



# An empirical assessment of the role of trade in services in export product diversification in Sub-Saharan Africa

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## Abstract

This paper identifies the dimensions of international trade in services that promote export product diversification in an unbalanced panel of 48 countries in Sub-Saharan Africa (SSA) over the period 2005–2019. Using the two-step system Generalized Method of Moments (GMM), the results show that tourism, total services exports, export in transport services, travel services, insurance services, financial services, use of licenses services and other business services promote export product diversification in SSA. Policy makers can make commercial services export an important lever for export products diversification by adopting policies and strategies to develop and orient the commercial services towards more efficient and high value-added services.

**Keywords** Trade in services · Tourism · Export product diversification · GMM · Sub Saharan Africa

**Jel Classification** F13 · F14 · Z32

## 1 Introduction

The search for sound knowledge on the drivers of export product diversification is important for the developing world as it is associated with economic growth (Dadush et al. 2020; Van den Berg and Lewer 2007) and mitigates the risks associated with commodity price volatility and macroeconomic shocks (Berthélemy 2005). Diversification has been shown to be relevant for developing countries as an engine of economic growth through technological spillovers to other sectors and as a source of jobs creation, structural transformation, and sustainable development (Freire 2019). Diversification of the productive structure of a country's export basket is considered as an important source of resilience to

external macroeconomic shocks and development for low-income countries (Berthélemy 2005; Caselli et al. 2020).

Economic diversification is equated with the exports structure of a country. For Berthélemy (2005), an economy is said to be diversified if its productive structure is dispersed into a large number of activities that differ from one another like goods and services produced. Subsequently, export product diversification refers to diversification in the basket of product export on international market by a given country. Empirical and analytical studies on diversification have long focused on the structure and dynamics of trade of tangible goods. Empirical findings (Agosin et al. 2012; Berthélemy 2005; Cadot et al. 2011; Elhiraika and Mbate 2014; Fosu and Abass 2019) show that export product diversification is determined by a multitude of factors that influence the long run behavior of a country or region's export structure. Services, despite their increasingly dominant place in international trade, according to recent statistics (<sup>1</sup>; <sup>2</sup>), are almost invisible in the exploration of the determinants of economic diversification. Yet today, both the developed and developing worlds are undergoing structural changes that bring services to the forefront. The WTO's 2019 report estimates that global trade in services is growing faster than trade in goods, with

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the value of trade in services reaching US\$13.3 trillion in 2017. The share of developing economies in world trade in commercial services was 34% in 2017 (WTO 2018).

The premises of the theoretical foundations on the contribution of services to real activity can be found in classical economic thought which, centered on the role of the manufacturing industry, has contributed to forging an image of deficient services from the performance view (Faiz 2007). Smith (1776) contrasts the productive work of manufacturing with the unproductive work of services, which vanish the moment they are produced. For Smith (1776), services are immaterial and do not create value identified with material production. The debate on services resurfaced in the 1960s with Baumol (1967) and Fuchs (1968) attributing to services the status of Cost Disease.<sup>3</sup> In the 1980s, much of the research was devoted to trade in services, drawing on WTO's publications and regional trade agreements. However, as Francois and Hoekman (2010) figure out, the majority of research on services focuses more on liberalisation in the services sector as well as the literature gives credit to trade and Foreign direct investments (FDI) in services. Meanwhile studies on the contributions of international services flows to world output and export patterns are even less visible. Therefore, we are in a phase of questioning the effect of the international diffusion of trade in services on export product diversification. What are the dimensions of trade in services that are conducive to export product diversification in Sub-Saharan Africa (SSA)? The main hypothesis in this paper is that commercial services exert positive effect on export product diversification in SSA. Therefore, the objective of this research is to identify the dimensions of trade in services that promote exports product diversification in SSA.

The relationship between services trade dynamism and export product diversification still needs empirical studies to strengthen the so far insufficient debate. The search for directions in the relationship between trade openness policies and economic diversification has guided the research prism for a long time. In view of the importance of diversification in transforming economies and achieving the goals set out in recent national, regional<sup>4</sup> and global development initiatives,<sup>5</sup> an assessment of the determinants, with particular attention to the role of services on export product diversification in developing countries, especially in SSA, is needed.

<sup>3</sup> van der Marel (2012) explains that the so-called Baumol's disease implies that the production process of services is more costly than that of manufacturing sectors, resulting in lower output and higher prices in the long run. These costs would arise from the inability to substitute labor for more productive inputs compared to manufacturing where wages are tied to their productivity. The limited scope for improving labor productivity means that services account for an ever-larger share of the economy. This ultimately results in lower overall economic growth.

<sup>4</sup> Agenda 2063 of the Africa Union.

<sup>5</sup> The Sustainable Development Goals (SDGs).

Exploring services as trade policy strategy remains an alternative in Africa, since natural resources account for the bulk of African exports. Moreover, given the growing role of services in Africa, the implementation of the African Continental Free Trade Area (AfCFTA) will be difficult if services are relegated to a secondary position in favor only of trade in goods.

A better understanding of the relationship between the development of international trade in services and export product diversification could better guide African policy makers in terms of policy adoption and implementation. In this sense, this paper contributes to better inform decision makers. The existence of a fairly extensive literature on economic diversification demonstrates the importance of the interest in analysing the vectors of export product diversification. However, the existing studies do not consider theoretically and empirically the role of exporting commercial services by an economy on its export product diversification. Therefore, this study would be, according to our understanding, one of the first paper to empirically address this gap.

The rest of the paper is structured as follows. The second section presents the literature review. The third section presents the stylized facts on trade in services and export product diversification in SSA. The fourth section presents the data and the methodology. The fifth section presents and discusses the empirical results on the effects of trade in services on export product diversification in SSA. The sixth and last section concludes.

## 2 Literature Review

The premises of export product diversification debate according to some authors (Berthélemy 2005; Cadot et al. 2011; Cadot and De Melo 2016; Hausmann et al. 2007; Imbs and Wacziarg 2003) can be traced back to the classical, neoclassical and the debate is non-exhaustive in the literature. While Ricardo supports specialisation, Heckscher-Ohlin models argue instead that export dynamics are largely determined by endowments, so that, if anything, we should be concerned with factors accumulation, not diversification (Cadot et al. 2011). Yet export product diversification remains a constant concern for policy makers in developing countries. Even more naive is the idea of explaining export dynamics primarily by endowments. Indeed, according to Cadot et al. (2011), the relationship between endowments, trade and growth is complex and imperfectly understood. Models of intra-industry trade have long shown that many factors other than endowments, including market failures and policies, can affect trade patterns. This idea is supported by the work of Hausmann et al. (2007) who find that export patterns can exhibit path dependence in the presence of externalities.

While some argue that export product diversification allows a country to better manage the risks associated with commodity price volatility (Berthélemy 2005; Hammouda and Ben 2006), others argue that it allows countries to hedge country-specific demand fluctuations and insure against downturns at home (Romer 1990). Faiz (2007) argues that pioneers' skepticism (Baumol 1967; Bladen 1960; Smith 1776) about the role of services in economic development has for a long time dominated economic literature, so that services have remained in a non-tradable and unproductive sector consideration. However, in recent years, services have become increasingly important in international trade and investment. This is accompanied by a growing interest in services trade in the diversification literature (Caselli et al. 2020; Feng et al. 2021; Gnanngnon 2020a; Nieminen 2020).

Moreover, despite the proven role of services in production (Arndt and Kierzkowski 2001; Fisher 1939) and growth (Baer and Samuelson 1981; Baumol 1967; Lee and McKibbin 2018; Romão 2020), there is less focus on the role of trade services in export product diversification. Yet, some theoretical and empirical evidences show the importance of commercial services in manufacturing production dynamism (Amiti and Wei 2005; Arnold et al. 2008; Beverelli et al. 2017; Chand and Sen 2002; UNCTAD 2022; Vogel 2022). The focus has been more relevant on services imports as inputs into production processes, but the main question here is to question the role of commercial services exports in the export product diversification. That said, our hypothesis is that among different dimensions of trade in services, commercial services exports exert favorable effects on export product diversification in Sub-Saharan Africa. In this vein, commercial services exports like tourism, travel, transport, financial and insurance services which are linked to exports of physical products can be catalysts to diversification of export product (Eichengreen and Gupta 2013).

But some voices emphasize the limited effects of some aspects of commercial services. For instance, although the increase in tourism revenues, Lejárraga and Walkenhorst (2013) argue that it does not automatically translate into large-scale economic development. According to them, the fact is that this sector is once again at the heart of the major development and economic diversification strategies of several developing countries. Tourism demand has induced effects on other economic sectors through indirect and direct effects generated by tourism spending on non-tourism sectors in host economies (Lejárraga and Walkenhorst 2013; Romão 2020; Sharpley 2002). Another phenomenon that affects export product diversification is servitization, which occurs when firms begin to produce and export services in addition to physical exports. This phenomenon allows not only productivity growth, but also an increasing capacity to firms for resilience and products diversification.

Trade in financial and banking services in the multilateral system affects not only the volume of exports (Baldwin and

Krugman 1989; Chan and Manova 2015; Dixit 1989; Kletzer and Bardhan 1987; Memanova and Mylonidis 2020) but also the dynamics of a country's export basket structure (Bose et al. 2020; Foley and Manova 2015; Nieminen 2020). Foley and Manova (2015) argue that the ability to access financial capital to pay for fixed and variable costs affects firms' choices about entry and export operations and, therefore, influences the overall structure of trade. Financial frictions and the use of internal capital markets influence the decisions made by multinationals regarding production locations, integration, and corporate governance.

The fast development of Information and Communication Technologies (ICT) has a significant impact on the performance of companies (Chari et al. 2007; León et al. 2016; Ravichandran et al. 2009), in the production of new goods (Chari et al. 2007), as well as on their access to new markets (León et al. 2016). León et al. (2016), in their study, analyse the impact of ICT use on the degree and type of diversification of small and medium-sized enterprises (SME). From a sample of 95 companies in the Autonomous Community of the Basque Country, they realize that diversified companies show a higher level of ICT use and this resource positively affects the degree of international diversification and the intensity of the company's activities.

Some findings have empirically shown the effect of commercial services export on diversification. The relationship between the tourism sector and export product diversification is controversial in the empirical literature. On the demand side, Lin et Sung (1984) find that tourism export growth in Hong Kong is more stable than that of major commodity exports, partly because tourism is less subject to import protectionism. They believe that tourism is therefore considered a prime choice in Hong Kong's economic diversification. Lejárraga et Walkenhorst (2013) in their study of a large sample of developing countries with cross-sectional data, find that the area most amenable to short-term policy interventions, such as the business environment or trade regulations, are the most important in fostering productive linkages between tourism and the general economy. In contrast, fixed factors, such as land availability, or longer-term objectives, such as progress in development levels, have less influence on the productive and export structure. Using a panel data model for 2006–2017, Romão (2020) finds that specialisation patterns combining tourism and agriculture have positive effects in both cases. Diversification strategies that include unrelated sectors contribute to increasing the resilience of European regions, while a focus on construction reduces regional resilience.

Nieminen (2020) using data from the Exporter Dynamics Database (EDD) finds that access to domestic financial services contributes positively to export product diversification by increasing the number of small exporters, as financial services alleviate the credit constraints faced by these exporters. Nguyen et al. (2020) mobilise nine financial

development indices and three patent variables to identify the main determinants of the captured economic complexity index. Nguyen et al. (2020) find that an overly large financial sector does not contribute to the diversification and sophistication of a national economy, but the efficiency of financial markets seems to have a positive influence on these processes, probably because financial markets provide alternative ways of financing patents and knowledge.

Unger (2016) conducts an empirical analysis on the role of financial intermediation in international trade. Combining Melitz's (2003) firm heterogeneity with Holmstrom and Tirole's (1997) credit frictions, Unger (2016) observes a selection of larger firms towards exporting and unsupervised financing, such as government debt or corporate bonds. Smaller producers only serve the domestic market and have to resort to costlier financial intermediation. He also finds that producers respond to financial shocks by switching to other types of financing. Furthermore, his model highlights a new source of gains from trade: average productivity increases when lower trade costs allow some exporters to select cheaper unguarded financing.

Chan and Manova (2015) empirically show that financial market imperfections affect the number and identity of exporters' destinations. Their results reveal that large economies with lower trade costs are more attractive markets because they offer higher export profits. They show that financially advanced nations therefore have more trading partners and move down the hierarchy, particularly in sectors that are highly dependent on the financial system. Gani and Clemes (2016) find a statistically significant positive correlation between the rule of law and regulatory quality and export and import of insurance and financial services in OECD<sup>6</sup> countries and in some developing countries. In contrast, their empirical results reveal a negative and statistically significant relationship of contract enforcement with exports and imports of insurance and financial services.

