Exports, Skills and Wages: The impact of destination in a middle income country

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PRELIMINARY AND INCOMPLETE
NOT FOR QUOTATION
May 2013

Abstract

In this work we analyse the links between exports and its destination to high income countries on the demand for skilled labour. The theoretical literature argues that exporting to high-income countries leads to quality upgrading that is skill intensive, and which requires additional skill intensive services.

We test this theory using a panel of Uruguayan manufacturing firms for the period 1997-2006 using data from the Encuesta de Actividad Economica from the Instituto Nacional de Estadisticas, which was merged with export data from the Direccion Nacional de Aduanas.

Firstly, we analyse associations by means of OLS estimations. Then we use IV-GMM models to analyse causality.

Our preliminary results seem to indicate that contrary to previous studies for developed and other middle income economies such as Mexico (Verhoogen 2008) and Argentina (Brambilla et al. 2012), exports to high income countries do not translate into a higher demand for skills and wages for the Uruguayan case, while exports in general do. The explanation for these results may lie in the productive specialization of the country, characterised by sectors of low technological content, low value added and low sophistication, or as Hausmann et al. (2005) argue "what we export matters".

JEL: F13, F14
Key Words: exports, skills, wages, destinations

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Acknowledgements
I want to thank specially to Sylvina Porras for her help and comments, as well as to Gabriela Mordecki and Sandra Garcia for the data and reports they have provided me. I am also indebted to Alvaro Brunini for his help with the data. All mistakes in this rush version are my entire responsibility.

1. Introduction

In the last few years there were a burgeoning number of studies showing the relationship between exporting and firm's performance. These studies were mostly inspired by the pioneering work by Bernard and Jensen (1999) for the United States, which finds that exporting firms are large, more productive, more capital intensive and pay higher wages. This work prompts up empirical tests for other countries as well as theoretical models.

Among the empirical works we can mention the study by Aw and Hwang (1995) for Taiwan; Bernard and Wagner (1997) for Germany; Aw et al. (2000) for South Korea; Kraay (1999) for China; Delgado et al. (2004b) for Spain; Girma et al. (2004a) for the United Kingdom; Álvarez and López (2005) for Chile, Isgut and Fernandes (2007) for Colombia, de Loecker (2007) for Slovenia.[1] All these works find a superior performance of exporting firms.

This bloom in empirical studies was accompanied by the development of theoretical models to explain these results. One of the first well known models was developed by Melitz (2003) who introduces firm heterogeneity. This model was followed by several types of further extensions.

Among these extensions Eaton et al. (2008) suggest that the relationship between firm performance and exporting depends on the destination of exports. Further, Holmes and Stevens (2012) develop a model showing that the exporter wage premium depends positively on distance. These authors introduce sunk costs associated with distance. In their model firms can make one investment to overcome distance barriers, and a second one to overcome border barriers. Thus, those exporters that ship their goods over a greatest distance are expected to pay higher wages than other exporters. Even though Holmes and Stevens (2012) focus on plant size instead of wages or productivity, they note that in the context of the Melitz model "productivity scales up plant size".

Matsuyama (2007), Verhoogen (2008), and Bustos (2011) provide further extensions suggesting different mechanisms by which exporting to high income countries requires higher levels of skills or human capital. Matsuyama (2007) and Bustos (2011) suggests that what matters is exporting "per se", with exporting firms adopting better technologies and using more skilled labour due to the role of different tasks that are needed in order to export, which are skilled intensive. Thus, these authors focus their explanations on the supply side –technology-. On the other hand, Verhoogen (2008) argues that exporting (by the most highly productive firms within an industry) causes quality

[1] For a survey see Wagner (2007 and 2012).

upgrading, which is skilled intensive, increasing so the demand for skilled labour by exporting firms and rising wage inequality.

Brambilla et al. (2012) provide a unified theory that integrates the various channels –supply and demand- linking skilled labour utilization and exporting to high income destinations, i.e. incorporating differences among exporting markets. From the demand side, the utility of a good depends not only on its price but also on a vertical differentiation parameter. Consumers in high income countries have a lower marginal utility of income, i.e. they are willing to pay a premium for high quality goods. The production side of the model integrates two channels linking exports and skills. One channel is related to the skill intensive nature of quality production, and the other is the skill intensive nature of foreign trade activities.

The delivery of final goods to consumers combine two tasks: the manufacturing of the product and various related services, such as product design, packaging, transportation and distribution, marketing research, advertising and costumers support. These two tasks are different in their skill intensity, so that the act of "exporting" becomes a skilled intensive activity, even when the act of manufacturing is unskilled intensive.[2] The authors classified services into two types: a) required services that are needed to reach consumers but do not affect the value that consumers attach to a product (namely transportation and distribution); b) services that act as means of vertical differentiation and shifts the aggregate demand function for the product (such as product design, packaging, advertising). The provision of both types of services is skilled intensive. Thus, the relative demand for skilled labour is a function increasing in required services –transportation and distribution- and decreasing in the marginal utility of income (which is lower in high income countries). Further, they introduce differences among firms in the efficiency in the use of unskilled and skilled labour, aside differences in fixed costs of exporting to different destinations. Thus in this model the supply and demand side will affect the demand for skilled labour in exporting firms according to the destination –or valuation for quality-.

We note that there are other mechanisms that could explain a positive link between exporting to high income countries and skills. One of them is profit sharing in a model of fair wages (Egger and Keickemeir 2009; Amiti and Davis 2008).
Other alternative approach comes from the theory of efficiency wages, in which firms exporting to high income countries pay higher wages in order to reduce labour turnover.

[2] Moreover, in Brambilla et al. model, the technology to supply goods may also depend on the destination of exports.

Finally, as Yeaple (2005) points out higher wages may be due to scale economies attached to exporting to different destinations. The size of the market and the scale of the firm determine the choice of technology and larger firms choose more skill intensive technologies that pay higher average wages.

Regarding to the empirical evidence, the findings in Matsuyama (2007) and Bustos (2011) suggest that what matters is exporting "per se", with exporting firms adopting better technologies and using more skilled labour. On the other hand, recent evidence (Verhoogen, 2008; Bastos and Silva, 2010; Görg et al. 2010; Schmillen, 2011; Manova and Zhang 2012 ; Brambilla et al. 2012) suggest that the country of destination matters. That is, the characteristics of the country of destination, such as, income, the valuation for quality, distance and transport costs, may affect firm behaviour.

Verhoogen (2008) for Mexico finds that exporting firms hired more skilled labour force. Bastos and Silva (2010) for Portugal find higher unit values of exports to richer countries. Manova and Zhang (2012) find that Chinese firms set higher prices to richer and more distant countries (see also Martin 2010). For Germany, Schmillen (2011) finds that exporters generally pay higher wages than non-exporters, but only exporting to certain countries are associated with a wage premium. Moreover, such a premium exists only for firms that ship goods over a relatively long distance. While Görg, Harpern and Murakozy (2011) using Hungarian firm-product destination data find a positive correlation between unit values and the per capita GDP of the export destination. Finally, Brambilla et al. (2012) for Argentina, using information on firm export volumes by destinations find a causal association between destination, skills and wages for the years 1998-2000.

