

Gnangnon, Sèna Kimm

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Services export diversification and services export revenue stability: does trade openness matter?

Sena Kimm Gnanon

World Trade Organization, Geneva, Switzerland

Abstract

Purpose – The international trade literature has established that export product diversification lowers export product revenue instability. The current analysis investigates whether this finding carries over services exports.

Design/methodology/approach – The empirical analysis covers a sample of 152 countries over the period 1980–2014 and employs the two-step system generalized method of moments (GMM) approach.

Findings – The empirical findings indicate that services export diversification reduces services export revenue instability both over the full sample as well as over sub-samples of high-income countries (HICs), least developed countries (LDCs) as well as developing countries (i.e. non-HICs) that are not LDCs. HICs appear to experience a higher positive effect of services export diversification on services export revenue instability than in developing countries. The analysis also shows that countries that further open-up to international trade enjoy a greater reducing effect of services export diversification on the instability of services export revenue.

Research limitations/implications – This analysis, therefore, adds to the existing studies on the relationship between export product diversification and the instability of revenue derived from goods exports by focusing on the services export side. An important message from the analysis is that countries that diversify their services export basket enjoy lower services export revenue instability when they further integrate into the world trade market.

Practical implications – This study highlights the importance of services export diversification, including for stabilizing services export revenue to services traders. Diversifying services export items, including across traditional and modern services sectors involves the implementation of a wide range of policies and measures, of which the liberalization of the services sectors through reduction and eventually the elimination of services trade barriers; the improvement of the business environment and the development of domestic financial markets (see for example, Hoekman, 2017). It could be interesting that another study consider policies and measures that could promote services export diversification.

Originality/value – To the best of the authors' knowledge, this is the first time this topic is being addressed, including empirically.

Keywords Services export diversification, Services export revenue instability, Trade openness

Paper type Research paper

1. Introduction

The critical role of services in economic growth and development has, in recent years, attracted the attention in both the academic and policy circles. Until a recent past, the

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contribution of the services sector to economic growth and development has been considered as negligible or even negative, as compared to manufacturing products, and services have been viewed as generating low productivity and low wage (e.g. Baumol, 1967; Kaldor, 1966). Thanks to rapid technological changes and the globalization in various services sectors [1], including through value chains, the tradability and contestability of services markets has now been recognized (e.g. Cali *et al.*, 2008; Hoekman and Shepherd, 2017). Many studies have now stressed the key role of services activities for economic growth, poverty reduction, structural transformation and development [2]. The increasing importance attached by international institutions to the potential role of services activities, and particular services trade for countries' economic and social development is exemplified by the fact that the World Trade Organization (WTO) has decided to focus the 2019 World Trade report on the topic "The future of services trade" (WTO, 2019). The report purports to deepen the international community's understanding on the issue of trade in services. In that respect, it has laid out a thorough analysis on today's landscape of trade in services, as well as how services trade might evolve in the coming years, particularly in light of the rapid technological developments that make some services increasingly tradeable (see WTO, 2019, p. 4). The report has shown, *inter alia*, that services trade has become the most dynamic component of international trade and will further expand in the coming decades, in particular as cooperation among countries is strengthened. It also emphasizes that the decline in trade costs, along with the increasing digitalization would lead to a rise in the share of services in global trade by 50% by 2040. Developing countries that adopted digital technologies could particularly experience a rise in their world trade in services share by about 15% by 2040. In connection to this, Anand *et al.* (2012) and Mishra *et al.* (2011) have elaborated on how countries, including developing ones are increasingly moving toward modern services [3].

A related matter is whether countries should diversify their services exports baskets. While there exists a dearth of studies in the literature on the determinants and, economic and social impacts of export product diversification, to the best of our knowledge, scant attention has been paid to the issue of services export diversification. Services export diversification entails the diversification of services export items across several items in both the modern and traditional services sectors. Put differently, services export diversification entails a homogenous distribution of services export items across services sectors, notably both traditional and modern sectors. This is in the same spirit as the definition of export product diversification, whereby products are distributed in a homogeneous manner among several products, including across the traditional (primary commodities or low-value added products) and modern sectors (manufactured products, including high-value added products).

The few existing studies that are closed in spirit to the issue of services export diversification have focused on services export sophistication (Anand *et al.*, 2012; Mishra *et al.*, 2011; Stojkoski *et al.*, 2016), which reflects much more a significant improvement in services export quality, rather than diversification of services exports *per se* across various services sectors in the economy. In fact, in light of the recognized tradability nature of services and given that they could share many characteristics of goods trade (e.g. Ghani and Kharas, 2010; Leamer and Storper, 2001), a number of recent studies have demonstrated that services trade shares many of the basic determinants of goods trade (e.g. Kimura and Lee, 2006; and Nyahoho, 2010). In other words, the classical international trade theory, especially the Heckscher-Ohlin trade theory could apply as well to trade in services. Thus, services export diversification could yield similar benefits to export product diversification. This is in a similar spirit to the parallelism between the findings by Hausman *et al.* (2007) that export product sophistication enhances significantly economic growth, and the findings by Anand *et al.* (2012), Mishra *et al.* (2011), Stojkoski *et al.* (2016) that services export sophistication could be an alternative avenue to promote economic growth, including in developing countries.

The benefits associated with export diversification, including export product diversification have been largely discussed in the literature. In particular, the works by [Prebisch \(1950, 1959\)](#) and [Singer \(1950\)](#) have shown that countries with a high dependence on primary commodity exports (that is, a high export concentration on primary commodities) are prone to a secular deterioration in their terms of trade, and such a dependence could result in high price volatility and low productivity growth. Along the same lines, and based on the portfolio effect theory from the finance literature, other studies have emphasized that countries featured by a strong dependence on primary commodities could suffer from export earnings instability, and this could discourage exporting firms, in particular risk-averse ones from undertaking the requisite investments in the economy. The consequences of this could, *inter alia*, be lower terms of trade gains, rising macroeconomic uncertainty and lower long-run economic growth prospects (e.g. [Athukorola, 2000](#); [Bleaney and Greenaway, 2001](#); [Dawe, 1996](#); [Ghosh and Ostry, 1994](#); [Hesse, 2008](#); [Osakwe, 2007](#); [Stanley and Bunnag, 2001](#); [United Nations, 2004, 2014](#)). At the firms' level, scarce studies have considered the effect of export product diversification on export revenue volatility. [Hirsch and Lev \(1971\)](#) have used a sample of 500 firms from the Netherlands, Denmark and Israel to confirm empirically, the standard portfolio theory that higher export diversification at the firm-level leads to lower volatility of sales. More recently, [Juvenal and Monteiro \(2013\)](#) have provided empirical evidence that Argentinian firms that diversify exports experience more stable export revenue. [Vannoorenberghe et al. \(2016\)](#) have used detailed firm-level data and found that a more diversified pool of export destinations is associated with a lower export volatility for larger exporting firms, while for smaller ones, the opposite result holds. [Kramarz et al. \(2020\)](#) have obtained that exporters' sales volatility depends on the (lack of) diversification in their portfolio of clients, with firms (regardless of whether they are large or small) that diversify their portfolio of clients experiencing lower volatility. Overall, one key message conveyed by these studies, including those based on the export portfolio theory is that export diversification reduces the instability of export earnings. However, it is not clear whether this finding - which concerns mainly export products - carries over services exports. We are not aware of any published studies on the effect of services export diversification on services export revenue instability. In fact, there seems to be no study on the macroeconomic determinants of the instability of services export revenue, as the bulk of the literature has focused on the macroeconomic factors underpinning the volatility of export products earnings, or the volatility of earnings from export of goods and services (taken together).

