The Role of Trade Partners on Product Quality: The case of Uruguay

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Abstract

We explore the link between export and import products quality to/from high-income countries using a rich database for Uruguay over the period 1997-2008. We use two econometric techniques to tackle the likely endogeneity problem: fixed effects by firm panel models with lagged regressors and dynamic panel models. The most robust results are a negative effect of distance on export quality, and that a higher share of exports to high-income countries and average GDP to export countries have a negative effect on import quality. The negative impact of exports to high-income countries on import quality results can be explained by the type of goods exported to high-income countries, which are mainly commodities in nature with low scope for vertical differentiation and that use mainly local inputs.

Keywords: exports, imports, product quality, destinations, source countries
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1. Introduction

Since the work of Bernard and Jensen (1995), Bernard and Bradford Jensen, (1999) several studies have shown that exporting firms are more productive, more capital intensive, and pay higher wages than their non-exporting counterparts.[1] These stylized facts gave rise to the development of theoretical models named "new-new" trade models.

Melitz (2003) seminal paper introduces the concept of heterogeneity in productivity at the firm level, with fixed exporting costs giving rise to these "new-new" trade models. The model replicates the stylized facts that only the most productive firms export but it does not explain some other empirical regularity, such as a positive relationship between prices and capital and labour endowments (Schott, 2004) or level of income (Hummels and Klenow, 2005) of the destination country.

The aforementioned results gave rise to the theory of competition on quality-adjusted prices in which consumers have a taste for quality and firms endogenously determinate the quality of their outputs. In particular, there is a consensus that in order to describe and explain trade flows and its impacts is important to consider the quality of the goods sold and bought by the firm. In this regard international trade would be characterised by decreasing horizontal specialisation and increasing in the quality of the goods (Khandelwal, 2010; Fontagné et al., 2008).

Thus, recently, the quality of traded goods has become an important field of study.[2] The quality of products is a key feature in the analysis of productive specialization of countries (Schott, 2004), the direction of trade between countries (Hallak, 2006), and even about how countries grow (Hummels and Klenow, 2005). Nevertheless, the study of quality and trade has been curtailed by the lack of measures of quality available, leading to an array of possible approximations of which the most common is the use unit values. Several researchers (Hallak and Schott, 2011; Khandelwal, 2010; Khandelwal et al., 2013) approximate the quality of the goods by their unit values adjusted by the demand and controlling for the extensive margin from the supply side. Feenstra and Romalis (2014) on the other hand propose to introduce more controls from the supply side in order to identify quality.

The objective of this work is to analyse the impact of the destination of exports and the origin of imports on the quality ofexported and imported products, using a rich dataset that matches survey data from the industrial surveys, i.e. firm level data, with customs data.

In particular, previous works find a positive causal link between export destinations and export quality (Bastos et al., 2018; Brambilla et al., 2012; Verhoogen, 2008). These works support the income-quality choice channel, which is based on the ideas that countries are asymmetric in income and in consumers' willingness to pay for product quality that individual firms choose to sell higher-quality products to richer

[1] See (Schank et al., 2007) for a review for several countries.
[2] Dinopoulos and Unel (2012) elaborate a model in which higher trade openness and greater competition, drive firms that produce low quality goods to exit the market and those that produce high quality goods to enter the export market.

countries, and that productivity and input quality are complements in producing higher quality goods. Thus, firms that are more productive will use higher quality inputs to produce higher quality goods.

In this study, we use a rich database, which combines administrative customs data with data from the Economic Surveys that allow us to analyse whether the level of income of destination markets induces improvements in quality at the firm level. In particular, we estimate export and import quality using Khandelwal (2010) methodology which provides better measures than firm-level import and export prices as proxies for quality.

We use two econometric techniques to tackle the likely endogeneity problem: fixed effects by firm panel models with lagged regressors, and dynamic panel models. The most robust results are a negative effect of distance on export quality, and that a higher share of exports to high-income countries and average GDP to export countries have a negative effect on import quality. The latter result is at odds with recent literature. We argue that this result may be due to the type of goods exported by firms located in Uruguay to high-income countries, which are mainly goods with low scope for vertical differentiation and produced mainly with agricultural domestic inputs.

This work contributes to the existent literature by providing evidence for a middle-income emerging economy located in the Southern Hemisphere far away from developed countries, and smaller than other economies, which have been studied such as Mexico, Argentina, Portugal and China. There are recent works for Colombia but the authors (Carranza et al., 2020) assume exogeneity of usually endogenous variables. For the Uruguayan case this type of studies are inexistent, and most works were conducted for larger or developed countries so this work contributes to the national literature and also to other similar middle-income small economies. Furthermore, we analyse causal relationships controlling for total factor productivity (TFP), and estimating fixed effects by firm models with lagged regressors, and dynamic models to tackle the endogeneity problem.

This work is structured as follows. After this introduction in Section 2 we present the literature review, in Section 3 the data and some stylized facts, in the fourth section the methodology, in the fifth the results, and finally in Section 6 some concluding remarks.

2. Literature review

2.1. Quality in the new-new trade theories

The “new-new” theories of trade pioneered by Melitz (2003) seminal paper introduces firm level productivity differences in order to explain firms´ participation in international trade, showing that only the most productive firms can overcome exporting trade costs and become exporters.

Some researchers observe not only differences in productivity but also in quality at the product level (Schott, 2004) and country level (Hummels and Klenow, 2005). Hallak (2006) proposes a sector-level demand side model which corroborates the significance of quality in explaining the direction of trade.

These findings confirm that one important limitation of the Melitz's model is that competition should be based on quality-adjusted prices. For that reason, the Melitz's model of heterogeneous firms has been extended by several studies to include a quality dimension to trade. It is therefore, as expressed by Baldwin and Harrigan (2011) more of a "conceptual amendment" than a separate model.

Researchers have added quality in their theoretical models by including taste for quality for consumers on the demand side, and by firms producing varieties that differ in quality that are costlier to produce on the supply side (Verhoogen, 2008, Baldwin and Harrigan, 2011, Feenstra and Romalis, 2014, Fan et al., 2015, Antoniades, 2015).[3]

Another approach to consider quality is by allowing firms to vary by other factors besides productivity, that is, by multiple attributes. Hallak and Sivadasan (2009) distinguish between process and product productivity. Similarly, Gervais (2013) distinguishes between product quality and technical efficiency and argues that two firms could have an identical revenue but different productivity and quality dimensions.