For Uruguay the studies that analyse the impact of trade on labour market are scarce, and so far there are no studies that analyse the effect of the destination of exports on the demand for skilled labour. The work by Peluffo (2012) analyses international linkages and the demand for skilled labour finding that in fact importers, exporters and multinational firms are not only more productive, but have also a higher demand for skilled labour than domestic oriented firms. Barboni et al. (2013) analyses self-selection and learning by exporting to developed countries finding that firms exporting to richer countries are more productive, but learning effects verified mostly for firms exporting to similar –according to the level of development- and closest countries. Further, self-selection is also confirmed in this study.

The work by Mordecki and Piaggio (2008) analyse the determinants of non-agroindustrial Uruguayan exports to Argentina and Brazil, using a Vector Error Correction Model, including as explanatory

variables the type of goods, foreign demand and real bilateral exchange rate. The authors find that foreign demand is the main determinant of non-agroindustrial exports –the ones with highest value added-, suggesting so, that higher value added exports would depend in the long run on the growth of Argentinean and Brazilian markets.

Thus this work contributes to the existent literature providing evidence for a small middle income country on the nexus between exports and skills taking into account the destination of exports.

This work structures as follows, after the introduction in section 2 we present the empirical strategy, followed by the results in section 3, and finally some concluding remarks.

2. Empirical Strategy

2.1. Data

We use data from two main sources: data at the firm level from the Instituto Nacional de Estadisticas (INE) and data on value and destination of exports by firms provided by the Direccion Nacional de Aduanas. The panel of Uruguayan manufacturing firms covers the period 1997 to 2006. It provides information on gross output, value added, sales, capital, exports, intermediate consumption discriminated in various items, number of workers which is further discriminated in non-production and production workers, professionals and technicians, wages, industry affiliation and exports, among other variables.

The data from the Encuesta de Actividad Economica provided by the Instituto Nacional de Estadisticas (INE) was merged with data from the Direccion Nacional de Aduanas, so we have the destiny and value of exports at the firm level for each firm over the period considered. Then we classified countries in high and middle and low income countries according to the OECD classification.

We use two definitions of high income countries: only high-income OECD countries, and OECD and non-OECD high income countries. In this way we know for each firm whether it has exported, how much and to where.

Also we defined countries –aside Mercosur's partners- according to the geographical distance: exports to the region and outside the region. Further we discriminated by different economic blocs: EU, Nafta, Other Latin American countries –non-Mercosur-, and the rest of the world. In this work we will focus on the impact of exporting to high income destinations.

We also use data from the Banco Central del Uruguay, which provide information on aggregate exports by destinations for the period.

2.2. Methodology

Firstly we analyse the associations between exporting to high income destinations and the demand for skills and wages –which is also a proxy for skills- through conventional robust Ordinary Least Squares.

Our baseline equation is the following:

$$Y_{ijt} = \beta_1 EXP_{ijt} + \beta_2 HIGH_{INC_{ijt}} + X'_{ijt}\beta_3 + D_j + D_t + \varepsilon_{it} \quad (1)$$

Where *i* indexes firms, *j* stands for industry and *t* for year. Y_{ijt} stands for measures of skills, *EXP* stands for exports and we try it as a dummy variable and also as export intensity (i.e. exports/sales), *HIGH_INC*: is the share of exports to high income countries over total exports by the firm. Dj and Dt stand for industry and time dummies.

We use two different definitions of skilled workers: as non-production workers over total employment and professionals and technicians over total employment. Further, we also analyse averages wages per firm as a proxy for skills.

Firstly, we analyse associations by means of pooled OLS estimations. Then, we use an IV-GMM model trying different instruments: lagged exports, and a set of variables constructed using bilateral exchange rates interacted by the share of exports to the different destinations considered as we explain below.

Thus we analyse the basic export premium in term of measures of skills and wages, and the destination specific exporter premia.

3. Results

3.1. Descriptive statistics

In Table 1 we present data on total Uruguayan exports by main destinations and economic blocs in millions of American dollars, while in Table 2 and Chart 1 we present the figures as shares in total exports.

We can observe the importance of Uruguayan exports to Brazil and Argentina in 1997 and 1998, and an important fall to these destinations in 1999, after the Brazilian devaluation. The reduction of exports to Mercosur partners is further decreased after the devaluation in Argentina in 2001. Along with the reduction to Mercosur's partners there was an increase to high income destinations, in particular to the NAFTA and the Rest of the World (ROW). By the end of the sample period (2005 and 2006) the share of exports to Mercosur remains relatively stable in less than 25 % of exports to Argentina and Brazil,[3] with a higher importance of exports to the ROW (Table 2).

Regarding to the microdata, we have 1,330 different firms present at least in one period, with an average of 672 firms per year and a total of 8,063 firm-year observations.[4] According to data from the Customs Direction 726 of these firms had export activity at least once in the period.[5]

From Table 3 it can be observed a high presence of exporting firms in the panel, with the highest presence in 2006 due to the fact that only the compulsory stratum was surveyed that year. [6]

Looking at the destiny at the firm level, it can be observed from Chart 2, a high participation of firms that have as main destination Mercosur´s partners (62 % of total exporting firms). After 2002 there is a reduction in the share of firms that export mainly to Mercosur´s partners (52 %), and there is an increase in firms exporting to the Nafta and the Rest of the World, as we have already noted for the aggregated data (in value) at the national level.

The amounts in value by destiny (Chart 3) to the Mercosur were in average 38 % of total exports per year, with a figure of 44 % for the period 1997-2001 and 30 % for the period 2003-2006. Thus, since the beginning of the recession in 1999, there is a diversification in the destiny of exports that is further deepened after the 2002 crisis that hit the Uruguayan economy. After the 2002 crisis, there

[3] This figure was of 50 % in 1997 and 55 % in 1998 of total Uruguayan exports to Mercosur's partners.
[4] We discarded firms that were only present in the Economic Census.
[5] There is a difference of 7.3 % lower if we take data from the INE.
[6] The number is lower in 2006 since only those firms with more than 50 workers and/or sales greater than 120 millions of pesos per year were surveyed (compulsory stratum).

is a reduction in exports to Mercosur's countries, from 53 % for the period 1997-1999, to 36 % in 2002, along with an increase to other destinations.

In Table 4 we present the main features according to the exporting status of the firm, and for firms exporting to high income countries. We can observe that exporting firms are bigger in terms of employment, sales, value added, and productivity, corroborating the findings of the empirical works for other countries and previous works for Uruguay (da Costa Ferré, 2008; Peluffo, 2012; Barboni et al. 2013). Further, there are significant differences if exports are mainly targeted to non-richer countries or to more developed (richer) countries.[7]

3.2. Conditional correlations

Table 5 we shows the results for OLS with average wages per firm in natural logarithms as the dependent variable. Our explanatory variables include an export dummy (EXP) or export propensity (EXP_SALES), as well as two different definitions of exports to high income countries: HI_OECD that measures exports to OECD high income countries over total exports, and RICHER calculated as exports to high income countries over total exports (OECD and non-OECD countries).

Further we try the interaction between the export dummy and both definitions of high income countries in columns (7) and (8). While the fact of exporting (EXP) seems to have a positive effect on average wages export intensity does not. Further we find not significant or negative signs for exports to high income countries.[8]

On the other hand the interaction terms between the dummy for exports and high income countries are negative and significant. In any case, the only robust conclusion that we can draw is that exports to high income countries do not translate into higher wages, while there is some evidence that the fact of exporting and the size of the firms affect positively average wages.