On another note, in the literature, there is no theoretical work on the effect of services export diversification on the stability of services export revenue. The current analysis is essentially empirical and draws on the empirical literature on the effect of export product diversification on the stability of export product revenue so as to investigate the relationship between services export diversification and the stability of services export revenue. In so doing, the present analysis bridges the gap in the literature (at least from an empirical perspective) on the effect of effect of services export diversification on the stability of services export revenue. The focus of the study on services export revenue stability as a possible outcome of services export diversification is dictated by the fact that ensuring a stable stream of services export revenue for trading firms engaged in services export activities would help not only trading firms and their employees enjoy a stable source of income (that could help reduce poverty, including in developing countries). The stability of their export revenue could also encourage them to increase their investments in their activities and innovate with a view to getting higher income from more sophisticated services sold abroad. Moreover, some few recent studies have underlined the stronger resilience of services exports (even more than goods exports) to shocks (e.g. [Ariu, 2016](#); [Borchert and Mattoo, 2010](#); [Miranda-Pinto, 2021](#)). This likely suggests that services exports would contribute to lowering output volatility (and eventually to a greater extent than goods exports).

From a theoretical perspective, we draw on the portfolio effect argument underlying the theoretical effect of export product concentration on export product revenue instability to argue that countries that diversify their services export baskets would be less exposed to external or domestic shocks (and would hence experience greater services export revenue stability) than countries that rely on a single or a very few items of services exports in their baskets. [Ariu \(2016\)](#) and [Borchert and Mattoo \(2010\)](#) have provided evidence that services exports are more resilient to shocks than goods exports. More recently, [Miranda-Pinto \(2021\)](#) has shown theoretically that service-oriented countries experience lower volatility of output because they have a more diversified set of suppliers. Against this background, we can expect that countries that diversify their services export items are likely to resist more shocks than those that rely on few services export items. This signifies that diversifying services export items would allow reducing the volatility of services export revenue that would be triggered by shocks affecting the economy.

To test empirically the effect of services export diversification on services export revenue stability, we use an unbalanced panel dataset of 152 countries over the period 1980–2014. The findings indicate that services export diversification induces a lower instability (i.e. a greater stability) of services export revenue. Moreover, we have obtained that services export diversification is associated with lower instability of services export revenue when countries further open-up to international trade.

The rest of the paper is planned as follows. [Section 2](#) presents the model specification that helps investigate the issue at the heart of this study and considers the suitable econometric approach to estimate this model. [Section 3](#) interprets empirical results. [Section 4](#) concludes.

2. Model specification

There is no theoretical framework for analyzing the determinants of services export earnings volatility. However, as noted above, the basic determinants of trade in goods could apply to trade in services (e.g. [Kimura and Lee, 2006](#); and [Nyahoho, 2010](#)). Therefore, we rely on the literature on the determinants of the instability of export products revenue (e.g. [Charette, 1985](#); [Gnangnon, 2018](#); [Stanley and Bunnag, 2001](#)) to examine empirically how services export product diversification affects services export revenue instability.

In light of this, we postulate the following model:

$$\begin{aligned} \text{Log}(\text{SEXPVOL})_{it} = & \alpha_0 + \alpha_1 \text{Log}(\text{SEXPVOL})_{it-1} + \alpha_2 \text{SERVCONC}_{it} + \alpha_3 \text{PRODCONC}_{it} \\ & + \alpha_4 \text{Log}(\text{OPENSX})_{it} + \alpha_5 \text{Log}(\text{GDPC})_{it} + \alpha_6 \text{FINDEV}_{it} \\ & + \alpha_7 \text{Log}(\text{INFLVOL})_{it} + \alpha_8 \text{Log}(\text{GRVOL})_{it} + \alpha_9 \text{FINOPEN}_{it} \\ & + \alpha_{10} \text{Log}(\text{POP})_{it} + \mu_i + \omega_{it} \end{aligned} \quad (1)$$

where i and t denote respectively a country and the time-period. The analysis uses an unbalanced panel dataset of 152 countries (including both developed and developing countries) over the period 1980–2014. The dependent variable “SEXPVOL” stands for the measure of services export revenue volatility. Our key regressor of interest is the index of services export concentration (“SERVCONC”). It has been computed using the Theil index of export concentration (e.g. [Agosin et al., 2012](#); [Cadot et al., 2011](#)) (the calculation of the index of services export concentration is described in [Table A1](#)). The variable capturing the export product concentration (“PRODCONC”) is also computed using the Theil index (it is extracted from the database of the International Monetary Fund (IMF) - see [Table A1](#) for more details). This is to ensure the consistency between the approach (i.e. the Theil approach) used to compute the indices of both services export concentration and export product concentration.

The variables “SEXPVOL”, “INFLVOL” and “GRVOL” are volatility variables and represent, respectively, the volatility of services export revenue, inflation volatility and economic growth volatility. These volatility variables have been computed over non-overlapping sub-periods of 5-years. The sub-periods include 1980–1984; 1985–1989; 1990–1994; 1995–1999; 2000–2004; 2005–2009 and 2010–2014. Thus, services export revenue volatility is the standard deviation of the growth rate of services export values; inflation volatility and economic growth volatility are respectively the standard deviation of the inflation rate and the economic growth rate. The other variables in model (1) include the level of export product concentration, denoted “PRODCONC”; the degree of trade openness, denoted “OPENSW” (the natural logarithm has been applied to this variable so as to reduce its skewness); the depth of financial development, denoted “FINDEV”; the population size, denoted “POP”; and a proxy for the development level, measured by the real per capita income, denoted “GDPC”.

As their distribution shows a high skewness, a number of variables contained in model (1) have been transformed using the natural logarithm so as to reduce this skewness. These variables are the indicator of services export revenue instability, the indicators of inflation volatility, real per capita income, trade openness, economic growth volatility and the population size. Data on these variables have been averaged over each of the seven sub-periods described above. All variables are described in Table A1, while descriptive statistics on the variables are presented in Table A2. The list of the 152 countries is provided in Table A3. α_0 to α_{10} are parameters to be estimated. μ_i represent countries’ time invariant specific effects; ω_{it} is a well-behaving error-term. λ_t are time dummies that represent global shocks affecting together all countries’ services export revenue instability.

We have introduced the one-period lag of the dependent variable as a regressor in model (1) so as to account for the eventual state-dependence nature of services export revenue instability. This also helps avoid omitted variables bias.