In addition, Kugler and Verhoogen (2012) as well as Bastos et al. (2018) treat the choice of quality of output and inputs as endogenous, by incorporating both productivity and quality parameters. A similar approach is followed by Johnson (2012) which differentiates between unit production costs and product quality steaming from the firm specific capability. Brambilla et al. (2012) also distinguish by the efficiency in the use of skilled and unskilled labour, but in this case, they allow firms to tailor the quality of their varieties to each country of destination.

2.2. Measuring Quality

The literature on quality and trade has been restricted by the lack of actual measures of quality available to researchers, and a few papers were actually able to measure it directly. One of these papers is Crozet et al. (2012) were champagne producers are assigned a quality rating based on experts' assessment. Nevertheless, most works have resorted to proxies, such as unit values, to measure quality. Under this category several papers directly consider unit values as their variable of interest (Baldwin and Harrigan, 2011; Bastos and Silva, 2010; Görg et al., 2010; Harrigan et al., 2015; Kugler and Verhoogen, 2012; Manova and Zhang, 2012; Martin, 2012; Schott, 2004).

Although Feenstra and Romalis (2014) and Hummels and Klenow (2005) find that much of the variation in unit values in exports is explained by quality, there is a general consensus that unit export values are an imprecise measure of quality as other factors such as the market characteristics or supply may also play a role in affecting prices. In particular, Khandelwal (2010) argues that prices are less appropriate measures of quality in markets with a lower scope for quality differentiation. In addition, Johnson (2012) finds that some sectors have a negative price-threshold correlation which indicates that the most capable firms charge lower unit prices. Gervais (2013) confirms this concept as he finds that while prices are increasing in quality

[3] We understand the term capability as the parameter by which firms differ in respect to both productivity and quality, as defined by Sutton (2007).

they are also decreasing in productivity. Therefore, goods of the same quality could be charged different prices due to the variation in the productivity of firms or pricing-to-market.

In addition to these measures some authors propose the use of different proxies such as multilateral price index[4] (Hallak, 2006), technology spending (Bas, 2012), utilization of skills in the labour force (Brambilla et al., 2012; Saravia and Voigtländer, 2012; Verhoogen, 2008), ISO 9000 certification (Hallak and Sivadasan, 2009; Verhoogen, 2008) or the distribution of transaction prices (Mandel, 2010).

Other researchers have tried to separate quality from prices by calculating quality-adjusted unit values at the product-level (Khandelwal, 2010; 2013) and country-level (Bas and Strauss-Kahn, 2015; Fan et al., 2015; Feenstra and Romalis, 2014). This has been done by adjusting unit prices by the relative demand of goods, and a higher quality is assigned to the good, which, conditional on prices has a larger demand. Gervais (2013) estimates quality from the firm unobserved effects and the price elasticity. We estimate quality using the methodology proposed by Khandelwal (2010, 2013), and with a variable elasticity of substitution at the 2-digit NCM level.

2.3. Drivers of quality

A considerable strand of literature, in addition to trying to reconcile the data with theory, also attempts to explain the drivers of quality. This comprehends several aspects, although these can be classified into those focused on supply-driven and demand-driven quality enhancements of products.

On the supply, side, export and import quality, are correlated with firms' characteristics such as: i) size and productivity (Bastos and Silva, 2010; Görg et al., 2010; Harrigan et al., 2015; Kugler and Verhoogen, 2012); ii) the type of imported inputs (Bas and Strauss-Kahn, 2015; Manova and Zhang, 2012); iii) the variety of inputs (Demir, 2011; Saravia and Voigtländer, 2012), or iv) the capital- and skill-intensity of the exporter (Harrigan et al., 2015; Khandelwal et al., 2013). In terms of the source country, it is argued that the level of income (Hummels and Klenow, 2005; Khandelwal, 2010) or the relative endowments of physical and human capital (Schott, 2004) are correlated with measures of quality. Antoniades (2015) also argues that competition raises the scope for quality differentiation. While the most productive firms raise quality in response to competition, the least productive ones respond in the opposite way or exit the market.

In addition, several papers find a positive relationship between export prices –as proxy for quality- and trade costs. Although in the literature there are several measures to account for trade costs, such as common border or if the country is landlocked, most papers proxy trade costs by distance to the destination market (Baldwin and Harrigan, 2011; Bastos and Silva, 2010; Görg et al., 2010; Hallak and Sivadasan, 2009; Hummels and Klenow, 2005; Manova and Zhang, 2012; Martin, 2012; Verhoogen, 2008). Their results nevertheless contradict some of the previous pricing-to-market models with heterogeneous firms' such as in Melitz and Ottaviano (2008). In fact, under the Melitz-Ottaviano model of endogenous mark-ups it is predicted a negative relationship between unit prices and distance, as firms absorb part of the increasing

[4] Hallak uses a modified version of the Elteto, Koves, and Szulc (2003) multilateral price index at the sectorial level weightened by the number of active categories of each country in each sector.

trade costs.

Görg et al. (2010) find that unit prices increase with distance and that this effect is stronger for differentiated goods as defined by Rauch (1999) in line with Khandelwal (2010) results. Finally, Lugovskyy and Skiba (2016) find that the sign of the relationship between export quality and distance depends on the relative income of the importer country, where a negative relationship arises when the importer country is richer than the average destination country of the exporter.

On the other hand, studies related to quality-driven demand have found that unit prices/quality are positively correlated with the level of income (Bas and Strauss-Kahn, 2015; Bastos and Silva, 2010; Bastos et al., 2018; Hallak, 2006; Hallak and Schott, 2011; Hummels and Klenow, 2005; Manova and Zhang, 2012; Martin, 2012; Schott, 2004). Nevertheless, they are negatively related to remoteness and the difficulty to enter a market (Baldwin and Harrigan, 2011; Harrigan et al., 2015; Johnson, 2012; Manova and Zhang, 2012). The literature is mixed regarding the size of the destination market (Görg et al., 2010; Manova and Zhang, 2012). The widespread evidence of a positive relationship between export and import values and the income level at the destination has caused that the majority of theoretical models in trade with heterogeneous firms to consider non-homothetic preferences. Higher income countries demand higher quality goods than low-income countries.

This has also led to an important strand of literature that support the quality-to-market hypothesis by which firms discriminate prices/quality across markets. For example, Manova and Zhang (2012) propose that firms could vary the level of quality of their products to different destinations by using inputs of different quality, and Görg et al. (2010) support the hypothesis that firms charge different prices even for the same product in different markets.

Some researchers find that firms upgrade quality following trade liberalization (Bas, 2012; Demir, 2011, Fan et al., 2015, Bas and Strauss-Kahn, 2015).

Moreover, an endogeneity issue remains to be answered in most studies. The positive correlation observed between higher export unit values and destination country characteristics, and in particular, the level of income, could be due to underlying factors that drive simultaneously both variables and not to a causal effect.