In Table 6 we present the results for OLS when our dependent variable is skills measure as professionals and technicians over total workforce at the firm level. We find significant positive effects of exporting and export propensity on the demand for professionals and technicians.

[7] For more details on this see Barboni et al. (2013).

[8] Correlation between export intensity and RICHER and HI_OECD: 0.43 and 0.42 respectively, while the association between RICHER and HI_OECD is of 0.98.

Nevertheless, there are not significant effects of exporting to high income countries for the two definitions tried, and for the interactions with the exporting status and export intensity of the firm.

When we considered as dependent variable non-production workers over total workforce (Table 7) we find unexpected negative effects of exporting and export intensity, as well as for exporting to developed countries –for the two definitions tried-, while the interactions between exporting and export intensity with high income destinations show mixed results.

Thus, it seems that exporting has some positive impact on the demand for professionals and technicians –the most qualified among the skilled workers- but not for all non-production workers (that takes into account less skilled workforce), while the destination of exports to high income countries is negative or not significant. This result would deserve a detailed analysis on skills and jobs characteristics of non-production workers.

The picture that emerges from these conditional associations is pointing out that it is not just to where we exports, but also "what" and "how", as well as the interplay between them.

Nevertheless, as we already note, these results are just associations and we cannot attribute any causal relation. In what follows we present our instrumental variable identification.[9]

3.2. Instrumental variable estimation

There are at least three endogenous variables in our model: the exporting status of the firm; export intensity of the firm (share of exports in total sales), and the share of exports to high income countries in total exports.[10]

The challenge to achieve identification is to find good instruments. To construct the instruments we follow Brambilla et al. (2012) who have used the exogenous variation in export intensity and destination generated by the Brazilian devaluation in 1999 on Argentinean exports. In this regard there is a growing literature that looks at changes in major trade partners as a source of identification. Revenga (1992) and Park et al. (2010) have used exchange rates of trade partners; Bustos (2009) have used changes in Brazilian tariffs after Mercosur creation to identify the impacts

[9] We also tried fixed effects estimations that we do not report for the sake of brevity.

[10] We also tested the endogeneity for size proxied as sales of the firm and turns out to be exogenous using endogtes(lnsales) from ivreg2 Stata 12.

on Argentinean firms. Further, Verhoogen (2008) uses own Mexican devaluation to analyse the links between exports, the demand for skilled labour and income inequality.

We also tried as instruments lagged values of the endogenous regressors but these were no good instruments, so we do not report the results.

As we comment above we follow Brambilla et al. (2012) strategy, using the devaluation of our main trading partners: Brazil in 1999, and Argentina in 2001. In this way we can track changes in skill utilization for a given firm, given its exogenous response in exports and export destinations following the devaluation of the major trade partners of Uruguay.

For Uruguay, in the first two years of our data, Brazil was our main export destination. In 1997 and 1998 nearly 34 % of Uruguayan total exports were targeted to Brazil, while 13 and 19 % to Argentina, respectively.[11] At the beginning of 1999 Brazil devaluates its domestic currency impacting on the trade flows from Uruguay and Argentina, which lost competitiveness in Brazilian markets. Uruguayan exports to Brazil in 1998 were 34 % of total aggregate exports and fall to 25 % in 1999. Moreover, we should note that the Argentinean crisis and devaluation in 2001 translated into a further reduction in exports from Uruguay to Argentina, and thus globally to Mercosur's partners. In 2001 nearly 15 % of total Uruguayan exports have Argentina as destiny, and this figure fell to 6 % in 2002. Nevertheless, as can be observed clearly in Chart 1, the biggest impact and reorientation in Uruguayan exports is verified after Brazilian devaluation. It induced a reduction in exports as well as a diversification of destinations. By the last years of the sample (2004-2006), there is an important increase in Uruguayan exports, mainly targeted to the rest of the world as we commented before.

Following Brambilla et al. (2012), we build separate instruments for exports to high income countries, export status, and export intensity. Our instrument for the share of exports to high income countries is defined as the interaction of a post-devaluation variable with the pre-devaluation share of firm's exports that were targeted to Mercosur´s partners before the devaluation.[12] Brambilla et al. use a panel of three years (1998-2001), so they have only data for 1998 preceding the devaluation. Due to data availability we use two pre-devaluation years: 1997 and

[11] The figure for Argentinean exports to Brazil in 1998 was of 36 %, quite similar in magnitude to that for Uruguay (Brambilla et al. 2012).

[12] We tried these instruments just to introduce some variation from Brambilla et al. work, since they use Brazil and do not cover the time spam of the Argentinean devaluation.

1998. Thus, since the shares of exports to the Mercosur in 1997 and 1998 precede the devaluation, they measure exogenous exposure to the devaluation. In short, our instrument is defined as:

$$Inst_{HI} = Post_t * \lambda_{i,t}^{MERC} \quad (2)$$

Or:

$$Inst_{HI,97} = Post_t * \lambda_{i,97}^{Merc} \quad (2a)$$

$$Inst_{HI,98} = Post_t * \lambda_{i,98}^{Merc} \quad (2b)$$

Where $\lambda_{i,t}^{MERC}$ are the export shares to Brazil and Argentina for 1997 and 1998. The theoretical rationale for this instrument is that following the devaluation, those firms that were most exposed to Mercosur's partners markets adjusted by moving away from these markets and by exploring new markets in 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.

We try two specifications for Post: as year dummies following the devaluation (from 1999 to 2006), so that the Instrumental variables are:

$$Inst_{HI_{it}}^{HI1} = \phi_t * \lambda_{i,t}^{MERC} \quad (3)$$

This is:

$$Inst_{HI_{it}}^{HI1} = \phi_t * \lambda_{i,97}^{MERC} \quad (3a)$$

$$Inst_{HI_{it}}^{HI1} = \phi_t * \lambda_{i,98}^{MERC} \quad (3b)$$

where ϕ_t stands for year dummies variables for the years 1999 till 2006. In this way the impact of the devaluation may vary over time as firms adjust to the exchange rate shock. The other specification tried is the interaction of $\lambda_{i,t}^{MERC}$ with the regional[13] exchange rate from 1999 till 2006, $exc_{rate_t}^{MERC}$, thus our second instrument is:

$$Inst_{HI_{it}}^{HI2} = exc_{rate_t}^{MERC} * \lambda_t^{MERC} \quad (4)$$

Or:

[13] The regional exchange rate is a weighted average of exports to Brazil and Argentina with their respective bilateral exchange rate with Uruguay.

$$Inst_{HI_{it}}^{HI2,97} = exc_{rate_t}^{MERC} * \lambda_{97}^{MERC} \quad (4a)$$

$$Inst_{HI_{it}}^{HI2,98} = exc_{rate_t}^{MERC} * \lambda_{98}^{MERC} \quad (4b)$$

To deal with the endogeneity of export intensity –ratio of exports to sales- we construct a measure of the average exchange rate faced by a given firm in international markets:

$$Inst_{it}^{EXP} - \sum_{c} exc_{rate_t}^{c} * \psi_{i,t}^{c} \quad (5)$$

Or:

$$Inst_{it}^{EXP,97} = \sum_{c} exc_{rate_t}^{c} * \psi_{i,97}^{c} \quad (5a)$$

$$Inst_{it}^{EXP,98} = \sum_{c} exc_{rate_t}^{c} * \psi_{i,98}^{c} \quad (5b)$$

Where $\psi_{i,t}^{c}$ is the share of exports of firm *i* to country c on total sales in 1997 and 1998 (which is predetermined) and $exc_{rate_t}^{c}$ is the exchange rate of country c (to the Uruguayan peso) at time t (1997 and 1998). In this way we have at least two possible instruments for each endogenous variable, and we can over-identify the model to test the goodness of the instruments.