Figure 1 allows getting a first view on the statistical relationship between services export concentration and services export revenue volatility over the full sample as well as over three sub-samples. These sub-samples include firstly high-income countries (HICs) that we denote

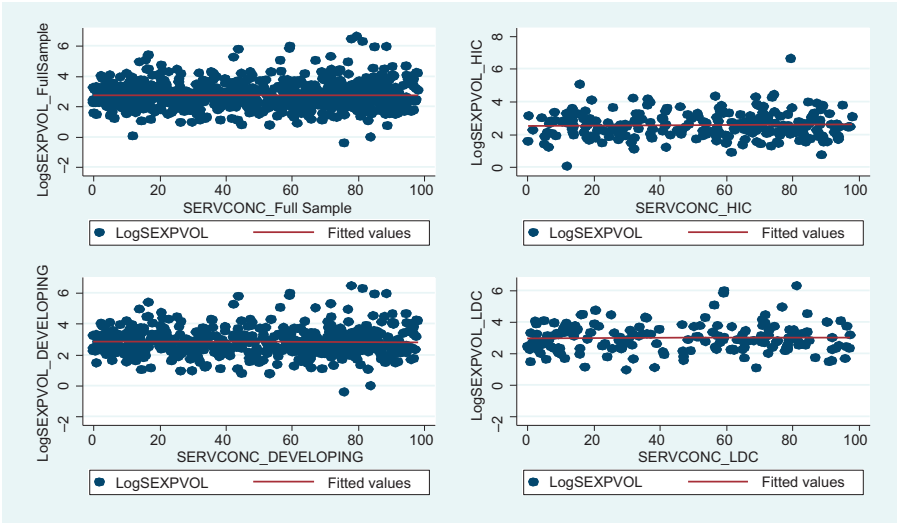


Figure 1.
Correlation pattern
between SERVCONC
and SEXPVOL

Source(s): Author

“HIC” in [Figure 1](#). HICs, which are extracted from the World Bank’s classification of countries, are considered here as “developed countries”. The other sub-samples include the sub-sample of non-HICs, i.e. other countries in the full sample that are not categorized as HICs (denoted “DEVELOPING”) and the sub-sample of least developed countries (LDCs) (denoted “LDC”). The sub-sample of LDCs contains countries identified by the United Nations [\[4\]](#) as those being both the poorest in the world and concurrently highly vulnerable to environmental and external shocks. The lists of countries contained in these sub-samples are presented in [Table A3](#). Several reasons explain why we choose the sub-samples of HICs, developing countries and LDCs to capture the correlation patterns between services export concentration and services export revenue volatility. First, developed countries and developing ones may display different correlation patterns between these two indicators, given that these two groups of countries do not face similar shocks [\[5\]](#) (including frequency and size of those shocks) (developing countries are more prone to external shocks than developed ones), and hence potentially lower services export revenue volatility than developing countries. Additionally, HICs may display greater services export product diversification than developing countries whose export capacity for both goods and services is relatively limited. Second, LDCs among developing countries are well known to experience a heavy reliance on few services export items (e.g. [WTO, 2020](#)). This signifies that compared to other developing countries, they would display a higher level of services export concentration.

[Figure 1](#) shows no clear correlation patterns between the indices of services export concentration and services export revenue volatility both over the full sample and the three sub-samples. The empirical analysis would surely provide further picture on the relationship between these two variables.

Let us now discuss the expected effects of variables in model (1). First of all, the real per capita income has been introduced in model (1) so as capture the fact that countries’ development level may matter for the degree of services export revenue instability. Likewise, the population size captures the country’s size, and we argue that small countries are likely more prone to external shocks than bigger countries. This leads us to expect that smaller countries could experience a higher services export revenue volatility than larger countries.

According to [Eichengreen and Gupta \(2013a\)](#) and [Sahoo and Dash \(2014\)](#), there is a positive “network effect” of export products on services exports, whereby higher volumes of goods exports, notably manufacturing exports help expand the demand for services exports. This means that countries with a high level of export product concentration, notably on primary products or on products of low quality would likely not benefit from a large network in the international trade market, which could adversely affect countries’ services export diversification path. At the same time, it is well established that concentration on a few export products, notably primary products translates into higher export product revenue volatility. Thus, in light of the relationship between export products on services exports through the network effect described above, we could expect export product concentration to lead to a rise in services export revenue volatility.

In spite of the benefits of trade openness (e.g. [Singh, 2010](#); [WTO, 2018](#)), greater trade openness could increase countries’ exposure to external shocks, which could possibly enhance the instability of services export revenue. Nevertheless, some authors (e.g. [Ariu, 2016](#); [Borchert and Mattoo, 2010](#)) have demonstrated that services exports are more resilient to shocks than goods exports. At the same time, greater trade openness could allow trading firms to enjoy increasing returns to scale and dynamic spillover effects. These could help firms operating in the international market of service trade to diversify their services export items, and hence experience lowers services export revenue volatility. In the same vein, greater trade openness could contribute to the expansion of the market size (e.g. [Alesina et al., 2005](#); [Costas et al., 2008](#); [Dennis and Shepherd, 2011](#)) and benefit to both goods and services trade. Market expansion would help trading firms in the services sector absorb more easily

external shocks, and hence limit the degree of their services export revenue volatility. Trade openness could also enhance services export concentration by leading firms to further specialize in their sectors of comparative advantage. In such a case, greater trade openness may be associated with higher services export revenue volatility. However, if trade openness, through the channels described above, promotes services export diversification, it could result in lower services export revenue volatility. Overall, at this stage of the analysis, it is difficult to anticipate the direction of the effect of trade openness on services export revenue volatility, as it could be positive or negative. Financial openness could increase countries' exposure to external shocks, including financial crisis (e.g. [Gluzmann and Guzman, 2017](#); [Shikimi and Yamada, 2019](#)), which may lead to higher services export revenue volatility. In contrast, other studies such as [Lee et al. \(2016\)](#) have uncovered a negative effect of financial liberalization on the likelihood of financial crises. In this case, financial openness would result in lower services export revenue volatility.

On another note, [Naceur et al. \(2019\)](#) have shown that the institutional dimension (rather than the market dimension) of financial development promotes financial stability, particularly in emerging markets and low-income countries. Thus, by contributing to greater financial stability, financial development help dampen the effects of external shocks on the economy and contribute to greater stability of services export revenue. On the other side, [Mathonnat and Minea \(2018\)](#) have shown that financial development could be associated with an increase in the occurrence of banking crises, in particular if it entails higher growth of liquid liabilities and a rise in the level of banks' credits/deposits. In such a case, financial development would be associated with greater instability of services export revenue.

Inflation volatility could translate into the volatility of the real exchange rate and possibly induces higher services export revenue volatility, in light of the relationship between real exchange rate and services exports (e.g. [Baggs et al., 2010](#); [Eichengreen and Gupta, 2013b](#); [Sahoo and Dash, 2014](#)). Finally, output volatility could hurt economic growth (e.g. [Antonakakis and Badinger, 2016](#); [Badinger, 2010](#); [Berument et al., 2012](#); [Ramey and Ramey, 1995](#)), including through lower investments in the *et al.*, productive sectors (of which the services sector), which could in turn contribute to enhancing services export revenue instability.

