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Working Paper

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Bruegel Working Paper, No. 2018/06

Provided in Cooperation with:

Bruegel, Brussels

Suggested Citation: García Herrero, Alicia; Marbach, Thibault; Xu, Jianwei (2018) : European and Chinese trade competition in third markets: The case of Latin America, Bruegel Working Paper, No. 2018/06, Bruegel, Brussels

This Version is available at:

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EUROPEAN AND CHINESE TRADE COMPETITION IN THIRD MARKETS: THE CASE OF LATIN AMERICA

ALICIA GARCÍA-HERRERO, THIBAUT MARBACH AND JIANWEI XU

China's increasingly important role in the global economy has transformed the nature of global competition and reshaped international trade. Meanwhile, the European Union has long been the most important power in global trade and continues to run a very large trade surplus. We address whether China is an increasingly relevant competitor for Europe in third markets, and in particular in Latin America. More specifically, we empirically estimate the elasticity of substitution between European exports and Chinese exports to Latin American economies (ie how their exports to Latin America respond to the changes in relative exporting prices).

Our results show that the degree of competition between China and the EU in Latin America has increased over time. Before 2007, China and the EU competed less with each other, partly reflecting the fact that China was mainly exporting low-quality products. However, the elasticity of substitution has increased since 2007, reflecting China's ascent up the value-added chain. We also look at competition between China and the EU in the key EU sectors that export to Latin America. We find that China-EU competition is fiercer in electrical machinery and road vehicles. This finding should be a wake-up call to Europe in its quest to remain competitive at the global level.



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1 Introduction

The emergence of China as a dominant economic power has transformed the nature of global competition and reshaped international trade. China's increased competitiveness has significantly influenced developing and developed countries' exports. China's growing export quota has created concerns in other exporting economies, including in Europe (Autor *et al*, 2013; Bloom *et al*, 2016). However, the usually overlooked reality is that China is competing with developed countries not only in their home markets but also in third markets. China's increasingly relevant role in global competition for third markets is clearly shown by the Belt and Road Initiative, which targets 68 economies. Given this, a natural question is to what extent China is competing with developed countries in the developing world.

We focus on the competition between China and Europe in Latin America. This serves as a good case study because Europe has long been a major exporter to Latin America, while China has quickly increased its market share from 3 percent in 2000 to 18.3 percent in 2016, and has become the largest exporter to several Latin American countries.

A number of studies have analysed the issue. Nowak (2014) reviewed China's and the European Union's trade and financial relationships with Latin American from 2000 to 2013 and found that, in the aftermath of the Global Financial Crisis, Europe's willingness to strengthen its relationship with Asian countries worsened its trade relations with Latin America. Meanwhile, China became a key exporter to the Latin American region. Rodrick (2006) and Hausmann *et al* (2008) showed that Chinese exports are skewed towards sophisticated and high-productivity goods, resembling the export structures of high-income countries. However, studies using the concept of trade value added, which takes into consideration the vertical linkage of modern global production, toned down the competition effect (Wang and Wei, 2010; Koopman *et al*, 2014). In the same vein, Hallak and Schott (2011) showed that the underlying quality of Chinese exports and those of high-income economies are different. This point of view is shared by Mandelson and Ferrero-Waldner (2006) when analysing the impact of Chinese competition on Europe's exports to emerging markets such as Asia, Africa and Latin America. By contrast, Poncet (2015) showed a more encouraging result for Europe, finding that the EU has withstood Chinese competitive pressure pretty well despite similarities in their industries.

While interesting, few of these papers have formally estimated the elasticity of substitution of exports from a country A (in our case China) with those of another country/area (in our case the EU)¹. Our paper fills a gap by empirically estimating such elasticity of substitution of exports in third markets (namely Latin America). In particular, we specify a translog demand function by assuming that Latin America can import from a variety of sources, and allow such elasticities of substitution to vary across different trading pairs. Beyond the general estimation, we also estimate such elasticities at a sectoral level for Chinese and EU key sectors that export to Latin America.

Our estimation of the export demand function confirms that the competition between China and the EU has been evolving over time. While the EU and China appear to have increased their trade complementarity before 2007, competition has become fiercer since then. This reflects the fact that China's export content has been moving up the value chain to offer more high-quality products which compete with those from the EU. Moreover, the competition between China and the EU is particularly strong over some high-value added products, such as electrical machinery. This finding should be a wake-up call to Europe to maintain its competitiveness at the global level.

