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Destination and source countries: Do they have a role on product quality?

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Abstract

In this work we explore the link between export and import products quality and the level of income of destination and source countries. As proxy to quality we use a firm-level measure calculated from the unit value prices of both exports and imports of Uruguayan manufacturing firms. Previous works argue that high quality products are exported to and imported from high income countries. Moreover, it is also argued that firms that export to high income countries upgrade their quality by using imports from high income countries.

We test these hypotheses using a rich database for Uruguay over the period 1997-2008. This dataset combines firm level data and detailed customs data of exports and imports by destination or origin country. To analyze causal associations we use instrumental variable techniques, and utilize real exchange rate fluctuation to construct the instruments. Our results show that exporting to high income countries has a negative effect on the quality of imported goods and that importing from high income countries has a positive effect on our measure of import quality.

Keywords: exports, imports, quality, international trade.

JEL: F1, L1, O1.

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Países de destino y origen: ¿tienen un rol en la calidad de los productos?

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Resumen

En este trabajo exploramos el vínculo entre la calidad de los productos de exportación e importación y el nivel de ingresos de los países de destino y de origen. Estimamos la calidad utilizando una medida a nivel de empresa calculada a partir del valor unitario tanto de las exportaciones como de las importaciones de las empresas manufactureras uruguayas. Trabajos previos sostienen que los productos de calidad alta son exportados e importados de países de altos ingresos. Además, se argumenta que las empresas que exportan a países de ingresos altos mejoran su calidad utilizando las importaciones también procedentes de países de ingresos altos.

Probamos estas hipótesis utilizando una cuantiosa base de datos para Uruguay durante el período 1997-2008. Esta base de datos combina información a nivel de empresa y de datos aduaneros detallados de exportaciones e importaciones por país de destino u origen. Para analizar las asociaciones causales utilizamos la técnica de variables instrumentales mediante el uso de la fluctuación del tipo de cambio real para construir los instrumentos. Nuestros resultados muestran que la exportación a países de ingresos altos tiene un efecto negativo en la calidad de los bienes importados y que la importación procedente de países de altos ingresos tiene un efecto positivo en nuestra medida de la calidad de las importaciones.

Palabras clave: exportaciones, importaciones, calidad, comercio internacional.

Código JEL: F1, L1, O1.

1 Introduction

Since the work of Bernard and Jensen (1995, 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 firm level productivity heterogeneity 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 is at odds with some other country level empirical regularity, such as a positive relationship between prices and capital and labor endowments (Schott, 2004) or level of income (Hummels and Klenow, 2005).

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 general 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 characterized by decreasing horizontal specialization 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 the countries (Schott, 2004), the direction of trade between countries (Hallak, 2006), and even of 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 being the use unit values. Several researchers (Hallak and Schott, 2011; Khandelwal, 2010; Khandelwal et al., 2013) approximate the quality of the goods based on the unit values adjusting 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.

[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.

In this work we analyze the impact of the destination of exports and the origin of imports on exported and imported products using a rich dataset that matches survey data from the industrial surveys with customs data. Using exchange rate movements as source of variation our main result is that exporting to richer countries leads firms to import products of lower firm's average import prices, which we argue indicates a lower export quality. This result is at odds with recent literature using a similar approach to deal with the endogeneity resulting from estimating export prices and destinations.

In particular previous literature on the subject finds a positive casual link between export destinations and export quality (Bastos et al., 2016;Brambilla et al., 2012; Verhoogen, 2008)). We argue that the reversion in the sign of our estimates come from the exporting structure of Uruguayan firms, which tend to export goods with a lower scope for quality differentiation to higher income markets.

For the Uruguayan case this type of studies are almost inexistent, so this work contributes to the national literature, as well as for the international state of the art providing evidence for a small middle income country.

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 the variation of firms´ participation in international trade. Melitz includes heterogeneity in productivity by enabling firms to produce a symmetric variety at different marginal costs. One of the main consequences of his theoretical model is that more productive firms charge lower prices, are larger in terms of output and revenue, and make higher profits. He also presents the idea that this productivity could be thought of as a demand-shifting quality variable enabling firms to produce a higher quality variety that is more appreciated by consumers at the same cost.

Schott (2004) using product-level manufacturing US imports argues that the new-new trade theories are inconsistent with the data as he observes a positive relationship between prices and productivity measured by source country's capital and labor endowment. He recommends further investigation in the area and suggests that the positive relation with prices could be driven by competition in quality and not only in prices. Hummels and Klenow (2005) perform a country-level analysis and find that

richer countries export goods at higher unit prices and argue that this is consistent with models of quality differentiation. Finally, 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 in the demand side, and by firms producing varieties that differ in quality that are costlier to produce in the supply side. Some papers also moved away from the single heterogeneity attribute in the Melitz's model by allowing firms to be heterogeneous not only in productivity but also in the ability to produce high quality varieties, which depend on a capability draw.[3]

With this idea in mind, Baldwin and Harrigan (2011) propose an extension of the Melitz model in which they consider a taste for quality in asymmetric countries. They tie the exogenously determined unit labor coefficient that determines marginal costs to the quality of a good. In doing so firms are now allowed to compete in prices as well as in quality.

Another extension is provided by Khandelwal (2010) where he considers that companies produce varieties with vertical and horizontal differentiation. In this work the vertical differentiation is associated to quality and it is driven by consumers' utility. Khandelwal (2010) assumes that quality is monotonically increasing with technology which varies in asymmetric countries and therefore rests on a Ricardian competitive advantage component.

Verhoogen (2008) follows a similar approach where firms have a single fixed heterogeneous attribute that interprets as "entrepreneurial ability" or "technical know-how". In this model firms endogenously determine the skill level used in the production which in turn determines quality based on an asymmetric country framework. Fan et al. (2015) also build a model of endogenous quality choice in which firms differentiate

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

themselves by their level of productivity but require more physical inputs to produce a higher quality variety. Similarly, Antoniades (2015) proposes an endogenous quality choice in the Melitz and Ottaviano (2008) model in which firms are exogenously given a productivity parameter by which they determine their marginal cost. Finally, Feenstra and Romalis (2014) propose a supply- and demand-driven model of endogenous quality choice were quality depends on a productivity draw.

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) differentiate between process and product productivity in an extension to Melitz model with iceberg costs decreasing in quality. They base this modification on the critique that in single attribute models both export status and firms' size are monotonically defined by productivity. That, they argue, would be the reason behind the empirical finding that exporters have a premium on the value of their unit prices. This double differentiation led the authors to argue that conditional on size, which depends on the capability of the firm, exporting firms show a higher quality in their products. 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. (2016) endogenize the choice of quality of output, as well as of inputs, by the existence of both productivity and quality parameters. Nevertheless, both parameters, productivity and quality, are determined by a "capability" draw of the firm when enters the market. Therefore their model collapses into a single attribute model rendering them isomorphic to the previous models.

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 differentiate by the efficiency in the use of skilled and unskilled labor, 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 partially 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 papers in

the literature must resort to proxies such as unit values in order 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 as 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 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.

Nevertheless, some the papers that consider unit values as a proxy for quality take into account this caveat and test different estimations for capturing quality. For example, Bastos and Silva (2010) estimate the same model of unit prices on quantities to sustain the quality hypothesis. Kugler and Verhoogen (2012) interact their explanatory variable with measures of scope for quality differentiation while Görg et al. (2010) consider that their results could be driven by firms capturing part of the mark-ups on transport costs in their FOB prices instead of quality.

Another thread of literature intends to separate quality from prices by calculating quality-adjusted unit values. This is done by adjusting unit prices by the relative demand of goods. For example, Khandelwal (2010; 2013) at product-level, and Hallak and Schott (2011) at country-level, propose a measure in which a higher quality is assigned to a good which, conditional on price, is exported in a larger amount. This methodology is followed by other authors as well (Bas and Strauss-Kahn, 2015; Fan et al., 2015). Feenstra and Romalis (2014) follow a similar approach but also include a supply side explanation to the calculation of quality-adjusted prices by accounting for firm quality choice. Gervais (2013) estimates quality from the firm unobserved effects and the price elasticity.

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 labor 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).

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 prices, as well as other measures to proxy quality, are correlated with firms' characteristics such as productivity (Bastos and Silva, 2010; Görg et al., 2010; Harrigan et al., 2015; Kugler and Verhoogen, 2012) the type of imported inputs (Bas and Strauss-Kahn, 2015; Manova and Zhang, 2012), the variety of inputs (Demir, 2011; Saravia and Voigtländer, 2012), or the capital- and skill-intensity of the exporter (Harrigan et al., 2015; Khandelwal et al., 2013). In terms of the source country variables 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 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 values and

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

distance, as firms absorb part of the increasing trade costs. Under the Melitz model productive firms are able to charge lower prices, which give them the upper hand to sell their products abroad as they have the possibility to pay the fixed exporting costs.

Baldwin and Harrigan (2011) allow for a taste for quality in the demand side to include a quality-driven competition in addition to price competition. This allows them to find a positive relationship between unit values and distance conditional on exporting that contradicts the Melitz model. They also support the theory that distance drives unit values in two ways, by a selection effect and a direct effect. The selection effect is driven by their finding that, distance is negatively related to the probability of exporting. The direct effect on the other hand is based on the evidence they provide that conditional on exporting, unit values also increase with distance.

