Regional South-South Trade and the Dutch Disease: The Case of Latin American Manufacturing Exports

Melike Döver[*]
Martin Middelanis[†]

Abstract:
This paper introduces two channels through which exports from commodity-dependent countries towards regional partners might be less affected by Dutch Disease effects than extra-regional exports. The first channel relates to a higher share of technologically more sophisticated products in intra-regional South-South trade, which are less sensitive to cost and price changes. The second channel is related to trade barriers and entry costs faced by extra-regional competitors in the regional market. The two channels are empirically tested through a panel data analysis of manufacturing exports from Latin American countries between 1996 and 2018. The evolution of exports to regional export partners is compared to extra-regional exports. Dutch Disease effects are most pronounced in exports to extra-regional partners, where a one-percent increase in commodity prices leads to a 0.48% decline in manufacturing exports, significantly larger than the 0.31% decline in regional trade. The effect is mainly driven by low-tech exports, which are more negatively affected than medium- and high-tech exports, with an elasticity of -0.95% in extra-regional trade compared to -0.58% in regional trade. The results support both channels, suggesting that technological upgrading and regional trade integration can mitigate the contraction of the manufacturing sector during commodity price booms.

Keywords: Dutch Disease; export diversification; Latin America; manufacturing exports; regional trade; structural change
JEL classification: F14, F15, O14, O24, Q33

Colors: We would appreciate if figure 1 could be printed in color.

[*] Freie Universität Berlin, Germany, and University of Applied Sciences (HTW) Berlin, Germany. Email: melike.doever@fu-berlin.de.
[†] Freie Universität Berlin, Germany. Email: martin.middelanis@fu-berlin.de. Corresponding author. Freie Universität Berlin, School of Economics and Business, Boltzmannstraße 4, D-14195 Berlin, Germany.

1. Introduction

The manufacturing sector plays a pivotal role in economic development due to its potential for economies of scale, technological learning, linkages to other sectors, and employment creation (van Wijnbergen 1984; Krugman 1987; Hidalgo et al. 2007). It continues to be considered the most promising sector for economic development in developing economies (Szirmai 2012; Haraguchi et al. 2017; Su and Yao 2017; Gabriel and de Santana Ribeiro 2019). Nevertheless, many developing economies are experiencing premature deindustrialization, as evidenced by declining manufacturing output and employment shares (Tregenna 2015; Rodrik 2016). In countries with abundant natural resources, this process may be exacerbated by the phenomenon of the Dutch Disease (Corden and Neary 1982; Corden 1984). Conversely, numerous publications and international reports that examine the composition of export patterns in Africa and Latin America highlight that intra-regional exports frequently exhibit a higher proportion of manufacturing content than extra-regional exports (e.g., Yeats 1997; Bekerman and Rikap 2010; UNECA 2015; Döver 2024). Consequently, regional trade can contribute to strengthening manufacturing production and exports in developing economies.

Despite the existence of a substantial body of literature examining the Dutch Disease effects in resource-abundant developing economies, it is, to the best of our knowledge, an open question as to whether the composition of trade partners to which exports are directed has an impact on the magnitude of Dutch Disease effects.

The objective of this paper is to establish a link between the existing literature on the Dutch Disease and that on regional trade. In this context, regional trade is defined as trade that takes place within a specific geographical region and between countries with similar levels of economic development. Under this definition, South-South trade in Latin America is an example of regional trade. We suggest two potential channels through which the composition of trade partners may exert an influence on the magnitude of Dutch Disease effects. Theoretical considerations indicate that a contraction of manufacturing exports due to Dutch Disease effects may be less likely to occur in exports to regional trade partners than to partners from outside the region. The first channel, the technological sophistication channel, departs from the observation that regional exports in Latin America and Africa contain a higher share of technologically more sophisticated products and that these products have a lower cost and price elasticity than low-tech manufacturing products. Consequently, when the Dutch Disease causes the real exchange rate to appreciate and the production costs of manufacturing exporters to rise, exports of more sophisticated products are less adversely affected. Second, the trade barrier and market entry cost channel provides an explanation for why exports to fellow regional trade partners are less likely to be replaced by foreign competitors. The Dutch Disease theory posits that manufacturing exports to all trade partners would become less competitive during the commodity price boom, leading to a substitution of these exports by exports from other countries. The main competitors are extra-regional, more industrialized exporters. However, they face relatively higher costs in regional trade due to market entry costs and trade barriers, such as transport costs and exclusion from regional trade agreements. Moreover, when a commodity price boom affects several countries in the region, regional competitors may also experience a decline in competitiveness due to Dutch Disease effects. As a result, exports from a commodity-dependent country to regional trade partners may experience a smaller loss in relative competitiveness than exports to extra-regional trade partners, potentially leading to a more stable export profile.

Against this theoretical background, the paper examines whether regional trade can serve to mitigate the effects of the Dutch Disease on manufacturing exports. The empirical analysis examines the performance of manufacturing exports from Latin American countries from 1996 to 2018. This period includes the commodity price boom from 2003 to 2013, which provides considerable variation in commodity prices (Erten and Ocampo 2013). The impact these price changes have on manufacturing exports is examined via a Poisson pseudo-maximum likelihood estimator with high-dimensional fixed effects (Santos Silva and Tenreyro 2006; Fally 2015). The effect on exports towards other Latin American countries is compared to the effect on exports to extra-regional trade partners. As expected, extra-regional manufacturing exports are significantly more negatively affected by rising commodity prices with an elasticity of -0.48% (compared to -0.31% in regional trade) to a one percent increase in commodity prices. This effect is mainly driven by low-tech exports which are more negatively affected than medium- and high-tech exports and have an elasticity of -0.95% in extra-regional trade, compared to -0.58% in regional trade. The results are consistent with our predictions for the technological sophistication channel and the trade barrier and market entry cost channel.

Our results suggest that technological upgrading and regional trade integration may serve as potential mitigating factors against the contraction of the manufacturing sector during periods of elevated commodity prices. The evidence supports both channels, as Dutch Disease effects are strongest for exports to extra-regional trade partners and for low-technology products. The following section elaborates on both channels and the underlying rationale. Section three outlines the research design. The results of the analysis are presented in section four and discussed in section five, before section six concludes the paper.

2. Theoretical argument

We develop two channels for explaining the mitigation of Dutch Disease effects through trade with regional trade partners. The starting point is the basic model of Dutch Disease proposed by Corden and Neary (1982). In a three-sector economy with a booming resource sector, a tradable manufacturing sector and a non-tradable service sector, a windfall in resource revenues leads to an increase in foreign financial inflows. These external financial inflows give rise to both the resource movement effect and the spending effect. The resource movement effect describes the reallocation of factors of production from the manufacturing and services sectors to the thriving resource sector, which offers higher wages and capital rents. The spending effect refers to the increase in demand for goods/services resulting from financial inflows. The demand for tradables can be met by imports, but the demand for non-tradables pushes up their prices. The result is an appreciation of the real exchange rate. Both the appreciation and the shift of productive factors away from manufacturing imply higher costs for manufacturing producers (Corden and Neary 1982). They lose their international competitiveness, and manufacturing exports decline.[3]

According to Cherif (2013), the Dutch Disease is expected to have a stronger impact on developing economies than on developed economies. A competitive real exchange rate is of paramount importance for the export performance of the former economies, while its influence is less pronounced in developed economies (Freund and Pierola 2012; Caglayan and Demir 2019; Bussière et al. 2020). Consequently, rising relative production costs associated with the Dutch Disease pose a significant challenge to manufacturing exports in developing economies such as those in Latin America.

Indeed, the empirical literature provides evidence that manufacturing exports decline due to Dutch Disease effects. Harding and Venables (2016) examine the effect of commodity exports on various non-commodity exports for 41 countries over the period 1970 to 2006. They find evidence that manufacturing exports show a stronger negative response than other non-commodity exports. For every additional dollar of non-resource exports, manufacturing exports decline by 46 cents. Stijns (2003) uses world trade data to examine the response of manufacturing exports in energy-exporting countries to rising energy prices. His results are close to those of Harding and Venables (2016), with a one percent increase in energy prices

[3] The Dutch Disease is economically problematic, as manufacturing has greater potential for economic development than other sectors (e.g. Prebisch 1950; van Wijnbergen 1984; Krugman 1987; Hidalgo et al. 2007; Siliverstovs and Herzer 2007; Murshed and Serino 2011).

leading to a decline in manufacturing exports of about half a percent. According to De Haas and Poelhekke (2019), not only commodity price increases, but also the mere presence of mining activities near a firm's location has negative effects on tradable sectors and positive effects on non-tradable sectors. Bahar and Santos (2018) analyze the effect of a sharp rise in commodity prices on the concentration of non-commodity exports and find that the diversification of non-commodity exports declines. Labor-intensive exports are the most affected, particularly in Latin America. Specifically for Latin America and the commodity price boom, which is also studied in this paper, Albrieu (2012) points out that there was an appreciation of the real exchange rate in commodity-dependent countries. However, this appreciation did not have a negative impact on manufacturing exports. Heresi (2023) shows for Chile that the commodity price boom led to a reallocation of market shares from exporting firms to non-exporting firms within the manufacturing sector, with negative effects on the sector's productivity and exports.

