

Effect of the DFQF Market Access Initiative on Domestic Investment in Least Developed Countries

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ABSTRACT

Trade Ministers of the World Trade Organisation adopted in 2005 an important Decision, namely the Duty-Free-Quota-Free Market Access Decision (“DFQF Decision”) that aimed to provide DFQF access for products originating from least developed countries (LDCs). The present analysis investigates the effect of the DFQF Decision on domestic investment in LDCs by comparing the domestic investment performance of LDCs to that of similar countries that are not beneficiaries of the DFQF market access initiative. The analysis covers a panel dataset of 40 LDCs (the treatment group) and 15 low-income countries (designated as such by the International Monetary Fund) in the control group (which is the main control group), over the period 1996 to 2019. For robustness check analysis, an alternative control group has been used that contains countries not in the LDC category and would not have met the criteria for graduating from this category if they were included in the category. Results based on the two-step system generalised method of moments suggest that the intensity of adverse environmental and exogenous shocks that affect LDC economies is an important factor that prevented them from expanding domestic investment further to the DFQF market access initiative. At the same time, the DFQF Decision led to the expansion of domestic investment in LDCs that enjoyed higher development aid flows, with the magnitude of this positive effect increasing as the amounts of development aid rose. These outcomes, therefore, underline the importance of not only helping LDCs cope with the adverse effects of environmental and external shocks on their economies, but also enhancing incentives for both LDC governments and private firms to expand domestic investment, which is key for exports, economic growth and development.

JEL Classifications: E22; F13; F14.

Keywords: DFQF market access; Domestic investment; Least developed countries; World Trade Organisation.

1. INTRODUCTION

How has the Duty-Free and Quota Free (DFQF) market access initiative in favour of least developed countries affected these countries? The present article aims to address this question, which to the best of our knowledge, has received scant attention in the literature.

The United Nations have designated the least developed countries² (LDCs) as the poorest countries in the world that are subject to a high frequency and size of environmental and external economic shocks. For this reason, LDCs receive special treatments³ from the international community (United Nations 2021; UNCTAD 2021), including the members of the World Trade Organisation (WTO) (WTO 2022). The special attention accorded by WTO members to LDCs arises from the very low share of LDCs in the world trade. For example, in 2020 LDCs' share in world exports of goods and commercial services was 0.91 per cent, down from 0.96 per cent in 2019 (WTO 2021a). The LDCs' share in world merchandise exports amounted to 1.06 per cent in 2020, down from 1.08 per cent in 2019⁴ (WTO 2021a).

In view of this, WTO Trade Ministers adopted a Decision at the 2005 Hong Kong Conference aiming at providing DFQF market access to at least 97 per cent of products originating from LDCs, defined at the tariff line level (WTO 2005). This landmark Decision (referred to in the present analysis as the "DFQF Decision") has been supplemented by the Bali Ministerial Decision. The latter reaffirmed the 2005 Hong Kong Ministerial DFQF Decision, including the importance of offering DFQF market access for products originating from LDCs, notably by countries that have not yet provided DFQF market access schemes in favour of LDCs, or those that have not yet reached the 97 per cent minimum threshold (WTO 2013a). Other Decisions adopted by Trade Ministers seek to ensure that the preferential rules of origin that govern the DFQF market access schemes in favour of LDCs are simple and transparent, and contribute to facilitating market access (WTO 2013b; 2015).

Extant studies have reported a positive effect of the DFQF market access schemes in favour of LDCs on LDCs' export products (Dowla 2008; Bouët *et al* 2010; Gradeva and Martínez-Zarzoso 2016; Gnanon and Priyadarshi 2017; Ito and Aoyagi 2019). The present analysis aims to contribute to the literature on the macroeconomic effects of the DFQF market access initiative in favour of LDCs by examining, for the first time, the effect of this initiative on LDCs' domestic investment (which includes public and private investment). The relevance of this topic lies in the critical role of domestic investment for promoting exports, including under the DFQF schemes (Cali and te Velde 2011; Vijil and Wagner 2012; Tadesse *et al* 2021), and enhancing economic growth and development (Adams 2009; Feldman *et al* 2021; Dinlersoz and Fu 2022; Xiao *et al* 2022).

The analysis makes use of an econometric method in the spirit of the difference-in-difference analytical framework, to examine the effect of the DFQF Decision on domestic investment in LDCs. To assess this, the analysis uses an unbalanced panel dataset covering the period 1996 to 2019 to compare – in

the periods before and after the DFQF Decision – LDCs’ domestic investment performance with the performance of countries that are not LDCs (and hence that did not enjoy the benefits of the DFQF Decision) but have characteristics similar to those of LDCs. Concretely, the panel dataset contains 40 LDCs (the treatment group) and 15 countries in the main control group. These 15 countries are low-income countries designated as such by the International Monetary Fund, that did not benefit from the DFQF schemes (i.e. that faced less generous preferential treatment for their export products from countries that grant non-reciprocal trade preferences). For robustness checks, the analysis utilises a control group that includes 16 countries that are not on the list of LDCs and would not have met the criteria for graduation from the LDC category if they had been in this list. This set of 16 countries are *de facto* ineligible for the benefits of the DFQF schemes offered by other WTO Members.

The analysis employs the two-step system generalised method of moments (GMM) estimator, and establishes several outcomes. While the DFQF Decision exerted a negative effect on domestic investment in LDCs, the intensity of environmental and exogenous shocks that affected LDC economies contributed to explaining this negative outcome. Meanwhile, we find that the DFQF Decision led to the expansion of domestic investment in LDCs that enjoyed higher development aid flows, with the magnitude of this positive effect increasing as the amounts of development aid rose.

The rest of the paper is structured around five sections. Section 2 provides a theoretical discussion on the effect of the DFQF Decision on domestic investment in LDCs. Section 3 lays down the baseline model specification used to perform the empirical analysis. Section 4 provides data analysis, and Section 5 discusses the appropriate econometric method for the estimation of the model presented in the previous section. Section 6 interprets the empirical results. Section 7 provides a robustness check analysis, and Section 8 concludes.

2. THEORETICAL DISCUSSION ON THE EFFECT OF THE DFQF DECISION ON DOMESTIC INVESTMENT IN LDCS

In 2005, WTO Trade Ministers adopted an important Decision to promote the integration of LDCs into the world market for trade in goods. This Decision, henceforth referred to as “DFQF Decision”, aims to provide duty-free and quota free (DFQF) market access for products originating from LDCs (see WTO 2005: Decision 36 of Annex F). It states *inter alia*, that developed-country Members, and developing-country Members declaring themselves in a position to do so shall “provide duty-free and quota-free market access on a lasting basis, for all products originating from all LDCs by 2008 or no later than the start of the implementation period in a manner that ensures stability, security and predictability” (see paragraph (a)(i) of Annex F). Moreover, it requests that:

developed-country Members and developing-country Members facing difficulties at this time to provide market access as set out above shall provide

duty-free and quota-free market access for at least 97 per cent of products originating from LDCs, defined at the tariff line level, by 2008 or no later than the start of the implementation period. These Members shall also take steps to progressively achieve compliance with the obligations set out above, taking into account the impact on other developing countries at similar levels of development, and, as appropriate, by incrementally building on the initial list of covered products. (see paragraph (a) (ii) of Annex F).

In another note, the DFQF Decision urges developed-country Members and developing-country Members declaring themselves in a position to do so, to ensure that preferential rules of origin applicable to imports from LDCs are transparent and simple, and contribute to facilitating market access (see paragraph (b) of Annex F).

At the WTO ministerial conference held in Bali in 2013, Trade Ministers adopted another Decision that reaffirms the 2005 DFQF Decision, while calling on developed country Members (and developing country Members in a position to do so) that have not yet provided DFQF market access for at least 97 per cent of products originating from LDCs (defined at the tariff line level) to seek to improve their existing DFQF coverage for such products (see WTO 2013a).

To ensure that the preferential rules of origin associated with the DFQF market access schemes do not constitute obstacles for LDCs trading firms' access to the markets of preference granting countries, WTO Trade Ministers adopted, at the 2013 Bali Ministerial Conference, a Decision that provides not a single set of rules of origin criteria but rather "elements upon which Members may wish to draw for preferential rules of origin applicable to imports from LDCs under such arrangements" (WTO 2013b). Furthermore, at the WTO's Nairobi ministerial Conference held in 2015, Members adopted a Decision, which for the first time, establishes multilateral guidelines to facilitate LDC exports that qualify for preferential market access granted by WTO members (WTO 2015). The guideline focuses on issues concerning the requirements for the assessment of sufficient or substantial transformation, the cumulation of origin, the documentary requirements, and issues related to implementation, flexibilities and transparency.

Thus far, all developed countries have provided DFQF market access schemes for LDCs' export products, and many developing countries have endeavoured to offer duty free treatment for many products originating from LDCs. The providers of the DFQF market access schemes in favour of LDCs are provided in the database⁵ on the preferential trade arrangements maintained by the WTO.⁶ As of the time of writing this paper (November 2022), nine developing countries providers of non-reciprocal preference schemes in favour of LDCs are Chile; China; India; Republic of Korea; Montenegro; Morocco; Chinese Taipei; Tajikistan; and Thailand. Fifteen other countries/group of countries, including developed countries and the European Union (as a group of countries) provide non-reciprocal preferences in favour of LDCs under their generalised system of preferences⁷ (GSP) schemes for developing countries. These countries are

Armenia; Australia; Canada; European Union; Iceland; Japan; Kazakhstan; Kyrgyz Republic; New Zealand; Norway; Russian Federation; Switzerland; Turkey; United Kingdom; and United States.