3. Empirical estimation and results

3.1 *Econometric approach*

We examine empirically the effect of services export concentration on services export revenue instability by firstly considering a specification of model (1) that does not contain the lag of the dependent variable. The standard Hausman test (fixed effects versus random effects) performed on this model specification reveals a Chi-square statistic equals to 17.4 and a *p*-value of 0.043. This outcome suggests a preference of the fixed effects estimator over the random effects estimator to estimate this specification of model (1). However, in light of the dominance of the between variation over the within variations in variables (results could be obtained upon request), we can be tempted to estimate the above-mentioned specification of model (1) using the random effects, as the fixed effects disregards the between-country variations. We proceed with estimating model (1) using both the fixed effects estimator approach where standard errors are corrected using the [Driscoll and Kraay \(1998\)](#) approach and the cross-section weighted feasible generalized least squares (FGLS) introduced by [Zellner \(1962\)](#). The FGLS estimator helps deal with the potential presence of heteroscedasticity, autocorrelation and cross-sectional dependence in the dataset. The use of the [Driscoll and Kraay \(1998\)](#) approach in the within fixed effects estimation also allows dealing with the eventual presence of cross-sectional dependence, autocorrelation and heteroscedasticity in the error term. The results of the estimation of model (1) by the FE and

FGLS estimators are presented respectively in columns [1] and [2] of [Table 1](#). However, these results may be biased for several reasons. First, the specification of model (1) estimated using these two estimators could suffer from the lack of the lag of the dependent variable as a regressor, as the later could help control not only for the eventual state-dependence nature of the services export revenue instability variable, but also for omitted variables. Second, a number of variables in model (1) could be subject to the reverse causality problem, that is, a feedback effect from the dependent variable to these regressors. The regressors include the index of services export concentration (which is our key variable of interest), the index of export product concentration; the depth of financial development; the inflation volatility; the economic growth volatility; the degree of trade openness and the level of financial openness. Let us take for example the case of the services export concentration variable. While as discussed above, we could expect greater services export concentration to induce higher services export revenue instability, the reverse effect could also take place. This is because lower services export revenue instability could make it less difficult for trading firms (in particular risk-averse ones) to plan their investments in the services sectors. Therefore, the stability of services export revenue would encourage firms to increase their supply of investments in the services sectors and possibly diversify their services export items. To address these concerns, we use the two-step system generalized method of moments (GMM) estimator (see [Arellano and Bover, 1995](#); [Blundell and Bond, 1998](#)). The use of this estimator entails the estimation of an equation in differences with an equation in levels: lagged first differences are used as instruments for the levels equation and lagged levels are used as instruments for the first-difference equation. To assess the consistency of this estimator, we use the Arellano-Bond test of first-order serial correlation in the error term (denoted AR(1)), the Arellano-Bond test of no second-order autocorrelation in the error term (denoted AR(2)), and finally, the Sargan test of over-identifying restrictions (OID) that tests the joint validity of the instruments used in the regressions.

The results of the estimation of the dynamic model (1) using the GMM estimator are provided in column [3] of [Table 1](#). We deepen the analysis by investigating the effect of services export concentration on services export revenue instability across two sub-samples, namely HICs and LDCs. In light with what we have observed in [Figure 1](#), the analysis over these sub-samples would help capture the net effect of services export concentration on services export revenue instability in HICs, developing countries, as well as in LDCs and in developing countries in the full sample that are not categorized as LDCs. To carry out this analysis, we first construct two dummies, namely “HIC”, which takes the value “1” for HICs and “0”, otherwise; and “LDC”, which takes the value “0” for LDCs and “1”, otherwise. These two dummies are introduced in the dynamic model (1) alongside their respective interaction with the index of services export concentration. The resulting model specification is estimated by the two-step system GMM approach, and the outcomes of this estimation are reported in [Table 2](#).

Finally, we check how services export revenue instability responds to services export concentration when countries further open-up to international trade. In light of the above-discussion on the effect of trade openness on services export revenue volatility, we argue here that if the negative effects of trade openness on services export revenue instability does not more than offset its positive effect on services export revenue instability, then greater trade openness would ultimately result in a higher instability services export revenue and subsequently enhance the positive effect of services export concentration on services export revenue instability. In this context, the positive effect of services export product concentration on services export revenue instability would increase as countries further open-up their economies to international trade. On the other hand, if greater trade openness ultimately lowers services export revenue instability, then, it can help mitigate any enhancing effect of services export concentration on services export revenue instability. To examine

Table 1.
Effect of services
export concentration
on services export
volatility Estimators:
FE and FGLS and two-
step system GMM

Variables	FE Log(SEXPVOL) (1)	FGLS Log(SEXPVOL) (2)	Two-step system GMM Log(SEXPVOL) (3)
Log(SEXPVOL) _{t-1}			0.0334*** (0.00642)
SERVCONC			0.00207*** (0.000422)
PRODCONC		0.00140*** (0.000502)	0.00262*** (0.000250)
Log(OPENSW)	-9.02e-06 (0.000430)	0.000531* (0.000307)	0.0832*** (0.0177)
Log(GDPC)	0.0805** (0.0331)	0.00196 (0.0156)	-0.222*** (0.0225)
FINDEV	-0.348*** (0.130)	-0.0988*** (0.0199)	-0.000500* (0.000296)
Log(INFLVOL)	-0.00245*** (0.000572)	-0.000832*** (0.000173)	-0.0410*** (0.0120)
Log(GRVOL)	-0.0330 (0.0254)	-0.00505 (0.0133)	0.166*** (0.0130)
FINOPEN	0.0530 (0.0525)	0.0208 (0.0175)	-0.00180*** (0.000363)
Log(POP)	-0.000383 (0.000744)	0.00166*** (0.000413)	-0.0178 (0.0217)
Constant	-0.372*** (0.136)	-0.0496*** (0.0136)	5.054*** (0.555)
Observations - Countries	12.09*** (3.241)	4.379*** (0.451)	591-152
Within R ² /Pseudo R ²	686-152	679-145	
Number of instruments	0.04	0.2645	144
AR1 (p-Value)			0.0000
AR2 (p-Value)			0.5032
AR3 (p-Value)			0.7178
Sargan (p-Value)			0.3757

Note(s): *p-value < 0.1; **p-value < 0.05; ***p-value < 0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables “SERVCONC”, “PRODCONC”, “FINDEV”, “INFLVOL”, “GRVOL”, “GDPC”, “OPENSW”, “OPEN” and “FINOPEN” have been considered as endogenous. Time dummies have been included in all regressions. The latter have used a maximum of 5 lags of the dependent variables as instruments and a maximum of 2 lags of endogenous variables as instruments

Variables	Log(SEXPVOL) (1)	Services export revenue volatility
Log(SEXPVOL) _{<i>t</i>-1}	0.0377*** (0.00660)	<div>99</div> <div>Table 2. Effect of services export concentration on services export volatility in HICs and LDCs Estimator: Two- step system GMM</div>
SERVCONC	0.00514*** (0.000658)	
SERVCONC*HIC	−0.00380*** (0.000815)	
SERVCONC*LDC	−0.00275* (0.00142)	
LDC	0.136* (0.0826)	
HIC	0.425*** (0.0860)	
PRODCONC	0.00206*** (0.000253)	
Log(OPENSW)	0.0460*** (0.0124)	
Log(GDPC)	−0.220*** (0.0269)	
FINDEV	−0.000364 (0.000317)	
Log(INFLVOL)	−0.0400*** (0.0123)	
Log(GRVOL)	0.194*** (0.0229)	
FINOPEN	−0.00137*** (0.000380)	
Log(POP)	0.0346** (0.0171)	
Constant	3.876*** (0.475)	
Observations - Countries	591–152	
Number of instruments	148	
AR1 (<i>p</i> -Value)	0.0000	
AR2 (<i>p</i> -Value)	0.5289	
AR3 (<i>p</i> -Value)	0.6962	
Sargan (<i>p</i> -Value)	0.2703	
Note(s): * <i>p</i> -value < 0.1; ** <i>p</i> -value < 0.05; *** <i>p</i> -value < 0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables “SERVCONC”, “PRODCONC”, “FINDEV”, “INFLVOL”, “GRVOL”, “GDPC”, “OPENSW”, “OPEN”, “FINOPEN” and the interaction variables have been considered as endogenous. Time dummies have been included in all regressions. The latter have used a maximum of 5 lags of the dependent variables as instruments and a maximum of 2 lags of endogenous variables as instruments		