In the following, we introduce how the composition of trade partners can affect the magnitude of Dutch Disease effects on manufacturing exports. To this end, we develop two channels that theoretically explain why trade with regional trade partners could mitigate the Dutch Disease. The first channel is the technological sophistication channel: Manufacturing exports to regional trade partners are expected to be less affected by Dutch Disease effects because, first, exports to these trade partners have a higher degree of technological sophistication and, second, technologically more advanced products are less sensitive to Dutch Disease effects.

In developing economies, intra-regional exports tend to be more technologically sophisticated than exports to industrialized countries. In intra-regional exports, the share of primary products is comparatively lower, while the share of manufactured products is higher. This has been observed not only in Latin America for the member countries of MERCOSUR (Yeats 1997; Snoeck et al. 2009; Bekerman and Rikap 2010; Mordecki Pupko and Piaggio Talice 2011), but also in other developing regions, such as intra-African trade (UNECA 2015; IMF 2019). At the same time, within manufacturing exports, technological sophistication is higher for exports to intra-regional trade partners, as shown in Figure 1 for merchandise exports of Latin American economies. It shows a much larger share, especially for medium-tech manufacturing, in regional trade.

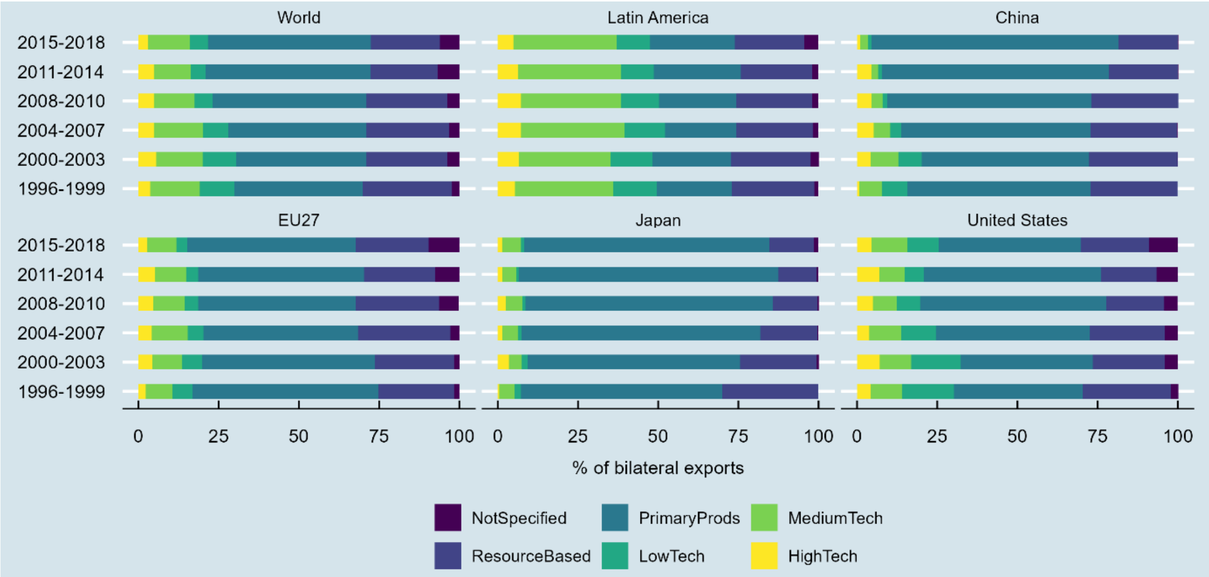

Figure 1: Evolution of technological export structure of Latin American economies to different export destinations (1996 – 2018, shares of total exports to partner (region)).
Source: Elaboration by the authors, based on The Growth Lab at Harvard University (2019).
Note: (1) Export structure according to Lall's (2000) classification, (2) exports from all exporters included in our study, except Mexico, due to the very particular trade structure of Mexico with the US.

There are several possible explanations for why the share of technologically more sophisticated manufacturing is higher in regional exports than in exports to the rest of the world. Not all of them have received sufficient attention in the literature. Some explanations focus on the reduction of regional tariffs and trade facilitation. Many economies in Latin America are integrated through a preferential trade agreement (PTA) (Dingemans and Ross 2012). The average applied tariff for regional trade in Latin America is 2%, well below the Most Favored Nation tariff of 7%. Moreover, 78% of intra-regional trade falls under a duty-free regime (ECLAC 2021). According to Bekerman and Rikap (2010) preferential tariffs offer the opportunity for regional markets to provide an initial export platform for the expansion of the manufacturing sector. This is reinforced by the investment strategies of extra-regional multinationals to produce within regional borders in order to access local markets with lower tariffs (ECLAC 2021).

In addition to tariffs, there are also non-tariff competitive advantages of regional exports in Latin America, as mentioned by Calzada Olvera and Spinola (2022, 15): "[G]eographical and cultural proximity, wage structure, technological capacity, and industrial activities are similar, and thus complex products are more likely to be competitive in terms of quality and cost". In a different regional context, Schmitt and Van Biesebroeck (2013) emphasize the importance of geographic and cultural proximity in the sourcing strategies of the European automotive industry, especially for technologically sophisticated products. For less sophisticated products, production costs are more critical. Similarly, Conconi et al. (2020) highlight the role of regional proximity in the trade of intermediate products to collaborate with suppliers, monitor production, and ensure timely delivery of customized inputs. In contrast, in trade with industrialized countries, technologically sophisticated products from the Global South often face difficulties in complying with product standards of multinational corporations that govern global value chains (GVCs) or with sanitary and phytosanitary standards in end-user markets in the Global North (Geyer 2019).

Technologically more sophisticated products are less sensitive to Dutch Disease effects because both cost and price elasticities are lower for more sophisticated products. For more sophisticated products, firms can charge higher mark-ups. When production costs increase, these firms do not have to pass on the full cost increase to the price of their products, but can reduce the markup to keep the price stable, leading to a lower cost elasticity (Berman et al. 2012; N. Chen and Juvenal 2014).[4] The price elasticity of products also decreases as the degree of technological sophistication increases. This can be explained by the lower degree of substitutability of these products, which reduces the competition they face (Carlin et al. 2001).

The resource movement effect of the Dutch Disease may likewise be less pronounced for more sophisticated products. Workers producing technologically advanced products tend to have higher skill levels (Arif 2021) and receive higher wages (Dalmazzo 2002; Cirera et al. 2022). Compared to workers in other industries, they would have relatively fewer financial benefits from moving to a job in the booming sector. Similarly, more sophisticated industries are more productive (Cirera et al. 2022), generating higher profits and returns to capital (Grifell-Tatjé and Lovell 1999). This implies, that shifting capital to the booming sector is less attractive.

The combined effect of the lower price and cost elasticity and the less pronounced resource movement effect is that exports of more sophisticated products are less adversely affected by Dutch Disease effects. Goda et al. (2024) show empirically that low-tech exports in Latin American countries are negatively affected by real exchange rate appreciation, while medium- and high-tech exports show no significant response. Similarly, a study by Caglayan and Demir (2019) shows that high-tech exports are least affected by real exchange rate appreciation and volatility, and South-South exports are less affected than South-North exports.

[4] In the particular case of real exchange rate appreciation in developing economies, there is an additional explanation for declining cost elasticities with technological sophistication. More sophisticated products require more imported inputs. Therefore, a smaller share of the cost of production is generated domestically. As a result, the appreciation affects a smaller share of production costs, reducing the overall impact of real exchange rate appreciation (Ahmed et al. 2015; Goda et al. 2024).

The second channel, called the trade barrier and market entry cost channel, states that manufacturing exports to regional trade partners face less risk of substitution by extra-regional competitors than exports to extra-regional trade partners. In intra-regional trade, extra-regional competitors face some relative disadvantages, especially when entering a new market. Trade is not fully liberalized and there are significant costs of entering the market of a country to which a firm has not previously exported (Bernard and Jensen 2004; Das et al. 2007). These costs stem from the establishment of trade relationships and distribution infrastructure (Burstein et al. 2003; Corsetti and Dedola 2005; Das et al. 2007; N. Chen and Juvenal 2014), the adaptation of products and services to local needs and requirements, and tariff and nontariff barriers such as product standards, product approvals, and customs procedures (Maskus et al. 2005; M. X. Chen et al. 2008). When regional economies share lower tariffs with each other than with economies outside the region, such as in a free trade area or customs union, external competitors are further disadvantaged (Ruta 2017). Similarly, the emphasis on regional proximity in the sourcing of intermediate goods, as highlighted by Conconi et al. (2020), may provide some protection against substitution by competitors from outside the region. In addition, firms from the region may have an advantage in bargaining power due to cultural similarities with the target market (Calzada Olvera and Spinola 2022). Finally, assuming that the market to be entered is in another region, transport costs may be higher for firms from external countries than for countries within the same region (Moreira et al. 2008).

These market entry costs and trade barriers reduce the cost advantage of extra-regional competitors, which has implications for our theoretical framework of the Dutch Disease and regional trade. Dutch Disease effects raise the cost of manufacturing exports from the exporting country. As a result, they are replaced in extra-regional destination markets by competitors that do not face a commodity boom and can therefore sell the products at a lower price. For regional trade, there are intra-regional and extra-regional competitors. Because extra-regional competitors face relative cost disadvantages, they are less likely to substitute for regional firms' exports. In the case of a commodity boom affecting several countries within the region, regional competitors may also be affected by an appreciation of the real exchange rate and experience a similar loss of competitiveness[5]. As a result, these regional competitors are also less likely to replace exports from our home country because their relative competitiveness does not increase. This implies that only competitors from countries within the region that have not experienced a commodity price boom would be able to fully benefit from replacing exports from our home country. These competitors would have to produce the same product at a similar quality and price, and in quantities that would allow for expansion.