Chari et al. (2007) develop and empirically test the hypothesis that investment in information technology helps to leverage the firm's specific assets across national borders and thus contributes to improving international diversification performance. They show that the impact of international diversification on performance is a positive function of the level of ICT investment. For the latter, the impact on performance can be significantly positive (for firms with high ICT investment), significantly negative (for firms with low ICT investment), or neutral (for the average internationally diversified firm, i.e. firms with an average level of ICT investment). Ravichandran et al. (2009) find in their study of US firms that while ICT spending interacts with tied diversification to have a positive effect on firm performance, similar interactions with untied diversification have no effect on firm performance.

Moreover, the interaction between ICT spending and geographic diversification is only positively associated with performance when the level of geographic diversification is low.

### 3 Trade in services and export product diversification: stylized facts

This section presents the stylized facts of the relation between trade in services and export product diversification in SSA.

#### 3.1 Dynamics of trade in services in Sub Saharan Africa

Figure 1 shows the evolution of trade in services in percentage of GDP in some regions of the world, namely Sub-Saharan Africa, the European Union (EU), South Asia and North America. The EU is the region that emphasized strong increase in trade in services over the period 2005–2019. The second region where trade in services accounts significantly in GDP is South Asia, representing 11.24 per cent of GDP on average over the same period. Sub-Saharan Africa is the third region with 11.10 per cent of GDP over 2005–2019. In North America, trade in services represents 7.08 percent of GDP.

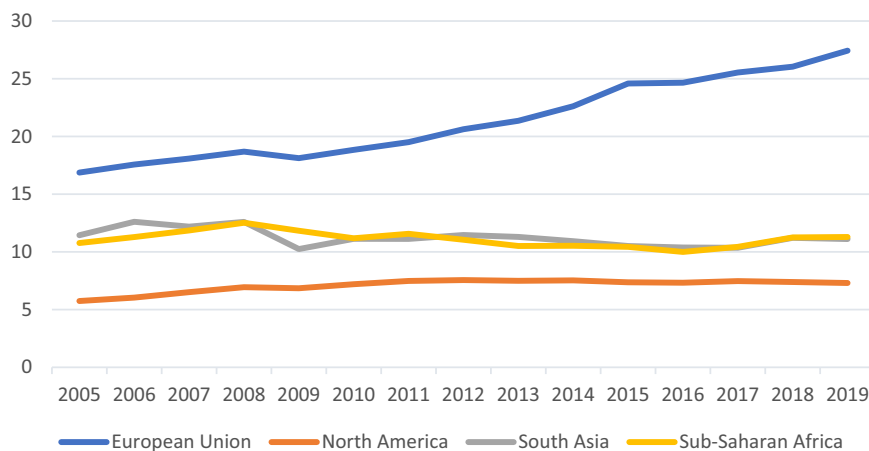
Trade in services in SSA is experiencing significant dynamism in view of its remarkable performance. SSA countries are net importers of services. Over the period 2005–2019, total services imports accounted for 66.61% of total services trade on average against 33.38% for services exports. However, due to the COVID-19 pandemic, exports and imports of services fell significantly in 2020, with a 15.55% drop in total trade in services in 2020 compared to 2019.

Figures 2 and 3 provide a set of information on the evolution of trade in services in the most important dimensions of this sector in SSA during the period 2005–2019. The Figures 2 and 8 in appendix show a strong expansion of the tourism sector in SSA since 2005. With an average annual growth rate of 3.16% over the period 2005–2019, SSA is becoming an important destination for tourism. The number of arriving visitors in SSA has increased from 25.92 million in 2005 to over 48 million annual visitors in 2016 before slowing down to 38.3 million in 2019. Over the same period, the top tourist destinations in SSA are respectively South Africa followed by Nigeria, Botswana, Mozambique, Kenya, Eswatini, Namibia, Rwanda, and Senegal (see Fig. 8 in appendix). This surge in tourism demand is accompanied by a significant increase in local consumer products, with important knock-on effects on other sectors.

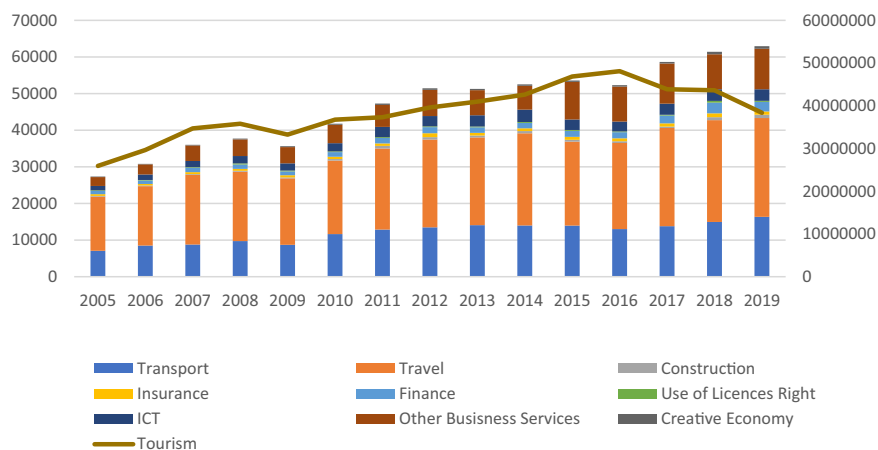
The Fig. 2 shows that travel services occupy the largest share of commercial services exports in SSA from 2005 to 2019. Indeed, this sector accounts for an average of 43.97 percent of total services exports in SSA (with 4.65% average

<sup>6</sup> Organisation for Economic Co-operation and Development.

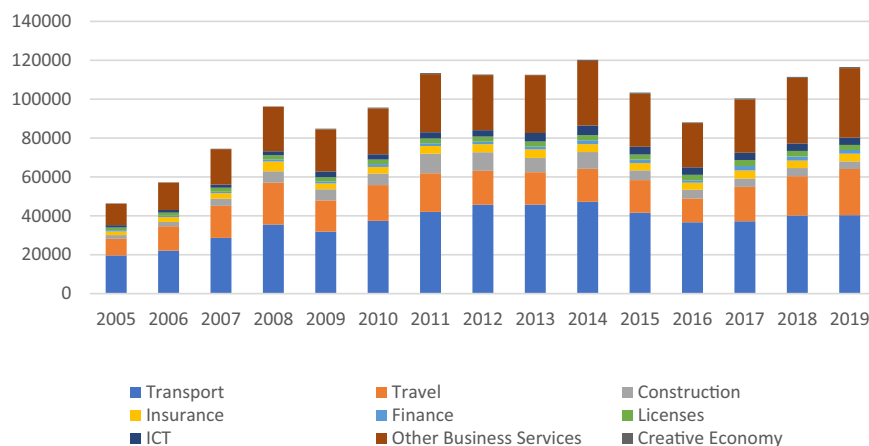
**Fig. 1** Trade in services (% of GDP) dynamics in some regions over 2005–2019. Source: Authors construction, UNCTAD data (2021)



**Fig. 2** Commercial services exports share dynamics in SSA over 2005–2019. Source: Authors’ construction, data from UNCTAD (2021)



**Fig. 3** Commercial services imports share dynamics in SSA over 2005–2019. Source: Authors’ construction, data from UNCTAD (2021)



growth) while travel services imports are down with an average of 9.93% growth over the same period representing 16.94% of total commercial services imports. Imports of transports services lead total services imports with an average growth of 0.19% over the period 2005–2019 and averaging about 41%. Exports of transport services represent 23.78% on average over the same period and an average growth of 6.66%. Trade in ICT services experienced positive trends, both in export and import and representing respectively an

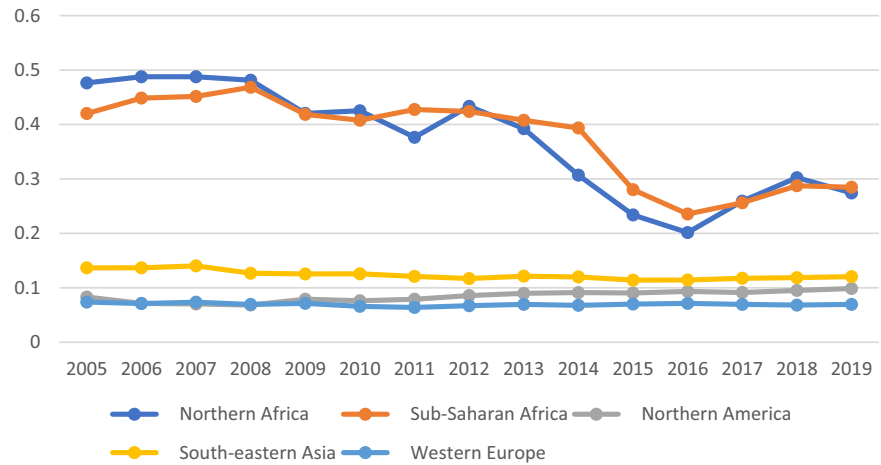
average growth of 7.81 and 9.68% over 2005–2019. Over the same period, financial and insurance services experienced an increase in exports (9.14 and 6.61% respectively) and in imports (11.50 and 8.27% respectively).

Overall, when considering services merged as traditional and modern services<sup>7</sup> (Katouzian 1970; Eichengreen and

<sup>7</sup> See Section 5.2 for more information on the method used for merging services into traditional and modern services.



**Fig. 4** Evolution of exports concentration (HHI) in some regions, 2005–2019. Source: Authors' construction, data from UNCTAD (2021)



Gupta 2013), Fig. 9 in appendix shows a clear superiority of traditional services exports over modern services exports. The export trends on the Fig. 9 confirm those illustrated in Fig. 2. The weight of traditional services in international trade in services is partly related to the economic characteristics of countries in SSA that are heavily dependent on service sub-sectors such as transport, travel and tourism. Modern services are described as knowledge-intensive services (Nelson and Winter 1985), the intensity of their export by a country depends on its competitive human capital endowment. Therefore, the low level of human capital in most SSA countries explains the low level of exports of modern services.

### 3.2 Dynamics of export product diversification in Sub Saharan Africa

Figure 4 traces the evolution of the export concentration index in five regions of the world, namely SSA, North America, Western Europe, East and Southeast Asia, and North Africa over the period 2005–2019. This figure reveals a shift in Herfindahl-Hirschman index (HHI)<sup>8</sup> into two groups. The first group includes regions with low exports concentration (North America, Western Europe, and East and Southeast Asia) and the second group includes regions with high exports concentration (SSA and North Africa). The export concentration of East and South Asian countries evolves on average around 0.1 while North American and Western European countries show an evolution of their export concentration below 0.1 over the period 2005–2019. The trend in the export concentration index for SSA and North Africa shows growth over the period 2005–2008. Over this period, North Africa shows higher levels of concentration than the other parts of the world, with a peak of 0.48 in 2006 and 2007. The figure shows a downward trend in the export concentration index in

SSA in recent years, but the level is still high compared to other regions. Indeed, over the period 2005–2019, SSA has an average concentration index level of 0.374 while the index is on average 0.370 in North Africa, 0.124 in East and South Asia, 0.084 in North America and 0.069 in western Europe.

However, starting in 2008, there was a sharp decline in the export concentration index in both regions of Africa (SSA and North Africa). The efforts undertaken in SSA countries have resulted in an average decrease of 2.14% in the HHI over 2005–2019. The financial crisis of 2007–2009 can explain this situation. Indeed, the financial crisis during these years led to a contraction in global demand for raw materials, of which African countries are the largest suppliers. Faced with low demand for non-value-added exports from developed countries, African countries are forced to increase their local processing capacity for their raw materials.