Bastos and Silva (2010) for Portugal using product-country and firm-product-country data find that within-product, within-firm and within-firm-product export prices increase with distance, although the point estimates decrease as the observation level becomes more granular. They consider that this finding supports the idea that as transport costs increase to the destination market so does the quality of the product exported. They also find that this positive relationship with distance is magnified by firms' productivity on within-product, but not on within-firm-product export prices. Görg et al. (2010) also finds that unit values 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 county is richer than the average destination country of the exporter.

On the other hand, those studies related to quality-driven demand have found that unit values are positively correlated with the level of income (Bas and Strauss-Kahn, 2015; Bastos and Silva, 2010; Bastos et al., 2016; Hallak, 2006; Hallak and Schott, 2011; Hummels and Klenow, 2005; Manova and Zhang, 2012; Martin, 2012; Schott, 2004) but are negatively related to remoteness and 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 of individuals. 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 across markets. For example, Manova and Zhang (2012) propose that firms could be varying 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.

As discussed above, Kugler and Verhoogen (2012) extend the Melitz model by endogenizing input and export quality choice. Using data for Colombia they find a positive correlation between import and output prices across firms, and those firms with a higher capability use higher quality imports to produce higher quality outputs. Manova and Zhang (2012) also find a positive correlation between input and export prices at the firm-product-level, where the more successful exporting firms use higher quality inputs to produce higher quality goods. Demir (2011) develops a theoretical framework in which the variety of intermediates imported by firms in developing countries from developed countries induce them to upgrade the quality of their output.

In addition, Saravia and Voigtländer (2012) find that this positive correlation also holds for firms that import relatively more inputs, but as for the rest of the papers the quality of the imports matter. In particular, they find that although imports could have a substitution effect reducing the share of white-collar workers, firms that import higher quality products employ a relatively more qualified labor force.

Using data of a period of unilateral trade liberalization in Argentina, Bas (2012) argues that firms in industries that experienced a greater decrease in import tariffs show a higher probability of exporting. Moreover, she also finds that a bigger tariff cut is also related to a technology upgrade of firms. This goes in line with Demir (2011) that argue that input trade liberalization is more likely to increase the probability of exporting in industries where intermediate quality is an important determinant of product quality.

Fan et al. (2015) also finds that tariff reduction lead firms in China following the accession to the WTO to increase the quality of the exported goods, especially in industries with a higher scope for quality. According to the authors this liberalization could also have induced firms to redirect their products to markets that have a higher appreciation for quality. Bas and Strauss-Kahn (2015) also find that trade liberalization in China lead firms to increase both the number and the price of their imported inputs,

which in turn allowed them to increase their export prices. This impact was larger for firms importing and exporting to the most developed countries.

There is still a causality issue that 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, in cross-section analysis 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 papers have attempted to use data that rely on a quasi-natural experimental structure, or the use of other estimation methods, such as instrumental variables. As discussed above, recently Bas and Strauss-Kahn (2015) used the accession of China to the WTO to estimate the causal effect of input tariffs cuts on quality upgrading in a difference-in-difference framework. Their identification is based on the exogenous input tariff reduction observed in China in 2001 and by taking advantage of the dual trade regime where while some firms pay the regular tariffs, others "processing" firms were exempted from paying these taxes. This allows them to treat exempted firms as control group. They argue that there is a causal effect of import liberalization on export price, but that this effect is specific to firms that trade with developed countries, which they find supports the theory that firms take advantage of the tariff cut to import higher quality inputs to export higher quality products.

On the other hand, a group of studies use an instrumental variable approach to analyze the causal link between country destination income and the quality of exports.[5] Brambilla et al. (2012) have used the devaluation of Brazil as instrument of an exogenous change in exports destination of Argentinean firms. Again, their hypothesis is that due to the devaluation of the Brazilian currency, Argentinean firms exporting to Brazil had to explore new markets, in particular those with a higher income and therefore higher demand for quality. They use different instruments to account for shares of exports to high income destination which are based on the interaction of the pre-devaluation share of exports that Argentinean firms send to Brazil, and a post-devaluation variable.

Bastos et al. (2016) use the average real exchange rate of Portuguese firms as an instrument to also analyze the relationship between firms' output and import prices and quality. In particular, using data from Portugal they find that an exogenous shock in the demand that caused firms to increase the average destination income of their exports

[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., 2014; Hummels et al., 2014; and Bastos et al., 2016 at the firm level.

induced them to pay higher costs for their inputs. They suggest that an increase in the demand for quality lead firms to use higher quality inputs and produce higher quality goods.

3 Data and stylized facts

3.1 Data

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

The administrative 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 costume 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*). The NCM shares the same structure as the Harmonized System in their 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.

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 covers all firms, the EAAE is a stratified sampling with probabilistic samples representative of economic sectors of the International Standard Industry Classification (ISIC). The exception is for the stratum of largest firms in terms of income or employment for which a census is performed. The survey covers firms that perform an economic activity related to industry, commerce or services in Uruguayan territory, except for those establishments in Special Economic Zones (SEZ). The survey does not include agriculture and livestock, extractive industries, construction, financial services controlled by the Central Bank, among others. For 2006 only firms of compulsory inclusion were surveyed.

From the CE 1997 and the EAAE we extract the total annual sales of each firm both to the domestic and the foreign markets, as well as total purchases of intermediate goods.

This allows us to calculate the level of internationalization of firms, measured by the share of exports over total sales and the share of imports over intermediate goods. We also extract from the EAAE the total revenue, employment, gross value added and total factor productivity. We match this information with the administrative customs data by using an identification number.

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. In addition, 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 form CEPII which report the distance between Uruguay and each trading partner, or if the partner is a landlocked country, among others.

In order to make the measurement units comparable, whenever it is possible to do a conversion, we transformed the statistics to the International System of Units in the administrative customs data. For example, if a product was traded in squared feet we convert it to squared meters. Whenever there is more than one measurement unit for each 10-digit product that cannot be transformed into a common measure we keep the most frequent one and eliminated from the sample those that differed. Observations for which we do not have information on units, values or quantities traded are also dropped.

We also eliminated all observations that do not report the source or destination country, as well as those destinated to or originated from Uruguay. We also dropped all traded products to Uruguayan SEZ as we are not able to track down to which countries these products were later on re-exported of from where they were originated.

Nevertheless, we do not expect this data cut to be significantly biasing our results since in our estimations we only considers those companies that registered trade in 1997, when the prevalence of exports to or imports from SEZ represented less than 0.6 percent of total exports and 0.3 percent of imports. In addition, most of exports to SEZ are agricultural products without significant transformation, mainly soy and wheat. As we only consider products produced by manufacturing firms most of these observations are not considered in our estimation sample.

We also performed a validation of firm identification number and NCM code numbers, and whenever these do not correspond to a tractable product or firm they

were eliminated from the sample. As a result of the data cleaning we lose less than 10% of the transactions of the administrative customs data.

3.2 Stylized facts

In Table 1 we report the distributions of firms by trading status for all years of the estimation sample. [6] Domestic firms are those that do not report international trade, while two-way traders are those firms that simultaneously import and export. Calculations are based on a yearly basis, so a firm that only had international trade in one year for the other years is classified as domestic.

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

Year	Domestic	Only Exporters	Only Importers	Twoway 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

Source: own elaboration based on data from the DNA and the INE. The "whole sample" refers to all observations from the administrative customs information and national survey data, while the "estimation sample" is the number of observations from the national survey firm-level data match or unmatched with customs information.

In our estimation sample in 1997 around 79 percent of firms were importers and 48 percent were exporters and only 19 percent 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 (2016)).

The jump in the share of two-way traders and the corresponding fall in the percentage of domestic firms in 2006 is due to a change in the sampling of the EAAE for that year.

[6] The Estimation sample only report those firms that are included in the Census data fopr 1997 and EAAE from 1998 to 2008.

As stated above, in this year the survey was only carried out to the largest firms which in other years are mandatory included due to its size in terms of revenue or employment.

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

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 and gross value added over total employment and total factor productivity estimated using Ackerberg et al. (2006) methodology.

In addition, two-way traders tend to export and import more, export to or import from more countries and trade a larger quantity of product categories, and show a significantly higher trade openness than only exporters or importers. Nevertheless, firms that simultaneously export and import have a fewer percentage of their trade destinated to higher income countries. This is due to a higher diversification of their import and export 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.

Table 2 also shows that only exporters tend to be more open to trade, are bigger in terms of revenue and gross value added, and are more productive measured by the two latter divided by total employment. Still, there are not significant differences in terms of total employment and total factor productivity.

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

	Only Importers	Only Exporters	Two-ways
Total exports		0.84	7.04
		(0.05)	(0.11)
Total imports	0.57		2.92
	(0.01)		(0.05)
Exports to high income countries		0.32	0.23
		(0.02)	(0.00)
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)
Firm openness	0.34	0.48	1.05
	(0.01)	(0.03)	(0.02)
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	6.73	6.47	7.00
	(0.16)	(0.56)	(0.13)
N (firms)	2,397	207	3,901

Note: Table reports averages across firms, weighting firms equally. Values of total exports and imports, Revenue and Gross value added in millions of 2005 US dollars, Revenue and Gross value added over total employment are in thousands of 2005 US dollars. Firm opennes calculated as the total exports and imports over gross production value. Total factor productivity calculated by the method proposed by Ackerberg et al. (2006). Values for domestic firms not reported due to low number of observations. Standard errors of means in parentheses.

