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Impact of Technical Barriers to Trade on Argentine Exports and Labor Markets

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Abstract

While tariff and quota barriers in agricultural, food and manufactured products have been declining due to the proliferation of multilateral trade agreements, there is increasing debate regarding the impact of product and process standards and technical regulations, since they may have become a subtler form of protection. One of the possible effects of increasing standards in developing countries is that it may affect the size of the exporting sector, with adverse effects on labor markets. We test such effect for the case of Argentina using firm level data for the manufacturing sector. We find evidence of a reduction in export shares due to an increase in standard stringency. Moreover, there is an increase in the skill ratio for exporting firms. The overall effect of standard stringency on average wages of exporting firms is negative, supporting the idea that lower net producer prices, due to a higher cost of standard compliance, are passed on to workers.

1 Introduction

The capability of developing countries to engage in international trade is conditioned by rich country policies. Trade barriers arise from direct interventions in the price determination process, either through the application of tariffs, quotas or subsidies to exports or

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production, or through the application of standards and regulations. As tariff and quota barriers to trade in agricultural, food, and manufactured products continue to decline due to the proliferation of multilateral trade agreements, increasing public debate is taking place regarding the impact of product and process standards and technical regulations. Standards and regulations have become a more common, though subtler, form of protection.

This is a particularly relevant matter for Argentina, where the poverty headcount currently is 26.9%¹, and where the scope for inward-looking development strategies is rather limited. In 2005 Argentina exported only 14.14% of its GDP in constant pesos. Up to May 2006, total exports in nominal values have grown about 60.8% since the large devaluation of the peso in January 2002. While these numbers may look impressive, they are somehow disappointing when compared to an increase of 81% for total world trade and 120% for the case of Brazil.

The performance of Argentina's exports shows that the requirements for Argentine firms to enter export markets in industrialized countries largely exceeds competitive costs. Indeed, a business survey conducted by IERAL in 2004 has shown that the compliance with standards and technical regulations in the North requires setup costs that may prevent the entry of a large number of potentially exporting firms, specially SMEs and that may raise variable costs of production for those who export, with a negative impact on their export share. These costs come from setting up a quality control and management system, from the adoption of new testing procedures, from product and process re-designs, from investment in additional plant and equipment and from costly search of information.²

This means that standards in rich countries, regardless of their reasonability, may be imposing barriers to entry into industrialized countries' markets that in turn generate a segmentation of production between exporting and non-exporting firms in developing countries. It has been documented that exporting firms have higher productivity and thus, pay higher wages. These firms also tend to display higher quality standards. In general, only the

¹This figure corresponds to 2006

²In a developing country like Argentina, the cost of installing a quality control system may reach dollars 37,000, the costs of calibration amount to dollars 3,000, the costs associated to testing procedures may represent up to 1% of the unit production costs, and the costs of investing in additional equipment like filling machines with precision scales may cost up to dollars 250,000. These represent very high costs for most Argentine SMEs, especially in the current context of lack of institutional financing of investment (the stock of banking credit to the private non-financial sector is less than 10% of GDP).

most productive firms in a developing country like Argentina enter the export market (to industrialized countries), producing better quality goods for export than for the domestic markets in order to supply richer developed country consumers. For example, segmentation can occur even within a same firm, where there are different quality in products as documented in Verhoogen (2004) for the Volkswagen plant in Mexico.³ This segmentation in production has significant effects on the labor markets, where workers employed in exporting firms get higher wages and workers employed in non-exporting firms get lower wages. In this setup, more stringent standards are likely to exacerbate the segmentation in production and, through its effects on the labor market, lead to bigger inter-firm wage inequality and to possible employment problems if the size of the exporting sector is reduced. Additionally, compliance with standards is likely to be skill-intensive, thus leading to a bigger skill premium.

The aim of this paper is to appraise to what extent the standards and technical regulations imposed by the US and the EU may result in a bigger segmentation of production and lower export shares, with a negative direct effect on employment and an increase of intra and inter firm wage inequality.

In the next section we provide a more thorough description and discussion of the evolution and rationale for standards and technical regulations in the world and why it is a relevant matter for Argentina. This section generates the hypotheses to test the effects of standards on exports, employment and wages. Sections ?? and ?? describe the proposed methodology for testing these hypotheses and the methodology we will use. Section ?? describes the data bases that we intend to use. Section ?? presents the results. Finally ?? shows our conclusions.

³Volkswagen produces two different line of products: one the model of the original "beetle" for the Mexican market and newer and more expensive models for export.

2 OECD policies: Standards and technical regulations

2.1 Standards and technical regulations in industrialized countries

Standards and technical regulations, be it for products, labor, or for the environment, are applied to mitigate against health and environmental risks, to prevent deceptive practices, and to reduce transaction costs in business by providing common reference points for notions of “quality”, “safety”, “authenticity”, “good practice”, and “sustainability” (World Bank⁴).

