The Least Developed Countries' Services Waiver and the Volatility of Least Developed Countries' Services Exports

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Abstract

Members of the World Trade Organization (WTO) adopted in 2011 a Decision ("LDC Services Waiver") that allows any WTO Member to offer preferential treatment to the services and service suppliers of least developed countries (LDCs). The present analysis investigates whether the LDC Services Waiver Decision has been instrumental in dampening the volatility of LDCs' commercial services exports. The analysis covers the treatment group of 43 LDCs and two control groups, over the period from 2004 to 2019, with the treatment period (i.e., period of operationalisation of the Waiver) being 2014–2019. Based primarily on the random-effects Mundlak estimator, the empirical exercise supports the hypothesis that the LDC Services Waiver has helped dampen the volatility of total commercial services exports, notably that of modern commercial services. Thus, meaningful preferences to LDCs under the Services Waiver, provide significant benefits to LDCs, including in terms of services exports stability.

JEL Classifications: F13; F14.
Keywords: Least developed countries' Services Waiver; Volatility of commercial services exports; World Trade Organization.

1. Introduction

The group of least developed countries[2] (LDCs) has been defined by the United Nations as the poorest and most vulnerable countries to environmental and exogenous economic shocks. LDCs represent a small share (less than 1 per cent) in the global trade in goods and services. According to the WTO (2021a), LDCs' share in world exports of goods and commercial services increased slightly from 0.92 per cent in 2017 to 0.96 per cent in 2019. Their commercial services exports[3] represented 0.70 per cent in 2019, and their share in global goods exports amounted to a mere 1.05 per cent in 2019. This explains why the integration of LDCs into the global trading system has attracted a great deal of attention from the international trade community (e.g.

Sibanda 2015; Flentø and Ponte 2017; United Nations 2021; UNCTAD 2021; WTO 2021a, 2021b, 2022a).

In light of the importance of international trade for economic growth and development (e.g. Chang *et al* 2009; Singh 2010; Atkin and Donaldson 2022), and in view of LDCs' minuscule share in world exports, Members of the World Trade Organization (WTO) adopted a series of Decisions in favour of these countries so as to enhance their integration into the global trading system (see WTO 2021c) and in particular, into international trade in services market (see Gnangnon 2022. See also UNCTAD 2020 for a literature review on these Decisions). As far as trade in services is concerned, WTO Trade Ministers adopted in 2011 a Decision that allows WTO Members (both developing and developed countries) to provide preferential treatment to services and service suppliers originating in LDCs (see WTO 2011). This Decision, also termed the "LDC Services Waiver[4]", states that the Waiver lasts 15 years (from the date of its adoption) or when an LDC beneficiary of the Waiver graduates from the LDC category. This time horizon of the Waiver is essential for reducing the uncertainty (and hence enhancing the predictability) concerning the access by LDCs to the markets of preference-granting countries. It would incentivise LDCs' trading firms to undertake relatively long-term investments in the services sector, which would in turn, contribute to reducing the volatility of services exports.

This LDC Services Waiver Decision was operationalised in 2014, and an additional ministerial Decision adopted in 2015 (see WTO 2015b) extended the time horizon of the Waiver Decision until 31 December 2030. Most of the existing studies related to the LDC Services Waiver are descriptive in nature, including those looking at the issue from a legal perspective (e.g., Carpio and Mir, 2014; Chanda and Raihan, 2016) or by considering case studies (e.g. Drake-Brockman *et al* 2015; Chanda and Raihan 2016; Mendoza *et al* 2016; UNCTAD 2020; Sharma 2023). Only recently has a study by Gnangnon (2024) investigated empirically the causal effect of the LDC Services Waiver on LDCs' modern and traditional commercial services exports.

The present paper complements the work of Gnangnon (2024), by investigating the effect of the LDC Services Waiver on the volatility of LDCs' commercial services exports. To the best of our knowledge, this paper is the first to address this issue. In fact, to the best of our knowledge, there is no paper that has investigated the effect of the LDC Services Waiver on the volatility of LDCs' commercial services exports. The relevance of this topic lies on the fact that the instability of export earnings discourages exporting firms, in particular risk-averse ones, from undertaking the requisite investments in exporting sectors (e.g. Agosin 2009; Gnangnon 2021). The consequences of this could, *inter alia*, be a fall in terms of trade gains, an increase in macroeconomic uncertainty, the encouragement of corruption, and bleak long-run economic prospects (e.g. Ghosh and Ostry 1994; Dawe 1996; Araujo *et al* 1999; Athukorola 2000; Bleaney and Greenaway 2001; Hesse 2008; United Nations 2014).

The argument at the heart of the analysis is, as mentioned above, that by enhancing the predictability of trading partners' market access, the LDC Services Waiver could contribute to dampening the volatility of services exports in the beneficiary countries of the Services Waiver, that is, LDCs. To test this hypothesis, the empirical analysis uses an approach akin to the difference-in-difference approach. It relies on two groups. The first is the group of LDCs, which constitute the treatment group. The second is the main control group, which includes low-income countries that are not LDCs, but which are eligible for the Poverty Reduction and Growth Trust (PRGT) facilities of the International Monetary Fund (IMF). For robustness check analysis, we use another control group, which contains countries that are not in the LDC category, but would not have met the criteria for graduating from the LDC category if they had been included in the category (see Klasen *et al* 2021 p 164). The panel dataset contains 43 LDCs, 22 countries in the first control group, and 18 countries in the second control group, over the period from 2006 to 2019. The empirical exercise lends support for the hypothesis set out above; that is, it has established that the LDC Services Waiver has helped reduce the volatility of LDCs' commercial services exports.

The remaining analysis contains four sections. Section 2 provides the background of the LDC Services Waiver. Section 3 discusses the effect of the LDC Services Waiver on LDCs services' export volatility. Section 4 presents the empirical strategy, including the model specification that helps address the question at heart of the paper, and the econometric approaches used to estimate it. Section 5 interprets empirical outcomes, and Section 6 concludes.

2. Background of the LDC Services Waiver

A major Decision to facilitate the access of LDCs' services suppliers to trading partners' markets was the Decision adopted on 17 December 2011 by WTO Trade Ministers. This Decision allows WTO Members (both developing and developed countries) to depart from the most favoured nation (MFN) principle[5] of the General Agreement on Trade in Services (GATS) and provide preferential treatment to services and service suppliers originating in LDCs (see WTO 2011). This Decision, also referred to as "LDC Services Waiver[6]", acts as an "Enabling Clause for services[7], specific for LDCs". It is similar to the Enabling Clause[8] for goods. Although the Decision does not oblige WTO Members to offer preferential treatment to services and service suppliers originating in LDCs (e.g. Carpio and Mir 2014), it has the merit of incentivising WTO members to expand market access for LDCs services and services suppliers (preferential treatment that non-LDC WTO Members cannot enjoy). The LDC Services Waiver Decision also states that the "Waiver shall terminate upon the expiration of a period of 15 years from the date of its adoption" (WTO 2011, paragraph 7). This provides certainty for access by LDCs' trading firms to the markets of preference granting countries. The Decision has also called on WTO Members

to enhance technical assistance and capacity building for LDCs in order to enable them to take advantage of the Waiver.

It was noticed that two years after the adoption of the LDC Services Waiver, no preferential treatments for LDC services and services suppliers had been extended to LDCs. WTO Trade Ministers then adopted another Decision to make operational the LDC Services Waiver. This Decision also termed the "Operationalization of the Waiver Concerning Preferential Treatment to Services and Service Suppliers of Least-Developed Countries" (see WTO 2013), established a process that would enable the effective operationalisation of the LDC Services Waiver (see WTO, 2013 paragraph 1.2). This process entailed the organisation of a High-Level meeting (a kind of a pledging conference) six months after the LDCs would submit a "Collective Request" that would identify the sectors and modes of supply of particular export interest to them.

The WTO LDC Group submitted its Collective Request in July 2014 (see WTO 2014), after which, the expected High-Level meeting[9] was held in February 2015. At that meeting, 24 developed and developing countries made announcements of the sectors and modes of supply where they intend to provide preferential treatment to LDC services and service suppliers (see WTO 2015a). Building on the success of this meeting WTO Trade Ministers adopted, at the 2015 Nairobi Ministerial Conference, a Decision that emphasises, *inter alia*, the need for developed countries, and developing Members in a position to do so, to extend preferential market access to LDCs services and services suppliers. The Decision also provides that the time horizon of the LDC Services Waiver be extended to 31 December 2030[10] (see WTO 2015b paragraph 1.1). The Nairobi Ministerial Decision, additionally, urges WTO Members to give special priority to addressing regulatory barriers to LDCs' services exports (pursuant to GATS Article VI:4) (see WTO 2015b paragraph 1.3), and reaffirms the criticality of specific technical assistance and capacity building measures that would allow LDC service suppliers to utilise the preferences granted (see WTO 2015b paragraph 1.4).

As of May 2022, 25 WTO members[11] submitted to the WTO, notifications of measures under the LDC services waiver, in response to the LDCs' Collective Request (WTO 2021a, 2022a). At the 12th WTO Ministerial Conference held in Geneva in June 2022, WTO Members reaffirmed the above-mentioned 2015 Bali Ministerial Decision, and instructed the WTO Secretariat to, *inter alia*, review and promote the operationalisation of the Waiver (see WTO 2022b paragraph 8).

3. Discussion on the Effect of the Services Waiver on Services Export Volatility

Apart from Gnangnon (2024), there is no empirical study on the effect of the LDC Services Waiver. Gnangnon (2024) showed that the Waiver Decision has led to higher modern commercial services exports at the expense of traditional commercial services exports. The other studies relating to the LDC Services Waiver are essentially descriptive, and considered the issue either from a legal

perspective (e.g. Carpio and Mir 2014; Chanda and Raihan 2016) or case studies with a view to providing recommendations to national policymakers and international institutions on how to enhance the benefits of the Waiver for beneficiary countries (e.g. Drake-Brockman *et al* 2015; Chanda and Raihan 2016; Mendoza *et al* 2016; UNCTAD 2020; Sharma 2023).