empirically the extent to which the level of trade openness matters for the effect of services export concentration on services export revenue instability, we estimate another specification of the dynamic model (1) by including therein an interaction between the trade openness variable (i.e. “OPENSW”) – see its description in [Table A1](#) - and the services export concentration index. Our main trade openness indicator “OPENSW” is the measure of trade openness suggested by [Squalli and Wilson \(2011\)](#). It is calculated as the share of sum of exports and imports of goods and services in GDP adjusted by the proportion of a country’s trade

level relative to the average world trade (see [Squalli and Wilson, 2011](#), p. 1758). For robustness check, we have replaced in this model specification the variable “OPENSW” with the standard measure of trade openness, i.e. the share (%) of sum of exports and imports of goods and services in GDP (denoted “OPEN”). Note that as the variable “OPEN” does not display a high skewness, we have not transformed it using the natural logarithm in the present variant of model (1) (as we did for other regressors in model (1)). The results of the estimation of the two specifications of model (1) – i.e. with each of the trade openness variables - using the two-step GMM estimator are displayed in columns [1] and [2] of [Table 3](#).

3.2 Estimation results

Starting with the estimates in columns [1] and [2] of [Table 1](#), we note that services export concentration is positively and significantly (at the 1 % level) associated with the instability of services export revenue. The outcomes based on the FE estimator suggest that a 1-point increase in the index of services export concentration induces a 0.18-point increase in the

Table 3.
Effect of services
export concentration
on services export
volatility for varying
levels of trade
opennessEstimator:
Two-step system GMM

Variables	Log(SEXPVOL) (1)	Log(SEXPVOL) (2)
Log(SEXPVOL) _{t-1}	0.0345*** (0.00447)	0.0374*** (0.0112)
SERVCONC	0.00513*** (0.000815)	0.000294 (0.00120)
SERVCONC*[Log(OPENSW)]	0.000383*** (0.000123)	
SERVCONC*OPEN		5.05e-05*** (7.89e-06)
Log(OPENSW)	0.0555*** (0.00692)	
OPEN		0.00177*** (0.000626)
PRODCONC	0.00235*** (0.000263)	0.00159*** (0.000278)
Log(GDPC)	−0.243*** (0.00970)	−0.0941*** (0.0115)
FINDEV	8.47e-05 (0.000222)	−0.000896*** (0.000263)
Log(INFLVOL)	−0.0545*** (0.00957)	−0.00492 (0.0131)
Log(GRVOL)	0.154*** (0.0155)	0.144*** (0.0212)
FINOPEN	−0.00181*** (0.000222)	−0.000829* (0.000428)
Log(POP)	−0.00330 (0.00868)	0.0942*** (0.0116)
Constant	4.902*** (0.197)	1.390*** (0.233)
Observations - countries	591–152	591–152
Number of instruments	150	140
AR1 (<i>p</i> -Value)	0.0000	0.0000
AR2 (<i>p</i> -Value)	0.5019	0.6200
AR3 (<i>p</i> -Value)	0.6702	0.6917
Sargan (<i>p</i> -Value)	0.6792	0.3099
Note(s): * <i>p</i> -value < 0.1; ** <i>p</i> -value < 0.05; *** <i>p</i> -value < 0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables “SERVCONC”, “PRODCONC”, “FINDEV”, “INFLVOL”, “GRVOL”, “GDPC”, “OPENSW”, “OPEN”, “FINOPEN” and the interaction variables have been considered as endogenous. Time dummies have been included in all regressions. The latter have used a maximum of 5 lags of the dependent variables as instruments and a maximum of 3 lags of endogenous variables as instruments		

indicator of services export revenue instability. For the results based on the FGLS approach, we obtain that a 1-point increase in the index of services export concentration induces a 0.14-point increase in the indicator of services export revenue instability. The magnitude of these two estimates are not exactly the same, but they are quite similar. For the estimates of other variables in columns [1] and [2] of Table 1, we find that at the 5% level, greater financial development and the rise in the population size are negatively and significantly associated with services export revenue instability. As also expected, a rise in the real per capita income influences negatively services export revenue instability. This means that as countries develop, they tend to experience lower volatility of their revenue derived from services exports. Trade openness induces a rise in services export revenue volatility for results based on the FE estimator, while for the ones obtained using the FGLS estimator, we find no significant effect of trade openness on services export revenue volatility. Finally, we obtain no significant effect of inflation volatility, economic growth volatility, financial openness on services export revenue volatility at the 10% level. At the 5% level, there is also no significant effect of export product concentration on the instability of services export revenue.

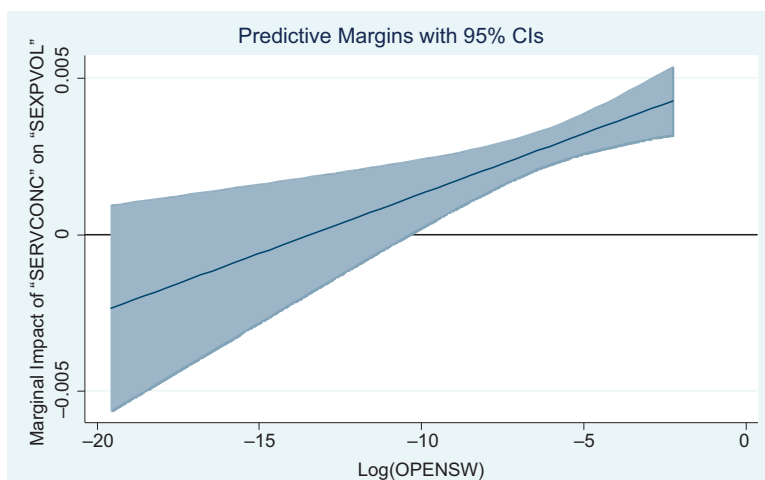
Turning to results in column [3] of Table 1 as well as those in Tables 2 and 3, we obtain that the outcomes of the tests concerning the assessment of the consistency of the two-step system GMM approach are fully satisfactory (see the bottom of all these columns). In fact, the *p*-values of the AR(1) test are lower than 0.01 (the 1% level of statistical significance), the *p*-values of the AR (2) test are all higher than 0.10, and the *p*-values of the OID test are also higher than 0.10. Additionally, the coefficient of the one-period lag of the dependent variable is positive and statistically significant at the 1% level and hence suggests the need for considering a dynamic specification of model (1) in the analysis.

