Real Exchange Rates and Trade in Colombia[1]

Key messages:

Colombia non-oil exports do not respond to Real Effective Exchange Rate (REER) movements. *At the aggregate level, on average there is a (spurious) negative relation between real exchange rate depreciations and export performance. Once we control for prices, the effect of the REER on aggregate exports is not significant. This puzzling result is explained by the dominance of oil and oil-related products and agriculture commodities in total exports. Estimation results for the remaining 20 percent of Colombia's non-commodity exports, suggests that they don't react to real exchange rates movements.*

The lack of responsiveness of Colombia's exports to the REER cannot be explained by the emergence of GVC, nor by Dutch disease, of which we do not find any evidence. *In the presence of GVCs, the potential gain that exporters would have as a result of REER depreciations could be diminished by an increase in the cost of imported intermediate inputs used for final production. Our results show that Colombia's responsiveness of exports to REER is significant (but negative) for sectors with high shares of imported intermediate inputs over total exports. These sectors however represent less than 15 percent of total exports, reflecting the low level of Colombia's integration into GVCs. For the rest of the sectors the impact is generally non-significant.[2] Different indicators also suggest that Colombia does not suffer from Dutch disease and therefore, the lack of responsiveness of its exports to the REER is not driven by an overly appreciated exchange rate.*

Instead, factors such as the lack of export diversification, limited export orientation and a dominant currency for transactions explain the lack of responsiveness of Colombia's exports to the REER. *The impact of a depreciation of the REER decreases (and becomes negative) for sectors with higher level of export concentration in terms of number of exporters, suggesting that sectors dominated by big firms do not respond (and sometimes negatively respond) to REER depreciations. Similarly, the high preponderance (95 percent of total trade) of for domestic oriented sectors (average share of exports over total turnover below 50 percent) also explain why Colombian exports do not react to the REER. Last, recent literature[3] suggests that most of the export/import transactions of Colombian firms are denominated in US dollars. In this case, a depreciation of the REER will not impact the relative price of Colombian products and therefore their imports from third countries other than the US.*

Exchange rates policy will be ineffective in promoting exports in Colombia. *While there is no evidence that exchange rate movement matters for the performance of Colombia's export, factor such as information externalities on the export market and the growth in foreign demand do affect it. This means that while an active use of exchange rate policy would not be successful in boosting export growth, policies aiming at providing information (for example, external market intelligence) would support export*

[1] This note was prepared by a World Bank team composed by Paolo Dudine (Senior Economist), Alejandro Forero (Consultant), Andres David Pinchao (Economist) and Nadia Rocha (Senior Economist).
[2] It is weakly positive for a couple of sectors representing less than 20 percent of total exports.
[3] Adler et al. (2020).

performance and should be a key objective of Colombia's export promotion and diversification strategy. In addition, focusing the promotion strategy on fast growing markets would allow to further reap the benefits of trade.

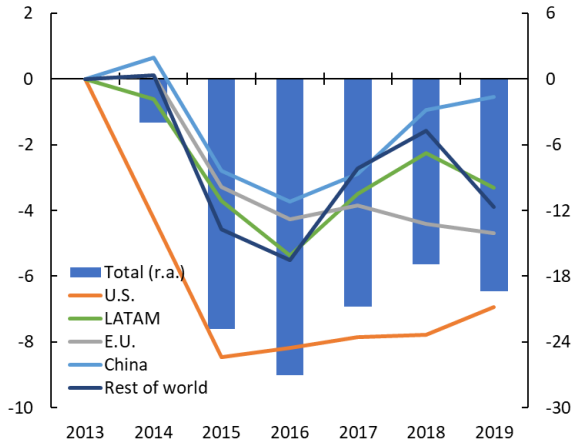
Motivation

The sharp depreciation that Colombia experienced after the 2014 drop in oil prices was followed by a sharp decline in exports. Between 2013 and 2019 Colombia's exports declined US$19 billion, or 32.6 percent of their average in 2011–13 (Figure 1). About a fifth of this total decline was lost between 2013 and 2014 alone in exports to the U.S. (US$4 billion). Another fifth was lost to the European Union. Exports to the rest of the world declined as well but did pick up after 2016. In contrast, exports to the U.S. and the European Union has remained way below 2013 levels ever since. Over the same period, the share of Colombia's export to world imports fell, reaching a minimum in 2016 of 0.20 percent from a peak of 0.32 percent in 2012, and then it increased slightly in subsequent years.

This is not surprising, if one considers that about 80 percent of exports is concentrated on oil and agricultural products. As it is the case for other commodity exporters, the Colombian peso is, effectively, a commodity currency. Indeed, after large scale oil production started in the mid-90s', the exchange rate of the Colombian peso vis-à-vis the U.S. dollar has trailed the price of oil, both in nominal terms and in real effective terms (Figure 2). This wouldn't be an issue per se if it wasn't that (i) oil production declines when oil prices fall, and that (ii) this is the case not only for actual production, but also for projected production (Figure 3 and Figure 4). Decreases in non-oil commodities after the 2014 depreciation are in line with the recent literature highlighting that supply of both *non-renewable* and *renewable* commodities is almost inelastic to prices, and hence, to the exchange rate (Fally and Sayre 2018). Also, over the past decade, prices of renewable and non-renewable commodities co-moved. During the 2008–2012 REER appreciation, price of agricultural goods also increased which could explain the increase in agricultural exports.