The meaningfulness of the preferences offered to LDCs under the LDC Services Waiver is still being debated in academic and policy circles (see for example the study by UNCTAD 2020). However, the benefits of the LDC Services Waiver in terms of its duration certainty, and of the reduction of potential barriers encountered by LDCs' services and services suppliers, could prompt LDC governments to liberalise (to some extent) the services sector, and incentivise LDC services exporting firms to make relatively long-term investments in their services sectors. In turn, this would help stabilise their services exports.

The debate concerning the adverse effects of the uncertainty over the benefits of non-reciprocal trade preferences for trading firms in developing countries is not new. While it has focused mostly on trade in goods, it can also apply to trade in services. In fact, the discretion of preference-granting countries over the choice of beneficiary countries of the preference schemes, the products (or services) coverage of the schemes, the rules that govern the benefit of the preferences, and the criteria of graduation from the programmes, create uncertainty over the benefits of the preference schemes for trading firms in beneficiary countries (e.g. Brenton and Ikezuki 2005; Grossman and Sykes 2005; Carpio and Mir 2014; Persson, 2015a, 2015b; Borchert and Di Ubaldo 2020). Taking the case of goods, the literature has noted that the uncertainty surrounding the preferences scheme (for example, in terms of security and stability of the preferential market access) can, in the long-run, distort the economic structure of beneficiary countries' trading patterns (e.g. Panagariya 2004; Hoekman and Özden 2006), and reduce firms' incentives to make long term investments in products eligible for the preferential regimes (e.g. Persson 2015a, 2015b; Borchert and Di Ubaldo 2020).

Persson (2015a) has underlined the difficulties for firms to take advantage of a market access agreement that lasts only a few years, compared to an agreement of unlimited duration. Onguglo (1999) has proposed that a multi-year waiver of a reasonable duration for non-reciprocal preferences would be appropriate to ensure a long-term obligation from the side of preference-granting countries. UNCTAD (2003) has proposed that stable benefits would accrue to beneficiary countries if preference granting countries developed enforceable and durable preference arrangements that could not be cancelled *ad hoc*. Such arrangements would cover all products from developing countries and rely on simple rules of origin. Bartels and Häberli (2010) have suggested that binding obligations in existing WTO rules could be used as a tool for increasing the predictability of market access.

Against this backdrop, we submit the following hypothesis. Key features of the LDC Services Waiver are likely to improve the predictability and stability of

market access for LDCs services and services suppliers, encourage long term investments in the services sectors by LDCs trading firms (including both local firms and multinationals located in LDCs), and reduce the volatility of LDCs' services exports.

These elements of the Waiver are the 15-year timeframe for the Waiver duration, the incentives provided to preference-granting countries to reduce potential barriers encountered by LDC services and services suppliers when acceding to their markets, and the technical assistance and capacity building that could be provided by preference granting countries to LDCs so as to help them take advantage of the preferences granted. On the other hand, the LDC Services Waiver Decision and the subsequent Decisions to make it operational could encourage LDC governments to adopt certain services sector liberalisation measures, including by adopting regulatory measures that would promote domestic investments, and attract foreign direct investments in the services sectors eligible for these preferences. Overall, we expect the LDCs services exports to be less volatile (i.e., more stable) after the operationalisation of the Waiver compared to the preceding period.

4. Empirical Approach

In this section, we first lay down the model specification that helps address empirically question at the heart of the present analysis. Second, we briefly present some data analysis on the development of the dependent variable ("CSEVALVOL") over the treated group (i.e., LDCs) and the main control group ("CG1"). For the robustness check analysis, we also show the development of the dependent variable ("CSEVALVOL") over the treated group (i.e. LDCs) and the second control group ("CG2"). Third, we discuss the econometric approaches used to estimate this model.

4.1. Model specification

Existing studies on the determinants of export volatility have mostly focused on goods exports, and been performed at the macro-level (e.g. Charette 1985; Stanley and Bunnag 2001; Mansfield and Reinhardt 2008; Gnangnon 2018; Chowdhury *et al* 2021; Han 2021) or at the firm-level (e.g. Hirsch and Lev 1971; Juvenal and Monteiro 2013; Vannoorenberghe *et al* 2016; Kramarz *et al* 2020). However, studies of the macroeconomic determinants of services export volatility are scarce. One of these rare studies is that of Gnangnon (2021) who has explored the effect of services export diversification on services export volatility.

The present analysis uses the difference-in-difference framework to assess the effect of the LDC Services Waiver on the volatility of LDCs' commercial services exports. The LDC Services Waiver and subsequent Decisions to operationalise it are fully exogenous to a particular LDC decision because both they were adopted at the international level by WTO Members. In other words, the adoption of the LDC Services Waiver Decision does not depend on

the willingness of a specific LDC (given its degree of services export volatility), but rather on the willingness of the entire membership of the WTO to promote LDCs' participation in international trade. As a result, the variable capturing the LDC Services Waiver Decision is treated as exogenous in the empirical analysis.

As also noted above, while the LDC Services Waiver was adopted in 2011, it only became operational after the ministerial Decision on its operationalisation, adopted by Trade Ministers in December 2013. Therefore, it makes sense to consider that the treatment period starts from 2014 onwards. Thus, we perform the difference-in-difference analysis using the period after 2013, that is, from 2014 to 2019[12] as the treatment period.

We investigate empirically the effect of the LDC Services Waiver Decision on LDCs' services exports volatility by considering the following parsimonious baseline model:

$$\begin{aligned} Log(SEXPVOL)_{it} = \quad & \alpha_0 + \alpha_1[(LDC_i) * (WAIVER)_t] + \alpha_2 LDC_i + \alpha_3 WAIVER_t \\ & + \alpha_4 Log(ODA)_{it-3} + \alpha_5 Log(GDPC)_{it-3} + \alpha_6 INST_{it-3} \\ & + \alpha_7 FINDEV_{it-3} + \alpha_8 DUMOUT_{it} + \mu_i + \omega_{it} \end{aligned} \quad (1)$$

The dependent variable is the indicator of export volatility in country *i* between the year *t–2* and the year *t* (this indicator is described below). The analysis covers a panel dataset of 43 LDCs (which form the treatment group), 22 countries in the main control group (i.e. the first control group – denoted "CG1"), and 18 countries in the second (alternative) control group (denoted "CG2"), over the period from 2006 to 2019.

Following Gnangnon (2024), the set of 22 countries in the main control group are low-income countries[13] (LICs) designated as such by the IMF. The second (alternative) control group is used for robustness check analysis, and contains countries (18 countries) that had not been in the LDC category, but would not have met the criteria for graduating from the category of LDCs if they were included in the category (see Klasen *et al* 2021 p 164).

The lists of countries in the treatment group (LDCs) and in each of the two control groups are provided in Appendix 2. α_0 to α_7 are parameters that will be estimated. μ_i are time invariant country specific effects. ω_{it} is an error-term. All variables contained in model (1) are described in Appendix 1. The standard descriptive statistics related to these variables are reported in Appendices 3a, 3b, 3c and 3d respectively for the full sample, the treatment group, and each of the control groups.

The dependent variable "SEXPVOL" is the indicator of the volatility of the value of commercial services exports. The measure of the volatility of the value of total commercial services exports (denoted "CSEVALVOL") has been computed as the standard deviation over 3-year rolling windows[14] (that is, from *t*–2 to *t*) of the value of total of commercial services exports to the mean of the value of total commercial services exports over 3-year rolling-windows (e.g. Patel *et al* 2018; Xiang *et al* 2020). Higher values of this indicator reflect

greater volatility of total commercial services exports. Data[15] on total services exports were initially available from 2005 to 2019. However, in light of the way the indicator of services export volatility has been computed (using the 3-year rolling windows), we lost one year in the analysis, so that the final dataset ultimately covers the period from 2006 to 2019. It is important to note that for robustness check analysis, we have also used as a measure of services export volatility the volatility of services exports (where services exports are expressed as a share of GDP, denoted "CSEGDPVOL"). It has been computed as the ratio of the standard deviation over 3-year rolling windows (that is, from t–2 to t) of the share of total commercial services exports in GDP to the mean of the share of total commercial services exports in GDP over 3-year rolling-windows. Higher values of this indicator reflect greater volatility of the share of total commercial services exports in GDP.

"LDC" is a dummy variable for LDCs in the full sample. It takes the value of 1 for LDCs, and 0 for countries in the control group. The variable "WAIVER" is the dummy variable capturing the period of the operationalisation of the LDC Services Waiver, that is, from 2014 onwards. It takes the value of 1 from 2014 to 2019 and 0 from 2007 to 2013.

The parameter α_1 represents the difference-in-difference effect between control countries in the pre-and-post-operationalisation of the LDC Services Waiver, and treated countries in the pre-and post-operationalisation of the Waiver. It uncovers the causal effect of the LDC Services Waiver on services exports' volatility. For the sake of simplicity, we denote $INTER = [(LDC_i)*(WAIVER)_t]$ in the empirical analysis.

The variable "GDPC" is real per capita income. It acts as a proxy for countries' development level, given the heterogeneity of the group of LDCs in terms of per capita income, even though all these countries are qualified as the poorest in the world. The introduction of this variable in model (1) aims to account for the differences among LDCs of the volatility of services exports.

The variable "DUMOUT" is a dummy-outlier that takes the value of 1 for outliers identified in the sample, and 0, otherwise (please see Figures 1 and 2 below).

The variable "ODA" represents real net disbursements of total official development assistance, expressed in constant 2019 US dollar prices. The development aid variable has been introduced in model (1) to account for the potential stabilising effect of aid on exports. Adverse exogenous shocks can result in lower investments in productive sectors, including services sectors, and lead to higher services export volatility (Gnangnon 2021). On the other hand, the literature has established empirically that development aid has a stabilising effect on economies affected by adverse exogenous shocks, including on their output (e.g. Guillaumont 2006; Chauvet and Guillaumont 2009; Collier and Goderis 2009; Guillaumont-Jeanneney and Tapsoba 2012). It ensues that by helping dampen the effects of adverse shocks on economies, development aid could reduce the volatility of exports of goods and services, and especially

services export volatility. On another note, Guillaumont and Le Goff (2010) have found that development aid has a stabilising effect on exports of goods and services, that is, it has helped to reduce the instability of export of goods and services. Gnangnon (2022) has demonstrated empirically that development aid has enhanced the resilience of exports to shocks by strengthening countries' productive capacities (including by enhancing beneficiary countries' supply response capacity). Overall, we expect higher development aid to be negatively associated with services exports volatility.