In order to address this causality puzzle, some researchers have attempted to use data that rely on a quasi-natural experimental structure (Bas and Strauss-Kahn, 2015), or the use of other estimation methods, such as instrumental variables constructed by using the exchange rate (Brambilla et al., 2012; Bastos et al., 2018; Verhoogen, 2008), or the devaluation of Brazil as instrument[5] of an exogenous change in exports destination of Argentinean firms (Brambilla et al., 2012). They find that exporting to high destination countries induces firms to hire more skilled workers and pay higher wages.

[5] Several authors have used similar instruments based on real exchange rates (Revenga, 1992; Bertrand 2004 at the sectoral level, and Park et al. 2010; Brambilla et al., 2012; Hummels et al., 2014; and Bastos et al., 2018 at the firm level).

Bastos et al. (2018) use the average real exchange rate of Portuguese firms as an instrument to analyse the relationship between firms' import prices and the level of income of destination countries. They find that a higher average income of the destination induced the firms to pay higher quality inputs, suggesting that a higher demand for quality lead firms to use higher quality inputs and produce higher quality goods.

In our first version we use real exchange rate interacted with pre-devaluation sales in the export/import markets (Peluffo and Scasso, 2016). Nevertheless, it is argued that exchange rate would have significant impact on firm level export/import prices which is documented in the exchange rate pass-through literature (Berman et al., 2012; Li et al., 2015). Specifically, in response to an exchange rate appreciation an exporting firm would decrease its export price to absorb some of the appreciations. Thus, we resort to panel models with fixed effects by firms with lagged explanatory variables, and to dynamic panel models, namely system-generalized method of moments with forward orthogonal deviations which do not need to look for instruments outside the model (Arellano and Bond, 1991, Arellano and Bover, 1995; and Blundell and Bond, 1998).[6]

3. Data and Descriptive Statistics

3.1. Data

We use two data sources to perform our analysis, administrative customs information and industrial firm-level data.

The customs data is collected by the National Customs Service (DNA, *Dirección Nacional de Aduanas*). This data is available from 1997 to 2008 at the transaction level from customs declarations. The level of detail of the database is quite comprehensive as products are coded at the 10 digit MERCOSUR Common Nomenclature (NCM, *Nomenclatura Común del MERCOSUR*).[7] The NCM shares the same structure as the Harmonized System in its first six digits so our analysis is comparable to other studies in the literature. For each product, the database provides information on the CIF and FOB values traded in current US dollars, the country of origin or destination, as well as the measurement unit in which the product was traded, which allows us to calculate unit values and the methodology proposed by Khandelwal (2010, 2013) to estimate quality.

The second source of information used are the Economic Census of 1997 (CE 1997, *Censo Económico 1997*) and the Annual Economic Activity Survey (EAAE; *Encuesta Anual de Actividad Económica*) from 1998 to 2008, both carried out by the National Institute of Statistics (INE, *Instituto Nacional de Estadística*). While the CE 1997 covered all firms we retain only those firms that appear at least twice over the period 1998-2008. The EAAE is based on a stratified sampling with probabilistic samples representative of economic sectors of the International Standard Industry Classification (ISIC). The exception is for the

[6] Also known as Arellano-Bover/Blundell-Bond estimator.
[7] Customs union between Argentina, Brazil, Paraguay and Uruguay signed in 1991.

stratum of largest firms in terms of income or employment for which a census is performed. In the year 2006 only firms of compulsory inclusion were surveyed.[8]

The survey covers firms that perform an economic activity related to industry, commerce or services in Uruguayan territory, except for those establishments in Export Processing Zones (EPZ). It does not include industries related to agriculture and livestock, extractive industries, construction, or financial services controlled by the Central Bank, among others.

In addition to these sources, other country-level databases were consulted. From the World Bank's World Development Indicators (WDI) we collected information on each of Uruguay's trade partners' GDP in constant 2005 US dollars and total population. Furthermore, we use annuallized data on the exchange rate and inflation rates from the IMF's International Financial Statistics (IFS) to calculate the real exchange rates. Other sources were consulted when the WDI or the IFS did not have such information. For example, for Taiwan we used information from the Taiwanese Statistic Office. We also used the GeoDist and Gravity databases from CEPII which report the distance between Uruguay and each trading partner, or if the partner is a landlocked country, among others.

3.2. Characteristics of Uruguayan firms

In Table 1 we report the distributions of firms by trading status for all years of the estimation sample. [9] Domestic firms are those that do not report international trade, while two-way traders are those firms that simultaneously imported and exported in any particular year.

In our estimation sample only around 17 percent of the firms do not report international trade activities. This points towards a considerable internationalization of Uruguayan firms, possibly due to the reduced size of the domestic market. The figures are also in line with other studies analysing the distribution of firms by trading status in small countries (Andersson et al., 2008; Castellani et al., 2010; Muûls and Pisu, 2009; Peluffo, 2022).

The rise in the share of two-way traders and the fall in the percentage of domestic firms in 2006 is due to a change in the sampling of the EAAE for that year. As stated before, in this year the survey only gathered information from the largest firms in terms of revenue or employment.

Table 2 reports the summary statistics of the estimation sample on the average value of exports and imports per firm in constant USD of 2005, the share of trade with high-income countries, the average number of countries to which each firm trades, the product categories traded at the 8-digit NCM, and the share of exports over total sales, among other indicators.

[8] The data is confidential but not exclusive and can be requested to the sources.
[9] The estimation sample report those firms that are included in the Census data for 1997 and EAAE from 1998 to 2008 matched with customs information.

We confirm as several studies have made before, that two-way traders are bigger in terms of revenue, employment and gross value added, and more productive measured by revenue over total employment and total factor productivity (TFP) estimated using Ackerberg et al. (2015) methodology.

In addition, two-way traders tend to export and import more, export to or import from more countries, trade a larger quantity of product categories and with more countries. Nevertheless, firms that simultaneously export and import have a lower percentage of their exports than only exporters destinated to higher income countries. This is due to a higher diversification of their markets, as suggested by the number of trade destinations. We also observe that two-way traders tend to import more from higher income countries than to export to these countries.

3.3. Composition of exports and imports

The swings of relative price levels of MERCOSUR partners, and of Uruguay versus the rest of the world had significant consequences on the selection of trading partners by Uruguayan firms.

By 1998, more than half of Uruguayan exports were destined to the MERCOSUR, and Brazil alone represented one-third of total exports (Table 3). After 1998, we see the first significant drop in Uruguayan exports in constant 2005 US dollars. This drop is explained by the decrease in exports to the MERCOSUR, and especially to Brazil.