According to the WTO, LDCs have substantially benefited from the DFQF market access schemes, given that the proportion of products traded under these schemes substantially increased from 48 per cent of exported products in 2005⁸ to 66 per cent in 2019 (WTO 2021a). Many previous studies have also reported a positive effect of the DFQF market access schemes in favour of LDCs on LDCs' goods exports (Dowlah 2008; Bouët *et al* 2010; Gradeva and Martinez-Zarzoso 2016; Gnangnon and Priyadarshi 2017; Ito and Aoyagi 2019).

In general, the suppliers of non-reciprocal trade preferences have some discretion over the choice of countries that would be eligible for the preferences, the product coverage of the preference schemes, the preferential rules of origin governing the schemes, and the criteria of graduation from the program (Brenton and Ikezuki 2005; Grossman and Sykes 2005; Persson 2015a, 2015b; Hakobyan 2017). These aspects of the non-reciprocal preference schemes create uncertainty over the benefits of the programmes for trading firms, and limit their effective utilisation by beneficiary countries (Hoekman and Özden 2006; Borchert and Di Ubaldo 2020). Persson (2015a) underlined the difficulties for firms to take advantage of a market access agreement that lasts only a few years compared to one with unlimited duration. Hakobyan (2020) found that the 2011 expiration of the United States GSP programme exerted significant negative effects on developing countries' exports to the US. In addition, such negative effects persisted over time as exports did not fully recover by 2012.

Other studies have also pointed out the consequences of the uncertainty surrounding the non-reciprocal preference schemes. According to Panagariya (2004), terminating a GSP scheme at short notice can lead to overcapacity and a production structure in beneficiary countries that might not reflect their particular comparative advantages under free trade. Herz and Wagner (2011) have pointed out that the distortions induced by non-reciprocal preference schemes can lead beneficiary countries to export under most favoured nations (MFN) tariffs rather than under the non-reciprocal GSP programmes. Onguglo (1999) proposed that a multi-year waiver of a reasonable duration would dampen the uncertainty and apprehension among beneficiary countries and their trading firms concerning the security and the stability of the preferential market access. Meanwhile, UNCTAD (2003) proposed that preference-granting countries develop enforceable and durable GSP arrangements that cannot be cancelled in an *ad hoc* manner, cover all products from developing countries, and rely on simple rules of origin. Bartels and Häberli (2010) proposed that binding obligations in existing WTO rules be used as a tool for increasing the predictability of market access. All of these recommendations have to some extent been followed in designing the DFQF Decision, as well as all subsequent Ministerial Decisions mentioned above, that aim to facilitate market access for products originating from LDCs.

Even though, for various reasons, some LDCs may occasionally be withdrawn from the list of beneficiary countries of the DFQF schemes, and the product coverage of these schemes may not include all products of interest to LDCs, the LDCs' DFQF market access schemes have many benefits compared to less generous non-reciprocal trade preferences enjoyed by developing countries that are not LDCs. First, the DFQF market access schemes are expected to be provided on a 'lasting basis' for products originating from LDCs. Second, these schemes are expected to cover a minimum of 97 per cent of products (defined at the tariff line level) originating from LDCs. Third, the WTO's Committee on Rules of Origin reviews regularly preference-granting members' efforts to implement the 2015 Nairobi Ministerial Decision that aims to ensure that preferential rules of origin applicable to products originating from LDCs are transparent and simple, and contribute to facilitating market access (WTO 2021b). This would encourage preference granting countries to design simple and transparent preferential rules of origin for LDCs' export products.

Three features of the DFQF Decision and subsequent Decisions highlighted above introduce a permanency into the DFQF market access schemes in favour of products originating from LDCs. These include the minimum threshold of "97 per cent of products originating from LDCs (defined at the tariff line level)"; the long term duration⁹ of the DFQF market access schemes (at least those supplied by developed countries); and the progressive improvement in the transparency and simplicity of preferential rules of origin governing DFQF market access schemes for LDCs' exported products. Therefore, these features of the DFQF Decisions provide greater market access certainty for LDC trading firms. As a consequence, LDC trading firms (including both local firms and multinational firms located in LDCs) could engage in long term investments in the sectors covered by the products eligible for the preferential regimes, with a view to taking advantage of the preferences granted (Persson 2015a, 2015b; Borchert and Di Ubaldo 2020). LDCs' governments could also be incentivised to increase public investment in infrastructure, as this would reduce firms' trade costs (Cali and te Velde, 2011; Vijil and Wagner 2012; Tadesse *et al* 2021) but also on human capital accumulation (which is essential for innovation and exports), and implement appropriate regulatory policies to improve the business environment.

Against this background, one could argue that the Decision concerning the DFQF market access in favour of LDCs' export products could stimulate domestic investment in LDCs (***hypothesis 1***). However, given the high susceptibility of LDCs to environmental and exogenous economic shocks¹⁰ (Guillaumont 2009, 2010; Cariolle *et al* 2016), one could argue that a greater intensity of adverse shocks could prevent LDCs from expanding domestic investment. Natural disasters cause significant damage to physical assets, infrastructure as well as human and physical capital (WTO 2021), which could discourage investors from undertaking investment in the domestic economy. Additionally, external economic shocks lead to higher poverty rates in developing countries (Ravallion

2009; Alexander 2010; Ahrend *et al* 2011; Rewilak 2018; Gngangnon 2021). In turn, higher poverty rates are likely to result in lower domestic investment. Thus, higher intensities of environmental and external economic and financial shocks would reduce domestic investment.

Therefore, we postulate that the intensity of environmental and exogenous economic shocks would affect negatively domestic investment in LDCs (***hypothesis 2***). In particular, the high susceptibility of LDCs to such shocks could prevent them from expanding domestic investment after the launch of the DFQF market access initiative, through the DFQF Decision (***hypothesis 3***).

At the same time, development aid is particularly relevant for LDCs, as it is well established that these countries are the most aid-dependent¹¹ economies in the world, with development aid flows being the foremost type of capital inflows to the LDCs as a group (UNCTAD 2019, 2020). On the other hand, the literature has underlined the critical role of development aid for the effective utilisation of non-reciprocal trade preferences (Dowlah 2008; Prowse 2010; Gradeva and Martínez-Zarzoso 2016; OECD-WTO 2017). For example, Dowlah (2008) has noted that greater financial resources would be needed to overcome supply constraints in the LDCs to ensure the effectiveness of GSP schemes. Other studies have underlined the importance of development aid for trade capacity building in developing countries (Prowse 2010; Gradeva and Martínez-Zarzoso 2016; OECD-WTO 2017). Therefore, one may argue that the effect of the DFQF market access initiative on domestic investment in LDCs could depend on the amounts of development aid that accrue to these countries.

Development aid can affect domestic investment through a variety of channels (see Herzer and Grimm 2012). For example, a non-negligible portion of development aid (the so-called Aid for Trade) is allocated to the build-up of economic infrastructure and productive capacities. Economic infrastructure covers both hard infrastructure, such as roads and railways, and soft infrastructure, such as information communication and technology tools. Productive capacities covers sectors such as banking and financial services, business and other services, agriculture, fishing, industry, mineral resources and mining in recipient countries (Cali and te Velde 2011; Vijil and Wagner 2012; Gngangnon and Roberts 2017; OECD-WTO 2017; Tadesse *et al* 2021). Development aid can also contribute to the accumulation of human capital (i.e. education and health) (Birchler and Michaelowa 2016; Kotsadam *et al* 2018), and induce a depreciation of the real exchange rate or an appreciation of the real exchange rate in the recipient country through the so-called Dutch Disease effect (Ouattara and Strobl 2008; Addison and Balamoune-Lutz 2017; Gngangnon 2022a). Aid can also help respond to humanitarian crises (Mary and Mishra 2020), reduce political instability (Steinwand 2015; Asongu and Leke 2019), and enhance political institutions (Jones and Tarp 2016).

It is worth noting that the effect of development aid on domestic investment through public investment can be positive or negative, depending on the nature

of public investment. The effect is positive when public investment takes the form of investment in infrastructure, and when there is some slack in the economy (Jongwanich and Kohpaiboon 2008; Herzer and Grimm 2012; Abiad *et al* 2016; Dreger and Reimers 2016). The effect of development aid on domestic investment through public investment is negative (i.e. it crowds out domestic investment) when public investment competes for the appropriation of limited financial and human resources in the economy that would otherwise be available to the private sector (Jongwanich and Kohpaiboon 2008; Herzer and Grimm 2012; Farla *et al* 2016; Bahal *et al* 2018).