Source: own elaboration based on data from the DNA and the INE.

As it is observed in Table 3, almost two thirds of exported values correspond to firms classified under “food and beverages” and “tanning and dressing of leather” sectors, acording to the International Standard Industrial Classification (ISIC). This shows 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.[7] For example, among food and beverages the most common exported products during the considered period were fresh, chilled or frozed 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" are 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 behavior. 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 analyze the behavior 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 –they are neither 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 that the same pattern as table 3 emerges when we look at exports by Rauch (1999) product classification. The main markets of differentiated goods throughout most of the period analyzed 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 considered period 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.

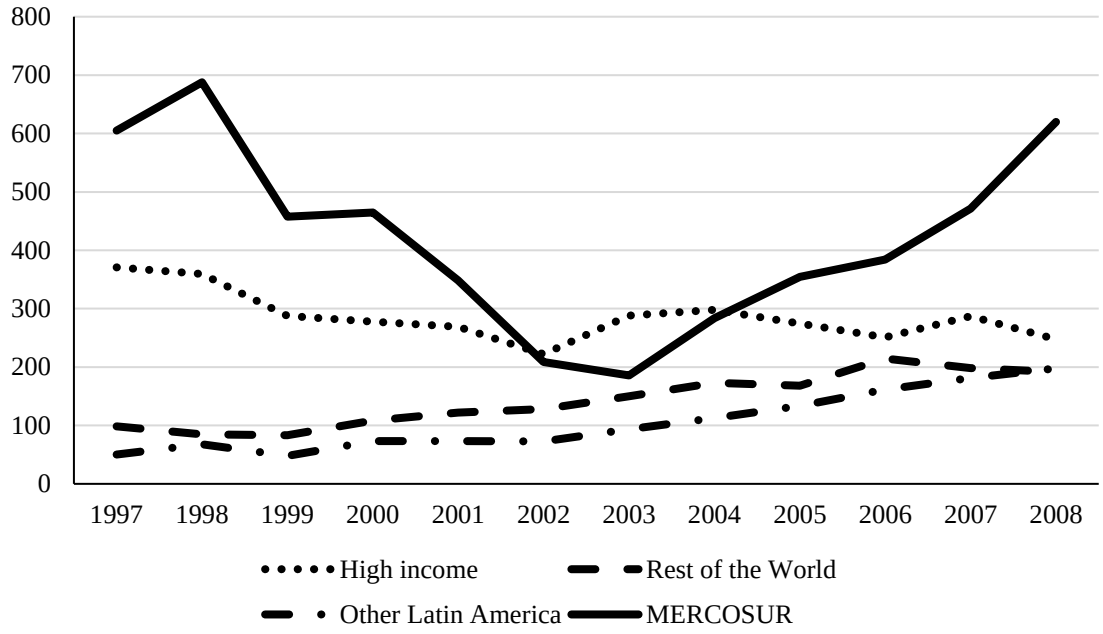
[7] Reports of Short Run Analysis Area, Institute of Economics, University of the Republic.

Table 3: Share of exports and imports by destination.

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

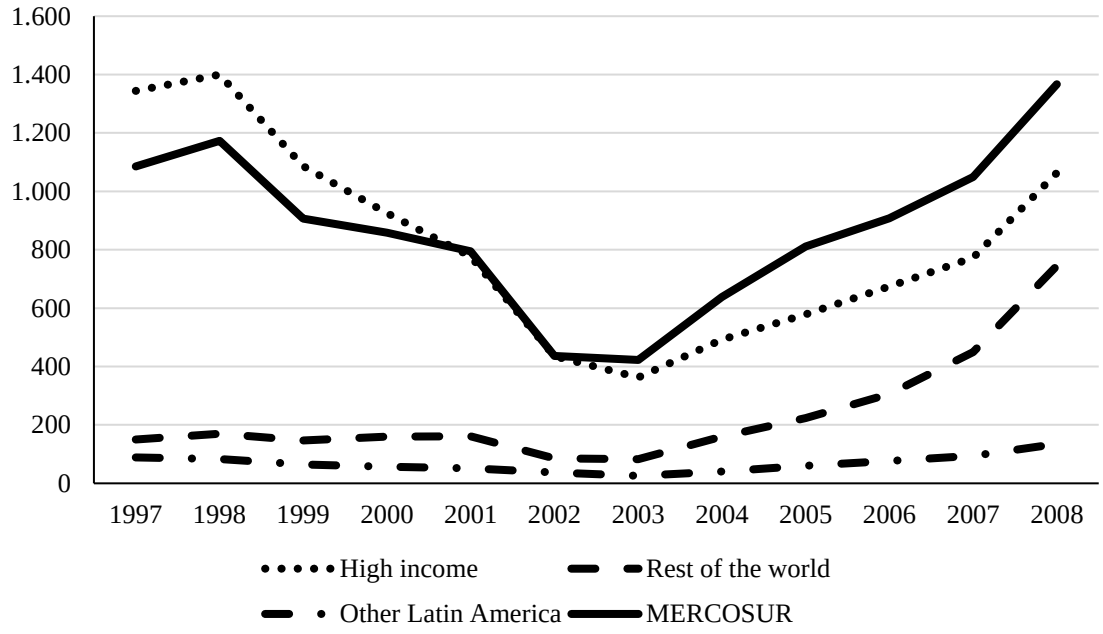
Source: own elaboration based on data from the DNA and the INE. Coke and refined petroleum products not included.
Note: Estimation sample. Share of exports to MERCOSUR of High income countries reported for industries in which there were at least 10 observations

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



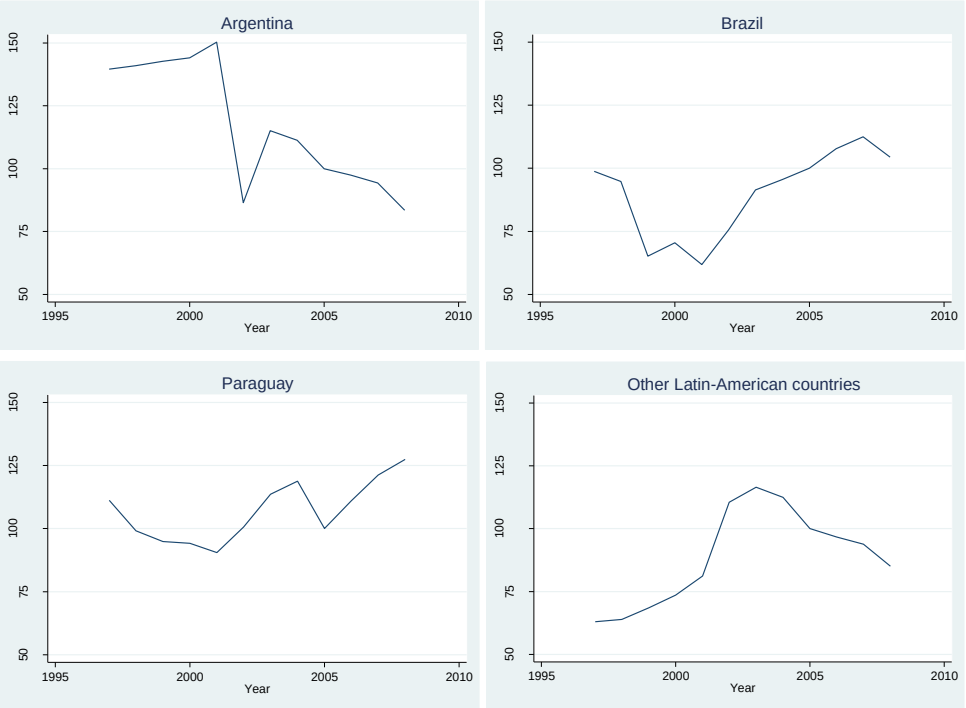
At stated above, high income and MERCOSUR countries are an important import market of differentiated products. Interestingly Uruguayan firms adjusted their purchases of differentiated products in both regions in a similar way during the regional economic crisis.

Figure 2: Differentiated products import by destination, in millions of 2005 US dollars



Consistent with Bastos et al. (2016) we find a positive empirical relationship between export and import prices and transactions with high income countries and to countries with higher GDP per capita.[8] In addition, in line with Görg et al. (2010) we find that once we control for firm-product effects export prices tend to be negatively correlated with the size of the destination market. Following (Melitz and Ottaviano, 2008) theoretical framework, this negative relationship could be explained by a stiffer competition in bigger markets that drives prices down.

Figure 3: Real exchange rates with selected trading partners and blocks



We now turn to the effects of real exchange rates movements on Uruguayan firms. As it can be observed in Figure 3 the real exchange rate (RER) of Uruguay during the period analyzed showed an important volatility. For trading partners outside the MERCOSUR we see a spike in the RER after the devaluation of the Uruguayan peso in 2002, and a fast return to pre-devaluation values. On the other hand, the evolution of the RER with MERCOSUR partners followed a different dynamic. For Brazil, and especially with Argentina we see an important deterioration of the RER after the devaluation of each of trading partner's currency. We expect the swings of relative price levels of MERCOSUR

[8] Tables A1a and A1b in appendix in an OLS firm-product estimation regressing export and import prices on two measures of market of destination income level, standard controls and a set of fixed effects.

partners, and also of Uruguay versus the rest of the world, to have significant consequences on the selection of exporting markets by Uruguayan firms.