Better access to credit supplied by the banking sector for financing export activities could help firms not only increase their exports (e.g. Becker *et al* 2013; Sahoo and Dash 2014, 2017; Chaney 2016; Leibovici 2021), but also cope with the effects of adverse shocks on their export activities. Exogenous adverse shocks result in the tightening of global financial conditions, a reversal of capital inflows, which could constrain trading firms' ability to finance trade (e.g. IMF 2020). According to Bems *et al* (2013), shocks to credit supply have amplified the decline in trade flows in the wake of the 2008–2009 global recession. While trade finance is, in general, critical for firms' participation in international trade (e.g. Auboin and Engemann 2014; Vaubourg 2016), its importance is even more evident during adverse global shocks. This is because the decline in trade finance after adverse shocks leads to a significant fall in trade flows (e.g. Auboin 2009, 2021). Against this background, one could expect financial development to help mitigate the adverse effects of shocks on services exports and, hence, reduce services export volatility. This could particularly be the case if financial development contributed to enhancing financial stability (e.g. Naceur *et al* 2019). Gnangnon (2021) has reported that financial development has been associated with lower services export volatility. However, the volatility of services export can increase if greater financial development results in the occurrence of banking crises (e.g. Mathonnat and Minea 2018; Binici and Ganioglu 2021). Summing-up, this theoretical discussion on the effect of financial development on services export volatility has not provided clear guidance on the effect of financial development on services export volatility. The issue will, therefore, be addressed empirically.

Finally, countries with good quality of institutions and governance are more likely to cope with adverse shocks than those with weak institutional and governance quality (e.g. Acemoglu *et al* 2003; Caldera Sánchez and Röhn 2016). We therefore expect that an improvement in institutional and governance quality could be associated with lower volatility of services exports.

We have applied the natural logarithm to the variables "ODA" and "GDPC" to reduce the skewness of their distributions. All control variables have been introduced in model (1) at the year t–3 to ensure their exogeneity (i.e. reverse causality) with respect to the dependent variable.

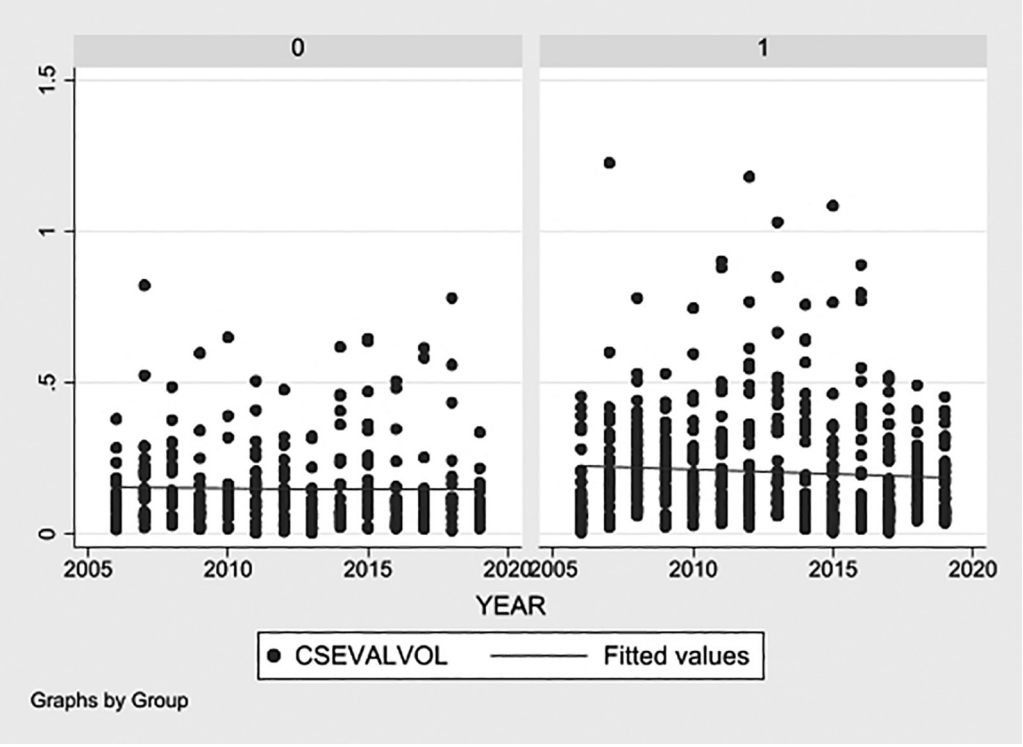
Before moving to the next section, we would like to note that services trade barriers could also be a source of the volatility of commercial services exports. However, data on such a variable do not exist for LDCs. For example,

the most used indicator of services trade barriers is the OECD Services Trade Restrictiveness Index[16]. However, this index covers only developed countries, as well as major developing countries, but not LDCs.

4.2. Data analysis

In this section, we present in Figure 1 the development of the dependent variable ("CSEVALVOL") over the treated group (LDCs) and the main control group ("CG1"). Figure 2 presents the development in the form of scatter plot of the dependent variable "CSEGDPVOL" over the treated group (LDCs) and the second control group ("CG2").

Figure 1: Development in the volatility of the value of total commercial services exports by LDCs (Group 1 in the graph) versus the Control Group CG1 (Group 0 in the graph)

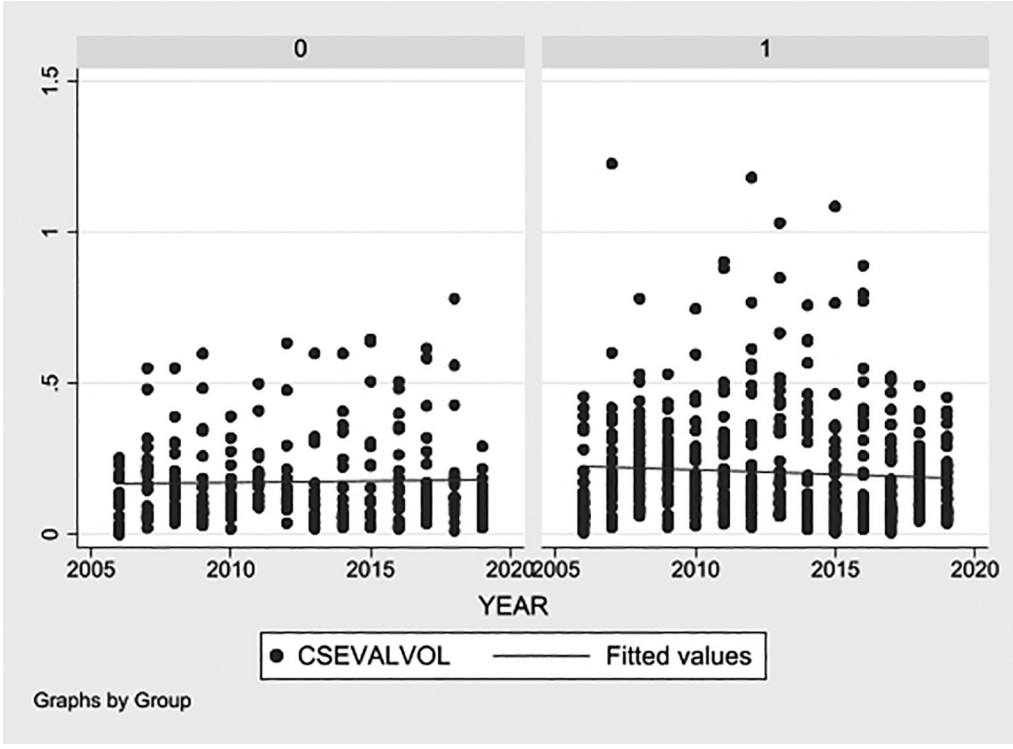


Source: Author

Note: The variable "CSEVALVOL" is the volatility of total commercial services exports (in values). "CG1" is the control group, and refers to the PRGT-Eligible Low-Income Countries. "LDCs" is the treated group (i.e., the group of LDCs).

Figure 1 shows that the volatility of the value of total commercial services exports in LDCs tended to fall over time, including to a greater extent than that of countries in control group CG1.

Figure 2: Development in the volatility of total commercial services exports (per cent of GDP), by LDCs (Group 1 in the graph) versus the Control Group CG2 (Group 0 in the graph)



Source: Author
Note: The variable is the volatility of total commercial services exports (in values). "CG1" is the control group, and refers to the PRGT-Eligible Low-Income Countries. "LDCs" is the treated group (i.e., the group of LDCs).

Likewise, for LDCs, the indicator of the volatility of the share of total commercial services exports in GDP tended to decline over time, while in the case of countries in the group CG1, it tended to increase slightly.

Thus, from both Figures 1 and 2, one may suspect that the LDC Services Waiver might have played a role in the decrease in the volatility of commercial services exports in LDCs compared to countries in the control group CG1, notably after 2014.

Outliers appear in both Figures 1 and 2, and are taken into account in the analysis through the inclusion of the dummy-outliers "DUMOUT" in model (1) (see above).