Empirically, Herzer and Grimm (2012) used a sample of countries that contains few low-income countries, and reported empirical evidence that development aid had crowded out domestic investment. Nevertheless, as LDCs are highly dependent on development aid for their economic and social development, it is likely that development aid would enhance domestic investment in these economies, given in particular the significant amounts of such aid invested in education and health sectors, as well as in public infrastructure. Overall, we can expect that development aid would stimulate domestic investment in LDCs (***hypothesis 4***). We also assume that the DFQF market access initiative would exert a positive effect on domestic investment in LDCs that received higher development aid inflows, and the higher the development aid flows to LDCs, the greater is the magnitude of the positive effect of the DFQF market access initiative on domestic investment (***hypothesis 5***).

3. MODEL SPECIFICATION

To test hypotheses 1 to 5, we build on previous studies on the macroeconomic determinants of domestic investment (Acosta and Loza, 2005; Jongwanich and Kohpaiboon 2008; Herzer and Grimm 2012; Morrissey and Udomkerdmongkol 2012; Farla *et al* 2016; Bahal *et al* 2018), and consider the following baseline model:

$$\begin{aligned}
 INV_{it} = & \beta_1 INV_{it-1} + \beta_2 [(LDC_i) * (DFQF_t)] + \beta_3 LDC_i + \beta_4 DFQF_t + \beta_5 Log(SHOCK)_{it} \\
 & + \beta_6 Log(ODA)_{it} + \beta_7 Log(GDPCAP)_{it} + \beta_8 Log(GDP)_{it} + \beta_9 Log(FD)_{it} \\
 & + \beta_{10} INST_{it} + \beta_{11} TREND + \mu_i + \varepsilon_{it}
 \end{aligned} \tag{1}$$

The subscripts i and t represent respectively the country, and time-period. The panel dataset utilised to perform the empirical analysis is unbalanced. It covers the period 1996 to 2019, and includes 55 countries, of which 40 LDCs are the treatment group, and 15 countries are the control group. Following Gnanangnon (2022b, 2022c, 2023), we use the countries (low-income countries – LICs) eligible for the Poverty Reduction and Growth Trust (PRGT¹²) facilities offered by the International Monetary Fund (IMF). This set of countries contains almost all LDCs, in addition to other low-income countries. Therefore, we constitute our control group by excluding LDCs from this set of countries, and get 15 LICs in the group. This set of 15 LICs are not eligible for the DFQF market access schemes (i.e. compared to LDCs, they enjoyed less generous preferential

treatment for their export products) from countries that grant non-reciprocal trade preferences). The lists of countries in both the LDCs and control group are provided in Appendix 3.

To mitigate the effect of business cycles on the variables contained in model (1), we use non-overlapping sub-periods of 3-year averages. There are a total of 8 sub-periods: 1996–1998; 1999–2001; 2002–2004; 2005–2007; 2008–2010; 2011–2013; 2014–2016 and 2017–2019. Using sub-periods also avoids the problem of non-stationarity of the variables (at least of the indicator of domestic investment) that would have arisen if we relied on annual data in the analysis.

β_1 to β_{11} are the coefficients that will be estimated. μ_i represents time invariant specific characteristics of each country in the panel dataset. “TREND” is a time trend indicator that captures global shocks affecting countries in the full sample. ε_{it} is an error-term.

The variable “INV” is the indicator of domestic investment, which is measured by the share (in per cent) of gross fixed capital formation in GDP. It is extracted from the World Development Indicators database of the World Bank, and includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Thus, it covers both domestic public and private investments.

Following previous studies on the macroeconomic determinants of domestic investment (Acosta and Loza 2005; Morrissey and Udomkerdmongkol 2012; Farla *et al* 2016), the lagged dependent variable has been introduced in the baseline model (1) as a right hand side regressor. It helps capture how private investors’ information in the preceding period influences their investment decision in the current period.

“LDC” is a dummy variable, which takes the value of 1 for LDCs¹³, and 0 otherwise. While this list contains 46 LDCs, we have added Vanuatu, which graduated from the LDC category in 2020. This is because the last year of our dataset is 2019, when Vanuatu was still an LDC.

“DFQF” is the variable capturing the period of treatment, which is the period running from the adoption of the DFQF Decision (2005–2007 in the present analysis) to 2017–2019. In other words, it captures the period of the implementation of the Hong Kong Ministerial Decision on the provision of DFQF market access to products originating from LDCs. It is a dummy variable that takes the value of 1 from the sub-period 2005–2007 to 2017–2019, and the value of 0 from 1996–1998 to 2002–2004.

The coefficient β_2 is the coefficient that captures the net effect of the DFQF Decision on domestic investment in LDCs. It reflects the net effect difference between control countries in the pre-and-post-DFQF Decision, and treated countries pre-and post-DFQF Decision. It uncovers the causal effect of the Waiver on LDCs’ domestic investment. Later in the empirical analysis, we denote $Effect = [(LDC_i) * (DFQF_t)]$.

All other variables introduced in model (1) are described in Appendix 1. Appendices 2a, 2b and 2c contain descriptive statistics on the variables¹⁴, respectively over the full sample, the treatment group (i.e. LDCs) and the control group.

The variable “SHOCK” is the indicator of environmental and exogenous economic shocks. We have already discussed the effect of environmental and exogenous shocks on domestic investment (see hypothesis 2). The indicator “SHOCK” is a component of the structural economic vulnerability index, which is one criterion of inclusion of a country in the LDC category, or graduation of a country from this category (see Appendix 1 for details). It has been computed as the weighted average of three sub-components, namely agricultural production instability; export instability; and the number of victims of natural disasters (see for example Feindouno and Goujon 2016). The values of the indicator “SHOCK” range from 0 to 10.

The variable “ODA” is the development aid indicator. This is real net disbursements of total official development assistance (ODA), expressed in constant 2019 prices, in US dollars. The effect of development aid has been discussed in section 2 (see hypothesis 4).

The variable “GDPCAP” is real per capita income. While all LDCs are considered to be the poorest countries in the world, they do not have the same real per capita income: the LDC category is still heterogeneous. Therefore, the inclusion of the variable representing real per capita income aims to take into account the extent to which different levels of real per capita income across LDCs may influence their domestic investment. Specifically, we expect countries with a higher real per capita to enjoy a higher level of domestic investment than LDCs with lower per capita incomes.

The variable “GDP” is real gross domestic product. It has been included in the baseline model (1) to capture the effect of aggregate demand on domestic investment. The accelerator hypothesis provides that a small change in domestic output leads to a more than proportionate increase in domestic investment (Blomstrom *et al* 1996; Acosta and Loza 2005; IMF 2015). Therefore, we expect a positive impact of real GDP on domestic investment.

The variable “FD” is the indicator of financial development. The literature has pointed out the positive effect of financial development on domestic investment (Jongwanich and Kohpaiboon 2008; Ndikumana and Blankson 2015).

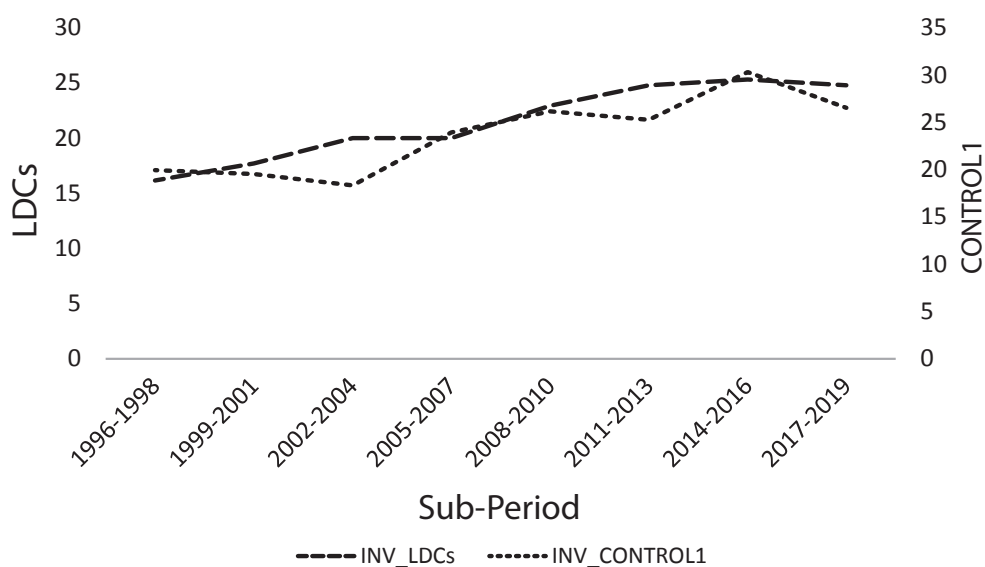
The variable “INST” represents institutional and governance quality. An improvement in institutional and governance quality can stimulate domestic investment (Morrissey and Udomkerdmongkol 2012; Farla *et al* 2016; Ouédraogo *et al* 2020).

In model (1), we present “SHOCK”, “ODA”, “GDPCAP”, “GDP”, and “FD” in natural logarithms, to limit their skewed distribution.

