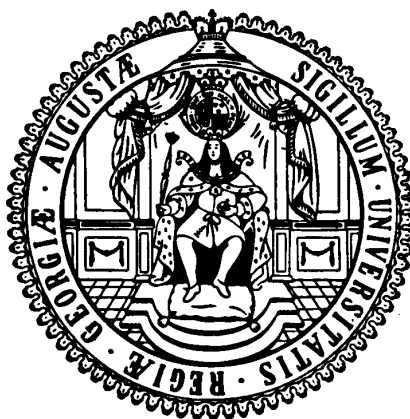# Ibero-Amerika Institut für Wirtschaftsforschung
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Does the Designation of Least Developed Country Status Promote Exports?

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Abstract

In this paper, we examine the extent to which developing countries export more as a result of being officially labelled as an LDC and consequently being eligible for a range of unilateral trade preferences. We estimate a gravity model of trade over the period of 1970 to 2013, in which identification is achieved by exploiting the particularities and asymmetries of 'inclusion' and 'graduation' criteria from LDC status. The main results show that inclusion in the official LDC list is associated with substantially higher exports. This is particularly the case for LDCs that also export manufactured and industrial goods and started to play a significant role after 1990. In addition, we evaluate the impact of developed countries' trade preferences on the exports of LDCs and the effectiveness of the trade preference schemes of the EU, the US, Canada, Japan, Australia, New Zealand, Norway and Turkey to better understand the mechanism at play. Unilateral preference regimes are, on average, not always beneficial in terms of increased export values for beneficiary developing countries but do have an impact on some sectors. They are mostly beneficial for agricultural goods and a few for manufactured goods, including textiles. As far as individual preference schemes are concerned, positive and statistically significant effects are found for the GSP schemes of Canada and Turkey. The positive effect of LDC status, however, is statistically significant and sizable even when controlling for trade preference schemes suggesting that other benefits of that status play a role in promoting exports.

Does the Designation of Least Developed Country Status Promote Exports?

1. Introduction

In 1971, the UN Committee for Development (later renamed the UN Committee for Development Policy, CDP) created a list of least developed countries (LDCs) for the first time to designate countries that suffered from low per-capita incomes and severe structural handicaps and were thus deserving of special support. The list at first included 23 countries but changed over time as new countries were included and others graduated from the category; these decisions are made by the CDP based on criteria that include a set of economic and social variables. The intention of the designation was that these countries should receive a range of special support measures from developed countries, as well as multilateral agencies, to further their economic development, including trade preferences, concessional aid, reduced UN contributions and support for participation in UN activities among others. The LDC category received increasing acceptance in trade discussions, especially since the late 1980s when it became the only official country grouping recognized by the WTO deserving of special support.

Related to this, industrialized countries (ICs) have been granting trade preferences to developing countries since the early 1970s. These unilateral preferences, known as the Generalized System of Preferences (GSP), have been covered by international trade law and have been described in the enabling clause of the General Agreement on Tariffs and Trade (GATT) in 1979 as part of the Tokyo Round of the GATT. GSP allows ICs to apply different tariffs between different categories of trading partners (e.g. developing (DCs) and least developed countries (LDCs)) without violating Article I of the GATT, which requires non-discriminatory and equal (most favoured nations (MFN)) treatment of trading partners. Such preferences can be part of the GSP, but they can also be granted via specific trade preference schemes, such as the EU's 'Everything by Arms' Initiative (EBA), which provides unilateral

preferences to LDCs, or the 'Africa Growth Opportunity Act' (AGOA), which provides unilateral trade preferences to African countries, including all African LDCs.

Even though LDC status and associated trade preferences seem to be a useful tool for developing countries, their effectiveness is unclear. According to a survey carried out by the United Nations (DESA/CDP, 2012), LDCs consider the unpredictability of non-reciprocal preferences, as well as the administrative costs involved, as deterrents to export-oriented investment in their countries, essentially arguing that those preferences are discretionary –and not contractually guaranteed– and hence could be withdrawn at any time by the importer. Given the uncertainty surrounding the preferences and costs when taking up GSP preferences in general, it is important to assess the effectiveness of these preferences. While literature exists on the effectiveness of individual preference schemes (see below), to our knowledge there is no literature (except for a recent simulation carried out by UNCTAD, 2016)[1] that examines the total impact of LDC status on the exports of these countries, which can be related to all of these preference schemes, but also to other support that LDCs might receive to improve their exports, including aid to improve infrastructure, promote foreign direct investment or other trade-enhancing schemes.

Hence in this paper, we analyze whether official LDC status has any impact on promoting the exports of these countries. To identify a causal effect of LDC status on exports, we exploit peculiarities and asymmetries in the inclusion and graduation criteria. More specifically, we compare LDCs to non-LDC developing countries that have similar values on the LDC criteria as LDCs but are not on the list due to historical contingencies and asymmetric inclusion and graduation criteria.[2] In particular, there is a large set of non-LDCs that are not badly enough off to meet the inclusion criteria but would also not meet the graduation criteria if they were on the list. In other words, if they had been placed on the list

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[1] The estimated loss of LDC-specific preferential treatment in the G20 countries is estimated to be equivalent to a 3-4 percent reduction in merchandise export revenues (UNCTAD, 2016, p. 17).

[2] See Guillamont (2009) for details on the inclusion and graduation criteria and their changes over time.

due to some historical contingency (e.g. being among the poorest countries in 1971), they would still be on it today. Hence, this comparable set of non-LDCs should thus serve as a good control group for countries on the list.

Clearly, the current group of 48[3] LDCs (Table 1) is very heterogeneous, including countries that mainly export goods that are already duty free at the MFN-level, and others that could benefit from trade preferences by joining specific schemes such as GSP+[4]. It includes landlocked countries, very small island states and countries that are heavily commodity-dependent. Therefore, we will also examine the effect on specific groups of countries. Moreover, we evaluate the impact of ICs' trade preferences on LDCs' exports focusing on the effectiveness of the trade preference schemes of the EU, the US, Canada, Japan, Australia, New Zealand, Norway and Turkey. Finally, we will analyze the impact of trade preferences on total exports, exports without oil and minerals, exports of raw materials, agricultural exports and manufactured exports (further differentiating here between chemical goods, machinery and transport goods and textiles and other goods).

The most important difference relative to previous studies is that we specifically include LDC status in our analysis while also studying the link between trade preferences and bilateral trade by differentiating by product groups/sectors and focus therefore on the specifics of a particular preference scheme[5]. We also account for time-varying and time-invariant country characteristics, country-pair heterogeneity and take into account other bilateral time-variant factors that affect exports, such as free trade agreements (FTAs),

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[3] The list includes Equatorial Guinea, which graduates in 2017, and South Sudan was included in 2012.

[4] The countries currently benefiting from the EU's Special Incentive Arrangement for Sustainable Development and Good Governance (GSP+) are: Armenia, Bolivia, Cape Verde, Kyrgyzstan, Mongolia, Pakistan, Paraguay, Philippines and Sri Lanka. The current GSP+ was established in 2012 and is valid until 2023.

[5] As argued above, the LDC category might promote their exports through other mechanisms, such as more preferential aid, more lenient treatment in the enforcement of trade regulations as well as other bilateral and multilateral support measures that lead to increased exports. Thus, it is important to assess the complete impact of LDC status on trade.

currency unions (CUs) and common WTO membership, following more recent studies (Herz and Wagner, 2011; Gil-Pareja et al., 2014).

The main results show that while official LDC status is associated with a substantial increase in exports, the unilateral preference regimes seem to generate no statistically significant effect. However, when exploring heterogeneity across sectors and different GSP schemes, we find positive effects for some goods and the GSP schemes of Canada and Turkey. We also find that LDC status leads to higher exports even when controlling for specific trade preference schemes suggesting that the benefits of that status extend beyond a specific trade preference scheme.

The rest of the paper is structured as follows: Section 2 presents a review of the closely related literature and Section 3 outlines the empirical strategy, the model specification and describes the data and its sources. The main results are presented in Section 4 and Section 5 concludes.

2. Trade Preferences, LDC Status and Developing Countries' Exports

Trade preferences (TP) under the GSP programme are granted not only by the so-called QUAD countries –namely the European Union (EU), the US, Japan and Canada– but also by Australia, New Zealand and Norway among others.[6] Whereas general GSP preferences are open to most developing countries, preference providers typically have more generous schemes exclusively for LDCs. These LDC schemes were introduced in the early 2000s as a response to the call for developed countries to provide duty- and quota-free access to LDCs. In addition to general GSP preferences and LDC preferences, many ICs also provide preferences to other groups of DCs or regions, either within the GSP or as separate schemes.

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[6] For a complete list see http://ptadb.wto.org/ptaList.aspx

Among the specific schemes, the *EU* offers the "Everything but Arms" (EBA) initiative with 'zero' tariffs for LDCs covering all products except for arms and ammunition and also the slightly less preferential GSP+ tariff for vulnerable countries, which respect human rights and other international conventions. The *United States* (USA) system of preferences for LDCs also works through different schemes in addition to the general GSP scheme, including the African Growth and Opportunity Act (AGOA) and the Caribbean Basin Trade Partnership Act (CBTPA), which include all LDCs in the region (but are not limited to them). Duty-free access is excluded for oil, certain textiles and apparel and some leather products under USA-GSP. Under AGOA, footwear, luggage, handbags, watches and flatware can be exported duty-free to the US since December 2000, subject to specific certification on the rules of origin. Textiles can be exported duty-free but not quota-free to the United States. Apart from the Generalized Preferential Tariff (GPT), *Canada* offers two further non-reciprocal regimes: the Commonwealth Caribbean Countries tariff (CCCT) and the Least Developed Country Tariff (LDCT). The *Japanese* GSP system is comprised of a positive list of agricultural items that are eligible for GSP, and a negative list of industrial goods that are ineligible. The Japanese system provides duty-free, as well as reduced-duty, access under GSP to developing countries. All the textile and clothing products from LDCs are duty-free and quota-free (DFQF) since 2001 in Japan. It is worth noting that Japan has adopted a special graduation policy, whereby a particular country can lose its GSP benefits for a specific product when the beneficiary is considered to be internationally competitive and Japan has also in fact withdrawn benefits as countries have graduated from LDC status[7]. However, a common feature of all preference systems is that GSP preferences can be withdrawn, suspended or limited vis-à-vis countries and products.