Standards are specifications that relates to product attributes. They can take different forms. Henson (2004) classifies them as:

- Terminology standards (e.g. units of measurement)
- Basic standards (e.g. tolerance)
- Dimensional standards (for compatibility, e.g. units of electric motors)
- Performance standards (e.g. minimum durability of light bulbs)
- Variety reduction standards (e.g. standard screw size)
- Testing and quality control standards (e.g. methods to determine protein content of animal feed)

Distinction can also be made between standards that relate to process and production methods (PPM) and to products. Product standards focus on characteristics of the final product (size, composition, function, safety, etc) whereas PPM address the way in which a product is made.⁵

Standards can also differ in freedom of choice regarding compliance. They can be mandatory (legally) or they can be voluntary. Mandatory standards are known as technical regulations and they are set by public institutions (regulatory agencies). Compliance of mandatory standards is obligatory. They are usually related to safety and health, when there is asymmetric information and the buyer can either not assess reliably the safety of the product or it can only do it at a very high cost. Voluntary standards arise from a

⁴ www.worldbank.org

⁵ Examples of such certifications are ISO 9001, ISO 14001, HACCP for food industry, etc.

coordinated process, mainly of private organizations or they arise from an uncoordinated process of market - based competition (*de facto* mandatory standards).

Usually, in the early stages of economic development, standards are mandatory and set by public institutions. As an economy develops, voluntary public standards and private standards become widespread. In developed economies, most private standards become *de facto* mandatory established by market competition.

Depending upon the particular industry or market circumstances, standards and technical regulations can either raise or lower economic efficiency; promote or block competition; facilitate or constrain international trade; and enable or exclude the participation of the poor in remunerative economic activities.

Mandatory standards are regulated by WTO to guarantee they only impede trade to achieve a legitimate objective and that they if they do it, it is in the least trade-distortive manner. The 1947 GATT accord allowed the use of minimum standards to protect human, animal and plant health, as well as bring order to the market. The World Trade Organization (WTO) established that standards can differ from internationally accepted levels only when there is scientific evidence supporting the decision. At multilateral level, there are two binding WTO agreements which intend to limit abusive uses of standards for protection purposes. These are: the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) and the WTO Agreement on Technical Barriers to Trade (the TBT Agreement).⁶

⁶World Trade Organization Agreements: The Sanitary and Phytosanitary Agreement (SPS) entered into force on 1 January 1995 and allows members to take scientifically based measures to protect public health. The agreement covers standards which are related to animals, plant material, and human health. The agreement commits members to base these measures on internationally established guidelines and risk assessment procedures. In the case of particularly stringent measures, countries must present scientific justification. When existing scientific evidence is insufficient to determine risk, members may adopt measures on the basis of available information, but must obtain additional information to objectively ground their assessment of risk within a reasonable period of time. Generally speaking, the SPS Agreement is a compromise that permits countries to take measures to protect public health within their borders so long as they do so in a manner that restricts trade as little as possible. The Technical Barriers to Trade Agreement (TBT) strikes a delicate balance between the policy goals of trade facilitation and national autonomy in technical regulations. The agreement attempts to extricate the trade-facilitating aspects of standards from their trade-distorting potential by obligating countries to ensure that technical regulations and product standards do not unnecessarily restrict international trade. The agreement covers mandatory provisions of government technical regulations that specify products characteristics or their related processes and production methods. The TBT Agreement works toward this end in three ways. The agreement encourages “standard equivalence” between countries, in other words, the formal acceptance of the standards of other countries through explicit agreements. It also promotes the use of international standards. It mandates that countries establish enquiry points and national notification authorities (the two may be the same body) in order to answer questions

Although the accords expressly stated that standards should not be used as covert forms of protectionism, sometimes protection is the only goal of the standard. They usually apply to both national and foreign production, and thus do not correspond to the classical form of protectionism which openly discriminate against imports. However, in practice, standards and technical regulations may be used strategically to enhance the competitive position of countries or individual firms. Standards and technical regulations can potentially impede international trade, for example, by imposing unnecessary costly and time consuming tests or by laying out unjustified different requirements in different markets. As traditional trade barriers to trade have fallen, these non-tariff barriers have become of particular concern to firms in developing countries, which may bear relatively larger costs in meeting their requirements than their counterparts in developed nations.

A greater number and wider range of standards are being implemented globally. Notifications of TBT and SPS measures has increased markedly since between 2005 and 1995. SPS notifications grew 658% and TBT notifications, 315%. Certifications of processes of quality assurance, ISO 9000 series of standards on quality management systems and ISO 14000 series on environmental management systems, are becoming widespread in both industrialized and developing countries and has become a de-facto requirement. Besides, as standards apply to either product characteristics, quality control systems and processes by which they are manufactured, provided and distributed, many standards might apply to a single product.