4. DATA ANALYSIS

Before moving to the discussion concerning the appropriate econometric estimator for uncovering the effect of the DFQF market access initiative on LDCs' domestic investment, we present in Figure 1 the developments of the share of gross fixed capital formation, over the treatment group (i.e. LDCs) and the control group. This compares how this indicator has evolved over the full period, including before and after the adoption by WTO Trade Ministers of the DFQF Decision. We note from this figure that for LDCs, domestic investment increased steadily from 16.2 per cent in 1996–1998 to 24.8 per cent in 2017–2019. In particular, it amounted to 20 per cent in both 2002–2004 and 2003–2005. In contrast, domestic investment fluctuated in LICs in the control group. It declined slightly from 19.95 per cent in 1996–1998 to 18.34 per cent in 2002–2004, and then increased to 23.9 per cent in 2005–2007, and 26.2 per cent in 2008–2010. Over the rest of the period it fluctuated, reaching 26.55 per cent in 2017–2019. It is worth pointing out that from 1996–1998 to 2002–2004, LDCs experienced a higher share of gross fixed capital formation in GDP than LICs in the control group. However, this pattern reversed from 2005–2007 to 2017–2019 (i.e. the period after the adoption of the DFQF Decision) as LICs (in the control group) enjoyed a higher level of domestic investment than LDCs.

Figure 1: Development of domestic investment over the treatment group and the control group (i.e., the PRGT-eligible low-income countries)



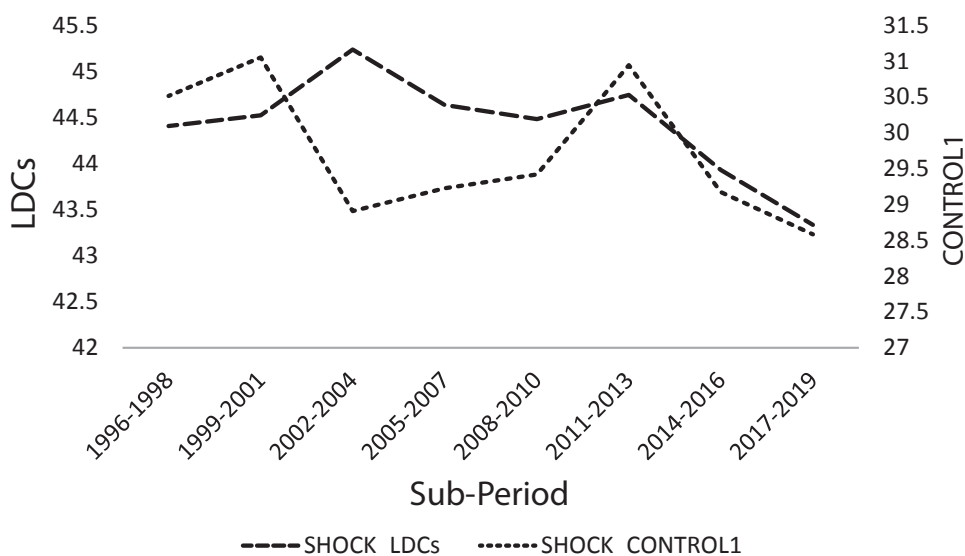
Source: Author

Note: "CONTROL1" is the control group that contains LICs (that are not LDCs) eligible to the PRGF of the International Monetary Fund.

While many factors might have contributed to explaining the decline in LDCs’ domestic investment after the adoption of the DFQF Decision, including in comparison with the LICs in the control group, we suspect that the difference in the intensities of shocks between these two groups of countries might have played a crucial role. It would be consistent with hypothesis 4 set out in section 2 if we observed at least graphically that the intensity of shocks faced by LDCs, in particular from 2005 onwards, was higher than the one faced by LICs in the control group.

Figure 2 shows the development of the intensity of shocks in both LDCs and the control group. It shows that while the intensity of shocks was higher for countries in the control group than for LDCs between 1996–1998 and 1999–2001, it then declined significantly in LICs, but increased in LDCs from 1999–2001 to 2002–2004. Interestingly, it remained far lower in countries in the control group than in LDCs from 2002–2004 to 2011–2013. It was only from 2011–2013 that the shock intensity started declining in both LDCs, and LICs in the control group, although it still remained higher in the former than in the latter over the rest of the period. The magnitude of shocks moved from 40.4 per cent in LDCs (against 30.5 per cent in LICs of the control group) in 1996–1998

Figure 2: Development of the intensity of environmental and external economic shocks over the treatment group and the control group (i.e., the PRGT-eligible low-income countries)



Source: Author

Note: “CONTROL1” is the control group that contains LICs (that are not LDCs) eligible to the PRGF of the International Monetary Fund.

to 45.2 per cent in LDCs (against 28.9 per cent in LICs of the control group) in 2002–2004. It, then, fell to 44.6 per cent in LDCs (against 29.2 per cent in LICs of the control group) in 2005–2007, and reached 43.3 per cent in LDCs, against 28.6 per cent for the control group in 2017–2019.

These developments in the “SHOCK” indicator, in both LDCs and LICs (in the control group), show that the greater extent of shocks faced by LDCs than LICs in the control group, especially from 1999–2001 onwards, might have contributed to explaining the lower performance of LDCs in terms of domestic investment than in LICs of the control group. The empirical analysis will provide further guidance on whether the extent of shocks in LDCs had contributed to explaining the lower performance of LDCs in terms of domestic investment than LICs in the control group, after the adoption of the DFQF Decision, compared to the preceding period.

5. ECONOMETRIC METHOD

We commence the empirical analysis by estimating the baseline model (1) using the pooled ordinary least squares (POLS) estimator. The results are presented in column [1] of Table 1.

However, the POLS estimator is likely to generate biased estimates because of the endogeneity arising from the presence of the one-period lagged dependent variable as a regressor, and the reverse causality from the dependent variable to some regressors. These regressors are notably development aid, financial development and the institutional and governance quality.

To handle these endogeneity concerns, we follow previous works (Morrissey and Udomkerdmongkol 2012; Farla *et al* 2016) and utilise the two-step system generalised method of moments (GMM) estimator (Arellano and Bover 1995; Blundell and Bond 1998) to estimate model (1) and its variants described below. This estimator has the advantage of addressing several endogeneity concerns, including the bias introduced by the presence of the lagged dependent variable as a right-hand side regressor (Nickell 1981), biased introduced by measurement errors, and omission of variables, as well as the bi-directional causality between regressors and the dependent variable. It is asymptotically more efficient than the difference GMM estimator (developed by Arellano and Bond 1991), especially in the context of persistent time series (Alonso-Borrego and Arellano 1999; Bond 2002). In fact, the two-step system GMM estimator uses additional moment conditions that reduce the imprecision and potential bias related to the difference GMM estimator (Blundell and Bond 1998).

Utilising the two-step system GMM estimator in the empirical analysis involves estimating a system of equations that combines an equation with variables in first-difference and an equation with variables in levels. This system uses lags of the variables in first differences as instruments in the equation in levels, and lags of the variables in levels as instruments in the first-difference equation.

Table 1: Effect of the DFQF market access initiative
on domestic investment in LDC

| Estimators: Pooled OLS and Two-step System GMM | | |
|---|----------------------|----------------------------|
| <i>Variables</i> | <i>Pooled OLS</i> | <i>Two-step System GMM</i> |
| | <i>INV</i> | <i>INV</i> |
| | (1) | (2) |
| INV _{t-1} | 0.730*** (0.0768) | 0.629*** (0.0127) |
| Effect = LDC*DFQF | -1.891** (0.818) | -3.828*** (0.980) |
| LDC | 3.202*** (0.645) | 10.81*** (1.550) |
| DFQF | 2.573* (1.335) | 3.837*** (0.801) |
| Log(SHOCK) | -0.643 (0.913) | -3.449*** (0.711) |
| Log(ODA) | 0.720 (0.569) | 1.880*** (0.231) |
| Log(GDPCAP) | 1.844*** (0.681) | 4.798*** (0.666) |
| Log(GDP) | -0.371 (0.401) | -0.984*** (0.366) |
| Log(FD) | 0.988 (0.717) | 2.612*** (0.301) |
| INST | 0.406 (0.364) | 2.151*** (0.296) |
| TREND | -0.285 (0.213) | -0.955*** (0.0794) |
| Constant | -8.215 (9.079) | -20.89*** (7.713) |
| Observations – Countries | 305 – 55 | 305 – 55 |
| R-squared | 0.659 | |
| F-Statistic (P-value) | 8.47 (0.0000) | |
| AR1 (P-Value) | | 0.0387 |
| AR2 (P-Value) | | 0.6935 |
| AR3 (P-Value) | | 0.1468 |
| OID (P-Value) | | 0.3143 |

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. In the regressions based on the two-step system GMM approach, the variables “ODA”, “FD” and “INST” have been treated as endogenous. The full sample contains the control group (i.e. 15 countries) and the treated group (i.e. 40 LDCs).

In the GMM-based regressions, the variables representing development aid, financial development and the institutional and governance quality are treated as endogenous in the analysis. The variable that captures the period of treatment, the period from the implementation of the DFQF Decision (i.e. the “DFQF” dummy) has been treated as exogenous because the DFQF Decision was adopted by the international trade community, i.e. WTO Trade Ministers, for the interest of all LDCs taken together. LDCs taken individually did not have a strong influence on the adoption of this Decision.