[5] The 2003 to 2013 commodity price boom affected several commodities over a similar period of time, leading to simultaneous price booms in several Latin American countries (Gruss 2014).

Especially in developing economies, these characteristics are not necessarily present. Since this group of advantaged competitors is much smaller than in extra-regional trade, exports to regional trade partners should decline less than exports to extra-regional trade partners.

To summarize our newly introduced theoretical arguments, the technological sophistication channel and the trade barrier channel should reduce the pass-through of adverse Dutch Disease effects on manufacturing exports to regional trade partners relative to extra-regional trade partners during commodity price booms.

3. Research design

In this section, we empirically test our theoretical argument. To answer the research question of whether commodity price increases have less adverse effects on manufacturing exports to regional trade partners than to extra-regional trade partners, we conduct a panel data analysis of bilateral manufacturing exports from Latin American economies over the period from 1996 to 2018. The sample includes low-, medium-, and high-tech manufacturing exports to 236 trade partners, distinguishing between regional and extra-regional destinations. The following subsection explains the case selection and how our theoretical assumptions are reflected in this environment. The second subsection presents the estimation methodology.

3.1 Data

Economies in Latin America provide a particularly useful case for analyzing the relationship between Dutch Disease and regional trade. Like Africa, Latin America is home to many commodity-dependent economies that are struggling to industrialize or are facing deindustrialization (Diao et al. 2019; Rodrik 2016). The entire region has historically been characterized by high levels of commodity dependence, which increased further during the commodity price boom of 2003 to 2013 (Ocampo 2017). At the same time, intra-regional trade played a larger role in Latin America during the commodity price boom compared to Africa.[6] Our data show that the share of regional trade is much higher for manufacturing[7] exports (see figure 1). Nearly 44% and 49% of manufacturing exports in our country sample are exported

[6] It accounted for 22 percent of total trade, while in Africa it was only 10 percent (in 2009) (Ben Barka 2012).
[7] In this paper, we classify manufacturing as the sum of low-, medium-, and high-technology exports according to the Lall (2000) classification. We exclude resource-intensive manufacturing.

to regional partners in 1996 and in 2018[8]. This relatively high share of intra-regional trade allows us to compare exports to regional trade partners with exports to extra-regional trade partners.

The observation period is from 1996 to 2018. The importance of international trade increased considerably with the establishment of the WTO in 1995 (Goldstein et al. 2007; Chang and Lee 2011; Felbermayr et al. 2024). By starting the observation period in 1996, the entire development under this new world trade order is covered. Moreover, this period includes the commodity price boom from 2003 to 2013. This boom had an exceptionally long duration and involved substantial price increases for a wide range of commodities. Due to these characteristics, it was the most pronounced commodity price boom ever experienced by many Latin American countries (Erten and Ocampo 2013). Consequently, it represents a suitable case for studying Dutch Disease effects in the region.

We analyze manufacturing exports of 20 Latin American countries and divide their export destinations into two groups: 1) regional trade partners and 2) extra-regional trade partners. Regional trade partners represent the same country sample of the exporters[9]. Extra-regional trade partners include all other export destinations of the Latin American economies which are included in the dataset of 236 countries of The Growth Lab at Harvard University (2019)[10]. The dataset is unbalanced due to missing values in the dependent variables[11].

Manufacturing export data are disaggregated into low-, medium-, and high-technology manufacturing following Lall (2000)[12]. The category of resource-based manufacturing is excluded because it is sensitive to the price effects of commodity price booms. In addition, low- to high-technology exports play a larger role in technological learning than resource-based exports (Oqubay and Ohno 2019). Manufacturing export data are converted from current to constant 2015 US dollar using the World Bank's gross domestic product (GDP) deflator for the United States.

The data for the explanatory variable, the commodity price index, comes from the IMF's commodity terms of trade database, which is described in more detail in Gruss and Kebhaj (2019). It represents the price evolution of each country's individual export commodities. These

[8] For the Latin American exporters, excluding Mexico due to its very particular trade structure with the US.
[9] For a robustness check, we also include Caribbean countries in the category of regional trade partners.
[10] A list with the included trade partners can be found in Annex 2.
[11] This does not provide a problem as the estimation method can deal with unbalanced trade data.
[12] For more details about the product classification, see annex 1.

country-specific indices represent the respective commodity price evolution in much more detail than general commodity price indices (Gruss and Kebhaj 2019).[13] Moreover, compared to other indicators of a country's commodity revenues, such as commodity exports or commodity production, the use of commodity prices avoids endogeneity problems, as markets are global and individual countries can be assumed to be price takers (e.g., Broda 2004; Raddatz 2007; Medina 2016; Fernández et al. 2018; Gruss and Kebhaj 2019).[14]

3.2 Method

We use a Poisson pseudo maximum likelihood (PPML) model with high-dimensional fixed effects. This estimation technique is widely used in econometrics to analyze count data or data with a non-negative integer outcome (Correia et al. 2020). It combines the PPML estimator, which is robust to certain forms of heteroskedasticity (Santos Silva and Tenreyro 2006), with the ability to control for high-dimensional fixed effects (Fally 2015), making it suitable for datasets with multiple sources of unobserved heterogeneity.

The following equations are used to test the hypothesis that manufacturing exports to regional trade partners are less negatively affected by Dutch Disease effects than manufacturing exports to extra-regional trade partners:

1. $Y_{c,i,j,t} = \exp[\alpha_0 lnComPrice_{it} * Tech_c + \alpha_1 X + \gamma_i + \eta_j + \delta_t + \theta_c + \mu_{c,i,j}] + \epsilon_{c,i,j,t}$
2. $Y_{c,i,j,t} = \exp[\alpha_0 lnComPrice_{it} * TP + \alpha_1 X + \gamma_i + \eta_j + \delta_t + \theta_c + \mu_{c,i,j}] + \epsilon_{c,i,j,t}$

Equation (1) estimates whether there are differences in the effect of commodity prices on export values according to the technological sophistication of exports. In our data, exports are classified into low-, medium-, and high-technology according to their technological sophistication c. In equation (1), $Y_{c,i,j,t}$ describes manufacturing exports of technology level c from country i to trade partner j in year t. These exports are estimated using the individual commodity price index of each exporting country ($lnComPrice_{it}$) and the control variables in vector X. The commodity price is interacted with a dummy for the technology level $Tech$ to see if its effects differ according to the technology level of the exports. The included fixed effects

[13] We use the gross export price index from the IMF database, only accounting for changes in export prices and not in import prices. Also, we use the index applying rolling weights to account for long-run trends in changes in the composition of export commodities. As the weights are lagged and predetermined to price fluctuations, they do not respond to endogenous changes in export volumes (Gruss and Kebhaj 2019).

[14] A complete list of the data sources for all used variables can be found in Annex 3.

are γ for the exporter, η for the importer, δ for the year, θ for the technology level and μ for exporter-importer-technology level fixed effects. It is most common in PPML models to apply importer-year, exporter-year, and exporter-importer fixed effects (Head and Mayer 2014). In this case, however, it would not be possible to include importer-year and exporter-year fixed effects because they would cancel out the effects of the exporter's commodity price index and the importer's GDP due to perfect multicollinearity. Therefore, instead of exporter-year and importer-year fixed effects, we use exporter, importer and time fixed effects separately. μ is an adapted version of the exporter-importer fixed effect that also takes into account the technology level of exports between the two countries and is thus more specific. ϵ is the error term and standard errors are clustered at the exporter-importer-technology level as this is the most disaggregated level.

Building on the determination of the Dutch Disease effects via equation (1), equation (2) aims to test our hypothesis. The interaction of the commodity price with the technology level is replaced by an interaction term with a dummy for regional and extra-regional trade partners TP. This allows us to differentiate the effect of commodity price increases on exports to these different groups of trade partners. To obtain elasticities, all independent variables, except for the dummy variables, are logarithmized.

In the baseline estimation, the control variable in vector X is the GDP of the trade partner. On the one hand, it represents the market size of the destination economy. Larger markets offer greater market potential. For firms, this means potentially larger economies of scale and better sales opportunities. In theory, this larger market could also be reached by exporting to several small and medium-sized economies. However, due to market entry costs, exporting to a few larger economies is considered more efficient (Martin and Sunley 1996; Bernard and Jensen 2004; Goda and Sánchez González 2024). On the other hand, changes in the GDP of trade partners are associated with changes in their demand. For both reasons, an increase in the GDP of a trade partner is expected to have a positive effect on manufacturing exports to that economy. The data for trade partners' GDP comes from the World Bank's World Development Indicators. Since the current GDP dataset has more data points than the constant dataset, we manually calculated the constant 2015 values using the GDP deflator.

For robustness tests, we include PTAs as another control variable in the estimation, change the composition of regional trade partners by including Caribbean countries, and control for the degree of commodity dependence of Latin American exporters.[15]

[15] An explanation of the choice of the robustness tests is provided in the robustness test subsection in section 4.

