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ABSTRACT

This paper studies the impact of Argentina trade liberalization during the nineties on the industry wage premium structure. We find that accounting for unobserved time-invariant industry characteristics is crucial. When we do not control for industry fixed effects, we find that workers in protected sectors receive lower wages. However, introducing industry fixed effects reverses the results; protection creates sector specific rents that are partly translated to workers in terms of greater wages. Since Argentina's tariff structure during this period protected relatively more high-skilled sectors, we conclude that nineties trade policy had an adverse effect on Argentina's income distribution.

RESUMEN

Este trabajo estudia el impacto de la liberalización comercial argentina en los noventa sobre la estructura de las primas salariales sectoriales. Encontramos que resulta crucial controlar por características sectoriales inobservables e invariantes en el tiempo. Cuando no incluimos efectos fijos por industrias, encontramos que los trabajadores en sectores protegidos reciben menores salarios. Al incluirlos se revierten los resultados; la protección crea rentas sectoriales que se trasladan a los trabajadores vía mayores salarios. Como la estructura tarifaria argentina durante este período protegió relativamente más a sectores calificados, concluimos que la política comercial tuvo un efecto adverso en la distribución del ingreso.

Key words: skill premium; industry premium; trade liberalization; Argentina

JEL codes: F1, J3

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1 Introduction

Trade economists have long investigated the relationship between trade liberalization and wage premium paid to skilled workers. The natural question to be answered is whether globalization and deepening of international trade could be responsible for the growth in relative earnings of skilled workers during the 1980s and 1990s in developed and developing countries respectively.

Maybe the most immediate way of thinking why trade could be associated with movements in skill premium is to reason in a Heckscher-Ohlin framework. Countries have different proportions of skilled and unskilled workers, and so do the goods that each country produces and exports. If this is true, then opening to trade is analogous to a skill transfer between economies. A country with relative scarcity of skilled workers would export unskilled-labor-intensive products and import skilled-labor-intensive products, and then opening the economy would be equivalent to an increase in its relative supply of skilled workers and a decline in its relative supply of unskilled workers. In this framework, opening the economy to trade would have an overall impact over the premium of skilled workers. We call this, an impact in the skill premium.

So if we rely in the Heckscher-Ohlin model for explaining the rise in the skill premium in developing countries (and in Latin America in particular) in late 1980s and early 1990s, we find a priori a contradiction. As long as these countries are unskilled-labor abundant, one would expect that their opening to trade should lead to a decline in their skill premium and inequality during the nineties. But, at least in Argentina, the effect we observe is the opposite. Should we conclude that Heckscher-Ohlin is not working? Galiani and Porto (2010) provide an example on how to study the relationship between trade and wages in a Stolper-Samuelson framework with bargaining power of unions.

However, extra assumptions are not necessary to reconcile facts with the classical model. Since tariff reductions in Latin America countries were disproportionately larger in unskilled-labor intensive sectors (Attanasio, Goldberg and Pavcnik, 2004; Hanson and Harrison, 1999; Pavcnik, Blom, Goldberg and Schady, 2004), the classic model could still be working. Given that tariff cuts were larger in unskilled-labor intensive sectors, the economy-wide return to unskilled workers should have decreased. Nevertheless, the evidence shown on those studies is not sufficient to conclude that the mechanism through which trade affect wages is the one described by Stolper-Samuelson years ago (Goldberg and Pavcnik, 2004).

More recent models of trade point out the relevant role that industry affiliation plays in determining how trade affects wages (Goldberg and Pavcnik, 2005). In these models, at least in the short run, labor is not perfectly mobile across sectors as was in Stolper-Samuelson (Heckman and Pagés, 2000). This assumption is important for the generation of sector specific rents that do not evaporate in the short run due to labor stickiness. Workers with similar levels of education or skills (even more, with similar levels of all observable characteristics such as gender, age, formality, etc.), could be affected differently by international trade just because of their sector or industry affiliation. When two workers that are equal in all observable characteristics receive different wages because they participate in different industries, we will say that there exists an industry

wage premium. In this type of models, since workers are not completely mobile across sectors, tariff cuts translate into proportional industry wage premiums reductions.