We avert the problem of instrument proliferation (Roodman 2009) by capping the number of lags used for instrumental variables at two. The validity of the two-step system GMM estimator is judged by means of the Arellano-Bond test of the presence of first-order serial correlation in the first-differenced error term (AR (1)); the Arellano-Bond test of the absence of second-order autocorrelation in the first-differenced error term (denoted AR (2)) and the Sargan/Hansen test of over-identifying restrictions (OID). Model (1) and its variants described below, will be considered as correctly specified if the p-values associated with the statistics of the AR(1) and AR(2) tests are at the 10 per cent level, respectively lower than 0.10, and higher than 0.10. The p-value of the statistic associated with the OID test is expected to be higher than 0.1 at the 10 per cent level. As a way to test for the absence of omitted variables, we perform the Arellano-Bond test of the absence of third-order autocorrelation in the first-differenced error term (denoted AR (3)). Here, the p-value related to the relevant statistic should be higher than 0.01 at the 10 per cent level.

We test hypotheses 1 to 5 set out in section 2 by estimating the following specifications of model (1), using the two-step system GMM approach. Hypotheses 1, 2 and 4 are tested by estimating model (1) as it stands. The related estimates are reported in column [2] of Table 1.

We then test hypothesis 3 by estimating a specification of model (1) that includes the multiplicative variable between the indicator of shocks and the variable “Effect”¹⁵. The outcomes of this estimation are presented in column [1] of Table 2.

Finally, we test hypothesis 5 by estimating a specification of model (1) that includes the multiplicative variable between development aid and the variable “Effect”. The outcomes of this estimation are provided in column [2] of Table 2.

6. INTERPRETATION OF RESULTS

Outcomes in Tables 1 and 2 suggest that the coefficient of the one-period lag of the dependent variable is positive and significant at the 1 per cent level. In line with previous studies on the macroeconomic determinants of domestic investment, this finding justifies the consideration of the dynamic specification of model (1) in the present analysis. The results of the diagnostic tests that help evaluate the validity of the GMM estimator are reported at the bottom of column [2] of Table 1 and in the two columns of Table 2. They suggest that all models described above are correctly specified. In light of these findings, we conclude

Table 2: Effect of the DFQF market access initiative on domestic investment in LDC

| Estimator: Two-step System GMM | | |
|---------------------------------------|-----------------------|-----------------------|
| <i>Variables</i> | <i>INV</i> | <i>INV</i> |
| | (1) | (2) |
| INV _{t-1} | 0.646*** (0.0156) | 0.626*** (0.0144) |
| Effect = LDC*DFQF | 21.88*** (3.573) | -19.39*** (4.948) |
| Effect*Log(SHOCK) | -6.779*** (0.932) | |
| Effect*Log(ODA) | | 0.772*** (0.254) |
| LDC | 10.00*** (1.683) | 11.02*** (1.648) |
| DFQF | 3.537*** (0.609) | 4.125*** (0.784) |
| Log(SHOCK) | -0.519 (0.942) | -3.614*** (0.739) |
| Log(ODA) | 2.186*** (0.326) | 1.834*** (0.278) |
| Log(GDPCAP) | 5.790*** (0.747) | 4.954*** (0.675) |
| Log(GDP) | -1.343*** (0.424) | -1.566*** (0.366) |
| Log(FD) | 2.945*** (0.385) | 3.132*** (0.394) |
| INST | 1.809*** (0.322) | 2.228*** (0.296) |
| TREND | -1.099*** (0.0984) | -0.980*** (0.0648) |
| Constant | -35.17*** (9.089) | -6.054 (7.980) |
| Observations – Countries | 305 – 55 | 305 – 55 |
| AR1 (P-Value) | 0.0374 | 0.0411 |
| AR2 (P-Value) | 0.6537 | 0.6425 |
| AR3 (P-Value) | 0.1897 | 0.1150 |
| OID (P-Value) | 0.3103 | 0.3772 |

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. In the regressions based on the two-step system GMM approach, the variables “ODA”, “FD” and “INST” have been treated as endogenous. The full sample contains the control group (i.e. 15 countries) and the treated group (i.e. 40 LDCs).

that the two-step system GMM estimator is appropriate for performing the empirical analysis.

The outcomes in column [1] of Table 1 (i.e. those based on the POLS estimator) suggest that the coefficient of the variable “Effect” is negative and significant at the 5 per cent level, thereby indicating that the DFQF Decision led to a fall in domestic investment in LDCs. In terms of magnitude, we find that domestic investment in LDCs declined by 1.9 percentage point after the implementation DFQF market access initiative. Among the control variables, only real per capita income has a significant coefficient at conventional significance levels. In particular, real per capita income exerts a positive effect on domestic investment at the 1 per cent level.

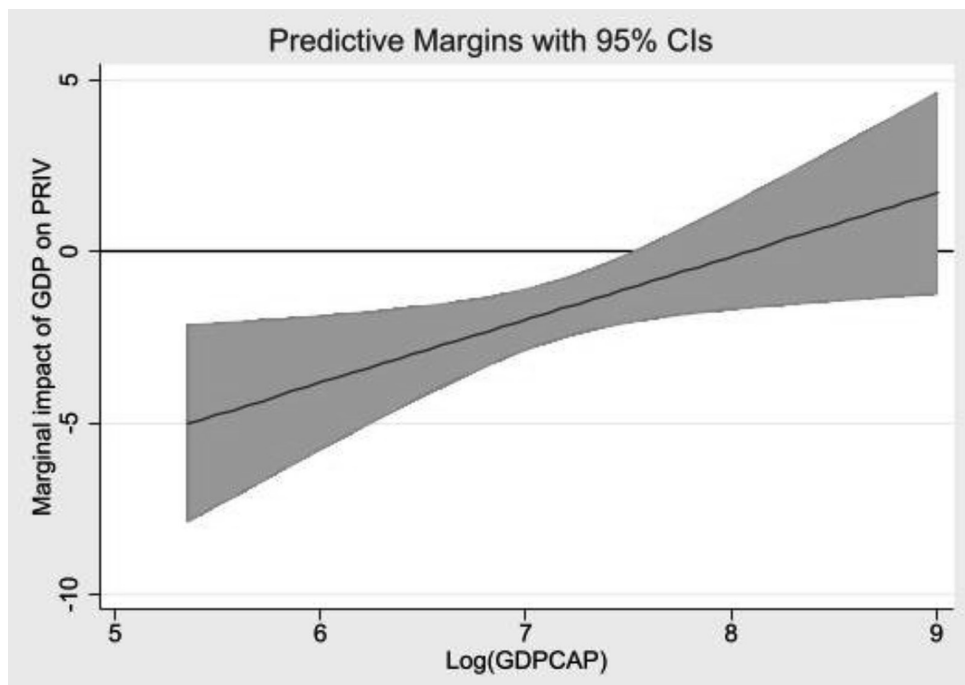
As underlined above, the outcomes in column [1] of Table 1 are likely biased because of the endogeneity concerns raised above. The results in column [2] of Table 1 (including here those based on the GMM estimator) are the most reliable. They also suggest a negative effect of the DFQF Decision on domestic investment in LDCs, with the coefficient of “Effect” being not only significant at the 1 per cent level, but also double the one obtained using the POLS estimator. In terms of magnitude, we find that LDCs experienced a fall in domestic investment of 3.8 percentage point after the adoption of the DFQF Decision by Trade Ministers. These findings do not support hypothesis 1. However, as noted above, the higher intensity of shocks in LDCs (including compared with the LICs in the control group) may help explain the negative effect of the DFQF Decision on domestic investment in LDCs. We shall consider this issue when analysing the results in Table 2. On the other hand, it is also possible that this negative effect of the DFQF Decision on domestic investment in LDCs may reflect the fact that the effect of the DFQF Decision on domestic investment in LDCs ultimately depends on the amounts of development aid flows received by these countries. The examination of results in column [2] of Table 2 will tell us whether or not hypothesis 5 is verified.

Almost all estimates associated with the control variables in column [2] of Table 1 are consistent with our theoretical hypotheses set out in section 2. In particular, we find that higher intensities of shocks exert a negative and significant effect (at the 1 per cent level) on domestic investment. This outcome lends support for hypothesis 2. Higher development aid inflows stimulate domestic investment at the 1 per cent level. This finding lends credence to hypothesis 4. As also expected, an increase in real per capita income, greater financial development and an improvement in the institutional and governance quality, are all positively and significantly associated with domestic investment (at the 1 per cent level). Surprisingly, we find that an increase in aggregate demand does not stimulate, but rather reduces, domestic investment in the full sample; which to recall, contains both LDCs and the LICs of the control group. We suspect that this outcome may reflect the fact that the effect of aggregate demand on domestic investment may depend on countries’ development level, proxied by their real per capita income. We, therefore, estimate¹⁶ another

specification of model (1) that contains the interaction variable between real per capita income (the proxy for economic development level) and real GDP (the proxy for aggregate demand).

Results suggest that the coefficient of the interaction variable is positive and significant at the 5 per cent level, while the coefficient of the variable representing real GDP is negative and significant at the 1 per cent level. Figure 3 presents, at 95 per cent confidence intervals, the marginal impact of real income on domestic investment for varying levels of real per capita income. It shows that this marginal impact is significant only for countries whose real per capita income is lower than 1890 US dollars. Values of real per capita income range from 211 US dollars and 3708 US dollars for LDCs (see Appendix 2b), and from 817 US dollars to 8157 US dollars for the LICs of the control group (see Appendix 2b). Thus, aggregate demand is negatively associated with domestic investment for countries whose real per capita income is lower than 1890 US dollars (these countries could be LDCs, or the LICs of the control group). Conversely, an increase in aggregate income exerts no significant effect in countries in the full sample (including both LDCs and the LICs of the control group) whose real per capita income is higher than 1890 US dollars.

