0.0418*<br>(0.022) | 0.0447*<br>(0.025)  | 0.0128<br>(0.028)     | 0.0428*<br>(0.025)    |
| LOU          | −0.0715***<br>(0.007) | 0.0545***<br>(0.018)  |                       | 0.0080<br>(0.011)   | −0.0029<br>(0.010) | −0.0097<br>(0.013)  | −0.0490***<br>(0.015) | −0.0469***<br>(0.016) |
| LPIB         | −0.1221***<br>(0.009) | 0.0100<br>(0.023)     |                       |                     | −0.032*<br>(0.017) | −0.049**<br>(0.023) | −0.0905***<br>(0.023) | −0.0961***<br>(0.025) |
| LIDE         | 0.0091*<br>(0.005)    | 0.0009<br>(0.004)     |                       |                     |                    | −0.0021<br>(0.006)  | 0.0052<br>(0.006)     | 0.0059<br>(0.005)     |
| LVA          | 0.2033***<br>(0.017)  | −0.0768***<br>(0.026) |                       |                     |                    |                     | 0.1816***<br>(0.035)  | 0.1951***<br>(0.038)  |
| LTC          | −0.0092***<br>(0.004) | 0.0585***<br>(0.015)  |                       |                     |                    |                     |                       | −0.0059<br>(0.008)    |
| Constant     | 0.7633***<br>(0.109)  | −1.0878***<br>(0.286) | −0.3800***<br>(0.068) | −0.452**<br>(0.166) | −0.0786<br>(0.220) | 0.1614<br>(0.252)   | 0.3817<br>(0.277)     | 0.2376<br>(0.329)     |
| Observations | 448                   | 448                   | 482                   | 479                 | 466                | 432                 | 430                   | 418                   |
| R-squared    | 0.487                 |                       |                       |                     |                    |                     |                       |                       |
| NI           |                       |                       | 6                     | 6                   | 7                  | 9                   | 9                     | 15                    |
| Number of id | 37                    |                       | 39                    | 38                  | 37                 | 37                  | 36                    | 36                    |
| AR1 [P]      |                       |                       | 0.0598                | 0.0736              | 0.0530             | 0.0336              | 0.0856                | 0.0947                |
| AR2 [P]      |                       |                       | 0.195                 | 0.456               | 0.343              | 0.325               | 0.927                 | 0.121                 |
| HOIR [P]     |                       |                       | 0.685                 | 0.804               | 0.464              | 0.302               | 0.517                 | 0.0363                |

Notes: les seuils de significativité sont de: \*\*\*représente 1%, \*\*représente 5% et \*représente 10%. Source: Authors.

Under OLS and FE methods, coefficients in columns (1) and (2) of IP are statistically significant, but with the mixed signs. However, OLS method fails in addressing the potential bias which general are occurring in a panel data, while although FE enables to control the country effect, but fails to account for the reverse causality and variable omissions issues. Therefore, OLS and fixed effect methods are biased to provide consistent estimators.

Economic growth and private investment are closely linked to human capital and political stability. Thus, integrating them into the initial model could distort the main coefficients (PI and FDI) due to multicollinearity.

Regarding the SGMM outcomes, findings are included in columns (3) to (8), where the column (3) include IP as only explanatory variables, and from there, control variables are successively included. Then model (8), which takes into account full explanatory variables, seems to be the best.

The robustness tests at the bottom in **Table 5** indicate that AR (1) and HOIR (Hausman over-identification test) are both significantly at 10% and 5%, respectively; while the probability related to AR (2) is 0.121 and it non-significant. These mean that Hansen test of over-identification shows that the null hypothesis of a valid instrument is not rejected until the 10% significance level, meaning that the instruments used in (Eq1) are valid. Moreover, it appears that the null hypothesis of the absence of a first-order correlation (AR1) is rejected, whereas the second-order correlation (AR2) hypothesis of the residual is not rejected. Finally, the coefficient of lagged dependent variable ( $-0.2077$ ) is significant, positives and less than 1. According to these diagnostic results, the econometric model specification is valid and can be used to carefully address the potential endogeneity issue (Roodman, 2009). Additionally, it is negative, suggesting the convergence process in exports diversification growth over the time among African countries. Furthermore, the maximal number of instruments is 15 against 36 selected countries, meaning that condition according to which the number of instruments must be less that the number of individual is respected. As consequence, SGMM is revealed as suitable approach for providing unbiased coefficient in analysing the nexus between exports DH and PI in SSA.