The rationale for these instruments is the following: given the shares of exports to market *c* in the pre-devaluation period (1997 and 1998), 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 in this market. Thus, we expect that our instrument is positively correlated with the export share.

The instruments have to be correlated with the endogenous variables but uncorrelated with the error term, i.e. they have to be exogenous –orthogonality condition-. In this regard, a priori, the instruments defined satisfy the conditions. On one side the Brazilian devaluation generated exogenous variation in export intensity and in export destinations. These changes are exogenous to the pre-devaluation shares of exports to Brazil. 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.

We test the association between our instruments and our endogenous variables, as well as the orthogonality conditions. That is, we check that our instruments do not affect the skill utilization beyond the indirect effect through exports and export destinations. One possible danger of violation in the exogeneity of the instruments is given by the macroeconomic conditions generated by the exogenous devaluation in our major trading partners on the Uruguayan economy, followed by the Uruguayan crisis in 2002. In order to control for any direct effects, we control with year effects. We note that we cannot rule out a direct effect of the devaluation on export behaviour, so it is very important to capture any possible variation with year dummies. Finally, we test for the existence of serial correlation (Appendix 1), since the strategy can fail if errors are correlated over time. In fact we find evidence of serial correlation of the errors, so we perform our analysis with using heteroskedastic and autocorrelation robust standard errors (Baum et al. 2003, 2007).

We try several specifications. In column (1) we present a model with the two endogeneous variables of interest: export intensity and share of exports to high-income countries, instrumented with the share of exports to Mercosur interacted by the regional exchange rates in 1997 and 1998, and the share of exports to each destination interacted for the regional exchange rate, in 1997 and 1998, as we have explained above.

In the model of column (2) we introduce year dummies and partial them out, while in model (3) we also add industry dummies. In model (4) we include as explanatory variable firm's size measured as the natural logarithm of sales, and instrumented with two lags, we also check the endogeneity of this variable, and in all the cases we cannot reject that is not endogenous. In model (5) to (7) we control for differences in initial conditions in order to rule out unobserved factors that could simultaneously determine the choice of export shares to Mercosur's partners in 1997 and 1998 and the subsequent response to the shock.[14] For instance, unobservable productivity shocks could invalidate the IV strategy because they imply that a firm's capability to change export destinations may depend on the initial share exported to Mercosur's partners in the pre-devaluation period. To account for this we include controls for unobserved pre-shocks differences that may drive the potentially endogenous response.

To control for initial conditions we interact log sales in 1997 with year dummies (model 5) and with the regional exchange rate (column 6), while in model (7) we include total factor productivity instrumented with two lags as an additional control. Further, we tested the endogeneity of the

[14] Such as pre-devaluation productivity shocks or cost shocks that may persist in time.

natural logarithm of total factor productivity finding in fact that it is endogenous, but the instrument of two lags performs adequately. The advantage of the models with the log of sales (model 4) and the log of total factor productivity (model 7) is that they can account for time-varying heterogeneity such as current productivity or cost shocks. Both, sales and total factor productivity proxy for unobserved characteristics and may improve the estimation of the parameters of interest.

We run our two step IV-GMM estimations with heteroskedastic and serial correlation (HAC) robust standard errors. In all the specifications we check the identification tests, in particular the Kleibergen-Paap test LM and Wald statistic (which is robust to HAC standard errors), as well as the weak identification tests (Kleibergen-Paap rk F statistic), since weak instruments may lead to the same problems as bad instruments. We also check the test of Hansen J statistic (a generalisation of Sargan test when we work with HAC errors).[15]

In Table 8 we present the results for logarithm of average wages. We find positive effects of export intensity, while exporting to high income countries has a negative impact on average wages. On the other hand total factor productivity has a positive effect on wages (column 7). However, when we control for initial conditions in model (5) and (6) we do not find significant effects of export propensity and the share of exports to high income countries. Nevertheless, when we control for total factor productivity we find again a positive effect of export intensity and a negative impact of exports to high income countries. In all the cases the models present good statistical properties.

In Table 9 we report the results for average wages when we consider as explanatory variable the export dummy. In this regard we should note that this variable has a lower variation than export intensity. We try an additional model –model 8- which includes as an instrument for export status the variable lagged twice. The best models seem to be those in columns 3, 7 and 8. We find a positive effect of the exporting status on average wages but mixed evidence for the impact of exporting to high income countries.

We present the results for skilled labour measured as the share of professionals and technicians in total labour force in Table 10 and 11. From Table 10 we can observe some evidence that export intensity has a positive effect on the demand for professionals and technicians. Nevertheless the evidence is not clear cut for the share of exports to richer countries.

[15] In the next draft we will check also redundancy of the instruments since this issue could reduce efficiency.

When we consider the export dummy (Table 11) we find that the best models are (3), (4), (5) and (6) –the others seem to suffer from weak identification-. For the most appropriate models we find that exporting increases the demand for professionals and technicians but there are not significant effects from the share of exports to high income countries.

Finally in Table 12 and 13 we report the results for skills measured as non-production over total employment. In Table 12, where we consider export intensity we find negative effects of this variable on the demand for skilled labour according to this definition, and not clear evidence of the share of exports to high income countries. We should recall that this definition includes workers with lower qualifications than when we consider exclusively the share of professionals and technicians.

On the other hand in Table 13 we analyse the impact of the export dummy. We find unexpected negative and significant effects of exporting and the share of exports to richer countries on the demand for non-production workers.

Thus, our preliminary results seem to indicate that contrary to previous studies for developed and other middle income economies such as Mexico (Verhoogen 2008) and Argentina (Brambilla et al. 2012), exports to high income countries do not translate into a higher demand in skills and wages for the Uruguayan case, while exports in general do, except for the case of non-production workers, but they seems to raise the demand for the most qualified workers (professionals and technicians). In order to pose an explanation for these puzzling results in this first draft, we classified industries according to their R&D intensity in low and high R&D intensive industries. We find that exports to high income countries are mainly from sector with low R&D intensity.[16] Then it follows that the productive structure of the country, characterised by sectors of low technological content, with low value added and low diversification, can be at the heart of these results, or in Hausmann et al.(2007) words "what we export matters.

4. Final remarks

[16] Even though the claim by Brambilla et al. (2012) it is that it is not the manufacturing process that demands skilled labour but exporting related services.

In this work we analyse the links between exports, skills and wages taking into account the destination of exports. The theoretical literature argues that exporting to high-income countries leads to quality upgrading that is skill intensive and which requires skill intensive additional services.

We test this theory using a panel of Uruguayan manufacturing firms for the period 1997-2006. We analyse skills defined as non-production workers in total employment and professionals and technicians in total employment and average wages. As explanatory variables we test a dummy equals to one for exporting firms, export intensity, and exports to high-income countries. We control for time dummies and industry dummies and firm size define as the natural logarithm of firm's sales using OLS models to analyse associations and IV-GMM to analyse causal relationships.