Figure 3: Marginal impact of “GDP” on “PRIV” for varying levels of the real per capita income, over the full sample



Estimates presented in column [1] of Table 2 indicate that the coefficient of the interaction variable ["Effect*Log(SHOCK)"] is negative and significant at the 1 per cent level. This suggests that LDCs that have faced a high intensity of shocks, experienced a negative effect of the DFQF Decision on domestic investment, and the magnitude of this negative effect was higher as the intensity of shocks increased. This outcome validates hypothesis 3. At the same time, results in column [2] show that the coefficient of the interaction variable ["Effect*Log(ODA)"] is positive and significant at the 1 per cent level. We conclude that the DFQF Decision encouraged the expansion of domestic investment in LDCs that received higher development aid flows, and the greater the amounts of such aid, the higher is the magnitude of the positive effect the DFQF Decision on domestic investment. These results, therefore, support hypothesis 5. On another note, outcomes of control variables in Table 2 are consistent with those in column [2] of Table 1.

Overall, the analysis of results in Tables 1 and 2 shows that the DFQF market access initiative has discouraged domestic investment in LDCs that faced a high intensity of environmental and exogenous economic shocks. However, this Decision promoted domestic investment in LDCs that received high amounts of development aid flows.

7. ROBUSTNESS CHECK ANALYSIS

The present section checks the robustness of the previous findings by using an alternative control group. Specifically, we draw from Klasen *et al* (2021) and use a control group that contains a set of developing countries that are not on the list of LDCs, and would not have met the criteria for graduation from the LDC category if they had been in this category. This control group contains 18 countries identified as such by Klasen *et al* (2021) on the basis of the last four tri-annual reviews (2006, 2009, 2012, 2015) performed by the United Nations' Committee of Development Policy (Klasen 2021 p 164). The majority of these countries were not included in the list of LDCs probably because, despite their poor economic and social (including in terms of education and health) performance, they might not have performed poorly enough to meet the criteria of inclusion in the LDC category. Also, despite their poor performance on income and human assets criteria for a long time (notably from the 1970s to the early 2000s), other countries such as India and Pakistan were not placed in the LDC category because they never met the structural economic vulnerability criterion. Finally, Ghana, Papua New Guinea, and Zimbabwe had met the inclusion criteria in the past, but their governments did not accept being considered as a LDC. This was because they did not want to be associated with the worst off countries, and were reluctant to acknowledge the economic decline of their country (see Klasen *et al* 2021 p 164).

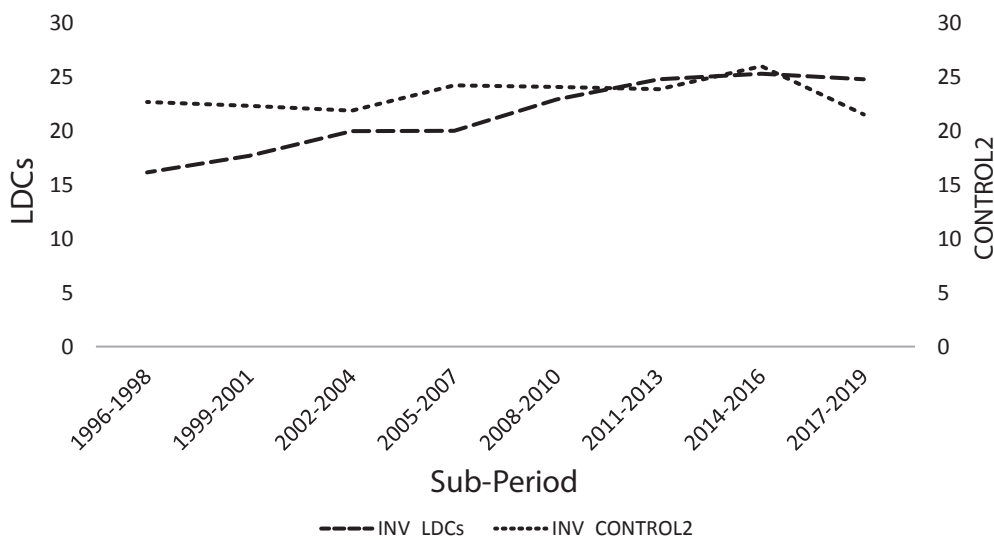
In the present analysis, 16 countries out of the 18 countries identified by Klasen *et al* (2021) are included in the control group, given data limitations.

These 16 countries are *de facto* ineligible for the benefits of the DFQF schemes offered by other WTO Members.¹⁷ The list of these 16 countries is provided in Appendix 4. The descriptive statistics related to variables in model (1) over this new control group (denoted “CONTROL2”) are provided in Appendix 5. It is worth noting that the treatment group still contains the 40 LDCs used in the analysis performed above.

Figure 4 displays the development of the indicator of domestic investment over the full period, for both LDCs and the new control group of 16 countries. It shows that before 2011–2013, LDCs experienced a lower level of domestic investment than countries in the control group, while from 2011–2013 to 2017–2019, the pattern reversed with LDCs’ level of domestic investment higher than that of countries in the control group. The level of domestic investment in LDCs moved steadily upward from 16.16 per cent in 1996–1998 to 24.8 per cent in 2017–2019, while for countries in the control group, it fell to 21.53 per cent in 2017–2019, from 22.7 per cent in 1996–1998.

We use this new control group to re-estimate the different specifications of model (1) that were used to test hypotheses 1 to 5, that is, the specifications of model (1) whose results were presented in column [2] of Table 1 and in the two columns of Table 2. The outcomes of these estimations are provided in

Figure 4: Development of domestic investment over the treatment group and the control group (i.e., the group labelled “CONTROL2”)



Source: Author

Note: “CONTROL2” is the control group that comprises a set of countries that had not been in the LDC category, and would not have met the criteria for graduating from this category if they were included in the category.

Table 3. We additionally check whether the results in Table 3 are sensitive to the exclusion of the countries that did not consent to be included in the category of LDCs. In particular, we exclude India and Papua New Guinea, as Zimbabwe was not part of the 16 countries of the new control group. Thus, we re-estimate the same specifications of model (1) with a control group of 14 countries (i.e. 16 countries excluding India and Papua New Guinea). The results of this sensitivity analysis are displayed in Table 4.

We note from outcomes reported at the bottom of Tables 3 and 4 that all requirements for the validity of the two-step system GMM estimator are met. Regarding the estimates, we show in Table 3 that the DFQF Decision exerted a negative and significant effect (at the 1 per cent level) on domestic investment in LDCs. This findings is consistent with the one presented in column [2] of Table 1. However, this outcome reflects the fact that the adverse effects of environmental and exogenous shocks prevented LDCs from expanding domestic investment, including during the period of the implementation of the DFQF Decision (the coefficient of the interaction term of the variable “[DiD*Log(SHOCK)]” is negative and significant at the 1 per cent level). This finding aligns with the one in column [1] of Table 2, and hence confirms hypothesis 3. At the same time, outcomes in column [3] of Table 3 show that those LDCs that received higher development aid inflows, were able to foster domestic investment, including to a greater extent than LDCs that received relatively lower amounts of development aid. This finding is also consistent with the one obtained in column [2] of Table 2, and hence supports hypothesis 5.

Overall, the findings from Table 3 concerning the effect of the DFQF Decision on domestic investment in LDCs (including the extent to which this effect depends on the intensity of shocks that hit LDCs, or on the amounts of development aid that accrued to LDCs) are consistent with those in Tables 1 and 2.

Regarding control variables, we find that while a higher intensity of shocks exerted a negative and significant effect (at the 1 per cent level) on domestic investment (see in particular columns [1] and [3] of Table 3), there is no significant effect of development aid on domestic investment at conventional significance levels. Incidentally, real per capita income, financial development and institutional and governance quality are all positively and significantly associated with domestic investment at the 1 per cent level. In contrast, aggregate demand exerts no significant effect on domestic investment at conventional significance levels.

Results in Table 4 align very well with those in Table 3, including in terms of magnitude of estimates. We, therefore, conclude that the outcomes in Table 3 are not sensitive to the exclusion of India and Papua New Guinea from the control group.