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[7] Other developed countries also apply some graduation rules. For instance, the EU standard GSP and GSP+ are subject to income and product graduation (Stevens et al., 2011).

As already mentioned in the introduction, the uncertainty and costs associated with the preference regimes has limited its use and effectiveness. Brenton (2003) claims that for most LDCs, the value of EU preferences is below 5% of total exports (see Table A.1 in the Appendix). The low value of preferences can be especially ascribed to the strict rules of origin (RoO)[8] and the administrative burden of filling out forms when claiming trade preferences (Gitli, 1995; Bjuggren and Hanson Lundström, 2012; Gradeva and Martínez-Zarzoso, 2016). Bjuggren and Hanson Lundström (2012) are able to show that the more generous rules of origin of the US lead to higher imports from developing countries, whereas the EU's stricter RoO lead to lower utilisation rates of preferences in textiles and clothing trade of developing countries. Next to RoO, non-tariff barriers to trade in the form of technical standards act as another trade impediment (Khorana, 2007; Mohan et al., 2012). Moreover, it is often argued that LDCs lack productive or administrative capacity to make use of these preferences (Huchet-Bourdon et al. 2009; UNCTAD, 2016).

While the trade benefits given to LDCs are variable, have changed over time and can easily be withdrawn, it is worth noting that countries that are classified as LDCs usually maintain this status for many years and graduation has only happened in a few cases. Since 1971, when the LDC category was created, the United Nations (UN) has granted LDC states (at present 48) a range of preferences and asked member states to provide special trade privileges to this group of countries. These unilateral trade privileges to LDCs are compatible with WTO rules, which recognizes the LDC category as the only official country grouping. The criteria for being classified as an LDC have been periodically revised and are based on three mainly social and economic outcomes: the level of per capita income, the level of human resources and the level of economic vulnerability. Every three years, a so-called tri-annual review is done by the CDP to decide which countries should be included and which

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[8] The total costs of border formalities to determine the origin of a product are in the range of 3% to 6% of the total export value of a product (Inama, 2003; Mohan et al., 2012).

should graduate from the list. Since its creation in the 1970s, only 4 countries have graduated[9] and a fifth is due to graduate in 2017 (Botswana in 1994, Cape Verde in 2007, the Maldives in 2011, Samoa in 2014 and Equatorial Guinea in 2017; see also UNCTAD, 2016). Only 23 countries were on the initial list (1971), with 7 countries added in 1975, 10 more added in the 1980s and 9 in the 1990s (See Table 1 for these countries and their exact dates). The precise criteria for inclusion and graduation, and how we use them in our identification strategy, are discussed below.

Econometric evidence on the role of trade preferences for developing countries' exports shows that the findings are mixed so far. In many cases, studies examining the impact of trade preference schemes on DCs' *aggregate exports* use trade preference indicators (*TPs*), i.e. dummies that indicate whether a trade preference system is at work or not. A number of empirical studies in the 1980s and 1990s show that GSP underperformed, with only a modest increase in the exports of beneficiary countries, some of which could be attributed to trade diversion (Brown, 1989; Sapir and Lundberg, 1984; Whalley, 1990). More recent studies by Herz & Wagner (2011) and Gil-Pareja et al. (2014) examine a number of trade preference schemes and also find mixed results.

Herz and Wagner (2011) analyze 184 countries over the period 1953-2006 using annual trade data. They use Pseudo Poisson Maximum Likelihood (PPML) estimation[10] to estimate a gravity model of trade that includes year- and country-pair fixed effects. The overall results point to an export hampering effect of trade preferences. More specifically, the authors show that trade preferences (GSP scheme) are associated with 4 percent *lower* exports for DCs on average. However, the impact of trade preferences on DCs' exports is positive and statistically significant if the scheme exists for less than 10 years, but turns negative and statistically significant for trade relations lasting up to two decades (medium- to

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[9] The timeline of a country's graduation is available at: https://www.un.org/development/desa/dpad/least-developed-country-category/ldc-graduation.html.

[10] They also show robustness checks with fixed effects LS (dyadic effects) and year dummies.

long-run). Herz and Wagner (2011) argue that the preference granting countries benefit in the short-run since GSP receiving countries import intermediate inputs mainly from GSP granting countries, supposedly due to a recipient country's goodwill or improved relations. They also emphasize that trade preferences seem to have distortive effects in DCs in the long-run when strict or complicated rules of origin lead DCs to export under most favoured nation (MFN) tariffs rather than under GSP preferences.

In contrast to these findings, Gil-Pareja et al. (2014) provide evidence of an export promoting effect of trade preferences for DCs. They use a panel data set of 177 countries over the period 1960 to 2008 to estimate a gravity model of trade in levels and in first differences, including controls for unobserved heterogeneity and multilateral resistance[11]. A Heckman 2-stage model and a PPML model are also estimated. Their results show positive and statistically significant average effects of trade preferences, ranging from a cumulative impact of 26 percent after 4 years to 88 percent after 8 years. They find an impact of 91 percent[12] when the model is estimated using first differences. Using a Heckman approach the impact is reduced to 39 percent and using PPML to 27 percent. A simulation study by UNCTAD (2016) finds that removal of LDC-specific preferential treatment in the G20 countries would cause a loss that is, on average, equivalent to a 3-4 percent reduction in merchandise export revenues.

There are a number of studies evaluating the effect of TPs granted by single ICs to DCs. We focus in what follows on the results of studies for the EU, the US and Japan. Thelle et al. (2015) look exclusively at the *EU* trade preference scheme using 176 countries (of which 133 DCs and 43 either OECD or high-income oil-exporting countries) and 3,408

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[11] They usually include country-year fixed effects for exporters and importers (in the main results) and country-pair (dyadic) effects in the robustness checks. In order to reduce the amount of dummy variables, they use data with 4 year increments.

[12] Since first difference regressions reflect short-run development, a value of 91% seems to be unrealistic and values computed by the Heckman or PPML approach produce more plausible figures in the range of around a 30 percent increase in exports.

products over a period of 18 years (1995-2012). They use three different trade preference (TP) measures: (i) tariff margins ($t^{MFN}- t^{TP}$)[13], (ii) preference ratios ($1-t^{TP}/t^{MFN}$) and (iii) existence of trade preferences, i.e. a dummy variable that takes the value of one if a trade preference scheme exists. This latter measure has the advantage to capture not only the impact of tariffs but that of quotas, non-tariff trade barriers and rules of origins as well, which may be important aspects of trade preferences not captured by tariffs. The disadvantage is of course that it is a very rough measure. In line with the results by Gil-Pareja et al. (2014), Thelle et al. (2015) find that, on average, trade preferences granted by EU countries significantly increase DCs' exports in nominal terms.[14] In particular, they find that enjoying trade preferences boost DCs' exports by about 6 percent (impact of the preference dummy), that a 100% elimination of tariffs (the preferential tariff becomes zero) would also increase exports of all products by 6 %, on average, and that a 1% increase in the tariff margin would increase DCs' exports by about 0.3% over a period of 18 years.

Frazer and van Biesebroeck (2010) examine the *AGOA scheme* –the US trade preference scheme for African countries—using data for the period of 1998-2006 from 207 countries and 5,120 products (6-digit). They find a large, positive and statistically significant impact of AGOA on US imports from AGOA countries. Receiving AGOA treatment increases US imports, on average, by 13%. Imports of apparel, agricultural goods, minerals, petroleum and manufacturing products increase by 42, 8, 16.6, 73.5 and 14.6 percent respectively.

Ito (2013) evaluates the impact on LDCs of DFQF access granted by *Japan*. Japan began granting LDCs DFQF access in 2000 and accelerated the policy after 2005. Ito (2013) finds that the LDCs did not benefit from DFQF access to the Japanese market in general. The tariff lines, which were granted zero tariffs and substantial preference margins over non-LDC

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[13] t^{MFN} is the tariff under Most Favoured Nations treatment; t^{TP} is the tariff under the relevant trade preference scheme.
[14] Export deflators for 3,408 products are not available.

countries, cover products not imported by Japan, although total imports from the LDCs to Japan were increasing. Ito interprets these negative results as suggestive evidence that tariff barriers are small obstacles for trade relative to the challenges posed by infrastructure, non-tariff barriers, distance and cultural differences.[15]

A summary of the main empirical findings of specific studies on EU and US trade preferences can be found in the Appendix in Tables A.2 (The impact of EU trade preferences) and A.3 (The impact of US trade preferences), respectively.

As argued above, however, LDC status may influence their exports through other mechanisms. They may range from higher and more concessional aid flows, specific aid for trade programs, support for FDI, which may boost exports, or greater goodwill in the enforcement of existing trade regulations. Indeed, LDCs receive significantly more aid than non-LDCs (on a per capita or per GDP basis), a larger share of aid is highly concessional aid and they receive substantial support through aid-for-trade programs (Alonso, 2015; Cali and Te Velde, 2011; Martínez-Zarzoso et al., 2017). It might well be the case that these mechanisms also help promote exports beyond the effect of trade preferences.