Measuring the effect of standards on trade is a difficult task because of the complex nature of standards. Exporters might gain competitive advantage from complying with the standards and might, in the end, gain market share. Still, compliance costs are far from unimportant. Moreover, a wide range of standards might apply to the same product.

Compliance costs usually have a fixed component, associated with redesigning needs and measured as the investment required for compliance, and a variable cost that results from

about SPS regulations and notify other nations of new regulations respectively. Enquiry points compile all available information in that country on product standards and trade regulations and provide it to other members upon request. The national notification authorities report changes in trade policy to the WTO and receive and take comments on these measures. To sum up, the SPS and TBT Agreements limit the scope for importing countries to impose arbitrary and unjustified requirements on exports from LDCs and encourage the use of internationally developed standards as the safety/quality reference for products moving in world trade irrespective of the supplier. It also establishes dispute settlement mechanisms and panels.

altering capital and labor usages to meet the recurring costs of complying. They might vary widely, from country to country and from industry to industry and between different types of standards. This will depend on the prevailing structure and conditions of the supply chain, the extent of private-public and private-private cooperation, domestic capacity, level of development of the export industry and so on. Equally important, compliance costs include not only the cost of meeting the technical requirement, but also the cost of verifying that the requirement is met, known as the conformity assessment. Often, the conformity assessment represents the largest barrier to trade. All these will determine if only incremental changes are needed or if major adjustment to meet the standards are required. In accomplishing standards exporters face administrative, technical and financial burden that might act as an entry barrier for individual suppliers, mainly small scale. This complex nature of influence of standards on trade impedes generalization, and evidence remains based on case studies and specific measurements. The World Bank conducted a survey over 689 firms and 17 developing countries inquiring on different regulatory requirements to globally investigate the impacts of technical requirements⁷. The survey helps appraise the incremental cost of standard compliance as a proportion of sales by industry, as shown in Table 2 in the appendix.

Unlike tariffs, trade barriers due to standards and regulations have differentiated effect on the decision to enter a market, depending on firm's characteristics. A key difference between both kind of protections may be that tariffs affect how much to import whereas fixed costs of compliance due to standards may affect the decision whether to export or not. Maskus et al. (2004) find that bigger set-up costs associated to more severe standards also raise variable costs of production, thus acting as import taxes as well.

Chen et al (2004) find that technical regulations in developed countries adversely affect firms propensity to export in developing countries. Besides, they also find empirical evidence that standards and testing procedures impede exporter' market entry, reducing the likelihood of exporting to multiple countries.

Hence, harmful effects of standards seem to have particular incidence on developing countries whereas benefits are mainly accrued by developed economies. This unbalanced

⁷see Wilson et al. 2004.

impact between developed and developing economies might be explained by the fixed costs imposed by meeting standards. These costs associated with foreign standards and technical requirements may be born publicly or privately. Usually, developing countries do not have adequate public testing capacity due to lack of public resources and they also face difficulties in collective action. As a result, costs of compliance are mainly borne by individual firms and, consequently, impede access to firms from developing countries, particularly smaller firms.⁸

Additionally, there are a proliferation of Mutual Recognition Agreements on standards and regulations aiming at harmonization or mutual recognition of national standards that also aim at facilitating trade between nations and countries, but mainly developed ones, which further excludes developing economies.⁹

Accordingly, accomplishing with international standards require additional efforts which might be impossible to afford in developing economies. As an example, Finger and Shuler show that the World Bank spent between 1991 and 1996 US\$ 82.7 millions in Argentina in a project to assist in the implementation of sanitary and phytosanitary regulations. Consequently, imposing standards may generate development problems. Even though under the WTO agreements (SPS, TBT, TRIPS) these regulations should be implemented in manners that restrict trade as little as possible and preserve health and safety, they might disguise protective measures as protection from specific risks.

2.2 From trade liberalization to standards and technical regulations

It is mostly agreed that trade related standards and technical regulations have risen in importance over tariffs as means of trade protection. The application of product regulation and standards is becoming increasingly contentious as an implicit non-tariff barrier to trade (Maskus, Wilson and Otsuki, 2001). Even though WTO agreements (TBT and SPS) have increased transparency in regulatory systems and promoted conformity to international

⁸One example is given by the investment in equipment used to test for electromagnetic interference in electrical machinery which amounts US\$ 1 million and is rendered obsolete every time the technical regulations in this area are changed, which happens very often.

⁹A noteworthy example is provided by some wineries in Argentina, which sell wine to most developed countries (including the US, England and Japan), but not to Germany because of a stringent regulation on the precise blend of grapes for producing wine. This standard does not operate however for US wineries exporting to Germany because of a Mutual Recognition of Standards Agreement.

standards, they remain a main concern specially for developing countries. Moreover, in developing countries, development issues on certification capacity building arise and international aid is required to build local capacity to meet standards. However, there still are many unknowns to determine the economic impact of regulations and conformity assessment requirements. As a result, it is difficult to establish negotiation priorities and policy trade-offs. In this section we draw on the main conclusions of the discussion in Maskus and Wilson (2001), where they present an overview of the policy debate around technical barriers to trade and product standards. As it has been mentioned above, non-tariff barriers have significant effects on developing countries, which may incur in additional costs in order to meet them.