Table 3: Effect of the DFQF market access initiative on domestic investment in LDC

| Estimator: Two-step System GMM | | | |
|---------------------------------------|-----------------------|-----------------------|-----------------------|
| <i>Variables</i> | <i>INV</i> | <i>INV</i> | <i>INV</i> |
| | (1) | (2) | (3) |
| INV _{t-1} | 0.559*** (0.0153) | 0.575*** (0.0131) | 0.563*** (0.0133) |
| Effect = LDC*DFQF | -3.353*** (0.540) | 16.04*** (3.013) | -26.29*** (6.785) |
| Effect*Log(SHOCK) | | -5.168*** (0.872) | |
| Effect*Log(ODA) | | | 1.153*** (0.334) |
| LDC | 14.82*** (0.994) | 13.70*** (0.806) | 14.48*** (0.973) |
| DFQF | 4.317*** (0.447) | 4.297*** (0.551) | 4.416*** (0.432) |
| Log(SHOCK) | -3.163*** (0.715) | -0.814 (0.793) | -3.061*** (0.590) |
| Log(ODA) | -0.480 (0.408) | -0.557 (0.405) | -0.210 (0.367) |
| Log(GDPCAP) | 2.533*** (0.660) | 2.849*** (0.498) | 2.979*** (0.509) |
| Log(GDP) | 0.0203 (0.307) | 0.194 (0.262) | -0.411 (0.354) |
| Log(FD) | 2.425*** (0.487) | 2.643*** (0.496) | 2.792*** (0.459) |
| INST | 2.760*** (0.203) | 2.612*** (0.283) | 2.670*** (0.192) |
| TREND | -0.925*** (0.0756) | -1.021*** (0.0791) | -1.003*** (0.0648) |
| Constant | 16.00 (9.977) | 4.035 (9.506) | 17.98** (8.163) |
| Observations – Countries | 337 – 56 | 337 – 56 | 337 – 56 |
| AR1 (P-Value) | 0.0233 | 0.0218 | 0.0245 |
| AR2 (P-Value) | 0.6247 | 0.6128 | 0.7343 |
| AR3 (P-Value) | 0.4579 | 0.5439 | 0.3664 |
| OID (P-Value) | 0.2603 | 0.2162 | 0.2096 |

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. In the regressions based on the two-step system GMM approach, the variables “ODA”, “FD” and “INST” have been treated as endogenous. The full sample contains the alternative control group (i.e. 16 countries) and the treatment group (i.e. 40 LDCs).

Table 4: Effect of the DFQF market access initiative on domestic investment in LDC

| Estimator: Two-step System GMM | | | |
|---------------------------------------|-----------------------|-----------------------|-----------------------|
| <i>Variables</i> | <i>INV</i> | <i>INV</i> | <i>INV</i> |
| | (1) | (2) | (3) |
| INV _{t-1} | 0.557*** (0.0126) | 0.588*** (0.0169) | 0.566*** (0.0109) |
| Effect = LDC*DFQF | -3.804*** (0.585) | 17.69*** (3.328) | -26.83*** (6.203) |
| Effect*Log(SHOCK) | | -5.718*** (0.958) | |
| Effect*Log(ODA) | | | 1.145*** (0.301) |
| LDC | 13.28*** (1.175) | 11.09*** (1.642) | 12.70*** (1.080) |
| DFQF | 4.960*** (0.572) | 4.955*** (0.516) | 5.012*** (0.510) |
| Log(SHOCK) | -2.195*** (0.600) | 0.806 (0.897) | -1.597*** (0.576) |
| Log(ODA) | -0.779* (0.440) | -0.899*** (0.321) | -0.689** (0.341) |
| Log(FD) | 2.350*** (0.460) | 2.754*** (0.583) | 3.326*** (0.712) |
| INST | 2.974*** (0.220) | 2.810*** (0.200) | 2.808*** (0.214) |
| Log(GDPCAP) | 2.017*** (0.689) | 1.991*** (0.771) | 2.390*** (0.511) |
| Log(GDP) | 0.00915 (0.326) | 0.232 (0.219) | -0.299 (0.259) |
| TREND | -0.862*** (0.0733) | -0.984*** (0.0978) | -0.965*** (0.0703) |
| Constant | 23.14*** (8.391) | 11.91 (8.772) | 26.05*** (9.187) |
| Observations – Countries | 328 – 54 | 328 – 54 | 328 – 54 |
| AR1 (P-Value) | 0.0231 | 0.0195 | 0.0237 |
| AR2 (P-Value) | 0.4290 | 0.4127 | 0.5063 |
| AR3 (P-Value) | 0.5152 | 0.6158 | 0.4218 |
| OID (P-Value) | 0.3192 | 0.3379 | 0.3440 |

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. In the regressions based on the two-step system GMM approach, the variables “ODA”, “FD” and “INST” have been treated as endogenous. The full sample contains the treatment group (i.e. 40 LDCs) and the alternative control group from which we exclude Ghana and Papua New Guinea (i.e. 14 countries).

8. CONCLUSION

In 2005, WTO Trade Ministers adopted a landmark Decision the DFQF Decision, to facilitate market access for products originating from LDCs, and promote the latter's integration into the global trading system. The Decision urges WTO Members to provide DFQF market access to at least 97 per cent of products at the tariff line level originating in LDCs, on a lasting basis. The present paper has explored whether this ministerial Decision has helped LDCs expand their domestic investment. The analysis has been performed using an analytical framework that allows for a comparison – in the periods before and after the DFQF Decision – LDCs' performance in terms of domestic investment to the performance of countries that are not LDCs (and hence that did not enjoy the benefits of the DFQF Decision) but have characteristics similar to those of LDCs.

The panel dataset is unbalanced, covers the period from 1996 to 2019, and contains 40 LDCs in the treatment group, 15 LICs in the first control group (which is our main control group), and 16 countries in the second control group (which has been used for robustness checks). Using the two-step system GMM estimator, the analysis has established a negative effect of the DFQF Decision on LDCs' domestic investment. However, this finding reflects the fact that greater intensities of adverse environmental and exogenous shocks that affected LDC economies and prevented them from expanding domestic investment. Meanwhile, the analysis has also shown that the DFQF Decision led to an expansion of domestic investment in LDCs that received higher development aid flows.

This analysis underlines the disastrous effect of environmental and exogenous shocks on domestic investment in LDCs, and shows that such shocks are likely to prevent LDCs from expanding domestic investment, and fully enjoying the benefits of DFQF market access schemes offered to them. The study also reveals that higher development aid flows to LDCs were instrumental in promoting domestic investment (by both the public sector and private firms). Domestic investment plays a critical role for export expansion (including under the DFQF schemes), economic growth and development. In light of the strong vulnerability of LDCs to both environmental and external shocks, the international community should help these countries develop sustainably to cope with future shocks, but also to reduce their exposure to such shocks. This would, *inter alia*, help LDCs foster their participation in international trade (including by making better utilisation of non-reciprocal trade preferences available to them), and enjoy sustainable economic growth and development. Development aid, as one major type of capital inflow, could be instrumental in achieving these objectives. But LDC governments should also be assisted to develop and implement domestic policies that would encourage private investors to engage in long term domestic investments.

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Appendix 1: Definition and Source of variables

| <i>Variables</i> | <i>Definition</i> | <i>Source</i> |
|------------------|--|---|
| INV | This is the share (in per cent) of gross fixed capital formation in GDP. | World Development Indicators (WDI) |
| GDPCAP | Real per capita Gross Domestic Product (constant 2010 US\$). | WDI |
| GDP | Gross Domestic Product (constant 2010 US\$). | WDI |
| ODA | This is the real net disbursements of total Official Development Assistance (ODA), expressed in constant 2019 prices, in US dollars. | OECD (Organisation for Economic Cooperation and Development) database on development indicators. |
| SHOCK | <p>This is an indicator of the intensity of environmental and exogenous economic shocks. It has been computed as the weighted average of three components, agricultural production instability; export instability; and the victims of natural disasters.</p> <p>This indicator of intensity of shocks is one of the two components of the economic vulnerability index set up at the United Nations by the Committee for Development Policy (CDP), and used by the latter as one of the criteria for identifying LDCs. It has been computed on a retrospective basis for 145 developing countries (including 48 LDCs) by the “Fondation pour les Etudes et Recherches sur le Developpement International (FERDI)”. The values of the indicator “SHOCK” range from 0 to 100. For further details on the computation of the EVI, see for example Feindouno and Goujon (2016).</p> | Data on EVI is extracted from the database of the Fondation pour les Etudes et Recherches sur le Developpement International (FERDI) – see online at: https://ferdi.fr/donnees/un-indicateur-de-vulnerabilite-economique-EVI-retrospectif |
| FD | This is the financial development index, which summarises how developed financial institutions and financial markets are in terms of their depth (size and liquidity), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low costs and with sustainable revenues, and the level of activity of capital markets). The values of this indicator range between 0 and 1, with higher values indicating greater financial development. | Data extracted from the IMF Financial Development Index Database (see online at: https://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B) – See also Sahay <i>et al</i> (2015). |
| INST | <p>This is the variable capturing the institutional and governance quality in the beneficiary countries of GSP programmes. It has been computed by extracting the first principal component (based on factor analysis) of six indicators of governance: political stability and absence of violence/terrorism; regulatory quality; rule of law; government effectiveness; voice and accountability; and corruption.</p> <p>Higher values of “INST” are associated with better governance and institutional quality.</p> | Data on the components of “INST” variables has been extracted from World Bank Governance Indicators developed by Kaufmann <i>et al</i> (2010) and updated recently. See online at: https://info.worldbank.org/governance/wgi/ |

Appendix 2a: Descriptive statistics on variables used in the analysis
over the full sample (including both LDC and LICs in the control group)

| <i>Variable</i> | <i>Observations</i> | <i>Mean</i> | <i>Standard deviation</i> | <i>Minimum</i> | <i>Maximum</i> |
|-----------------|---------------------|-------------|---------------------------|----------------|----------------|
| INV | 305 | 22.996 | 9.907 | 4.085 | 72.432 |
| SHOCK | 305 | 40.210 | 15.546 | 5.653 | 87.964 |
| ODA | 305 | 751 | 739 | 29.1 | 4590 |
| FD | 305 | 0.119 | 0.046 | 0.003 | 0.261 |
| INST | 305 | -1.757 | 1.188 | -4.736 | 1.455 |
| GDPCAP | 305 | 1185.440 | 900.250 | 211.006 | 8157.079 |
| GDP | 305 | 17300 | 25200 | 159 | 195000 |

Note: The variables “ODA” and “GDP” are expressed in millions of US dollars.