Then, the model 8 indicates that the coefficient associated to PI is 0.0428 and it is significant at 10% threshold. It means at 1% increase in private investments, the improvement in exports of diversification reaches 0.0428, all things being equal. This result corroborates Dunning (1993) and Caves (1996) which found that Private investments positively affect diversification, and explained that this occurs through the channel of technology transfer from developed to developing countries, but also the knowledge diffusions and their effect on market structure of recipient countries. In the same vein, Grossman & Helpman (1995a) established evidence according to which increasing in human capital dotation in host countries lead to strengthen the diversification. Economic growth stimulates both domestic and external demand, which encourages private investors to turn towards new export domains. However, at an increasing pace, private investments tend to

concentrate more heavily on sectors that are already high-performing and lucrative (often linked to extraction or natural resources). Although economic growth promotes investment, it may lead to a lack of diversity by reinforcing dominance in a few sectors. As for foreign direct investment (FDI), it provides financial resources, technologies, and skills that can, at first, broaden the range of exports. Nevertheless, in Sub-Saharan Africa, FDI is concentrated in highly profitable but narrowly diversified areas such as oil, mining, and telecommunications (Imbs & Wacziarg, 2003; Cadot et al., 2011; Diallo et al., 2020b). Thus, within the framework of this study, FDI negatively affects export diversification. This finding is corroborated by Napo & Adjande (2019a), who demonstrated in his research on export diversification that the concentration of exports on primary commodities and manufactured value-added products exerts a negative impact on per capita GDP growth. This outcome is explained by the concentration of FDI in the primary commodities sector. In our study, the GDP variable also shows a negative effect on horizontal diversification, which confirms the strong concentration of FDI in the primary commodities sector. Such concentration of FDI hinders the horizontal diversification of exports into other sectors such as agriculture, livestock, transport, and health, among others. Then, this result allowing validating the hypothesis according to which horizontal exports diversification could be significantly improved through the increase in private investment in SSA.

## 4.2. Robustness Checks

Several exercises have been built in order to validate the consistence of the result from the baseline findings. It is based on the including of additional control variables, followed by using of alternative samples and transmission channel, and end examining the marginal effects. We further added the new control variables in order to assess whether the baseline results remain consistent and what extent the estimated coefficients change. For this purpose, the variables set including IN, IF, CH (Human Capital), SP and IP squared, are added. The including of natural resource (IN) in the baseline equation is particularly important, since natural resource rents play a central role for SSA economies (Gueye & Diop, 2024). However, rents from natural resource management may be both positively or negatively affect the global economic. The observation is consistent with the resource curse theory, meaning that the abundance in natural resource is responsible of developing of African economies.

Regarding the Capital Human variable (LCH), Beker (1992) suggested that it is important to foster future income, and including education, training, health, etc. Similar, Römer (1990) and Lucas (1988) observed that human capital is an engine of endogenous economic growth and innovation. These last authors clarified that human capital enables entrepreneurship to enhance their investment management through investments across economic sectors. Thereby, human capital seems to be a relevant driver for exports horizontal diversification.