Two caveats should be noted, though. First, we use gross trade data and not value-added data. While Latin America is relatively isolated from the global production chain (with the notable exception of Mexico), use of gross trade data could still distort our results somewhat. Second, our methodology does not provide an explicit specification for the supply function, but we try to control for changes in supply by introducing time dummies as proxies for aggregate supply shock. Finally, we deal with Latin America and the European Union as regional blocks. Some results are offered for the largest EU countries but not at the same level of detail as for the EU as whole.

2 Institutional background and some stylised facts

China and the EU are the world's two largest trade giants (Figure 1), and competition between them in Latin America has become increasingly intensive. Europe is always an important player in Latin America, with its market share stable at approximately 14 percent for the past fifteen years. China, however, only accounted for 3 percent of Latin American countries' imports from the world outside Latin America in 2000, but this market share grew rapidly to 18.3 percent in 2016 (Figure 2). Moreover, both the EU and China enjoy massive trade surpluses with Latin America: China has been running a durable trade surplus which reached a record high of \$90 billion in 2015 (Figure 3), whereas Europe

¹ In an earlier Bruegel paper (García-Herrero and Xu, 2016), we analysed, using a similar technique, the impact on the EU of growing ties between China and Russia.

reversed its trade deficit with Latin America after 2012 with the surplus peaking at \$16 billion in 2016 (Figure 4).