3. Empirical Analysis

3.1 Empirical Strategy

To assess the impact of being designated an LDC on their exports, it is critical to identify a control group of countries that is as similar as possible to LDCs, but are not classified as an LDC. The identification of such a control group is actually possible since the rules of inclusion and graduation are asymmetrical. In particular, a country needs to perform poorly (be worse than a fixed cut-off) in all three criteria of the LDC classification –per capita income, human assets and economic vulnerability— to be included in the list. For

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[15] As cited in Harrison (2014).

graduation, countries only have to be above the cut-offs in two out of three criteria; moreover, the graduation cut-offs are 10 percent higher than the inclusion cut-offs. As a result, it is possible that a country *A* that happened not to be on the list, has the same score as country *B* that is on the list. In particular, this would be the case if country *A* is not doing badly enough to be included on the list (i.e. is not below the lower inclusion cut-off in all three criteria) but not well enough to graduate (i.e. is not above the higher graduation cut-off in two out of the three criteria).

In order to identify such comparable countries, we look at the last four tri-annual reviews (2006, 2009, 2012, 2015)[16] to identify developing countries that are not on the list of LDCs, but had they been on the list, would not have met the criteria for graduation. Table 1 shows that 18 countries meet this condition and are therefore comparable in the three LDC criteria to countries on the list.

How can it be that these 18 countries are not on the LDC list to begin with? Three reasons play a role. Quantitatively, the most important reason is that there are countries that were not doing badly enough to be included on the original list in 1971 (either in terms of income or education), but suffered from poor economic or education/health performance since then so that they end up performing similarly poor to countries that were initially placed on the list; however, they are not performing poor enough to meet the strict inclusion criteria and did not make it onto the list in the 1980s or 1990s. Most countries fall into this category, for example: Ghana, the Congo, Ivory Coast, Kenya, Nigeria, Pakistan, Swaziland and Vietnam. India, Nigeria and Pakistan never made it on to the LDC list as the CDP had an additional inclusion criterion starting in the 1990s, which was that countries should have less

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[16] Going back further is difficult as the criteria have changed slightly over time and data is not available for earlier years. Since most developing countries also recorded economic growth and improvements in education and health in the 1990s, going back further (i.e. to a time when they were poorer and education and health were worse) would be very unlikely to change the list of comparator countries.

than 75 million people and which they all surpassed in the 1990s.[17] And Zimbabwe, as a result of its economic decline in the 1990s and 2000s plus the impact of AIDS, has actually met the inclusion criteria in the last three tri-annual reviews, but the government has not given its consent to place the country on this list.

To illustrate our point, consider Figure 1, which shows nominal GDP/capita in US$ (using the Atlas method), the income indicator used for determining LDC status, for four countries from 1965-2013. Zambia became an LDC in 1991, Burkina Faso and Sudan have been one since the beginning and Cameroon and Ghana are two countries that if they had been on the list in the last 4 tri-annual reviews, would not have graduated in at least one of them. One can see that the income levels of off-list countries are similar and quite often below those of LDCs. One should also note, however, that there are some very poor LDCs, such as Burkina Faso, Niger and Mali, that are doing worse than most off-list countries (with the exception of Zimbabwe). Due to these poor performing LDCs, the average performance of LDCs on the LDC criteria is worse than those of off-list countries. Thus while we have created a much more comparable group of countries through our procedure, we might still underestimate the effect of LDC status under the assumption that poorer LDCs are having a harder time benefiting from LDC status. In a robustness check, we will remove the worst-off LDCs (and Zimbabwe from the off-list countries) to make the groups even more comparable.

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[17] The argument was that more populous countries would be better able to deal with their structural handicaps. Surpassing 75 million does not lead to graduation, however, which is why Bangladesh and Ethiopia are still LDCs.

Figure 1: Per-capita incomes, selected LDCs and off-list countries, 1965-2013
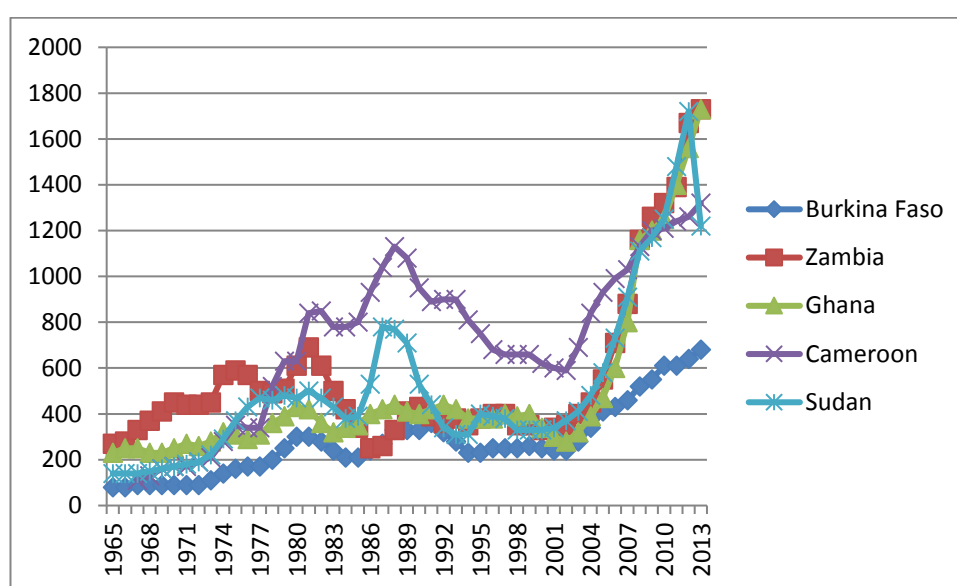
A difference-in-difference analysis, comparing LDCs with this control group, is utilized to see whether or not official LDC status benefits official LDCs in terms of greater exports. In addition, we exploit the information of countries entering the list later and the graduation of the four countries.

Apart from this analysis, we also compare LDCs to all non-LDC developing countries. To assess the impact of trade preferences as a transmission channel, individual trade preference granters are also considered (the US, Canada, the EU, Norway, Japan, Australia, New Zealand and Turkey). In addition, the impact over time of trade preferences are briefly assessed.

Table 1. List of LDCs and control group list

LDC Country	Incl.	Grad.	LDC Country	Inc.	Grad.	Off-LDC list (control group)
Afghanistan	1971		**Madagascar**	1991		Cameroon
Angola	1994		Malawi	1971		The Congo
Bangladesh	1975		The Maldives	1971	2011	Côte d'Ivoire
Benin	1971		Mali	1971		Ghana
Bhutan	1971		Mauritania	1986		Guyana
Botswana	1971	1994	**Mozambique**	1988		Honduras
Burkina Faso	1971		**Myanmar**	1987		India

Burundi	1971		**Nepal**	1971		Iraq	
Cambodia	1991		Niger	1971		Kenya	
Cape Verde	1977	2007	Rwanda	1971		Mongolia	
Central African R.	1975		Samoa	1971	2014	Namibia	
Chad	1971		Sao Tome and Principe	1982		Nicaragua	
Comoros	1977		**Senegal**	2000		Nigeria	
Dem. Rep. Congo*	1991		Sierra Leone	1982		Pakistan	
Djibouti	1982		Somalia	1971		Papua N. Guin.	
Eritrea	1994		South Sudan	2012		Swaziland	
Equatorial Guinea*	1982		**Sudan**	1971			
Ethiopia	1971		Timor-Leste*	2003		Vietnam	
Gambia	1975		**Togo**	1982		Zimbabwe	
Guinea	1971		Tuvalu*	1986			
Guinea-Bissau	1981		**Uganda**	1971			
Haiti	1971		**Tanzania**	1971			
Kiribati	1986		Vanuatu	1985			
Lao P. Dem. Rep.	1971		Yemen	1971			
Lesotho	1971		Zambia	1991			
Liberia	1990		Solomon Islands*	1991			

Note: *no export data available. Source: UNDP. Big exporters and countries that have diversified their exports are in **bold.** Small island states are underlined. No data are available for South Sudan.

Secondly, a dummy variable 'Trade Preferences' (TP) will be used to signal the existence of trade preferences. The TP-dummy also includes the existence of tariff-quotas, voluntary export restraints, rules of origin and non-tariff trade barriers in the form of technical standards and the like. Hence, 'the carrot and the stick' scenario holds that the EU, the US, Canada, Norway, Japan, Australia, New Zealand and Turkey must make an offer. The interaction of the TP-dummy with the LDC dummy indicates the impact of a TP-scheme for official LDCs.

Thirdly, LDC exports are compared to all non-LDC exports also analyzing the impact of trade preference schemes. The comparison with the more developed non-LDCs will allow us to uncover the impact of tariff erosion, which can be the result of multilateral tariff liberalization, bilateral free trade and economic partnership agreements that include non-LDCs.

3.2 Model Specification: The Augmented Gravity Model of Trade and the Trade Preference-Export Link

We analyze the impact of being an LDC and the trade preference-export relationship within the framework of the gravity model of trade, for which theoretical foundations have been developed in the past three decades by Anderson (1979), Bergstrand (1985, 1989 and 1990), Helpman (1987), Deardorff (1998), Feenstra et al. (2001), Anderson and van Wincoop 2003, Feenstra (2004), Haveman and Hummels (2004) and Redding and Venables (2004) among others. Excellent reviews of the recent developments can be found in Anderson (2011) and Head and Mayer (2014).