Estimates presented in column [3] of Table 1 suggest that the coefficient of the variable capturing “services export concentration” is positive and significant at the 1% level. We conclude that a greater services export concentration induces a rise in the instability of services export revenue. However, the magnitude of this effect is slightly higher than the ones reported in columns [1] and [2] of Table 1. Based on results in column [3] of this Table, we can conclude that a 1-point increase in the index of services export concentration induces a 0.21-point increase in the indicator of services export revenue instability. A better economic interpretation of this result suggests that a rise in the index of services export concentration by a 1 standard deviation (i.e. by 27.15 - see Table A2) induces a 5.7-points ($= 0.21 \times 27.15$) increase in the indicator of services export revenue instability over the full sample. With regard to control variables, we obtain that at the 5% level, the increase in the instability of services export revenue is driven by greater trade openness, a higher level of export product concentration, higher economic growth volatility, lower levels of financial openness. A rise in the real per capita income is associated with lower services export revenue instability. In the meantime, we find that financial development reduces the instability of services export revenue only at the 10% level. Surprising, lower inflation volatility induces greater services export revenue instability at the 1% level. This puzzling result relating to inflation volatility runs against our hypothesis and deserves a deeper analysis, which would focus on the effect of inflation volatility on services export revenue instability. In the present analysis, we do not have a clear explanation on this “average” positive effect of lower inflation volatility on services export revenue instability across countries in the full sample. However, we have tried to check whether the negative effect of higher inflation volatility on services export revenue instability holds for all countries in the full sample, by estimating a specification of model (1) that includes an interaction between the real per capita income variable and the inflation volatility variable. Results that could be obtained upon request show that the coefficient of the inflation volatility variable is negative and significant at the 1% level, while the interaction term is statistically significant at the 1% level. These, therefore, suggest that over the full sample, for higher degrees of inflation volatility, services export concentration induces greater services export revenue instability. Incidentally, the population size does not affect significantly services export revenue instability.

We now examine results in columns [1] and [2] of Table 2. Starting with estimates provided in column [1] of this Table, we observe that the coefficient of the services export product concentration variable is positive and significant at the 1% level, while the interaction term related to the interaction variable “[SERVCONC*HIC]” is negative and significant at the 1% level. However, the coefficient of the interaction variable “[SERVCONC*LDC]” is yet negative, but significant only at the 10% level. On the basis of these outcomes, we derive several conclusions. First, services export concentration induces a lower positive effect on services export revenue instability on HICs than in developing countries. In other words, greater services export diversification exerts a greater negative effect on services export revenue instability on HICs than in developing countries. At the same time, at the 5% level, there is no differentiate effect of services export product concentration on services export revenue instability in LDCs and non-LDCs in the full sample. In terms of the magnitude of these effects across sub-samples, we find that at least at the 5% level, the net effect of services export product concentration on services export revenue instability in the LDCs amounts to +0.0051 (which is essentially the magnitude of this effect over the full sample). Similarly, at the 1% level, the net effect of services export product concentration on services export revenue instability in HICs amounts to +0.0013 ($= 0.00514 - 0.00380$). For developing countries (i.e. non-HICs) that are not LDCs, the magnitude of the net effect of services export product concentration on services export revenue instability is the same as that of LDCs and amounts to 0.0051 (at the 1% level). Overall, greater services export concentration induces a rise in the instability of services export revenue (i.e. greater services

export diversification leads to lower instability of services export revenue) in HICs, LDCs and developing countries that are not LDCs. However, while the magnitudes of these effects are similar in both LDCs and in developing countries that are not LDCs, they remain higher than in HICs. As noted above, these effects reflect average effects over sub-samples, and my hide differentiated effects across countries in the full sample, including in terms of direction, magnitude and statistical significance of the effects. Therefore, it could be useful to examine how the effect varies across countries in the full sample. We note from column [2] of [Table 2](#) a negative and significant coefficient (at the 1% level) of the services export concentration variable, but concurrently, a positive and significant (at the 1% level) interaction term of the interaction variable between the real per capita income and the services export concentration variable. These two results indicate that services export concentration induces lower services export revenue instability up to a certain threshold of the real per capita income, above which the effect becomes positive. This threshold amounts to US\$ 1344.5 [= exponential (0.0152/0.00211)] (values of the real per capita income range between \$US 226.4 and \$US 89835.2 - see [Table A3](#)). This signifies that, on average, in countries whose real per capita income is lower than US\$ 1344.5, services export product concentration results in lower instability of services export revenue. In contrast, countries with a real per capita income higher than US\$ 1344.5 experience a positive effect of services export product concentration on services export revenue instability. In other words, for the latter set of countries, services export diversification induces lower services export revenue instability, with relatively advanced countries enjoying a higher magnitude of the negative effect of services export diversification on services export revenue instability, than relatively less developed economies do.

We now take up the outcomes reported in [Table 3](#). The outcomes in column [1] of this Table indicate both the coefficient of services export concentration variable and the interaction term related to the interaction variable ["SERVCONC*Log(OPENSW)"] are positive and significant at the 1% level. These two results suggest that regardless of the level of trade openness, services export concentration always induces higher services export revenue instability, and the greater the degree of trade openness, the higher is the magnitude of the positive effect of services export concentration on services export revenue instability. In other words, services export diversification reduces the instability of services export revenue as countries increase their degree of trade openness. As these findings reflect average effects over the full sample, it could be useful to examine how the effect of services export concentration on services export revenue instability changes as the level of trade openness varies. [Figure 2](#) depicts, at the 95% confidence intervals, the marginal impact of services export concentration on services export revenue instability for varying values of trade openness, the latter being measured using the indicator proposed by [Squalli and Wilson \(2011\)](#). We observe in [Figure 2](#) that the marginal impact of services export concentration on services export revenue instability can be positive and negative and increases as the level of trade openness rises. However, this marginal impact is not always statistically significant at the 5% level. It appears to be significant only for positive values [6] of levels of trade openness, notably those higher than (or equal to) 0.000026 [= exponential (-10.55116)] (note that values of "OPENSW" range between 0.0000000032 and 0.108). Therefore, we conclude that countries whose degree of trade openness is lower than 0.000026 experience no significant effect of services export concentration on services export revenue instability. However, for the other countries (i.e. whose trade openness level is higher than 0.000026, a rise in the degree of services export concentration leads to a higher instability of services export revenue, and the greater the trade openness, the higher is the magnitude of the positive effect of services export concentration on services export revenue instability. Summing-up, [Figure 2](#) shows that as countries further open-up their economies to international trade, they experience a greater reducing effect of services export concentration on services export revenue instability. In contrast, countries that rely on few services export items (i.e. those with



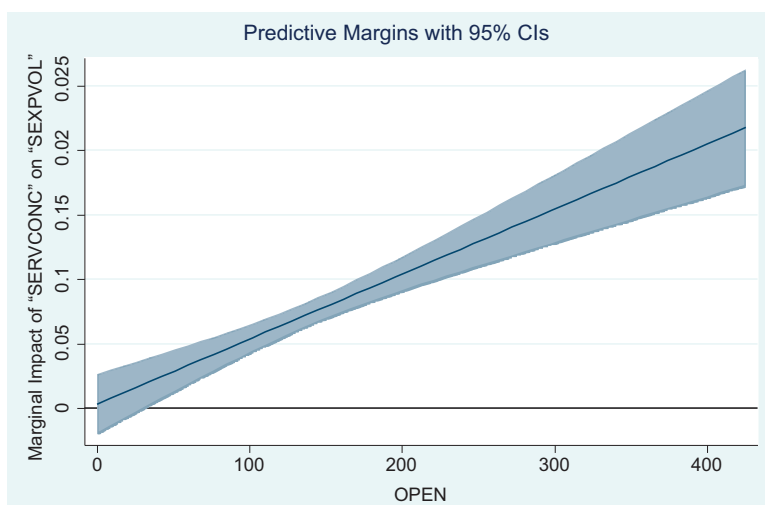
Source(s): Author

Services export
revenue
volatility

103

Figure 2.
Marginal impact of
“SERVCONC” on
“SEXPVOL”, for
varying values of
“OPENSW”

a high degree of services export concentration) enjoy a lower instability of services export revenue if they reduce their degree of trade openness. In other words, a high degree of services export product concentration tends to lead countries to reduce their trade openness level if they wish to limit the instability of their services export revenue (as a lower trade openness level would limit the exposure of countries to external shocks that could, in turn, result in a high instability of services export revenue). These findings are confirmed by results in column [2] of Table 3, which show a non-statistically significant (at the conventional levels) coefficient of the services export concentration index, while at the same time, the interaction term of the interaction variable [“SERVCONC*OPEN”] is positive and statistically significant at the 1% level. Figure 3, presents at the 95% confidence intervals, the marginal impact of