Figure 1: Share of world exports

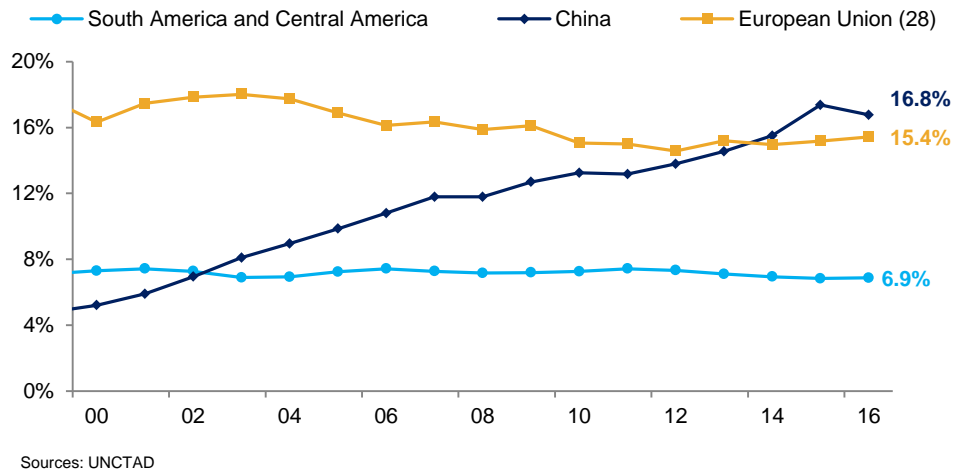


Figure 2: Share of Latin American imports from 1998 to 2015

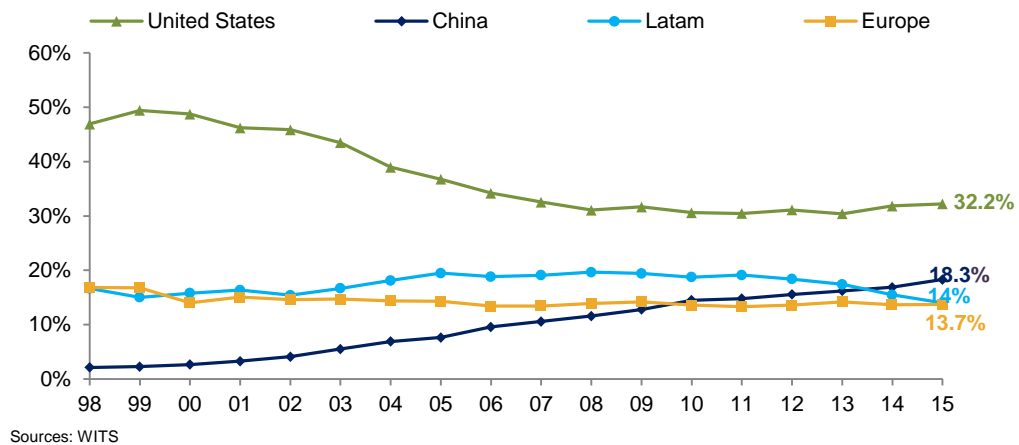


Figure 3: Latin America (LatAm) trade relationship with China, in \$ billions

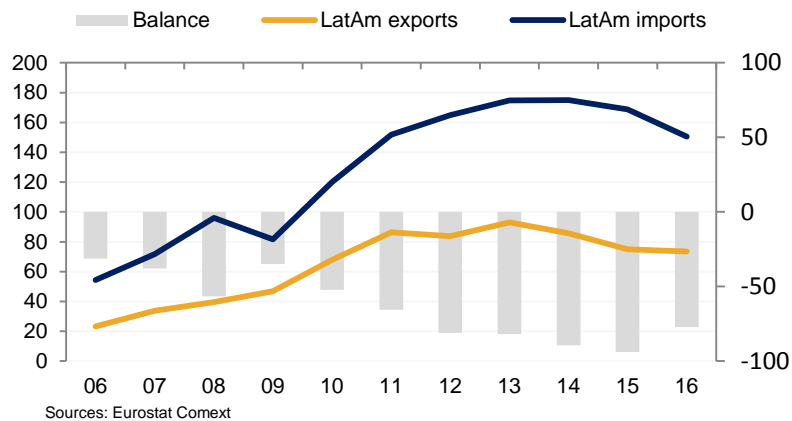
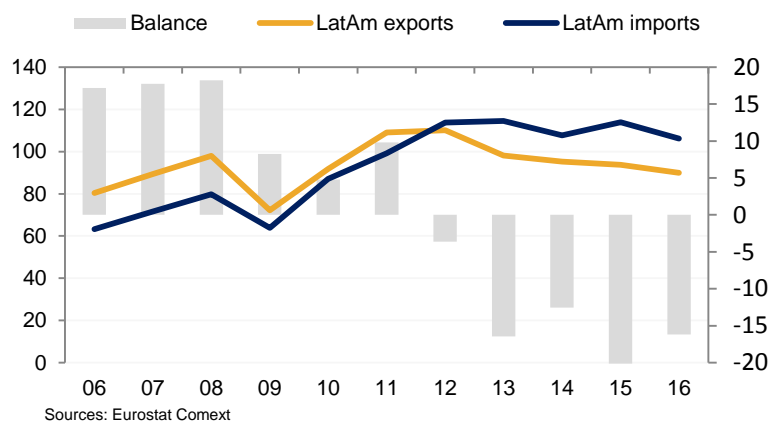


Figure 4: Latin America trade relationship with Europe, in \$ billions



Against this backdrop, one has to ask whether the rise of China has gradually replaced the EU's exports to Latin America. To get a better understanding of China-EU competition in Latin America, we check Latin America's product-level import structure in relation to the EU and China. Figures 5 and 6 reports the top 10 Latin American imports from China and the EU in terms of total trade value. This suggests that the biggest competition between the two blocs in Latin America is in the categories of general machinery, road vehicles and electrical machinery. The latter stands out because it is the second largest exporting sector from the EU to Latin America, and the fifth largest from China to Latin America. In addition, the two blocs compete in the provision of road vehicles, which is the third largest exporting sector from Europe and the eighth largest from China. In other sectors, China has a particular comparative advantage in office machinery, telecommunication equipment and some labour-intensive

products such as textile yarn and clothing, while the EU has a leading position in medicinal and pharmaceutical products, power generating machinery and petroleum and chemical products.

Figure 5: Top Latin American imports from Europe, \$ billions, 2014

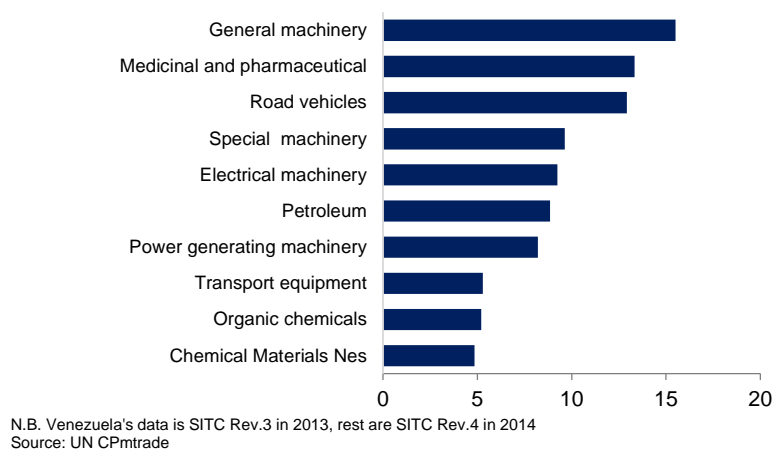
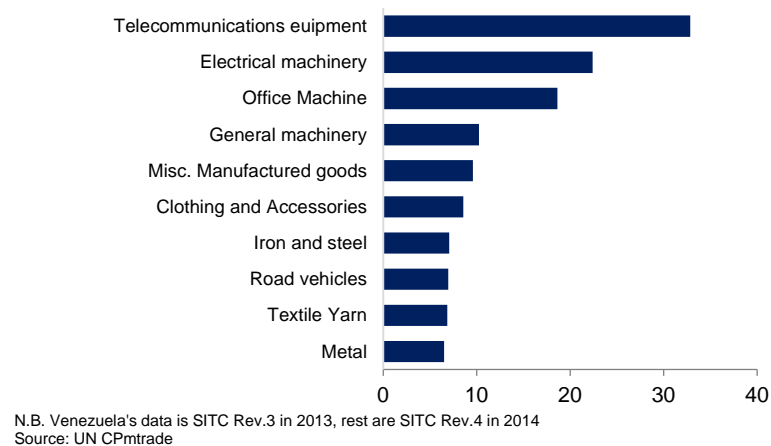