### 3.3 Correlation between interest variables

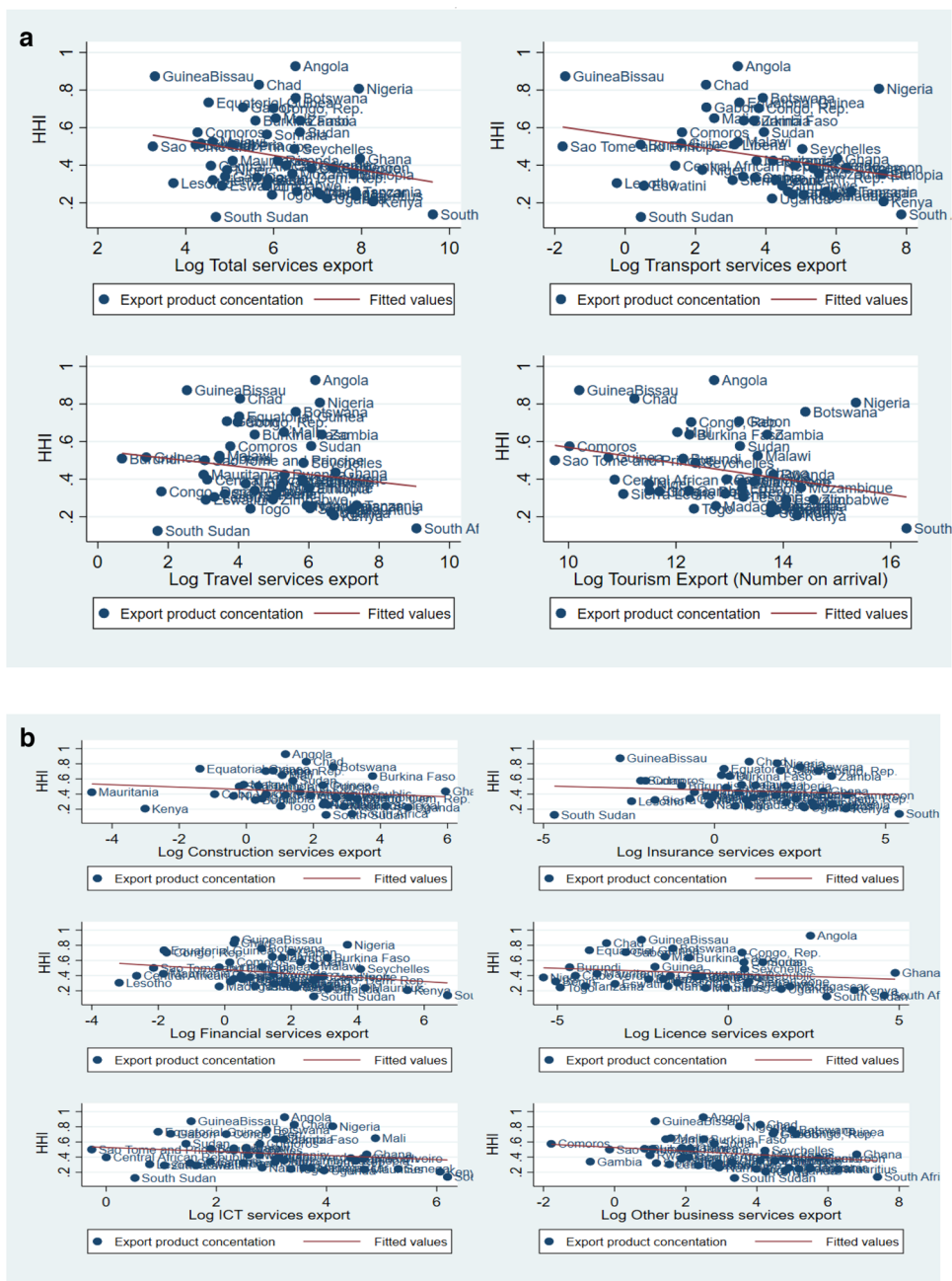
Figure 5a, b provides an overview of the correlation between export concentration (HHI) and the explanatory variables of interest (tourism, export of transport, travel, financial, insurance, ICT, licence, creative services and other services). It shows a negative relationship between export of tourism, transport, travel, financial, ICT, licence, creative services and other services and export concentration index (HHI). This means that an increase (decrease) in exports volume of these services leads to a decrease (increase) in export concentration in SSA between 2005 and 2019.<sup>9</sup> The correlation coefficients in appendix Table 2 illustrate the negative correlations between the services trade dimensions and the export concentration index.

Moreover, Fig. 6 shows a strictly negative correlation between the export concentration index and traditional and

<sup>8</sup> The normalized Herfindahl-Hirschman Index (HHI) measuring export concentration and varies between 0 (more diverse) to 1 (less diverse).

<sup>9</sup> Table 1 in the appendix gives, through the pairwise correlations, sufficient detail on the directions and coefficients of the correlations between the variables of interest.

**Fig. 5 a** Correlation between export concentration and exports of total services and disaggregated traditional services SSA, 2005–2019. Source: Authors’ construction, data from UNCTAD (2021). **b** Correlation between export product concentration and exports of disaggregated modern services SSA, 2005–2019. Source: Authors’ construction, data from UNCTAD (2021)



modern services exports (See Table 1 in appendix for more details on the coefficients of correlations). That is, it suggests that an increase in the level of exports of traditional and modern services is accompanied by an increase in export product diversification in SSA. The figure shows that countries with high levels of export diversification are major exporters of traditional and modern services. South Africa with the highest level of export diversification is also by far the largest exporter of traditional and modern services. This is due to South Africa’s technological endowments and its level of development. The country is not only a tourist magnet but also its level of development allows it to export highly competitive services. Countries such as Kenya, Mauritius, Tanzania,

Uganda, Senegal also have similarly high levels of export diversification and exports of traditional and modern services. Ethiopia with a high level of exports of traditional services is a concentrated economy in terms of product exports. Countries such as Angola, Burundi, Nigeria, Guinea Bissau, Chad, Equatorial Guinea are the least diversified and also most have low exports of modern and traditional services.

The Fig. 7a, b shows a positive relationship between import of transport, travel, financial, ICT, license, creative services and other services and export concentration index (HHI) in SSA. That is, an increase (decrease) in import of those services dimensions imply an increase (decrease) in export concentration index (HHI) or a decrease in export product diversification

in SSA over the period 2005 to 2019. Moreover, Table 3 in the Appendix shows that all dimensions of services imports in SSA are not only positively correlated with the export concentration index, but also have fairly low correlation coefficients.

Given that export in services have more negative relationship with export concentration more than import in services, that means the focus should be put on the relationship between export in services and export product diversification. However, it is important to notice that correlation does not automatically imply a causal relationship between the variables, so econometric regressions will allow us to verify the true nature of the relationship between the variables.

## 4 Data and methodology

This section presents the data and the methodology of the study.

### 4.1 Data

In the literature, we find several indexes expressing the degree of diversification of export product, such as the warhead index (Attaran and Zwick 1987; Hammouda and Ben 2006), the entropy index (Attaran and Zwick 1987; Berthélemy 2005), the Herfindahl-Hirschman index (Agosin et al. 2012; Berthélemy 2005; Hammouda and Ben 2006), the aggregated specialization index (Berthélemy 2005; Dadush et al. 2020; Hammouda and Ben 2006) and the export ubiquity index developed by Hausmann and Hidalgo (2012). In this study, we use the Herfindahl-Hirschman index (HHI) as a relative measure of export product diversification by expressing its value between 0 and 1. HHI is preferred because it is both the simplest to program and the most frequently used in the literature on export product diversification.<sup>10</sup> The normalized HHI index reflects the degree of concentration of a country's export, expressed as a value between 0 and 1. When the value of the index is close to 0, it reflects a lower concentration of export and a high degree of economic diversification; however, a value close to 1 reflects a high concentration of exports and therefore a low degree of economic diversification. Data on HHI are collected from the UNCTAD (2021) database.

Data on trade services (all services dimensions) are also collected from the UNCTAD (2021) database. These data are of two types: (i) those corresponding to the concepts and definitions of the fifth edition of the IMF Balance of Payments Manual (BPM5) edited in 1993 with data from 1980 to 2013 and (ii) the sixth edition of the IMF Balance of Payments and International Investment Position Manual (BPM6) edition in 2009 which provides a new definition of services with a

classification of eighteen (18) categories and sub-categories of services by breaking the first six categories according to the BPM5. The BPM5 categorizes services as follow: (1) all services, (2) transport, (3) travel, (4) other services, (5) all commercial services, and (6) other commercial services. Given that the BPM6's classification gives a wider range of subcategories of services than the BPM5's classification, we therefore consider in this study only data collected from BPM6's classification over the period 2005–2019. There are several reasons for not combining the two databases. First, they do not have the same classification methodology, combining them can lead to errors in the analysis. Second, the fact that the number of service categories differs from each database can be a potential source of missing in combined databases.

Data on human capital (number of years spent in secondary school) are from the Penn World Tables (PWT). Data on macroeconomic, physical, and institutional variables are from the World Bank (WDI<sup>11</sup> and WGI<sup>12</sup>). The study covers an unbalanced panel of 48 countries in SSA (Table 3, Appendix) over the period 2005–2019 (15 years). While Table 5 (Appendix) presents the variables, their definitions and their sources, Table 6 (Appendix), presents the descriptive statistics of those variables.

### 4.2 Model specification

According to the literature on export dynamics and structure, the theoretical foundation formulation (Agosin et al. 2012; Benbouziane 2018; Cadot et al. 2011; Dadush et al. 2020; Elhiraika and Mbate 2014; Hammouda and Ben 2006; Imbs and Wacziarg 2003; Nieminen 2020) of export product diversification can be summarized as follow:

$$ED = f(MV, PV, PhV, IV) \quad (1)$$

where ED is export product diversification, MV are macroeconomic variables, PV are policy variables, PhV are physical variables and IV are institutional variables.

While some authors use simple linear models (Berthélemy 2005; Hammouda and Ben 2006; Klinger and Lederman 2006), others use non-parametric models (Imbs and Wacziarg 2003), general equilibrium models (Hausmann and Rodrik 2003). In this empirical exercise, we estimate the following equation:

$$EXCON_{it} = \lambda_0 + \lambda_1 EXCON_{it-1} + \lambda_2 TS_{it} + \lambda_3 X_{it} + \eta_t + u_i + \varepsilon_{it} \quad (2)$$

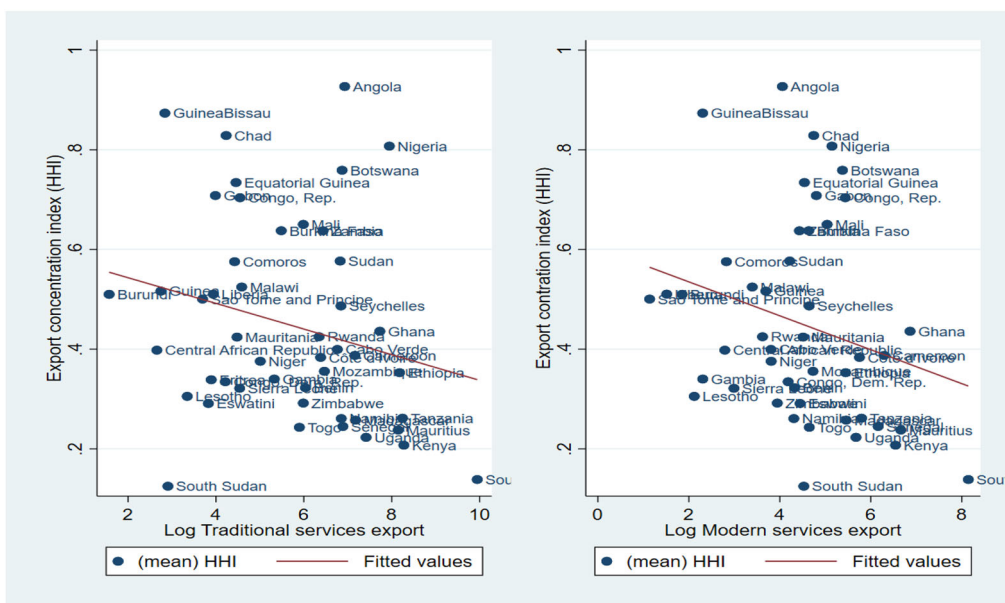
with  $i = 1, \dots, N$ ,  $t = 1, \dots, T$ ; where  $EXCON_{it}$  represents the dependent variable reflecting export concentration,  $EXCON_{it-1}$  represents the lagged variable of the dependent variable, the use of this autoregressive lagged variable (AR1) is motivated by the fact that export product diversification is a slow and

<sup>10</sup> For more details on the construction of the index, see Cottet et al. (2012), Hammouda and Ben (2006) and Gnanon (2020a).

<sup>11</sup> World Development Indicators.

<sup>12</sup> Worldwide Governance Indicators.





**Fig. 6** Correlation between export product concentration and aggregated traditional and modern services export in SSA, 2005–2019. Source: Authors’ construction, data from UNCTAD (2021)

dynamic process.  $TS_{it}$  represents the set of our variables of interest (the dimensions of services trade).  $\sum X_{it}$  gathers our control variables,  $\eta_t$  represents the period fixed effects,  $u_i$  a vector represents the country fixed effects,  $\varepsilon_{it}$  represents the error terms capturing all unobserved variables and likely to influence the dependent variable, with  $E(\varepsilon_{it}) = 0$ ,  $i$  represents the individual (country) and  $t$  time period.