Appendix 2b: Descriptive statistics on variables used in the analysis
over the treatment group, i.e., LDC

| <i>Variable</i> | <i>Observations</i> | <i>Mean</i> | <i>Standard deviation</i> | <i>Minimum</i> | <i>Maximum</i> |
|-----------------|---------------------|-------------|---------------------------|----------------|----------------|
| INV | 237 | 22.441 | 9.981 | 4.085 | 63.022 |
| SHOCK | 237 | 43.318 | 14.872 | 14.762 | 87.964 |
| ODA | 237 | 770 | 772 | 32.8 | 4590 |
| FD | 237 | 0.111 | 0.040 | 0.003 | 0.216 |
| INST | 237 | -1.820 | 1.200 | -4.736 | 1.455 |
| GDPCAP | 237 | 970.777 | 681.084 | 211.006 | 3708.431 |
| GDP | 237 | 16400 | 26900 | 166 | 195000 |

Note: The variables “ODA” and “GDP” are expressed in millions of US dollars.

Appendix 2c: Descriptive statistics on variables used in the analysis
over the control Group (“CONTROL1”)

| <i>Variable</i> | <i>Observations</i> | <i>Mean</i> | <i>Standard deviation</i> | <i>Minimum</i> | <i>Maximum</i> |
|-----------------|---------------------|-------------|---------------------------|----------------|----------------|
| INV | 68 | 24.930 | 9.465 | 9.224 | 72.432 |
| SHOCK | 68 | 29.380 | 12.819 | 5.653 | 53.398 |
| ODA | 68 | 686 | 607 | 29.1 | 2730 |
| FD | 68 | 0.146 | 0.055 | 0.048 | 0.261 |
| INST | 68 | -1.538 | 1.124 | -3.279 | 1.323 |
| GDPCAP | 68 | 1933.606 | 1145.519 | 817.114 | 8157.079 |
| GDP | 68 | 20600 | 17600 | 159 | 78400 |

Note: The variables “ODA” and “GDP” are expressed in millions of US dollars.

Appendix 3: List of the 55 countries used in the full sample, of which the 30 LDC and 15 LICs in the control group (“CONTROL1”)

| <i>Treatment group (LDC)</i> | <i>Control Group (PRGT-Eligible Low-Income Countries that are not LDC)</i> |
|------------------------------|--|
| Angola | Liberia |
| Bangladesh | Madagascar |
| Benin | Mali |
| Bhutan | Mauritania |
| Burkina Faso | Mozambique |
| Burundi | Myanmar |
| Cambodia | Nepal |
| Central African Republic | Niger |
| Chad | Rwanda |
| Comoros | Senegal |
| Congo, Dem. Rep. | Sierra Leone |
| Eritrea | Solomon Islands |
| Ethiopia | South Sudan |
| Gambia, The | Sudan |
| Guinea | Tanzania |
| Guinea-Bissau | Timor-Leste |
| Haiti | Togo |
| Kiribati | Uganda |
| Lao PDR | Vanuatu |
| Lesotho | Zambia |
| | Cabo Verde |
| | Cameroon |
| | Congo, Rep. |
| | Cote d'Ivoire |
| | Ghana |
| | Honduras |
| | Kenya |
| | Kyrgyz Republic |
| | Maldives |
| | Marshall Islands |
| | Nicaragua |
| | Papua New Guinea |
| | Tajikistan |
| | Tonga |
| | Uzbekistan |

Note: The list of PRGT-Eligible Low-Income Countries has been extracted from IMF (2021 p 34).

Appendix 4: List of the 16 countries used in the countries in the control group (“CONTROL2”)

| <i>Control Group</i> | | | |
|----------------------|----------|-----------|------------------|
| Cameroon | Ghana | Kenya | Nigeria |
| Congo, Rep. | Guyana | Mongolia | Pakistan |
| Cote d'Ivoire | Honduras | Namibia | Papua New Guinea |
| Eswatini | India | Nicaragua | Vietnam |

Appendix 5: Descriptive statistics on variables used in the analysis over the control Group (“CONTROL2”)

| <i>Variable</i> | <i>Observations</i> | <i>Mean</i> | <i>Standard deviation</i> | <i>Minimum</i> | <i>Maximum</i> |
|-----------------|---------------------|-------------|---------------------------|----------------|----------------|
| PRIV | 100 | 23.391 | 8.597 | 9.224 | 72.432 |
| SHOCK | 100 | 29.507 | 11.436 | 5.653 | 56.369 |
| ODA | 100 | 1090 | 1090 | 32.1 | 6740 |
| FD | 100 | 0.208 | 0.102 | 0.048 | 0.460 |
| INST | 100 | -1.393 | 1.070 | -3.251 | 0.895 |
| GDFCAP | 100 | 2133.008 | 1306.703 | 764.621 | 6281.889 |
| GDP | 100 | 174000 | 458000 | 2750 | 2810000 |

Note: The variables “ODA” and “GDP” are expressed in millions of US dollars.

ENDNOTES

1. The World Bank, 1818 H Street, NW Washington, DC 20433 USA. sgnangnon@worldbank.org

2. Information on LDCs is available online at: <https://www.un.org/ohrlls/content/least-developed-countries>

3. The list of the international support measures in favour of LDCs is available online at: <https://www.un.org/ldcportal/>

4. This decline in LDCs’ world merchandise exports share reflects the adverse effects of the COVID-19 pandemic (WTO 2021a).

5. Non-reciprocal preferential trade schemes are referred to as “preferential trade arrangements” in the parlance of the WTO. Detailed information on all non-reciprocal trade preferences, including those that are in force, is provided by the WTO in its dedicated Preferential Trade Arrangements (PTA) database maintained by the WTO. It is accessible online at: <http://ptadb.wto.org/>

6. The WTO Secretariat document (WTO 2021a, Annex Table 6, p 41-42) also provides a summary of the major providers of DFQF market access schemes in favour of LDCs, as of 2021. The title of Annex Table 6 is “Major multilateral non-reciprocal LDC preference schemes undertaken by Members, 2021 or latest available year”.

7. In general, developed countries offer non-reciprocal preferences to products originating from developing countries through their Generalised System of Preferences schemes (e.g. Grossman and Sykes 2005; Herz and Wagner 2011; Persson 2015a, 2015b), and the special treatment accorded to LDCs’ products (including in the form of DFQF market access for these products) are sub-schemes of these Generalised System of Preferences schemes. It is also important to note that apart from the Generalised System of Programmes, developed countries could also provide special non-reciprocal trade preferences to a selected set of countries, under a special Waiver granted by WTO Members (see WTO 2010). These include for example the African Growth and Opportunity Act (AGOA) offered by the United States to selected sub-Saharan African countries. Information on all of these types of preferences is contained in the WTO’s Preferential Trade Arrangements database.

8. To recall, 2005 is the year of adoption of the first Ministerial Decision to provide DFQF market access to products originating from LDCs.

9. As stated in the Hong Kong and Bali Ministerial Decisions, the DFQF market access granted (at least by developed countries) to at least 97 per cent of products originating from LDCs should be on a '*lasting basis*'.

10. The literature has also underlined the adverse economic effects of external shocks on low-income countries (which include LDCs) (e.g. IMF 2011; Dabla-Norris and Gündüz 2014).

11. In light of the strong vulnerability of LDCs to shocks, Guillaumont (2010) has proposed that the structural economic vulnerability index (which is one of the indicators used to assess whether a country can be classified as an LDC, or for the graduation of a country from the LDC category) be used to allocate development aid among recipient countries.

12. The PRGT represents the main vehicle used by the IMF to provide concessional loans (currently at zero interest rates) to LICs (as defined by the IMF). See further information online at: <https://www.imf.org/en/About/Factsheets/IMF-Support-for-Low-Income-Countries>

13. The list of countries currently included in the category of LDCs is available on the United Nations website at: <https://www.un.org/ohrlls/content/list-lldc>

14. The pairwise correlation matrices between variables for the treated group (LDCs), the first control group, and the second control group (used later in the robustness check analysis) suggest that all correlation coefficients are below the rule of thumb threshold of 0.8, recommended by Studenmund (2011) (these statistics can be obtained upon request). These statistics, therefore, indicate that our regressions did not suffer from a severe multicollinearity problems.

15. To recall, the variable "Effect" captures the interaction between the dummies "LDC" and "DFQF", and hence measures the effect of the DFQF Decision on domestic investment in LDCs.

16. To save space, we have not reported the outcomes of this estimation here. These outcomes can be obtained upon request.

17. Note that nowadays, one of these countries (India) provides duty free treatment to a large number of products originating from current LDCs (see the WTO Preferential Trade Arrangement database).

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