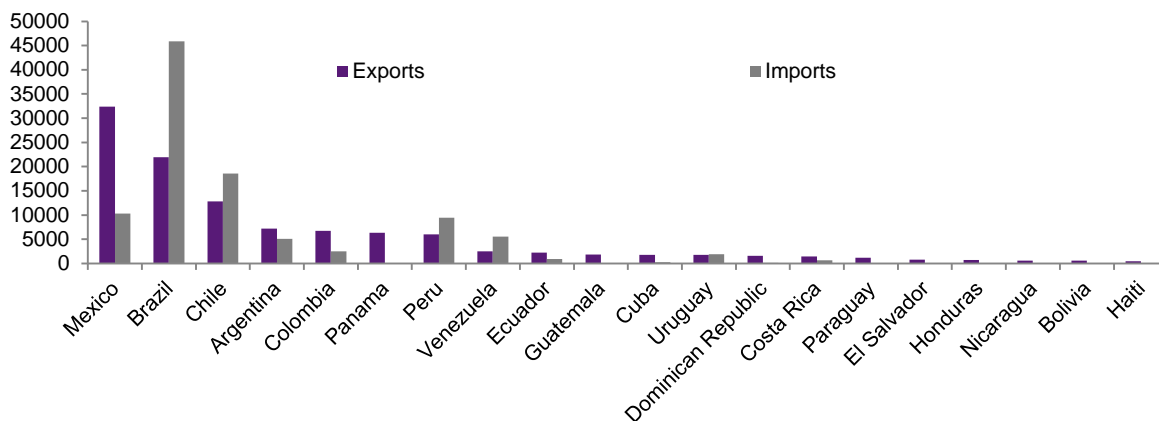
Figure 6: Top Latin American imports from China, \$ billions, 2014



Among the Latin American countries, Brazil, Mexico and Chile are China's three largest trading partners. In 2016, China had trade deficits of around \$24 billion and \$6 billion with Brazil and Chile respectively, mainly because of China's major imports of oil seeds and oleaginous fruits from Brazil and copper from Chile. However, China has a significant trade surplus of up to \$22 billion with Mexico because of China's exports of electrical machinery. The EU also exports massively to the three largest Latin American countries and has a surplus with Mexico because of the EU's comparative advantage in exporting vehicles. EU trade with Brazil and Chile is approximately balanced, with exports and imports

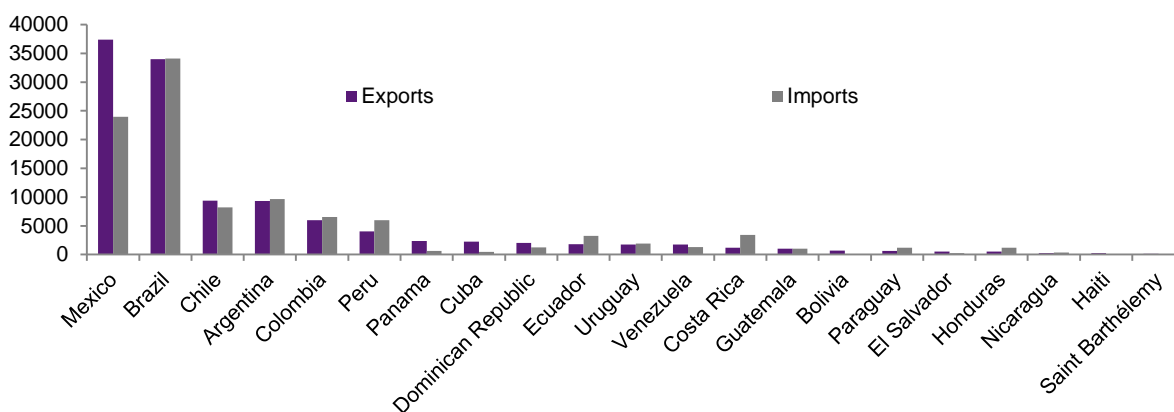
reaching \$34 billion for the two countries together. Figures 7 and 8 report the country-by-country breakdown of Chinese and EU trade with Latin America.