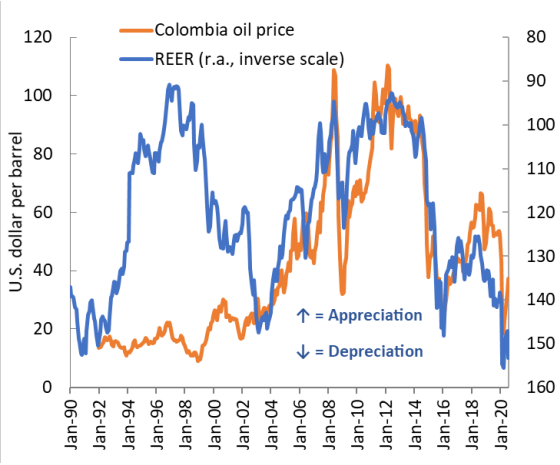
What was surprising about the 2014 – 16 depreciation is that non-commodity exports did not increase as expected. Both economic theory and international evidence suggest that a depreciation of the real effective exchange rate (REER) would increase exports (Freund and Pierola, 2012, Di Nino et al. 2012, Eichengreen and Gupta, 2013, Nicita, 2013). Indeed, back in 2015, economists in Colombia were expecting an increase in non-traditional export, including the Central Bank and the Ministry of Finance (Marco Fiscal de Mediano Plazo 2014 and 2015, Informe al Congreso and reports from the Central Bank, 2014 y 2015). However, the share of manufacturing exports to world import of manufacturing goods decreased from 0.08 percent to 0.06 percent between 2012 and 2019.

Figure 1: Export value change, relative to 2013 (in billions of U.S. dollars)



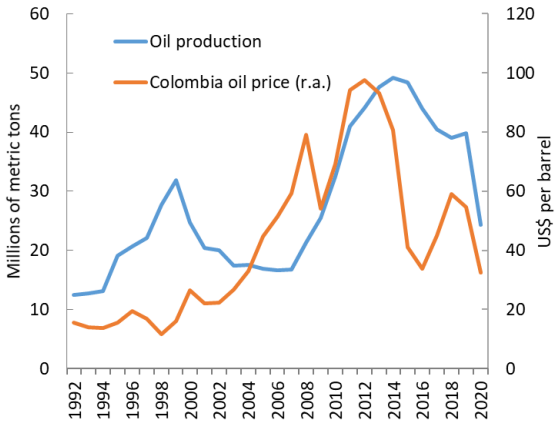
Source: Banco de la Republica and DANE.

Figure 2: Real Effective Exchange Rate of Colombia and the U.S.



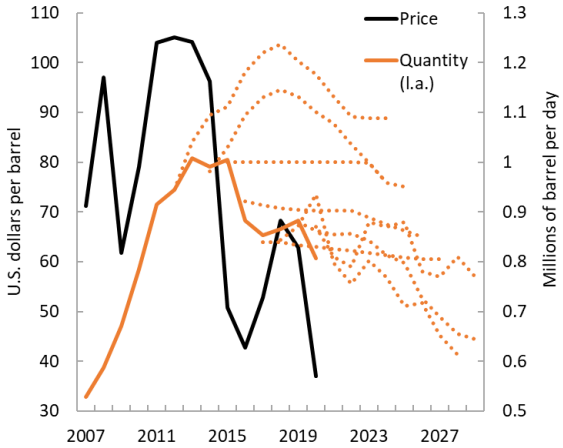
Source: Banco de la Republica and DANE.

Figure 3: Oil production and oil prices



Source: DANE.

Figure 4: Oil price, oil production, and projections of oil productions



Source: Ministry of Finance, Medium-Term Fiscal Framework.

The fact that Colombia's exports tend not to respond to the exchange rate is not new and has been evidenced by empirical studies. Between 1997 and 2001 Colombia's REER depreciated a cumulative 33 percent. Over the same period, exports only increased a cumulative 6 percent. Lanau and Toscani, 2018, estimate that Colombia's *total* export was inelastic to the REER during 2001–12. More recently, Adler and others, 2020, and Casas and others, 2020, using data from Colombia, show that the more firms price exports and/or finance themselves in a dominant currency (generally, the U.S. dollars), the less their exports respond to exchange rate changes. A study by the research department of the Ministry of Trade on the elasticity of the trade balance to the exchange rate (mimeo) also finds a similar result.

In this note we ask three questions:

- How large is the exchange rate elasticity of Colombia's total, non-mining, and manufacturing exports?
- What might explain the lack of responsiveness of non-oil exports?
- Does Colombia suffer from Dutch disease, whereby the extractive industry is making other export industries uncompetitive?

The Puzzle of Colombia's Low Export Elasticity to the Exchange Rate

First, we estimate the elasticity of Colombia's *total* exports to the real exchange rate with a simple reduced form model that explains exports volume as a function of the real effective exchange rate and global demand. We use quarterly as well as annual data from 1992–2019, employ different measures of the real effective exchange rate,[4] and consider different lag structures (see Annex 1 and 2 for details on the data and the estimation techniques).

This aggregate analysis shows that Colombia's exports respond in a counter-intuitive way to exchange rate movements, that is exports increase with an appreciation of the REER and decrease with a depreciation. Our estimates of export volumes elasticity to the exchange rate span, depending on the model, from -0.3 to -0.2 (Table 1), that is a 10 percent depreciation of the REER causes total exports volumes to decrease between 2 and 3 percent. If we use the share of Colombia's exports to total world imports (this implicitly controls for both export prices and external demand), the semi-elasticity to the REER is -0.001, that is a 10 percent depreciation of the REER decreases the share of export by 0.01 percentage points, which is somewhat in line with the observed decline in share of total world imports observed after 2014. However, we do find that the exports do respond to trading partners' demand. Across models, the elasticity of exports to global demand ranges from 0 to 1.3 (see annex table 1, 2, and 3).

Table 1. Estimates of Colombia's export elasticity

	To the real effective exchange rate		To global demand	
	Min	**Max**	**Min**	**Max**
Export value	-1.336***	-0.742***	0	3.904***
Export volume	-0.257***	-0.169**	0	1.333***
Export share	-0.001***	-0.001***	0	0

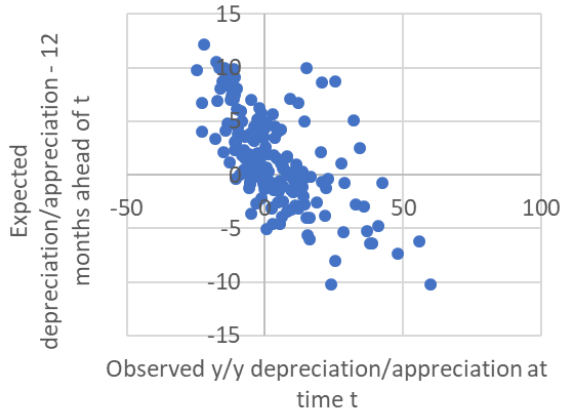
Source: Authors' estimates using the estimation strategy presented in technical annex 1A.