The economic impact of differing regulations and conformity assessment requirements directly affect trade policy choices and success or failure of liberalization efforts. Thus empirical work on standards is crucial.

One of the more important conclusions of their work is the need to develop empirical analysis of the effects of standards on trade. For that, they recommend the following steps,

1. availability of firm level surveys in developing countries
2. devising methods for assessing how standards can restrict trade in developing countries
3. which econometrics approaches can be used to micro data to see the effect of standards on exports.

According to Wilson (1999), developing countries members of the WTO have made standards and TBT a priority in the trade agenda post- Seattle. Among the key points raised by these members are both technical assistance in order to implement WTO obligations on standards and concerns over the use of environmental regulations by developed countries as motives to block imports.

While there is not a specific year to which we can say that standard requirement significantly started to affect export decisions to the EU and US, according to Maskus, Wilson and Otsuki (2001) 1995 can be considered the year in which claims of violation of various provisions of the Agreement on Technical Barriers to Trade to the WTO started to increase

and since that year there was a marked raise in the number of trade disputes over standards, mainly under the SPS agreement. These claims to violations plus the increase in the number of notifications of TBT and SPS measures to WTO appear to be the only proxy available so far of the increase use of standards and technical regulations as protectionist devices following the multilateral tariff reduction under the Uruguay Round of the WTO. And both point at 1995.

3 Evolution of exports and standards in Argentina

After the 2001 crisis, most of private investment in Argentina has been directed towards expanding production for the domestic market rather than improving quality. The amount of investment directed towards improving product quality was reduced from 43.6% in 2001 to 20.8% in 2006 as it can be observed in Table ??.

While total investment has recovered from pre-crisis levels, its composition has changed. There is a much higher participation of residential and public investment on total investment, concentrated in non exporting sectors.¹⁰

This lower investment in quality is consistent with the fact that although exports of manufacturing products are showing a more dynamic behavior than before the crisis, the countries of destination of such exports generally demand lower quality than the EU and US.

Graph I shows the relation existing between industrial exports and ISO 9000 certification. While the ISO 9000 certifications are certifications of quality management systems and not of product quality, they can be considered a good proxy for the latter, since generally both go hand in hand.

Any increase in standard stringency, as it has been happening in developed countries in recent years, may have the short run effect of discouraging the already sluggish behavior of Argentine exports to the EU and US. In Table ?? we can observe the cost faced by Latin American companies of different industries in order to fulfil with quality requirements and technical regulations demanded by OECD countries. Finally, we can appraise the

¹⁰For a more detailed description of investment patterns in Argentina after the 2001 crisis, see Sanchez and Butler (2007).

incremental cost of complying with specific standards in order to export to US and EU for Argentine firms as obtained from Sanchez and Butler (2005) in Table ??.

Such costs include ISO type environmental and product certifications, and the cost of investing in quality development. As it can be observed, such costs are far from negligible and they are proportionally higher the smaller the size and scale of the firm.

Finally, we would like to show some statistical differences between human capital indicators of exporting vs. non exporting firms. As shown Table ??, average wages in exporting industries are 18% higher than in the non-exporting sector. Also, labor informality rates (which bear a high correlation with poverty through lower wages) are higher in the non exporting sector. Lastly, standard estimation of Mincer (see Table ??) equations show that returns to schooling and experience are much higher in the exporting than in the non exporting sector.

4 Testable hypotheses

From the previous sections we can suggest several hypotheses which could be tested. More stringent standards will have effects on exports, employment, skill intensity and wages at the firm level. For example, we could conjecture the following effects of an increase in standard stringency:

1. The participation of exports to industrialized countries on total exports and output will decline.
2. Bigger fixed costs of compliance will increase the probability of switching from exporting to industrialized countries to exporting to other countries, or to non-exporting.
3. Employment of unskilled labor in firms exporting to industrialized countries will decline, as a result of their bigger skill intensities and reduced output.
4. The effect on skilled labor will be ambiguous for these firms, since products complying with standards require higher skill intensity but such exports may fall.
5. Total employment of exporting firms will decline.

6. The skill intensity of employment will go up for exporting firms, as standard compliance is skill intensive.
7. Average wages will increase for these firms, raising interfirm wage inequality.

Unfortunately, data limitations -which will be explained in the next section- allow us just to test three hypotheses of the ones mentioned above:¹¹

1. The participation of exports on total output will decline.
2. The skill intensity of employment will go up for exporting firms.
3. Average wages will increase for these firms as a result of the bigger skill intensity of standard compliance.