Our preliminary results seem to indicate that contrary to previous studies for developed and other middle income economies such as Mexico (Verhoogen 2008) and Argentina (Brambilla et al. 2012), exports to high income countries do not translate in a higher demand in skills and wages for the Uruguayan case, while exports in general do. This last finding is in line with the empirical results obtained by Matsuyama (2007) and Bustos (2011) who argue that what matters is exporting "per se".

In order to pose some further explanation for these puzzling results we classified industries according to their R&D intensity in low and high R&D intensive industries. We find that exports to high income countries are mainly from sector with low R&D intensity, and mostly "commodities" with low scope for vertical differentiation. Then it follows that the productive structure and specialization of the country, characterised by sectors of low technological content, with low value added and low sophistication, can be at the heart of these results, or in Hausmann et al. (2005) words "what we export matters."

A brief overview of the structure of exports by type of good and destination shows that exports targeted to Argentina has a higher content of value added.[i] In fact exports to Argentina concentrate mainly in transport equipment, plastic products, paper, and chemical and textiles. On the other hand exports to the EU, the Nafta and the rest of the world are mainly food products, such as meat, rice, soy, dairy products, wood, leather and wool, i.e. are commodities in nature. In this regard exports to Brazil are also similar to those exported to developed countries: mainly food products with low value added.

Furthermore, recently a new literature on export quality measured by unit values goes to the other extreme by arguing that the important variance across countries in differences of quality within narrowly defined product categories, rather than the products themselves.[17] In this regard, the dynamics of quality (measured by the growth of export unit values) potentially offers insights into the drivers of economic growth by acting as a proxy for the accumulation of underlying factors of production that yield high-quality goods and perhaps greater productivity (Maloney and Lederman, 2012).

Thus, in our research agenda is to analyse further the interaction of "where", "what" and "how" to provide a sound explanation for these results.

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[17] According to Maloney et al. (2012): "the issue for development policy is not whether an economy exports wine or microchips; it is about whether the economy produces Chateau Margaux for US$ 2,000 or Charles Shaw's Two-buck Chuck". They also note that it would be important to analyse "tasks" instead of "products" due to the fragmentation of production.

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Table 1: Uruguayan exports by main partners and economic blocs (millions of US$)

	Argentina	Brazil	MERCOSUR	USA	Canada	Mexico	NAFTA	Germany	Italy	U.K.	EU
1997	354.3	940.2	1,355.20	160.8	0	0	0	120.4	91.1	116.5	515.7
1998	513.2	935.2	1,532.30	158.4	0	0	0	112.1	78.7	94	456
1999	368.9	557.1	1,007.20	140.8	0	0	0	111	72.1	80.5	438.9
2000	410.7	530.7	1,023.90	180.4	0	0	0	90.2	69.3	71.6	371.9
2001	316.4	440.7	839.90	171	0	0	0	96.5	70.9	65.6	385.3
2002	113.3	431.8	606.80	137.9	0	0	0	108.5	88.2	78.6	441.2
2003	155.2	470.8	673.80	234	86.8	91.3	412.1	145.3	89	78.8	505.8
2004	223.3	483.6	765.50	577.3	105.1	117.7	800.1	151.5	89.3	91.4	570.1
2005	266.9	460.3	783.30	762.8	87.1	139.3	989.2	144.6	92.9	85.2	590.4
2006	301.9	584.1	944.40	523.1	45.1	136.4	704.6	165.2	112.8	96	663.6

	CHINA	JAPON	R WORLD	TOTAL
1997	123.2	28.7	542.1	2,725.70
1998	76.5	21.9	523.6	2,768.70
1999	61.9	23.5	499.9	2,237.10
2000	91.2	34.8	483.9	2,299.50
2001	102.9	12.1	417.4	2,057.60
2002	103.6	14	473.1	1,861.00
2003	95.4	12.4	518.8	2,205.90
2004	112.9	0	682.2	2,930.80
2005	121.7	0	932.3	3,416.90
2006	164.3	0	1509	3,985.90

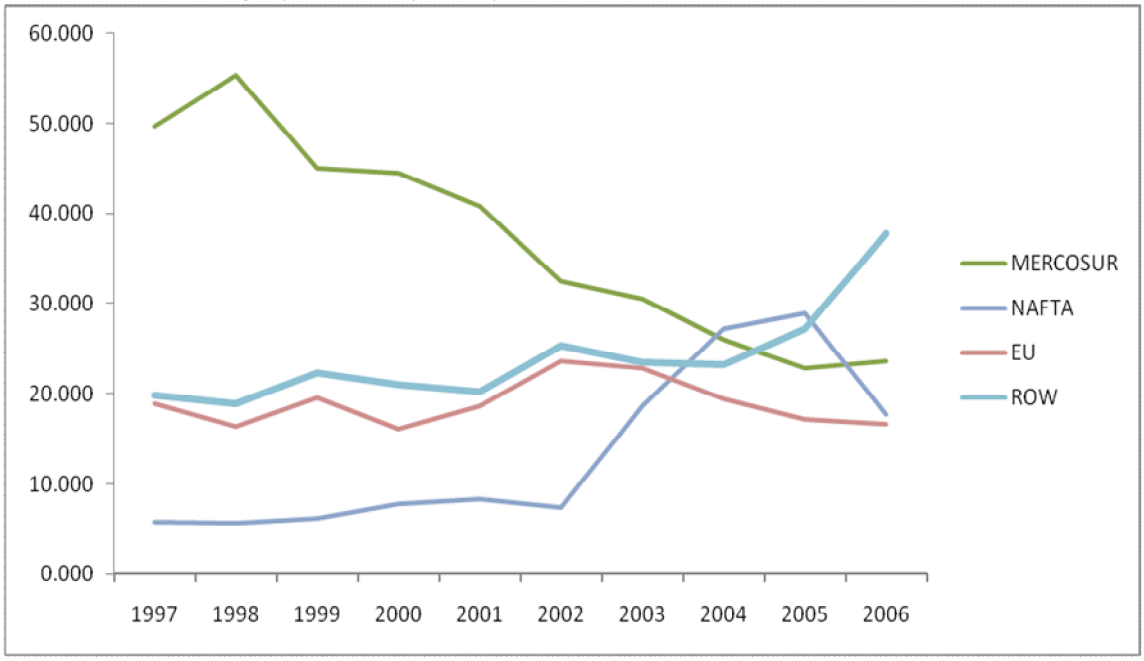
Source: data from the Banco Central del Uruguay; elaborated by Area de Coyuntura Economica [Short Run Economic Analysis], IECON.