4 Methodology

Our baseline estimation is through the conventional robust Fixed Effect model to analyze the associations between trade with high income countries and export and import prices:

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

Where i and t indexes firms and year respectively; $\overline{v}_{it}$ stands for a firm level average export and import price, inc_{it} is the average GDP per capita of firms i's export or import trade partners in year t; A_i is a firm fixed effect; B_t is a year effect; $X_{it}\alpha$ are other time-varying firm characteristics, including log average distance, or log of total factor productivity; and ε_{it} is a conditional mean zero error term.

As the measure of our dependent variable we follow Bastos et al. (2016) and construct firm-level average export and import prices:

$$ln(\bar{v}_{ipt}) = \theta_{it} + \delta_{pt} + \varepsilon_{ipt} \qquad (2)$$

where $\bar{v}_{ipt}$ is the unit value of product p imported or exported by firm i in year t. The unit value is calculated as the ratio of the total exports or imports of product p at the NCM-8 digit, divided by the quantity exported or imported by each firm. θ_{it} is the firm-year fixed effects; δ_{pt} the product-year fixed effects; and ε_{ipt} is the error term.

We use θ_{it} as our measure of firm-level average prices as it allows us to retain only the intrinsic component of each firm's prices, cleaned of any differences in the product mix of the firm. Nevertheless, this measure is still an imperfect to measure quality for the reasons commented above.

As Bastos et al. (2016) point out, there may be unobserved differences that bias the OLS estimates.[9] Although the level of income at destination has been showed to be highly correlated with unit values of exports, including the trade partners GDP per capita directly into our estimations raises concerns on endogeneity in the upgrading of quality. In addition, we are concerned about reverse causality issues. The increase in the export

[9] These authors suggests a theoretical model in which firms pass increases in input costs into increases in output prices.

unit values of firms to higher income regions could be caused by setting prices 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 input and output prices. In addition, there could be omitted variables biasing our estimates. For example, an increase in costs – pass through imports, labor costs, etc. Finally, equation (1) is also silent about the importance of mark-up pricing, since firms could upgrade quality to all destinations but only be able to increase prices to high-income destinations.

Therefore, to avoid these issues we use an instrumental variable generalized method of moments (IV-GMM) model trying various set of instruments, defined as we explain below. Furthermore, we use the GMM-Continuously Updated GMM Estimation (CUE) as this technique works is less affected by weak instruments under heteroscedasticity.[10]

Our aim is to analyze the 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. In particular, we also look at the quality of exported goods when the firm uses a higher share of imported inputs from high income countries.

In the instrumental variable approach, we follow previous works and construct different instruments for a firms' average destination and origin market using movements in the exchange rate. The endogenous variables are export and import penetration of the firms' and the income level of destination and source countries.

In terms of export and import penetration, the ratios of exports over sales and imports over total purchases of intermediate goods are instrumented by the real average exchange rate faced by a given firm:

$$I_{it}^{E} = \sum_{c} erate_{ct} * \psi_{i,97}^{c} \qquad (3.1)$$

$$I_{it}^{I} = \sum_{c} erate_{ct} * \varphi_{i,97}^{c} \qquad (3.2)$$

where $\psi_{i,97}^{c}$ is the share of exports of firm i to country c on total sales in 1997 and $\varphi_{i,97}^{c}$ is the share of imports of firm i from country c over total purchase of intermediate goods. The real exchange rate ($erate_{t}^{c}$) is calculated as:

$$erate_{ct} = e_{ct} \frac{CPI_{t}^{uy}}{CPI_{t}^{c}} \qquad (4)$$

[10] LIML allows only for weak instruments but not for heteroscedasticity.

where e_{ct} is the nominal exchange rate of country c in time t using Uruguayan peso as the fixed currency. CPI_t^{uy} is the consumer price index of Uruguay at time t, and CPI_t^c is the consumer price index of country c. In the case of sales within the domestic market the RER is defined as 100. For the calculation 2005 was used as the reference year.

The rationale for these instruments is the following: given the shares of exports to country c in the pre-devaluation period (1997), a higher exchange rate would induce firm i to export more to this market –i.e. is more competitive in this market- increasing so the share of exports over total sales to this market. Thus, we expect that our instrument is positively correlated with the export share of the firm. The reverse holds true for the share of imports over total intermediate goods purchases.

Our second endogenous variable, exports to or imports from high income countries, is instrumented by the real exchange of Uruguayan firms with respect to exports or imports in 1997 to MERCOSUR countries. In this way, we make use of the devaluation of the currency of Uruguay's main trading partners, in particular Argentina and Brazil, to analyze whether an exogenous change in the destination or source markets of Uruguayan firms cause an upgrade of the quality of their exported or imported goods.

In particular, our instrument is defined as the interaction of a post-devaluation variable with the pre-devaluation share of firm's exports or imports that were traded with MERCOSUR´s partners. Thus, since the shares of exports to and imports from the MERCOSUR in 1997 precede the devaluation, they measure exogenous exposure to the devaluation. In short, our instrument is defined as:

$$I_{it}^{E-HI} = Post_t * \psi_{i,97}^{MERC} \qquad (5.1)$$

$$I_{it}^{I-HI} = Post_t * \varphi_{i,97}^{MERC} \qquad (5.2)$$

where $\psi_{i,97}^{MERC}$ is the share of exports to the MERCOSUR in 1997, and Post are time dummies. $\varphi_{i,97}^{MERC}$ is analogous for imports. We try three specifications for Post. The first one is the firm-level regional real exchange rate ($erate_{1997}^{MERC}$) which is built as the weighted average of exports to Argentina, Brazil and Paraguay with their respective bilateral exchange rate with Uruguay.

In the second specification we consider the MERCOSUR component of each firm's real exchange rate by multiplying the regional real exchange rate ($erate_{1997}^{MERC}$) to the share of exports to these countries ($\varphi_{i,97}^{MERC}$). That is, we include the share of exports or imports to the MERCOSUR twice. We do this in order to add a second dimension. Not only is

important the variation in the real exchange rate to MERCOSUR countries but also their initial relative importance. Finally, our third specification builds on the second one and includes year dummies (ϕ_t), so that we are able to capture the impact of the devaluation over time as firms adjust to the exchange rate shock.

The theoretical rationale for these instruments is that following the devaluation, those firms that were most exposed to MERCOSUR's partners markets adjusted by moving away from these markets and into high income countries. In other words, a positive correlation is to be expected between the scope to diversify exports and exports to high income countries. The reverse situation should be observed for the share of imports.

The instruments have to be correlated with the endogenous variables –i.e. be relevant- but uncorrelated with the error term, i.e. they have to be exogenous –orthogonality condition-. In this regard, a priori, the instruments defined satisfy these conditions. On one side the devaluation of our major trading partners (Brazil in 1999 and Argentina in 2001) generated exogenous variation in export intensity and in export destinations. These changes are exogenous to the pre-devaluation shares of exports to MERCOSUR's partners. On the other hand the instrument for export shares is based on exogenous changes in the exchange rates of all trading partners and on each firm exposure to those changes given their pre-devaluation export shares.

Why to use the Brazilian and Argentinean devaluations?

Due to the aftermaths of the East Asian 1997 and Russian 1998 crisis, Brazil growing unbalances forced the Central Bank of Brazil to defend the crawling peg making Brazil's international reserves to collapse. The exchange rate regime finally became unsustainable and the government let the currency to float freely in early 1999. Although the devaluation was a possibility, it was largely unexpected and the dimension caught by surprise the Uruguayan economy. The real depreciated 70 percent in January 1999. During the same time the Uruguayan peso devaluated by less than 1 percent.

As it can be observed in Table 4, by 1998, more than half of Uruguayan exports were destined to MERCOSUR, and Brazil alone represented one-third of total exports. After 1998 we see the first significant drop in Uruguayan exports in constant 2005 US dollars since 1991. This drop is almost completely explained by the decrease in exports to the MERCOSUR, and especially to Brazil. The importance of the MERCOSUR continues decreasing with the devaluation of the Argentinean peso and the financial and economic

crisis of the neighboring country. In 2002 total Uruguayan exports reached a bottom and represented a drop of approximately 40 percent since 1998 in 2005 US dollars.

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 cause a reversion in decreasing exports due to the regained competitiveness in terms of the real exchange rate depreciation. Nevertheless, the surge in Uruguayan exports after the devaluation meant a shift of the destination distribution. From 2002 to 2005 export surged 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 (NAFTA), particularly to the US and Mexico. The participation of the NAFTA went from 13 percent in 2002 to 29 percent in 2005, surpassing the importance of the MERCOSUR.

Table 4. Exports by destination market, share of total

	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 5. Imports by destination market, share of total

	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.

5 Results

5.1 Export and import prices by level of income of destination markets

According to OLS estimates from Table 6, there is a positive relationship between the percentage of exports to high income markets and the firm-level average export prices. Following Bastos et al. (2016) we also consider that these results could be affected by pricing to market, reflecting the existence of endogenous mark-ups rather than of product quality. For that reason, we also estimate the relationship between export destination income and export intensity on the average import prices of the firm as we expect that mark-ups should not influence firms' import prices.