5 Testing methodology

In order to test the first hypothesis we could use panel data from the National Survey on Firms' Innovation and Technological Behavior ¹² at the firm level for 1992, 1996, 1998 and 2001. We have information on expenditure in general certifications such as ISO 9001, sector specific certifications and environmental certifications and many other firm characteristics as well. While the variables accounting for product certification can be considered as proxies for standard compliance, we come across a problem of endogeneity, since almost surely companies already exporting spent more on standards in the past. Moreover, the number of observations for product certification is small.

In order to overcome these problems, we suggest a different approach for estimation: as mentioned in the previous section, around 1995 standards became significantly more stringent and thus we may assume that there is some sort of structural change in standards requirement at some point around that time. If we work with data corresponding to 1992 and

¹¹Data availability imposed serious limitations for testing our priors. In particular, the number of observations for firms exporting to industrialized countries did not have good information about cost of standard compliance at the firm level. Neither the role of entry/exit could not be assessed with the data available, since there were too few observations to perform this analysis. Information about the level of skills for each firm workers was also limited, being the skill ratio the only information available. Finally, as far as wages are concerned there was only information on average wages.

¹²The contents of this survey are explained in the next section

2001, we can resort to methodologies that are generally used for program evaluation, using a Difference in Difference estimator.¹³ In this sense, our priors indicate that an increase in standards imposed by EU and US will have no direct effect on Argentine companies who devote their production to the internal market or who sell their exports to other destinations like Mercosur. However, it will have some effect on the ones exporting to the US and the EU. In this sense we can define a treatment (companies exporting to the EU and US) and a control group (companies exporting to Mercosur) and see the effect of the treatment (structural change in standard requirements) on export shares. In order to do that, we estimate a DID estimator which is equivalent to a two dimensional fixed effects panel estimation that can be specified as follows:

$$Y_{it} = \alpha I_{it} + \beta X_{it} + \lambda_t + \mu_i + \varepsilon_{it} \quad (1)$$

where Y_{it} are export shares of firm i at period t , I_{it} is a binary variable which takes the value one for companies suffering the stringency in standards at year t and zero otherwise, X_{it} is a vector of firm and time specific variables, λ_t is a common effect for all firms which varies over time, μ_i is a firm specific time invariant fixed effect. Finally, ε_{it} is an error, independent of fixed and trend effects. (Chamberlain 1984).

In this estimation, α measures the effect of changing standards on export shares. Our hypothesis is that this coefficient is negative.¹⁴

In order to test the second and the third hypotheses, where we measure the effect of changing standards on employment and wages we must overcome the problem of estimating jointly wage equations and labor demands, which requires a GE model, which goes beyond the scope of this research project.

¹³For robustness, we tried to split the sample in different periods, 1992-1996 and 1998-2001 and found no effects of standards, which supports our priors that the structural change took place around 1995. Results of these estimations are available upon request.

¹⁴While it can be argued that I_{it} may be endogenous, reflecting the fact that it represents firm's decision to stay in the export markets, we did not find many observations in our sample which dropped the EU and US as main destination all over the period analyzed. This somehow supports the idea that standard stringency may be causing marginal effects on export shares, but not entry/exit decisions. If this were the case and there were some valid instrument for I_{it} , our experiment would be calculating a lower bound for the effect of standard stringency on export shares.

We again use a similar DID approach as we did in the first hypothesis. For the labor demand equations, we will use the adequate IV procedure, as we will explain below, in order to overcome the endogeneity problem (we use as an IV for wages the average sector wage). Finally, labor demand is a function of firm characteristics and of instrumented wages, where we want to see the effect of changing standards.

6 Datasets

6.1 The World Bank Technical Barriers to Trade Survey

The World Bank Technical Barriers to Trade Survey was the first attempt to investigate the impacts of technical requirements on trade on a set of developing countries across regions, including Argentina. The intent of the survey was to solicit information from agricultural, manufacturing, and trade firms in developing countries regarding technical barriers encountered in major export markets that impact trade facilitation, and the costs associated with meeting standards and regulatory requirements. Information on technical regulations specific to five major exports markets also enables comparisons of the stringency and importance of standard and technical regulations by exports markets such as the European Union, United States, Japan, Canada, and Australia. The data are also relevant to investigate of the role of the Mutual Recognition Agreements (MRAs) to promote trade. The Survey includes information on countries such as Argentina, Bulgaria, Czech Republic, Poland, Chile, Honduras, Panama, Iran, Jordan, India, Pakistan, Kenya, Mozambique, Nigeria, Senegal, South Africa, and Uganda. The findings of the Survey can be used in our current framework, to extend our between and within sector analysis to a between and within country analysis.