The importance of MERCOSUR partners continues to decrease with the devaluation of the Argentinean peso and the financial and economic crisis of the neighbouring country. In 2002, total Uruguayan exports reached a bottom and represented a drop of 37 percent from 1998 in 2005 US dollars. Even by 2002, the drop of exports to MERCOSUR represented more than 80 percent of the total fall in exports.

In 2002, after the devaluation of the Argentinean peso it was inevitable for Uruguay to leave the crawling peg to the US dollar. As expected, this caused a reversion in the trend of decreasing exports due to the regained competitiveness in terms of the RER depreciation.

Nevertheless, the surge in Uruguayan exports after the devaluation meant a shift of the destination distribution. From 2002 to 2005 export increased by 1,400 million constant 2005 US dollars, while export to the MERCOSUR only increased by 135 million. Most of the increase in exports was destined to the North America Free Trade Area, particularly to the US and Mexico. The participation of the NAFTA went from 6 percent in 1998 to 26 percent in 2005, surpassing the importance of the MERCOSUR.

Imports from MERCOSUR countries remained relatively stable (Table 4). The main change during this period is the decrease of the share of imports from high-income countries, especially from Europe, and the increaseof imports from the Rest of the World driven by China and Russia.

In terms of the composition of international trade, as it is observed in Table 5, almost two thirds of exported values from 1997 to 2008 correspond to firms classified under "food and beverages" and "tanning and dressing of leather" sectors, according to the International Standard Industrial Classification (ISIC). This confirms previous finding by Peluffo (2021) that exports from Uruguayan firms are highly concentrated in a few industries characterized by low R&D intensity and commoditized goods with low scope for vertical differentiation. For example, among food and beverages the most common exported products during the period considered were fresh, chilled or frozen boneless bovine cuts and semi-milled or wholly milled rice.

It is relevant to highlight that high-income countries represent a significant share of exports in sectors with shorter "quality ladders". In particular, 86 percent of exported values of "wood, cork and straw products" and more than 50 percent of exports of "tanning and dressing of leather" and "basic materials" were destined to high-income countries.

On the other hand, exports to MERCOSUR countries represent a significant proportion of exports in sectors with a higher scope for quality differentiation. For example, 92 percent of the exported value of "motor vehicles" and 76 percent of "chemicals and chemical products" are destined to MERCOSUR countries.

In terms of imports, there is a more heterogeneous behaviour. While imports from high-income countries represent 55 percent of the "Machinery and equipment n.e.c." sector and 67 percent of "Medical, precision and optical instruments", the MERCOSUR represent 58 percent of imports from the "Electrical machinery" industries.

In Figure 1 and 2 we analyse the behaviour of exports and imports following Rauch (1999) product classification. Rauch classifies products into three categories: homogeneous goods –or goods traded on organized exchanges–, reference priced goods and differentiated products –which are not traded on organized exchanges nor have reference prices. Based on this classification we proxy differentiated products as exports and imports with a large scope for quality differentiation, and homogeneous goods as those with small scope for quality differentiation.

In Figure 1 we observe the same pattern of Table 5 when we look at exports according to Rauch (1999) product classification. The main markets of differentiated goods throughout most of the period analysed are destined to MERCOSUR countries. Only during the 2002 economic crisis and aftermaths, high-income countries represented a more important destination market of differentiated products. During the period considered is also relevant the steady and continuous increase of the importance of differentiated products exports to other Latin American countries and to the rest of the world.

At stated above, high-income countries and the MERCOSUR are important import markets of differentiated products. Interestingly, Uruguayan firms adjusted their purchases of differentiated products in both regions in a similar way during the regional economic crisis.

4. Methodology

Our baseline estimating equation to analyse the associations between trade with high-income countries and export and import quality is the following:

$$ln\bar{q}_{it} = \ln inc_{it}\,\beta + A_i + B_t + X_{it}\,\alpha + \varepsilon_{it} \qquad (1)$$

Where i and t indexes firms and year respectively; $\overline{q}_{it}$ stands for a firm level average export and import quality in logs, inc_{it} stands for the share of exports to or imports from high-income countries. As an additional check we also consider the weighted average GDP per capita of firm i's export destination or source country in year t.[10] A_i are firm fixed effects; B_t are time dummies; X_{it} are other time-varying firm characteristics, including log average distance, or log of TFP and size; and ε_{it} is a conditional mean zero error term. We proxy size as the log of total employment at the firm level. We note that endogeneity could work through simultaneous choice of exports and intermediate inputs quality in such a way that more productive firms have higher quality of both. To circunvent this issue we estimate total factor productivityusing the Ackerberg, Caves and Frazer (2015) methodology and include it as a regressor in our estimations.

We estimate measures of quality following the methodology proposed by Khandelwal et al. (2013) which builds in Khandelwal (2010), who combines information on prices and physical quantities to infer quality of exports and imports using data at the NCM 8-digit level. Khandelwal et al. (2013) identify the relationship between quantity and price by assuming specific elasticities of substitution. We use the estimates of Broda and Weinstein (2006) and allow the elasticity of substitution to differ across HS 2-digit product classes.[15] We can then infer quality as the OLS residual e_{ipct} from estimating:

$$\ln q_{ipct} + \sigma_s lnp_{ipct} = \alpha_p + \alpha_{ct} + \sigma_s \alpha_{ct} + e_{ipct} \qquad (2)$$

Where q_{ipct} and p_{ipct} are the quantitiy and the price, respectively, of trade of product p by firm i to country c in year t, σ_s represents the elasticity of substitution in industry s, α_p captures time-invariant product characteristics, and α_{ct} represents destination/source-year effects to capture aggregate incomes and price indices in the partner/trading country.

Moreover, we also estimate export and import unit prices, following Bastos et al. (2018) to construct firm-level average export and import unit prices. Results are in line with the ones obtained for export and import estimated using Khandelwal methodology.[11]

There may be unobserved variables changes that bias the panel fixed effects by firm estimation.[12] Although the level of income at the destination country is highly correlated with quality, including trade partners' GDP per capita directly into our estimations raises endogeneity concerns in the upgrading of quality. Moreover, the increase in the export quality of firms to higher income regions could translate in prices/quality that could only be paid by consumers in high-income markets. There may also be unobserved differences among firms that affect both the composition of export destination, or import source countries, and output and input quality. In addition, there could be omitted variables biasing our estimates such as an increase in costs– pass through imports, labour costs, etc. To mitigate endogeneity problems we lagged all the explanatoryvariables one period to avoid the reverse causality concern in the estimation with fixed effects by firm.