Political stability (SP) may influence the capacity for a country to encourage

**Table 6.** Additional control variables.

|                   | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
|-------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| L.LDH             | 0.1041***<br>(0.027) | 0.2281***<br>(0.056) | 0.1745***<br>(0.030) | 0.1688<br>(0.214)    | 0.1172**<br>(0.058)  | 0.1164***<br>(0.011) |
| LIP               | 0.0512***<br>(0.014) | 0.0403**<br>(0.018)  | 0.0644***<br>(0.014) | 0.0911**<br>(0.036)  | 0.0873***<br>(0.034) | 0.5039*<br>(0.275)   |
| LIN               | 0.0048<br>(0.004)    |                      | 0.0025<br>(0.003)    | 0.0444***<br>(0.017) | 0.0015<br>(0.009)    | −0.0009<br>(0.003)   |
| LIF               |                      | 0.0182<br>(0.031)    | 0.0231<br>(0.021)    | −0.0504**<br>(0.024) | −0.0593*<br>(0.031)  | −0.0454**<br>(0.021) |
| LCH               |                      |                      |                      | 0.0557<br>(0.073)    | 0.1017*<br>(0.057)   | 0.1512***<br>(0.047) |
| SP                |                      |                      |                      |                      | 0.0070<br>(0.017)    | 0.0066<br>(0.016)    |
| LIP2              |                      |                      |                      |                      |                      | −0.0680<br>(0.047)   |
| Control variables | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Constant          | −0.0313<br>(0.168)   | 0.5739<br>(0.403)    | 0.0621<br>(0.121)    | 0.0516<br>(0.265)    | 0.6856*<br>(0.371)   | −0.3206<br>(0.376)   |
| Observations      | 356                  | 289                  | 251                  | 135                  | 135                  | 135                  |
| Number of id      | 35                   | 28                   | 27                   | 20                   | 20                   | 20                   |
| ar1p              | 0.0494               | 0.10                 | 0.159                | 0.107                | 0.189                | 0.258                |
| ar2p              | 0.109                | 0.642                | 0.371                | 0.351                | 0.371                | 0.308                |
| hansenp           | 0.415                | 0.336                | 0.125                | 0.826                | 0.266                | 0.380                |

Notes: les seuils de significativité sont de: \*\*\*représente 1%, \*\*représente 5% et \*représente 10%. Source: Authors.

foreign private investments inflow. It enables to channel IP toward more productive sectors, resulting in increased exports horizontal diversification.

Similar result has been supported by [Acemoglu & Robinson \(2012\)](#) showing that stable and inclusive institutions enhance business climate for private investments and innovations. Then, through stable politics, the creation of several activities in across the export sectors can support through political stability. Moreover, [Avon & Ngue \(2020\)](#) found the evidence that political stability is initial conditions for efficient private investment in diversification sector.

In the same vein, the World Bank reported that the most political stable African countries are the principal recipients of private investments in diversified sectors ([World Bank, 2023](#)). And end, regarding the dynamic of inflation, the uncertainty

theory developed by Keynes and Tobin elaborates that a higher inflation rate or unstable lead macroeconomic uncertainty on the future costs, as well as on interest rate and the real yield. Consequently, it leads to discourage productive investments in processing and agro-food sectors; which enable to support export horizontal diversification.

**Table 7.** Robustness for samples heterogeneity.

| Variables         | Driscoll-Kraay<br>(1)        | Resource Natural (RN)           |                                  | Niveau du revenu              |                                |
|-------------------|------------------------------|---------------------------------|----------------------------------|-------------------------------|--------------------------------|
|                   |                              | RN-Riche                        | RN-Pauvre                        | Moyen/élevé                   | Faible                         |
| L.LDH             | 0.6905***<br>(0.086)         | 0.7404***<br>(0.023)            | 1.6476***<br>(0.187)             | 1.1185***<br>(0.021)          | 1.4621***<br>(0.170)           |
| LIP               | 0.0066<br>(0.014)<br>(0.002) | 0.0247***<br>(0.007)<br>(0.001) | -0.0572***<br>(0.022)<br>(0.006) | 0.0227*<br>(0.012)<br>(0.001) | -0.0544*<br>(0.038)<br>(0.008) |
| Control variables | Yes                          | Yes                             | Yes                              | Yes                           | Yes                            |
| Constant          | 0.2541**<br>(0.088)          | -0.0350<br>(0.059)              | -0.1728<br>(0.214)               | -0.0539**<br>(0.025)          | -0.0337<br>(0.214)             |
| Observations      | 418                          | 185                             | 233                              | 154                           | 264                            |
| R-squared         | 0.781                        |                                 |                                  |                               |                                |
| Number of groups  | 36                           |                                 |                                  |                               |                                |
| ar1p              | .                            | 0.183                           | 0.0894                           | 14                            | 22                             |
| ar2p              | .                            | 0.447                           | 0.115                            | 0.161                         | 0.0979                         |
| hansenp           | .                            | 0.335                           | 0.678                            | 0.321                         | 0.128                          |
| Number of id      |                              | 17                              | 19                               | 0.154                         | 0.725                          |

Source: Authors.