4.3. Econometric approach

To ensure that our results are not biased by not meeting the requirement of parallel trends between the treatment group and each of the control groups, we implement the statistical 'common pre-dynamics test' developed by Mora and Reggio (2012, 2015, 2017). The test involves investigating the existence of common pre-treatment dynamics in the treatment group and each of the control groups, CG1 and CG2. The test is implemented using the indicators "CSEVALVOL" and "CSEGDPVOL" as dependent variables. The null hypothesis of the test is the presence of common dynamics and equal dynamic effects in the treatment group and control group before the treatment. For the test performed over the full sample of LDCs and the control group CG1, the outcomes indicate for the variable "CSEVALVOL" a Chi-squared equal to 9.55 and a related p-value of 0.216, and for the variable "CSEGDPVOL", a Chi-squared equal to 8.88 and a related p-value of 0.262. The outcomes of the test performed over the full sample contains LDCs and the control group CG2 suggest for the variable "CSEVALVOL" a Chi-squared equal to 2.78 and a related p-value of 0.91. For the variable "CSEGDPVOL", the outcomes of the test indicate that a Chi-squared equal to 4.52 and a related p-value of 0.72. Thus in all cases (i.e., for both variables "CSEVALVOL" and "CSEGDPVOL"), the p-values relating to the Chi-squared statistic are higher than 0.10. These outcomes, therefore, suggest that the null hypothesis of common pre-treatment dynamics in the treatment group and each of the two control groups (before the treatment) cannot be rejected. The implication of this is that we can proceed now with the empirical analysis using the difference-in-difference framework.

We estimate model (1) using primarily the random-effects Mundlak model (Mundlak 1978) and, incidentally, the within fixed effects model. While the fixed effects model has the advantage of controlling for time-invariant variables, and hence accounting for biases induced by omitted and unobserved variables, it has the drawback of disregarding between-country effects, while taking essentially into account within-country effects. As a result, all countries' time-invariant regressors (such as the "LDC" dummy in the present analysis) are withdrawn from the regression. The random-effects Mundlak model accounts for differences within and between-countries. It is considered as a hybrid model because it involves introducing in the random effects specification, both the time-invariant variables with the demeaned coefficients from the fixed-effects model. The Mundlak approach is also referred to as the 'correlated random effects model' because it assumes that the unobserved heterogeneity depends on the country-level time averages of regressors. This signifies that the introduction of the vector of time-averaged regressors controls for time-invariant unobserved heterogeneity (between-country effects) in the regressions. As a

result, coefficient α_1 in equation (1) will capture the within-effects estimates (as the between effects are controlled for by the averages of regressors across years and per country) in the regressions. According to Wooldridge (2010), the Mundlak model provides the advantage of measuring the effects of time-constant regressors, as allowed for by a traditional random-effects model.

Overall, in estimating model (1) using the random-effects Mundlak approach, the averages[17] of all time-varying covariates for each country in the panel dataset have been introduced in the random-effects regressions. Note that in estimating model (1) by means of the within-fixed effects estimator, we apply the Driscoll and Kraay (1998) technique that helps correct the standard errors of coefficients for the autocorrelation, heteroscedasticity, and any form of cross-sectional dependence in the error-term.

Even though, as stated above, the empirical approach employed in the present analysis is akin to the difference-in-difference approach, it remains that the validity of the latter to uncover the causal effect of the LDC services Waiver on the volatility of commercial services exports rests on the assumption of parallel trends between the indicator of services export volatility of the treatment group and the control group, in the absence of the intervention (i.e. over the period preceding the operationalization of the Waiver). In other words, the difference between the outcome variable under analysis (which is here, the indicator of services export volatility) of the treatment group and each control group, should remain constant over time in the absence of the intervention. This signifies that the average outcomes of treatment and control groups would follow parallel trends in the absence of the intervention (Abadie 2005). However, according to Fredriksson and Oliveira (2019), this assumption is fundamentally untestable, insofar as the treatment group is only observed as treated. However, in the present analysis, and as clarified above, we have used an estimation approach akin to, but not exactly, the difference-in-difference approach. In reality, it may be very difficult to have the characteristics of the control group that fully match those of the treated group, when carrying out an analysis at the macroeconomic level (i.e. using macroeconomic aggregates). Nevertheless, we test the parallel trends assumption in the present analysis, especially for the full sample that contains LDCs plus each of the control groups by using the statistical 'common pre-dynamics test' developed by Mora and Reggio (2012, 2015, 2017).

In the empirical exercise, we mainly use the Mundlak estimator, but we start by estimating the regression using the both the within-fixed effects, simply to compare its outcomes with the ones obtained from the random-effects Mundlak. Results presented in Table 1 have been obtained using the full sample that contains LDCs and countries in the control group CG1. Columns [1] and [2] of Table 1 report the estimates arising from the estimation of the specification of model (1) (without the outliers' dummy) where the dependent variable is the volatility of the value of total commercial services exports, and respectively using the within fixed effects and the Mundlak estimator. Column [3] of the same Table report outcomes obtained using the Mundlak estimator to estimate

model (1) (with the outliers' dummy), but still where the dependent variable is the volatility of the value of total commercial services exports. In column [4], we report the outcomes of the estimation of a specification of model (1) (with the outliers' dummy) where the dependent variable is the volatility of the share of total commercial services exports in GDP.

The estimates in columns [5] and [6] of Table 1 have been derived using the full sample that contains LDCs and countries in control group CG2. Here, we estimate model (1), including the dummy-outliers, but where the dependent variable is the volatility of the value of total commercial services exports.

We deepen the analysis by exploring how the LDC Services Waiver has affected the volatility of each of the two main components of total commercial services exports, that is, modern services exports, and traditional services exports. Following previous studies that made the distinction between modern and traditional services exports (e.g. Eichengreen and Gupta 2013; Sahoo and Dash 2014, 2017; Gnangnon 2024), the category of "modern services" includes the sub-sectors of 'Insurance and pension services'; 'Financial services'; 'Telecommunications, computer, and information services'; 'Charges for the use of intellectual property n.i.e'; and 'Other business services'. The category of "traditional services" covers the sub-sectors of 'goods-related services (i.e. manufacturing services on physical inputs owned by others and Maintenance and repair services)'; 'Transport'; 'Travel'; 'Construction'; and 'Personal, cultural, and recreational services' (see Appendix 1).

Based on this categorisation of total commercial services exports, we first compute the indicator of modern services exports (in values) as well as the indicator of traditional services exports (in values). We, then, calculate the volatility of the values of modern services exports (denoted "MSEVALVOL") the ratio of the standard deviation over 3-year rolling windows (that is, from t–2 to t) of the value of modern commercial services exports to the mean of the value of modern commercial services exports over 3-year rolling-windows. Likewise, the indicator of the volatility of traditional services exports (expressed in values) denoted "TSEVALVOL" is calculated as the ratio of the standard deviation over 3-year rolling windows (that is, from t–2 to t) of the value of traditional commercial services exports to the mean of the value of traditional commercial services exports over 3-year rolling-windows. Higher values of each of these indicators reflect greater volatility of the value of modern/traditional commercial services exports.

The random-effects Mundlak approach is also used here to investigate empirically the effect of the LDC Services Waiver on the volatility of modern and traditional services export values. Two full samples have been used, and include the group of LDCs and countries in the control group CG1 on the one hand, and the group of LDCs and countries in the control group CG2, on the other hand. Columns [1] and [2] of Table 2 report the outcomes arising from the estimation of the specifications of model (1) where the dependent variable is measured respectively by the volatility of the value of modern services exports

and the volatility of the value of traditional services exports, over the full sample comprising the group of LDCs and countries in the control group CG1.

5. Empirical Results

Results in the four columns of Table 1 suggest that regardless of the approach used to estimate model (1) (without or with the outlier-dummy) and of whether the dependent variable is "CSEVALVOL" or "CSEGDPVOL", the coefficients of the variable "INTER" are negative and significant at the 1 per cent level. In addition, these coefficients are almost identical across all columns of the Table. It is worth nevertheless recalling that (as noted above), one advantage of the random-effects Mundlak approach is its usefulness in obtaining estimates of time-invariant covariates, while the fixed effects estimator does not allow for the obtaining of such estimates. This explains why no estimates have been reported for the dummy variable "LDC" in column [1] (outcomes based on the fixed effects model).

These outcomes lend support to our theoretical hypothesis by revealing that the operationalisation of the LDC Services Waiver has been instrumental in dampening the volatility of LDCs' total commercial services exports. In terms of magnitude of the effects, we note from Table 1 that between 2014 and 2019, compared to the period from 2006 to 2013, the LDC Services Waiver has led to a decrease in the volatility of LDCs' total commercial services exports by 8.6 per cent (for results based on the within fixed effects – see column [1]), by almost 9 per cent (for results based on the Mundlak approach in columns [2] and [3]) and by 8.15 per cent (for results based on the Mundlak approach in column [4] – here the dependent variable is "CSEGDPVOL").

In addition, the outcomes of the T-test of the parallel trends assumption are reported at the bottom of the columns [1] to [4] of Table 1, especially for the estimation of the specification of model (1) using the Mundlak approach. These outcomes show that the p-values related to the test are higher than 0.10 at the 10 per cent level. Based on these statistical results, we conclude that the parallel trend assumption holds.