The negative impact of REER depreciations on exports persists after controlling for oil prices and REER expectations. Oil prices could affect export elasticities through different channels. First, if oil prices determine the exchange rate, then estimates of the elasticity are biased if one does not control for them. Once we control for the price of oil, the absolute value of the estimated elasticity decreases but the sign

[4] The real (effective) exchange rate index that we use is such that an increase is interpreted as a depreciation.

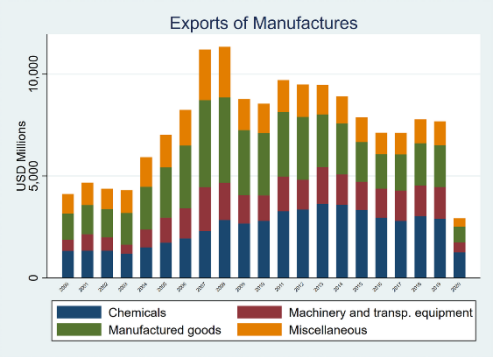
does not revert. Second, oil prices could also influence expectations about future exchange rate movements. If agents expect that the exchange rate moves with oil prices, they might use expectations about the oil price to derive expectations about exchange rate movement in the future. Expectations about whether a depreciation will be long-lasting may be important to induce firms to invest more, augment scale and expand capacity, and hence export more. However, when we compare exchange rate movements between *t - 1* and *t*, and *expectations* of exchange rate movements between *t* and *t+1*, we observe a negative correlation. This suggests that Colombian agents tend to believe that exchange rate movements over a specific year will be reverted over the following year (Figure 5), which could inhibit an expansion of exports. To control for this effect, we include the expected depreciation of the REER[5] in our regressions. Yet, the results do not change, and our estimates of elasticity remain negative.

Figure 5: Expected exchange rate movement given an observed exchange rate movement



Source: Banco de la Republica.

Figure 6: Composition of manufacturing exports



Source: DIAN exports dataset.

The puzzle remains even if one focuses only on manufacturing exports. If we look at export values, we find that manufacturing exports decline between 4 and 5.3 percent for every 10 percent depreciation of the REER. Instead, if we use the manufacturing export share in total world imports of manufacturing goods as a proxy for export volumes and if we control for total external demand,[6] we find that manufacturing exports do not respond to REER movements (Table 2).

Table 2. Estimates of Colombia's manufacturing export elasticity

	To the real effective exchange rate		To global demand	
	Min	Max	Min	Max
Export value	-0.535***	-0.397***	0	4.777***
Export share	0	0	0	0

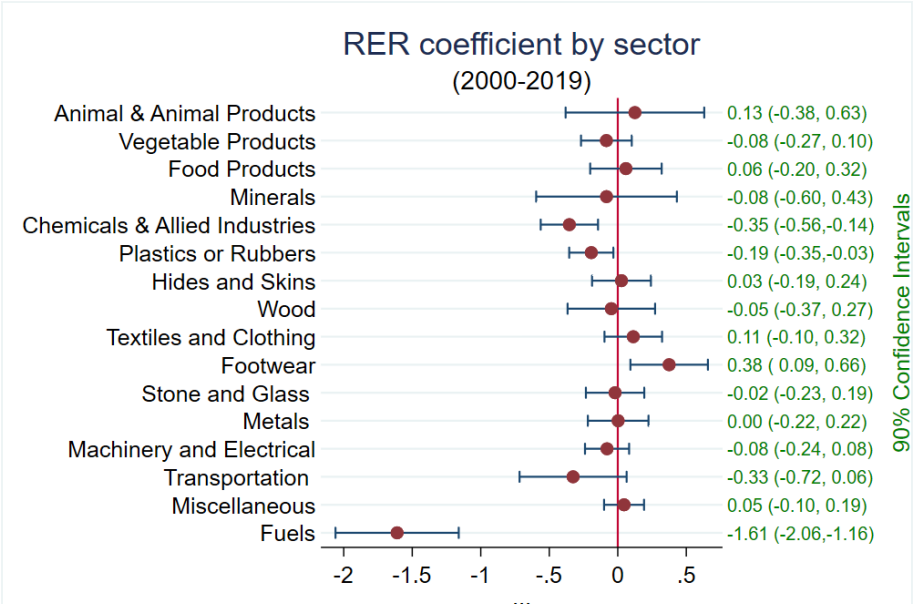
Source: Authors' estimates.

[5] We also add he expected price of oil as an alternative variable.

[6] As argued before, using export shares in total world imports allows to automatically control for global demand. Whether exports share in total world demand is a good or bad proxy for export volumes depends on the degree of homogeneity of the composition of Colombia's exports and world imports. If the two are composed of different goods, the proxy is of lower quality.

Analysis at the sector[7] level confirms Colombia's anomalous response to real exchange rate movements. A panel regression[8] on the determinants of Colombian exports during 2000-2019 shows that on average, bilateral exports do not respond to real exchange depreciation of the Colombian peso (see Annex table 5). As suggested above, this puzzling result can be explained by the high concentration of exports in oil and oil-intensive sectors (Figure 6). Indeed, when results are compared across economic sectors, we can observe that for fuel and petroleum-related sectors such as Chemicals and Plastics & Rubbers, the coefficient on the REER is negative and significant. With the exception of footwear, for the rest of the sectors the coefficient on the REER is not significant, suggesting that Colombian exports in non-oil intensive sectors do not respond to real exchange rate movements (see Figure 7).

Figure 7: Sectoral impact of REER on export performance



Note: These linear combinations of coefficients are obtained from regression in column 2 of Annex Table 5.