### 4.3 Stationarity and diagnostic tests

Among the different tests that can be used to determine the existence or not of unit roots in panel data, we have the Levin-Lin-Chou (Levin et al. 2002), Harris - Tzavalis (1999), Breitung and Pesaran (2008), Im-Pesaran-Shin (Im et al. 2003) and Fisher-type (Choi 2001) tests with null hypothesis, all panels contain a unit root. The Fisher ADF test is preferred because it does not require highly balanced data and also accepts cross sectional that have deviations. Table 7 in appendix shows that except variables such as the logarithm of tourism, construction services export, natural resources endowment, credit to private sector and merchandise trade openness that are stationary in first difference, all the other variables contain unit roots that is they are stationary at level.

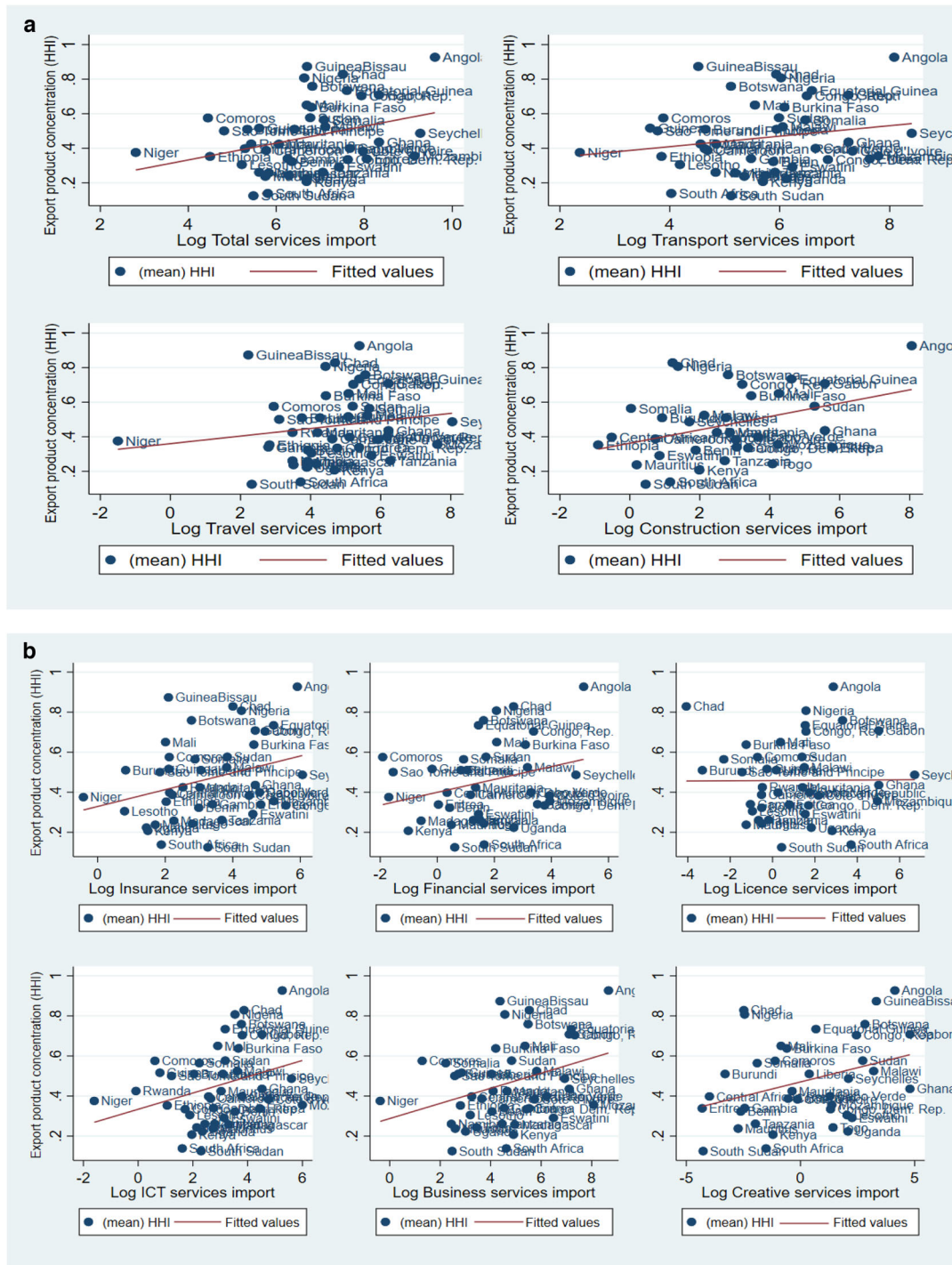
Table 8 in the appendix shows the results of the Wald test for the heteroscedasticity of the errors, the Pesaran and Yamagata (2008) test for the slope heterogeneity and Wooldridge test for autocorrelation of the panel residuals. The significance of the tests performed implies that firstly the errors are heteroscedastic. In other words, the variance of the residuals from the regressions is not constant. The consequence is that in the presence of non-homoscedastic errors, the Ordinary Least Squares (OLS) estimators become

inefficient. Second, with Pesaran and Yamagata (2008) test, the significance of all the tests performed imply the rejection of the null hypothesis of homogeneity of the model slope coefficients. Third, the Wooldridge tests show the presence of first order autocorrelation in the residuals. Thus, all these show the need for an estimation method that can take into account the heterogeneity of the slopes and solve the problems of heteroscedasticity and autocorrelation.

### 4.4 Estimation strategy

Our model is a multiple linear model, and several estimation methods are available to estimate such model. The most common basic method of estimation is the OLS method with fixed effects or random effects estimation. Among the widely and sustained methods of estimation, there is the Two Stage Least Squares (2SLS) method. However, due to the heteroscedastic and autocorrelation issues, the OLS method can lead to biased estimates due to the violation of certain assumptions such as the autocorrelation of errors, the heteroscedasticity of errors, and the endogeneity of certain variables.<sup>13</sup> Also, the pairwise correlation test shows a significant correlation between our explanatory variables that makes also OLS and within

<sup>13</sup> There is a reverse causality between diversification of exports and trade services. It is established (Caselli et al. 2020; Gngangnon 2020a, 2020b; Lin and Sung 1984) that a high level of participation in international trade in services promotes greater economic diversification. Conversely, the more diversified an economy is, the more likely it is to export more services. Economic diversification stimulates the country’s capacity to produce market services. In this respect, Gordon and Gupta (2005) and Grünfeld and Moxnes (2003) show that countries with a wide range of export products are the biggest suppliers of market services.



**Fig. 7** **a** Correlation between export concentration and import of total services and disaggregated traditional services SSA, 2005–2019. Source: Authors’ construction, data from UNCTAD (2021). **b** Correlation between export product concentration and exports of disaggregated modern services SSA, 2005–2019. Source: Authors’ construction, data from UNCTAD (2021)

estimators inconsistent. In such situations, some alternative and consistent estimators are recommended such as the Generalized Method of Moments (GMM).

The Generalized Method of Moments (GMM) is based on the conditions of orthogonality between the lagged endogenous variables and the error terms, i.e., absence of correlation

between the lagged endogenous variable and the error terms. There are two types of GMM methods. The first one is the difference GMM developed by Arellano and Bond (1991) which can face the problem of over-identification. The second type is the system GMM proposed by Arellano and Bover (1995). This method combines first difference equations and

level equations. In the two-step system GMM method, the instruments in the first difference equation are expressed in level and the instruments in the level equation are expressed in first difference.

As highlighted by Roodman (2009), GMM is appropriate in panels with small  $T$  (15) and large  $N$  (48), meaning few periods and many individuals ( $N > T$ ), a linear functional relationship, a dynamic left-hand side variable (dependent variable), dependent on its own past realizations, and independent variables that are not strictly exogenous, meaning that they are correlated with past and possibly current realizations of the error. For all these reasons, the two-step system Generalized Method of Moments (GMM) is the appropriate method to estimate Eq. (2).

## 5 Results and discussion

This section presents and discusses the empirical results on the effects of trade in services on export product diversification in Sub-Saharan Africa.

### 5.1 Heterogeneous effects of trade in services on export product diversification in SSA

Using the two-step system Generalized Method of Moments (GMM) and performed several calibrations, the empirical results are presented in Table 9. The results of the diagnostic tests show that all models are well specified. The Hansen test does not reject the validity of instruments (Hansen test  $p$  values  $\geq 10$ ), and the absence of second-order serial correlation is also not rejected (AR (2)  $p$  values  $\geq 10$ ). Too many instruments can severely weaken and bias the Hansen over-identifying restrictions test and, therefore, the rule of thumb is that the number of instruments should be less than the number of countries (Roodman 2009). In all tables, the number of countries is more than the number of instruments, indicating that there is no problem of instruments proliferation.

Realizing the presence of outliers that can bias the results since they have extreme values for some variables, we performed regressions by excluding the outliers to check the sensibility of trade in services on export product diversification. The results found from regressions without outliers are the same to the first results with outliers. We first ran the regressions with services export (dimensions) as explanatory variables and then with services import. From the different regressions, only the services export present convincing results. All the dimensions as well as total services imports show positive and insignificant coefficients, which confirms Fig. 6 on the correlation between services imports and export product diversification. Thus, our main focus has been made on the effect of services exports on export product diversification.

In the analysis of the results, an independent variable with a negative sign implies that this variable leads to a decrease in the concentration of exports and an increase in exports product diversification. An explanatory variable with a positive coefficient leads to an increase in exports concentration and to a decrease in exports product diversification.

Table 9 shows that export concentration index (HHI) initial variable is positive and significant at the 1 and 5 % levels in all specified models. This is not only supporting the findings of Agosin et al. (2012), Elhiraika and Mbate (2014), Fosu and Abass (2019), but also the economic theory arguing that export dynamics is a long-run implication than in the short-run. These results support the idea of the dependence of African countries on their export product diversification trajectories developed by Elhiraika and Mbate (2014) and supported then by Fosu and Abass (2019).

All our variables of interest show the expected signs according to economic theory. Indeed, total services exports, transport services, travel services, insurance services, financial services, other business services (services to enterprises), creative economy services have coefficients with negative sign and are all significant at 5 or 10%. The exceptions are exports in ICT and in creative economy that show coefficients with negative sign but are not significant while export in construction services shows coefficient with positive sign but not significant. In that regard, there is a negative relationship between total services export and export concentration in SSA. In addition, the results show that an increase in transport and travel services exports leads to a decrease in SSA export concentration. The coefficients of transport and travel services are negative and significant at 10% levels. That is an increase in transport and travel services exports leads to a decrease in export concentration. This positive relationship between transport services and export product diversification confirms the thesis that the efficiency of transport services determines the ability of firms to compete in foreign markets (Casas 1983; Francois and Wooton 2001; Strandenes 2021). To a situation where transport costs is high, exporting firms must pay lower wages to workers in order to remain competitive or either accept lower returns to capital or must be more productive. For a country whose exports are made possible by imported transport services, facing exorbitant transport costs not only reduces the competitiveness of its firms but also affects the productive capacity and the number of products dedicated to export.

The negative relationship between exports in insurance services, financial services and export concentration reinforces Foley and Manova (2015) idea that financial frictions and the use of domestic capital markets influence multinationals decisions about where and how to produce. These results further support Nieminen (2020) findings that argue that access to banking and financial services through the development of the financial sector and banking structure

positively affects the microstructures of the export sector as well as the behavior of exporters which will have effects on export product diversification at the macro level, through the number of active export lines and the concentration among active export lines. Indeed, any increase in exports of financial services and insurance services leads to a decrease of export concentration in SSA. The negative relationship between other business services (services to enterprises) exports and export concentration highlights the important role that services provide to enterprises play as intermediaries in the production process and productivity of firms (Arnold et al. 2008, 2011; Jones and Kierzkowski 1990; Malchow-Møller et al. 2015; Su et al. 2020).

There is a negative relationship between tourism and export concentration due to the negative sign of the coefficient of the variable which is also significant at the 10% level. The increase in the number of tourists on arrival leads to a decrease in export concentration in SSA. This implies that the development of tourism sector leads to a greater diversification of export product in SSA. A theoretical foundation of these findings can be tied to Lejárraga and Walkenhorst (2013), Lin and Sung (1984) and Romão (2020) who show that tourism demand is always accompanied by significant spillover effects on other activity sectors due to the growing demand for consumption goods complementary to tourism. In the same line, Lejárraga and Walkenhorst (2013) argue that since tourism services are consumed locally, tourists will demand a variety of products and services to satisfy their needs, which encourages the visited country to increase the supply of consumer goods.