Using this modelling framework we are able to evaluate and quantify the impact of trade preferences on bilateral exports controlling for a variety of factors related to the business cycle, the level of development, country size and other policy factors that affect bilateral trade. Anderson and van Wincoop (AvW) (2003) contributed to this literature by deriving trade costs from the gravity model and by suggesting how to model not only bilateral trade costs but also trade costs from third countries, which clearly influence bilateral trade costs. These relative-costs are called 'multilateral resistance terms' (MRTs) and are very important determinants of exports and imports. The AvW model with MRTs has been extended to applications explicitly involving developed and less developed countries by Nelson and Juhasz Silva (2012).

In our analysis, we use the typical control variables of the gravity model (see Bergstrand 1985, 1989, 1990; Anderson and van Wincoop, 2003; Nelson and Juhasz Silva, 2012; Pettersson and Johansson, 2012) and augment the model with variables that indicate if a specific country is an official 'LDC' and include controls that signal whether a country enjoys a *particular GSP status*. We account for time-invariant unobservable heterogeneity by

using country-pair fixed effects. In addition, we include time-variant importer and exporter dummies in the model to account for MRTs. Given the time span of our analysis, MRTs do not vary yearly, but every ten years. The main reason for this choice is twofold. First, we would like to identify the effect of being an LDC, and since this dummy is exporter specific and varies yearly, we will only be able to identify this effect if we restrict the temporal variation of the MTRs to ten-year intervals. Secondly, MRTs are supposed to account for trade costs relative to all trading partners and we assume that these costs only vary substantially in the medium term[18].

According to the underlying theory of the gravity model, trade between two countries is explained by nominal incomes of the trading countries, by the distance between the economic centres of the exporter and importer and by a number of trade impediment and facilitation variables. Geographical distance and a number of dummy variables, such as common border, former colony, common language, free trade agreements, common currency and the like, are generally used as proxies for these factors, but in our setting, these variables are absorbed by dyadic fixed effects.

In order to study the impact of specific trade preference schemes on exports, we will focus on the role played by unilateral *trade preferences (TP) including EU, American, Canadian, Japanese, Australian, New Zealand, Norwegian and Turkish trade preference systems*.

A comprehensive econometric version of the structural gravity model, augmented with GSP and LDC factors, is specified as follows:

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[18] As robustness checks, we vary the frequency of the time-country dummies and the results remain similar, with the only exception of agricultural exports, for which the LDC dummy coefficient has a much higher magnitude when using six-year intervals.

$$X_{ijt} = Exp\left[\delta_{ij} + \tau_{ip} + \varphi_{jp} + \alpha_1 \ln Y_{it}\right.$$

$$+ \alpha_2 \ln Y_{jt} + \sum_k \beta_k TP_{k\_ijt} + \alpha_5 BTP_{ijt} + \alpha_6 LDC_{it}$$

$$\left.+ \sum_h \gamma_h (TP_{k_{ijt}} * LDC_{it})\right]\varepsilon_{ijt}$$

(1)

where *t* stands for the year and *p* for the time windows used, e.g. the inclusion of dummies that are country specific and vary every *p* years. X_{ijt} are the exports from exporter *i* to importer *j* in period *t* in current US dollars. *k* is the number of trade preference (TP) schemes.

Trading-partner (dyadic) fixed effects, δ_{ij}, which proxy for time-invariant characteristics in the relationship between *i* and *j,* are included to account for time-invariant bilateral effects. This leads to the exclusion of distance and other bilateral factors, namely geographical distance, common border, common language, colonial relationship and the like. As the influence of variables that are bilateral and time-invariant cannot be directly estimated (due to perfect collinearity) when bilateral (dyadic) fixed effects are included, we will not be able to estimate coefficients for these factors.

Exporter-time fixed effects (τ_{ip}) and importer-time-fixed effects (ϕ_{jp}) proxy for all sorts of trade barriers that are country specific and vary slowly over time. They are supposed to control for outward and inward multilateral resistance, i.e. trade barriers from third countries that affect trade costs. We use 10-year windows (*p*) for constructing the exporter-time and importer-time fixed effects, mainly to account for factors, such as institutions, infrastructure or cultural factors, which vary slowly over time. Y_{it} (Y_{jt}) indicates the GDP[19] of

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[19] We utilise GDP rather than GNP in order to avoid counting income received by third countries (international transfer payments such as aid) twice.

the exporter (importer). The variable *TP* denotes different trade preference dummies that can vary over time and that characterize *k* different *Trade Preference Schemes* (*TP$_k$*) relating to country-pair *ij* at time *t*.

TP_{k_ijt}, CU_{ijt}, RTA_{ijt} and WTO_{ijt} denote time-variant bilateral factors related to common membership in *currency unions, regional free trade agreements and the World Trade Organization.*

Taking logarithms, the basic specification of the gravity model becomes:

$$
\begin{aligned}
\ln X_{ijt} &= \alpha_1 \ln Y_{it} + \alpha_2 \ln Y_{jt} + \alpha_3 RTA_{ijt} + \alpha_4 CU_{ijt} + \alpha_5 WTO_{ijt} \\
&\quad \delta_{ij} + \tau_{jp} + \phi_{ip} + \beta_1 TP_{1ijt} + ... + \beta_K TP_{Kit} + \alpha_8 LDC_{it} + \gamma_1 (TP_{1ijt} * LDC_{it}) + ... + \quad (2) \\
&\quad \gamma_H (TP_{Hijt} * LDC_{it}) + \varepsilon_{ijt}
\end{aligned}
$$

where *ln* denotes variables in natural logs. The model is estimated for data on a maximum of 192 countries (for 184 of them data on GSP schemes are available) over the period from 1973 to 2013. The model will be estimated by panel fixed effect techniques that are either based on the least squares (LS) technique or on PPML.

In the panel LS estimations, we include exporter-time- and importer-time-dummies and dyadic effects. The exporter-time and importer-time dummies capture (multilateral) trade costs, that is, the influence of third countries on bilateral trade costs (MRTs). The main reason why we use 10-year windows is because our target variable, the LDC dummy, varies by exporter and year and we would like to be able to identify this effect that should not be absorbed by the exporter-time MRT.

As a robustness check, the regressions are also performed with the PPML technique. We add dyadic effects (exporter and importer dummies) and common time effects as controls.

3.3 Data and Variables

Bilateral trade data from 1973 to 2013 for aggregated and disaggregated exports (1 digit level SITC) is from UN-COMTRADE. The products included in the sectors considered in the empirical analysis are listed in Table A.4 in the Appendix. Data on income variables are drawn from the World Bank (World Development Indicators Database, 2016). Distances between capitals computed as great-circle distances using data on straight-line distances in kilometres, latitudes and longitudes, trade impeding or promoting factors, such as being a former colony and sharing a common language or a common border, are taken from the CEPII database[20]. GSP preference dummies were kindly provided by Marco Wagner (Herz and Wagner, 2011) and have been extended until 2013 using information from UNCTAD reports. RTA and WTO dummies are from De Sousa (2012). The official LDC list and the characteristics of LDC countries are from the UNDP.

4. Main Results

4.1 Results for LDCs and Comparable Countries

In this section, we start by comparing the exports of official LDC countries with the exports of the control group, 'off-LDC-list' countries (see Table 1), which are countries with a low level of income, a low level of human development and a high level of economic vulnerability, but which for some reason have not obtained LDC status for the reasons discussed above.

The main results for the selected comparable developing countries as exporters are presented in Table 2 for aggregated exports with and without energy (mineral fuels, lubricants and related materials) products in columns (1) and (2) and for the most important

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[20] http://www.cepii.fr/anglaisgraph/bdd/fdi.html.

sectors at the 2 digit SITC disaggregation level in columns (3) to (8). The estimations contain data for around 3800 country-pairs with no-missing trade for aggregate exports.

Results in the first row of column 2 of Table 2 indicate that LDCs export 74% [(exp(0.557)-1)*100%] more in total exports and about 61% [(exp(0.476)-1)*100%] more of agriculture-related exports (column 4) than the control group. The impact of LDC status on other manufactured goods is also statistically significant (with an associated trade increase of 46%). The effect of preferences (GSP dummy variable) with higher exports is non-significant, whereas the combination of receiving preferences and being an official LDC is associates with higher aggregate exports, higher agricultural exports, manufactured exports and higher exports of other manufactured goods and textiles. Thus the presence of preferences further increases exports for LDCs.