Also, classical models of trade suppose perfect competition in product and labor markets. However, trade policy can affect industry wage premiums in frameworks of imperfect competition. An example of that comes from Levinsohn (1993), who use Turkish drastic manufacturing trade liberalization in 1984 for testing the hypothesis of import as market discipline in an oligopoly model. He finds that sectors with higher import penetration reduced markups in a larger proportion. In this context, trade liberalization of the more unskilled-labor-intensive sectors in Latin America should have also played a role in reducing industry wage premium in sectors with a low fraction of skilled workers.

Our purpose in this paper is to estimate industry wage premiums in Argentina during the 1990s and relate them trade policy in each sector following a two-step methodology estimation used by Goldberg and Pavcnik (2005). We find that, once we control for unobserved time-invariant industry characteristics, tariff reductions that took place in the 1990s reduced industry wage premiums in the manufacturing sectors under analysis. Since tariff reductions were larger for sectors who used a high proportion of unskilled workers, we conclude that trade liberalization in Argentina has contributed to raise inequality in the last decade of 20th century. It is worth mentioning that our results do not refer to changes in the skill premium per se, but to the premium that industries pay to workers with the same level of skills. In this sense, if trade liberalization also had a positive effect on the overall skill premium of the economy, low-skill workers could have been hit twice.

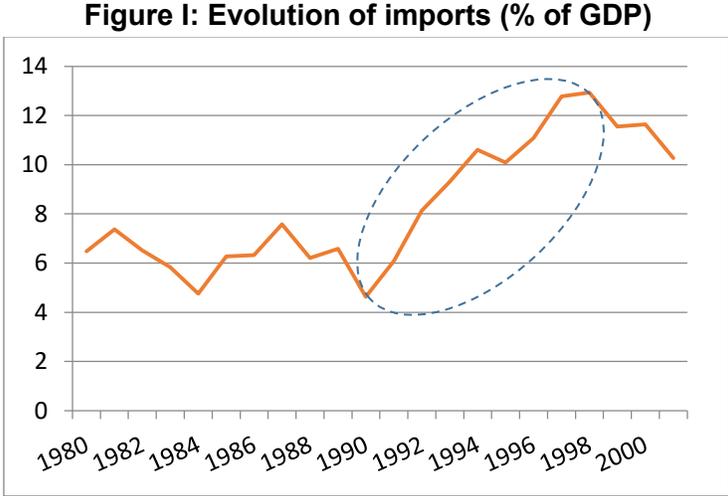
The remainder of the paper is organized as follows. In Section 2, we motivate the work by describing trade reforms made by Argentina in the nineties. Section 3 is a brief description of the data used in the paper. In Section 4, we present our regression model and explain the empirical methodology we follow. In Section 5, we show our main results, and Section 6 is left for conclusions.

2 Argentina's Background

Argentina's economic performance during the 1980s was quite poor, and by the end of the decade the economy was broken down. Growth of real output was stagnated, financial markets were collapsed and prices were rising largely due to currency depreciation. The hyperinflation of 1989 finally provided the impetus for the economic reforms applied in the early nineties. Trade liberalization policy was one of the basic instruments included in the stabilization program which meant a new way of introducing the country in international trade.

Trade liberalization started gradually as a unilateral policy in 1988 but made a strong impact only after 1990. The program included both a reduction in nominal protection and a significant reduction of tariff position that were subject to quantitative restrictions. By the end of 1991, nominal tariffs had been lowered to an average level of 12 percent and all import licenses had been eliminated (Galvani and Sanguinetti, 2003).

Trade liberalization significantly impacted trade flows. As can be seen in Figure I, between 1990 and 1998 the share of imports on GDP almost triplicated, going from 4.63% to 12.93%.



Source: own elaboration based on WDI, World Bank.

Also, Table I reports import penetration defined as imports to value-added disaggregated at industry level from 1993 to 1999. Import penetration increased in all sectors during this period, with the exception of beverages and footwear. On average, this index more than duplicated.