Source(s): Author

Figure 3.
Marginal impact of
“SERVCONC” on
“SEXPVOL”, for
varying values
of “OPEN”

services export concentration on services export revenue instability for varying values of trade openness, the latter being measured by the standard indicator of trade openness, i.e. the share (%) of the sum of export of goods and services in GDP. This Figure displays a pattern similar to the one observed in Figure 2, which is, that only positive values of the marginal impact of services export concentration on services export revenue instability are statistically significant at the 5% level, as the level of trade openness increases. Specifically, the marginal impact is negative, and therefore, not statistically significant for levels of trade openness lower than 34.2%. However, countries whose degree [7] of trade openness exceeds 34.2%, experience a positive (negative) effect of services export concentration on services export revenue instability.

Overall, columns [1] and [2] of Table 3 convey the message that greater services export product diversification reduces the instability of services export revenue as countries open-up their economies to international trade, and the magnitude of this negative effect increases as countries further increase their degree of trade openness.

It is noteworthy here that estimates related to control variables in Tables 2 and 3 are similar to those reported in column [3] of Table 1.

4. Conclusion

This article has considered the effect of services export concentration on the instability of services export revenue, using a sample of 152 countries over the period 1980–2014. The analysis has found that over the full sample, services export concentration (diversification) is positively (negatively) and significantly associated with services export revenue instability. This finding applies also to sub-samples of HICs, LDCs and developing countries (i.e. non-HICs) that are not LDCs. However, the magnitude of this positive effect varies across these sub-samples. While it is similar for both LDCs and developing countries that are not LDCs, it appears to be lower in HICs than in developing countries. This means that it that greater services export product concentration exerts a lower positive effect on services export revenue instability in HICs than in developing countries. More importantly, greater services export diversification results in a higher services export revenue stability in countries that further open-up to international trade, and the greater the degree of trade openness, the higher is the magnitude of the positive effect of services export diversification on the stability of services export revenue..

Overall, this study complements the findings in the literature that export product diversification can lower the instability of export product revenue. An important message from the analysis is that countries that diversify their services export basket enjoy lower services export revenue instability when they further integrate into the international trade market. Diversifying services export items, including across traditional and modern services sectors involves the implementation of a wide range of policies and measures, of which the liberalization of the services sectors through reduction and eventually the elimination of services trade barriers; the improvement of the business environment and the development of domestic financial markets (see for example, Hoekman, 2017). The benefits of services export diversification, including the sophistication of services export goes above reducing services export revenue instability, as it promotes economic growth particularly in developing countries and represents another important way for spurring economic growth in developing countries (e.g. Anand *et al.*, 2012; Mishra *et al.*, 2011; Stojkoski *et al.*, 2016), as these countries are found it difficult to do so through the traditional route of industrialization and exports of sophisticated manufactured goods.

This study has relied on the standard portfolio theory to provide a first empirical analysis on the determinants of services export revenue instability. We believe that in light of the increasing role that services exports would play on both developed and developing

economies, the study could open-up avenues for future research on the determinants of services export revenue volatility, including through the development of a theoretical model on the issue. The study highlights the importance of services export diversification, including for stabilizing services export revenue to services traders. Therefore, another avenue for future research could be to explore policies and measures that could promote services export diversification.

Notes

1. A detailed analysis of the role of the services sector on economic development and trade integration could be found in [Roy \(2019\)](#).
2. These include for example [Adlung \(2007\)](#), [Anand et al. \(2012\)](#), [Balchin et al. \(2016\)](#), [Baldwin et al. \(2015\)](#), [Bas \(2014\)](#), [Cali et al. \(2008\)](#), [Fiorini and Hoekman \(2018\)](#), [François and Hoekman \(2010\)](#), [Heuser and Mattoo \(2017\)](#), [Hoekman and Shepherd \(2017\)](#), [Hoekman and Mattoo \(2008\)](#); [Lanz and Maurer \(2015\)](#), [Mishra et al. \(2011\)](#), [Stojkoski et al. \(2016\)](#), [Roy \(2019\)](#) and [Su et al. \(2020\)](#).
3. The distinction between modern and traditional services is not clear-cut in the literature. For example, [Anand et al. \(2012\)](#) have considered that modern services include finance; computer and information; royalties and license fees; and other business services. Traditional services encompass communications; insurance; transportation; travel; construction; and personal, cultural and recreational services.
4. For further information on LDCs, please see the dedicated United Nations' website: <https://www.un.org/ohrrls/>
5. See for example [Barrot et al. \(2018\)](#); [Dabla-Norris and Gündüz \(2014\)](#) and [Guillaumont \(2009\)](#).
6. The number “−10.55116” used to compute the values of trade openness above which the marginal impact of services export concentration on services export revenue instability is statistically significant has been extracting from the STATA software when constructing [Figure 2](#).
7. The number “34.2%”, which represents the value of trade openness (“OPEN”) above which the marginal impact of services export concentration on services export revenue instability is statistically significant has been extracting from the STATA software when constructing [Figure 3](#).

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Appendix

Variables	Definition	Sources
SEXPVOL	This is the measure of the volatility of services exports values. It has been calculated as the standard deviation of the growth rate of total services exports over non-overlapping sub-periods of 5-years	Authors' calculation based on data extracted from the IMF's database on the international trade in services (see online at: https://data.imf.org/?sk=07109577-E65D-4CE1-BB21-0CB3098FC504) – See also Loungani <i>et al.</i> (2017)
SERVCONC	<p>This variable represents the Theil index of services export concentration. It has been calculated using the following formula (for example, see Agosin <i>et al.</i>, 2012; Cadot <i>et al.</i>, 2011):</p> $\text{THEIL} = \frac{1}{n} \sum_{k=1}^n \frac{x_k}{\mu} \ln\left(\frac{x_k}{\mu}\right),$ <p>where $\mu = \frac{1}{n} \sum_{k=1}^n x_k$</p> <p>$n$ represents the total number of the (services) export lines (k)</p> $n = \sum_{k=1}^n kx_k$ <p>n stands for the amount of services exports associated with the services line “k”</p>	Author's calculation based on the same data from the database developed by the International Monetary Fund (IMF) on the international trade in services (see online at: https://data.imf.org/?sk=07109577-E65D-4CE1-BB21-0CB3098FC504) – See also Loungani <i>et al.</i> (2017). The data used to compute the HHI indicator are sectoral data on services exports at 2-digit level, which is the maximum digit-level of disaggregated data available on services exports. In particular, we have relied on 11 major sectors of services (categories of services) – at the 1-digit level - and used the disaggregated data on services exports for sub-sectors at the 2-digit level. See Loungani <i>et al.</i> (2017: page 20, Table 1) for the 11 major services sectors and the related sub-sectors covered in the analysis Details on the calculation of this Index could be found online: International Monetary Fund's Diversification Toolkit – See data online at: https://data.imf.org/?sk=3567E911-4282-4427-98F9-2B8A6F83C3B6
PRODCONC	This is the index of overall export product concentration. It is calculated using the Theil Index and following the definitions and methods used in Cadot <i>et al.</i> (2011). The overall Theil index of export product concentration is the sum of the intensive and extensive components of the “ECI” variable. Indeed, Export product diversification can occur over either product narrowly defined or trading partners. It can be broken down into the extensive and intensive margins of diversification. Extensive export diversification reflects an increase in the number of export products or trading partners, while intensive export diversification considers the shares of export volumes across active products or trading partners. The computation of the index has been based on a classification of products into “Traditional”, “New”, or “Non-Traded” products categories. A rise in the values of “ECI” index signifies an increase in the degree of overall export product concentration, while lower values of this index indicates a greater export product diversification	