The positive relationship between our measure of export quality and the firm's exports prevalence to high income markets is not observed in the case of import quality. The only variable that appears to have a positive correlation with average import prices is total factor productivity. Nevertheless, we still have reasons to believe that the OLS estimates could be inconsistent.

Table 6. Destination income and firm average export and import prices, OLS

	(1)	(2)
Percentage of exports to high income countries	0.454**	0.135
	(2.34)	(1.44)
Exports over sales	-0.305	0.165
	(-0.89)	(1.21)
Log average distance to destination countries	0.056	-0.010
	(1.58)	(-0.96)
Log of total factor productivity of firm	-0.010	0.059**
	(-0.21)	(2.48)
Log of employment	0.009	0.047
	(0.07)	(0.69)
N	2454	2606

Notes: OLS regressions. Dependent variables are the firm's average (1) export or (2) import prices. Robust standard errors.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For the instrumental variables approach we report the estimation under the GMM continuously updated estimator (CUE). The reason for using CUE is that it is more robust to the presence of week instruments (Hahn et al., 2004) as "their finite-sample performance may be superior" than GMM. Furthermore, it is also more robust to heteroscedasticity.

The IV-GMM estimates in Table 7 are on firm's average export prices, or export quality. In these estimations we use as instruments three variations of the average real exchange rate of each firm weighted by the shares of exports of the firm in 1997 and the average real exchange rate weighted by the share of exports to MERCOSUR countries in 1997 interacted with time dummies.[11] In addition to the set of instruments for export propensity and exports to high income countries we also consider the second lag of the endogenous variables. [12]

Table 7. Destination income and firm average export prices, IV-CUE

	(1)	(2)	(3)
Percentage of exports to high income countries	-1.627 (-0.96)	-2.197 (-1.18)	-1.633 (-1.29)
Exports over sales	0.850 (0.56)	0.676 (0.45)	0.587 (0.40)
Log average distance to destination countries	0.105 (1.51)	0.112 (1.58)	0.055 (0.97)
Log of total factor productivity of firm	-0.037 (-0.52)	-0.038 (-0.52)	-0.047 (-0.68)
Log of employment	-0.091 (-0.53)	-0.073 (-0.40)	-0.060 (-0.34)
N	1382	1382	1272
Hansen J statistic	0.476	0.090	3.045
p-value	0.788	0.956	0.963
Kleibergen-Paap rk LM stat.	9.784	9.872	21.56
p-value	0.021	0.020	0.018
Kleibergen-Paap rk Wald F stat.	3.705	3.813	3.018
Stock-Yogo (10% max. LIML)	4.72	4.72	3.60

Notes: IV-CUE regressions. Dependent variable in second stage: firm's average export prices. All regressions include firm and year fixed effects. Excluded instruments for the percentage of exports to high income countries is the average RER of each firm to MERCOSUR using the shares of exports in 1997 interacted with time dummies. Excluded instruments for export intensity are (1) the average yearly RER using destination country export shares of 1997, (2) the average yearly RER using destination country shares of 1997 multiplied by the share of exports of each firm to the destination country, and (3) idem to column 2 but interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As our model is overidentified we can test whether the overidentifying restrictions are valid. From the Hansen J test we find that instruments are coherent in all specifications, but still this is not sufficient to ensure that our instruments are valid and therefore that our parameters of interest are successfully identified. As an additional check we report the underidentification test (Kleibergen-Paap rk LM) and find that in all

[11] Estimates using alternative set of instruments and time periods in the appendix. Full table of Stock-Yogo critical values available upon request.
[12] We test for auto-correlation structure of data.

specifications our excluded instruments are correlated with the endogenous regressors at 5 percent significance level, and therefore relevant.

Despite this, according to the Stock-Yogo estimates and the Kleibergen-Paap rk Wald F statistic our instruments are only weakly correlated to the endogenous regressors at a 10 percent significance level.[13]

In contrast to the OLS estimations, the IV-CUE estimates tell a different story. Now we do not observe a significant relationship between exports to high income markets and export quality. Still results should be taken with caution as the model could be only weakly identified and, as discussed above, estimates might be affected by pricing to market.

Table 8. Destination income and firm average import prices, IV-CUE

	(3)	(2)	(1)
Percentage of exports to high income countries	-4.181***	-3.878***	-1.528**
	(-2.76)	(-2.67)	(-2.25)
Exports over sales	-0.229	-0.165	0.782
	(-0.24)	(-0.18)	(1.19)
Log average distance to destination countries	0.095**	0.089**	0.035*
	(2.20)	(2.15)	(1.71)
Log of total factor productivity of firm	0.023	0.024	0.025
	(0.55)	(0.59)	(0.84)
Log of employment	-0.084	-0.069	0.049
	(-0.56)	(-0.49)	(0.51)
N	1466	1466	1321
Hansen J statistic	3.010	2.201	11.75
p-value	0.222	0.333	0.228
Kleibergen-Paap rk LM stat.	9.925	9.761	28.68
p-value	0.019	0.021	0.001
Kleibergen-Paap rk Wald F stat.	3.485	3.562	4.103
Stock-Yogo (10% max. LIML)	4.72	4.72	3.60

Notes: IV-CUE regressions. Dependent variable in second stage: firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for exports to high income countries is the average RER of each firm to MERCOSUR using the shares of exports in 1997 interacted with time dummies. Excluded instruments for export intensity are (1) the average yearly RER using destination country export shares of 1997, (2) the average yearly RER using destination country shares of 1997 multiplied by the share of exports of each firm to the destination country, and (3) idem to column 2 but interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For this reason, in Table 8 we estimate the same model as in Table 7 but using the firm's average import prices as our dependent variable. Again all instruments are jointly

[13] We follow Baum et al. (2007) suggestion in using the rk Wald statistic instead of the Cragg-Donald statistic in the presence of heteroskedasticity, autocorrelation and clustering.

valid and relevant in all specifications, but only in our third specification we can reject at 10 percent that they are weakly correlated to the endogenous regressors.[14]

Our main result is that the percentage of exports to high income countries has a negative impact on the average import prices. This negative effect could be due to the productive structure of Uruguayan firms exporting 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 with a low scope for vertical differentiation.

In addition we see a positive effect of distance to the export market on the firm's average import prices. This indicates that firms that export to more remote countries use higher quality imports.

5.2 Export and import prices by source markets income

This section studies the effect of the income level of source countries to the average export and import prices. From the OLS estimations in Table 9 we observe that there is a positive correlation between the percentage of imports from high income countries with the firm's average import price, but not with average export prices. In terms of import propensity the relationship is negative with firms' average export prices and positive with import prices.

Table 9. Source income and firm average import prices, OLS

	(1)	(2)
Percentage of imports from high income countries	0.009 (0.05)	0.468*** (4.76)
Imports over purchases of intermediate goods	-0.334* (-1.87)	0.228*** (3.00)
Log average distance from source countries	-0.071 (-1.10)	-0.003 (-0.10)
Log of total factor productivity of firm	-0.046 (-0.92)	0.021 (1.15)
Log of employment	-0.040 (-0.32)	0.109 (2.15)
N	2518	4700

Notes: OLS regressions. Dependent variables are the firm's average (1) export or (2) import prices. Robust standard errors.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[14] In specifications 1 and 2 we reject the existence of weakly correlated instruments at the 15% significance level.

Our IV-CUE estimates on the effect of imports distribution and intensity on firms' average export prices seems to indicate a similar relationship as the one observed in the OLS estimates. One possible explanation for this relationship could be that the gains in efficiency by using higher quality imported inputs may drive export prices down. Still, we cannot reject in any of our specifications the existence of weak instruments so we should interpret these results with caution.

Table 10. Source income and firm average export prices, IV-CUE

	(1)	(2)	(3)
Percentage of imports from high income countries	-0.767 (-0.43)	-0.664 (-0.37)	0.598 (0.65)
Imports over purchases of intermediate goods	-1.915 (-2.10)	-1.865** (-2.01)	-1.229* (-1.69)
Log average distance from source countries	0.036 (0.14)	0.020 (0.08)	-0.166 (-1.23)
Log of total factor productivity of firm	-0.057 (-0.84)	-0.057 (-0.83)	-0.104* (-1.69)
Log of employment	-0.069 (-0.23)	-0.033 (-0.19)	-0.067 (-0.47)
N	1596	1596	1596
Hansen J statistic	1.007	1.001	18.46
p-value	0.604	0.606	0.048
Kleibergen-Paap rk LM stat.	10.57	10.43	28.37
p-value	0.014	0.015	0.003
Kleibergen-Paap rk Wald F stat.	3.301	3.289	3.058
Stock-Yogo (10% max. LIML)	4.72	4.72	3.58

Notes: IV-CUE regressions. Dependent variable in second stage: firm's average export prices. All regressions include firm and year fixed effects. Excluded instruments for imports from high income countries is the average RER of each firm to MERCOSUR using the shares of imports in 1997 interacted with time dummies. Excluded instruments for import intensity are (1) the average yearly RER using source country import shares of 1997, (2) the average yearly RER using source country shares of 1997 multiplied by the share of imports of each firm to the source country, and (3) idem to column 2 but interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, as expected results in Table 11 indicate that a higher proportion of inputs imported from high income countries results in a higher firm average import price. This points out towards a higher quality of the imported goods from high income markets. There is also a positive effect of the size of the company on imported quality, and a negative effect of distance. 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.