4. Results

As a first step, we estimate whether Dutch Disease effects caused a decline in Latin American manufacturing exports during our observation period. To do so, we estimate the impact of commodity price changes on low-, medium-, and high-tech manufacturing exports. We assess whether our prediction that low-tech exports are most affected by the Dutch Disease is true. Column 1 of Table 1 shows the results for estimating the value of manufacturing exports. The coefficients of the interaction terms of the commodity price with low-, medium-, and high-tech indicate the extent to which a one percent increase in the commodity price affects exports in each category. The effect is significant for all three categories, but it is strongest for low-tech exports, with exports falling by 0.92% for a 1% increase in commodity prices. For medium-tech and high-tech exports, the declines are smaller at 0.41% and 0.49%, respectively. This difference is statistically significant, as shown in column 1 of Table 2. It shows the difference between the impact of commodity prices on low-tech exports and the impact on the other two categories (the difference between the values in column 1 of Table 1) and indicates whether this difference is statistically significant: Low-tech exports are significantly more negatively affected by rising commodity prices than medium- and high-tech exports. As expected, a higher trade partner's GDP is associated with an increase in the value of manufacturing exports.

Next, we assess whether, as we hypothesize, there is a stronger negative effect of commodity price increases on extra-regional exports than on regional exports. The results in column 2 of Table 1 show that the effect is negative for both groups. However, the effect is stronger, with a decline of 0.48%, and more significant (1% level) for extra-regional exports than for regional exports, where the decline of 0.31% is only significant at the 10% level. Again, we assess whether this difference is statistically significant (column 2, table 2) and find that regional exports are indeed significantly less affected by rising commodity prices at the 10% level.

To test the full model, we combine the two components, technology level and export destination, in Table 3. The results show that extra-regional exports are more negatively affected than regional exports in all categories. The effect is particularly strong for extra-regional low-tech exports, which fall by 0.95%, while regional low-tech exports fall by only 0.58%. The coefficients for rising commodity prices are significant for all categories in extra-regional exports, while for regional exports the effect on medium-tech exports is insignificant.

Low-tech exports are also more affected than medium- and high-tech exports in both regional and extra-regional trade. As shown in Table 4, extra-regional low-tech exports are more than twice as negatively affected as extra-regional medium- and high-tech exports, and this difference is significant. Extra-regional low-tech exports are also significantly more negatively affected than regional low-tech exports, with a larger decline of 0.37 percentage points. Similar analyses for medium- and high-tech exports show that the difference between extra-regional and regional trade is not significant for these categories.[16].

Table 1: Effect of commodity prices on low-, medium-, and high-tech exports and on regional and extra-regional trade partners

	(1) Manufacturing Exports	(2) Manufacturing Exports
Log Commodity Price * Low-tech	-0.921***	
	(0.145)	
Log Commodity Price * Medium-tech	-0.408***	
	(0.155)	
Log Commodity Price * High-tech	-0.485***	
	(0.139)	
Log Commodity Price * Extra-regional		-0.481***
		(0.139)
Log Commodity Price * Regional		-0.310*
		(0.180)
Log Importer GDP	0.604***	0.555***
	(0.0636)	(0.0856)
Observations	132,299	132,299
Pseudo R2	0.987	0.987

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Effect of commodity prices on regional exports in difference to extra-regional exports

	(1) Manufacturing Exports	(2) Manufacturing Exports
Log Commodity Price * Low-tech	-0.921***	
	(0.145)	
Difference between Low- and Medium-tech	0.513***	
	(0.0482)	
Difference between Low- and High-tech	0.437***	
	(0.0566)	
Log Commodity Price * Extra-regional		-0.481***
		(0.139)
Difference between extra-regional and regional		0.171*
		(0.0897)
Log Importer GDP	0.604***	0.555***
	(0.0636)	(0.0856)
Observations	132,299	132,299
Pseudo R2	0.987	0.987

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[16] Results in Annex 4.

Table 3: Effect of commodity prices on low-, medium-, and high-tech exports differentiated by regional and extra-regional trade partners

	Manufacturing Exports
Extra-regional:	
Log Commodity Price * Low-tech	-0.948***
	(0.158)
Log Commodity Price * Medium-tech	-0.397***
	(0.152)
Log Commodity Price * High-tech	-0.464***
	(0.140)
Regional:	
Log Commodity Price * Low-tech	-0.582***
	(0.177)
Log Commodity Price * Medium-tech	-0.243
	(0.199)
Log Commodity Price * High-tech	-0.344**
	(0.170)
Log Importer GDP	0.548***
	(0.0720)
Observations	132,299
Pseudo R2	0.987

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Difference between the effect of commodity price increases on extra-regional low-tech and the other categories of exports

	Manufacturing Exports
Log Commodity Price * ERLT	-0.948***
	(0.158)
Difference between ERLT and ERMT	0.551***
	(0.0671)
Difference between ERLT and ERHT	0.484***
	(0.0761)
Regional:	
Difference between ERLT and RLT	0.366***
	(0.107)
Difference between ERLT and RMT	0.705***
	(0.133)
Difference between ERLT and RHT	0.604***
	(0.113)
Log Importer GDP	0.548***
	(0.0720)
Observations	132,299
Pseudo R2	0.987

Note: ER = extra-regional, R = regional, LT = low-tech, MT = medium-tech, HT = high-tech.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Robustness tests

To test the robustness of our results we include PTAs as another control variable and extend the classification of regional trade partners by including Caribbean countries in this category. Finally, we control for the level of commodity dependence of our exporters.[17]

PTAs between trade partners provide a relative competitive advantage over non-PTA competitors by reducing tariff and non-tariff barriers to the export destination market (Ruta 2017). Consequently, we expect the presence of a trade agreement to increase the volume of exports. The data for trade agreements are taken from the *NSF-Kellogg Institute Database on Economic Integration Agreements*, and we use a dummy that takes the value of 1 if any type of listed trade agreement is in force between the two trade partners. We include trade agreements with regional and extra-regional trade partners only in the robustness tests and not in our baseline estimation because the trade agreement dataset covers fewer countries and including them would considerably reduce our sample size.

Although Caribbean countries are geographically close to mainland Latin American nations, they lack land borders, have varying degrees of cultural proximity, and are less integrated into the Latin American market. As a result, they are classified as extra-regional trade partners in our baseline estimation. However, due to their geographical proximity and comparable level of economic development we include them as regional trade partners in a robustness test.

We account for the heterogeneity of commodity dependence and commodity boom experience in Latin America by dividing our sample into boom and non-boom economies. Following the classification of Flechtner and Middelanis (2024), we consider boom economies to be those that experienced an improvement in their terms of trade during the commodity price boom and have a commodity dependence of at least 50% of their exports. According to this classification, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru and Venezuela are classified as boom economies. We expect Dutch Disease effects to be more pronounced for the exports of these economies.

Changing the classification of Caribbean countries from extra-regional to regional trade partners does not significantly alter the results. Similarly, the main trends remain very stable in magnitude and significance when considering the presence of PTAs. In fact, our main

[17] The results of the robustness tests are found in Annex 5.

argument that regional trade is less affected by Dutch Disease effects than extra-regional trade is strengthened when controlling for PTAs, as the effect of commodity price increases on regional exports becomes weaker (-0.265 instead of -0.310) and insignificant. The significance of the difference in the effect of commodity price increases on extra-regional versus regional exports becomes more significant (5% level instead of 10% level). The effect on regional high-tech exports is also weaker and less significant. As expected, the effect of PTAs on the value of manufacturing exports is positive and significant in all specifications.

For the distinction between boom and non-boom exporters, we confirm our expectation that Dutch Disease effects are stronger for boom exporters. However, we also find a significant negative effect of commodity price increases on extra-regional exports for non-boom exporters. Although this effect is weaker in magnitude, the result suggests that Dutch Disease effects are a relevant phenomenon not only for the most commodity-dependent countries in the region, but for the region in general.

5. Discussion

Our results, presented in Section 4, provide some interesting insights into whether trade with regional trade partners mitigates Dutch Disease effects. Table 4 summarizes the main results including their interpretation with respect to our hypotheses.

Table 5: Results and their interpretation

Result	Table	Reference to hypothesis	Interpretation
Rising commodity prices lead to a decline in manufacturing exports	1	In line with classical Dutch Disease theory	Confirms that DD is relevant in country sample
Low-tech exports are more affected than more sophisticated exports	1	In line with theory about cost- and price elasticity	Confirms assumption of technological sophistication channel
Significant difference between Dutch Disease effects on extra-regional and regional exports	1,2	In line with our hypothesis	Regional trade less affected by DD effects, possible explanations: technological sophistication channel and trade barrier channel
When disaggregating by technology level and region: all significantly negatively affected but regional medium-tech exports	3	In line with our hypothesis	The trade barrier and the technological sophistication channel can explain these results
When disaggregating by technology level and region: significant difference between regional and extra-regional exports only for low-tech	4	In line with trade barrier and market entry cost channel	Stronger Dutch Disease effects provide more space for mitigation

Source: Elaboration by the authors.