TABLE 2. LDCs & comparable 'off-LDC-list' countries as exporters, all importers

VARIABLES	(1) Ln xtot	(2) Ln xnoen	(3) Ln xManu	(4) Ln xRawm	(5) Ln x_Agri	(6) Ln xChem	(7) Ln xMachtr	(8) Ln xTex_Others
LDC status	0.557***	0.414***	0.307*	0.186	0.476**	0.273	0.228	0.377**
	[0.160]	[0.147]	[0.166]	[0.194]	[0.198]	[0.219]	[0.163]	[0.153]
GSP	0.0414	0.0434	-0.0514	0.260*	-0.0206	-0.104	-0.282*	0.0388
	[0.120]	[0.116]	[0.126]	[0.153]	[0.167]	[0.257]	[0.166]	[0.128]
LDC*GSP	0.547***	0.419**	0.373*	0.0807	0.530**	-0.939***	-0.160	0.585***
	[0.191]	[0.177]	[0.192]	[0.252]	[0.247]	[0.326]	[0.217]	[0.181]
Ln Y_i	0.536***	0.545***	0.606***	0.312***	0.602***	0.568***	0.885***	0.443***
	[0.0620]	[0.0397]	[0.0496]	[0.0603]	[0.0528]	[0.0805]	[0.0712]	[0.0530]
Ln Y_j	0.510***	0.529***	0.692***	0.426***	0.465***	0.716***	0.632***	0.688***
	[0.0483]	[0.0384]	[0.0480]	[0.0595]	[0.0539]	[0.0752]	[0.0684]	[0.0515]
CU	0.383	0.323	0.675**	0.952*	0.948**	1.728***	0.231	0.927**
	[0.259]	[0.269]	[0.321]	[0.503]	[0.394]	[0.625]	[0.336]	[0.414]
WTO	0.173***	0.235***	0.204***	0.137	0.292***	0.362***	0.259***	0.231***
	[0.0667]	[0.0642]	[0.0674]	[0.0892]	[0.0822]	[0.0848]	[0.0919]	[0.0666]
RTA	0.431***	0.483***	0.1905**	0.690***	0.518***	0.277***	0.214**	0.166*
	[0.0797]	[0.0774]	[0.0827]	[0.108]	[0.0969]	[0.104]	[0.0855]	[0.0885]
Observations	78,861	78,163	56,333	45,451	47,893	26,151	36,340	50,485
R-squared	0.249	0.251	0.270	0.161	0.240	0.356	0.256	0.258
Number of id	6,028	5,999	5,137	4,508	4,540	3,013	4,298	4,711

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. xtot=total exports; xnoen=total exports without energy products; xManu=manufactured exports; xRawm=raw material exports; xAgri= agricultural exports; xChem=exports of chemical products; xMachTr=exports of machinery and transport goods; xTex_others=exports of textiles and other manufactured goods. The controls include dyadic, exporter-time and importer-time fixed effects (CPFE&CTFE).

The fact that the coefficient of the interaction term (LDC status*GSP) is positive and statistically significant in columns (1), (2), (3) and (5), and in some cases of higher magnitude than the coefficient of LDCs, indicates that although being an official LDC status is in itself associated with higher exports, if this is combined with non-reciprocal preferences, exports more than double. Thus, preferences for LDCs matter, but being an LDC has an additional positive effect on exports, possibly related to the other benefits they receive (e.g. in overall aid, aid for trade or more generous implementation of existing trade rules).

Meanwhile, the impact of belonging to a regional trade agreement (RTA) makes a big difference: it increases total exports by 54% [(exp(0.431)-1)*100%], manufactured exports by 20% [(exp(0.190)-1)*100%], agriculture-related exports by 68% [(exp(0.518)-1)*100%] and textile and other exports by around 18% [(exp(0.601)-1)*100%].

In Table 3, we split up the sample into groups of importers[21] (high income OECD countries, high income non-OECD countries, upper middle-income countries, lower middle-income countries and low-income countries) and only show the impact of LDC status (compared to the off-list status). LDCs export more food exports than off-list countries to high income OECD countries, lower-middle income and low-income countries and these coefficients are statistically significant[22]. One reason why LDC status is helpful in promoting exports is because it reduces the uncertainty attached to the GSP regime, which is revised periodically and depend on single IC (EU) decisions, whereas graduation from LDCs status is very unlikely to happen in the short-run and it has to be confirmed by the UN[23]. Moreover,

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[21] The results of a model estimated with specific GSP schemes are shown in Table A.6 for the sample of LDCs and off-list countries. None of the estimated coefficients of the specific GSP dummies are statistically significant at conventional levels. For this reason, we extend the sample of countries in the next section.

[22] The coefficient for high-income OECD countries is close to statistical significance; most probably the decrease in significance level in comparison with the results in Table 2 is a result of the decrease in sample size. In any case, it could be considered as statistically significant at the 5 percent level using a one-sided test, assuming that the coefficient is positive.

[23] LDC graduation could only happen six years after the findings confirming eligibility are presented for the first time. Only Cape Verde has accepted graduation (in 2007) relatively smoothly; however, the EU has given the

we find that it specially promotes agricultural exports, which accounts for an important share of exports in many LDCs and is only considered in some of the preference schemes (EBA, AGOA) but not always in the GSP.

Table 3. LDCs & comparable "off-LDC-list" countries as exporters, by groups of importers

LDC status coefficient Income Group:	(1) Total	(2) Manu	(3) Agri	(4) Others
High OECD	0.786***	0.308	0.492*	0.282
	[0.242]	[0.259]	[0.299]	[0.243]
High Non-OECD	-0.435	-0.00586	-0.296	0.943
	[0.526]	[0.437]	[0.650]	[0.661]
Upper-Midle	0.535	0.477	0.206	0.631*
	[0.376]	[0.546]	[0.543]	[0.375]
Lower-Middle	0.198	0.0849	0.856***	0.0486
	[0.318]	[0.300]	[0.299]	[0.314]
Low	0.503**	0.199	0.716**	0.438**
	[0.248]	[0.219]	[0.316]	[0.206]

Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is total exports. Only the coefficient for the dummy variable LDC status is reported. Estimation technique LS with CPFE & CTFE.

4.2 Results for all Countries

In this sub-section, we present the results obtained for the whole sample of countries thus comparing LDCs with all other exporting countries (non-LDC developing countries and developed countries). As in the previous section, exports to other developing countries and OECD countries are considered and we focus on the comparison between the GSP regimes and official LDC status.

Table 4 looks at specific trade preference systems, different granters of trade preferences: Canada (GSP_IM_CA), the US (GSP_IM_US), Australia (GSP_IM_AUT), New Zealand (GSP_IM_NZ), Japan (GSP_IM_JAP), the EU (GSP_IM_EU), Norway (GSP_IM_NOR) and Turkey (GSP_IM_TUR). We find that only Canada's and Turkey's

country 4 years of DFQF, until 2011, and now it gets GSP+. The Maldives received DFQF until 2013 and Samoa benefits from EBA until the end of 2017.

trade preference systems have a positive and statistically significant impact on developing countries' total exports: They increase imports into Canada by 54% [(exp(0.431)-1)*100%] and into Turkey by about 44% [(exp(0.368)-1)*100%]. Moreover, also the non-reciprocal preferences given by the US and Australia show some positive effects on the exports of machinery and transport equipment (column 7). In contrast, the trade preferences granted by all of the other above-mentioned preference granters (New Zealand, Japan, the EU and Norway) do not show any significant positive impact on the trade preferences of receiving countries' exports.

With respect to the role of LDC status, we find that it has a positive and statistically significant effect on total exports leading to an increase of 61% [(exp(0.480)-1)*100%]. More specifically, manufactured exports increase by 39%, agricultural exports by 61% [(exp(0.477)-1)*100%] and textile and other exports increase by 56% [(exp(0.448)-1)*100%][24]. The estimates differ from Table 2, since the comparison group is now more heterogeneous (includes developing and developed countries) and we therefore rely on the estimates obtained in Table 2 to evaluate the impact of the LDC status. In regards to total exports (col. (1)), we observe that several factors do promote total exports in a statistically significant way: If both countries share a common currency (comcur), the exporting country exports 35% more [(exp(0.31)-1)*100%] and if both parties belong to a regional trade agreement (RTA), they export 22% more [(exp(0.204)-1)*100%]. Exporter and importer GDP (Ln Y_i and Ln Y_j) enhance exports as they stand for supply (exporter) or demand (importer). With respect to all export categories (col. (2)-(8)), we find exporter and importer income to be relevant and of positive impact and so are RTAs.

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[24] We also estimated two additional versions of the model, one without the LDC status variable and a second with an interaction term between the LDC status and the GSP preference dummy variables. In both cases, the estimates of the GSP variables remain very similar (change only in the third decimal point) and in the second case the interaction term is not statistically significant nor negative and statistically significant for exports of chemical, machined or transport goods. The results are available upon request.

Table 4. Results for all countries including specific non-reciprocal preference regimes

VARIABLES	(1) Ln xtot	(2) Ln xnoen	(3) Ln xManu	(4) Ln xRawm	(5) Ln x_Agri	(6) Ln xChem	(7) Ln xMachTr	(8) Ln xTex_Others
LDC status	0.480***	0.361***	0.331**	0.0473	0.477**	-0.0520	0.138	0.448***
	[0.148]	[0.140]	[0.153]	[0.183]	[0.189]	[0.208]	[0.152]	[0.140]
GSP_IM_CA	0.431*	0.325	0.198	0.355*	0.0911	-0.0671	0.138	0.0701
	[0.224]	[0.202]	[0.185]	[0.208]	[0.220]	[0.294]	[0.155]	[0.215]
GSP_IM_US	0.162	0.0847	0.0407	0.0841	-0.207	-0.323	0.324**	-0.0193
	[0.138]	[0.136]	[0.143]	[0.173]	[0.145]	[0.227]	[0.151]	[0.150]
GSP_IM_AUT	0.179	0.0686	0.0549	0.387	0.225	-0.511**	0.288**	0.158
	[0.153]	[0.170]	[0.127]	[0.347]	[0.236]	[0.252]	[0.142]	[0.141]
GSP_IM_NZ	-0.346	-0.130	-0.140	0.0321	-0.185	-0.555*	-0.0899	-0.121
	[0.277]	[0.241]	[0.251]	[0.250]	[0.297]	[0.284]	[0.246]	[0.276]
GSP_IM_JAP	0.175	0.207	0.236	0.130	-0.247	-0.158	0.200	-0.00537
	[0.177]	[0.181]	[0.195]	[0.204]	[0.333]	[0.231]	[0.186]	[0.220]
GSP_IM_EU	-0.0208	-0.0153	0.0159	-0.0137	0.0455	-0.322***	0.0629	0.0326
	[0.0523]	[0.0503]	[0.0537]	[0.0768]	[0.0633]	[0.0841]	[0.0639]	[0.0591]
GSP_IM_NOR	-0.427	-0.557*	-0.114	0.0358	0.105	-0.0632	-0.464*	0.188
	[0.311]	[0.307]	[0.206]	[0.373]	[0.340]	[0.270]	[0.282]	[0.222]
GSP_IM_TUR	0.368**	0.367**	0.368**	0.0443	0.299	0.445**	0.289	0.429***
	[0.156]	[0.146]	[0.156]	[0.228]	[0.231]	[0.214]	[0.227]	[0.155]
WTO	0.0960***	0.106***	0.177***	0.00659	0.0530**	0.101***	0.172***	0.143***
	[0.0203]	[0.0197]	[0.0199]	[0.0300]	[0.0255]	[0.0246]	[0.0240]	[0.0216]
CU	0.311***	0.341***	0.131**	0.383***	0.409***	0.436***	-0.137***	0.163***
	[0.0565]	[0.0554]	[0.0526]	[0.0967]	[0.0709]	[0.0652]	[0.0525]	[0.0574]
RTA	0.204***	0.206***	0.117***	0.297***	0.274***	0.165***	0.168***	0.173***
	[0.0218]	[0.0213]	[0.0213]	[0.0327]	[0.0279]	[0.0263]	[0.0242]	[0.0232]
Observations	441,023	438,253	362,769	263,479	306,756	257,431	291,451	335,051
R-squared	0.347	0.358	0.339	0.207	0.279	0.338	0.350	0.283
Number of id	25,476	25,367	22,918	18,729	20,036	17,438	20,161	21,664