Table 11. Source income and firm average import prices, IV-CUE

	(1)	(2)	(3)
Percentage of imports from high income countries	1.537**	1.537**	1.113**
	(2.26)	(2.30)	(2.40)
Imports over purchases of intermediate goods	0.134	0.132	0.209
	(0.34)	(0.33)	(0.59)
Log average distance from source countries	-0.208*	-0.211*	-0.153**
	(-1.85)	(-1.93)	(-1.93)
Log of total factor productivity of firm	-0.008	-0.008	-0.008
	(-0.33)	(-0.33)	(-0.34)
Log of employment	0.150**	0.144*	0.142**
	(2.02)	(1.89)	(1.99)
N	2765	2765	2765
Hansen J statistic	0.396	0.321	8.949
p-value	0.820	0.852	0.537
Kleibergen-Paap rk LM stat.	21.91	21.39	47.47
p-value	0.000	0.000	0.000
Kleibergen-Paap rk Wald F stat.	6.669	6.542	5.776
Stock-Yogo (10% max. LIML)	4.72	4.72	3.58

Notes: IV-CUE regressions. Dependent variable in second stage: firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for imports from high income countries is the average RER of each firm to MERCOSUR using the shares of imports in 1997 interacted with time dummies. Excluded instruments for import intensity are (1) the average yearly RER using source country import shares of 1997, (2) the average yearly RER using source country shares of 1997 multiplied by the share of imports of each firm to the source country, and (3) idem to column 2 but interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Concluding remarks

In this paper we analyze the impact of the markets of destination of exports and origin of imports on the quality of exports and imports, using as proxy to quality the unit values of traded goods controlled by product at the firm level. We follow other previous studies and examine this relationship using an instrumental variable approach that exploit the changes in the real exchange rates of Uruguay with its Mercosur trade partners as an exogenous change in the structure of exported and imported products.

Our endogenous variables are the export and import intensity of firms and the percentage of exports to or imports from high income countries. Our preferred set of instruments are the average real exchange rate that each firm faces with the rest of the world based on exports or imports in 1997 multiplied by the relative importance of each

transaction, and the average regional real exchange rate to MERCOSUR countries interacted with time dummies. While the first instrument is used to estimate the causal effect of export or import propensity of the firms, the second is used for the participation of high income countries in exports and imports.

The measure that we use to capture quality is imperfect as prices also depend on other characteristics of the product and the behavior of the firms or consumers that we are not able to control for. For that reason we follow Bastos et al. (2016) and explore the effect of exogenous changes in exports and imports experienced by Uruguayan firms on the average import and export prices. We test these hypotheses using a rich database for Uruguay over the period 1997-2008. This dataset combines firm level data and detailed customs data of exports and imports by destination or origin country.

Our main result is that as firms increase their fraction of exports to higher income markets, the lower the average export prices or exports quality. 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, our results show a positive effect of importing from high income countries to the quality of imported goods. This suggests that an increase in the average income of source markets leads to increases in the quality of the goods imported.

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8 Appendix

Table A1a. Destination characteristics and export prices in cross section

	(1)	(2)	(3)	(4)
High income country	0.174***	0.135***		
Log of GDP per capita of destination country			0.075***	0.053***
Log of GDP of destination country	0.011**	-0.010**	0.000	-0.016**
MERCOSUR	-0.054*	-0.020	-0.008	0.011
Log distance to destination	-0.003	-0.002	0.024**	0.018
Product effects	Y	N	Y	N
Firm-product effects	N	Y	N	Y
Year effects	Y	Y	Y	Y
R2	0.781	0.896	0.781	0.896
N	107,808	75,107	107,807	75,106

Notes: OLS regression. Dependent variables: firm-product log export price. Sample is all firm-product-destination-year observations for firms in estimation sample. Robust standard errors clustered by destination.
t statistics in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A1b. Source characteristics and import prices in cross section

	(1)	(2)	(3)	(4)
High income country	1.353***	0.380***		
Log of GDP per capita of source Country			0.518***	0.157***
Log of GDP of source country	-0.046	-0.023	-0.047	-0.023
MERCOSUR	0.133	-0.182	0.226	-0.130
Log distance form source country	-0.186*	-0.077**	-0.024	-0.027
Product effects	Y	N	Y	N
Firm-product effects	N	Y	N	Y
Year effects	Y	Y	Y	Y
R2	0.621	0.873	0.626	0.874
N	1,755,472	623,019	1,755,467	623,015

Notes: OLS regression. Dependent variable: firm-product log import price. Sample is all firm-product-destination-year observations for firms in estimation sample. Robust standard errors clustered by destination
t statistics in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2. Destination income and firm average export and import prices, IV-CUE using 1998 as base year

	(1)	(2)	(3)	(4)	(5)	(6)
Percentage of exports to high income countries	0.118 (0.09)	-1.507 (-0.85)	-1.870 (-1.62)	-1.436* (-1.76)	-2.345** (-2.19)	-1.157* (-1.93)
Exports over sales	1.682 (1.23)	0.975 (0.70)	2.467 (1.49)	0.219 (0.33)	0.095 (0.13)	0.018 (0.03)
Log average distance to destination countries	0.084 (1.38)	0.115* (1.74)	0.087 (1.43)	0.053** (2.15)	0.075** (2.41)	0.052*** (3.06)
Log of total factor productivity of firm	-0.040 (-0.65)	-0.035 (-0.51)	0.000 (0.01)	0.039 (1.20)	0.039 (1.14)	0.061* (1.95)
Log of employment	-0.229* (-1.72)	-0.166 (-1.09)	-0.042 (-0.28)	-0.048 (-0.53)	-0.036 (-0.34)	0.065 (0.71)
N	1370	1370	1163	1446	1446	1200
Hansen J statistic	2.773	1.387	10.45	4.182	1.815	12.04
p-value	0.250	0.500	0.316	0.124	0.404	0.211
Kleibergen-Paap rk LM stat.	11.90	10.14	28.27	14.42	11.05	25.16
p-value	0.008	0.017	0.002	0.002	0.012	0.005
Kleibergen-Paap rk Wald F stat.	4.851	3.661	3.535	6.051	4.185	3.931
Stock-Yogo (10% max. IV RB)	4.72	4.72	3.60	4.72	4.72	3.60

Notes: IV-CUE regressions. Dependent variable in second stage: (1-3) firm's average export prices and (4-6) firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for the percentage of exports to high income countries is the average RER of each firm to MERCOSUR using the shares of exports in 1998 interacted with time dummies. Excluded instruments for export intensity are (1 and 4) the average yearly RER using destination country export shares of 1998, (2 and 5) the average yearly RER using destination country shares of 1998 multiplied by the share of exports of each firm to the destination country (3 and 6) interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3. Source income and firm average export and import prices, IV-CUE using 1998 as base year

	(4)	(5)	(6)	(1)	(2)	(3)
Percentage of imports from high	-1.440	-1.397	-0.659	2.339***	2.629***	1.072**
Income countries	(-0.71)	(-0.69)	(-0.62)	(2.62)	(3.00)	(2.41)
Imports over purchases of	-1.957**	-1.954**	-1.698**	0.040	0.015	-0.073
Intermediate goods	(-2.06)	(-2.04)	(-2.01)	(0.09)	(0.03)	(-0.21)
Log average distance from	0.153	0.149	0.039	-0.340**	-0.396**	-0.125
source countries	(0.47)	(0.46)	(0.24)	(-2.06)	(-2.44)	(-1.45)
Log of total factor productivity	-0.052	-0.052	-0.057	-0.004	-0.002	0.003
of firm	(-0.75)	(-0.75)	(-0.90)	(-0.13)	(-0.08)	(0.13)
Log of employment	-0.080	-0.078	-0.034	0.144	0.155*	0.132*
	(-0.49)	(-0.48)	(-0.22)	(1.59)	(1.66)	(1.90)
N	1599	1599	1521	2742	2742	2559
Hansen J statistic	0.702	0.801	17.82	4.993	5.085	17.81
p-value	0.704	0.670	0.058	0.082	0.079	0.058
Kleibergen-Paap rk LM stat.	7.482	7.756	28.74	14.98	14.96	50.96
p-value	0.058	0.051	0.003	0.002	0.002	0.000
Kleibergen-Paap rk Wald F stat.	2.360	2.487	3.439	4.266	4.349	6.149
Stock-Yogo (10% max. IV RB)	4.72	4.72	3.58	4.72	4.72	3.58

Notes: IV-CUE regressions. Dependent variable in second stage: (1-3) firm's average export prices and (4-6) firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for imports from high income countries is the average RER of each firm to MERCOSUR using the shares of imports in 1998 interacted with time dummies. Excluded instruments for import intensity are (1 and 3) the average yearly RER using source country import shares of 1998, (2 and 4) the average yearly RER using source country shares of 1998 multiplied by the share of imports of each firm to the source country (3 and 6) interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4. Destination income and firm average export and import prices, IV-CUE until 2005