Figure 7: China's exports to/imports from Latin America (\$ millions, 2016)



Source: UN Comtrade, Natixis

Figure 8: EU exports to/imports from Latin America (\$ millions, 2016)



Source: UN Comtrade, Natixis

China's and the EU's determination to reach free trade agreements with countries in Latin America has intensified their competition (Table 1). The EU struck first with an agreement with Chile; subsequently, the EU has proceeded with two agreements in 2013 with Central America and three Andean countries (Peru, Colombia and later Ecuador). The EU has now also finalised an agreement with Mexico, which is expected at time of writing to be implemented soon. China's first agreements in Latin America were also with Peru and Chile. In 2011, China reached another bilateral trade agreement with Costa Rica.

Table 1: EU and Chinese free trade agreements with Latin America

	Partner country	Date of entry into force	End of implementation period	Type
China	Costa Rica	8/2011	2025	FTA & Economic Integration Agreement
	Chile	8/2010	2015, and updated in 2017	FTA & Economic Integration Agreement
	Peru	3/2010	2026	FTA & Economic Integration Agreement
EU	Mexico	4/2018	To be implemented	EU-Mexico Global Agreement
	Central America	8/2013	2027	FTA & Economic Integration Agreement
	Peru, Colombia, Ecuador	3/2013	2030	FTA & Economic Integration Agreement
	Chile	3/2005	2013, under negotiation for update	FTA & Economic Integration Agreement

Source: Bruegel.

As a first attempt to quantitatively assess how close the EU and China's exports into Latin America are in terms of sector distribution, we computed a coefficient index (C), as the arithmetic average of two common measures in the trade literature, namely, the coefficient of specialisation (CS) and the coefficient of conformity (CC)² (Blazquez-Lidoy *et al*, 2006). Figure 9 and Table 2 present the evolution of the index in the Latin American markets from 1995 to 2016. The calculation shows that the C /between China and Europe has increased from 0.33 to 0.46, suggesting sufficient room for China and Europe to compete with each other, but the C /has stagnated since beginning of the 2010s. Country-by-country analysis further indicates that Germany, Spain, Italy and Sweden have expanded their product coverage to compete with China in Latin America, while Portugal, France and the United Kingdom are exhibiting significantly lower degrees of product coverage than China in the Latin American market.

² These coefficients measures the degree to which a local economic system specialises in one or more economic sectors compared to another region.

Figure 9: China trade competition indicators, comparison between 1998 and 2016

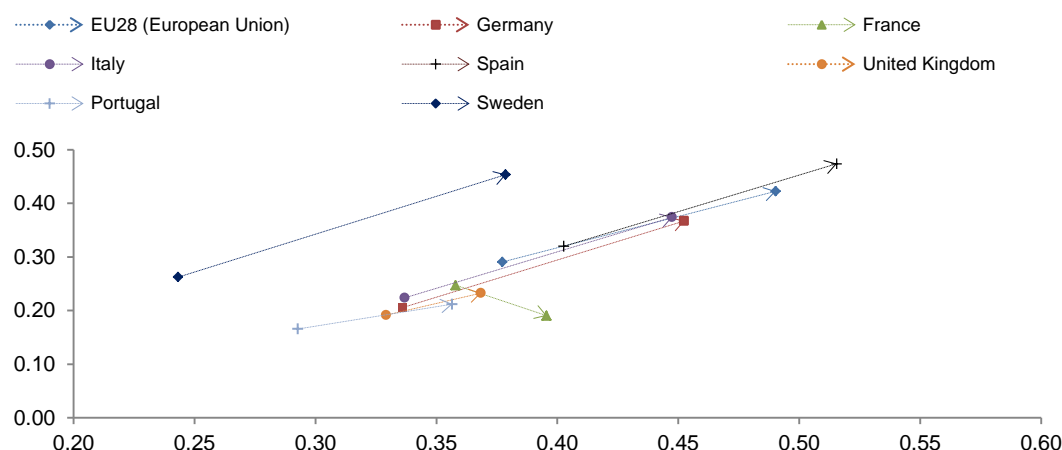


Table 2: Coefficient index (CI)