However, despite the substantial literature (Biryukova and Matiukhina 2019; Hausmann et al. 2007; Luong and Nguyen 2021; Xing 2018) on the catalytic role of ICT in the growth of firms' productive performance, the non-significance of the coefficients of exports of ICT services, construction services and creative economy services can be explained in part by the fact that the exports of these services in SSA, even if they are increasing over time, are still low compare to the other commercial services. For instance, Fink et al. (2005) in their estimates using disaggregated data reveal that communication costs are more important for trade in differentiated products than for trade in homogeneous products.

The control variables show mostly the expected signs, while some give rather mixed signs depending on the specification. The negative and significant relationship between inflation, FDI, credit to the private sector and export concentration is valid in the theoretical field insofar as it confirms some previous findings. The results on inflation are in line with Balavac and Pugh (2016) who find that permanent instability in the price level is unfavorable for export product diversification. The negative relationship between FDI, credit to the private sector and export concentration confirms the findings of Agosin et al. (2012), Balavac and Pugh (2016), Elhiraika and

Mbate (2014) and of Fosu and Abass (2019) who in their work find favorable effects of these variables to the diversification of a country's export product basket. An environment conducive to FDI and access to credit by the private sector increases the productive structure and competitiveness of firms. Human capital formation is a strong lever for economic diversification because it increases the workforce skills and productivity. In fact, human capital is a strong determinant of export product diversification since countries where population show higher levels of education are more likely to boost export product diversification (Elhiraika and Mbate 2014). However, in this study, despite having negative relation with export concentration, human capital is not significant in all our regressions. That can be explained by the low level of education in most of SSA countries. In addition, most of African manufacturing industries are driven by imported expertise meanwhile local workforce is dedicated to low qualification work.

Natural resources and GDP per capita encourage export concentration in SSA. A country with a large endowment of natural resources has a high propensity to export more raw materials than manufacturing goods, which explains the positive relationship between natural resources and export concentration (Agosin et al. 2012; Ansu et al. 2016; Elhiraika and Mbate 2014). Political stability is very important for export product diversification as argued by Fosu and Abass (2019). Political stability shows rather mixed results as in some specifications it shows positive signs and others negative signs, but all are not significant. This is the result of the stabilisation and pacification efforts observed in some countries over the past decades, although in most cases in SSA political stability remains an ongoing quest. Openness expresses here as the openness in merchandises trade appears to be an important determinant of exports product diversification since in most of the specifications there is a negative relationship with export concentration, but the coefficients are not significant. As so far countries are open to international markets, they are more likely to diversify their exports. The non-significant of the coefficient can be related to the fact that SSA exports are dominated by commodities. This is in line with some findings like Agosin et al. (2012), Elhiraika and Mbate (2014), Feng et al. (2021), Khalil (2019) and Makhoul et al. (2015).

The time effect incorporated in the regressions reveals a rather interesting feature. The negative and significant relationship of years 2007 to 2009 shows that the period of the international financial crisis has a favorable effect on exports product diversification in SSA. The reason is that during the financial crisis, most of African countries faced difficulties in selling their production due to the global demand contraction for commodities. Faced with such a situation, efforts to transform commodities domestically have emerged in several countries in SSA that are heavily dependent on commodities, such as Nigeria, South Africa, Kenya, Ethiopia, Ghana and Angola.



## 5.2 Robustness checks of the results

The checking of the robustness of our results is done by three main types of distinct procedures. First, we perform additional estimations by changing the dependent variable. We use the Theil index of export products concentration from the International Monetary Fund (IMF) database instead of the UNCTAD HHI index. Theil index calculated from the seminal work of Cadot et al. (2011) is used in several empirical works (Agosin et al. 2012; Fosu and Abass 2019; Gngangnon 2020a; Nieminen 2020) as part of the work on export product diversification.

Secondly, in the same vein, we classify the main types of commercial services into two broad categories, traditional services (transport, travel and tourism) and modern services (construction, insurance, finance, use of license rights, ICT, business services and creative services). In contrast to Eichengreen and Gupta (2013),<sup>14</sup> we classify financial and insurance services as modern services following the classification used by Sahoo and Dash (2017) for two main reasons.<sup>15</sup> The following equation models the relationship between trade in services and export product diversification captured by the Theil index. With  $THEIL_{it}$  the Theil index,  $THEIL_{it-1}$  the lagged variable of the dependent variable,  $TiS_{it}$  capturing the dimensions of trade in services,  $X_{it}$  a set of control variables,  $\vartheta_t$  and  $\tau_i$  the temporal and individual effects respectively and  $\varepsilon_{it}$  the error terms.

$$TI_{it} = \delta_0 + \delta_1 TI_{it-1} + \delta_2 TiS_{it} + \delta_j X_{it} + \vartheta_t + \tau_i + \varepsilon_{it} \quad (3)$$

with  $i = 1, \dots, N$ ,  $t = 1, \dots, T$

Tables 10 and 11 show that the estimates parameters are stable regarding their signs and amplitudes by using Theil

<sup>14</sup> Eichengreen and Gupta (2013) include financial and insurance services in traditional services for two reasons, one related to their long history and the second considering that insurance and finance exports are highly correlated with merchandise exports. In order to be able to combine transport, travel and tourism export, we consider inbound tourism expenditure from the World Development Indicator (WDI). One might consider the classification proposed by Katouzian (1970) since the 1970s on three-level categorisation of services. Category 1, called new services, includes services such as education, clinical and health services, entertainment (hotels, holiday centers, cinemas, nightclubs, and others). The second category, called complementary services, includes banking, financial services, transport, wholesale, and retail trade. Category 3, called old services, includes services that flourished long before the industrial revolution, namely domestic services. However, we did not consider this categorisation of services because it takes into account some services that do not fit into the current classifications of commercial services, namely domestic services and other.

<sup>15</sup> Firstly, while recognizing their long history, it is quite evident today that their production and delivery is being revolutionized by the evolution of Information and Communication Technologies (now referred to as the digital revolution and fintech). Secondly, finance and insurance are both highly skilled and knowledge intensive sectors.

index. This implies a confirmation of the robustness of the results, in the sense that most of our previous results are confirmed. In contrast to the results in Table 9, with the Theil Index, only export in creative economy services is not significant. However, if most of our interest variables become significant and with the expected sign (negative), the other control variables appear in Table 9 with more heterogeneous effect on export product diversification compared to the results with HHI in Table 8. Moreover, Table 11 shows that traditional and modern services export promote export product diversification either with Herfindahl-Hirschman index or Theil index. In both cases, these results are in line with the findings of Eichengreen and Gupta (2013). The results suggest that exports of modern services have greater effects than traditional services on export product diversification.

Third, to have a broad database over the period 1996 to 2019, we reprocess the data from two UNCTAD datasets by combining the bases of the fifth and sixth editions of the Balance of Payments Manual.<sup>16</sup> Thus, with the new database, we re-estimated Eqs. (2) and (3) whose results can be founded in Tables 12 and 13. The latest results show that there are no major variations in the magnitude of the coefficients of the different models' parameters as well as the signs with respect to the previous results. Therefore, we can assert that the results are stable and robust weather we use data from BPM6 or from the combined BPM5 and BPM6.

## 6 Conclusion

This study has identified the dimensions of trade in services that are conducive to export product diversification in SSA. The analysis of the theoretical foundations of the relationship between trade in services through its different components and export product diversification led us to resort to empirical method to identify the dimensions of services that promote export product diversification. The two-step system Generalized Method of Moments (GMM) is used as an estimation method. The results show that total export of services, export of traditional and modern services, export of transport, travel, insurance, financial, licences services and tourism promote export product diversification in SSA.

Given these results, a number of economic policies can be suggested to the SSA policy makers to make

<sup>16</sup> The sixth edition of the Balance of Payments Manual sixth edition (BPM6) gives a wider range of services than the one made in the fifth edition of the Balance of Payments Manual (BPM5). That is, we have grouped certain sub-categories of services by summation. This allowed us not only to obtain a combination of the two databases but also to extend the data over the period 1966 to 2019.



commercial services export an important lever for export product diversification. In this perspective, policy makers can adopt policies and strategies to develop and orient the services sector towards more efficient and high value-added services. In this sense, as export of modern services exert more favorable effects, policy makers can focus more on increasing a stock of highly skilled human capital. This will allow for a better reallocation of labor from the services sector to be more productive and capable of providing more skilled and competitive services as is the case in South East Asia. They can also strengthen national strategies for the development and modernization of the tourism sector as a lever for export product diversification.

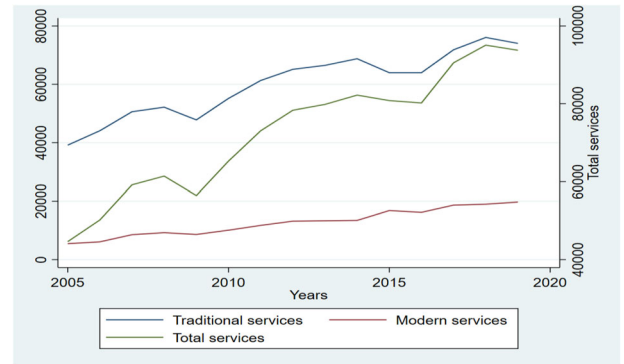
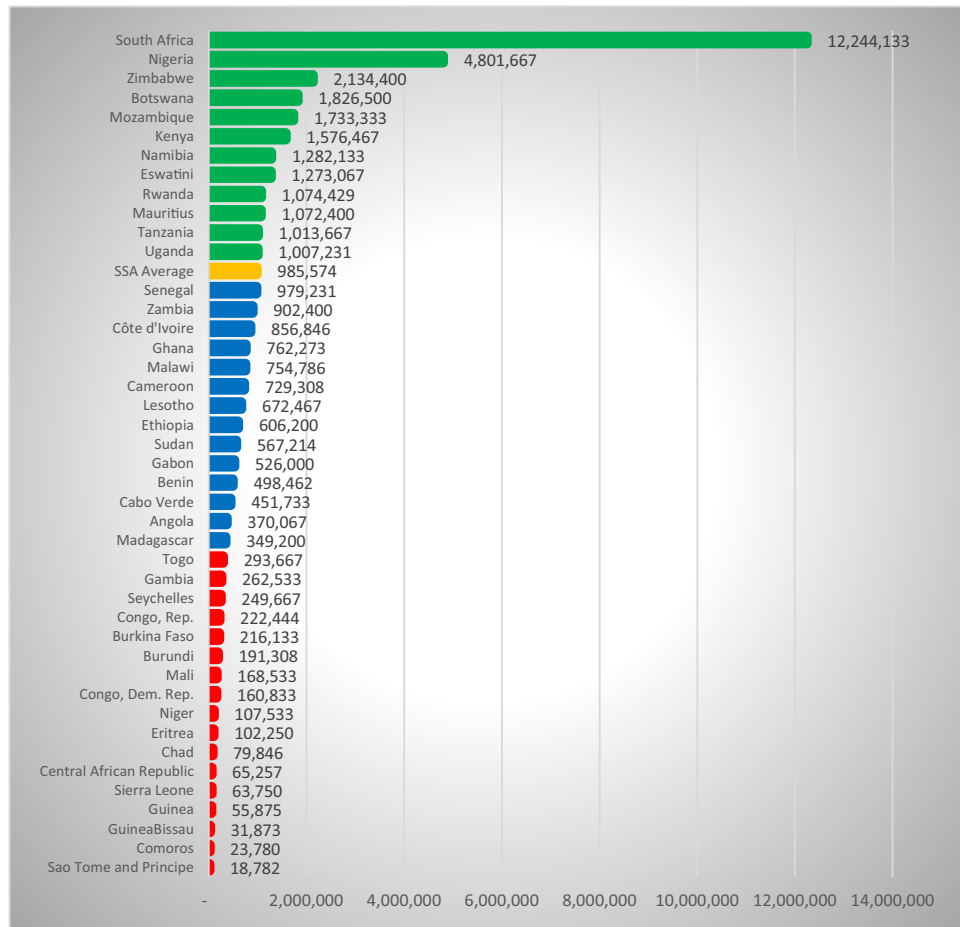
### Compliance with ethical standards

**Conflict of interest** The authors declare no competing interests.

## 7 Appendices

Figures 8 and 9; Tables 1–13

**Fig. 8** Evolution of the average number of tourists to the main countries of attraction in SSA (2005–2019). Source: Authors construction, data from WDI (2021)



**Fig. 9** Traditional and modern services exports’ trends. Source: Authors

**Table 1** Pairwise correlations between traditional and modern services export

Variables	(1)	(2)	(3)
(1) Log traditional services export	1.000		
(2) Log modern services export	0.720*	1.000	
(3) Log total services export	0.974*	0.835*	1.000