	(4)	(5)	(6)	(1)	(2)	(3)
Percentage of exports to high income countries	-6.362**	-6.535**	-6.990**	-3.643	-3.836	-1.486
	(-2.26)	(-2.29)	(-2.24)	(-1.34)	(-1.34)	(-0.87)
Exports over sales	1.292	1.023	9.530***	3.511	3.987	2.636
	(0.65)	(0.51)	(3.00)	(1.19)	(1.29)	(1.06)
Log average distance to destination countries	0.119*	0.127*	0.084	0.051	0.052	-0.024
	(1.73)	(1.79)	(1.12)	(0.64)	(0.62)	(-0.36)
Log of total factor productivity of firm	-0.004	0.005	-0.208	-0.078	-0.089	-0.056
	(-0.06)	(0.07)	(-1.58)	(-0.70)	(-0.76)	(-0.53)
Log of employment	-0.230	-0.209	-0.213	-0.075	-0.088	-0.039
	(-0.79)	(-0.71)	(-0.35)	(-0.34)	(-0.37)	(-0.21)
N	1001	1001	916	937	937	880
Hansen J statistic	1.227	1.709	8.631	1.046	1.662	5.165
p-value	0.541	0.426	0.195	0.593	0.436	0.523
Kleibergen-Paap rk LM stat.	6.457	6.636	13.32	6.620	7.534	8.529
p-value	0.091	0.085	0.065	0.085	0.057	0.288
Kleibergen-Paap rk Wald F stat.	2.003	2.189	2.082	1.912	2.234	1.371
Stock-Yogo (10% max. IV RB)	4.72	4.72	3.78	4.72	4.72	3.78

Notes: IV-CUE regressions. Dependent variable in second stage: (1-3) firm's average export prices and (4-6) firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for the percentage of exports to high income countries is the average RER of each firm to MERCOSUR using the shares of exports in 1997 interacted with time dummies. Excluded instruments for export intensity are (1 and 4) the average yearly RER using destination country export shares of 1997, (2 and 5) the average yearly RER using destination country shares of 1997 multiplied by the share of exports of each firm to the destination country (3 and 6) interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5. Source income and firm average export and import prices, IV-CUE until 2005

	(1)	(2)	(3)	(4)	(5)	(6)
Percentage of imports from high	-1.500	-1.508	-5.966***	2.235**	2.224**	1.694**
Income countries	(-0.79)	(-0.79)	(-2.95)	(2.31)	(2.39)	(2.48)
Imports over purchases of	-3.591**	-3.450*	-3.224*	0.462	0.401	0.913
Intermediate goods	(-2.11)	(-1.87)	(-1.88)	(0.64)	(0.55)	(1.41)
Log average distance from	0.176	0.173	0.826**	-0.341**	-0.339**	-0.255**
source countries	(0.64)	(0.61)	(2.53)	(-2.04)	(-2.12)	(-2.15)
Log of total factor productivity	0.019	0.016	0.124	-0.027	-0.025	-0.035
of firm	(0.22)	(0.20)	(1.10)	(-0.76)	(-0.72)	(-1.07)
Log of employment	0.103	0.104	0.047	0.146	0.141	0.121
	(0.42)	(0.43)	(0.17)	(1.37)	(1.32)	(1.17)
N	1166	1166	1168	2112	2112	2112
Hansen J statistic	0.667	0.787	10.46	0.848	0.736	7.550
p-value	0.717	0.675	0.164	0.654	0.692	0.374
Kleibergen-Paap rk LM stat.	12.08	13.90	14.25	14.79	14.94	24.26
p-value	0.007	0.003	0.075	0.002	0.002	0.002
Kleibergen-Paap rk Wald F stat.	3.628	4.189	1.885	4.321	4.365	3.143
Stock-Yogo (10% max. IV RB)	4.72	4.72	3.70	4.72	4.72	3.70

Notes: IV-CUE regressions. Dependent variable in second stage: (1-3) firm's average export prices and (4-6) firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for imports from high income countries is the average RER of each firm to MERCOSUR using the shares of imports in 1997 interacted with time dummies. Excluded instruments for import intensity are (1 and 3) the average yearly RER using source country import shares of 1997, (2 and 4) the average yearly RER using source country shares of 1997 multiplied by the share of imports of each firm to the source country (3 and 6) interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6. Destination income and firm average export and import prices, IV-CUE using 2001 as base year

	(4)	(5)	(6)	(1)	(2)	(3)
Percentage of exports to high income countries	-0.220 (-0.25)	-0.328 (-0.34)	0.515 (0.74)	-3.422 (-0.72)	-2.607 (-0.63)	-5.685* (-1.90)
Exports over sales	3.299 (1.20)	3.895 (1.24)	2.035 (1.42)	16.471 (1.27)	11.859 (1.16)	13.018*** (2.75)
Log average distance to destination countries	-0.026 (-0.90)	-0.024 (-0.82)	-0.038 (-1.32)	0.106 (0.92)	0.088 (0.84)	0.103 (0.93)
Log of total factor productivity of firm	-0.009 (-0.16)	-0.009 (-0.14)	0.001 (0.02)	-0.039 (-0.22)	-0.063 (-0.43)	0.082 (0.52)
Log of employment	-0.042 (-0.25)	-0.045 (-0.26)	0.025 (0.15)	0.092 (0.14)	0.077 (0.13)	0.750 (1.39)
N	791	791	673	748	748	655
Hansen J statistic	0.535	0.710	2.772	1.453	0.560	2.976
p-value	0.765	0.701	0.837	0.484	0.756	0.812
Kleibergen-Paap rk LM stat.	4.913	3.570	13.55	2.441	2.194	15.27
p-value	0.178	0.312	0.060	0.486	0.533	0.033
Kleibergen-Paap rk Wald F stat.	1.321	0.942	1.822	0.648	0.597	2.181
Stock-Yogo (10% max. IV RB)	4.72	4.72	3.78	4.72	4.72	3.78

Notes: IV-CUE regressions. Dependent variable in second stage: (1-3) firm's average export prices and (4-6) firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for the percentage of exports to high income countries is the average RER of each firm to MERCOSUR using the shares of exports in 2001 interacted with time dummies. Excluded instruments for export intensity are (1 and 4) the average yearly RER using destination country export shares of 2001, (2 and 5) the average yearly RER using destination country shares of 2001 multiplied by the share of exports of each firm to the destination country (3 and 6) interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7. Source income and firm average export and import prices, IV-CUE using 2001 as base year

	(1)	(2)	(3)	(4)	(5)	(6)
Percentage of imports from high	-17.058	-23.975	-3.063	-3.998	-6.238	-0.845
Income countries	(-1.57)	(-1.44)	(-1.37)	(-1.13)	(-1.05)	(-0.85)
Imports over purchases of	14.963	23.265	3.488	2.475	3.869	0.886
Intermediate goods	(1.46)	(1.37)	(1.43)	(1.22)	(1.07)	(1.21)
Log average distance from	1.543	2.157	0.249	0.582	0.842	0.190
source countries	(1.40)	(1.31)	(0.99)	(1.33)	(1.17)	(1.47)
Log of total factor productivity	-0.614	-0.877	-0.347**	-0.178	-0.255	-0.069*
of firm	(-1.45)	(-1.34)	(-2.30)	(-1.44)	(-1.21)	(-1.65)
Log of employment	-0.263	-0.427	-0.200	0.013	-0.002	-0.050
	(-0.20)	(-0.35)	(-0.71)	(0.05)	(-0.01)	(-0.36)
N	951	951	898	1598	1598	1473
Hansen J statistic	2.775	2.082	8.577	1.185	1.085	3.772
p-value	0.250	0.353	0.285	0.553	0.581	0.806
Kleibergen-Paap rk LM stat.	2.910	2.319	12.53	2.209	1.476	15.85
p-value	0.406	0.509	0.129	0.530	0.688	0.045
Kleibergen-Paap rk Wald F stat.	0.718	0.553	1.438	0.558	0.368	1.992
Stock-Yogo (10% max. IV RB)	4.72	4.72	3.70	4.72	4.72	3.70

Notes: IV-CUE regressions. Dependent variable in second stage: (1-3) firm's average export prices and (4-6) firm's average import prices. All regressions include firm and year fixed effects. Excluded instruments for imports from high income countries is the average RER of each firm to MERCOSUR using the shares of imports in 2001 interacted with time dummies. Excluded instruments for import intensity are (1 and 3) the average yearly RER using source country import shares of 2001, (2 and 4) the average yearly RER using source country shares of 2001 multiplied by the share of imports of each firm to the source country (3 and 6) interacted with time dummies. We also add the second lag of the endogenous variables. The standard errors are clustered by firm level.
z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8. Summary statistics, exports and imports, 1997