In **Table 7** above, although the nexus between IP and DH is occurring significant, it remains a challenge to provide critical explanation regarding this outcome. Especially, how IP leads to horizontal export diversification? Several responses have been based on the dataset for developed countries, and we needed to deeper our understanding for the SSA context. Particularly, the above question aims to emphasis the transmission channels (indirect effect) through which IP oils export diversification in SSA.

Conventionally, similar concerns are addressed by crossing the interest variable (IP) with the mediating factors such as Foreign direct investments (IDE), Natural resource rents (RN), economic growth (PIB) and political stability (SP). However, by adding these variables in different models as a robustness check (**Table 6**), it allows us to see whether the main results (the effect of PI on diversification) remain consistent.

Considering the Equation (1) can be rewritten as follows (see **Table 8**):



**Table 8.** Robustness for the pathway.

| Variables         | (1)<br>LDH          | (2)<br>LDH            | (3)<br>LDH            | (4)<br>LDH          |
|-------------------|---------------------|-----------------------|-----------------------|---------------------|
| L.LDH             | 0.0610<br>(0.152)   | 0.1609***<br>(0.038)  | −0.3115***<br>(0.070) | −0.1545<br>(0.096)  |
| LIP               | 0.2166**<br>(0.109) | 0.1562***<br>(0.046)  | 2.8534*<br>(1.548)    | 0.0069<br>(0.094)   |
| LIPxLIDE          | −0.0106*<br>(0.006) |                       |                       |                     |
| LIPxLRN           |                     | −0.0502***<br>(0.018) |                       |                     |
| LIPxLPIB          |                     |                       | −0.3582*<br>(0.220)   |                     |
| LIPxSP            |                     |                       |                       | −0.1130*<br>(0.060) |
| Control variables | Yes                 | Yes                   | Yes                   | Yes                 |
| Constant          | 0.0999<br>(0.325)   | 0.0080<br>(0.352)     | −7.8796*<br>(4.646)   | 1.0277<br>(0.831)   |
| Observations      | 418                 | 386                   | 418                   | 418                 |
| Number of id      | 36                  | 36                    | 36                    | 36                  |
| ar1p              | 0.0927              | 0.0478                | 0.0152                | 0.0235              |
| ar2p              | 0.408               | 0.294                 | 0.859                 | 0.264               |
| hansenp           | 0.386               | 0.209                 | 0.818                 | 0.615               |

Source: Auteur à partir des données de la Banque mondiale et la CNUCED.

$$DH = \alpha + \beta_1 IP + \beta_2 (IP \times Med) + \beta_3 X + \varepsilon \quad (2)$$

where DH and IP are horizontal export diversification and private investments, Med is a mediating factor, X is control variable including mediating factors among others, and  $\varepsilon$  is error term assumed i.i.d.

Findings show that the sign of IP's coefficient is opposite with each of crossing term, and according to [Noufelie & Djamen \(2025\)](#), [Meka'a et al. \(2024\)](#), it means that mediating factors leads to mitigate the magnitude of direct effects. In other words, although the increase in DH is associated to IP in SSA hypothesis remains confirmed, PIB, IDE, RN and SP lead to mitigate it. This occurs generally when economic growth gained are not channelled toward productive sectors needed to support private investors; also, there is a substitution rather than complementary relationship between IP and IDE and then foreign private investments inflows are the potential driver of the reduction in global domestical private investments.