The lack of response of Colombia's manufacturing exports to the exchange rate remains after we account for the fact that most of these exports go to other countries in Latin-America. REER indices aggregate bilateral exchange rates using bilateral shares in total exports. Because most oil exports are directed to the U.S. and Europe, REER indices tend to assign a large weight to the bilateral exchange rate of the Colombian peso vis-à-vis de U.S. dollar and the Euro. However, most of manufacturing exports is directed to other countries in Latin America, and, in general, the exchange rate of currencies of countries in Latin America vis-à-vis the U.S. dollar tend to move together (Figures 8 and 9). As a result, while a depreciation of the pesos vis-à-vis the U.S. dollar leads to a sizeable depreciation of the REER, this does not improve Colombia's competitiveness in manufacturing relative to Colombia's trading partners in manufacturing. Hence, we construct a real effective exchange rate index based only on manufacturing trade, both for Colombia and its trading partners. Even using this measure of the REER we find that manufacturing export is not elastic to the exchange rate (Table 3 and annex table 4).

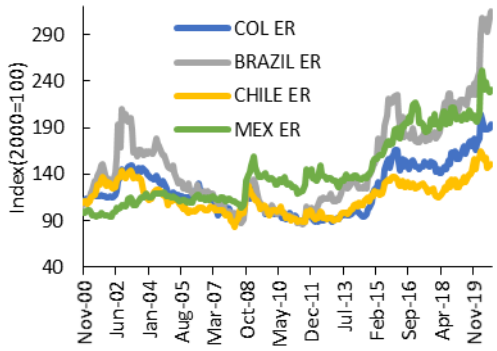
[7] Sectors are defined at HS code 4 digits.
[8] See Technical appendix A.2 for the estimation equation and controls.

Table 3. Estimates of Colombia's manufacturing export elasticity, using manufacturing REER

	To the real effective exchange rate		To global demand	
	Min	Max	Min	Max
Total	0	0	5.399***	5.596***

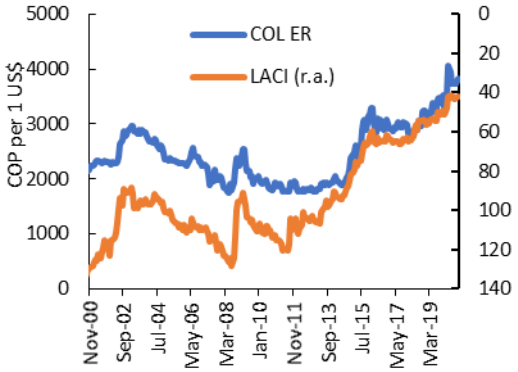
Source: Authors' estimates.

Figure 8: Exchange rate index of Brazil, Colombia, Chile, and Mexico



Source: Bloomberg.

Figure 9: Exchange rate of Colombia and Exchange Rate Index of LAC



Source: Bloomberg.

While changes in REER do not seem to affect non-oil exports, factors such as information externalities on the export markets and foreign demand play a significant role as determinants of Colombia's exports. Sectoral level regressions suggest that information externalities are a significant determinant of export flows in Colombia. The more export products reach a given destination, the more firms (of all sectors) acquire information and expertise about how to reach that destination, which in turn increases the export flows to that given destination. Our estimation results show that a 10 percent increase in the number of products exported to a specific destination *d* increases exports to that destination by 5.1 percent. In addition, as expected, both aggregate and sectoral regressions suggests that exports are boosted by destination specific demand shocks.

What does explain the lack of responsiveness of Colombia's non-oil exports to the REER?

The lack of responsiveness of Colombia exports to declines in real exchange rates is not fully linked with the emergence of GVCs.[9] GVC integration through backward linkages could impact the response to REER via two potential mechanisms. First, a depreciation will increase the cost of imported intermediate inputs used in final good production, thus lowering the competitive gain. Second, more stable links between supplier and buyers increase the costs of switching suppliers as a result of exchange rate depreciations.

[9] Global evidence suggests that the rise in global value chains explains on average 40 percent of the fall of REER elesticity of exports in the last decades (Ahmed et al. 2015).

Our analysis shows[10] that at the sectoral level, the responsiveness of exports to REER movements decreases (and becomes negative) the higher the share of intermediate inputs that are used for exporting. Specifically, for those sectors importing 5 percent or less of intermediate inputs the interaction term is weakly significant and positive suggesting that a depreciation of the Colombian peso can boosts exports. These sectors represent less than 18 percent of Colombian exports. For other low integrated sectors representing 69 percent of total exports (sectors with GVC integration between 5 and 55 percent) the impact of the REER on exports is not significant .The impact of REER becomes negative and significant for those sectors with high shares of intermediate imports over exports of 60 percent or higher. These highly integrated sectors, however, represent less than 13 percent of total exports (see Figure 10).

Figure 10: Impact of REER on exports of sectors with different levels of GVC integration

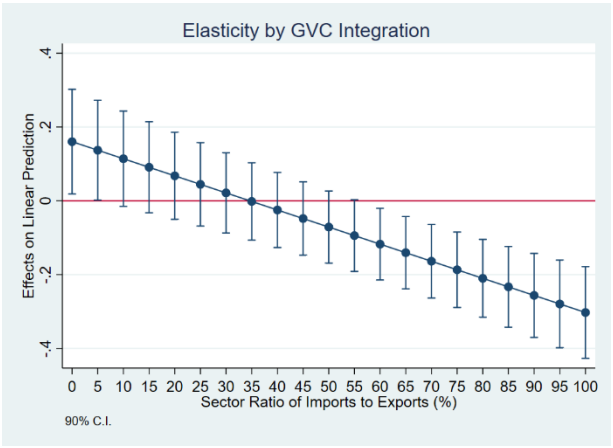
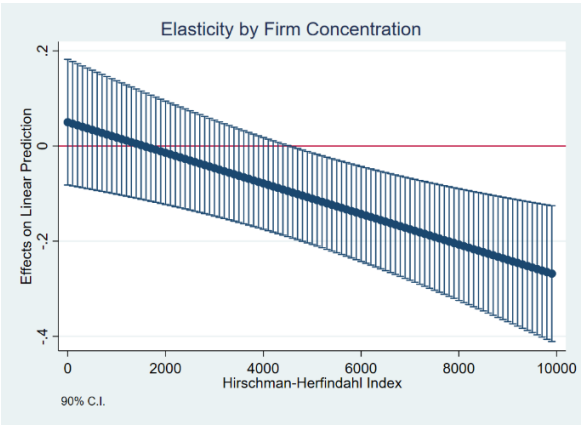