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1; xtot=total exports; xnoen=total exports without energy products; xManu=manufactured exports; xRawm=raw material exports; xAgri=agricultural exports; xChem=exports of chemical products; xMachTr=exports of machinery and transport goods; xTex_others=exports of textiles and other manufactured goods. Estimation technique LS with CPFE & CTFE. The coefficients of income variables are not reported to save space.

Overall, we see that LDCs' agricultural products, textiles and other goods are the beneficiaries of both non-reciprocal trade preferences and RTAs.

4.3 Robustness

As a first robustness check, we look a bit closer at LDC countries' characteristics using the reduced sample of LDCs and comparable countries in Table 5. We differentiate between LDCs that are regular exporters (LDC_exp1, category omitted), big exporters (LDC_bigexp) and small exporters (LDC_sids, including islands, landlocked and very small countries; see Table 1 for the classification). Looking at the coefficients belonging to the big exporters among the LDCs, we find clear evidence that the big exporters are much more successful than the off-list countries as far as total exports and agriculture-related exports are concerned.

Table 5. LDCs & comparable "off-LDC-list" countries as exporters

VARIABLES	(1) Total	(2) Manu	(3) Agri	(4) Textile and Others
LDC_big exporters	0.326**	0.0505	0.815***	0.295**
	[0.134]	[0.119]	[0.173]	[0.129]
LDC_small islands	-0.975**	-1.100**	-0.508	-0.799
	[0.492]	[0.508]	[0.455]	[0.832]
Ln Y_i	0.603***	0.606***	0.621***	0.461***
	[0.0405]	[0.0485]	[0.0520]	[0.0520]
Ln Y_j	0.479***	0.694***	0.425***	0.682***
	[0.0389]	[0.0472]	[0.0527]	[0.0511]
WTO	0.160**	0.179***	0.277***	0.197***
	[0.0653]	[0.0680]	[0.0808]	[0.0678]
CU	0.511**	0.746**	0.932***	1.097***
	[0.242]	[0.312]	[0.360]	[0.405]
RTA	0.441***	0.103	0.509***	0.158*
	[0.0769]	[0.0823]	[0.0928]	[0.0899]
Observations	86,615	61,379	50,923	54,665
R-squared	0.231	0.250	0.231	0.238
Number of Countries	7,613	6,234	5,266	5,638

Using the same sample as in Tables 2 and 5, Table 6 shows that having LDC status did not help LDCs export more before the 1990s. However, the non-reciprocal GSPs were effective in increasing exports of off-list comparable countries, in particular of textiles and other manufactured goods. Trade preferences for LDCs in combination with the LCD status have only become effective in the period 1991-2013 (columns 5 to 8). This is to be expected as preference schemes targeting LDCs only started being established in the 1990s (Guillamont, 2008). Moreover, in the 1990s and 2000s, being on the list of LDCs independently of being GSP beneficiaries is also associated with higher agricultural exports, textiles and other manufactured goods, whereas receiving non-reciprocal preferences alone does not promote the exports of countries who do not have official LDC status.

However, further study is required to determine if there was preference erosion after the signing of Economic Partnership agreements (EPAs) in 2008 and the signing of bilateral trade agreements between ICs and more developed developing countries, which started in the 2000s.

As a third robustness check, we estimate the model for all countries and total exports leaving out the last 5 years of the sample in the 1973-2008 period (see Table A.5 in the Appendix). We would like to find out whether or not preferences have eroded in the last years due to the ratification of numerous RTAs and we also wish to compare our results to Gil-Pareja et al. (2014)[25].

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[25] For comparability with Gil-Pareja et al. (2014), we estimated the model using four-year interval data, including country year FE and country pair FE in the specification for the period of 1973-2008. The point estimate for the GSP dummy was 0.126 statistically significant at the 5% level. This is very similar to the estimate the authors present in column 1 of Table 2 (GSP coefficient is 0.129 also statistically significant at the 5% level) for the period of 1960-2008. By taking the first and second lag of the GSP dummies and adding them as regressors, the point estimate in our model decrease to 0.0628 as is not statistically significant, whereas the coefficient increased to 0.625 in Gil-Pareja et al. (2014).

When comparing the results with the 1973-2013 period (shown in Table 4), we find a diminishing impact of TPs granted by Canada and even a total erosion of the impact of TPs granted by Australia and the EU. Australian and EU TPs even cease to be effective and the Canadian TP impact declines from 74.7% [(exp (0.558)-1)*100%] to 55% [(exp (0.435)-1)*100%]. Interestingly, Turkish GSP preferences become effective only when adding the years 2009-2013 with an impact of 45% [(exp (0.367)-1)*100%].

The diminished impact of Canada's TPs and the erosion of the impact of Australia's TPs are supposedly correlated with an expansion of product coverage and lower tariff rates in response to the signing of many bilateral trade agreements, which benefited industrialized and non-LDC developing countries as well.

Between 2009 and 2012, Canada concluded several bilateral trade agreements, e.g. with Panama, Jordan, Colombia, Peru and the European Free Trade Association (EFTA). Australia signed the ASEAN-Australia-New Zealand Free Trade Agreement in 2010. A further erosion of Australia's TPs is to be expected as Australia signed bilateral trade agreements with China (2015), with Japan (2015) and with South Korea (2014).

In 2015, Australia signed the so-called Australia-Transpacific Partnership Agreement which covers Brunei, Canada, Chile, Japan, Malaysia, Mexico, Peru, New Zealand, Singapore, the United States and Vietnam.

The erosion of trade preferences granted by the EU between 2008/2009 and 2013 can be traced back to basically three phenomena that mostly affect LDCs: First, the expansion of bilateral trade agreements of the EU with the more developed DCs (e.g. with Albania, Montenegro, Bosnia, Herzegovina and Serbia; with South Korea; with Central America; with Colombia, Ecuador and Peru and with the Mediterranean countries[26]). Secondly, the signing of fifteen Economic Partnership Agreements (EPAs) between the EU and ACP countries in

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[26] http://ec.europa.eu/trade/policy/countries-and-regions/agreements/#_europe
http://ec.europa.eu/trade/policy/countries-and-regions/agreements/#_mediterranean
http://ec.europa.eu/trade/policy/countries-and-regions/agreements/#_other-countries

January 2008 led to a preference erosion for LDCs as EPAs were mainly signed between the EU and Non-LDCs (the Caribbean countries, Cameroon, Kenya, Mauritius, the Seychelles, Zimbabwe, Papua New Guinea, Fiji, Ivory Coast, Ghana, Botswana, Namibia and Swaziland). Thirdly, only a quarter of the LDCs enjoy economically (in terms of products exported) relevant trade preferences or trade preferences which are relevant in taking their export value into account (see Tables A.1 in the Appendix from Brenton, 2003).

Table 6. The impact of trade preferences over time

VARIABLES	Period 1973-1990				Period 1991-2013			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total	Manu	Agri	Other	Total	Manu	Agri	Other
LDC status	-0.362	-0.306	-1.285	0.214	0.441**	0.317	0.618**	0.458***
	[1.435]	[0.922]	[1.090]	[1.038]	[0.196]	[0.196]	[0.246]	[0.167]
GSP	0.0700	0.671**	0.393	0.859**	-0.0571	-0.200	-0.204	-0.0246
	[0.214]	[0.296]	[0.285]	[0.361]	[0.132]	[0.126]	[0.190]	[0.130]
LDC*GSP	-0.356	-0.588	-1.960	-0.0312	0.699***	0.444**	0.905***	0.660***
	[1.456]	[0.966]	[1.138]	[1.079]	[0.230]	[0.221]	[0.316]	[0.199]
Ln Y_i	0.459***	0.698***	0.286**	0.580***	0.589***	0.605***	0.692***	0.455***
	[0.0776]	[0.160]	[0.112]	[0.173]	[0.0490]	[0.0536]	[0.0598]	[0.0577]
Ln Y_j	0.424***	0.736***	0.456***	0.759***	0.583***	0.669***	0.524***	0.641***
	[0.0696]	[0.115]	[0.0977]	[0.113]	[0.0503]	[0.0549]	[0.0659]	[0.0594]
WTO	0.0804	0.237	-0.470	0.0799	0.0890	0.164**	0.250***	0.202***
	[0.179]	[0.213]	[0.489]	[0.214]	[0.0636]	[0.0696]	[0.0781]	[0.0690]
CU	0.252	0.0654	1.048**	-0.536	0.110	0.643	0.298	0.536
	[0.360]	[0.584]	[0.438]	[0.504]	[0.501]	[0.649]	[0.314]	[0.710]
RTA	0.282		0.133		0.152*	-0.0326	0.0958	0.0374
	[0.193]		[0.169]		[0.0783]	[0.0876]	[0.0925]	[0.0893]
Observations	15,997	7,276	8,570	6,563	62,864	49,057	39,323	43,922
Number of id	0.101	0.125	0.101	0.132	0.187	0.198	0.208	0.180

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Estimation technique LS with CPFE & CTFE.