First, we observe a substantial and significant Dutch Disease-like effect of rising commodity prices on manufacturing exports during our analyzed period, with significant negative effects across all three technology levels. Notably, low-tech exports are significantly more affected than medium- and high-tech exports, supporting our hypothesis that due to greater cost- and price sensitivity, low-tech industries are more vulnerable to Dutch Disease.

This finding provides the basis for the technological sophistication channel. Since extra-regional trade contains a larger share of low-tech exports, it should be more affected by Dutch Disease effects. Indeed, when considering aggregated manufacturing exports, extra-regional exports experience a significantly greater negative impact from Dutch Disease effects compared to regional exports. The respective declines, 0.48% for extra-regional exports and 0.31% for regional exports, align closely with the findings of Harding and Venables (2016) and Stijns (2003), who find declines in manufacturing exports of around half a percent. The larger decline in extra-regional exports can be explained by the technological sophistication channel. At the disaggregated level, however, the technological sophistication channel cannot explain why there is a significant difference between extra-regional and regional low-tech exports. Instead, this result can be explained by the trade barrier and market entry cost channel, which mitigates the loss of competitiveness of regional exports and thus their contraction. Consequently, our results align with both channels we have introduced in this paper. We find that the difference between regional and extra-regional exports is mainly driven by low-tech exports. This is not surprising since the Dutch Disease effect is strongest for this category, so there are more opportunities for the Dutch Disease effect to be mitigated by regional trade and for the positive effects of the trade barrier and entry cost channel to materialize.

At first glance, it seems surprising that the effect is stronger and, in some specifications, more significant for high-tech exports than for medium-tech exports. However, as shown in Figure 1, high-tech exports play only a marginal role in the export structure of Latin American economies. Another possible explanation is that some exports classified as high-tech actually reflect assembly activities within GVCs and therefore involve less technology than reported. Consequently, at least for Latin American economies, medium-tech exports may be the more appropriate indicator of more sophisticated exports.

6. Conclusion

In this paper, we established a link between the literatures on the Dutch Disease and on regional trade. Two channels are introduced through which regional trade might mitigate the effects of the Dutch Disease during a commodity price boom. The technological sophistication channel suggests that more sophisticated exports are less affected by the Dutch Disease due to lower cost and price sensitivity. Since regional trade contains a higher degree of technological sophistication, it should be less affected by the Dutch Disease. The trade barrier channel suggests that the loss of competitiveness of regional exports relative to those of extra-regional competitors due to Dutch Disease effects could be reduced by the entry costs and trade barriers faced by these extra-regional competitors.

These theoretical considerations are empirically tested using data on bilateral manufacturing exports of Latin American countries from 1996 to 2018. The results show, first, that there is a negative Dutch Disease effect of rising commodity prices on manufacturing exports. Second, the Dutch Disease effect is most pronounced for low-tech exports, as predicted by the technological sophistication channel. Third, we find significantly lower Dutch Disease effects on manufacturing exports to regional trade partners than to extra-regional trade partners. These significantly lower effects are found for aggregated manufacturing exports, where a one percent increase in commodity prices leads to a 0.48% decline in extra-regional exports, while the decline is only 0.31% for regional exports. The higher share of more sophisticated exports in regional trade may be one reason for this difference. At the same time, a disaggregation by technology level shows that this difference is mainly driven by the impact on low-tech exports, which decline by 0.95% to extra-regional trade partners, significantly more than the 0.58% decline to regional trade partners. While the technological sophistication channel cannot explain this difference, it could come from the market entry costs and trade barriers channels. Consequently, we find evidence for our hypothesis that regional trade mitigates the negative effects of the Dutch Disease.

These results highlight the importance of regional trade for commodity-dependent developing economies. During a commodity price boom, further regional integration could help mitigate unwanted Dutch Disease effects. In addition, the results show that technological upgrading can also reduce the vulnerability of the manufacturing sector to commodity price changes. For Latin American countries struggling to industrialize and suffering from premature deindustrialization, these results provide a strong case for industrial upgrading strategies aimed at moving from low-tech to mainly medium-tech exports. Strengthening regional trade integration can help achieve this goal. While we have conducted an empirical study for Latin America, our theoretical considerations suggest that similar conclusions may hold for other commodity-dependent late industrializers. Future research could focus on this aspect.

Bibliography

Ahmed, Swarnali, Maximiliano Appendino, and Michele Ruta. 2015. *Depreciations without Exports? Global Value Chains and the Exchange Rate Elasticity of Exports*. Policy Research Working Papers. The World Bank. https://doi.org/10.1596/1813-9450-7390.

Albrieu, Ramiro. 2012. "La Macroeconomía de Los Recursos Naturales En América Latina." In *Los Recursos Naturales Como Palanca Del Desarrollo En América Del Sur: Ficción o Realidad?*, edited by Ramiro Albrieu, Andrés López, and Guillermo Rozenwurcel, 105–53. Montevideo: Red Mercosur. https://www.redsudamericana.org/sites/default/files/doc/Los%20RecursosNaturalesPalancaDesarrollo.pdf.

Arif, Imran. 2021. "Productive Knowledge, Economic Sophistication, and Labor Share." *World Development* 139 (March): 105303. https://doi.org/10.1016/j.worlddev.2020.105303.

Bahar, Dany, and Miguel A. Santos. 2018. "One More Resource Curse: Dutch Disease and Export Concentration." *Journal of Development Economics* 132 (May): 102–14. https://doi.org/10.1016/j.jdeveco.2018.01.002.

Bekerman, Marta, and Cecilia Rikap. 2010. "Regional Integration and Export Diversification in MERCOSUR: The Case of Argentina and Brazil." *CEPAL Review*, no. 100 (April).

Ben Barka, Habiba. 2012. "Border Posts, Checkpoints, and Intra-African Trade: Challenges and Solutions." African Development Bank.

Berman, Nicolas, Philippe Martin, and Thierry Mayer. 2012. "How Do Different Exporters React to Exchange Rate Changes?" *The Quarterly Journal of Economics* 127 (1): 437–92. https://doi.org/10.1093/qje/qjr057.

Bernard, Andrew B., and J. Bradford Jensen. 2004. "Why Some Firms Export." *Review of Economics and Statistics* 86 (2): 561–69. https://doi.org/10.1162/003465304323031111.

Broda, Christian. 2004. "Terms of Trade and Exchange Rate Regimes in Developing Countries." *Journal of International Economics* 63 (1): 31–58. https://doi.org/10.1016/S0022-1996(03)00043-6.

Burstein, Ariel T, João C Neves, and Sergio Rebelo. 2003. "Distribution Costs and Real Exchange Rate Dynamics during Exchange-Rate-Based Stabilizations." *Journal of Monetary Economics* 50 (6): 1189–1214. https://doi.org/10.1016/S0304-3932(03)00075-8.

Bussière, Matthieu, Guillaume Gaulier, and Walter Steingress. 2020. "Global Trade Flows: Revisiting the Exchange Rate Elasticities." *Open Economies Review* 31 (1): 25–78. https://doi.org/10.1007/s11079-019-09573-3.

Caglayan, Mustafa, and Firat Demir. 2019. "Exchange Rate Movements, Export Sophistication and Direction of Trade: The Development Channel and North–South Trade Flows." *Cambridge Journal of Economics* 43 (6): 1623–52. https://doi.org/10.1093/cje/bez005.

Calzada Olvera, Beatriz, and Danilo Spinola. 2022. "Complexity and Productive Structure in Latin America: A Network Analysis of Trade Patterns." *Centre for Applied Finance and Economics (CAFE) Working Paper*, no. 16.

Carlin, Wendy, Andrew Glyn, and John Van Reenen. 2001. "Export Market Performance of OECD Countries: An Empirical Examination of the Role of Cost Competitiveness." *The Economic Journal* 111 (468): 128–62. https://doi.org/10.1111/1468-0297.00592.

Chang, Pao-Li, and Myoung-Jae Lee. 2011. "The WTO Trade Effect." *Journal of International Economics* 85 (1): 53–71. https://doi.org/10.1016/j.jinteco.2011.05.011.

Chen, Maggie Xiaoyang, John S. Wilson, and Tsunehiro Otsuki. 2008. "Standards and Export Decisions: Firm-Level Evidence from Developing Countries." *The Journal of International Trade & Economic Development* 17 (4): 501–23. https://doi.org/10.1080/09638190802250027.