\* $p < 0.1$

Source: Authors’ calculations

**Table 2** Pairwise correlation between HHI and export in commercial services dimensions

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) HHI	1.000											
(2) LTOUTISM	-0.333*	1.000										
(3) Log Total services	-0.264*	0.716*	1.000									
(4) Log Transport	-0.306*	0.634*	0.884*	1.000								
(5) Log Travel	-0.176*	0.649*	0.852*	0.724*	1.000							
(6) Log Construction	-0.111	0.283*	0.406*	0.242*	0.250*	1.000						
(7) Log Insurance	-0.148*	0.498*	0.608*	0.502*	0.488*	0.260*	1.000					
(8) Log Finance	-0.143*	0.409*	0.593*	0.498*	0.445*	0.356*	0.515*	1.000				
(9) Log Licenses	-0.151*	0.388*	0.507*	0.414*	0.496*	0.443*	0.337*	0.417*	1.000			
(10) Log ICT	-0.161*	0.355*	0.694*	0.613*	0.517*	0.450*	0.521*	0.526*	0.349*	1.000		
(11) Log Business services	-0.304*	0.517*	0.729*	0.646*	0.536*	0.445*	0.515*	0.488*	0.363*	0.453*	1.000	
(12) Log Creative economy	-0.158*	0.512*	0.599*	0.475*	0.493*	0.294*	0.528*	0.536*	0.601*	0.430*	0.501*	1.000

\* $p < 0.1$

Source: Authors' calculation

**Table 3** Pairwise correlations between HHI and import in commercial services dimensions

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) HHI	1.000										
(2) Log Total services	0.269*	1.000									
(3) Log Transport	0.160*	0.941*	1.000								
(4) Log Travel	0.131*	0.817*	0.733*	1.000							
(5) Log Construction	0.260*	0.595*	0.538*	0.306*	1.000						
(6) Log Insurance	0.239*	0.800*	0.779*	0.644*	0.457*	1.000					
(7) Log Finance	0.205*	0.658*	0.591*	0.514*	0.367*	0.607*	1.000				
(8) Log Licenses	0.024	0.562*	0.463*	0.481*	0.188*	0.358*	0.388*	1.000			
(9) Log ICT	0.240*	0.804*	0.786*	0.685*	0.461*	0.650*	0.534*	0.427*	1.000		
(10) Log Business services	0.252*	0.869*	0.739*	0.709*	0.578*	0.731*	0.610*	0.573*	0.719*	1.000	
(11) Log Creative economy	0.226*	0.441*	0.338*	0.357*	0.388*	0.255*	0.503*	0.376*	0.312*	0.449*	1.000

\* $p < 0.1$

Source: Authors' calculations

**Table 4** List of countries in the sample

01	Angola	25	Liberia
02	Benin	26	Madagascar
03	Botswana	27	Malawi
04	Burkina Faso	28	Mali
05	Burundi	29	Mauritania
06	Cabo Verde	30	Mauritius
07	Cameroon	31	Namibia
08	Central African Republic	32	Mozambique
09	Chad	33	Niger
10	Comoros	34	Nigeria
11	Congo, Dem Rep	35	Rwanda
12	Congo, Rep	36	Sao Tome and Principe
13	Cote d'Ivoire	37	Senegal
14	Equatorial Guinea	38	Seychelles
15	Eritrea	39	Sierra Leone
16	Eswatini	40	Somalia
17	Ethiopia	41	South Africa
18	Gabon	42	South Sudan
19	Gambia	43	Sudan
20	Ghana	44	Tanzania
21	Guinea	45	Togo
22	Guinea-Bissau	46	Uganda
23	Kenya	47	Zambia
24	Lesotho	48	Zimbabwe

Authors construction

**Table 5** Variables, their definitions and sources

Variables	Description	Sources
Export product diversification	The normalized Herfindahl-Hirschman Index (HHI) measuring export concentration and varies between 0 (more diverse) to 1 (less diverse).	UNCTAD
Transport	Include all transport services involving the carriage of people and objects from one location to another as well as related supporting and auxiliary services. Also included are postal and courier services.	UNCTAD (MBP5 & MBP6)
Travel	Travel credits cover goods and services for own use or to give away acquired from an economy by non-residents during visits to that economy. Travel debits cover goods and services for own use or to give away acquired from other economies by residents during visits to these other economies.	UNCTAD (MBP5 & MBP6)
Construction	Construction covers the creation, renovation, repair, or extension of fixed assets in the form of buildings, land improvements of an engineering nature, and other such engineering constructions as roads, bridges, and dams. It also includes related installation and assembly work. It includes site preparation and general construction as well as specialized services such as painting, plumbing, and demolition. It also includes management of construction projects.	UNCTAD (MBP5 & MBP6)
Insurance	Expresses insurance and pension services include services of providing life insurance and annuities, nonlife insurance, reinsurance, freight insurance, pensions, standardized guarantees, and auxiliary services to insurance, pension schemes, and standardized guarantee schemes.	UNCTAD (MBP5 & MBP6)
Financial services	Financial services cover financial intermediary and auxiliary services, except insurance and pension fund services. These services include those usually provided by banks and other financial corporations.	UNCTAD (MBP5 & MBP6)
Licence services	Charges for the use of intellectual property include: (a) charges for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs including trade secrets, franchises) and (b) charges for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast).	UNCTAD (MBP5 & MBP6)
ICT services	(1) Telecommunications services encompass the broadcast or transmission of sound, images, data, or other information by telephone, telex, telegram, radio and television cable transmission, radio and television satellite, electronic mail, facsimile, and so forth, including business network services, teleconferencing, and support services. They do not include the value of the information transported. Also included are mobile telecommunications services, Internet backbone services, and online access services, including provision of access to the Internet. Excluded are installation services for telephone network equipment (included in construction) and database services (included in information services). (2) Computer services consist of hardware- and software-related services and data-processing services. They exclude non-customized packaged software (systems and applications), and video and audio recordings on physical media; computer-training courses not designed for a specific user; and leasing of computers without an operator. (3) Information services include news agency services, such as the provision of news, photographs, and feature articles to the media. Other information provision services include database services, direct non-bulk subscriptions to newspapers and periodicals, other online content provision services, and library and archive services.	UNCTAD (MBP5 & MBP6)
Others services to enterprises	Other business services cover research and development, professional and management consulting and technical, trade-related and other business services.	UNCTAD (MBP5 & MBP6)
Creative economy	Includes personal, cultural, and recreational services and consist of (a) audio-visual and related services and (b) other personal, cultural, and recreational services.	UNCTAD (MBP5 & MBP6)
Tourism	Number of foreign visiting tourists on arrival in a country over a one-year period	WDI
Political Stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate gives the country's score between -2.5 and 2.5.	WGI
Human Capital	Estimated on the years of schooling and educational performance	PWT
GDP per capita	Gross Domestic Product per capita (current \$)	WDI
Population	Total population in millions	WDI
Openness in merchandise trade	It expresses the sum of imports and exports of merchandises as a percentage of GDP: $(X + M)/GDP$	WDI
Natural Resources	Expressing the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents and forestry rents as a percentage of GDP.	WDI
Credit	Is the total credit to the private sector which refers to the financial resources provided to the private sector by financial companies as a percentage of GDP	WDI
FDI	Expresses the net inflow of the Foreign Direct Investment (FDI) measured as a % of GDP.	WDI
Inflation	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole.	WDI

Source: Authors compilation

**Table 6** Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Herfindahl-Hirschman index (HHI)	1184	0.467	0.209	0.099	0.961
Total services export	1097	898.047	2049.35	0.668	17639.8
Transport services export	1000	227.282	504.41	0	3549.846
Travel services export	1001	408.345	1134.682	0	9995.91
Construction services export	571	14.476	35.165	0	425.561
Insurance services export	853	18.668	54.647	0	543.898
Finance services export	705	39.176	135.243	0	973.016
Use of license services export	579	7.658	24.048	0	233.413
ICT services export	1102	39.385	90.557	0	755.712
Other business services export	916	152.325	477.262	0	6450.322
Creative economy export	575	9.923	33.626	0	301.323
Total services import	1070	1916.376	3953.172	10.405	38710.166
Transport services import	1006	689.94	1298.85	4.654	9737.58
Travel services import	989	332.078	977.809	0	13508.942
Construction services import	689	128.425	632.716	0	7932.26
Insurance services imports	937	75.603	137.6	-1.512	1498.13
Finance services imports	694	35.792	102.318	0	1241.302
Use of license services imports	732	58.108	262.309	0	2124.316
ICT services imports	995	52.749	146.408	0	1544.648
Other business services imports	951	540.707	1371.359	0	15965.095
Creative economy imports	653	9.872	27.964	0	301.531
Tourism (Number on arrival)	880	860436.25	1802653.4	2900	15121000
Political Stability	1083	-0.554	0.947	-3.315	1.282
Human Capital	925	1.744	0.43	1.053	2.964
Inflation	1144	18.117	166.13	-31.566	4800.532
Openness (Merchandises)	1132	54.459	30.235	7.806	225.412
Natural resources	1089	11.183	11.213	0.001	62.697
Credit to private sector	1093	17.452	16.634	0	106.26
Foreign Direct Investment (FDI)	1098	4.515	9.468	-11.625	161.824
GDP per capita	1148	1877.067	2898.967	102.598	22942.61

Source: Authors' calculations

**Table 7** Fisher ADF type stationarity Test

Variables	At level	First difference	Order of integration
HHI	-4.5776***	-22.9227***	I (0)
Log Total services Export	-4.2543***	-20.1006***	I (0)
Log Tourism	-1.1624	-14.4799 ***	I (1)
Log Transport Services export	-3.7961***	-18.8842***	I (0)
Log Travel Services export	-3.5412***	-15.7314***	I (0)
Log Construction Services export	-	-12.7297***	I (1)
Log Insurance Services export	-5.1889***	-21.4307***	I (1)
Log Financial Services export	-2.0195**	-17.3109***	I (0)
Log Use of Licenses Services export	-4.1068***	-14.8137***	I (0)
Log ICT Services export	-3.6110***	-13.9735***	I (0)
Log Other Business Services export	-4.9256***	-18.8405***	I (0)
Log Creative Economy Services	-5.2578***	-13.3290***	I (0)
Political stability	-3.7623***	-20.7157***	I (0)
Human Capital	-4.0320***	5.0832	I (0)
FDI	-7.4171***	-26.5080***	I (0)
Natural resources	1.3816	-14.2387***	I (1)
Log GDP per capita	-5.2238***	-14.1902***	I (0)
Credit to private sector	-0.2807	-14.9239***	I (1)
Openness (Merchandises)	-1.2148	-16.8458***	I (1)
Inflation	-14.4553***	-30.2567***	I (0)

Source: Authors' calculations

\*\*\* $p < 0.01$ , \*\* $p < 0.05$

**Table 8** Diagnostic tests on interest variables

Tests	Wald Test for Heteroscedasticity	Test for Slope Homogeneity	Wooldridge Test for Autocorrelation in Panel Data
Equation	HHI	HHI	HHI
Log Total Services Export	1.2e + 05 (0.0000)	8.930 (0.0000)	31.329 (0.0000)
Log Tourism	62083.50 (0.0000)	–	43.211 (0.0000)
Log Transport Services export	28903.85 (0.0000)	5.076 (0.0000)	40.922 (0.0000)
Log Travel Services export	5.4e + 05 (0.0000)	5.417 (0.0000)	28.864 (0.0000)
Log Construction Services export	4.9e + 32 (0.0000)	–	6.559 (0.0169)
Log Insurance Services export	4.7e + 31 (0.0000)	4.573 (0.0000)	21.365 (0.0000)
Log Financial Services export	8.7e + 31 (0.0000)	7.283 (0.0000)	26.340 (0.0000)
Log Use of Licenses Services export	5.4e + 31 (0.0000)	–	10.842 (0.0027)
Log ICT Services export	8.5e + 32 (0.0000)	7.042 (0.0000)	32.419 (0.0000)
Log Other Business Services export	2.0e + 05 (0.0000)	9.124 (0.0000)	34.087 (0.0000)
Log Creative Economy Services	4.5e + 31 (0.0000)	–	15.434 (0.0005)

HHI = Normalized Herfindahl-Hirschman Index (HHI). Modified Wald test for groupwise heteroscedasticity of cross-sectional time series, H0:  $\sigma(i)^2 = \sigma^2$  for all i. Wooldridge test for autocorrelation in panel data, H0: no first order autocorrelation. Pesaran and Yamagata (2008) test for slope heterogeneity, H0: slope coefficients are homogenous