Regarding control variables we find, across all four columns of Table 1, that at the 10 per cent level development aid inflows and the population size exert no significant effect on the volatility of total services exports. At the 1 per cent level, an increase in real per capita income is associated with lower volatility of total commercial services exports (whether expressed in values or in percentage of GDP), especially for the results based on the Mundlak approach. This signifies that countries with higher per capita incomes are better equipped to cope with the adverse effects of shocks on services exports than very low-income countries. On another note we find, across all columns of the Table, that (at least at the 10 per cent level), an improvement in institutional and governance quality tends to result in a greater volatility of total services exports[18]. This surprising outcome may reflect differentiated effects of the institutional and governance quality on the volatility of total commercial services exports across

Table 1: Effect of the LDC Services Waiver on the volatility of the value of services exports in LDCs. Over the full sample that includes LDCs and countries in the control group CG1/CG2

Estimators: Within Fixed Effects (FE) and Random-effects Mundlak

		Full sample = LDCs + CG1			**Full sample = LDCs + CG2**	
	FE	**Random-effects Mundlak**			**Random-effects Mundlak**	
Variables	CSEVALVOL	CSEVALVOL	CSEVALVOL	CSEGDPVOL	CSEVALVOL	CSEGDPVOL
	(1)	(2)	(3)	(4)	(5)	(6)
INTER = LDC*WAIVER	-0.0857***	-0.0894***	-0.0896***	-0.0815***	-0.0773***	-0.0766***
	(0.0191)	(0.0209)	(0.0209)	(0.0202)	(0.0219)	(0.0218)
WAIVER	0.0578***	0.0523***	0.0520***	0.0582***	0.0306	0.0496**
	(0.0197)	(0.0180)	(0.0179)	(0.0173)	(0.0209)	(0.0208)
LDC		-0.269	-0.178	-0.0444	-0.897***	-0.832***
		(0.175)	(0.154)	(0.164)	(0.301)	(0.321)
DUMOUT			0.144***	0.165***	0.171***	0.188***
			(0.0314)	(0.0337)	(0.0346)	(0.0370)
$Log(ODA)_{t-3}$	-0.0157	-0.0160	-0.0160	-0.00766	0.0171	0.0128
	(0.0183)	(0.0144)	(0.0144)	(0.0139)	(0.0144)	(0.0143)
$Log(GDPC)_{t-3}$	-0.221	-0.233***	-0.234***	-0.314***	-0.108	-0.214***
	(0.163)	(0.0754)	(0.0753)	(0.0727)	(0.0778)	(0.0774)
$INST_{t-3}$	0.0309*	0.0333*	0.0334*	0.0388**	0.0214	0.0248
	(0.0158)	(0.0198)	(0.0197)	(0.0191)	(0.0205)	(0.0204)
$FINDEV_{t-3}$	0.00213*	0.00206**	0.00206**	0.00146*	0.000334	-0.000303
	(0.00108)	(0.000905)	(0.000904)	(0.000873)	(0.00102)	(0.00101)
Log(POP)	-0.107	-0.0249	-0.0198	-0.0191	-0.0167	-0.0190
	(0.0718)	(0.0203)	(0.0174)	(0.0187)	(0.0169)	(0.0181)
Constant	3.727*	0.289	-0.115	-0.344	0.669	0.391
	(2.017)	(0.560)	(0.488)	(0.525)	(0.546)	(0.585)
Observations – Countries	648 – 65	648 – 65	648 – 65	648 – 65	611 – 61	611 – 61
Within R^2	0.0658	0.0649	0.0648	0.0724	0.0455	0.0528
Between R^2		0.3086	0.4958	0.5060	0.5224	0.5328
Overall R^2		0.1604	0.2809	0.3093	0.2981	0.3185
T-test of parallel (common) trend between LDCs and CG1/CG2 (Chi2 statistic and P-value in parentheses)		1.70 (0.1917)	1.69 (0.1939)	2.81 (0.0936)	1.09 (0.3010)	1.48 (0.2231)

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. Results in columns [1] to [4] are obtained using a full sample that contains the control group CG1 (i.e., 22 countries) and the treated group (i.e., 43 LDCs). Results in columns [5] and [6] are obtained using a full sample that contains the control group CG2 (i.e., 18 countries) and the treated group (i.e., 43 LDCs). The dummy variable "WAIVER" takes the value 1 after the year 2013, i.e., from 2014, and 0 for the other years. The variable "INTER" is the interaction between the dummy "WAIVER" and the dummy "LDC", the latter taking 1 for LDCs, and 0, for countries in the control group. Control variables included in the regressions are development aid ("ODA); the real per capita income ("GDPC"); institutional quality ("INST"); financial development ("FINDEV") and the population size ("POP").

countries in the full sample which, to recall, contains both LDCs and countries of the control group.

We also find that at least at the 10 per cent level, financial development enhances the volatility of total commercial services exports. Once again, while these outcomes may hide differentiated effects across countries in the full sample, the 'positive effects' obtained may also indicate that when facing adverse shocks, trading firms in the services sectors do not benefit from financial support from the banking sector so as to alleviate the negative effects of these shocks on their services export activities.

Outcomes reported in columns [5] and [6] of Table 1 confirm the findings in the previous columns of the same Table, that the LDC Services Waiver has contributed to reducing the volatility of LDCs' total commercial services exports. This is because the coefficients of the variable "INTER" are negative and significant at the 1 per cent level in the two columns of the Table. In addition, in the two columns of the Table, both coefficients are similar in magnitude and are close to the estimates of the variable "INTER" reported in columns [3] and [4] of Table 1. In terms of magnitude of the impact, we obtain from columns [5] and [6] of Table 1 that the LDC Services Waiver has resulted in a decrease in the volatility of LDCs' total commercial services exports by 7.73 per cent (see column [1]), and by 7.66 per cent (see column [2]), between 2014 and 2019, compared to the period from 2006 to 2013.

Concerning estimates of control variables reported in columns [5] and [6] of the Table, we find that the only variable that has a significant coefficient is real per capita income in column [2]. This coefficient is negative and significant at the 1 per cent level, a finding that aligns with the one observed in Table 1. The coefficients of the other control variables in the two columns of the Table, and of the "GDP" variable in column [1] of the Table are not significant at conventional significance levels.

The outcomes of the T-test statistic of the parallel trends assumption reported at the bottom of columns [5] and [6] of the Table reveal that the p-values related to the test are higher than 0.10 at the 10 per cent level. We therefore conclude that the parallel trend assumption holds.

A key message from Table 1 is that the LDC Services Waiver has led to a fall in the volatility of LDCs' total commercial services exports.

Turning to the results presented in Table 2, we find that the coefficients of "INTER" are always negative and significant at the 5 per cent level in column [1] and at the 1 per cent level in column [2] of the Table. Additionally, both coefficients have almost the same magnitude. These outcomes again support our theoretical hypothesis, and suggest that the LDC Services Waiver has been instrumental in mitigating the volatility of both modern and traditional services exports (expressed as a percentage of GDP). In terms of magnitude, the operationalisation of the LDC Services Waiver has allowed LDCs to reduce the volatility of the value of modern services exports by 6.85 per cent, and the volatility of the value of traditional services exports by 6.16 per cent.

Table 2: Effect of the LDC Services Waiver on the volatility of modern and traditional services exports (expressed in percentage of GDP) in LDCs. Over the full sample that includes LDCs and countries in the control group CG1

Estimator: Random-effects Mundlak

	Full sample = LDCs + CG1	
Variables	MSEVALVOL	TSEVALVOL
	(1)	(2)
INTER	-0.0685**	-0.0616***
	(0.0347)	(0.0239)
WAIVER	0.0465	0.0290
	(0.0297)	(0.0204)
LDC	-0.434**	-0.0514
	(0.189)	(0.191)
DUMOUT	0.130***	0.161***
	(0.0357)	(0.0387)
$Log(ODA)_{t-3}$	-0.0253	-0.0114
	(0.0239)	(0.0164)
$Log(GDPC)_{t-3}$	-0.166	-0.225***
	(0.125)	(0.0858)
$INST_{t-3}$	0.0458	0.0379*
	(0.0331)	(0.0227)
$FINDEV_{t-3}$	-0.00153	0.00133
	(0.00150)	(0.00103)
Log(POP)	-0.0197	-0.0288
	(0.0198)	(0.0215)
Constant	0.649	-0.270
	(0.555)	(0.603)
Observations – Countries	643 – 65	643 – 65
Within R^2	0.0238	0.0419
Between R^2	0.5360	0.3903
Overall R^2	0.1949	0.2289
T-test of parallel (common) trend assumption between LDCs and CG1 (Chi2 statistic and P-value in parentheses)	1.94 (0.1641)	0.88 (0.3493)

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. The full sample contains both the control group CG1 (i.e., 22 countries) and the treated group (i.e., 43 LDCs). The dummy variable "WAIVER" takes the value 1 after the year 2013, i.e., from 2014, and 0 for the other years. The variable "INTER" is the interaction between the dummy "WAIVER" and the dummy "LDC", the latter taking 1 for LDCs, and 0, for countries in the control group. Control variables included in the regressions are development aid ("ODA); the real per capita income ("GDPC"); institutional quality ("INST"); financial development ("FINDEV") and the population size ("POP").

Regarding the estimates associated with control variables in Table 2, we observe that with the exception of the coefficient of real per capita income in column [2] of the Table, all estimates are insignificant at conventional significance levels. The coefficient of real per capita income in column [2] of the Table is negative and significant, thereby indicating that as countries improve their real per capita income, they tend to experience lower volatility in the value of traditional commercial services exports.

6. Conclusions

To promote LDCs' integration into the global trade in services, WTO Members adopted in 2011 a Waiver that allows them to depart from the MFN principle of the GATS and offer preferential treatment to LDCs services and services suppliers. This Waiver has been operationalised from 2014, through the submission by LDCs of a Collective Request (that identified the sectors and modes of supply of particular export interest to them). In response to this Collective Request, 25 WTO Members made announcements of sectors and modes of supply where they intend to provide preferential treatment to LDC services and service suppliers under the Waiver. The present paper has investigated whether the LDC Services Waiver has helped reduce the volatility of LDCs' services exports (or in other words, ensure the stability of services exports).

The analysis has used an approach akin to the difference-in-difference approach over the annual period from 2006 to 2019 and a set of countries containing 43 LDCs in the treatment group (countries that are *de facto* beneficiaries of the Services Waiver) along with two different control groups. The first and main control group contains 22 Low Income Countries (LICs; countries that are not eligible for the benefits of the LDC Services Waiver). The second control group (used for robustness check analysis) encompasses countries that had not been in the LDC category, but would not have met the criteria for graduating from the category of LDCs if they were included in the category.

The analysis helps to uncover the causal effect of the LDC Services Waiver on the volatility of commercial services by comparing LDCs' performance in terms of the volatility of commercial services to the performance of countries in the control groups (notably those in the first control group) in terms of the volatility of commercial services over the period 2014–2019 (the period post-operationalisation of the Waiver) versus the pre-Waiver operationalisation period (i.e., from 2006 to 2013).

Based on the within-fixed effects and random-effects Mundlak estimators, the analysis has established that the LDC Services Waiver has been instrumental in dampening the volatility of total commercial services exports. In addition, the LDC Services Waiver has contributed to lowering both the volatility of modern commercial services exports and the volatility of traditional commercial services exports.