Table I: Import Penetration by Manufacturing Sector

Manufacturing sector	1993	1994	1995	1996	1997	1998	1999
Food products	12.88	14.62	13.27	14.58	13.66	16.98	14.35
Beverages	4.66	4.08	3.76	3.29	4.43	4.73	4.14
Tobacco	0.08	0.07	0.08	0.15	-	-	-
Textiles	36.54	36.21	41.32	52.49	51.23	56.83	49.65
Apparel (except fur apparel)	28.36	30.02	26.81	26.69	-	-	-
Dressing and dyeing of fur; articles of fur	12.57	15.51	11.48	18.72	26.77	50.52	44.28
Footwear	44.93	38.26	32.79	34.64	22.32	28.40	36.08
Wood production (non furniture)	28.56	40.42	55.41	63.13	61.45	66.95	62.36
Paper and paper products Printing and related activities	79.70	86.50	98.41	119.19	82.16	80.24	83.43
Refine petroleum products	7.52	9.29	11.57	11.18	-	-	-
Basic chemicals	9.91	17.95	22.58	21.53	30.15	45.77	25.98
Other chemical products	262.94	217.61	238.02	285.04	-	-	-
Rubber products	32.53	38.74	39.19	44.54	-	-	-
Plastics products	64.79	66.45	70.46	88.37	109.35	107.64	153.67
Glass and glass products	23.22	29.46	30.86	29.51	40.30	37.94	31.92
Non-metallic mineral products n.e.c.	26.35	31.61	30.94	32.86	39.87	51.68	47.16
Basic iron and steel	11.66	14.29	15.68	15.86	-	-	-
Basic precious and non- ferrous metals	51.09	48.80	45.67	44.58	59.57	63.57	74.73
Other metal products	75.56	81.22	84.20	107.45	131.38	246.82	155.89
General purpose machinery	33.24	44.86	53.49	52.88	67.55	69.53	67.10
Domestic appliances n.e.c.	184.94	264.75	299.20	291.22	351.79	356.19	403.23
Medical appliances and instruments of precision	218.22	268.71	296.23	307.45	368.98	411.80	358.98
Motor vehicles	208.54	297.67	247.25	359.89	393.49	351.82	378.80
Furniture	113.81	137.85	141.38	164.30	222.27	278.19	322.63
Other manufacturing	18.23	17.51	13.29	19.94	47.17	46.33	52.65
Average	171.64	188.50	217.52	234.00	447.97	422.57	415.07

Source: own elaboration based on Nicita and Olarreaga database (2007).

Industry is well known to be a low-skill-labor sector relative to the average skill level of the economy. This can be seen in Table II, which shows the share of employment by skill group for the wide economy and for the manufacturing sector. Thus, given that manufacturing as a whole is a low-skill-labor intensive sector, if tariff reductions are larger for manufactures that employ high proportions of unskilled workers, the impact of trade liberalization on income distribution would be twice negative.

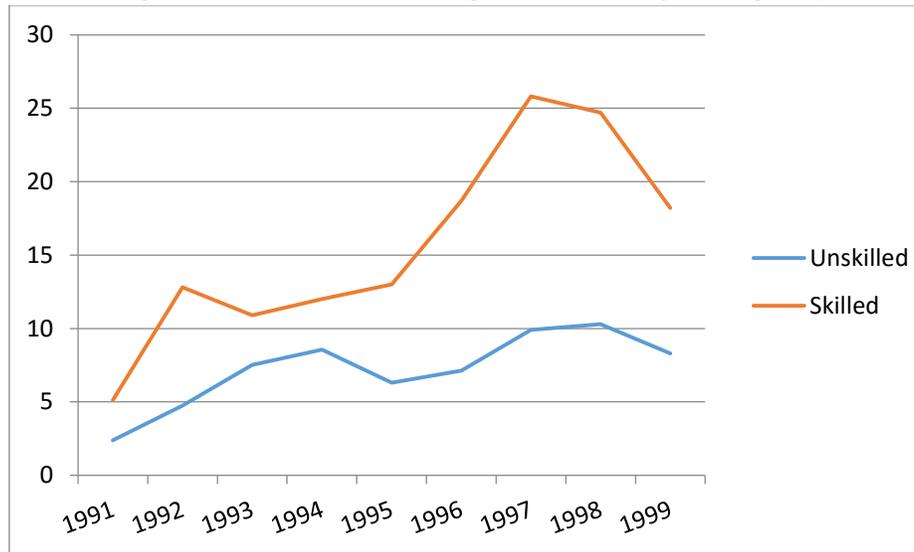
Table II. Import penetration by manufacturing sector

	Share of skilled workers (%)		
	1991	1995	1999
Manufacturing	9.99	12.01	14.96
Services	22.86	21.49	23.60
Total economy except manufacturing	22.87	21.56	21.12
Total economy	19.65	19.78	19.78

Source: own elaboration based on SEDLAC.