6.2 National Survey on Firms' Innovation and Technological Behavior

The National Survey on Firms' Innovation and Technological Behavior (NSFITB) is a survey developed by the National Institute of Statistics and Census (INDEC) for the 1992-1996 and 1998-2001 periods. It surveys a sample of more than 1600 industries representing over 50% of the Argentine universe of firms. While the main objective of this database is the

gathering of information about innovation and technological behavior of Argentine firms, it has also abundant information regarding firm characteristics (ownership, export shares and destination, employment structure, factor intensity, etc.). Regarding standards the surveyed firms define the name, year and cost of the different certifications attained. Moreover, the survey has different measures of firm' productivity and each firm is compared to each most advanced competitor in the field in terms of a series of indicators. It also asks specific questions as to whether innovation is devoted to improve the quality of products in order to be able to sell in foreign markets.

6.3 The Permanent Household Survey

The Permanent Household Survey (PHS) is a National Program of Systemic and Permanent construction of social indicators. It is developed by the National Institute of Statistics and Census (INDEC). This program makes it possible to know about special socioeconomic and socio-demographic characteristics of households. The PHS is a two stage random sample of households that contains an array of personal, demographic and economic information on individual household members. Since the beginnings in 1974 it was conducted twice a year (in May and October) in the main urban centers of Argentina . Since 2003 it has been carried out as a continuous survey that produces quarterly data. The files record information on each respondent's labor market status and living arrangements during the survey week as well as the retrospective data on labor market activity during the previous month. In terms of personal, demographic, and economic information on individual household members, it provides the following information: labor market status (employed, unemployed or non labor force), relation to household head, age, sex, marital status, hours worked in the survey week, occupation, firm size and sector of activity, non labor income, schooling, number of children, hourly wage, number of hours worked. It is not difficult to join personal and household files and to create from these joined database variables related to the household than can influence individual behavior towards the labor market. The original PHS had a rotating sample design, with households (addresses, strictly speaking) in the survey for four waves (two years) renewing the sample for each wave. The continuous survey has a rotating sample design called 2-2-2. Households on a determined area are included in the

sample during two consecutive quarters. Then these households are excluded for other two quarters. Finally, those same households are included on the sample for 2 more consecutive quarters. In this way, we can gather information from a household for about an year and a half.

7 Results

As mentioned above, we estimated three DID equations, one for export shares, one for labor demand and one for wages. Several controls and dependent variable specifications were used. As we will discuss below, Argentina suffered different shocks which could be affecting its export performance other than the change in standards: the Mexican devaluation (1994), the Brazilian devaluation (1999) and Mexico joining the NAFTA (1993).

7.1 Impact of standards on export shares

The results for each equation can be seen in the appendix. As it was suspected, the increase in standards stringency has a negative effects on the export shares. More stringent standards appear to reduce firms' export shares (to the US and EU) by 33 basic points.

Results are robust to different specifications of the equations we estimated. We used different controls: industry export shares (Industry export share), investment in capital goods over total sales (KIsales), skilled labor over total labor (NTechNtotal), sales per employee, index of wages per employee, export of the industry to the EU and US (XEUUS), real exchange rate (TCR) and industry share of employment (SecN1).

7.2 Impact of standards on labor demand and its composition

For our labor demand equation, we have three different specifications for the dependent variables: number of employees and two specification for the ratio of white collar employees to total workers ((NTechNtotal) and (NProfNtotal)). The change in standard stringency has no effects on the total number of employees, but a positive effect on white collar/blue collar employment ratio in the exporting firms. In particular, for the firms exporting to the US and EU, more stringent standards appear to have increased their share of technical

personnel.

7.3 Impact on wages

In order to measure the effect of standard stringency on wages, we use as dependent variable wages per employee. While the ideal dependent variable would be wages for each kind of workers (white and blue collar), we do not have such information. The overall effect of standard stringency on average wages is negative, contradicting our predictions. We believe that such effect can be consistent with bargaining theories where a lower net producer price is passed on to workers in the form of lower wages.

7.4 Competing explanations

It is very hard to argue that the change in standard stringency analyzed above is the only economic shock that might be affecting export performance suffered by Argentina in the period considered. Argentina suffered many shocks which could have affected exports.

More specifically, Argentina was hit by the Mexican and Brazilian crisis and the entrance of Mexico to the NAFTA.

To account for the different shocks, we used diverse controls in our regressions. We used the real exchange rate faced by each sector. An increase in the real exchange rate, TCR, (accounting for nominal devaluation, lowering or increasing tariffs, etc.) might be affecting export shares other than the change in standards. Industry export share was also considered, since for Argentina, sectors which are export oriented are in general more productive and better prepared to face negative shocks. Capital and skill intensity (KIsales and NTechTotal) are used to account for the fact that the same increase in standard stringency, will affect less to industries that are more capital and or skill intensive. Finally, sales per employee and wages per employee are used as proxies for firm's productivity.