Chen, Natalie, and Luciana Juvenal. 2014. *Quality, Trade, and Exchange Rate Pass-Through*. Washington, D.C.: International Monetary Fund.
Cherif, Reda. 2013. “The Dutch Disease and the Technological Gap.” *Journal of Development Economics* 101 (March): 248–55. https://doi.org/10.1016/j.jdeveco.2012.10.010.
Cirera, Xavier, Diego Comin, and Marcio Cruz. 2022. *Bridging the Technological Divide: Technology Adoption by Firms in Developing Countries*. The World Bank. https://doi.org/10.1596/978-1-4648-1826-4.
Conconi, Paola, Glenn Magerman, and Afrola Plaku. 2020. “The Gravity of Intermediate Goods.” *Review of Industrial Organization* 57 (2): 223–43. https://doi.org/10.1007/s11151-020-09762-2.
Corden, Max. 1984. “Booming Sector and Dutch Disease Economics: Survey and Consolidation.” *Oxford Economic Papers* 36 (3): 359–80. https://doi.org/10.1093/oxfordjournals.oep.a041643.
Corden, Max, and Peter Neary. 1982. “Booming Sector and De-Industrialisation in a Small Open Economy.” *The Economic Journal* 92 (368): 825–48. https://doi.org/10.2307/2232670.
Correia, Sergio, Paulo Guimarães, and Tom Zylkin. 2020. “Fast Poisson Estimation with High-Dimensional Fixed Effects.” *The Stata Journal: Promoting Communications on Statistics and Stata* 20 (1): 95–115. https://doi.org/10.1177/1536867X20909691.
Corsetti, Giancarlo, and Luca Dedola. 2005. “A Macroeconomic Model of International Price Discrimination.” *Journal of International Economics* 67 (1): 129–55. https://doi.org/10.1016/j.jinteco.2004.09.009.
Dalmazzo, Alberto. 2002. “Technological Complexity, Wage Differentials and Unemployment.” *Scandinavian Journal of Economics* 104 (4): 515–30. https://doi.org/10.1111/1467-9442.00299.
Das, Sanghamitra, Mark J. Roberts, and James R. Tybout. 2007. “Market Entry Costs, Producer Heterogeneity, and Export Dynamics.” *Econometrica* 75 (3): 837–73. https://doi.org/10.1111/j.1468-0262.2007.00769.x.
De Haas, Ralph, and Steven Poelhekke. 2019. “Mining Matters: Natural Resource Extraction and Firm-Level Constraints.” *Journal of International Economics* 117 (March): 109–24. https://doi.org/10.1016/j.jinteco.2019.01.006.
Diao, Xinshen, Margaret McMillan, and Dani Rodrik. 2019. “The Recent Growth Boom in Developing Economies: A Structural-Change Perspective.” In *The Palgrave Handbook of Development Economics*, 281–334. Cham: Palgrave Macmillan.
Dingemans, Alfonso, and César Ross. 2012. “Free Trade Agreements in Latin America since 1990: An Evaluation of Export Diversification.” *CEPAL Review* 2012 (108): 27–48. https://doi.org/10.18356/0cc7e81b-en.
Döver, Melike. 2024. “If What You Export Matters, Does It Matter Where You Export to? An Analysis of Diversification and Technological Sophistication of Bilateral Exports in the SADC Region.” *Unpublished*.
ECLAC. 2021. *Regional Integration Is Key to Recovery after the Crisis*. International Trade Outlook for Latin America and the Caribbean 2020. Santiago de Chile: United Nations.
Erten, Bilge, and José Antonio Ocampo. 2013. “Super Cycles of Commodity Prices Since the Mid-Nineteenth Century.” *World Development* 44 (April): 14–30. https://doi.org/10.1016/j.worlddev.2012.11.013.
Fally, Thibault. 2015. “Structural Gravity and Fixed Effects.” *Journal of International Economics* 97 (1): 76–85. https://doi.org/10.1016/j.jinteco.2015.05.005.
Felbermayr, Gabriel, Mario Larch, Erdal Yalcin, and Yoto V. Yotov. 2024. “On the Heterogeneous Trade and Welfare Effects of GATT/WTO Membership.” *Review of World Economics*, January. https://doi.org/10.1007/s10290-023-00520-6.
Fernández, Andrés, Andrés González, and Diego Rodríguez. 2018. “Sharing a Ride on the Commodities Roller Coaster: Common Factors in Business Cycles of Emerging Economies.”

Journal of International Economics 111 (March): 99–121. https://doi.org/10.1016/j.jinteco.2017.11.008.
Flechtner, Svenja, and Martin Middelanis. 2024. “The Role of the Commodity Price Boom in Shaping Public Social Spending: Evidence from Latin America.” *World Development* 182 (October): 106717. https://doi.org/10.1016/j.worlddev.2024.106717.
Freund, Caroline, and Martha Denisse Pierola. 2012. “Export Surges.” *Journal of Development Economics* 97 (2): 387–95. https://doi.org/10.1016/j.jdeveco.2011.06.008.
Gabriel, Luciano Ferreira, and Luiz Carlos de Santana Ribeiro. 2019. “Economic Growth and Manufacturing: An Analysis Using Panel VAR and Intersectoral Linkages.” *Structural Change and Economic Dynamics* 49 (June): 43–61. https://doi.org/10.1016/j.strueco.2019.03.008.
Geyer, Herman S. 2019. “Global Value Chain Participation and Trade Barriers in Sub-Saharan Africa.” In *Value Chains in Sub-Saharan Africa*, edited by Sören Scholvin, Anthony Black, Javier Revilla Diez, and Ivan Turok, 13–26. Advances in African Economic, Social and Political Development. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-06206-4_2.
Goda, Thomas, and Santiago Sánchez González. 2024. “Export Market Size Matters: The Effect of the Market Size of Export Destinations on Manufacturing Growth.” *International Economic Journal* 38 (1): 21–44. https://doi.org/10.1080/10168737.2023.2300301.
Goda, Thomas, Alejandro Torres García, and Cristhian Larrahondo. 2024. “Real Exchange Rates and Manufacturing Exports in Emerging Economies: The Role of Sectoral Heterogeneity and Product Complexity.” *Review of World Economics*, February. https://doi.org/10.1007/s10290-023-00523-3.
Goldstein, Judith L., Douglas Rivers, and Michael Tomz. 2007. “Institutions in International Relations: Understanding the Effects of the GATT and the WTO on World Trade.” *International Organization* 61 (01). https://doi.org/10.1017/S0020818307070014.
Grifell-Tatjé, Emili, and C. A. K. Lovell. 1999. “Profits and Productivity.” *Management Science* 45 (9): 1177–93. https://doi.org/10.1287/mnsc.45.9.1177.
Gruss, Bertrand. 2014. “After the Boom–Commodity Prices and Economic Growth in Latin America and the Caribbean.” *IMF Working Papers* 14 (154). https://doi.org/10.5089/9781498363518.001.
Gruss, Bertrand, and Suhaib Kebhaj. 2019. “Commodity Terms of Trade: A New Database.” *IMF Working Papers* 19 (21). https://doi.org/10.5089/9781484393857.001.
Haraguchi, Nobuya, Charles Fang Chin Cheng, and Eveline Smeets. 2017. “The Importance of Manufacturing in Economic Development: Has This Changed?” *World Development* 93 (May): 293–315. https://doi.org/10.1016/j.worlddev.2016.12.013.
Harding, Torfinn, and Anthony Venables. 2016. “The Implications of Natural Resource Exports for Nonresource Trade.” *IMF Economic Review* 64 (2): 268–302. https://doi.org/10.1057/imfer.2015.43.
Head, Keith, and Thierry Mayer. 2014. “Gravity Equations: Workhorse,Toolkit, and Cookbook.” In *Handbook of International Economics*, 4:131–95. Elsevier. https://doi.org/10.1016/B978-0-444-54314-1.00003-3.
Heresi, Rodrigo. 2023. “Reallocation and Productivity in Resource-Rich Economies.” *Journal of International Economics* 145 (November): 103843. https://doi.org/10.1016/j.jinteco.2023.103843.
Hidalgo, César, Bailey Klinger, Albert-László Barabási, and Ricardo Hausmann. 2007. “The Product Space Conditions the Development of Nations.” *Science* 317 (5837): 482–87. https://doi.org/10.1126/science.1144581.
IMF, ed. 2019. *Regional Economic Outlook. Sub-Saharan Africa : Recovery amid Elevated Uncertainty*. World Economic and Financial Surveys 2019. Washington, DC: International Monetary Fund.
Krugman, Paul. 1987. “The Narrow Moving Band, the Dutch Disease, and the Competitive Consequences of Mrs. Thatcher.” *Journal of Development Economics* 27 (1–2): 41–55. https://doi.org/10.1016/0304-3878(87)90005-8.