Table A1.
Definition and source
of variables

(continued)

Variables	Definition	Sources
INFLVOL	Inflation volatility is calculated as the standard deviation of inflation rate over non-overlapping sub-periods of 5-years	Authors' calculation based on inflation data extracted from the World Development Indicators (WDI)
GRVOL	This is the measure of the volatility of economic growth rate. It has been calculated as the standard deviation of the annual economic growth rate (growth rate of real GDP) over non-overlapping sub-periods of 5-years	Authors' calculation based on economic growth rate data extracted from the WDI
GDP	GDP per capita (constant 2010 US\$)	WDI
OPENSW	Measure of trade openness suggested by Squalli and Wilson (2011). It is calculated as the share of sum of exports and imports of goods and services in GDP adjusted by the proportion of a country's trade level relative to the average world trade (see Wilson, 2011, p. 1758)	Authors' calculation based on data extracted from the WDI
OPEN	This is the second measure of trade openness. It is the share (%) of sum of exports and imports of goods and services in GDP.	Data extracted from the WDI.
FINOPEN	This is the measure of de jure financial openness	This index has been computed by Chinn and Ito (2006) and updated in July 2019. Its value ranges between 0 and 1. We have multiplied this index by 100 so as to ensure a coherence with the trade policy variable defined below (which is also a measure of a de jure trade policy, whose value range between 0 and 100) See: http://web.pdx.edu/~ito/Chinn-Ito_website.htm
FINDEV	This is the measure of the depth of financial development. It is measured by the domestic credit to private sector (% of GDP), where missing values have been replacing with the domestic credit to private sector by banks (% of GDP)	WDI
POP	This is the measure of the total population	WDI

Table A1.

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
SEXPVOL	591	25.208	55.073	0.663	764.039
SERVCONC	591	55.597	27.150	0.000	98.106
PRODCONC	591	50.716	35.601	0.000	100.000
OPENSW	591	0.004	0.010	0.00000000318	0.108
OPEN	591	80.524	43.987	0.218	425.158
FINDEV	591	56.942	48.733	−66.497	302.785
FINOPEN	591	48.807	35.892	0.000	100.000
GDP	591	10664.570	15651.930	226.384	89835.230
GRVOL	591	3.170	3.890	0.244	70.073
INFLVOL	591	28.742	298.634	0.115	5774.875
POP	591	43600000	165,000,000	40817.4	1,350,000,000

Table A2.
Descriptive statistics
on variables

Full sample		HICs				LDCs	
Albania	Czech Republic	Korea	Philippines	Antigua and Barbuda	Spain	Angola	
Algeria	Côte d'Ivoire	Kuwait	Poland	Australia	St. Kitts and Nevis	Bangladesh	
Angola	Denmark	Kyrgyz Republic	Qatar	Austria	Sweden	Benin	
Antigua and Barbuda	Dominica	Lao P.D.R.	Romania	Bahamas, The	Switzerland	Burkina Faso	
Argentina	Dominican Republic	Latvia	Russia	Bahrain	United Kingdom	Burundi	
Armenia	Ecuador	Lebanon	Rwanda	Barbados	United States	Cambodia	
Australia	Egypt	Lesotho	Samoa	Belgium	Uruguay	Central African Republic	
Austria	El Salvador	Liberia	Saudi Arabia	Canada		Chad	
Azerbaijan	Eritrea	Libya	Senegal	Chile		Comoros	
Bahamas, The	Estonia	Lithuania	Seychelles	Cyprus		Congo, Democratic Republic of the	
						Eritrea	
Bahrain	Finland	Macedonia, FYR	Sierra Leone	Czech Republic		Gambia, The	
Bangladesh	France	Madagascar	Slovak Republic	Denmark			
Barbados	Gabon	Malawi	Slovenia	Estonia		Guinea	
Belarus	Gambia, The	Malaysia	South Africa	Finland		Guinea-Bissau	
Belgium	Georgia	Maldives	Spain	France		Haiti	
Belize	Germany	Mali	Sri Lanka	Germany		Lao P.D.R.	
Benin	Ghana	Malta	St. Kitts and Nevis	Greece		Lesotho	
Bolivia	Greece	Mauritania	St. Lucia	Hong Kong SAR		Liberia	
Bosnia and Herzegovina	Grenada	Mauritius	St. Vincent and the Grenadines	Iceland		Madagascar	
Botswana	Guatemala	Moldova	Sudan	Ireland		Malawi	
Brazil	Guinea	Mongolia	Suriname	Israel		Mali	
Bulgaria	Guinea-Bissau	Morocco	Swaziland	Italy		Mauritania	
Burkina Faso	Guyana	Mozambique	Sweden	Japan		Mozambique	
Burundi	Haiti	Myanmar	Switzerland	Korea		Myanmar	
Cabo Verde	Honduras	Namibia	Tajikistan	Kuwait		Nepal	
Cambodia	Hong Kong SAR	Nepal	Tanzania	Latvia		Niger	
Cameroon	Iceland	Netherlands	Thailand	Lithuania		Rwanda	
Canada	India	New Zealand	Togo	Malta		Senegal	
Central African Republic	Indonesia	Nicaragua	Tonga	Netherlands		Sierra Leone	
Chad	Iran	Niger	Tunisia	New Zealand		Sudan	
Chile	Ireland	Nigeria	Uganda	Norway		Tanzania	
China	Israel	Norway	Ukraine	Oman		Togo	
Colombia	Italy	Oman	United Kingdom	Poland		Uganda	
Comoros	Jamaica	Pakistan	United States	Qatar		Vanuatu	
Congo, Democratic Republic of the	Japan	Panama	Uruguay	Saudi Arabia		Zambia	
Congo, Republic of	Jordan	Papua New Guinea	Vanuatu	Seychelles			
Costa Rica	Kazakhstan	Paraguay	Venezuela	Slovak Republic			
Cyprus	Kenya	Peru	Zambia	Slovenia			

Table A3.
List of countries contained in the full sample and sub-samples of HICs and LDCs

About the author

Sena Kimm Gnanon is an Economist at the World Trade Organization (WTO). He holds a PhD degree in Development Economics, in CERDI (Centre d'Etudes et de Recherches sur le Développement International) – University of Clermont-Ferrand, in France. Before joining the WTO, he was Economist at the Organization Internationale de la Francophonie and Consultant at the French Agency for Development (in Paris), as well as at the WTO Secretariat (in Geneva). He also held Research Assistant and Teaching Assistant positions in CERDI (Centre d'Etudes et de Recherches sur le Développement International) – University of Clermont-Ferrand, in France. Sena Kimm Gnanon can be contacted at: kgnanon@yahoo.fr

Services export
revenue
volatility