Source: Authors' calculations



**Table 9** Results of two- step system-GMM, dependent variable: standardized HHI

Variables	Dependent variable: Herfindahl-Hirschman Index (HHI)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.HHI	0.365*** (0.107)	0.421*** (0.152)	0.857*** (0.245)	0.534*** (0.190)	0.438*** (0.124)	0.676*** (0.156)	0.716*** (0.193)	0.770*** (0.127)	0.556*** (0.148)	0.334*** (0.126)	0.441*** (0.164)	0.390*** (0.131)
Political stability	-0.0164 (0.0202)	-0.0315 (0.0259)	-0.0102 (0.0153)	-0.0126 (0.0168)	0.0271 (0.0217)	-0.00648 (0.0156)	-0.00409 (0.0168)	0.00413 (0.0180)	-0.0117 (0.0256)	0.00466 (0.0324)	-0.00109 (0.0192)	-0.0127 (0.0275)
Human Capital	-0.0624 (0.0563)	-0.0162 (0.0622)	0.0281 (0.0311)	-0.0328 (0.0584)	-0.0353 (0.0710)	0.0195 (0.0317)	-0.00521 (0.0406)	0.0386 (0.0418)	-0.0422 (0.0483)	-0.0276 (0.0560)	-0.0338 (0.0678)	-0.00208 (0.0631)
Inflation	-0.000213 (0.000145)	-0.000222 (0.000144)	-0.000235 (0.000393)	-0.000176 (0.000409)	0.000536 (0.00111)	-0.000575 (0.000456)	-0.000803* (0.000485)	9.71e-05 (0.000445)	-0.000613* (0.000367)	-0.000650* (0.000354)	-0.000587 (0.00107)	-6.32e-05 (0.000148)
Trade	0.000655 (0.000967)	0.000270 (0.000771)	-0.000356 (0.00128)	5.12e-05 (0.000795)	-0.000400 (0.000467)	-8.90e-05 (0.000628)	-0.00154 (0.00109)	-0.000155 (0.000555)	0.000370 (0.000942)	-0.00173 (0.00215)	0.000300 (0.000976)	-0.000249 (0.00106)
Openness (merchandise)												
Natural resources	0.00221 (0.00194)	0.00182 (0.00200)	0.000309 (0.00311)	-0.000180 (0.00255)	0.00703*** (0.00246)	0.00350* (0.00190)	0.00152 (0.00290)	0.00477* (0.00254)	0.00387* (0.00220)	0.00378 (0.00230)	0.00529* (0.00274)	0.00196 (0.00192)
Credit to private sector	-0.00359*** (0.000907)	-0.00211* (0.00111)	8.09e-05 (0.00134)	-0.00234* (0.00138)	-0.00272** (0.00115)	-0.00132* (0.000790)	-0.000946 (0.000991)	-0.000646 (0.000905)	-0.00166 (0.00170)	-0.00343*** (0.00106)	-0.00126 (0.00112)	-0.00275** (0.00108)
FDI	-0.00164*** (0.000481)	-0.00156*** (0.000458)	-0.00164* (0.000845)	-0.00188*** (0.000405)	-0.00295*** (0.000927)	-0.00153 (0.000944)	-0.000801 (0.000952)	-0.000754 (0.00109)	-0.00256** (0.00102)	-0.00123 (0.000938)	-0.00203 (0.00181)	-0.000673 (0.00176)
Log GDP per Capita	0.0816*** (0.0288)	0.0888** (0.0408)	0.0155 (0.0392)	0.0834* (0.0483)	0.0626** (0.0251)	0.0359* (0.0217)	0.0485* (0.0261)	0.0187 (0.0208)	0.0579* (0.0340)	0.111*** (0.0382)	0.0335 (0.0265)	0.109** (0.0479)
Log Total services exp		-0.0479* (0.0275)										
Log Transport services exp			-0.0280* (0.0158)									
Log Travel services exp				-0.0322* (0.0178)								
Log Construction services exp					0.00306 (0.00764)							
Log Insurance services exp						-0.0122** (0.00524)						
Log Financial services exp							-0.0129* (0.00762)					
Log Licence use services exp								-0.0181* (0.0101)				
Log ICT services exp									-0.0149 (0.0208)			

**Table 9** (continued)  
 Dependent variable: Herfindahl-Hirschman Index (HHI)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log Business services exp										-0.0259* (0.0154)		
Log Creative economy exp											-0.0120 (0.0115)	
Log Tourism												-0.0732* (0.0400)
Constant	-0.188 (0.130)	-0.0451 (0.177)	0.0316 (0.127)	-0.122 (0.158)	-0.122 (0.155)	-0.134 (0.0983)	-0.103 (0.112)	-0.135 (0.112)	-0.119 (0.166)	-0.217 (0.151)	0.0190 (0.140)	0.503 (0.357)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	498	485	453	455	234	401	361	256	421	430	261	408
Number of countries, <i>n</i>	37	37	37	37	30	35	32	31	36	37	30	34
No. of instruments, <i>i</i>	25	32	31	35	32	33	23	26	28	30	28	26
Instruments ratio, <i>n/i</i>	1.48	1.16	1.19	1.06	0.94	1.06	1.39	1.19	1.29	1.23	1.07	1.31
AR1 <i>p</i> value	0.000134	0.000118	0.00736	0.00139	0.00103	0.00291	0.0271	0.00289	0.00105	5.91e-05	0.000892	6.69e-05
AR2 <i>p</i> value	0.227	0.187	0.339	0.274	0.326	0.378	0.690	0.445	0.749	0.783	0.285	0.763
Hansen <i>p</i> value	0.836	0.342	0.312	0.466	0.564	0.394	0.166	0.794	0.835	0.502	0.532	0.211

\*Note: The numbers in parentheses represent the robust standard errors of the estimated coefficients  
 \*, \*\*, \*\*\*represent the significances at 10, 5 and 1%  
 Source: Authors' calculations

**Table 10** Robustness of results (system-GMM, dependant variable: Theil Index)

Variables	Dependent variable: Theil index											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.THEIL	0.805*** (0.131)	0.806*** (0.0851)	0.674*** (0.107)	0.834*** (0.124)	0.802*** (0.100)	0.878*** (0.126)	0.850*** (0.115)	0.861*** (0.120)	0.845*** (0.140)	0.689*** (0.0915)	0.513* (0.291)	0.705*** (0.112)
Political stability	0.125 (0.0810)	-0.198 (0.166)	0.0192 (0.118)	-0.0174 (0.0697)	0.0483 (0.119)	0.0328 (0.130)	0.0592 (0.576)	0.0353 (0.108)	-0.0463 (0.146)	0.181 (0.168)	0.0203 (0.320)	-0.0209 (0.160)
Human Capital	0.127 (0.160)	0.271 (0.262)	0.179 (0.219)	0.0617 (0.226)	0.0903 (0.389)	0.346* (0.208)	0.0754 (0.262)	0.192* (0.109)	0.0407 (0.242)	0.368 (0.306)	0.0715 (0.392)	0.255 (0.246)
Inflation	-0.0049** (0.00217)	-0.000391 (0.00304)	-0.00527* (0.00307)	-0.00195 (0.00215)	-0.0110 (0.0246)	-0.00328 (0.00247)	-0.00450 (0.00747)	0.000309 (0.00245)	-0.00283 (0.00261)	-0.00602* (0.00362)	-0.0248 (0.0180)	-0.00288 (0.00195)
Trade Openness (merchandise)	-0.00673 (0.00578)	0.00648 (0.00941)	0.000917 (0.00503)	-0.00155 (0.00657)	0.0212** (0.0102)	-0.00391 (0.0115)	-0.00219 (0.0228)	0.00207 (0.00611)	-0.00280 (0.00716)	-0.00724 (0.00737)	0.0354 (0.0356)	0.00258 (0.0169)
Natural resources	0.0206** (0.00975)	0.00367 (0.0136)	0.0205 (0.0138)	-0.0125 (0.0190)	0.0213 (0.0383)	0.000590 (0.0210)	0.0367 (0.0938)	0.0189 (0.0167)	-0.00696 (0.0135)	0.0413* (0.0246)	0.0534 (0.0600)	0.00173 (0.0110)
Credit to private sector	-0.00288 (0.00560)	0.00988 (0.00789)	-0.00126 (0.00638)	-0.00517 (0.00357)	-0.000183 (0.00510)	-0.00332 (0.00589)	0.000481 (0.00643)	-0.00122 (0.00232)	-0.000614 (0.00566)	-0.000278 (0.00585)	0.00800 (0.0127)	-0.00466 (0.00737)
FDI	-0.00274 (0.00280)	-0.00281 (0.00304)	-0.000976 (0.00343)	-0.00181 (0.00214)	-0.0320*** (0.0108)	0.00393 (0.0126)	-0.00892 (0.00676)	-0.00679 (0.00586)	0.00227 (0.00584)	-0.00553 (0.00442)	-0.0505* (0.0297)	0.00235 (0.0162)
Log GDP per Capita	0.0341 (0.135)	0.133 (0.198)	0.0704 (0.160)	0.203* (0.120)	-0.224 (0.193)	0.0617 (0.114)	0.144 (0.374)	-0.0189 (0.0983)	0.0754 (0.121)	0.142 (0.136)	-0.716 (0.519)	0.243 (0.209)
Log Total services export		-0.494** (0.217)										
Log Transport services exp		-0.153* (0.0904)										
Log Travel services exp				-0.146* (0.0827)								
Log Construction services exp				-0.115* (0.0679)								
Log Insurance services exp						-0.0917** (0.0463)						
Log Financial services exp							-0.104*** (0.0377)					
Log Licence use services exp								-0.0482** (0.0240)				
Log ICT services exp									-0.131* (0.0732)			
Log Business services exp										-0.194** (0.0956)		

Table 10 (continued)

Variables	Dependent variable: Theil index											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log Creative economy exp											0.0488 (0.0943)	
Log Tourism												−0.393* (0.232)
Constant	0.557 (0.431)	1.687 (1.102)	0.894 (0.868)	0.236 (0.552)	1.234 (0.944)	−0.208 (0.441)	−0.510 (2.286)	−0.0256 (0.630)	0.609 (0.584)	0.361 (0.776)	4.599* (2.431)	4.157* (2.483)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	317	292	292	147	256	222	158	264	275	160	269
Number of countries, <i>n</i>	37	37	36	36	25	34	29	26	34	36	27	33
No. of instruments, <i>i</i>	26	28	28	33	25	26	27	25	30	33	23	29
Instruments ratio, <i>n/i</i>	1.42	1.32	1.29	1.09	1.00	1.31	1.07	1.04	1.13	1.09	1.17	1.14
AR1 <i>p</i> value	0.0596	0.0328	0.0473	0.0771	0.144	0.0780	0.0515	0.0137	0.0966	0.0242	0.0824	0.0687
AR2 <i>p</i> value	0.241	0.119	0.242	0.108	0.0512	0.466	0.829	0.236	0.711	0.522	0.287	0.253
Hansen <i>p</i> value	0.506	0.655	0.368	0.301	0.693	0.776	0.746	0.237	0.433	0.433	0.823	0.682

Note: The numbers in parentheses represent the robust standard errors of the estimated coefficients