[10] This variable is calculated as the GDP per capita at PPP in constant 2005 USD of each country with which the firm trades, weighted by the share of exports that this country represents to the firm during each year. Similarly, the firm's average import market income is calculated from the share of imports that each country represents to the firm. Results are available upon request.

[11] Results are available upon request from the authors.

[12] These authors suggest a theoretical model in which firms translate increases in input costs into increases in output prices.

Moreover, we use also dynamic panel models, namely system generalized method of moments (SYS-GMM) that builds a system of two equations -the original and the transformed one- known as SYS-GMM. In particular, we use SYS-GMM with orthogonal forward deviations to minimize the gaps of the panel, and two-steps robust standard errors cluster at the firm level.[13]

Dynamic panel estimators are designed for situations where: a) the dependent variable is dynamic and depends on its own past realizations, b) there are explanatory variables that are not strictly exogenous, i.e. correlated with past and possible current realizations of the errors, c) there are fixed individual effects, 4) heteroscedasticity and autocorrelation within firms but not across them. Then the estimating equation with the same variables as in (1) is the following:

$$ln\bar{q}_{it} = ln\bar{q}_{it-1} + \ln inc_{it}\,\beta + B_t + X_{it}\,\alpha + \varepsilon_{it} \qquad (3)$$

Our aim is to analyse if there is an effect on the quality of exports when they are destined to high-income countries, the quality of imports when they are sourced from high-income countries, and how these two interact. We also look at the quality of exports when the firm uses a higher share of imported goods from high-income countries, and the quality of imports when firms export a higher proportion of their goods to high-income countries. Export and import intensities are defined as the ratios of exports over sales and imports over total purchases of intermediate goods. We treat as endogenous variables lagged quality, the share of exports and imports from/to high income countries, export and import intensities, average GDP per capita of firm i's export destination or source country, TFP and size. Thus, except for distance and time dummies, we consider that all variables are not strictly exogenous.

5. Results

5.1. Export and import quality by level of income of destination markets

Table 6 presents the results of panel fixed effects by firm and lagged regressors for one period. We note a high correlation (0.90) between average GDP per capita of destination countries and average distance, so we run specifications (1) and (3) with just one of these variables to avoid collinearity. For export quality we do not find any relationship with the share of exports to high-income markets (column 1, model 1). Furthermore, we find a negative effect of lagged average distance to destination countries (model 1 and 2) and of average GDP per capita (model 3), pointing out to a negative association between export quality and more distant and richer countries. We should keep in mind that a higher distance represents also higher trade costs, so it is possible that firms absorb part of the increasing trade cost as postulated by Melitz and Ottaviano (2008). Johnson (2012) and Gervais (2013) also argue that more productive firms charge lower prices, and this may be the case in a market of mainly commodities with low scope for vertical differentiation and competing in quality. While for import quality we find a negative association with the share of exports to high-income countries and positive association with TFP.

In the case of import quality (column 4, model 1) we observe a weak association with the share of exports to high-income countries. In line with this result, there is no significant effect of average GDP per capita of export countries. The only variable that appears to have a strong positive correlation with average import

[13] To this end we use the command in Stata xtabond2 developed by Roodman (2015).

prices is TFP. Nevertheless, this estimation could still have endogeneity problems and could be biased if there are unobserved variables that change over time.

Thus, we estimate dynamic panel models using SYS-GMM and forward orthogonal deviation with robust standard errors (clustered at the firm level) in two-step estimation and small sample correction. Furthermore, it is also robust to heteroscedasticity and autocorrelation.

In Table 7 we present the estimates for firm's average export quality as dependent variable.

From the Hansen test we find that the set of instruments are valid in all specifications, and we check autocorrelations. We use two lags except when otherwise specified and check that there was no autocorrelation of order 2 since this could invalidate our results.

In contrast to the models with fixed effects by firm, the dynamic panel model estimates tell a different story. Similarly to the previous models, we do not find a significant relationship between exports to high-income markets or average income at the destination and export quality. Nevertheless, we find a significant positive effect of export intensity and TFP, while distance unexpectedly in not significant.

In Table 8 we estimate the same model as in Table 7 but using the firm's average import quality as our dependent variable. Again, all instruments are jointly valid and relevant in for model 1 and 2 but in model 3 only at the 10 percent of confidence.

Our main results are that the share of exports to high-income countries and average income of the destination countries have a negative impact on the average import quality in model 1 and 2 respectively. This negative effect could be due to the type of goods exported to developed regions. As we described before, Uruguayan exports to high-income countries are mainly from sectors with low R&D intensity and commoditized goods –namely agricultural food with manufacturing process- with a low scope for vertical differentiation, and use mainly agricultural light intermediates inputs produced domestically. Agro-industrial goods exported use a lesser share of imported inputs that other manufacturing industries.

Export intensity shows a negative effect, while distance, TFP and size exhibit a positive and significant effect of import quality. Thus, the positive effect of distance to the export market on the firm's average import quality indicates that exports to more remote countries use higher quality imports, in more productive and bigger firms. In all cases we find persistence of quality, pointing out the existence of dynamic effects.

5.2. Export and import quality by level of income of source markets

This section studies the effect of the income level of source countries on the average export and import quality. In Table 9, we present the fixed effects by firm estimations with explanatory variables lagged one period. For export quality we do not find any significant effect of the regressors. Nevertheless, for import quality we find an unexpected negative effect of average GDP of source countries in model 3, but a positive

and significant effect of TFP. Thus, it seems that productivity is more associated with imports than with exports quality perhaps because our main exports are goods with low vertical differentiation.

In Table 10, we present the dynamic panel model estimates. The effect of imports from high-income countries and average GDP from source countries present a positive effect on export quality which is quite different to the one observed in the FE estimates. The share of imports from high-income countries present a positive effect on export quality. Furthermore, we find a negative effect of distance on export quality. One possible explanation for the latter result is that firms exporting to more distant countries reduce its price –namely the mark-up- and this translates into the estimated quality.

Finally, results in Table 11 indicates that a higher proportion of inputs imported from high-income countries and average income in source countries have not effect on import quality. There is a positive effect of TFP and size of the firm on imported quality. Although the effect of distance on quality is generally found to be positive, Lugovskyy and Skiba (2016) find that a negative relationship is possible depending on the relative income of the importing country with regards to the exporter and if the firm absorb parts of the higher trade costs.