The take-home message of this analysis is that the LDC Services Waiver has genuinely helped stabilise LDCs' services exports, including to a greater

extent than LICs that have not benefited from this Services Waiver. This work complements the recent study by Gnangnon (2024), which found a positive effect of the LDC Services Waiver on commercial services exports (notably modern services exports). These findings indicate that the LDC Services Waiver has been providing significant benefits to LDCs. Thus, the supply by a higher number of WTO Members (both developed and developing countries) of meaningful preferential treatment (under the LDC Services Waiver) to LDC services and service suppliers would surely contribute to enhancing these benefits to the LDCs. The Waiver could prompt LDC governments to adopt measures to liberalise their services sectors and improve the business environment, thereby reducing the perceived risk (by exporting firms) to export services. In turn, this would encourage long-term investments, including both domestic investment and foreign direct investment inflows, which are critical for LDCs long-term economic development.

We would like to note that a limitation of the present study may be the choice of countries in the control groups. Yet, our approach for constructing the control groups rests on the arguments of low-income countries' characteristics or countries that would have been included in the LDC category, but were in fact not included in that category. An avenue for future research could be to try to address this limitation (if any at all).

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Statement on data availability
I hereby state that the data used in this analysis is available online and could be obtained upon request.

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Appendix 1: Definition and Source of variables

Variables	*Definition*	*Source*
CSEVALVOL	This is the indicator of the volatility of the value of total commercial services exports (US$). It has been computed as the ratio of the standard deviation over 3-year rolling windows (that is, from t–2 to t) of the value of total commercial services exports to the mean of the value of total commercial services exports over 3-year rolling-windows. Higher values of this indicator reflect greater volatility of the value of total commercial services exports.	Author's calculation based on services export data (detailed sectoral data) compiled by WTO/UNCTAD in cooperation with the ITC and UNSD. See below for details on the services sectors used in the analysis. Data on GDP (US$ current prices) collected from the WDI.
CSEGDPVOL	This is the indicator of the volatility of the share of total commercial services exports in GDP. This indicator has been computed as the ratio of the standard deviation over 3-year rolling windows (that is, from t–2 to t) of the share of total commercial services exports in GDP to the mean of the share of total commercial services exports in GDP over 3-year rolling-windows. Higher values of this indicator reflect greater volatility of the share of total commercial services exports in GDP.	Author's calculation based on services export data compiled by the World Trade Organization (WTO/United Nations Conference on Trade and Development (UNCTAD) in cooperation with the International Trade Centre (ITC) and United Nations Statistics Division (UNSD). See below for details on the services sectors used in the analysis. Data on GDP (US$ current prices) from the World Development Indicators (WDI).
MSEVALVOL	This is the indicator of the volatility of the value of modern commercial services exports. It has been computed as the ratio of the standard deviation over 3-year rolling windows (that is, from t-2 to t) of the value of modern commercial services exports to the mean of the value of modern commercial services exports over 3-year rolling-windows. Higher values of this indicator reflect greater volatility of the value of modern commercial services exports.	Author's calculation based on services export data (detailed sectoral data) compiled by the World Trade Organization (WTO/United Nations Conference on Trade and Development (UNCTAD) in cooperation with International Trade Centre (ITC) and United Nations Statistics Division (UNSD).
TSEVALVOL	This is the indicator of the volatility of the value of traditional commercial services exports. It has been computed as the ratio of the standard deviation over 3-year rolling windows (that is, from t–2 to t) of the value of traditional commercial services exports to the mean of the value of traditional commercial services exports over 3-year rolling-windows. Higher values of this indicator reflect greater volatility of the value of traditional commercial services exports.	Author's computation based on data on services exports compiled by the WTO/UNCTAD in cooperation with ITC and UNSD. The indicator of the values of traditional commercial services exports is computed as the difference between the total commercial services exports (in values) and modern commercial services exports (in values).
GDPC	Real per capita Gross Domestic Product (constant 2010 US$).	WDI
ODA	This is the real net disbursements of total Official Development Assistance (ODA), expressed in constant prices 2019, US$.	OECD (Organization for Economic Cooperation and Development) database on development indicators.
FINDEV	This is the proxy for financial development. It is measured by the share (per cent) of domestic credit to private sector by banks in GDP.	WDI

INST	This is the variable capturing institutional and governance quality. It has been computed by extracting the first principal component (based on factor analysis) of the following six indicators of governance: political stability and absence of violence/terrorism; regulatory quality; rule of law; government effectiveness; voice and accountability, and corruption. Higher values of the index "INST" are associated with better governance and institutional quality.	Data on the components of "INST" variables has been extracted from World Bank Governance Indicators developed by Kaufmann *et al* (2010) and updated recently. See online at: https://info.worldbank.org/governance/wgi/
POP	This is the indicator of the total population.	WDI

Appendix 2: List of the countries used in the full sample, including the 43 LDCs 22 countries in the first (main) control group, and 18 countries in the second (alternative) control group

Group treated (LDCs)		*Control Group CG1* (PRGT-Eligible Low-Income Countries that are not LDCs)	*Control Group CG2*[a]
Afghanistan	Malawi	Cabo Verde	Cameroon
Angola	Mali	Cameroon	Congo, Rep.
Bangladesh	Mauritania	Congo, Rep.	Cote d'Ivoire
Benin	Mozambique	Cote d'Ivoire	Eswatini
Bhutan	Myanmar	Dominica	Ghana
Burkina Faso	Nepal	Ghana	Guyana
Burundi	Niger	Grenada	Honduras
Cambodia	Rwanda	Honduras	India
Central African Republic	Sao Tome and Principe	Kenya	Iraq
Chad	Senegal	Kyrgyz Republic	Kenya
Comoros	Sierra Leone	Maldives	Mongolia
Congo, Dem. Rep.	Solomon Islands	Micronesia, Fed. Sts.	Namibia
Djibouti	South Sudan	Moldova	Nicaragua
Ethiopia	Sudan	Nicaragua	Nigeria
Gambia, The	Tanzania	Papua New Guinea	Pakistan
Guinea	Timor-Leste	Samoa	Papua New Guinea
Guinea-Bissau	Togo	St. Lucia	Vietnam
Haiti	Uganda	St. Vincent and the Grenadines	Zimbabwe
Lao PDR	Vanuatu	Tajikistan	
Lesotho	Yemen, Rep.	Tonga	
Liberia	Zambia	Uzbekistan	
Madagascar		Zimbabwe	

Note: The list of PRGT-Eligible Low-Income Countries has been extracted from IMF (2021 p 34). (a) The Control Group CG2 refers to countries that had not been in the LDC category, but would not have met the criteria for graduating from the category of LDCs if they were included in the category (see Klasen et al 2021 p 164).

Appendix 3a: Descriptive statistics on variables used in the analysis over the full sample (LDCs + Control Group CG1)

Variable	*Observations*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
CSEGDPVOL	648	0.167	0.173	0.002	1.194
CSEVALVOL	648	0.185	0.170	0.004	1.181
MSEGDPVOL	643	0.256	0.244	0.007	1.311
MSEVALVOL	643	0.264	0.244	0.006	1.354
TSEGDPVOL	643	0.174	0.187	0.003	1.247
TSEVALVOL	643	0.192	0.189	0.003	1.479
ODA	648	814000000	968000000	5990000	6610000000
GDPC	646	1925.162	1963.274	208.075	9350.492
INST	648	-1.390	1.442	-4.914	2.229
FINDEV	631	26.705	20.157	2.305	114.194
POP	648	16700000	24500000	70848	163000000

Appendix 3b: Descriptive statistics on variables used in the analysis over the Treatment Group, i.e., LDCs

Variable	*Observations*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
CSEVALVOL	417	0.205	0.180	0.006	1.181
CSEGDPVOL	417	0.186	0.184	0.002	1.194
MSEVALVOL	413	0.289	0.261	0.006	1.354
TSEVALVOL	413	0.213	0.202	0.003	1.479
ODA	417	992000000	1070000000	21500000	6610000000
GDPC	415	1077.360	712.682	208.075	3843.199
INST	417	-1.802	1.174	-4.914	1.483
FINDEV	401	21.293	17.100	2.305	114.194
POP	417	21000000	28200000	175877.000	163000000

Appendix 3c: Descriptive statistics on variables used in the analysis over the Control Group (CG1)

Variable	*Observations*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
CSEVALVOL	231	0.149	0.145	0.004	0.781
CSEGDPVOL	231	0.132	0.147	0.002	0.760
MSEVALVOL	230	0.219	0.202	0.011	1.216
TSEVALVOL	230	0.155	0.155	0.005	1.067
ODA	231	492000000	627000000	5990000	3190000000
GDPC	231	3448.270	2503.618	719.348	9350.492
INST	231	-0.648	1.580	-3.465	2.229
FINDEV	230	36.141	21.595	4.872	93.514
POP	231	8931145	12300000	70848	52600000

Appendix 3d: Descriptive statistics on variables used in the analysis over the Control Group (CG2)

Variable	*Observations*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
CSEVALVOL	194	0.178	0.154	0.012	0.781
CSEGDPVOL	194	0.170	0.164	0.002	0.760
MSEVALVOL	193	0.263	0.230	0.016	1.216
TSEVALVOL	193	0.179	0.157	0.010	0.802
ODA	194	1230000000	1090000000	33000000	4020000000
GDPC	194	2623.920	1586.519	902.124	6369.716
INST	194	-1.538	1.124	-3.763	0.893
FINDEV	193	32.607	25.990	3.779	137.912
POP	194	111000000	297000000	747718	1370000000

Endnotes

1. Chief Economist Office, Africa Region, The World Bank Group, Washington DC 20433 USA. Email: sgnangnon@worldbank.org.

2. Further information on the group of LDCs, including the criteria for the selection of countries that are included in this category, as well as the list of countries contained in this group are available in the website of the UN-OHRLLS (United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States), accessible at: https://www.un.org/ohrlls/content/least-developed-countries

3. The group of LDCs is heterogenous, and contains LDCs in Africa, Asia, Pacific Islands and Haiti (a Caribbean country). It therefore follows that the range of commercial services export items could vary across countries, and include business services, computer services, professional and management consulting services, international tourism, and transport services. However, travel exports and transport services tend to dominate commercial services exports by LDCs (see WTO 2021a).