In Figure II we show the evolution of mean tariff for skilled and unskilled industries weighted by the dollar value of their imports. Weighted tariffs are larger for skilled industries, so we conclude that Argentina's trade policy during the nineties favored them relatively more.

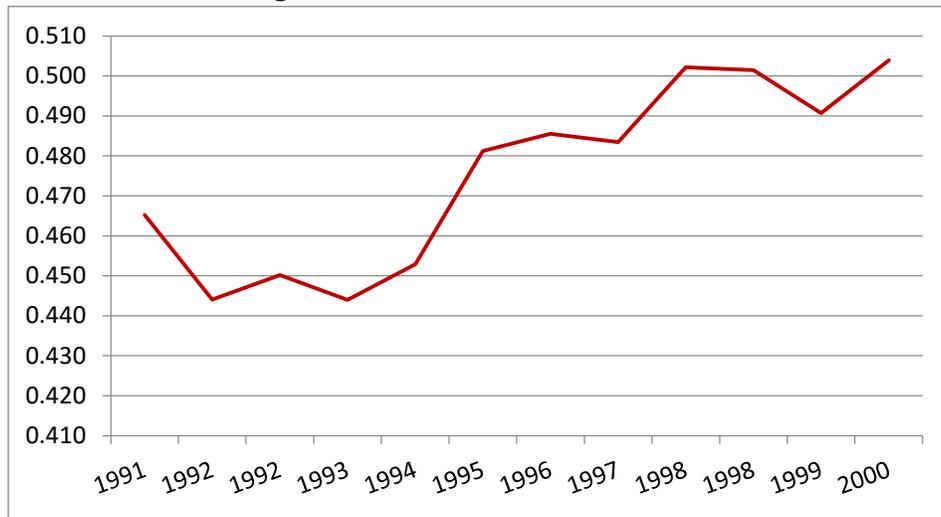
Figure II: Evolution of weighted tariffs by skill group



Source: own elaboration based on Galliani and Porto (2008) and SEDLAC.

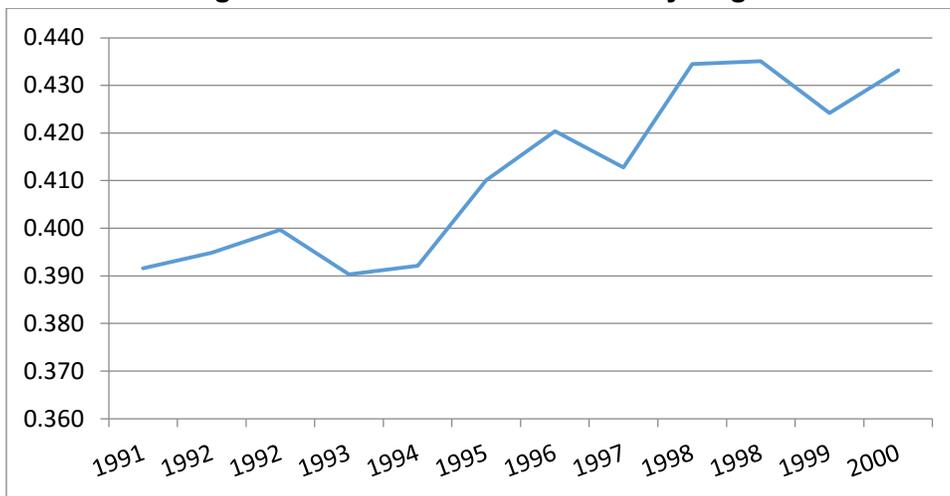
At the same time, inequality rose considerably, a common trend in Latin American countries during this decade. Alvaredo and Gasparini (2015) document that income inequality rose sharply in the region in the late 1980s and in the 1990s, probably as the result of recurrent macroeconomic crisis and some structural transformations. Figure III and IV show the Gini coefficient on per capita family income and on hourly wage in main job, respectively, for Argentina between 1991 and 2000.