Figure 11: Impact of REER on exports of sectors with different levels of concentration



Instead, factors such as the high concentration of exporting firms, limited export orientation and a dominant currency for transactions explain the non-response of Colombia's non-oil exports to REER movements. Firms accounting for a larger portion of exports in a certain sector, may find it easier to hedge against real exchange rate changes along their production network. Our results confirm[11] that the impact of a depreciation of the REER decreases (and becomes negative) for sectors with higher level of export concentration[12] in terms of number of exporters, suggesting that sectors dominated by big firms (high levels of concentration of exports) do not respond (and sometimes negatively respond) to REER depreciations (see Figure 11). In addition, firms that are not export oriented and mainly serve the domestic market might not respond to real exchanges movements. Indeed, our results show that for domestic oriented sectors (average share of exports over total turnover below 50 percent), which

[10] To assess the impact of GVC integration we add in the regression an interaction term between our variable of interest (log REER) and a variable of GVC integration, which is measured as the share of imports over total exports. Regression results are reported in column 3 of Annex table 5.

[11] To assess the potential role of GVC integration on the response of exports to REERs, we add in the regression an interaction term between our variable of interest (log REER) and a variable of GVC integration, which is measured as the share of imports of intermediatesand capital goods over total exports. Regression results are reported in column 3 of Annex table 5.

[12] To capture the level of concentration at the sectoral level we compute the HHI index and we interact it with our variable of interest (REER). Regression results are presented in column 4 of appendix table A5.

represent more than 95 percent of trade, exports do not react to REER (see column 5 of annex table 5). Last, recent literature suggests that most of the export/import transactions of Colombian firms [13] are denominated in US dollars. In this case, a depreciation of the REER will not impact the relative price of Colombian products and therefore their imports from third countries other than the US (Adler et al, 2020). Colombian exporters usually have debts in dollars and in moments of depreciation tend to decrease imports and exports (Casas and others, 2020).

Can Dutch disease be an explanation for the low responsiveness of Colombian exports to exchange rates? Low responsiveness to REER could be driven by the fact that Colombia suffers from the Dutch disease, whereby tradable sectors like manufacturing are not competitive and hence are not in a condition to penetrate other market even when the exchange rate depreciates. In addition, countries experiencing Dutch disease usually have overly appreciated exchange rates which would make the marginal effect of a depreciations of the REER non-significant for export performance. We explore this in the next session.

Does Colombia suffer from Dutch Disease?

A country suffers from the Dutch disease when the development and growing economic importance of the natural resource sector comes at the expense of the competitiveness and development of the non-resource tradable sector. This can happen through two channels:

1) *The resource movement channel.* The demand for capital and labor of the resource sector drives up wages and return on capital and dries up labor and capital from manufacturing and services. As a result, as output and employment decline, and production costs increase in non-tradable services, prices of non-tradable goods and services go up. As a result, unless labor productivity increases, the tradable sector becomes less profitable and less competitive. This channel functions to the extent that labor and capital are mobile, and the demand for labor from the resource sector is large relative to the rest of the economy.

2) *The demand channel.* Irrespective of resource movements, the rent coming from natural resource extraction generate an income effect that pushes up demand, and hence, prices for non-tradable services. As a result, not only does the real effective exchange rate increases, but the cost of labor and of inputs increase in the tradable sector even if there has been no increase in productivity.

The IMF does not find evidence that the REER is consistently and significantly overvalued. Between 2010 and 2016, during the oil price boom, the IMF assessed that the REER was broadly in line with fundamentals. During 2017–20, it estimated an REER overvaluation spanning from 5 percent in 2017 to about 13 percent in 2019, which is not high and is subject to large estimation errors.

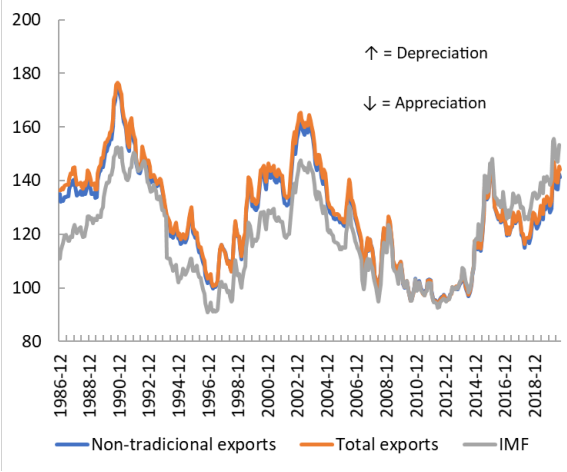
We find no evidence that Colombia suffers from Dutch disease. According to the theory described above, the Dutch disease carries three symptoms: (i) a protracted appreciation of the exchange rate, (ii) lack of

[13] In 2010 98% and 99% of exports transactions and value respectively were denominated in USD. The second most common currency is Colombian peso.

dynamisms in manufacturing output and employment, and (iii) an increase in wages of services and manufacturing that exceeds the growth of labor productivity growth. However, for Colombia we find that:

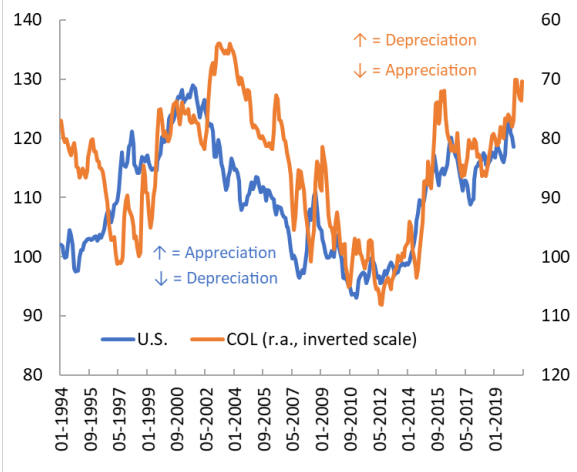
1) *The Real Effective Exchange Rate does not show a long-run tendency to appreciate.* Over the past 32 years, the real effective exchange rate of Colombia has experienced two periods of sustained appreciation (1990–96 and 2002–11) and two periods of sustained depreciation (1997–2001 and 2012–2020), but there is no long-run tendency to appreciate (Figure 12). Although the REER follows closely oil prices, this is mostly driven by the nominal exchange rate vis-à-vis the U.S. dollar, not by inflation differentials. Actually, if we compare the REER of Colombia with that of the U.S., we see that since the mid-90s the appreciation/depreciation of Colombia's REER has been associated to the depreciation/appreciation of the U.S. dollar (Figure 13).

Figure 12: Real Effective Exchange Rate of Colombia



Source: Banco de la Republica and IMF.

Figure 13: Real Effective Exchange Rate of Colombia and the U.S.



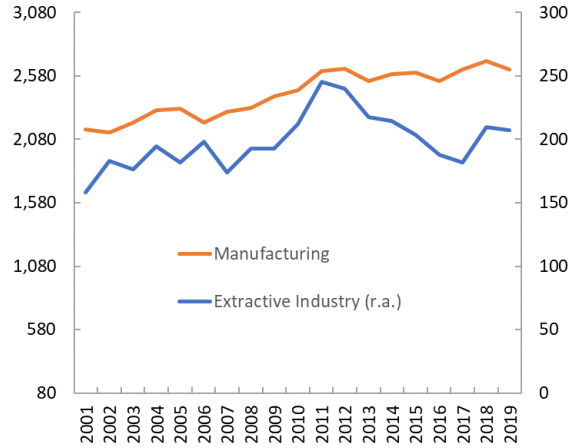
Source: BIS.

2) *The expansion of the oil sector has not negatively affected employment growth in manufacturing.* Over time, employment in manufacturing has increased steadily, including when employment in extractive industries surged (during 2008–2011, Figure 14). Also, employment in Colombia's extractive industries has amounted to between 7 and 9 percent of employment in manufacturing and about 1 percent of total employment. Numerically, the resource sector has been too small to crowd out employment in other sectors. Finally, until 2012 employment in manufacturing has increased in line with total employment. The divergence between the growth in total employment and employment in manufacturing has coincided with a decline in resource sector employment.

3) *Wages in manufacturing have increased in line with manufacturing labor productivity.* High wage growth in services (commerce) and manufacturing pre-dates the expansion of the oil sector and is linked to a period of two-digit inflation. Since 2002, nominal wages in the tradable and non-tradable sector (proxied by wages in commerce and manufacturing) have increased in at an annual average of 6 percent, or at an average 1.1 percent in real terms. In addition, if we compare the manufacturing real wage index with a proxy of labor productivity in manufacturing (which we

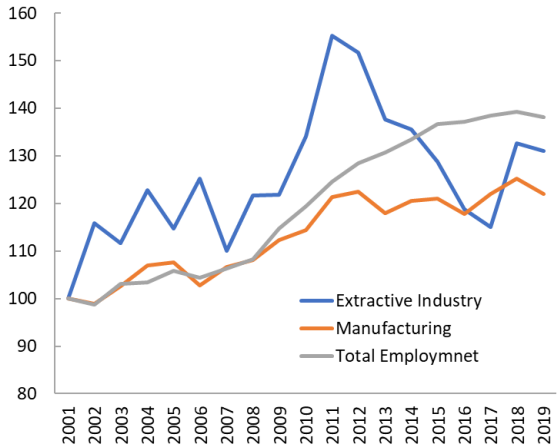
obtain by constructing an index of manufacturing production per person employed in manufacturing) we see that the increase in wage tracks the increase in productivity.

Figure 14: Employment index (2001 = 100)



Source: DANE.

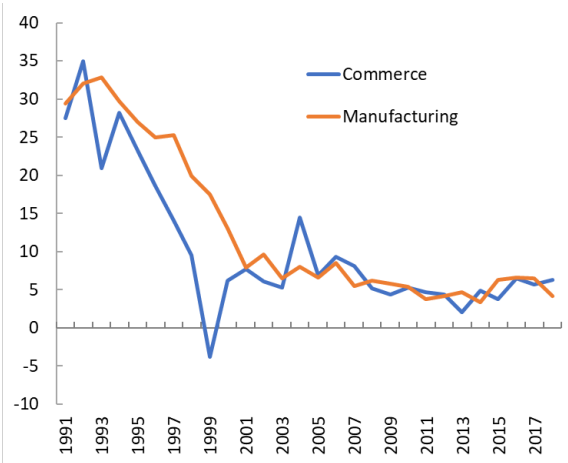
Figure 15: Employment (thousands)



Source: DANE.

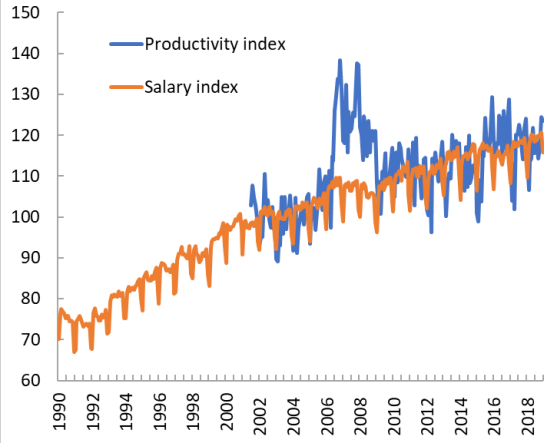
4) *Alternative indicators suggest that non-tradeable are not overappreciated.* For example, according to the Economist Intelligence Unit, the cost of living in Bogota' is lower than in cities such as Lima, Mexico City, or Santiago. According to the Big Mac Index, also by the Economist, the Colombian peso was overvalued in 2010 and 2011 (by around 16 percent), but was then overvalued around 10 percent until 2014, and it is now 42 percent undervalued relative to the U.S. dollar.