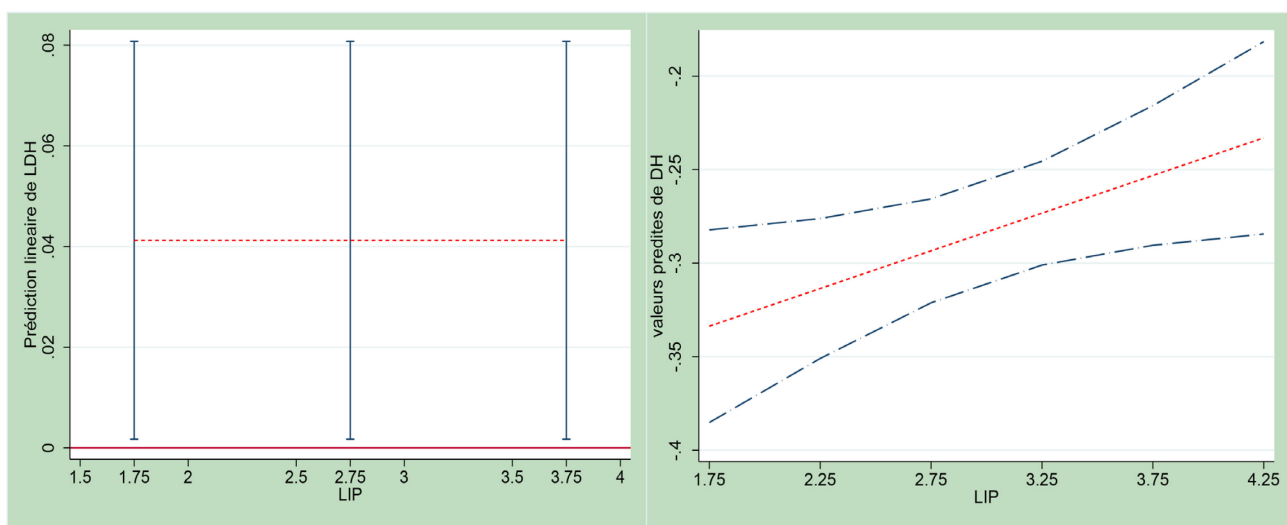
Moreover, private investment in natural resource sectors does not a got fit for diversification, since in the SSA context, it has been observed that it supports activity concentrations rather than their diversification, leading then to valid the natural resource curse hypothesis. Finally, SSA's political environment observe as long grow up in lower political stability. As consequence, it leads to mitigate the private investor attractiveness and then reduce the potential for investments in diversified sectors.

#### Robustness for marginal effects

The marginal effects (ME) graphs are drawn which aim to provide important insights into nexus between PI and horizontal export diversification by in SSA.

Indeed, rather than assuming a constant linear relationship, the ME analysis aims to seek the consistence of the baseline result or how this last is varying according the specific country characteristic such as natural resource dependant, institutional conditions, etc.

The marginal effect of adjusted value of DH by controlling IP in an OLS model allowing evaluating how others variables may influence horizontal exports diversification. Then, in **Figure 3**, graph in the left side presents the trend of this nexus. The trend arising from there shows that the estimated coefficient of IP effect on DH is nearly constant and linear, irrespectively of IP level. It means that according to the OLS model, increase in IP provide similar effect on DH, irrespectively of the IP level. *Tadesse & Shukralla (2013)* shown also that the stock of IDE oils horizontal exports diversification, and such as the marginal effect is largely unrelated to the initial level of private investment and diversification. However, both the linear and constant effect above mentioned can be biased as OLS fails to address the potential endogeneity bias. Then, regarding the marginal effect from SGMM estimations, graph at the right side of **Figure 3** shows that although the nexus remains linear, it increases with the IP level. Furthermore, the concave