Table 2: Shares of exports by main trade partners and economic blocs, in total Uruguayan exports

	Year									
COUNTRY	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
ARGENTINA	12.998	18.536	16.490	17.860	15.377	6.088	7.036	7.619	7.811	7.574
BRAZIL	34.494	33.778	24.903	23.079	21.418	23.203	21.343	16.501	13.471	14.654
MERCOSUR	49.719	55.344	45.023	44.527	40.819	32.606	30.545	26.119	22.924	23.694
USA	5.899	5.721	6.294	7.845	8.311	7.410	10.608	19.698	22.324	13.124
Canada	0.000	0.000	0.000	0.000	0.000	0.000	3.935	3.586	2.549	1.131
Mexico	0.000	0.000	0.000	0.000	0.000	0.000	4.139	4.016	4.077	3.422
NAFTA	5.899	5.721	6.294	7.845	8.311	7.410	18.682	27.300	28.950	17.677
EU	18.920	16.470	19.619	16.173	18.726	23.708	22.929	19.452	17.279	16.649
CHINA	4.520	2.763	2.767	3.966	5.001	5.567	4.325	3.852	3.562	4.122
JAPON	1.053	0.791	1.050	1.513	0.588	0.752	0.562	0.000	0.000	0.000
ROW	19.888	18.911	22.346	21.044	20.286	25.422	23.519	23.277	27.285	37.858

Source: Own elaboration, based on data from the Banco Central del Uruguay

Chart 1: Share of Uruguayan total exports by destination (economic blocs)



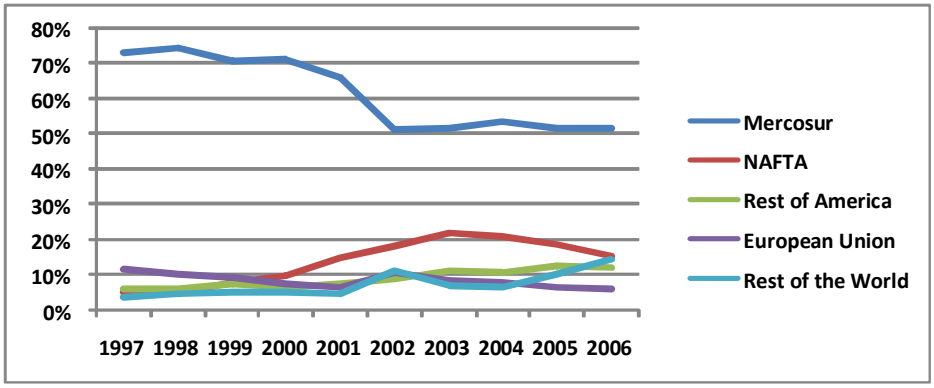
Source: Own elaboration, based on data from the Banco Central del Uruguay

Table 3: Share of exporting firms, exporters to high income countries and to non-developed countries

Year	Exporting firms	Exp_richer	Exp_hi_OECD	Exp_excl_NoRich
1997	0.509	0.205	0.200	0.304
1998	0.587	0.233	0.222	0.355
1999	0.555	0.224	0.219	0.330
2000	0.569	0.244	0.234	0.325
2001	0.527	0.233	0.227	0.294
2002	0.483	0.272	0.257	0.211
2003	0.527	0.284	0.275	0.242
2004	0.511	0.265	0.251	0.246
2005	0.535	0.268	0.261	0.266
2006	0.675	0.406	0.380	0.270
Total	0.542	0.258	0.247	0.285

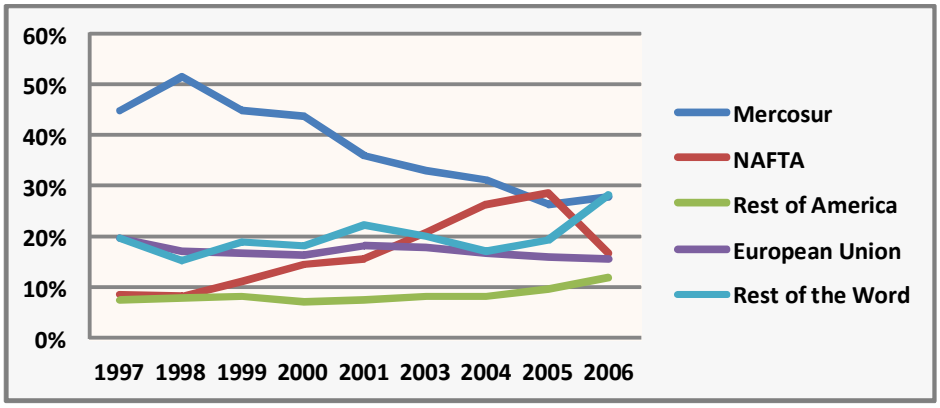
Share of exporting firms in total firms for the sample period, Exp_richer: dummy for exporting to high-income countries; Exp_hi_oecd: dummy for firms exporting to high-income OECD countries; Exp_excl_NoRich: dummy for firms that exports exclusively to low and middle income countries.
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Chart 2: Firms by destination (% of exporting firms)



Source: Barboni et al. (2012), based on data of the INE and Dirección Nacional de Aduanas.

Chart 3: Exports by destination (% of total exports in value)



Source: Barboni et al. (2013) based on data of the INE and Dirección Nacional de Aduanas

Table 4: Main features of exporting firms and exporters to high-income countries, average for the period

	Exporting Status		Exporters to high income countries		Total
	0	1	0	1	
Total employment	50.00	136.05	64.99	187.99	96.66
Sales(a)	23.9	136	43.8	207	85.6
Value added(a)	10.2	40.8	16.7	55.6	26.8
Total factor productivity (b)	52339.31	78528.5	59119.93	89373.94	66888.86
Average wages	76051.64	108642.6	88737.57	108149	93738.26
Export propensity	0.00	0.324	0.089	0.473	0.187
Non production/Total workers	0.347	0.313	0.343	0.287	0.329
P&T/Total workers	0.062	0.073	0.068	0.070	0.068

(a) Millions of constant pesos, base year 1997; (b) constant Uruguayan pesos, base year 1997.

Source: Own elaboration based on data from the Encuesta de Actividad Economica, INE.

	Exporting Status		Exp HI countries	Total
	0	1	1	
Total employment	50	136	188	97
Sales(a)	23.9	136	207	86
Value added(a)	10.2	40.8	55.6	26.8
Total factor productivity(b)	52,339	78,529	89,374	66,889
Average wages	76,052	108,643	108,149	93,738
Export propensity	0.000	0.324	0.473	0.187
Non production/Total workers	0.347	0.313	0.287	0.329
P&T/Total workers	0.062	0.073	0.070	0.068

Table 5: Average wages in natural logarithm, Ordinary Least Squares estimation (file: sh2ols1.xlsx)

VARIABLES	(1) ln_avgwage	(2) ln_avgwage	(3) ln_avgwage	(4) ln_avgwage	(5) ln_avgwage	(6) ln_avgwage	(7) ln_avgwage	(8) ln_avgwage
exp_stot	-0.0571*		-0.0497	-0.0455				
	(0.0297)		(0.0308)	(0.0306)				
exp2		0.0284*			0.0391**	0.0387**	0.0413**	0.0410**
		(0.0169)			(0.0171)	(0.0171)	(0.0171)	(0.0171)
hi_oecdc			-0.0247		-0.0653*	0.0734		
			(0.0351)		(0.0347)	(0.0719)		
richerc				-0.0374			-0.0766**	0.0448
				(0.0337)			(0.0334)	(0.0693)
exp_hi						-0.168**		
						(0.0799)		
exp_richer								-0.147*
								(0.0766)
lnsales	0.234***	0.226***	0.235***	0.235***	0.226***	0.227***	0.226***	0.227***
	(0.00616)	(0.00651)	(0.00619)	(0.00621)	(0.00650)	(0.00651)	(0.00652)	(0.00654)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.814***	6.934***	6.814***	6.811***	6.937***	6.926***	6.934***	6.923***
	(0.112)	(0.117)	(0.112)	(0.112)	(0.117)	(0.117)	(0.117)	(0.117)
Observations	4,767	4,767	4,767	4,767	4,767	4,767	4,767	4,767
R-squared	0.521	0.521	0.521	0.521	0.521	0.522	0.521	0.522