6. Concluding remarks

In this work, we analyse the impact of destination of exports and origin of imports markets on the quality of exports and imports, using as proxy to export and import quality the measure proposed by Khandelwal (2010, 2013). We examine this relationship using fixed effects by firm estimation with the explanatory variables lagged to avoid simultaneity. Nevertheless, since these techniques may still suffer from endogeneity we also estimate dynamic panel model, namely system generalized method of moments, with robust standard errors, cluster at the firm level, in twostep estimation and corrected by small sample issues.

Our endogenous variables are the export and import intensity of firms and share of exports to or imports from high-income countries. Furthermore, we also test for the average income of destination and source countries.

The most robust results are a negative effect of distance on export quality and that a higher share of exports to high-income countries have a negative effect on import quality.

When we take the results of the dynamic panel models and observe that export quality is positively affected by export intensity, TFP, the share of imports from high-income countries and average GDP of destination countries. Nevertheless, the average distance to export countries has a negative effect on export quality.

Import quality is affected negatively by exports to high-income countries, export intensity and average GDP of exports markets. This negative effect seems to be related to the low R&D intensity and commoditization of goods exported by Uruguayan firms to developed markets. On the other hand, the results show a positive effect of average distance to export destination, TFP, and firms' size on the quality of imported goods. Contrary to our expectations, a higher share of exported goods to high-income countries translates into lower import quality. This could be due to exports to high-income country being mainly agro-industrial goods with a low content of imported goods compare to other manufacturing industries. Furthermore, to

explain our results beyond the type of goods exported by destination we are aware of the existence of higher protection for manufactured goods (tariff escalation), as well as the input composition of goods exported by destination.

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Table 1. Summary statistics, type of trade performed by firm and year (%)

	Domestic	Only Exporters	Only Importers	Two-way traders
1997	18.89	2.06	33.41	45.64
1998	13.69	1.79	33.78	50.74
1999	14.37	2.14	30.89	52.60
2000	14.12	2.27	29.55	54.06
2001	18.13	3.07	30.88	47.93
2002	21.63	3.51	30.48	44.38
2003	18.90	3.95	30.32	46.83
2004	18.51	3.01	30.99	47.49
2005	19.64	3.60	29.60	47.16
2006	10.19	2.08	25.46	62.27
2007	15.72	2.17	30.43	51.67
2008	15.16	1.48	28.65	54.71
Total	16.93	2.64	30.61	49.81
Number of firms	1,326	207	2,397	3,901

Source: own elaboration based on data from the DNA and the INE. The estimation sample only report those firms that are included in the Census data for 1997 and observed unless two years over the period 1998-2008, and the EAAE from 1998 to 2008.

Table 2. Summary statistics, at the firm level, 1997-2008

	Only Importers	Only Exporters	Two-ways traders
Total exports		0.84	7.04
		(0.05)	(0.11)
Total imports	0.57		2.92
	(0.01)		(0.05)
Share of Exports to high-income countries		0.32	0.23
		(0.02)	(0.00)
Share of Imports from high-income countries	0.36		0.40
	(0.01)		(0.01)
Number of destination countries		2.78	5.22
		(0.19)	(0.08)
Number of origin countries	4.19		7.78
	(0.09)		(0.12)
Number of exported categories		2.52	6.33
		(0.17)	(0.10)
Number of imported categories	14.83		42.92
	(0.30)		(0.69)
Share of exports over total sales		0.31	0.39
		(0.02)	(0.01)
Revenue	4.85	7.17	28.17
	(0.10)	(0.54)	(0.47)
Total employment	58.83	55.62	147.89
	(1.20)	(3.87)	(2.37)
Gross value added	0.89	1.41	3.57
	(0.02)	(0.10)	(0.06)
Revenue over total employment	88.77	149.29	181.62
	(1.92)	(11.25)	(3.04)
Gross value added over total employment	15.37	26.75	23.72
	(0.31)	(1.88)	(0.38)
Total factor productivity (ACF)	6.73	6.47	7.00
	(0.16)	(0.56)	(0.13)
Number of firms	2,397	207	3,901

Note: Table reports averages across firms, weighting firms equally. Values of total exports and imports, revenue and value added in millions of 2005 US dollars, revenue and value added over total employment are in thousands of 2005 US dollars. Total factor productivity calculated using Ackerberg et al. (2015) methodology reported in natural logarithm. Standard errors in parentheses.
Source: own elaboration based on data from the DNA and the INE.

Table 3. Exports by destination market, share of total exports

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
MERCOSUR	0.487	0.532	0.447	0.441	0.407	0.319	0.303	0.258	0.228	0.236	0.267	0.268
Argentina	0.130	0.170	0.160	0.175	0.149	0.057	0.069	0.075	0.075	0.076	0.085	0.085
Brazil	0.336	0.337	0.252	0.230	0.218	0.230	0.212	0.163	0.136	0.145	0.165	0.165
Paraguay	0.022	0.026	0.035	0.036	0.041	0.032	0.022	0.020	0.016	0.015	0.017	0.018
Other Latin-America	0.070	0.084	0.087	0.096	0.102	0.097	0.103	0.102	0.118	0.130	0.131	0.132
Mexico	0.012	0.009	0.020	0.038	0.038	0.038	0.041	0.040	0.041	0.034	0.047	0.029
High-income	0.349	0.324	0.365	0.355	0.361	0.396	0.435	0.484	0.484	0.389	0.379	0.316
United States	0.057	0.050	0.063	0.081	0.082	0.075	0.107	0.198	0.224	0.130	0.109	0.036
Europe	0.204	0.186	0.205	0.172	0.195	0.245	0.235	0.204	0.188	0.191	0.205	0.212
Asia	0.072	0.072	0.069	0.068	0.048	0.054	0.044	0.036	0.036	0.043	0.036	0.037
Rest of the World	0.094	0.060	0.102	0.109	0.129	0.189	0.160	0.156	0.171	0.246	0.223	0.284
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: own elaboration based on data from the DNA.

Table 4. Imports by source market, share of total imports

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
MERCOSUR	0.439	0.446	0.450	0.462	0.439	0.484	0.515	0.520	0.523	0.416	0.409	0.425
Argentina	0.217	0.226	0.235	0.251	0.227	0.257	0.277	0.256	0.252	0.201	0.184	0.198
Brazil	0.215	0.215	0.211	0.206	0.206	0.219	0.231	0.257	0.264	0.209	0.220	0.219
Paraguay	0.006	0.004	0.005	0.005	0.006	0.008	0.006	0.007	0.006	0.006	0.006	0.007
Other Latin-America	0.053	0.044	0.050	0.060	0.106	0.045	0.045	0.044	0.044	0.173	0.120	0.060
Mexico	0.014	0.012	0.013	0.012	0.012	0.014	0.012	0.012	0.016	0.014	0.015	0.017
High-income	0.417	0.442	0.421	0.388	0.350	0.381	0.346	0.311	0.292	0.241	0.279	0.289
United States	0.118	0.125	0.122	0.106	0.089	0.097	0.094	0.090	0.084	0.076	0.114	0.083
Europe	0.207	0.223	0.214	0.209	0.193	0.213	0.179	0.157	0.139	0.113	0.110	0.111
Asia	0.078	0.084	0.065	0.059	0.056	0.052	0.059	0.051	0.058	0.044	0.046	0.047
Rest of the World	0.091	0.068	0.078	0.090	0.105	0.090	0.095	0.124	0.141	0.171	0.191	0.226
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: own elaboration based on data from the DNA.