4. See Carpio and Mir (2014) for a discussion of the legal scope of the LDC Services Waiver, in particular its background, the preferences covered, and the conditions applying to these preferences.

5. The LDC Services Waiver exempts WTO Members from meeting their legal obligation to provide non-discriminatory (MFN) treatment to all trading partners (as contained in Article II:1 of the GATS) when offering trade preferences to LDCs.

6. See Carpio and Mir (2014) for a discussion of the legal scope of the LDC Services Waiver, in particular its background, the preferences covered, and the conditions applying to these preferences.

7. The expression “Enabling Clause for trade in services” was first used by Schloemann (2012).

8. Established in 1979, the Enabling Clause for goods represents the permanent legal basis for granting unilateral trade preferences to products originating from developing countries.

9. Further information on this High Level meeting can be found online at: https://www.wto.org/english/news_e/news15_e/serv_05feb15_e.htm

10. It is important to note here that the LDC Services Waiver Decision (WTO 2011 paragraph 8) also provides that the Waiver shall terminate when the graduation of an LDC beneficiary of Waiver becomes effective. Thus, for a given LDC, "the LDC Services Waiver is valid until 2030 or until a member's date of graduation from LDC status – whichever occurs earlier" (WTO 2022 p 10).

11. These included the 24 Members that made announcements at the High-Level meeting in February 2015, and the United Kingdom, which after its withdrawal from the European Union, submitted, on 1 January 2021, to the WTO its notification concerning the preferential treatment accorded to LDC services and services suppliers. The list of these 25 Members is accessible in document WTO (2021a p 29 Table 6).

12. As explained below, the panel dataset used in the analysis concerning the effect of the LDC Waiver Decision on services export volatility covers the period from 2007 to 2019, based on data availability.

13. There are 69 countries designated as LICs by the IMF. These are countries eligible for the Poverty Reduction and Growth Trust (PRGT) facilities, and are located in Africa, Asia, and Latin America (see IMF 2021 p 34). To build the list of countries in the control group, we excluded from the list of the 69 LICs (as defined by the IMF) all countries defined as LDCs by the United Nations. As a result, we included 22 countries in the control group. It is worth noting that all LDCs except for Angola are in the category of the PRGT-eligible LICs.

14. We use the 3-year rolling windows because of the short time span of the dataset used in the analysis.

15. As noted in Appendix 1, this dataset was extracted from the database developed by the World Trade Organization (WTO)/United Nations Conference on Trade and Development (UNCTAD), in cooperation with International Trade Centre (ITC) and United Nations Statistics Division (UNSD).

16. See information online at: https://www.oecd.org/trade/topics/services-trade/

17. These 'averages' indicators have the same value for a given country across years, but different values across countries in the panel dataset.

18. The coefficient of the variable "INST" is significant at the 5 per cent level in column [4] of the Table, but the coefficients of the same variable are significant only at the 10 per cent level in the other three columns of the Table.

References

Abadie A (2005) 'Semiparametric difference-in-differences estimators', *Review of Economic Studies*, 72(1), 1-19.

Acemoglu D, Johnson S, Robinson J and Taicharoen Y.(2003) 'Institutional causes, macroeconomic symptoms: volatility, crises and growth', *Journal of Monetary Economics*, 50(1), 49-123.

Araujo B, Combes J-L and Combes P M (1999) 'The Economic Consequences of Export Instability in Developing Countries: A Survey', Working Papers 199926, CERDI, Clermont-Ferrand, France.

Athukorola P C (2000) 'Manufacturing exports and terms of trade of developing countries: evidence from Sri Lanka', *Journal of Development Studies*, 36, 89-104.

Atkin D and Donaldson D (2022) 'The role of trade in economic development' in Gopinath G, Helpman E Rogoff K (eds) *Handbook of International Economics*, 5, Amsterdam: North Holland, 1-59.

Auboin M (2009) 'Restoring trade finance during a period of financial crisis: stock-taking of recent initiatives', WTO Staff Working Paper, ERSD-2009-16. World Trade Organization (WTO), Geneva, Switzerland.

Auboin M (2021) 'Trade finance, gaps and the covid-19 pandemic: a review of events and policy responses to date', WTO Staff Working Paper, ERSD-2021-5. World Trade Organization (WTO), Geneva, Switzerland.

Auboin M and Engemann M (2014) 'Testing the trade credit and trade link: evidence from data on export credit insurance', *Review of World Economics*, 150, 715-743.

Bartels L and Häberli C (2010) 'Binding Tariff Preferences for Developing Countries under Article II GATT', *Journal of International Economic Law*, 13(4), 969-995.

Becker B, Chen J and Greenberg D (2013) 'Financial Development, Fixed Costs, and International Trade. *Review of Corporate Finance Studies*, 2(1), 1-28.

Bems R, Johnson R C and Yi K-M (2013) 'The Great Trade Collapse', *Annual Review of Economics*, 5(1), 375-400.

Binici M and Ganioglu A (2021) 'Net external position, financial development, and banking crisis', *Empirical Economics*, 61, 1225-1251.

Bleaney M and Greenaway D (2001) 'The Impact of Terms of Trade and Real Exchange Volatility on Investment and Growth in Sub-Saharan Africa', *Journal of Development Economics*, 65, 491-500.

Borchert I and Di Ubaldo M (2020) 'Go ahead and trade: the effect of uncertainty removal in the EU's GSP scheme', EUI Working Paper RSCAS 2020/15. European University Institute, Italy.

Brenton P and Ikezuki T (2005) 'The impact of agricultural trade preferences, with particular attention to the least developed countries' in Aksoy M A and Beghin J C (eds) Global Agricultural Trade and Developing Countries, Washington DC: The World Bank, 55-73.

Caldera Sánchez A and Röhn O (2016) 'How do policies influence GDP tail risks?', OECD Economics Department Working Papers ECO/WKP (2016) 63, OECD Publishing, Paris.

Carpio C M and Mir J C (2014) 'The Least-Developed Countries Services Waiver: Any Alternative Under the GATS?', *Goettingen Journal of International Law*, 6(1), 115-143.

Chaney T (2016) 'Liquidity Constrained Exporters', *Journal of Economic Dynamics and Control*, 72, 141-154.

Chanda R and Raihan S (2016) 'Services Waiver for Least-Developed Countries and Market Access for Services Exports from Bangladesh: Opportunities and Challenges' in Kathuria S and Malouche M M (eds) *Attracting Investment in Bangladesh – Sectoral Analyses: a diagnostic trade integration study*, Washington DC: The World Bank Group, 241-291.

Chang R, Kaltani L and Loayza N V (2009) 'Openness can be good for growth: The role of policy complementarities', *Journal of Development Economics*, 90(1), 33-49.

Charette M F (1985) 'Determinants of export instability in the primary commodity trade of LDCs', *Journal of Development Economics,* 18(1), 13-21.

Chauvet L and Guillaumont P (2009) 'Aid, Volatility, and Growth Again: When Aid Volatility Matters and When it Does Not?', *Review of Development Economics*, 13(3), 452-463.

Chowdhury A, Liu X, Wang M and Wong M (2021) 'The Role of Multilateralism of the WTO in International Trade Stability', *World Trade Review*, 20(5), 668-689.

Collier P and Goderis B (2009) 'Does Aid Mitigate External Shocks?', *Review of Development Economics*, 13(3), 429-451.

Dawe D (1996) 'A new look at the effects of export instability on investment and growth', *World Development*, 24, 1905-1914.

Drake-Brockman J, Greenidge A, Lan J and Zhao Q (2015) *Making the Most of the LDC Services Waiver*, Geneva: International Trade Centre.

Driscoll J C and Kraay A C (1998) 'Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data', *Review of Economics and Statistics*, 80(4), 549-560.

Eichengreen B and Gupta P (2013) 'The Real Exchange Rate and Export Growth Are Services Different? World Bank Policy Research Working Paper 6629', The World Bank Group, Washington, D.C.

Flentø D and Ponte S (2017) 'Least-Developed Countries in a World of Global Value Chains: Are WTO Trade Negotiations Helping?', *World Development*, 94, 366-374.

Fredriksson A and Oliveira G M D (2019) 'Impact evaluation using Difference-in-Differences', *RAUSP Management Journal*, 54(4), 519-532.

Ghosh A R and Ostry J (1994) 'Export Instability and the External Balance in Developing Countries', *IMF Staff Papers*, 41, 214-235.

Gnangnon S K (2018) 'Impact of multilateral trade liberalization and aid for trade for productive capacity building on export revenue instability', *Economic Analysis and Policy*, 58, 141-152.

Gnangnon S K (2021) 'Services export diversification and services export revenue stability: does trade openness matter?', *International Trade, Politics and Development*, 5(2), 90-113.

Gnangnon S K (2022) 'Development Aid and Export Resilience in Developing Countries: A Reference to Aid for Trade', *Economies*, 10(7), 161.

Gnangnon S K (2024) 'The least developed countries' Services Waiver, Aid for Trade for services and services exports', *The World Economy*, 47(4), 1495-1530.

Grossman G M and Sykes A O (2005) 'A preference for development: the law and economics of GSP', *World Trade Review*, 4(1), 41-67.

Guillaumont P (2006) 'Macro vulnerability in low-income countries and aid responses' in Bourguignon F, Pleskovic B and van der Gaag J (eds), *Securing Development in an Unstable World*, Washington DC: The World Bank, 65-108.

Guillaumont P and Le Goff M (2010) 'Aid and Remittances: Their Stabilizing Impact Compared', FERDI Working Paper n° 12. Fondation pour les Études et Recherches sur le Développement International (FERDI), Clermont-Ferrand, France.

Guillaumont-Jeanneney S and Tapsoba S-A J (2012) 'Aid and Income Stabilization', *Review of Development Economics*, 16(2), 216-229.