We also estimated the model using a PPML estimator for the sample of LDCs and the off-list countries. Estimates similar to those shown in Table 2 are shown in Table A.7. The main differences are that in the PPML model, zero/non-reported trade flows are included in the estimation and hence the number of observations increases drastically. The results confirm that LDC status is associated with higher agricultural exports and other manufactured goods including textiles.[27]

Finally, as discussed above, the off-list countries may be systematically better off than the worst-off LDCs. To investigate this further, we remove the worst-off LDCs to make the groups even more comparable. In the sub-sample analysis, we take out Benin, Burkina Faso, Burundi, Chad, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mozambique, Niger, Sierra Leone, Somalia, South Sudan and Togo from the LDC list and Zimbabwe from the off-list countries. The results are shown in Table A.8 in the Appendix and are comparable to those in Table 2. The restricted sample confirm our previous findings and the coefficients for the LDC status variable are very similar to those found in Table 2; however, they show a slightly higher magnitude as expected. Thus, we find that the effect of LDC status among the most comparable group is statistically significant, substantial and robust.

5. Conclusions

We found that LDC status (compared to non-LDC status, which relates to developed countries, emerging economies, higher-income developing countries or low-income developing countries with a higher human asset index) gives LDCs a large advantage, as far as total exports, non-oil exports, agricultural exports and textile exports are concerned. This effect tends to be larger when a trade preference scheme is operating but also exists

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[27] The coefficients estimated for the GSP dummy are implausibly high in magnitude and this is probably due to the exclusion of MRT. The same applies to the interaction term between LDC status and GSP.

independent of it. We argue that LDC status is helpful in promoting exports because it potentially reduces the uncertainty attached to the GSP regime, which is revised periodically and depends on the decision of the granters, whereas graduation from the LDCs status is very unlikely to happen in the short-run and it has to be confirmed by the UN.

In addition, we found that only the trade preference schemes of Canada and Turkey are effective, in the sense that these GSP systems promote exports from developing countries (LDCs and non-LDCs). We were not able to find significant positive export effects of the GSP schemes of the US, Australia, New Zealand, Japan, EU and Norway. This result holds for agricultural exports, textile exports and manufactured exports.

When we compare the export effect of trade preferences for LDCs with that for 'off-LDC-list' developing countries (untreated LDCs), a substantial export advantage ranging from 46% (for manufactured exports) to more than 60% (for food and agricultural exports) for LDCs is noticeable. In addition, differentiating among LDC exporters by country size, geographic location and export strength shows that big exporters have a large export advantage compared to the off-LDC-list countries and the regular and island LDCs.

In terms of policy, these results suggest that LDC status seems to generate important benefits as intended on the one hand. On the other hand, this would imply that graduating countries have to face the threat of declining exports. This is a potentially serious problem as the number of countries that are becoming, or will soon become, eligible for graduation is currently increasing rapidly. Ten LDCs have been identified for graduation in the coming 5 years and more are likely to move towards graduation soon, including countries that are major exporters of manufactured goods and benefit a great deal from trade preferences (such as Bangladesh, Cambodia and Myanmar). For these countries, a smooth transition to non-LDC status, which should involve a slow winding down of trade preferences and other benefits over many years, will be critical.

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Appendix

Table A.1. Value-based relevance of EU trade preferences for LDCs

Value-based importance of EU trade preferences	Affected LDCs
EU trade preferences without value (Share of value of preference in relation to value to total exports < 1%)	Liberia, Central African Republic, the Democratic Republic of the Congo, Chad, Niger, Vanuatu, Djibouti, Angola, Sudan, Equatorial Guinea, Burundi, Mali, Guinea and Bhutan
EU trade preferences of low value (share of value of preference lies between 1% and 5% in relation to export value)	Sierra Leone, Somalia, Solomon Islands, Ethiopia, Burkina Faso, Haiti, Benin, Afghanistan, Rwanda, ACP countries on average, Togo, Samoa, Zambia, Eritrea, Lesotho, Kiribati, Sao Tome, Yemen, Guinea Bissau and Mauritania
EU trade preferences of high value (share of value of preference lies between 5% and 16% in relation to export value)	Tanzania, Comoros, Gambia, Cape Verde, Uganda, Tuvalu, Mozambique, Nepal, Madagascar, Malawi, Laos, no-ACP countries on average, Bangladesh, Cambodia and the Maldives
Relevance of EU Trade Preferences	**Affected LDCs**
EU preferences without relevance (Share of potentially duty-free exports (in relation to total exports) < 5%)	Angola, Central African Republic, Chad, the Democratic Republic of the Congo, Liberia, Niger and Vanuatu
EU preferences of low relevance (5%< share of potentially duty-free exports <30%)	Bhutan, Burundi, Djibouti, Equatorial Guinea, Guinea, Kiribati, Mali, Rwanda, the Solomon Islands and Sudan
EU preferences of high relevance (share of potentially duty-free exports >30%)	Benin, Burkina Faso, Cape Verdes, Comoros, Eritrea, Gambia, Guinea Bissau, Madagascar, Malawi, Mauritanian, Mozambique, Sao Tome, Somalia, Tanzania, Togo, Tuvalu, Uganda and Zambia

Source: Brenton (2003).

Table A.2. Findings on the impact of EU preferences

Authors	Title	Results
Cipollina, M. and Salvatici, L. (2008)	"Trade impact of EU preferences"; PUE & PIEC; working Paper 10/2008; Università della Calabria	EU preferences matter and have a positive impact on developing countries' exports; The average preference impact is over 3%: largest impact for foodstuffs, beverages, spirits and tobacco; negligible impact for mineral and wood products;
Candau, F. and Jean; S. (2009)	"What Are European Union Trade Preferences Worth for Sub-Saharan African and Other Developing Countries?", in *Trade Preference Erosion:*	SSA countries do not fully utilize their preferences; Rules of origin appear to significantly limit the value of the

	Measurement and Policy Response, in Hoekman, B., Martin, W. and C.A. Primo Braga (eds.), Palgrave-McMillan and The World Bank, 2009, pp. 65-102.	EBA scheme, which is only half utilized; the Generalised System of Preferences (GSP) scheme is significantly under-utilized in the manufacturing sector, even when the receiving country is not eligible for any other preferential regime
Nilsson, L. and Matsson, N. (2009)	"Truths and myths about the openness of EU trade policy and the use of EU trade preferences", document by European Commission, Directorate General for Trade; Brussels	EU preferences are well used, in particular by the ACPs; low preference use in textile exports from the non-ACP LDCs and from ASEAN, which may be related to restrictive EU RoO in that particular sector; the effects of EU trade preferences on total EU imports from developing countries are more likely to lie in the range of 10%. ACP non-LDCs: + 13% LDC non-ACPs: + 9% ACP LDCs: + 7%

Table A.3. Findings on the impact of AGOA

Authors	Title	Results
Mattoo, A., Roy, D. and Subramanian; A. (2003)	"The Africa Growth and Opportunity Act and Its Rules of Origin: Generosity Undermined?" *World Economy* 26:6 (2003), 829–851	AGOA countries' exports will increase by 8 to 11%; Impact could be nearly 5-fold bigger if rules of origin were more favorable; The end of the Multifiber Agreement in 2005 will decrease AGOA's exports by 30%
Gibbon, P. (2003)	"The African Growth and Opportunity Act and the Global Commodity Chain for Clothing," *World Development* 31:1 (2003), 1809–1827.	Studies the impact of AGOA on African firms; there has been a significant level of response in the clothing industry; In the case of trade in clothing, employment and wage income gains can be expected in beneficiary countries
Brenton, P. and Ikezuki, T. (2004)	"The Initial and Potential Impact of Preferential Access to the U.S. Market under the African Growth and Opportunity Act," World Bank Policy Research Working Paper no. 3262 (2004).	A key issue is access to preferences for clothing. These are the main source of gains under AGOA, especially if accompanied by liberal rules of origin; AGOA has yet to have a significant economic impact on one constituent group of countries –LDCs not eligible for clothing benefits.

Table A.4. Product categories

Exports	Categories (1 digit codes)
X=aggregated (total) exports	0+1+2+3+4+5+6+7+8+9
X_noen = Non-energy exports	0+1+2+4+5+6+7+8+9
X_manu = Manufactured exports	5+6+7+8+9
X_rawm = Exports of raw materials	2+4
X_agri =Agricultural exports	0+1
X_chem = Chemical	5
X_mach = Machinery and transport equipment exports	7
X_textiles_others =Exports of textiles, apparel and clothing, leather, footwear, travel goods, cork, wood, paper, furniture	6+8

Note: 1 digit codes in column 2 are based on Standard International Trade Classification (SITC) Revision 3.