Lall, Sanjaya. 2000. “The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-98.” *Oxford Development Studies* 28 (3): 337–69. https://doi.org/10.1080/713688318.
Martin, Ron, and Peter Sunley. 1996. “Paul Krugman’s Geographical Economics and Its Implications for Regional Development Theory: A Critical Assessment.” *Economic Geography* 72 (3): 259. https://doi.org/10.2307/144401.
Maskus, Keith E., Tsunehiro Otsuki, and John S. Wilson. 2005. *The Cost Of Compliance With Product Standards For Firms In Developing Countries: An Econometric Study*. Policy Research Working Papers. The World Bank. https://doi.org/10.1596/1813-9450-3590.
Medina, Leandro. 2016. “The Effects of Commodity Price Shocks on Fiscal Aggregates in Latin America.” *IMF Economic Review* 64 (3): 502–25. https://doi.org/10.1057/imfer.2016.14.
Mordecki Pupko, Gabriela, and Matías Piaggio Talice. 2011. “Regional Integration: Economic Growth through Export Diversification?” *Revista de Economía y Estadística* 49 (1): 51–77.
Moreira, Maurício Mesquita, Christian Volpe Martincus, and Juan S. Blyde. 2008. *Unclogging the Arteries: The Impact of Transport Costs on Latin American and Caribbean Trade*. Washington, DC; Cambridge, MA: Inter-American Development Bank; David Rockefeller Center for Latin American Studies, Harvard University.
Murshed, Syed Mansoob, and Leandro Antonio Serino. 2011. “The Pattern of Specialization and Economic Growth: The Resource Curse Hypothesis Revisited.” *Structural Change and Economic Dynamics* 22 (2): 151–61. https://doi.org/10.1016/j.strueco.2010.12.004.
Ocampo, José Antonio. 2017. “Commodity-Led Development in Latin America.” In *Alternative Pathways to Sustainable Development: Lessons from Latin America*, by Gilles Carbonnier, Humberto Campodónico, and Sergio Tezanos Vázquez, 51–76. Leiden; Boston: Brill.
Oqubay, Arkebe, and Kenichi Ohno, eds. 2019. *How Nations Learn: Technological Learning, Industrial Policy, and Catch-Up*. 1st ed. Oxford University Press. https://doi.org/10.1093/oso/9780198841760.001.0001.
Prebisch, Raúl. 1950. *The Economic Development of Latin America and Its Principal Problems*. Santiago de Chile: ECLAC. https://archivo.cepal.org/pdfs/cdPrebisch/002.pdf.
Raddatz, Claudio. 2007. “Are External Shocks Responsible for the Instability of Output in Low-Income Countries?” *Journal of Development Economics* 84 (1): 155–87. https://doi.org/10.1016/j.jdeveco.2006.11.001.
Rodrik, Dani. 2016. “Premature Deindustrialization.” *Journal of Economic Growth* 21 (1): 1–33. https://doi.org/10.1007/s10887-015-9122-3.
Ruta, Michele. 2017. *Preferential Trade Agreements and Global Value Chains: Theory, Evidence, and Open Questions*. World Bank, Washington, DC. https://doi.org/10.1596/1813-9450-8190.
Santos Silva, J. M. C., and Silvana Tenreyro. 2006. “The Log of Gravity.” *The Review of Economics and Statistics* 88 (4): 641–58. https://doi.org/10.1162/rest.88.4.641.
Schmitt, Alexander, and Johannes Van Biesebroeck. 2013. “Proximity Strategies in Outsourcing Relations: The Role of Geographical, Cultural and Relational Proximity in the European Automotive Industry.” *Journal of International Business Studies* 44 (5): 475–503. https://doi.org/10.1057/jibs.2013.10.
Siliverstovs, Boriss, and Dierk Herzer. 2007. “Manufacturing Exports, Mining Exports and Growth: Cointegration and Causality Analysis for Chile (1960–2001).” *Applied Economics* 39 (2): 153–67. https://doi.org/10.1080/00036840500427965.
Snoeck, Michele, Lucia Pittaluga, Hector Pastori, Rosario Domingo, and Carlos Casacuberta. 2009. “The Emergence of Successful Export Activities in Uruguay: Four Case Studies.” *IDB Working Paper*, no. 238. https://doi.org/10.2139/ssrn.1815920.
Stijns, Jean-Philippe. 2003. “An Empirical Test of the Dutch Disease Hypothesis Using a Gravity Model of Trade.” *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.403041.
Su, Dan, and Yang Yao. 2017. “Manufacturing as the Key Engine of Economic Growth for Middle-Income Economies.” *Journal of the Asia Pacific Economy* 22 (1): 47–70. https://doi.org/10.1080/13547860.2016.1261481.

Szirmai, Adam. 2012. "Industrialisation as an Engine of Growth in Developing Countries, 1950–2005." *Structural Change and Economic Dynamics* 23 (4): 406–20. https://doi.org/10.1016/j.strueco.2011.01.005.

The Growth Lab at Harvard University. 2019. "International Trade Data (SITC, Rev. 2)." Harvard Dataverse. https://doi.org/10.7910/DVN/H8SFD2.

———. n.d. "The Atlas of Economic Complexity." http://www.atlas.cid.harvard.edu.

Tregenna, Fiona. 2015. "Deindustrialisation, Structural Change and Sustainable Economic Growth." *UNU-MERIT Working Papers* 2015 (32).

UNECA. 2015. *Economic Report on Africa 2015: Industrializing through Trade*. Addis Ababa: United Nations Economic Comission for Africa.

Wijnbergen, Sweder van. 1984. "The `Dutch Disease': A Disease After All?" *The Economic Journal* 94 (373): 41–55. https://doi.org/10.2307/2232214.

Yeats, Alexander James. 1997. "Does Mercosur's Trade Performance Raise Concerns about the Effects of Regional Trade Arrangements?" Policy Research Working Paper Series 1729. The World Bank.

Annex

Annex 1: Technological classification of exports (SITC 3-digit, revision 2)

Low technology manufacturers (LT1: Textile, Garnment and Footwear & LT2: Other products)	
LT1: Textile, garment and footwear 611 Leather 612 Leather etc. manufactures 613 Fur skins tanned, dressed 651 Textile yarn 652 Cotton fabrics, woven 654 Other woven textile fabric 655 Knitted, etc. fabrics 656 Lace, ribbons, tulle, etc. 657 Special textile fabric, products 658 Textile articles nes 659 Floor coverings, etc. 831 Travel goods, handbags 842 Mens outerwear not knitted 843 Womens outerwear non-knitted 844 Under garments not-knitted 845 Outerwear knit non-elastic 846 Under garments knitted 847 Textile clothing accessories nes. 848 Headgear, non-textile clothing 851 Footwear	**LT2: Other products** 642 Paper, etc. precut, articles of 665 Glassware 666 Pottery 673 Iron, steel shapes etc. 674 Iron, steel universal plate, sheet 675 Iron, steel hoop, strip 676 Railway rails, etc. iron steel 677 Iron, steel wire (exc. rod) 679 Iron, steel castings unworked 691 Structures and parts nes 692 Metal tanks, boxes, etc. 693 Wire products non-electrical 694 Steel, copper nails, nuts, etc. 695 Tools 696 Cutlery 697 Base metal household equipment 699 Base metal manufactures nes 821 Furniture, parts thereof 893 Articles of plastic nes 894 Toys, sporting goods, etc. 895 Office supplies nes 897 Gold, silver ware, jewellery 898 Musical instruments, parts 899 Other manufactured goods

Medium technology manufacturers (MT1: Automotive, MT2: Process, MT3: Engeneering)	
MT1: Automotive 781 Passenger motor vehicle excluding buses 782 Lorries, special motor vehicles nes	**MT3: Engineering** 711 Steam boilers and auxiliary plant 713 Internal combustion piston engines

783 Road motor vehicles nes 784 Motor vehicles parts, accessories nes 785 Cycles, etc. motorized or not **MT2: Process** 266 Synthetic fibres to spin 267 Other man-made fibres 512 Alcohols, phenols etc. 513 Carboxylic acids, etc. 533 Pigments, paints, etc. 553 Perfumery, cosmetics, etc. 554 Soap, cleansing, etc. preparations 562 Fertilizers, manufactured 572 Explosives, pyrotech products 582 Products of condensation etc. 583 Polymerization, etc. products 584 Cellulose derivatives, etc. 585 Plastic material nes 591 Pesticides disinfectants 598 Miscellaneous chemical products nes 653 Woven man-made fibre fabric 671 Pig iron etc. 672 Iron, steel primary forms 678 Iron, steel tubes, pipes, etc. 786 Trailers, non-motorized vehicles, nes 791 Railway vehicles 882 Photo, cinema supplies	714 Engines and motors nes 721 Agricultural machinery, excluding tractors 722 Tractors non-road 723 Civil, engineering equipment etc. 724 Textile, leather machinery 725 Paper etc. mill machinery 726 Printing bookbinding machinery, parts 727 Food machinery non-domestic 728 Other machinery for special industries 736 Metalworking machine tools 737 Metalworking machinery nes 741 Heating, cooling equipment 742 Pumps for liquids, etc. 743 Pumps nes, centrifuges, etc. 744 Mechanical handling equipment 745 Non-electrical machinery tools nes 749 Non-elec machinery parts, acc nes 762 Radio broadcast receivers 763 Sound recorders, phonograph 772 Switchgear, etc. parts nes 773 Electrical distributing equipment 775 Household type equipment nes 793 Ships and boats etc. 812 Plumbing, heating, lighting equipment 872 Medical instruments nes 873 Meters and counters nes 884 Optical goods nes 885 Watches and clocks 951 War firearms, ammunition

High technology manufacturers (HT1: Electronic and electrical, HT2: other)	
HT1: Electronic and electrical 716 Rotating electric plant 718 Other power-generating machinery 751 Office machines 752 Automatic data processing equipment 759 Office, automatic data processing machine parts, accessories 761 Television receivers 764 Telecom equipment parts, accessories nes 774 Electro-medical, x-ray equipment 776 Transistors, valves, etc. 778 Electrical machinery nes	**HT2: Other** 524 Radioactive, etc. material 541 Medicinal, pharmaceutical products 712 Steam engines, turbines 792 Aircraft, etc. 871 Optical instruments 874 Measuring, controlling instruments 881 Photo apparatus, equipment nes

Source: Elaboration by the authors, data from Lall (2000).
Note: “Excludes ‘special transactions’ like electric current, cinema film, printed matter, special transactions, gold, works of art, coins, pets.”