Figure 16: Nominal wage growth (percent)



Source: Banco de la Republica.

Figure 17: Manufacturing real salary and productivity index



Source: Banco de la Republica and DANE.

Conclusion

The previous results suggest that exchange rates should not be used as policy instruments to stimulate exports. Engineering a depreciation would have little impact on overall exports. A few sectors or firms might benefit from it, but this depends on the existence of conditions (for example low integration with GVCs) the removal of which would benefit the economy.

Instead, information provision, in the form of market intelligence, should be a key objective of Colombia's export promotion. Information externalities appear to benefit exports growth and firms. In addition, because import demand appears to be a key driver of export growth, focusing the promotion strategy on fast growing markets would allow to further reap the benefits of trade.

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Annex

Technical annex 1: Data

- Country level export and import data from Colombia is obtained from the customs data by DIAN. Data has standard cleaning.
- Aggregate export quantities series are obtained from Banco de la Republica. Sector level export quantities are constructed following the methodology of Garavito et al (2014).
- HS 4-digit level data from Colombia is obtained from customs data.
- World trade of HS-4 digit sectors, external demand, and partner demand are constructed using data from BACI for 1995-2018. It is complemented using data from WITS for 2019.
- Colombia and partners GDP control variables are from World Development Indicators database.
- Exchange rates are from Bank for International Settlements.
- Inflation rates are obtained from International Financial Statistics, IMF.

Technical annex 2: Estimation strategy aggregate regressions

We estimate the elasticity usign time series econometrics techniques. The variables that we use are integrated of order 1, but are not cointegrated. Hence, we estimate the elasticity using the following equation:

$$\Delta \ln(exp_t) = \alpha + \beta \Delta \ln(REER_t) + \gamma \Delta \ln(D_t) + \gamma_2 X_t + \varepsilon_t$$

where $\exp_t$ is total Colombian exports, either measured in value or volume (depending on the regression), REER_t is Colombia's Real Effective Exchange Rate index (for total exports or for manufacturing exports only, depending on the regression), D_t is the exteranl demand for Colombia's exports, and X_t is a set of control variables. In the regression where we consider exports share we consider instead:

$$share_t = \alpha + \beta \Delta \ln(REER_t) + \gamma X_t + \varepsilon_t$$

where share_t is the share of total (manufacturing) exports in total world (manufacturing) imports.

Annex Table 1: Total export values

	D.log(total exports value)					
	R1	**R2**	**R3**	**R4**	**R5**	**R6**
D.log(REER)	-1.090***	-0.948***	-1.336***	-0.765***	-0.742***	-0.853***
	(0.334)	(0.306)	(0.310)	(0.140)	(0.139)	(0.142)
D.log(world gdp in PPP US$)	3.125***			0.419		
	(0.995)			(0.712)		
D.log(world gdp in US$)		3.904***			0.884	
		(1.085)			(0.753)	
D.log(external demand, trade weighted)			3.712***			1.225*
			(0.727)			(0.671)
D.log(oil price)				0.402***	0.382***	0.370***
				(0.0651)	(0.0655)	(0.0567)
Constant	-0.094*	-0.123**	-0.044**	0.019	-0.001	0.008
	(0.054)	(0.055)	(0.021)	(0.036)	(0.036)	(0.020)
Observations	27	27	27	27	27	27
R-squared	0.547	0.617	0.626	0.859	0.863	0.871

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

Annex Table 2: Total export volumes

	D.log(total exports volume)					
	R1	**R2**	**R3**	**R4**	**R5**	**R6**
D.log(REER)	-0.186**	-0.169*	-0.191**	-0.248**	-0.237**	-0.257**
	(0.0820)	(0.0840)	(0.0819)	(0.0968)	(0.0863)	(0.102)
D.log(world gdp in PPP US$)	0.491			0.852**		
	(0.310)			(0.324)		
D.log(world gdp in US$)		0.562*			1.133***	
		(0.303)			(0.262)	
D.log(external demand, trade weighted)			0.570			0.878*
			(0.388)			(0.469)
D.log(oil price)				-0.0506	-0.0698**	-0.0485
				(0.0360)	(0.0319)	(0.0338)
Constant	0.0204	0.0182	0.0269**	0.00655	-0.00315	0.0208
	(0.0141)	(0.0112)	(0.0125)	(0.0177)	(0.0134)	(0.0155)
Observations	24	24	24	24	24	24
R-squared	0.194	0.212	0.206	0.266	0.331	0.276

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

Annex Table 3: Total export share in total world imports

	D.(share of Colombia's exports in total world imports)					
D.log(REER)	-0.00107**	-0.00117***	-0.000842**	-0.00144**	-0.00144**	-0.00136**
	(0.000392)	(0.000389)	(0.000356)	(0.000639)	(0.000633)	(0.000613)
D.log(world gdp in PPP US$)	0.000453**	0.000508***	0.000400**			
	(0.000164)	(0.000178)	(0.000162)			
D.log(world gdp in US$)	-0.00494			-0.00189		
	(0.00291)			(0.00255)		
D.log(external demand, trade weighted)		-0.00523*			-0.00121	
		(0.00274)			(0.00271)	
D.log(oil price)			-0.00217			0.000517
			(0.00252)			(0.00236)
Constant	0.000213	0.000214	0.000	0.000	0.000	0.000
	(0.000146)	(0.000129)	(7.93e-05)	(0.000134)	(0.000136)	(7.63e-05)
Observations	27	27	27	27	27	27
R-squared	0.545	0.558	0.468	0.323	0.314	0.307