CI coefficient	1995	2016	Evolution
EU28 (European Union)	0.33	0.46	36.68
Germany	0.27	0.41	51.44
France	0.30	0.29	-3.17
Italy	0.28	0.41	46.56
Spain	0.36	0.49	36.87
United Kingdom	0.26	0.30	15.34
Portugal	0.23	0.28	24.06
Sweden	0.25	0.42	64.64

Our indicator of specialisation indicates that the EU and China tend to export more similar products to Latin America. That said, the CI/CC methodology only shows the potential room (product coverage) for competition between the EU's and China's exports to Latin America, which does not necessarily reflect the exact competition stance between them. For example, the EU and China both export automobiles and their parts to Latin American countries, but those from Europe should have, in general, a higher quality standard than those from China. Thus, even if Chinese firms are expanding their markets in Latin America, they might target different consumers to those targeted by the EU, and the competition might not be as strong as it appears to be. To tackle this issue, we need to take into account the impact of price adjustments to get a more accurate measure of elasticity of substitution. This requires a more rigorous econometric analysis.

3 An empirical approach to export competition in third markets

To assess the degree of competition/complementarity between EU and Chinese exports to a third market (Latin America in our case), we measure the degree of substitutability of Chinese and EU products in response to price variations. We use the CEPII-BACI bilateral trade database to estimate the Hicks-Allen elasticities of substitution from a translog cost function, namely:

$$\ln Y = \ln A + \sum_{i=1}^n \alpha_i \cdot \ln X_i + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \beta_{ij} \cdot \ln X_i \cdot \ln X_j$$

Where Y is the total imports of Latin America, and X_i and X_j are imports from country i and country j respectively. By applying the Shephard's lemma, we arrive at the following function:

$$s_i = \alpha_i + \sum_{j=1}^n \beta_{ij} \cdot \ln X_j$$

Where s_i is the market share of a country in the destination market. The price elasticity is thus defined as the follows:

$$\eta_{ij} = \frac{\beta_{ij}}{s_i} + s_j \text{ for all } i \neq j$$

Under the assumption of a time-variant aggregate supply function, the above equation closes to an equilibrium with an addition of time dummies, which absorb potential time-variant aggregate supply shocks. To further take into consideration the case of industry-specific supply shocks, we also conduct an industry level econometric exercise in our empirical analysis.

4 Aggregate and sectoral results

The estimated Hicks-Allen elasticity of substitution allows us to take into account the price sensitivity across countries of demand adjustment in the third market. Table 3 presents our estimated results.

Table 3: Estimated results

Elasticity of substitution in the Latin America market	Europe – China	Europe – Rest of World	China – Rest of World
1998-2014	1.24**	1.01**	0.96**

Source: Bruegel. Note: ** $p < 0.05$

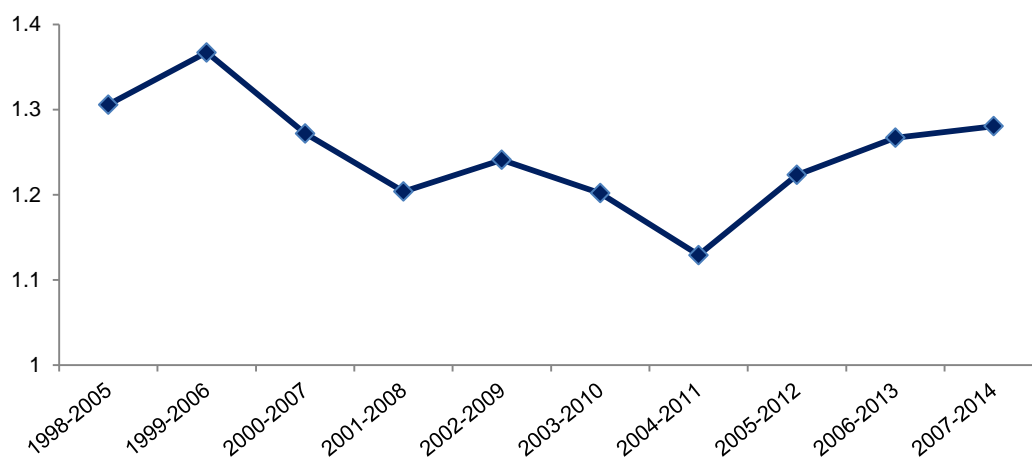
The significantly positive estimates show that China, the EU and the rest of world are competing in terms of their exports to Latin America. This is a more rigorous justification of the earlier stylised facts that China and the EU offer similar categories of products in the Latin American market, ie electrical machinery, general machinery and road vehicles. Moreover, the fact that the elasticity is greater than one implies that a decrease in the relative price of Chinese goods relative to European goods will induce an even larger response in the relative demand adjustment. In other words, China can benefit, in terms of larger export revenues in Latin America, from a reduction in its relative export prices.