ANNEX 2: List of trade partners

<table>
<tr><th>Regional boom economies (8)</th><th>Extra-regional economies (213)</th></tr>
<tr><td>ARG, BOL, BRA, CHL, COL, ECU, PER, VEN</td><td rowspan="5">ABW, AFG, AGO, AIA, ALB, AND, ANT, ARE, ARM, ASM, ATA, ATF, ATG, AUS, AUT, AZE, BDI, BEL, BEN, BFA, BGD, BGR, BHR, BHS, BIH, BLM, BLR, BMU, BRB, BRN, BTN, BVT, BWA, CAF, CAN, CCK, CHE, CHN, CIV, CMR, COD, COG, COK, COM, CPV, CUW, CYM, CYP, CZE, DEU, DJI, DMA, DNK, DZA, EGY, ERI, ESH, ESP, EST, ETH, FIN, FJI, FLK, FRA, FRO, FSM, GAB, GBR, GEO, GHA, GIB, GIN, GLP, GMB, GNB, GNQ, GRD, GRL, HKG, HRV, HUN, IDN, IND, IOT, IRL, IRN, IRQ, ISL, ISR, ITA, JAM, JOR, JPN, KAZ, KEN, KHM, KIR, KNA, KOR, KWT, LAO, LBN, LBR, LBY, LCA, LKA, LSO, LTU, LUX, LVA, MAC, MAF, MAR, MDA, MDG, MDV, MHL, MKD, MLI, MLT, MMR, MNG, MNP, MOZ, MRT, MSR, MUS, MWI, MYS, MYT, NAM, NCL, NER, NFK, NGA, NIU, NLD, NOR, NPL, NRU, NZL, OMN, PAK, PCN, PHL, PLW, PNG, POL, PRI, PRK, PRT, PSE, PYF, QAT, ROU, RUS, RWA, SAU, SCG, SDN, SEN, SGP, SHN, SLE, SMR, SOM, SPM, SRB, SSD, STP, SVK, SVN, SWE, SWZ, SXM, SYC, SYR, TCA, TCD, TGO, THA, TJK, TKL, TKM, TLS, TON, TTO, TUN, TUR, TUV, TWN, TZA, UGA, UKR, UMI, USA, UZB, VAT, VCT, VGB, VNM, VUT, WLF, WSM, YEM, ZAF, ZMB, ZWE</td></tr>
<tr><td>Regional non-boom economies (12)</td></tr>
<tr><td>BLZ, CRI, SLV, GTM, HND, MEX, NIC, PAN, GUY, PRY, SUR, URY</td></tr>
<tr><td>Caribbean economies (3)</td></tr>
<tr><td>CUB, DOM, HTI</td></tr>
</table>

Source: Elaboration by the authors, data from the Atlas of Economic Complexity (The Growth Lab at Harvard University, n.d.).

ANNEX 3: Data references

Variable	Description	Data source
Low-, medium-, and high-tech manufacturing data	Bilateral manufacturing export data is retrieved by matching data from the Growth Lab at Harvard University with a product key according to the Lall (2000) classification of the technological content of exports. Constant values are manually calculated with the GDP deflator.	The Growth Lab at Harvard University & Lall (2000)
Trade partner's GDP (constant 2015 US$)	Manually calculated with WDI data and GDP deflator – less gaps than constant WDI GDP	World Development Indicators (WDI)
Commodity Terms of Trade	Commodity Export Price Index, Individual Commodites Weighted by Ratio of Exports to Total Commodity Exports Historical, Annual (1962 - present), Rolling Weights, Index (2012 = 100)	IMF commodity terms of trade database
GDP deflator (constant 2015 $)		World Bank
Preferential trade agreements	Dummy for any active preferential trade agreement in goods	NSF-Kellogg Institute Data Base on Economic Integration Agreements

Annex 4: Results for difference between extra-regional and regional for medium-tech and high-tech

Table 6: Difference between the effect of commodity price increases on extra-regional medium-tech and the other categories of exports

	Manufacturing Exports
Log Commodity Price * ERMT	-0.948***
	(0.158)
Difference between ERMT and ERLT	-0.551***
	(0.0671)
Difference between ERMT and ERHT	-0.0670
	(0.0475)
Regional:	
Difference between ERMT and RLT	-0.185**
	(0.0893)
Difference between ERMT and RMT	0.154
	(0.119)
Difference between ERMT and RHT	0.0535
	(0.0964)
Log Importer GDP	0.548***
	(0.0720)
Observations	132,299
Pseudo R2	0.987

Note: ER = extra-regional, R = regional, LT = low-tech, MT = medium-tech, HT = high-tech.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Difference between the effect of commodity price increases on extra-regional high-tech and the other categories of exports

	Manufacturing Exports
Log Commodity Price * ERHT	-0.464***
	(0.140)
Difference between ERHT and ERLT	-0.484***
	(0.0761)
Difference between ERHT and ERMT	0.0670
	(0.0475)
Regional:	
Difference between ERHT and RLT	-0.118
	(0.0934)
Difference between ERHT and RMT	0.221*
	(0.121)
Difference between ERHT and RHT	0.120
	(0.0984)
Log Importer GDP	0.548***
	(0.0720)
Observations	132,299
Pseudo R2	0.987

Note: ER = extra-regional, R = regional, LT = low-tech, MT = medium-tech, HT = high-tech.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ANNEX 5: Results robustness tests

Table 8: Robustness test: Effect of commodity prices on low-, medium-, and high-tech exports and on regional and extra-regional trade partners

Manufacturing Exports	(1)	(2)	(3)	(4)
Log Commodity Price * Low-tech	-0.923***	-0.921***		
	(0.146)	(0.145)		
Log Commodity Price * Medium-tech	-0.409***	-0.408***		
	(0.159)	(0.155)		
Log Commodity Price * High-tech	-0.493***	-0.485***		
	(0.141)	(0.139)		
Log Commodity Price * Extra-regional			-0.481***	-0.481***
			(0.141)	(0.139)
Log Commodity Price * Regional			-0.265	-0.319*
			(0.185)	(0.180)
Trade Agreement	0.284***		0.305***	
	(0.0752)		(0.0787)	
Log Importer GDP	0.560***	0.604***	0.490***	0.557***
	(0.0701)	(0.0636)	(0.0967)	(0.0854)
Observations	95,022	132,299	95,022	132,299
Pseudo R2	0.988	0.987	0.988	0.987
Caribbean as regional	No	Yes	No	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Robustness test: Effect of commodity prices on regional exports in difference to extra-regional exports

Manufacturing Exports	(1)	(2)
Log Commodity Price * Extra-regional	-0.481***	-0.481***
	(0.141)	(0.139)
Difference between regional and extra-regional	0.216**	0.162*
	(0.0916)	(0.0886)
Trade Agreement	0.305***	
	(0.0787)	
Log Importer GDP	0.490***	0.557***
	(0.0967)	(0.0854)
Observations	95,022	132,299
Pseudo R2	0.988	0.987
Caribbean as regional	No	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Robustness test: Effect of commodity prices on low-, medium-, and high-tech exports differentiated by regional and extra-regional trade partners

	(1)	(2)

Manufacturing Exports		
Extra-regional:		
Log Commodity Price * Low-tech	-0.947***	-0.952***
	(0.159)	(0.159)
Log Commodity Price * Medium-tech	-0.396**	-0.397***
	(0.154)	(0.152)
Log Commodity Price * High-tech	-0.469***	-0.465***
	(0.142)	(0.140)
Regional:		
Log Commodity Price * Low-tech	-0.547***	-0.585***
	(0.179)	(0.176)
Log Commodity Price * Medium-tech	-0.197	-0.253
	(0.202)	(0.198)
Log Commodity Price * High-tech	-0.296*	-0.345**
	(0.172)	(0.170)
Trade Agreement	0.304***	
	(0.0773)	
Log Importer GDP	0.482***	0.548***
	(0.0834)	(0.0721)
Observations	95,022	132,299
Pseudo R2	0.988	0.987
Caribbean as regional	No	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Difference between the effect of commodity price increases on extra-regional low-tech and the other categories of exports

Manufacturing Exports	(1)	(2)
Log Commodity Price * ERLT	-0.947***	-0.952***
	(0.159)	(0.159)
Difference between ERLT and ERMT	0.551***	0.555***
	(0.0675)	(0.0693)
Difference between ERLT and ERHT	0.478***	0.487***
	(0.0752)	(0.0780)
Regional:		
Difference between ERLT and RLT	0.400***	0.367***
	(0.111)	(0.107)
Difference between ERLT and RMT	0.750***	0.698***
	(0.136)	(0.133)
Difference between ERLT and RHT	0.651***	0.607***
	(0.117)	(0.114)
Trade Agreement	0.304***	
	(0.0773)	
Log Importer GDP	0.482***	0.548***
	(0.0834)	(0.0721)
Observations	95,022	132,299
Pseudo R2	0.988	0.987
Caribbean as regional	No	Yes

Note: ER = extra-regional, R = regional, LT = low-tech, MT = medium-tech, HT = high-tech.
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Effect of commodity price increases on regional and extra-regional exports for boom and non-boom exporters

	Manufacturing Exports
Log Commodity Price * Boom * Extra-regional	-0.806***
	(0.214)
Log Commodity Price * Boom * Regional	-0.579***
	(0.215)
Log Commodity Price * Non-Boom * Extra-regional	-0.535***
	(0.141)
Log Commodity Price * Non-Boom * Regional	-0.139
	(0.176)
Log Importer GDP	0.583***
	(0.0814)
Observations	132,299
Pseudo R2	0.987

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1