\*, \*\*, \*\*\* represent the significances at 10, 5 and 1%

source: authors' calculations

**Table 11** Results of system-GMM regressions with traditional and modern services

Dependent variable Variables	Herfindahl-Hirschman Index (HHI)			Theil index		
	HHI (1)	HHI (2)	HHI (3)	THEIL (4)	THEIL (5)	THEIL (6)
L.Dependent variable	0.493*** (0.184)	0.436*** (0.113)	0.529*** (0.119)	0.889*** (0.0747)	0.889*** (0.0477)	0.716*** (0.145)
Political stability	−0.0257 (0.0267)	−0.0140 (0.0199)	−0.0196 (0.0181)	0.0591 (0.0900)	0.00948 (0.0761)	−0.0370 (0.117)
Human Capital	−0.0239 (0.0668)	−0.0457 (0.0543)	−0.0297 (0.0435)	0.175 (0.154)	0.0888 (0.120)	0.0591 (0.169)
Inflation	−0.000112 (0.000210)	−0.000211 (0.000142)	−0.000548 (0.000365)	−0.00176 (0.00176)	−0.00130 (0.00201)	−0.00370 (0.00276)
Trade Openness (merchandises)	0.000112 (0.000824)	0.000166 (0.000599)	−3.37e−05 (0.000632)	−0.00373 (0.00583)	0.000127 (0.00988)	0.00428 (0.00699)
Natural resources	−0.000943 (0.00288)	0.00155 (0.00191)	0.000292 (0.00190)	0.0104 (0.0127)	−0.00160 (0.0110)	0.0118 (0.0203)
Credit to private sector	−0.00159 (0.00166)	−0.00274*** (0.000919)	−0.00246** (0.00109)	0.00614 (0.00509)	−9.76e−05 (0.00214)	−0.00127 (0.00570)
FDI	−0.00229** (0.00103)	−0.00183*** (0.000436)	−0.00160*** (0.000549)	−0.00725* (0.00402)	−0.00360 (0.00291)	−0.00730 (0.00496)
Log GDP per Capita	0.0939** (0.0478)	0.0830** (0.0381)	0.0766** (0.0359)	0.0635 (0.135)	0.0766 (0.137)	0.154 (0.144)
Log Total services export	−0.0588* (0.0346)			−0.215* (0.119)		
Log Traditional services exp		−0.0185* (0.0112)			−0.123* (0.0733)	
Log Modern services export			−0.0221* (0.0134)			−0.218* (0.130)
Constant	−0.00191 (0.222)	−0.125 (0.137)	−0.136 (0.139)	1.024 (0.810)	0.619 (0.450)	0.617 (0.655)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	482	479	457	316	313	294
Number of countries, <i>n</i>	37	37	37	37	37	36
No. of instruments, <i>i</i>	24	27	27	29	31	31
Instruments ratio, <i>n/i</i>	1.542	1.370	1.370	1.276	1.194	1.161
AR1 <i>p</i> value	0.00577	9.98e−05	0.000714	0.0348	0.0404	0.0352
AR2 <i>p</i> value	0.314	0.487	0.290	0.140	0.123	0.749
Hansen <i>p</i> value	0.600	0.520	0.915	0.564	0.738	0.837

Note: The numbers in parentheses represent the robust standard errors of the estimated coefficients

\*, \*\*, \*\*\* represent the significances at 10, 5 and 1%

Source: Authors' calculations



**Table 12** Robustness of results with combined data (BPM5 and BMP6) and HHI index (system-GMM regression)

Variables	Dependent variable: Herfindahl-Hirschman Index (HHI)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.HHI	0.528*** (0.0816)	0.649*** (0.0969)	0.519*** (0.0993)	0.581*** (0.0684)	0.745*** (0.0863)	0.595*** (0.0959)	0.640*** (0.0811)	0.628*** (0.128)	0.576*** (0.0769)	0.614*** (0.129)	0.429** (0.192)	0.582*** (0.0883)
Political stability	0.0226 (0.0165)	0.0201 (0.0199)	0.0109 (0.0228)	0.0166 (0.0160)	0.0187* (0.0109)	0.0205 (0.0139)	-0.0125 (0.0148)	0.00355 (0.0170)	0.00593 (0.0186)	-0.00378 (0.0164)	0.0398* (0.0235)	0.0222 (0.0186)
Human Capital	-0.0303 (0.0385)	0.0446 (0.0528)	0.00549 (0.0418)	-0.0183 (0.0335)	-0.0180 (0.0353)	-0.00134 (0.0377)	-0.0255 (0.0430)	-0.0122 (0.0511)	-0.0394 (0.0372)	-0.0380 (0.0296)	-0.0766 (0.0842)	0.0190 (0.0468)
Inflation	-9.48e-05*** (2.62e-05)	-0.000182* (0.000109)	-0.000144* (8.61e-05)	-0.000147*** (4.82e-05)	0.00111 (0.000695)	4.97e-05 (0.000118)	-0.000121*** (2.23e-05)	0.000126 (0.000102)	-9.87e-05*** (3.22e-05)	-5.85e-05 (3.84e-05)	0.000600 (0.000731)	-0.00013** (5.42e-05)
Trade Openness (merchandise)	-0.0547 (0.0516)	-0.268** (0.108)	-0.123 (0.116)	-0.0628 (0.0682)	-0.0482 (0.0394)	-0.0900* (0.0496)	-0.00562 (0.0305)	0.0537 (0.0396)	0.00807 (0.0526)	0.0565 (0.0628)	-0.247* (0.135)	-0.121* (0.0693)
Natural resources	0.00713** (0.00299)	0.00359 (0.00277)	0.00449* (0.0028)	0.00413** (0.00182)	0.00226 (0.00150)	0.0072*** (0.00232)	0.000679 (0.00254)	0.00181 (0.00124)	0.00237 (0.00193)	0.00273 (0.00230)	0.00721 (0.00547)	0.00391* (0.00204)
Credit to private sector	-0.00155** (0.000757)	-0.000784 (0.00124)	-0.00143 (0.000883)	-0.00178*** (0.000589)	-0.00126** (0.000577)	-0.00143* (0.000763)	-0.00123* (0.000689)	-0.00161* (0.000863)	-0.00236** (0.00103)	-0.00193** (0.000898)	-0.00111 (0.00122)	-0.00172** (0.000675)
FDI	-0.00158*** (0.000540)	0.000911 (0.00163)	-0.000328 (0.00112)	-0.00168** (0.000692)	-0.000303 (0.00121)	-0.000981 (0.000878)	-0.00178 (0.00118)	-0.000831 (0.00121)	-0.00181* (0.00109)	-0.00235*** (0.000688)	0.00261 (0.00211)	0.00110 (0.00136)
Log GDP per Capita	0.0403*** (0.0135)	0.09899*** (0.0363)	0.0674*** (0.0226)	0.0535*** (0.0173)	0.0338*** (0.00931)	0.0533*** (0.0150)	0.0425** (0.0177)	0.0242 (0.0250)	0.0491*** (0.0149)	0.0344** (0.0152)	0.0787** (0.0307)	0.0683*** (0.0223)
Log Total services export												
Log Transport services exp			-0.0312** (0.0150)									
Log Travel services exp				-0.0118* (0.00712)								
Log Construction services exp					-0.00339 (0.0128)							
Log Insurance services exp						-0.00971* (0.00515)						
Log Financial services exp							-0.0139* (0.00835)					
Log ICT services exp												
Log Business services exp												
Log Creative economy exp												
Log Tourism												
Constant	0.172 (0.185)	0.744** (0.294)	0.326 (0.366)	0.156 (0.220)	0.102 (0.120)	0.137 (0.164)	-0.0421 (0.146)	-0.187 (0.172)	-0.0904 (0.200)	-0.177 (0.212)	0.729* (0.410)	-0.0391* (0.0230)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	745	721	687	687	330	593	501	356	603	634	352	604
Number of countries, <i>n</i>	37	37	37	37	31	37	33	31	36	37	31	35
No. of instruments, <i>l</i>	25	18	18	35	29	29	31	29	26	32	27	26
Instruments ratio, <i>n/l</i>	1.48	1.48	2.05	1.05	1.06	1.27	1.06	1.06	1.38	1.15	1.37	1.34
ARI <i>p</i> value	4.38e-05	0.000313	0.000105	8.69e-05	0.00729	0.000152	0.00560	0.00328	0.00101	0.00301	0.0290	0.000169
AR2 <i>p</i> value	0.155	0.144	0.147	0.116	0.779	0.331	0.532	0.856	0.826	0.126	0.585	0.364
Hansen <i>p</i> -value	0.670	0.923	0.896	0.507	0.233	0.928	0.627	0.574	0.623	0.748	0.593	0.580

Note: The numbers in parentheses represent the robust standard errors of the estimated coefficients

\*, \*\*, \*\*\* represent the significances at 10, 5 and 1%

Source: Authors' calculations

**Table 13** Robustness of results with combined data (BPM5 and BMP6) and Theil index (system-GMM regression)

Variables	Dependent variable: Theil index										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
L.THEIL	0.850*** (0.0782)	0.824*** (0.0968)	0.841*** (0.0810)	0.996*** (0.140)	0.807*** (0.0746)	0.847*** (0.0814)	1.079*** (0.156)	0.937*** (0.0943)	0.770*** (0.0938)	0.775*** (0.192)	0.866*** (0.104)
Political stability	0.103* (0.0621)	0.117 (0.0976)	0.205* (0.107)	0.0884 (0.118)	0.0969 (0.0958)	0.138 (0.209)	0.0349 (0.0914)	0.172* (0.104)	0.141 (0.110)	0.260** (0.132)	0.0691 (0.117)
Human Capital	0.199 (0.206)	0.160 (0.186)	0.151 (0.221)	0.142 (0.110)	0.174 (0.120)	-0.149 (0.207)	0.281 (0.215)	0.371 (0.290)	0.128 (0.180)	0.280 (0.219)	0.385 (0.294)
Inflation	-0.000206 (0.000215)	-0.000230 (0.000181)	-0.000249 (0.000295)	0.00411 (0.00646)	-0.000218 (0.000967)	0.000291 (0.000257)	0.000178 (0.000857)	-0.000654* (0.000378)	4.21e-05 (0.000272)	-0.00273 (0.00433)	-0.000271 (0.000278)
Trade Openness (merchandise)	-0.332 (0.458)	-0.0367 (0.276)	-0.240 (0.347)	0.0430 (0.585)	-0.168 (0.324)	0.315 (0.427)	-0.756* (0.395)	-1.065* (0.619)	-0.313 (0.473)	-0.0297 (1.014)	-0.390 (0.527)
Natural resources	0.0227** (0.0113)	0.0281** (0.0135)	0.0314* (0.0181)	0.00576 (0.0258)	0.0236** (0.0113)	0.0562 (0.0415)	0.0177 (0.0182)	0.0224 (0.0176)	0.0229 (0.0152)	0.0561 (0.0403)	-0.00193 (0.0208)
Credit to private sector	0.00260 (0.00445)	0.00376 (0.00552)	0.00185 (0.00381)	-0.00120 (0.00287)	-0.00240 (0.00240)	-0.00210 (0.00390)	0.000904 (0.00458)	0.000748 (0.00789)	-0.00288 (0.00443)	0.00500 (0.00519)	-0.00257 (0.00533)
FDI	-0.00106 (0.00494)	-0.00232 (0.00397)	-0.00404 (0.00409)	-0.0122 (0.0143)	0.000206 (0.00582)	-0.0191* (0.0114)	0.0105 (0.0125)	0.0146 (0.0109)	-0.00195 (0.00516)	-0.00586 (0.0147)	0.00866 (0.0137)
Log GDP per Capita	0.147 (0.165)	0.0533 (0.0963)	0.109 (0.139)	0.0333 (0.127)	0.149** (0.0723)	0.219* (0.132)	0.169 (0.156)	0.152 (0.162)	0.155* (0.0852)	-0.0970 (0.276)	0.217 (0.182)
Log Total services export	-0.201* (0.110)										
Log Transport services exp		-0.174** (0.0800)									
Log Travel services exp			-0.136* (0.0774)								
Log Construction services exp				-0.0744* (0.0404)							
Log Insurance services exp					-0.116** (0.0575)						
Log Financial services exp						-0.110** (0.0553)					
Log Licence use services exp							-0.0572** (0.0229)				
Log ICT services exp								-0.0722 (0.112)			
Log Business services exp									-0.134* (0.0810)		

Table 13 (continued)

Variables	Dependent variable: Theil index										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Log Creative economy exp										-0.0801*	
Log Tourism										(0.0453)	-0.285*
Constant	1.527 (1.065)	0.633 (0.594)	0.996 (0.678)	-0.516 (1.209)	0.102 (0.976)	-1.949 (1.221)	0.814 (0.926)	2.738* (1.450)	1.237 (1.185)	0.626 (1.946)	3.711 (2.279)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	553	526	524	243	448	362	258	446	479	251	465
Number of countries, <i>n</i>	37	37	37	26	36	30	26	34	36	28	34
No. of instruments, <i>i</i>	29	31	35	20	30	29	19	31	35	21	30
Instruments ratio, <i>i</i> / <i>n</i>	1.27	1.19	1.05	1.3	1.2	1.03	1.36	1.09	1.02	1.33	1.13
AR1 <i>p</i> value	0.0120	0.00925	0.00874	0.0948	0.0239	0.0210	0.0130	0.0429	0.0127	0.0914	0.0268
AR2 <i>p</i> value	0.191	0.159	0.146	0.225	0.633	0.702	0.170	0.600	0.168	0.499	0.190
Hansen <i>p</i> value	0.324	0.671	0.617	0.383	0.596	0.954	0.485	0.755	0.496	0.655	0.750

Note: The numbers in parentheses represent the robust standard errors of the estimated coefficients

\*, \*\*, \*\*\* represent the significances at 10, 5 and 1%

Source: Authors' calculations

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