Han Y (2021) 'Three Essays on Export Earnings Volatility', PhD Thesis, University of Kentucky. Retrieved from https://doi.org/10.13023/etd.2021.297

Hesse H (2008) 'Export Diversification and Economic Growth', Commission on Growth and Development' Working Paper No. 21, World Bank, Washington, D.C.

Hirsch S and Lev B (1971) 'Sales stabilization through export diversification', *Review of Economics and Statistics*, 53(3), 270-277.

Hoekman B and Özden C (2006) 'Trade Preferences and Differential Treatment of Developing Countries: a selective survey', World Bank Policy Research Working Paper 3566, The World Bank, Washington, D.C.

IMF (2020) 'Global Financial Stability Report: Markets in the Time of COVID-19', International Monetary Fund, Washington, DC, April.

IMF (2021) 'Macroeconomic Developments and Prospects In Low-Income Countries -2021. IMF Policy Paper, International Monetary Fund, Washington, D.C. Retrieved from https://www.imf.org/en/Publications/Policy-Papers/Issues/2021/03/30/Macroeconomic-Developments-and-Prospects-In-Low-Income-Countries-2021-50312

Juvenal L and Monteiro P (2013) 'Export Market Diversification and Productivity Improvement: Theory and Evidence from Argentinian Firms', Federal Reserve Bank of Saint Louis Working Paper 2013-015A. Federal Reserve Bank of Saint Louis, St. Louis, USA.

Kaufmann D, Kraay A and Mastruzzi M (2010) 'The Worldwide Governance Indicators Methodology and Analytical Issues', World Bank Policy Research N° 5430 (WPS5430). The World Bank, Washington, D.C.

Klasen S, Martínez-Zarzoso I, Nowak-Lehmann F and Bruckner M (2021) 'Does the designation of least developed country status promote exports?' *Journal of International Trade & Economic Development*, 30(2), 157-177.

Kramarz F, Martin J and Mejean I (2020) 'Volatility in the small and in the large: The lack of diversification in international trade', *Journal of International Economics*, 122, 103276.

Leibovici F (2021) 'Financial Development and International Trade', *Journal of Political Economy*, 129(12), 3405-3446.

Mansfield E D and Reinhardt E (2008) 'International institutions and the volatility of international trade', *International Organization*, 62(4), 621-652.

Mathonnat C and Minea A (2018) 'Financial development and the occurrence of banking crises'. *Journal of Banking & Finance*, 96, 344-354.

Mendoza M R, Schloemann H, Bellmann C and Hijazi H (2016) The LDC Services Waiver- Operationalized? A first look at preferences granted, constraints persisting, and early conclusions to be drawn. Report commissioned by UNCTAD. https://unctad.org/system/files/officialdocument/ditc-05072016-LDCWaiver-AssessmentPaper.pdf

Mora R and Reggio I (2012) Treatment effect identification using alternative parallel assumptions, Working Paper1233. Universidad Carlos III de Madrid. https://core.ac.uk/downl oad/pdf/29404 052.pdf

Mora R and Reggio I (2015) 'Didq: A command for treatment-effect estimation under alternative assumptions', *The Stata Journal*, 15(3), 796-808.

Mora R and Reggio I (2017) 'Alternative diff-in-diffs estimators with several pretreatment periods', *Econometric Reviews*, 38(5), 465-486.

Mundlak Y (1978) 'On the pooling of time series and cross section data'. *Econometrica*, 46(1), 69-85.

Naceur S B, Candelon B and Lajaunie Q (2019) 'Taming financial development to reduce crises'. *Emerging Markets Review*, 40, 100618.

Onguglo B F (1999) 'Developing countries and unilateral trade preferences in the new international trading system' in Mendoza M R, Low P and Kotschwar B (eds), *Trade Rules in the Making: Challenges in Regional and Multilateral Negotiations*. Washington DC: The Brookings Institution Press/Organization of American States,109-133.

Panagariya A (2004) 'Aid through Trade: An Effective Option? International Trade 0308011, University Library of Munich, Germany.

Patel P C, Guedes M J, Soares N and Goncalves V (2018) 'Strength of the association between R&D volatility and firm growth: the roles of corporate governance and tangible asset volatility', *Journal of Business Research*, 88, 282-288.

Persson M (2015a) 'From Trade Preferences to Trade Facilitation: Taking Stock of the Issues', *Economics*, 6(1), 2012-2017.

Persson M (2015b) 'Trade Preferences from a Policy Perspective', in Morrissey O, Lopez R and Sharma K (eds) *Handbook on Trade and Development*, Cheltenham: Edward Elgar, 111-128.

Sahoo P and Dash R K (2014) 'India's surge in modern services exports: Empirics for policy', *Journal of Policy Modeling*, 36, 1082-1100.

Sahoo P and Dash R K (2017) 'What Drives India's Surge in Service Exports?', *The World Economy*, 40(2), 439-461.

Schloemann H (2012) 'The LDC Services Waiver: Making It Work', *Bridges Africa Review*, 1, 13-14.

Sharma S (2023) 'Improving the Operationalisation and Implementation of the WTO's LDC Services Waiver: A Commonwealth Perspective', International Trade Working Paper 2023/01. London: Commonwealth Secretariat.

Sibanda Sr O S (2015) 'Towards a Revised GATT/WTO Special and Differential Treatment Regime for Least Developed and Developing Countries', *Foreign Trade Review*, 50(1), 31-40.

Singh T (2010) 'Does International Trade Cause Economic Growth? A Survey', *The World Economy*, 33(11), 1517-1564.

Stanley D L and Bunnag S (2001) 'A new look at the benefits of diversification: lessons from Central America', *Applied Economics*, 33, 1369-1383.

UNCTAD (2003) 'Trade Preferences for LDCs: An Early Assessment of the Benefits and Possible Improvements', Paper presented at UNCTAD. UNCTAD/ITCD/TSB/2003/8. United Nations Conference on Trade and Development, Geneva, Switzerland.

United Nations (2014) 'World Economic Situation and Prospects 2014', New York: United Nations.

United Nations (2021) 'Handbook on the Least Developed Country Category: Inclusion, Graduation and Special Support Measures' – Fourth Edition. Committee for Development Policy and United Nations Department of Economic and Social Affairs, United Nations publication Sales No.: E.22.II.A.1. New York. Retrieved at: https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/LDC-Handbook-2021.pdf

UNCTAD (2020) 'Effective Market Access for Least Developed Countries' services exports An Analysis of the World Trade Organization Services Waiver for Least Developed Countries', UNCTAD/DITC/TNCD/2019/1. UNCTAD, Geneva, Switzerland.

UNCTAD (2021) 'The Least Developed Countries in the post-COVID world: Learning from 50 years of experience. The Least Developed Countries Report 2021. United Nations, UNCTAD/LDC/2021, New York.

Vannoorenberghe G, Wang Z and Yu Z (2016) 'Volatility and diversification of exports: Firm-level theory and evidence', *European Economic Review*, 89, 216-247.

Vaubourg A-G (2016) 'Finance and International Trade: A Review of the Literature', *Revue d'économie politique*, 1(126), 57-87.

Wooldridge J M (2010) Econometric analysis of cross section and panel data, Cambridge MA: MIT Press.

WTO (2011) 'Preferential Treatment to Services and Services Suppliers of Least-Developed Countries: Decision of 17 December 2011 (document WT/L/847)', WTO, Geneva, Switzerland.

WTO (2013) 'Operationalization of the Waiver Concerning Preferential Treatment to Services and Service Suppliers of Least developed countries: Decision of 11 December 2013 (document WT/MIN(13)/43; WT/L/918)', Ninth Session of the Ministerial Conference, 3-6 December 2013. Bali, Indonesia.

WTO (2014) 'Collective Request pursuant to the Bali Decision on the Operationalization of the Waiver Concerning Preferential Treatment to Services and Service Suppliers of Least developed countries'. Submission by the Delegation of Uganda on behalf of the LDC Group on 23 July 2014 (document S/C/W/356)', World Trade Organization, Geneva, Switzerland.

WTO (2015a) 'Report of the meeting held on 5 February 2015. Note by the Council for Trade in Services' (document S/C/M/121)', World Trade Organization, Geneva, Switzerland.

WTO (2015b) 'Implementation of Preferential Treatment in Favour of Services and Service Suppliers of Least Developed Countries and Increasing LDC Participation in Services Trade'. Ministerial Decision of 19 December 2015: Ministerial Decision of 19 December 2015 (document WT/MIN(15)/48; WT/L/982)', Tenth Session of the Ministerial Conference, 15-18 December 2015, Nairobi, Kenya.

WTO (World Trade Organization) (2021a) 'Market access for products and services of export interest to least developed countries'. Note by the Secretariat prepared for the Sub-Committee on Least Developed Countries, WT/COMTD/LDC/W/69, 27 October 2021. World Trade Organization, Geneva, Switzerland.

WTO (2021b) 'Participation of developing economies in the global trading system'. Note by the Secretariat prepared for the Committee on Trade and Development, WT/COMTD/W/262, 28 October 2021. World Trade Organization, Geneva, Switzerland.

WTO (2021c) 'Special And Differential Treatment Provisions in WTO Agreements and Decisions'. Note by the Secretariat prepared for the Committee on Trade and Development, WT/COMTD/W/258, 2 March 2021. World Trade Organization, Geneva, Switzerland.

WTO (2022a) 'Boosting trade opportunities for least-developed countries – Progress over the past ten years and current priorities', Geneva, Switzerland. Accessible online at: https://www.wto.org/english/res_e/publications_e/boottradeopp22_e.htm

WTO (2022b) 'MC12 Outcome Document – Draft. Ministerial Decision of 16 June 2022' (document WT/MIN(22)/W/16/Rev.1). Twelfth Session of the Ministerial Conference, 12-15 June 2002, World Trade Organization, Geneva, Switzerland.

Xiang E, Gasbarro D, Cullen G and Ruan W (2020) 'Does R&D expenditure volatility affect stock return?', *Journal of Contemporary Accounting & Economics*, 16(3), 100211.