Exports				Imports			
country	rank	all	estimation	country	rank	all	estimation
Brazil	1	0.336	0.342	Argentina	1	0.217	0.226
Argentina	2	0.130	0.133	Brazil	2	0.215	0.222
United States	3	0.057	0.070	United States	3	0.118	0.091
United Kingdom	4	0.046	0.035	Italy	4	0.048	0.065
Germany	5	0.043	0.050	France	5	0.033	0.044
China	6	0.041	0.028	Germany	6	0.032	0.053
Italy	7	0.032	0.036	Spain	7	0.032	0.038
Netherlands	8	0.026	0.020	Japan	8	0.026	0.013
Israel	9	0.026	0.028	Korea, Rep. of	9	0.021	0.011
Hong Kong, SAR	10	0.023	0.026	United Kingdom	10	0.018	0.013
Paraguay	11	0.022	0.029	China	11	0.018	0.007
Spain	12	0.022	0.015	Chile	12	0.017	0.015
Chile	13	0.021	0.025	Nigeria	13	0.017	0.000
Mexico	14	0.012	0.010	Mexico	14	0.014	0.025
Canada	15	0.011	0.013	Hong Kong, SAR	15	0.012	0.007
Japan	16	0.010	0.009	Chinese Taipei	16	0.012	0.006
Peru	17	0.010	0.014	Sweden	17	0.010	0.005
France	18	0.008	0.010	Switzerland	18	0.009	0.024
Iran, IR	19	0.008	0.012	Russian Fed.	19	0.009	0.032
Malaysia	20	0.008	0.013	Netherlands	20	0.009	0.010
Russian Fed.	21	0.006	0.002	Venezuela, BR	21	0.008	0.004
Belgium	22	0.006	0.008	South Africa	22	0.008	0.002
Venezuela, BR	23	0.005	0.008	Canada	23	0.007	0.010
Colombia	24	0.005	0.006	India	24	0.007	0.006
Norway	25	0.005	0.000	Paraguay	25	0.006	0.013
Korea, Rep. of	26	0.005	0.003	Iran, IR	26	0.005	0.000
Portugal	27	0.004	0.003	Belgium	27	0.005	0.010
Senegal	28	0.004	0.006	Ecuador	28	0.005	0.000
Turkey	29	0.004	0.001	Egypt	29	0.004	0.000
Saudi Arabia	30	0.004	0.001	Israel	30	0.004	0.006
Switzerland	31	0.003	0.005	Panama	31	0.004	0.001
Sweden	32	0.003	0.004	Denmark	32	0.004	0.007
Puerto Rico	33	0.003	0.003	Australia	33	0.003	0.001
Chinese Taipei	34	0.003	0.003	Singapore	34	0.002	0.000
Ecuador	35	0.002	0.001	British Virgin Is.	35	0.002	0.000
Morocco	36	0.002	0.000	Finland	36	0.002	0.004
Jordan	37	0.002	0.000	Poland	37	0.002	0.001
Finland	38	0.002	0.000	Malaysia	38	0.002	0.000
South Africa	39	0.002	0.002	Colombia	39	0.002	0.003
Trinidad & Tobago	40	0.002	0.002	Libya	40	0.002	0.001
India	41	0.001	0.001	Thailand	41	0.002	0.001
Greece	42	0.001	0.001	Austria	42	0.002	0.001
Poland	43	0.001	0.001	Morocco	43	0.001	0.005
Pakistan	44	0.001	0.000	New Zealand	44	0.001	0.002
Australia	45	0.001	0.001	Indonesia	45	0.001	0.001
Bolivia, PS	46	0.001	0.001	Peru	46	0.001	0.001
Viet Nam	47	0.001	0.001	Bulgaria	47	0.001	0.004
Indonesia	48	0.001	0.000	Turkey	48	0.001	0.000
Singapore	49	0.001	0.001	Greece	49	0.001	0.000
Bahamas	50	0.001	0.001	Ireland	50	0.001	0.002

*SEZ not reported in ranking

Table A9: List of markets by level of income at 2005 (World Bank)

Low income	Low-middle income	High-middle income	High income
Afghanistan	Albania	Argentina	Andorra
Bangladesh	Algeria	Barbados	Antigua and Barbuda
Bhutan	Angola	Botswana	Australia
Solomon Island	Azerbaijan	Belize	Austria
Myanmar	Armenia	Chile	Bahamas
Cambodia	Bolivia, PS	Costa Rica	Bahrain
Central African Republic	Bosnia and Herzegovina	Croatia	Belgium
Comoros	Brazil	Czech Republic	Bermuda
Benin	Bulgaria	Dominica	British Virgin Islands
Ethiopia	Belarus	Equatorial Guinea	Brunei Darussalam
Eritrea	Cameroon	Estonia	Canada
Gambia	Cabo Verde	Gabon	Cayman Islands
Ghana	Sri Lanka	Grenada	Chinese Taipei
Guinea	China	Hungary	Cyprus
Haiti	Colombia	Lebanon	Denmark
India	Congo	Latvia	Faroe Islands
Côte d'Ivoire	Cook Islands	Lithuania	Finland
Kenya	Cuba	Malaysia	France
Korea, DPR	Dominican Republic	Mauritius	French Guiana
Kyrgyzstan	Ecuador	Mexico	French Polynesia
Lao, PDR	El Salvador	Oman	Germany
Liberia	Fiji	Panama	Greece
Madagascar	Georgia	Poland	Greenland
Mali	Kiribati	Russian Federation	Guadeloupe
Mauritania	Guatemala	Saint Kitts and Nevis	Hong Kong
Mongolia	Guyana	Saint Lucia	Iceland
Montserrat	Honduras	Saint Vincent and the	Ireland
Mozambique	Indonesia	Grenadines	Israel
Nauru	Iran, IS	Seychelles	Italy
Nepal	Iraq	Slovakia	Japan
Niger	Jamaica	South Africa	Korea, Republic of
Nigeria	Kazakhstan	Trinidad and Tobago	Kuwait
Pakistan	Jordan	Turkey	Luxembourg
Papua New Guinea	Lesotho	Venezuela, BR	Macao
Guinea-Bissau	Maldives		Malta
Rwanda	Moldova, Republic of		Martinique
Sao Tomé and Principe	Morocco		Netherlands
Senegal	Namibia		Netherlands Antilles
Sierra Leone	Vanuatu		Aruba
Viet Nam	Nicaragua		New Caledonia
Somalia	Marshall Islands		New Zealand
Zimbabwe	Paraguay		Norway
Tajikistan	Peru		Portugal
Togo	Philippines		Puerto Rico
Uganda	Suriname		Qatar
Tanzania, UR	Syrian Arab Republic		Anguilla
Burkina Faso	Thailand		San Marino
Uzbekistan	Tonga		Saudi Arabia
Yemen	Tunisia		Singapore
Zambia	Turkmenistan		Slovenia
	Ukraine		Spain
	Macedonia, FYR		Sweden
	Egypt		Switzerland
	Samoa		United Arab Emirates
			Turks and Caicos Islands
			United Kingdom
			United States

Table A10: List of markets by geographic classification

Rest of the World		MERCOSUR	High income
Afghanistan	Mauritius	Argentina	Andorra
Albania	Moldova	Brazil	Antigua and Barbuda
Algeria	Mongolia	Paraguay	Australia
Angola	Morocco		Austria
Armenia	Mozambique		Bahamas
Azerbaijan	Myanmar	**Rest of LAC**	Bahrain
Bangladesh	Namibia	Barbados	Belgium
Belarus	Nepal	Belize	Bermuda
Benin	Niger	Bolivia	British Virgin Islands
Bhutan	Nigeria	Chile	Brunei Darussalam
Bosnia and	Oman	Colombia	Canada
Botswana	Pakistan	Costa Rica	Cayman Islands
Bulgaria	Philippines	Cuba	Chinese Taipei
Burkina Faso	Poland	Dominica	Cyprus
Cape Verde	Russian Federation	Dominican Rep.	Denmark
Cambodia	São Tomé and Príncipe	Ecuador	Faroe Islands
Cameroon	Senegal	El Salvador	Finland
China	Seychelles	Grenada	France
Comoros	Sierra Leone	Guatemala	French Guiana
Congo, Rep. of	Slovakia	Guyana	French Polynesia
Côte d'Ivoire	Solomon Islands	Haiti	Germany
Croatia	South Africa	Honduras	Greece
Czech Republic	Sri Lanka	Jamaica	Greenland
Egypt	Swaziland	Mexico	Guadeloupe
Equatorial Guinea	Syrian Arab Rep.	Montserrat	Hong Kong
Eritrea	Tanzania, United Rep.	Nicaragua	Iceland
Estonia	Thailand	Panama	Ireland
Ethiopia	Togo	Peru	Israel
Fiji	Tunisia	Saint Kitts and Nevis	Italy
Gabon	Turkey	Saint Lucia	Japan
Gambia	Turkmenistan	Saint Vincent and the	Korea, Republic of
Georgia	Uganda	Suriname	Kuwait
Ghana	Ukraine	Trinidad and Tobago	Luxembourg
Guinea	Uzbekistan	Venezuela	Macao
Guinea-Bissau	Vanuatu		Malta
Hungary	Viet Nam		Martinique
India	Yemen		Netherlands
Indonesia	Zambia		Netherlands Antilles
Iran, Islamic Rep.	Zimbabwe		Aruba
Iraq			New Caledonia
Jordan			New Zealand
Kazakhstan			Norway
Kenya			Portugal
Korea, Dem. Rep.			Puerto Rico
Kyrgyzstan			Qatar
Latvia			Anguilla
Lebanon			San Marino
Liberia			Saudi Arabia
Libya			Singapore
Lithuania			Slovenia
Macedonia, FYR			Spain
Madagascar			Sweden
Malaysia			Switzerland
Maldives			United Arab Emirates
Mali			Turks and Caicos
Marshall Islands			United Kingdom
Mauritania			United States

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