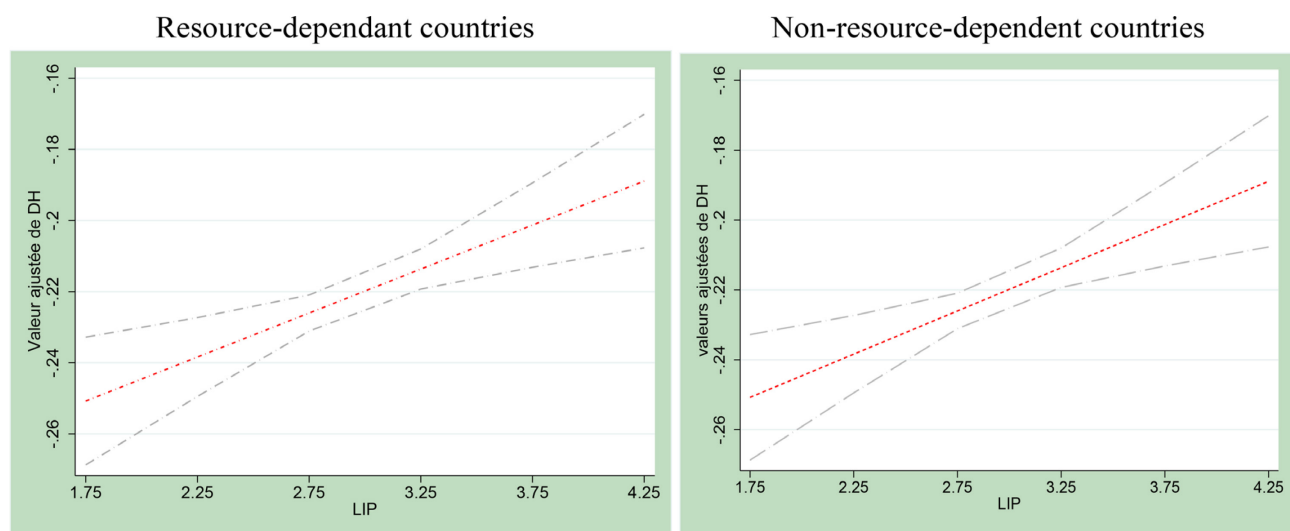


Source: Authors. NB: Dash blue lines represent the confidence interval at 95%.

**Figure 3.** Marginal effect using results from OLS and SGMM.

curve indicates a stability IP-DH nexus, meaning that the dynamic GMM approach provide the consistence findings rather than OLS, and also, allow us to support the baseline findings.

**Figure 4** and graph at the left side depicts the marginal effect of PI on horizontal export diversification for natural resource-dependant countries. The estimated marginal-effects curve exhibits both convex and concave segments, indicating a non-linear relationship between IP and export diversification. At low levels of private investment, the ME on diversification is weak or statistically insignificant. This suggests that initial increases in IP do not translate into meaningful diversification gains. A plausible explanation that private capital is predominantly absorbed by extractive industries, which are capital-intensive but weakly, linked to the broader productive structure of the economy.



Source: Authors.

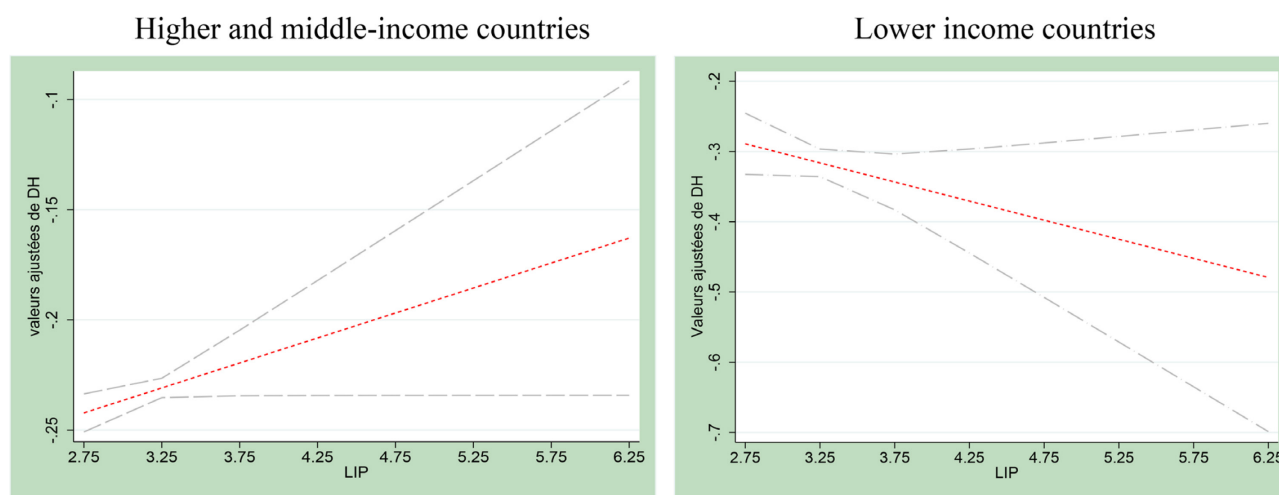
**Figure 4.** Marginal effect according to the level of resource-dependent countries.