Table A.5. Results for all countries for different time periods

	(1)	(2)	
CPFE&CYFE	1973-2008	1973-2013	1990-2013
VARIABLES	Ln Total Exports	Ln Total Exports	Ln Total Exports
LDC	0.316**	0.416***	0.569***
	[0.156]	[0.149]	[0.194]
GSP_IM_CA	0.558***	0.432*	0.330
	[0.188]	[0.224]	[0.243]
GSP_IM_US	0.144	0.151	0.194
	[0.124]	[0.134]	[0.125]
GSP_IM_AUT	0.324**	0.183	0.0907
	[0.151]	[0.153]	[0.145]
GSP_IM_NZ	-0.233	-0.318	-0.536*
	[0.234]	[0.277]	[0.298]
GSP_IM_JAP	0.285	0.171	0.157
	[0.185]	[0.179]	[0.157]
GSP_IM_EU	0.126**	-0.00205	0.0102
	[0.0554]	[0.0523]	[0.0566]
GSP_IM_NOR	-0.0175	-0.409	-0.260
	[0.189]	[0.313]	[0.252]
GSP_IM_TUR	0.205	0.383**	0.386***
	[0.192]	[0.153]	[0.140]
Ln Y_i	0.406***	0.462***	0.520***
	[0.0197]	[0.0156]	[0.0186]
Ln Y_j	0.605***	0.595***	0.728***
	[0.0185]	[0.0140]	[0.0158]
CU	0.156***	0.307***	0.108***
	[0.0661]	[0.0565]	[0.0367]
WTO	0.0930*	0.0901***	0.0755***
	[0.0477]	[0.0202]	[0.0205]
RTA	0.315***	0.207***	0.102***
	[0.0277]	[0.0221]	[0.0200]
Observations	333,994	430,737	336,275
R-squared	0.339	0.339	0.250
Number of id	21,161	25,436	24,909

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Estimation technique LS with CPFE & CTFE.

Table A.6. Results for reduced sample. Specific preference schemes

VARIABLES	(1) Total	(2) Manu	(3) Agri	(4) Textile and Other Manuf.
Ln Y$_i$	0.526***	0.338***	0.359***	0.253***
	[0.0411]	[0.0419]	[0.0452]	[0.0440]
Ln Y$_j$	0.781***	0.972***	0.856***	0.967***
	[0.0527]	[0.0538]	[0.0578]	[0.0569]
WTO	0.357	0.898*	0.885*	0.842*
	[0.371]	[0.460]	[0.499]	[0.445]
CU	-0.0613	-0.0304	-0.0724	-0.0682
	[0.0410]	[0.0421]	[0.0604]	[0.0463]
RTA	0.0493	0.0735**	-0.0391	0.0487
	[0.0371]	[0.0362]	[0.0420]	[0.0384]
GSP_IM_CA	0.220	0.137	-0.0338	-0.108
	[0.218]	[0.233]	[0.225]	[0.268]
GSP_IM_US	0.117	0.0229	-0.0931	-0.0874
	[0.122]	[0.134]	[0.136]	[0.139]
GSP_IM_AUT	0.0432	0.0106	0.0660	0.0159
	[0.114]	[0.106]	[0.243]	[0.130]
GSP_IM_NZ	-0.458	-0.0746	-0.329	-0.0549
	[0.257]	[0.211]	[0.357]	[0.230]
GSP_IM_JAP	0.130	0.315	-0.188	0.175
	[0.144]	[0.213]	[0.323]	[0.207]
GSP_IM_EU	0.0148	-0.000854	0.0278	-0.0547
	[0.0586]	[0.0596]	[0.0702]	[0.0655]
GSP_IM_NOR	-0.192	-0.0287	0.120	0.167
	[0.239]	[0.211]	[0.284]	[0.220]
AGOA	-0.0724	0.392	-0.210	0.615
	[0.418]	[0.380]	[0.293]	[0.377]
ACP	-0.551	-0.0623	-0.0597	0.0155
	[0.311]	[0.312]	[0.428]	[0.292]
EBA	-0.00264	-0.127	0.0350	-0.0315
	[0.0901]	[0.0982]	[0.107]	[0.0967]
Observations	77,272	71,877	64,611	68,836
R-squared	0.280	0.278	0.246	0.225
Number of id	4,742	4,558	4,242	4,430

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Estimation technique LS with CPFE & CTFE.

Table A.7 PPML estimates

VARIABLES	(1) xtot	(2) xnoen	(3) xManu	(4) xRawm	(5) xAgri	(6) xChem	(7) xMachtr	(8) Ln Tex_Others
LDC status	0.221	0.305	-0.0993	0.0100	0.728***	-0.118	0.212	0.583**
	[0.195]	[0.197]	[0.277]	[0.267]	[0.268]	[0.151]	[0.258]	[0.281]
GSP	2.432***	1.910***	1.256*	1.038**	1.550***	1.646***	1.242**	1.806**
	[0.550]	[0.445]	[0.646]	[0.458]	[0.338]	[0.442]	[0.542]	[0.731]
LDC*GSP	1.384***	1.313***	1.600***	0.182	1.257***	0.715	0.792*	2.346***
	[0.328]	[0.320]	[0.375]	[0.415]	[0.313]	[0.437]	[0.470]	[0.392]
Ln Y_i	0.617***	0.791***	0.703***	0.886***	0.760***	1.779***	1.569***	0.579**
	[0.166]	[0.163]	[0.270]	[0.156]	[0.0855]	[0.268]	[0.178]	[0.294]
Ln Y_j	0.514***	0.470***	0.876***	0.472**	0.414***	-0.221	-0.137	1.109***
	[0.138]	[0.126]	[0.261]	[0.212]	[0.109]	[0.210]	[0.229]	[0.292]
CU	0.250	0.0805	0.202	0.242	-0.667	-0.176	-0.887***	0.169
	[0.378]	[0.405]	[0.243]	[0.678]	[0.481]	[0.544]	[0.211]	[0.424]
WTO	-0.230	-0.0263	-0.419**	0.681***	0.406**	-0.271	0.404	-0.503**
	[0.219]	[0.164]	[0.188]	[0.241]	[0.206]	[0.284]	[0.315]	[0.214]
RTA	0.647***	0.512***	0.946***	0.824***	0.424**	0.582***	0.575**	0.939***
	[0.184]	[0.175]	[0.174]	[0.285]	[0.185]	[0.200]	[0.249]	[0.189]
Observations	123,854	123,206	102,741	90,253	87,525	53,580	83,525	93,392
Number of id	3,806	3,784	3,137	2,719	2,686	1,593	2,518	2,847

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Estimation technique PPML with CPFE&TFE. xtot=total exports; xnoen=total exports without energy products; xManu=manufactured exports; xRawm=raw material exports; xAgri=agricultural exports; xChem=exports of chemical products; xMachTr=exports of machinery and transport goods; xTex_others=exports of textiles and other manufactured goods.

Table A.8. Replication of Table 2 excluding worst off countries

VARIABLES	(1) Ln xtot	(2) Ln xnoen	(3) Ln xManu	(4) Ln xRawm	(5) Ln x_Agri	(6) Ln xChem	(7) Ln xMachtr	(8) Ln xTex_Others
LDC status	0.580***	0.438***	0.223	0.114	0.517**	0.311	0.189	0.301*
	[0.168]	[0.154]	[0.174]	[0.204]	[0.208]	[0.234]	[0.173]	[0.158]
GSP	0.0370	0.0413	-0.0443	0.241	-0.0371	-0.0905	-0.256	0.0531
	[0.121]	[0.117]	[0.127]	[0.154]	[0.166]	[0.260]	[0.166]	[0.128]
LDC*GSP	0.574***	0.451**	0.340*	0.0513	0.607**	-0.967***	-0.157	0.555***
	[0.198]	[0.184]	[0.199]	[0.265]	[0.256]	[0.339]	[0.219]	[0.184]
Ln Y$_i$	0.537***	0.538***	0.601***	0.310***	0.597***	0.538***	0.888***	0.442***
	[0.0630]	[0.0402]	[0.0503]	[0.0608]	[0.0533]	[0.0815]	[0.0721]	[0.0536]
Ln Y$_j$	0.515***	0.528***	0.688***	0.422***	0.472***	0.727***	0.638***	0.681***
	[0.0490]	[0.0389]	[0.0488]	[0.0601]	[0.0544]	[0.0763]	[0.0686]	[0.0522]
CU	0.235	0.179	0.623*	0.856*	0.957**	1.505**	0.338	0.767*
	[0.272]	[0.280]	[0.362]	[0.468]	[0.417]	[0.594]	[0.353]	[0.456]
WTO	0.179***	0.241***	0.210***	0.134	0.304***	0.357***	0.233**	0.235***
	[0.0668]	[0.0643]	[0.0670]	[0.0893]	[0.0821]	[0.0855]	[0.0924]	[0.0662]
RTA	0.388***	0.455***	0.0584	0.708***	0.518***	0.313***	0.231***	0.122
	[0.0822]	[0.0797]	[0.0859]	[0.113]	[0.101]	[0.108]	[0.0888]	[0.0905]
Observations	76,812	76,297	54,590	44,019	46,342	24,945	34,827	48,835
R-squared	0.249	0.251	0.269	0.164	0.243	0.361	0.261	0.258
Number of id	6,012	5,988	5,122	4,491	4,521	2,984	4,282	4,695

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. xtot=total exports; xnoen=total exports without energy products; xManu=manufactured exports; xRawm=raw material exports; xAgri=agricultural exports; xChem=exports of chemical products; xMachTr=exports of machinery and transport goods; xTex_others=exports of textiles and other manufactured goods. The controls include dyadic, exporter-time and importer-time fixed effects (CPFE & CTFE). Sample excluding Benin, Burkina Faso, Burundi, Chad, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mozambique, Niger, Sierra Leone, Somalia, South Sudan and Togo from the LDCs and Zimbabwe from the off-list countries.