Exp_stot: exports/sales; exp: dummy for exporting firms; hi_oecd: share of exports to high-income OECD countries over total exports; richer: share of exports to developed countries (OECD and non-OECD countries); exp_hi:exports status interacted by hi_oecd: exp_richer: export status interacted by the share of exports to high income countries. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 6: Skills defined as professionals and technicians on total employment (skill5); Ordinary Least Squares estimation (file: sh2ols2.xlsx)

VARIABLES	(1) skill5b	(2) skill5b	(3) skill5b	(4) skill5b	(5) skill5b	(6) skill5b	(7) skill5b	(8) skill5b
exp_stot	0.0125***		0.0146***	0.0147***				
	(0.00376)		(0.00432)	(0.00435)				
exp		0.00736***			0.00845***	0.00842***	0.00848***	0.00845***
		(0.00215)			(0.00233)	(0.00233)	(0.00233)	(0.00233)
hi_oecdc			-0.00767**		-0.00646*	0.000296		
			(0.00382)		(0.00334)	(0.00869)		
richerc				-0.00745**			-0.00626*	0.00160
				(0.00377)			(0.00329)	(0.00827)
exp_hi						-0.00809		
						(0.00887)		
exp_richer								-0.00939
								(0.00843)
lnsales	0.00720***	0.00689***	0.00730***	0.00732***	0.00692***	0.00695***	0.00693***	0.00698***
	(0.000581)	(0.000697)	(0.000580)	(0.000582)	(0.000696)	(0.000696)	(0.000696)	(0.000696)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.123***	-0.118***	-0.124***	-0.124***	-0.118***	-0.119***	-0.118***	-0.119***
	(0.0108)	(0.0123)	(0.0107)	(0.0108)	(0.0123)	(0.0123)	(0.0123)	(0.0123)
Observations	7,344	7,344	7,344	7,344	7,344	7,344	7,344	7,344
R-squared	0.197	0.197	0.198	0.198	0.197	0.197	0.197	0.197

Exp_stot: exports/sales; exp: dummy for exporting firms; hi_oecd: share of exports to high-income OECD countries over total exports; richer: share of exports to developed countries (OECD and non-OECD countries); exp_hi:exports status interacted by hi_oecd: exp_richer: export status interacted by the share of exports to high income countries. Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1

Table 7: Skills defined as non-production workers in total employment (skill1), Ordinary Least Squares estimation (file: skill1_ols1.xlsx)

VARIABLES	(1) skill1	(2) skill1	(3) skill1	(4) skill1	(5) skill1	(6) skill1	(7) skill1	(8) skill1
exp_stot	-0.145***		-0.0647***	-0.148***				
	(0.0112)		-0.0062	(0.0098)				
exp		-0.0670***			-0.0635***	-0.0639***	-0.0621***	-0.0626***
		-0.0063			(0.00709)	(0.00653)	(0.00655)	(0.00654)
hi_oecd			-0.0295***		-0.0231*	0.0950***		
			(0.0108)		(0.0110)	(0.0289)		
exp_hi						-0.141***		
						(0.0304)		
richerc				-0.0048			-0.0292***	0.0813***
				(0.0107)			(0.0106)	(0.0283)
exp_richer								-0.132***
								(0.0296)
lnsales	0.0215***	0.0223***	0.0220***	0.0216***	0.0223***	0.0229***	0.0224***	0.0230***
	-0.00176	-0.0063	(0.0018)	-0.00176	(0.0019)	(0.00190)	(0.00192)	(0.00190)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.152***	-0.167***	-0.162***	-0.1526***	-0.167***	-0.173***	-0.167***	-0.174***
	-0.0317	-0.0337	(0.0326)	(0.0317)	(0.0337)	(0.0335)	(0.0336)	(0.0334)
Observations	7,348	7,348	7,348	7,348	7,348	7,348	7,348	7,348
R-squared	0.211	0.209	0.211	0.181	0.183	0.185	0.182	0.185

Exp_stot: exports/sales; exp: dummy for exporting firms; hi_oecd: share of exports to high-income OECD countries over total exports; richer: share of exports to developed countries (OECD and non-OECD countries); exp_hi:exports status interacted by hi_oecd: exp_richer: export status interacted by the share of exports to high income countries. Robust

Table 8: Average wages, IV-GMM estimation with standard errors robust to heteroskedasticity and autocorrelation HAC and bw(3), file: wages_last1.xls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage
exp_stot	0.933***	0.969***	1.297***	0.236**	0.0441	-0.0190	0.696***
	(0.139)	(0.141)	(0.146)	(0.112)	(0.0778)	(0.0761)	(0.158)
richer	-2.249***	-2.314***	-2.452***	-0.688**	-0.295	-0.189	-1.427***
	(0.298)	(0.306)	(0.361)	(0.269)	(0.180)	(0.175)	(0.361)
lnsales				0.206***			
				(0.0109)			
lntfp							0.454***
							(0.0372)
Constant	11.29***						
	(0.0246)						
Observations	4,773	4,773	4,773	2,699	4,199	4,199	2,478
Uncentered R-squared	-0.611	-0.650	-0.952	0.213	-0.017	-0.007	-0.274

Exp_stot: exports/sales; richer: share of exports to developed countries (OECD and non-OECD countries); lntfp: natural logarithm of total factor productivity.
HAC robust standard errors; *** p<0.01, ** p<0.05, * p<0.1

Table 9: Average wages, IV-GMM estimation with standard errors robust to heteroskedasticity and autocorrelation (file wages_last11.xlsx), dependent: ln avg wages; HAC; bw(3)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage	ln_avgwage
exp	0.405***	0.417***	0.518***	0.116**	0.00381	-0.0524	0.292***	0.505***
	(0.0488)	(0.0483)	(0.0416)	(0.0576)	(0.0444)	(0.0441)	(0.0515)	(0.0482)
richer	-0.719***	-0.726***	-0.0777	-0.248	-0.222*	-0.220*	-0.373**	-0.200
	(0.143)	(0.143)	(0.159)	(0.160)	(0.124)	(0.121)	(0.162)	(0.157)
lnsales				0.196***				
				(0.0131)				
lntfp							0.462***	
							(0.0319)	
Constant	11.07***							
	(0.0309)							
Observations	5,312	5,312	5,312	2,699	4,199	4,199	2,780	3,608
Uncentered R-squared	0.049	0.049	0.058	0.273	-0.008	-0.017	0.093	0.058

exp: dummy for exporting firms; richer: share of exports to developed countries (OECD and non-OECD countries).