Table 5: Share of exports and imports by industry and destination, 1997-2008

	Exported values				Imported values			
ISIC code and description	to the MERCOSUR	% high-income countries	over total exports	HH Index	from the MERCOSUR	% high-income countries	over total imports	HH Index
15- Food and beverages	0.262	0.440	0.548	0.111	0.725	0.232	0.164	0.023
16- Tobacco products	0.921	0.035	0.015	0.924	0.489	0.357	0.031	0.115
17- Textiles	0.168	0.430	0.087	0.318	0.313	0.405	0.045	0.067
18- Wearing apparel	0.487	0.263	0.026	0.075	0.292	0.527	0.024	0.028
19- Tanning and dressing of leather	0.059	0.571	0.103	0.120	0.633	0.333	0.073	0.072
20- Wood, cork and straw products	0.027	0.862	0.021	0.282	0.284	0.588	0.006	0.041
21- Paper and paper products	0.855	0.012	0.019	0.130	0.607	0.271	0.039	0.035
22- Publishing, printing, media	0.807	0.045	0.005	0.265	0.289	0.575	0.020	0.037
23- Coke and refined petroleum products	.	.	.	.	.	.	.	.
24- Chemicals and chemical products	0.756	0.050	0.063	0.037	0.277	0.363	0.257	0.024
25- Rubber and plastics products	0.805	0.014	0.019	0.205	0.407	0.456	0.086	0.183
26- Other non-metallic mineral products	0.634	0.181	0.007	0.165	0.506	0.417	0.018	0.026
27- Basic metals	0.402	0.543	0.016	0.232	0.732	0.218	0.031	0.035
28- Metal products	0.828	0.009	0.009	0.192	0.684	0.244	0.034	0.072
29- Machinery and equipment n.e.c.	0.823	0.014	0.004	0.158	0.258	0.549	0.019	0.057
30- Office, accounting and computing	.	.	0.000	.	0.010	0.329	0.006	0.062
31- Electrical machinery	0.692	0.037	0.004	0.123	0.575	0.303	0.019	0.072
32- Radio, TV and communication equipment	0.789	0.048	0.000	0.179	0.374	0.561	0.003	0.179
33- Medical, precision and optical instruments	0.481	0.392	0.003	0.532	0.130	0.670	0.006	0.024
34- Motor vehicles	0.922	0.056	0.041	0.093	0.501	0.493	0.078	0.347
35- Other transport equipment	0.541	0.268	0.003	0.413	0.097	0.194	0.020	0.119
36- Furniture, other	0.932	0.004	0.007	0.153	0.460	0.435	0.023	0.056
37- Recycling	0.238	0.377	0.000	0.709	0.223	0.639	0.000	0.148
Total	0.346	0.381	1.000	0.038	0.463	0.360	1.000	0.000

Source: own elaboration based on data from the DNA and the INE. Coke and refined petroleum products not included. The Herfindahl–Hirschman Index (HH Index) calculated at 8-digits NCM.
Note: Estimation sample. Share of exports to MERCOSUR of High-income countries reported for industries in which there were at least 10 observations.

Table 6. Destination to high-income countries and firm average export and import prices, fixed effects by firm estimation

	Export Quality			Import Quality		
VARIABLES	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Share of exports to high-income countries lagged one period	0.0206			-0.190*		
	(0.278)			(0.107)		
Log average GDP per capita of destination countries lagged one period		-0.113	-0.187**		-0.0255	-0.0237
		(0.101)	(0.0951)		(0.0359)	(0.0344)
Exports over sales lagged one period	-0.0490	-0.0455	-0.125	-0.0329	-0.0227	-0.0210
	(0.444)	(0.443)	(0.439)	(0.118)	(0.118)	(0.116)
Log of Total Factor Productivity lagged one period	-0.0626	-0.0638	-0.0639	0.0676***	0.0685***	0.0685***
	(0.0700)	(0.0701)	(0.0706)	(0.0259)	(0.0261)	(0.0261)
Log average distance to destination countries lagged one period	-0.167**	-0.138**		0.0220	0.00311	
	(0.0667)	(0.0648)		(0.0228)	(0.0205)	
Log of Employment lagged one period	-0.257	-0.249	-0.258	-0.00804	-0.00730	-0.00719
	(0.210)	(0.211)	(0.212)	(0.0745)	(0.0748)	(0.0747)
Number of firms	433	433	433	506	506	506
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,136	2,136	2,136	2,481	2,481	2,481

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Destination income and firm export quality, SYS-GMM dynamic model

	Export Quality		
VARIABLES	Model 1	Model 2	Model 3
Export Quality lagged one period	0.152*	0.235***	0.222**
	(0.0885)	(0.0901)	(0.0883)
Share of exports to high-income	0.432		
countries	(0.658)		
Log average GDP per capita of		-0.305	0.0381
destination countries		(0.306)	(0.287)
Exports over sales	1.873**	1.386*	1.568**
	(0.832)	(0.757)	(0.782)
Log average distance to	-0.105	0.140	
destination countries	(0.182)	(0.148)	
Log of Total Factor Productivity	0.110*	0.107	0.138**
lagged one period	(0.0667)	(0.0691)	(0.0610)
Log of employment	0.00109	0.0187	-0.00207
	(0.0649)	(0.0716)	(0.0747)
Number of firms	401	401	401
Time Dummies	Yes	Yes	Yes
AR(1)	0.000798	0.000139	0.000162
AR(2)	0.217	0.308	0.309
Hansen p-value	0.163	0.372	0.262
Number Observations	1,810	1,810	1,810

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8. Destination income and firm average export prices, dynamic panel model (SYS-GMM)