This linearity is also related to higher concentration of investments in extractive sectors, leading to weak incentives for productive diversification. These findings align with Niass (2020), who shows that in resource-dependent SSA, IP is largely captured by extractive sectors, thereby limiting spillovers to manufacturing and non-traditional export activities.

**Figure 4**, graph at right side illustrates the ME for countries featured by a weak dependent to natural resources. In contrast to resource-dependent economies, the ME curve displays a more stable and Upward-sloping pattern, indicating a consistently positive impact of private investment on export diversification. This result suggests that in the absence of strong resource-sector dominance, private investment is more effectively allocated toward manufacturing, agro-processing, and services, sectors that are inherently conducive to diversification. The positive and monotonic relationship implies that higher levels of private investment continuously enhance exports. Further explanations have been provided by Hounbedji (2022) showing that exports diversification enables to substantially

reduce the economic vulnerability of African countries.

**Figure 5** and graph at the left side depicts how IP affects DH in higher and middle incomes African countries including Capo-Verde, Ghana, Botswana, Seychelles, among others. It appears that the adjusted value curve of DH regarding IP is monotonic and increase, meaning that higher is private investment, larger is horizontal exports diversification in SSA countries. According to the [World Bank \(2018\)](#), the marginal effect of export DH increase with private investments, especially through a stable environment, human capital and modern infrastructures. It allows to sectorial duplication of projects and innovation agglomeration effects



Source: Authors. NB: Grese lines represent the confidence interval at 95%.

**Figure 5.** Marginal effect according to the stage of development.

**Figure 5** and especially the graph at the right presents the marginal prediction of adjusted value of DH by controlling private investments. A negative nexus arises between IP and adjusted value of DH. It is related to decrease in private Investments in structure of productive transformation. The finding from [Zakariyaou et al. \(2020\)](#) aligned with this argument and arguing that horizontal dimension of exports diversification is inefficient in lower income countries. Furthermore, [Millogo et al. \(2024b\)](#) shown that the lack of better institutions in SSA reinforce the adverse effect of trade openness on exports diversification.

## 5. Conclusion and Policy Implications

Highlighting the limit of absolute gain from the participation in the global trade for the domestic economic, the diversification of exportation is more and more suggested as the best way to optimize the comparative advantage from trade openness. The issues are critical for SSA African economies which particularly depend on natural resources. Questioning the determinants of horizontal exports diversification (DH), the current study focuses the attention on private investments, which have been found critical in fostering local economic and product diversification. To attempt this purpose, we use a panel of 41 SSA countries spanning from

2009 to 2022. We employ OLS, FE and two-steps GMM approaches in order to carefully address the potential endogeneity bias. Furthermore, several exercises are made in order to provide the robustness of our findings, which include the marginal effect analysis, the addition of control variables, and using alternative sample by considering the stage of development and natural resource availability. Findings shown that horizontal export diversification is positively and significantly affected by private investments in the SSA countries selected. It means that, more IP is higher, larger is DH in SSA. Especially, we found that IP's coefficient is 0.0428, suggesting that a 10% increase in private investments leads to improve by 0.428% horizontal exports diversification, all think being equal. This finding has been largely supported in the prior studies including [Dunning \(1993\)](#) and [Caves \(1996\)](#), which associated it to the capacity to technological transfer through knowledge diffusion, as well as their effect on market structure of host countries. Moreover, [Grossman & Helpman \(1995b\)](#) provided further explanations through the endogenous growth theory, suggesting that the level of human capital in local countries enable to foster diversification. Therefore, by supporting the private investments in education, health or innovation sectors, SSA's policymakers lead to strengthen DH in SSA. Moreover, in order to optimise the external effects of IP in SSA, African's governments should elaborate a promoting technical training strategies based on education, health and technological innovation funding, which will take to account the market demand.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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