In addition, the absolute level of the elasticity of substitution between China and the EU is greater than their own elasticity of substitution with the rest of the world. This implies that the two blocs are more intensely competing with each other than with other regions in the world. Therefore, an immediate conclusion of our estimation is that China and the EU are competing with their exports on the Latin American markets.

One could wonder, though, whether such export competition has become increasingly acute in recent years as China has moved up the ladder in terms of its exports structure. This is an *a-priori* hypothesis we gather from the preliminary results obtained by the evolution of the coefficients of specialisation for key European countries with China (section II). To more precisely test the hypothesis, we made eight-year rolling average estimations of the elasticity of substitution between the EU's and China's exports to Latin America. Figure 10 reports the results. We found that, although Chinese exports increased dramatically before 2007, the degree of China-EU competition actually decreased during the same period up to 2007. The results are in line with the idea that Chinese exports were of lower quality on average than the EU's exports, after China's accession to the World Trade Organisation (WTO). However, the trend has since been reversed with the elasticity of substitution rapidly picking up after

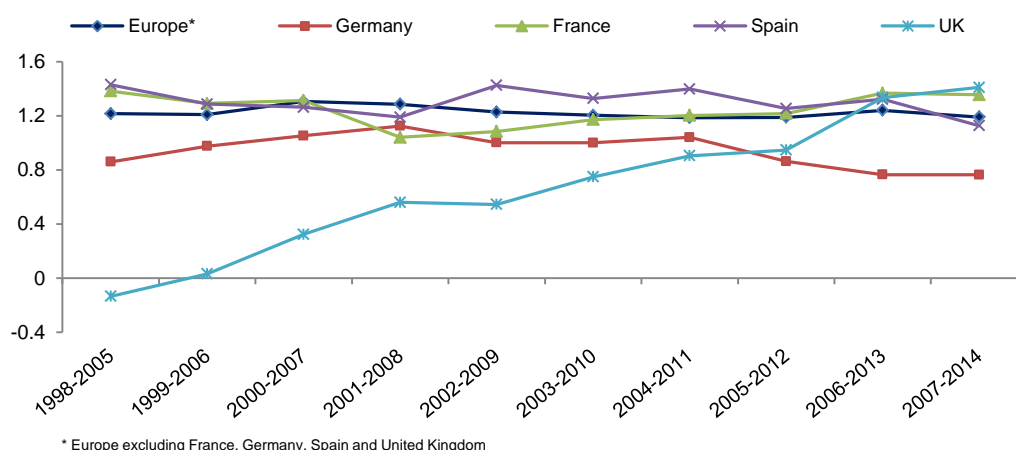
2007. Since then, the earlier situation has changed substantially as Chinese exports have expanded to higher-value-added sectors.

Figure 10: Evolution of the average elasticity of substitution between Europe and China in the Latin American market



A further breakdown to selected countries shows that China's most obvious competitor in 2005 was Spain, as its elasticities of substitution relative to Chinese exports were the greatest (Figure 11). Today, it is actually the UK and France that are China's most obvious competitors in Latin America. The changing pattern seem to be in line with the two countries' corresponding shifts in market share: the UK's share of Latin America's imports fell sharply (31 percent from 2012 to 2016) compared to Spain (only reduced by 16 percent during the same period).

Figure 11: Average elasticity over time between China and selected EU countries



* Europe excluding France, Germany, Spain and United Kingdom

Moving now to potential differences across products, we estimated sector-level elasticities for EU and Chinese exports to Latin America. To that end, we follow the SITC Revision 4 classification, from which the 10 largest sectors per country are shown in Figures 5 and 6. The estimated elasticities allow us to rank all sectors in two groups: the 10 most complementary sectors (ie with the lowest elasticities) and the 10 sectors where the degree of competition is greatest. Both categories are reported separately in Figures 12 and 13. The results show that the EU's high-value-added sectors, such as electric machinery and office machinery, face fierce competition from Chinese exports. This is in line with China moving up the ladder in its export structure. Our results are also in line with those of Hausmann *et al* (2007), who found that China's export bundle is increasingly overlapping with that of the world's most-developed economies.