HAC robust standard errors; *** p<0.01, ** p<0.05, * p<0.1

Table 10: Skills measured as professionals and technicians over total employment; IV-GMM estimation with standard errors robust to heteroskedasticity and autocorrelation [Dependent: Skill5, file: skill5_last1.xlsx; HAT SE, bw(3)]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Skill5	skill5	skill5	skill5	skill5	skill5	skill5
exp_stot	0.0151	0.0169	0.0250*	0.0359*	0.0386***	0.0360***	0.0492**
	(0.0139)	(0.0140)	(0.0133)	(0.0190)	(0.0135)	(0.0134)	(0.0230)
richerc	-0.0452	-0.0495*		-0.0278	-0.0380	-0.0324	-0.0657
	(0.0290)	(0.0294)		(0.0446)	(0.0298)	(0.0300)	(0.0496)
lnsales				-0.000117			
				(0.00198)			
lntfp2							0.0194***
							(0.00546)
Constant	0.0697***						
	(0.00234)						
Observations	4,777	4,777	2,626	2,701	4,201	4,201	2,478
Uncentered R-squared	-0.011	-0.013	0.002	-0.003	-0.009	-0.006	-0.024

Exp_stot: exports/sales; richer: share of exports to developed countries (OECD and non-OECD countries); lntfp: natural logarithm of total factor productivity.
HAC robust standard errors; *** p<0.01, ** p<0.05, * p<0.1

Table 11: Skills measured as professionals and technicians over total employment; IV-GMM estimation with standard errors robust to heteroskedasticity
HAT SE, bw(3), dependent: skill5; file: skill5_last11.xlsx

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	skill5	skill5	skill5	skill5	skill5	skill5	skill5
exp	0.00326	0.00426	0.0130**	0.0194*	0.0188**	0.0171**	0.0134
	(0.00635)	(0.00628)	(0.00581)	(0.0100)	(0.00745)	(0.00735)	(0.00903)
richerc	-0.0196	-0.0211	0.0306	0.0412	0.0319	0.0323	0.0151
	(0.0158)	(0.0158)	(0.0194)	(0.0263)	(0.0205)	(0.0203)	(0.0234)
richer							
lnsales				-0.00243			
				(0.00255)			
lntfp2							0.0196***
							(0.00561)
Constant	0.0683***						
	(0.00382)						
Observations	5,318	5,318	5,318	2,701	4,201	4,201	2,781
R-squared	0.002	0.003	-0.005	-0.027	-0.019	-0.017	0.006

exp: dummy for exporting firms; richer: share of exports to developed countries (OECD and non-OECD countries).
HAC robust standard errors; *** p<0.01, ** p<0.05, * p<0.1

Table 12: Skills measured as non-production workers over total employment; IV-GMM estimation with standard errors robust to heteroskedasticity

skill1_last1.xls, HAT SE, bw(3), dependent: skill1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	skill1	skill1	skill1	skill1	skill1	skill1	skill1
exp_stot	-0.156***	-0.152***	-0.136***	-0.195***	-0.211***	-0.219***	-0.0704
	(0.0336)	(0.0342)	(0.0378)	(0.0434)	(0.0312)	(0.0351)	(0.0472)
richerc	-0.0141	-0.0229	0.0627	0.135	0.180***	0.189**	-0.104
	(0.0730)	(0.0745)	(0.0880)	(0.102)	(0.0679)	(0.0773)	(0.104)
lnsales				0.0154***			
				(0.00458)			
lntfp2							0.0211*
							(0.0119)
Constant	0.356***						
	(0.00614)						
Observations	4,777	4,777	4,777	2,701	4,201	4,201	2,478
R-squared	0.046	0.046	0.024	0.023	0.006	0.002	-0.004

Exp_stot: exports/sales; richer: share of exports to developed countries (OECD and non-OECD countries); lntfp: natural logarithm of total factor productivity.
HAC robust standard errors; *** p<0.01, ** p<0.05, * p<0.1

Table 13: Skills measured as non-production workers over total employment; IV-GMM estimation with standard errors robust to heteroskedasticity
file: skill1_last11.xlsx, dependent: skill1; HAC SE, bw(3)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	skill1	skill1	skill1	skill1	skill1	skill1	skill1
exp	-0.0788***	-0.0745***	-0.0593***	-0.122***	-0.131***	-0.139***	-0.0373*
	(0.0158)	(0.0158)	(0.0155)	(0.0259)	(0.0208)	(0.0209)	(0.0194)
richerc	-0.256***	-0.259***	-0.170***	-0.220***	-0.194***	-0.193***	-0.212***
	(0.0409)	(0.0411)	(0.0467)	(0.0612)	(0.0489)	(0.0489)	(0.0539)
lnsales				0.0301***			
				(0.00605)			
lntfp2							0.0245**
							(0.0122)
Constant	0.399***						
	(0.0109)						
Observations	5,318	5,318	5,318	2,701	4,201	4,201	2,781
R-squared	-0.072	-0.069	-0.045	-0.072	-0.089	-0.096	-0.105

exp: dummy for exporting firms; richer: share of exports to developed countries (OECD and non-OECD countries).
HAC robust standard errors; *** p<0.01, ** p<0.05, * p<0.1

Appendix 1: Test of serial correlation

We perform tests of serial correlation and in all the cases we reject the null hypothesis of no autocorrelation. Therefore we estimate models robust to heteroskedasticity and autocorrelation.

```
. xtserial ln_avgwage exp_stot richerc mercosurc lnsales, output

Linear regression                                      Number of obs =    3373
                                                       F(  4,   740) =    7.03
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.0143
                                                       Root MSE      =  .24436

                              (Std. Err. adjusted for 741 clusters in nro_ine)
------------------------------------------------------------------------------
             |               Robust
D.ln_avgwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    exp_stot |
         D1. |   .0330892   .0618878     0.53   0.593    -.0884073    .1545857
             |
     richerc |
         D1. |  -.0051979   .0202124    -0.26   0.797    -.0448783    .0344825
             |
   mercosurc |
         D1. |  -.0243018    .013207    -1.84   0.066    -.0502294    .0016259
             |
     lnsales |
         D1. |   .0621269   .0124221     5.00   0.000       .03774    .0865137
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     668) =     16.102
           Prob > F =      0.0001


.   xtserial skill1 exp_stot richerc mercosurc, output

Linear regression                                      Number of obs =    3377
                                                       F(  3,   741) =    1.21
                                                       Prob > F      =  0.3058
                                                       R-squared     =  0.0018
                                                       Root MSE      =  .12359

                              (Std. Err. adjusted for 742 clusters in nro_ine)
------------------------------------------------------------------------------
             |               Robust
    D.skill1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    exp_stot |
         D1. |  -.0394331   .0304165    -1.30   0.195    -.0991459    .0202797
             |
     richerc |
         D1. |  -.0046628    .010182    -0.46   0.647    -.0246519    .0153263
             |
   mercosurc |
         D1. |   .0098138   .0098726     0.99   0.321    -.0095678    .0291954
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     669) =      9.617
           Prob > F =      0.0020
```

```
.     xtserial skill1 exp2 richerc mercosurc, output

Linear regression                                      Number of obs =    4338
                                                       F(  3,   747) =    0.68
                                                       Prob > F      =  0.5653
                                                       R-squared     =  0.0004
                                                       Root MSE      =  .11415

                              (Std. Err. adjusted for 748 clusters in nro_ine)
------------------------------------------------------------------------------
             |               Robust
    D.skill1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        exp2 |
         D1. |  -.0060194    .006559    -0.92   0.359    -.0188957    .0068569
             |
     richerc |
         D1. |  -.0003031   .0090287    -0.03   0.973    -.0180277    .0174216
             |
   mercosurc |
         D1. |     .01005   .0095693     1.05   0.294     -.008736     .028836
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     676) =     31.370
           Prob > F =      0.0000
```

[i] Reports of Short Run Analysis [Area de Coyuntura], Instituto de Economía, Universidad de la Republica.