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

Annex Table 4: Manufacturing export

	D.log(manufacturing export value)	
D.log(REER manufacturing)	-0.159	-0.151
	(0.121)	(0.134)
D.log(world gdp in US$)	5.596***	5.399***
	(0.859)	(0.933)
D.log(oil price)		0.0233
		(0.0671)
Constant	-0.209***	-0.201***
	(0.0352)	(0.0403)
Observations	27	27
R-squared	0.612	0.614

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

Technical annex 3: Estimation strategy sectoral (panel) nel regressions

To estimate the export determinants in Colombia the following model is estimated:

$$\exp_{idt} = \beta_1 RER_{dt} + \beta_2 * RER_{dt} * Sector_{it} + \gamma X + a_{id} + e_{idt}$$

where $\exp_{idt}$ is the total Colombian exports of HS 4-digit sector i to destination d in period t in USD. RER_{dt} is the bilateral real exchange rate of Colombia with partner *d* constructed using the following formula:

$$\mathrm{RER}_{d,t} = \frac{NER_{COL,t}}{CPI_{COL,t}} \frac{CPI_{d,t}}{NER_{d,t}}$$

where $NER_{c,t}$ is the nominal exchange rate of Colombia or the partner *d* against the USD, measured as the number of local currency units to purchase 1 USD. $CPI_{c,t}$ is the consumer price index of Colombia or the partner. With this definition an increase in the RER measures a real depreciation of the Colombian peso against the partners currency. In some regressions we interact the RER variable with Sector, GVC, and HHI indexes to identify heterogeneity by these variables.

X is a vector of control variables including. $\mathrm{W}_{i,t}$ is the world trade of product i in year t excluding Colombia, which captures technological or global demand shocks. $\mathrm{GDP}_{COL,t}$ and $\mathrm{GDP}_{d,t}$ are the real GDP in PPP of Colombia and the partner respectively, which capture other time macroeconomics shocks. P_{dt} is the number of products exported to destination d in period t, D_{it} is the number of countries reached with product i in period t, these two variables are mainly related with information and export expertise. M_{idt} refers to the imports of product i by destination d in period t, C_{idt} is the number of competitors for product i in destination d during period t, these two variables are mainly related with destination specific demand shocks. a_{id} is a set of product-destination specific effects that capture time-invariant idiosyncratic factors that may affect RER while being correlated with trade.

Annex Table 5:

VARIABLES	(1) Log(Export Value)	(2) Log(Export Value)	(3) Log(Export Value)	(4) Log(Export Value)	(5) Log(Export Value)
Log(RER)	-0.0698	0.125	0.160*	-0.0874	0.0500
	(0.0604)	(0.308)	(0.0862)	(0.0613)	(0.0803)
Log(Col. GDP PPA)	-0.316***	-0.295**	-0.307***	-0.321***	-0.312***
	(0.115)	(0.117)	(0.114)	(0.122)	(0.114)
Log(Partner GDP PPA)	0.317**	0.311**	0.310**	0.327**	0.315**
	(0.124)	(0.124)	(0.123)	(0.132)	(0.123)
Log(Partner-HS4 Imports)	0.125***	0.125***	0.125***	0.126***	0.125***
	(0.0162)	(0.0161)	(0.0163)	(0.0164)	(0.0162)
Log(World Trade in HS4)	0.335***	0.322***	0.336***	0.322***	0.334***
	(0.0317)	(0.0314)	(0.0315)	(0.0344)	(0.0316)
Log(# Exported Prods. to Partner)	0.513***	0.513***	0.511***	0.518***	0.512***
	(0.0726)	(0.0721)	(0.0722)	(0.0750)	(0.0725)
Log(# Partners of HS4)	0.684***	0.682***	0.687***	0.681***	0.685***
	(0.0403)	(0.0395)	(0.0397)	(0.0423)	(0.0405)
Log(# Competitors at Partner-HS4)	0.0440**	0.0441**	0.0436**	0.0486**	0.0444**
	(0.0194)	(0.0193)	(0.0192)	(0.0227)	(0.0192)
Log(RER)*Animal & Animal Products		0			
		(0)			
Log(RER)*Vegetable Products		-0.208			
		(0.323)			
Log(RER)*Food Products		-0.0657			
		(0.330)			
Log(RER)*Minerals		-0.207			
		(0.449)			
Log(RER)*Chemicals & Allied Industries		-0.479			
		(0.344)			
Log(RER)*Plastics or Rubbers		-0.318			
		(0.323)			
Log(RER)*Hides and Skins		-0.0980			
		(0.298)			
Log(RER)*Wood		-0.172			
		(0.315)			
Log(RER)*Textiles and Clothing		-0.0120			
		(0.318)			
Log(RER)*Footwear		0.250			
		(0.318)			
Log(RER)*Stone and Glass		-0.145			
		(0.316)			
Log(RER)*Metals		-0.122			
		(0.356)			
Log(RER)*Machinery and Electrical		-0.203			
		(0.354)			
Log(RER)*Transportation		-0.451			
		(0.328)			
Log(RER)*Miscellaneous		-0.0792			
		(0.334)			
Log(RER)*Fuels		-1.736***			
		(0.386)			
c.log_rer#c.GVC_mean			-0.00463***		
			(0.00110)		
1.export_oriented_dummy50#c.log_rer				0.303*	
				(0.177)	
c.log_rer#c.hhi_mean					-3.21e-05***
					(1.21e-05)
Constant	-0.569	-0.761	-0.651	-0.581	-0.600
	(0.796)	(0.783)	(0.790)	(0.863)	(0.790)
Observations	204,936	204,936	204,046	192,376	204,936
R-squared	0.084	0.085	0.085	0.083	0.084
Number of i	30,629	30,629	30,271	28,447	30,629
Sector-Partner FE	Yes	Yes	Yes	Yes	Yes
Cluster SE	Partner	Partner	Partner	Partner	Partner

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