	Import Quality		
VARIABLES	(1)	(2)	(3)
Import quality lagged one period	0.565***	0.389***	0.522***
	(0.127)	(0.136)	(0.150)
Share of exports to high-income countries	-0.464*		
	(0.242)		
Log average GDP per capita of destination countries		-0.309***	-0.143
		(0.106)	(0.127)
Exports over sales	-0.402*	-0.635**	0.191
	(0.239)	(0.258)	(0.244)
Log of Total Factor Productivity lagged one period	0.0846***	0.0861**	0.0672*
	(0.0288)	(0.0350)	(0.0365)
Log average distance to destination countries	0.173***	0.244***	
	(0.0563)	(0.0523)	
Log of Employment	0.141***	0.212***	0.173***
	(0.0472)	(0.0506)	(0.0556)
Number of firms	493	493	493
Time Dummies	Yes	Yes	Yes
AR(1)	5.70e-06	8.53e-05	5.14e-05
AR(2)	0.138	0.124	0.0696
Hansen p-value	0.229	0.341	0.0539
Number of Observations	2,199	2,199	2,199

Notes: Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Source income and firm average export and import prices, Fixed Effects by firm

	Export Quality			Import Quality		
VARIABLES	(1)	(2)	(3)	(1)	(2)	(3)
Share of imports from high-income	0.201			-0.0612		
countries lagged one period	(0.270)			(0.100)		
Log average GDP per capita of source		0.123	0.0451		-0.0622	-0.0860**
countries lagged one period		(0.134)	(0.121)		(0.0403)	(0.0421)
Imports over purchases of intermediate	-0.294	-0.292	-0.289	0.0756	0.0709	0.0697
goods lagged one period	(0.314)	(0.314)	(0.314)	(0.0877)	(0.0874)	(0.0873)
Log average distance from source	-0.0808	-0.0891		-0.0417	-0.0293	
countries lagged one period	(0.120)	(0.116)		(0.0423)	(0.0374)	
Log of Total Productivity lagged one	-0.0642	-0.0646	-0.0670	0.0634***	0.0645***	0.0641***
period	(0.0654)	(0.0657)	(0.0666)	(0.0240)	(0.0241)	(0.0242)
Log of employment lagged one period	-0.242	-0.246	-0.258	0.0401	0.0425	0.0378
	(0.209)	(0.210)	(0.210)	(0.0608)	(0.0606)	(0.0600)
Number of firms	452	452	452	674	674	674
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,144	2,144	2,144	3,544	3,544	3,544

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10. Source income and firm average export prices, dynamic panel model (SYS-GMM)

	Export Quality		
VARIABLES	(1)	(2)	(3)
Export quality lagged one period	0.375***	0.220**	0.293***
	(0.0826)	(0.102)	(0.105)
Share of imports from high-income countries	0.703*		
	(0.425)		
Log average GDP per capita of source countries		0.515*	0.529**
		(0.275)	(0.257)
Imports over purchases of intermediate goods	-0.224	-0.169	-0.189
	(0.245)	(0.409)	(0.504)
Log average distance from source countries	-0.234*	-0.294**	
	(0.120)	(0.121)	
Log of Total Factor Productivity lagged one period	0.0850	0.123	0.104
	(0.0587)	(0.0751)	(0.0919)
Log of Employment	0.0857	-0.00317	0.0620
	(0.0534)	(0.0608)	(0.0637)
Number of firms	393	393	393
Time Dummies	Yes	Yes	Yes
AR(1) p-value	1.43e-07	6.11e-05	1.98e-05
AR(2) p-value	0.821	0.601	0.702
Hansen p-value	0.211	0.455	0.332
Number of Observations	1,939	1,939	1,939

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11. Source income and firm average import prices, dynamic panel estimation (SYS-GMM)

	Import Quality		
VARIABLES	(1)	(2)	(3)
Import Quality lagged one period	0.336***	0.366**	0.330**
	(0.118)	(0.142)	(0.141)
Share of imports from high-income countries	0.105		
	(0.276)		
Log average GDP per capita of source countries		0.00532	0.0259
		(0.169)	(0.179)
Imports over purchases of intermediate goods	0.230	0.251	0.139
	(0.201)	(0.218)	(0.230)
Log average distance from source countries		0.0215	0.0252
		(0.0771)	(0.0827)
Log of Total Factor Productivity lagged one period	0.0625**	0.0691**	0.0848***
	(0.0278)	(0.0302)	(0.0314)
Log of employment	0.214***	0.219***	0.226***
	(0.0476)	(0.0525)	(0.0530)
Number of firms	639	667	667
Time Dummies	Yes	Yes	Yes
AR(1) p-value	1.21e-06	6.23e-06	9.13e-06
AR(2) p-value	0.0232	0.0125	0.0170
AR(3) p-value	0.050	0.059	0.065
AR(4) p-value	0.757	0.767	0.741
Hansen p-value	0.329	0.353	0.168
Number Observations	3,503	3,503	3,503

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Differentiated products exported by destination, in millions of 2005 US dollars

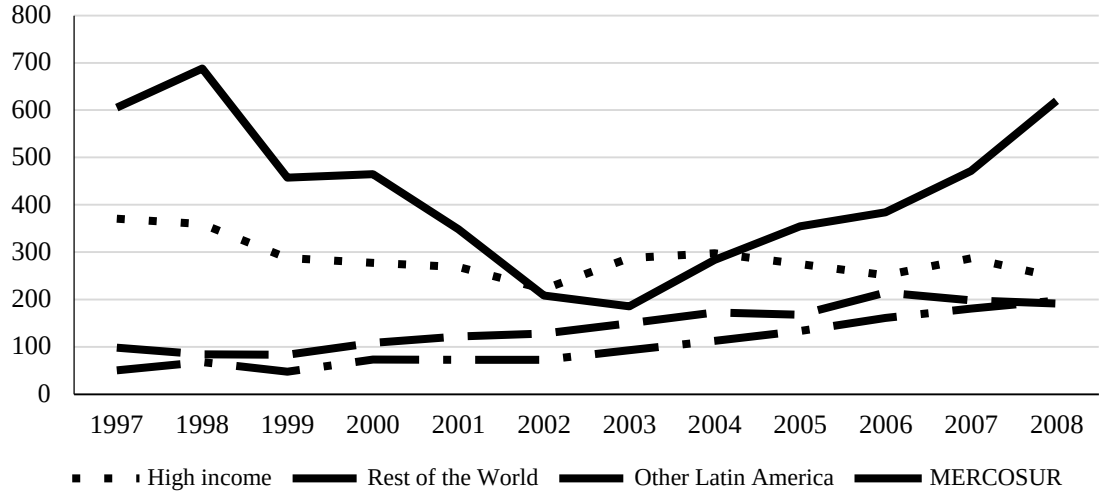

Figure 2: Differentiated products imported by origin, in millions of 2005 US dollars