If any of the above mentioned shocks were driving our change in export shares to industrialized countries, we would have different results. For example, a devaluation in Brazil will result in a loss of competitiveness of Argentine products which will reduce export shares, skill ratio and average wages in exporting industries. The same would happen for Mexico's devaluation and for the Mexico entering the NAFTA.

8 Conclusions

Our results go in line with our priors. An increase in standard stringency reduces export shares of the already exporting firms. Conditional on reducing export shares, the firms which export increase their relative demand for more skilled workers. Moreover, average wages per employee are reduced. However, the fact that demand for skilled labor increases while average wages are reduced deserves further examination, since such results are counterintuitive. Such result might be explained by bargaining theories, where a lower net producer price due to the increase in costs is passed on to workers in the form of lower wages.

Our results represent a contribution to existing empirical research about the effects of standards on trade. One of the severe limitations to test our hypotheses is the data availability. Our work suggest the need of more effort in gathering firm level micro data in order to measure the effect of standards on trade, employment and wages to be able to formulate policy recommendations.

We could not derive poverty and income distribution implications with our data, but there is evidence which links positively trade and poverty reduction, so any policy which discourages exports will affect poverty at some point. As far as income distribution is concerned, evidence is mixed.

For the specific case of Argentina, where the gap between wages, returns to schooling and informality between workers in the exporting and non exporting sector is widening, facilitating the compliance with standards of Argentine firms should be a top priority in the agenda.

Finally, technical assistance from OECD countries to developing countries with the objective of helping the later to comply with the standards is also a valuable policy recommendation.

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Table 1: Investment

Purpose (in %)	2001(1)	2002	2003	2004
Improve product or service quality	43.6	32.9	29.7	17.9
Input optimization	17.3	20.7	18.0	20.6
Penetrate foreign markets	6.4	12.8	11.5	9.8
Increase production	16.7	17.6	27.9	38.3
Reduce non wage labor cost	7.7	7.5	4.7	3.7
Increase internal market share	3.2	5.7	8	9.7
Reduction in the number of hours worked	0	1.9	0.2	0
Reduction in the number of employees	5.1	1.1	0	0

(1): up to December

Source: Indec

Table 2: Incremental cost of Standard Compliance.

Industry	Mean*	Std. Dev
Electrical and electronic equipment	2.4	4.28
Fabricated metal	11.21	25.66
Industrial machinery and equipment	1.81	2.14
Industrial or agricultural chemical	3.17	4.01
Instruments, photographic, optical, watches	0.26	-
Leather and leather products	1.98	2.49
Paper and allied products	1.28	1.60
Printer and publishing products	0.29	-
Processed food and tobacco	4.61	10.61
Rubber and plastic products	5.2	6.18
Telecommunications and terminal equipment	1.57	1.96
Textiles and apparel	2.73	6.80
Transportation equipment, auto parts, dealers	4.18	8.27
Lumber, wood and furniture	0.45	0.27
Construction and construction related services	1.43	1.09
Primary metal and metallic ores	11.27	20.48
Miscellaneous manufactured commodities	20.89	50.51
Drug and liquor	3.67	3.82
Material	1.99	1.12
Other services	0.26	0.33
Other	4.6	-

Source: World Bank

% of sale price.

Table 3: % Incremental costs relative to Sale price.

Industry	Costs
Chemical (granulated enzymes)	0%
Metals (aluminum and steel)	0 - 4.20%
Car parts (shock-absorbers and valves)	0 - 4.66%
Electrical machinery (digital scales and fitness equipment)	4.30 - 8.33%
Dairy products	1.77 - 3.19%
Shoes and Footwear	10.73%
Processed foods (juices and canned products)	2.44%
Oil refining	2.50%

Source: IERAL Survey

Table 4: Statistics

Variable	
Mean Wages (2001 AR\$)	
Non-exporting	506.37
sd	(560)
Exporting	589.59
sd	(617)
Labor Informality*	
Non-exporting	41%
Exporting	32%

Source: PHS

Labor informality is measured as % of employees without Social Security Contributions.

Table 5: Mincer equations.

Dep. var.		
Log income	Non-exporting	Exporting
schooling	0.064 (0.04)	0.250 (0.02)
experience	0.053 (0.02)	0.067 (0.01)
experience2	-0.001 (0.00)	-0.001 (0.00)
size	0.091 (0.07)	0.010 (0.04)
Sex	-0.054 (0.12)	-0.337 (0.08)
civil	0.192 (0.12)	0.315 (0.08)
cons	4.245 (0.38)	3.755 (0.24)
Nobs	602	1444
R-squared	0.0325	0.11

Source: PIH

Notes: Sex=1 female, Civil=1 married, size=1 more than 100 employees

Table 6: Descriptive Statistics.