However, only a few of these highly substitutable products are exported simultaneously with large enough market shares by the EU and China to Latin America. Among the most-exported (top 10) products from Europe to Latin America, only road vehicles and electrical machinery have a high elasticity of substitution with similar Chinese exports. The two sectors thus have systemic relevance for the future of EU exports to Latin America. As such, a warning flag could be put up signalling an increasingly difficult competitive environment for EU exports at the higher end of the spectrum. More specifically, if China continues to move up the ladder, as envisaged in [China Manufacturing 2025](#) (EU Chamber of Commerce in China, 2017), the EU might find it harder to compete with China in third markets, even in capital-intensive sectors, as is already the case for electric machinery and road vehicles, at least in Latin America.

Figure 12: China-Europe higher elasticities in Latin America across sectors

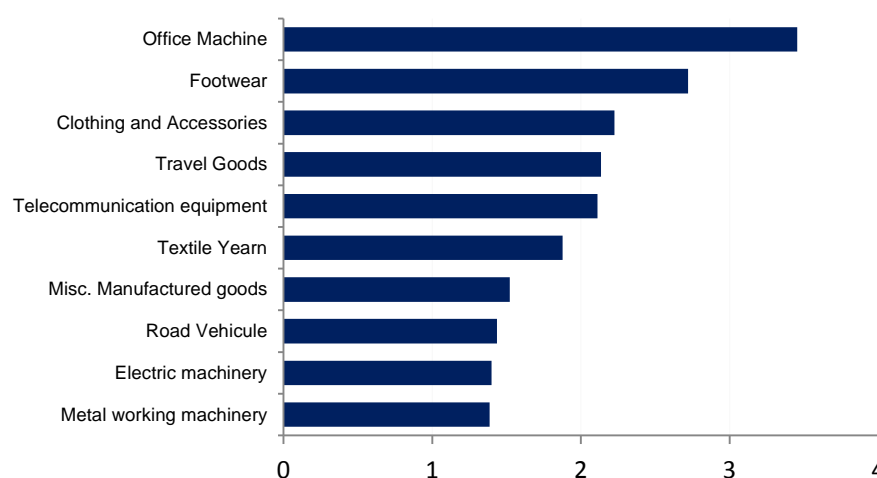
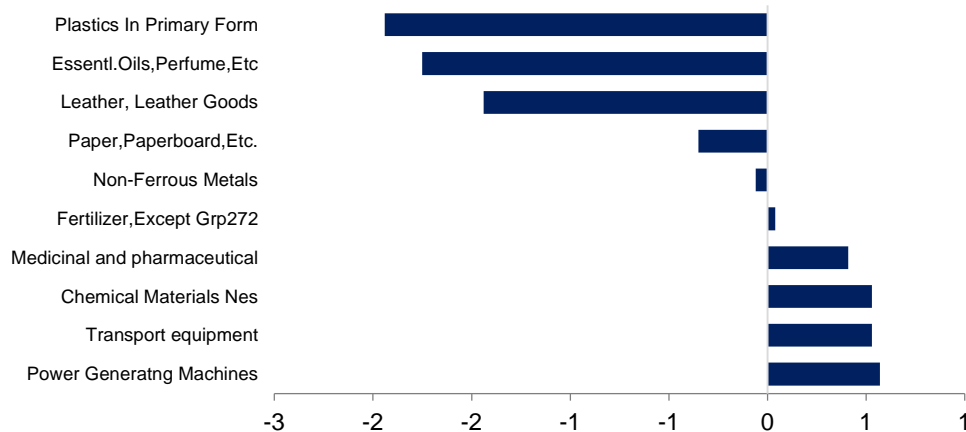


Figure 13: China-Europe lower elasticities in Latin America across sectors



5 Conclusions

To assess the competition between China and the EU in Latin American markets, we empirically estimated the elasticity of substitution between Europe and China in the Latin American market, ie how their exports to Latin America respond to the changes in relative exporting prices. Our results show that the degree of competition between China and the EU in Latin America appears to change over time. Before 2007, China and the EU competed less with each other, partly reflecting the fact that China was mainly exporting low-quality products, whereas the EU aimed at a higher-end market. However, with China gradually climbing up the value-added chain, it has also started to produce more high-quality products, thereby leading to a higher elasticity of substitution relative to the EU. In fact, the competition between China and the EU has been fiercer in some high-end products, especially electrical machinery and road vehicles. This finding should be a wake-up call to Europe in its quest to remain competitive at the global level.

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