	1992			2001		
	Number of Observations	Mean	SD	Number of Observations	Mean	SD
Export Shares	312	0.14	0.23	707	0.24	0.39
Industry Export Share	312	0.07	0.06	705	0.16	0.11
Capital Goods/Sales	311	0.06	0.22	707	0.06	0.42
Other Investments/Sales	311	0.01	0.03	707	0.01	0.04
White Collar Workers/Total Workers (1)	309	0.08	0.10	702	0.33	0.24
White Collar Workers/Total Workers (2)	309	0.06	0.08	702	0.09	0.10
Average Wage (Index)	259	28.86	38.16	486	94.99	25.32

Table 8: Employment

	NTechNtotal			NProfNtotal							
treatment	0.068	0.097	0.092	0.101	0.069	0.012	0.014	0.007	0.01	0.009	0.012
Industry export share	1.26	1.69	1.58	1.69	1.28	0.53	0.67	0.34	0.43	0.43	0.54
KIsales	-0.144	0.729	0.724	0.103	0.103	-0.039	0.104	0.022	0.009		
	-0.6	(3.86)**	(3.82)**	(2.21)*	(2.21)*	-0.4	-1.46	-0.25	-0.1		
	0.119	0.023	0.031	0.112	0.001	0.025	0.013	0.021	0.017	0.018	0.02
	(2.22)*	-0.44	-0.56	(2.15)*	(3.01)**	-1.13	-0.65	-1.01	-0.82	-0.95	-1.07
Wages per employee	0.001	0.002	0.002	0.003	0.003	0	0	0	0	0	0
	(2.97)**	(6.96)**	(6.89)**	(10.65)**	(10.65)**	-0.51	-0.92	-0.49	-0.67	-0.67	-0.52
SecN1	2.226	1.548	1.385	0.906	2.213	0.354	0.187	0.021	0.103	0.096	0.338
	(2.04)*	-1.38	-1.2	-0.76	(2.04)*	-0.71	-0.44	-0.05	-0.24	-0.22	-0.68
XEUUS	0.319	-0.1	-0.1	-0.129	0.29	0.104			0.072	0.073	0.096
	-1.91	-0.63	-0.63	-0.79	-1.81	-1.51			-1.16	-1.18	-1.46
TCR	-1.332	(5.32)**			-1.23	-0.203					-0.167
	1.14	-0.173	-0.128	-0.045	(6.70)**	-1.06					-0.99
Constant	(4.30)**	-1.7	-1.03	-0.35	1.034	0.217	0.038	0.061	0.033	0.034	0.181
Observations	554	554	554	554	554	554	-0.99	-1.5	-0.71	-0.75	-1.16

t statistics in parentheses

* significant at 5%; ** significant at 1%

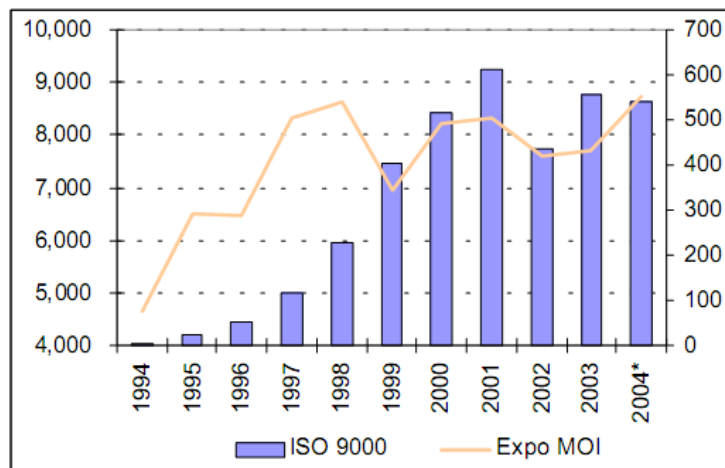
Table 9: Wages

	Average Wage	
treatment	-2.336	-1.32
	-0.22	-0.12
	(9.11)**	(13.64)**
Industry export share	13.215	-30.165
	-0.29	-0.75
KIsales	-9.921	1.096
	-0.97	-0.11
Export shares	5.134	4.951
	-0.61	-0.58
Sales per employee	0	0
	-0.42	-0.36
	27.508	
	-0.9	
	193.846	
	(2.49)*	
Constant	-185.723	28.745
	(2.31)*	(5.82)**
Observations	554	554
Number of regitecnol	364	364
R-squared	0.72	0.71
	0.799	1.42
	0.007	0.13
	(13.60)**	(18.12)**
	-42.236	
	-1.05	
	-1.565	-5.69
	-0.16	-0.63
	5.119	4.648
	-0.6	-0.55
	0	0
	-0.33	-0.37
	54.757	49.993
	-1.9	-1.76
	182.812	
	(2.70)**	
	-174.187	
	(2.50)*	
	554	554
	364	364
	0.71	0.71
	0.72	0.72

t statistics in parentheses

* significant at 5%; ** significant at 1%

ISO Certification and Exports



Source: IERAL Fundación Mediterránea based on INDEC and INTI.

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