Figure III: Gini coefficient on PCFI



Source: own elaboration based on SEDLAC

Figure IV: Gini coefficient on hourly wages



Source: own elaboration based on SEDLAC

Given these two stylized facts, in the rest of this paper we investigate if trade liberalization could have been one of the factors behind the sharp increase in inequality.

3 Data

We use four different types of data: household-level data from SEDLAC (CEDLAS-Universidad Nacional de La Plata and World Bank); industry-level data from the trade and production database compiled by Nicita and Olarreaga (2007); import tariff data used by Galiani and Porto (2010); and multilateral real exchange rate series for Argentina published by the Central Bank of Argentina.

Household level data from SEDLAC contains information on earnings, worker characteristics and industry affiliation. Information is homogenized to be consistent across

time. We restrict the sample to individuals in working age (15 to 65 years old) who report positive labor earnings. We use surveys for the period 1991-1999.

The variables that we use from the household surveys in our analysis are labor earnings, age, gender, education, sector of employment, geographic location and formality status. These variables are used in our Mincer regressions in which we relate labor earnings with worker characteristics and include dummies for sector affiliation. The coefficients accompanying these dummies reflect industry wage premium, that is, differences in wages between workers that are exactly the same, except for their industry affiliation. The definition of sector of employment is expressed at the 3-digit level of the ISIC Revision 3 classification, so we match survey information to this classification using United Nations Statistics Division concordance tables.

Trade and production database from Nicita and Olarreaga (2007) collects sector data at the 3-digit level of ISIC Revision 2 classification sector. We use concordance tables again to translate them to Revision 3. This data contains information about imports, exports, value-added, output, number of employees and other variables, all at the sector level. With this data we construct two variables of relevance: i) productivity, defined as the ratio of output (or value added) to number of employees; and ii) trade openness, defined as the ratio of imports to output (or value-added). Both productivity and trade openness are interesting variables for explaining industry wage premiums. We count on this information for the years 1993-1999.

Import tariff data is the same used by Galiani and Porto (2010). It consists on historical data collected by the authors from the *Guía Práctica del Exportador e Importador*, a monthly publication that provides current tariffs at the most disaggregated level of the National Import Tariff Classification (NADI). We count on this information for the period 1991-1999.

Finally, we use multilateral real exchange rate data series published by the Central Bank of Argentina.

4 Empirical Strategy

We follow Goldberg and Pavcnik (2005) in investigating the effects of trade policy on wage inequality, who suggest a two-stage estimation methodology. In the first stage, the log of worker i 's wage is regressed on a vector of worker i 's characteristics, including age, gender, level of education, dummies for formality status and region of residence. Besides, we incorporate dummies for industry affiliation. The coefficients on the industry dummies are interpreted as industry wage premiums, and represent the part of the variation in wages that is explained solely by workers' industry affiliation, and not by workers' individual characteristics. In other words, they represent the difference in wages between workers that are exactly the same, except from the industry where they work. In this stage eq. (1) is regressed separately for each year on our sample:

$$\ln(w_{ijt}) = C_{ijt}\beta_C + I_{ijt}ip_{jt} + \varepsilon_{ijt} \quad (1)$$

where $\ln(w_{ijt})$ is the log of worker i 's wage; C_{ijt} is the vector of worker i 's characteristics and I_{ijt} are dummies for industry affiliation.

The use of individual characteristics allows us to control for compositional differences across sectors. Average industry wages may vary across industries because of the different types of workers that each sector usually employs, and consequently sectors with a large share of skilled workers are likely to have higher average wages. If these industries have low tariffs, one would wrongly predict that protecting industries in the form of higher tariffs would lead to a decrease in their worker's wages. Note that this problem would not exist if industry composition were constant over time, since industry fixed effects could capture differences in composition between sectors.

Once we obtain the industry wage premium coefficients (ip_{jt}), we compute a normalized industry wage premium variable, expressing each ip_{jt} coefficient as deviation from the employment-weighted average industry wage premium. This new variable is interpreted as the proportional difference in wages for a worker in a given industry relative to an average worker in all industries with the same observable characteristics.

Then we pool these normalized industry wage premiums (which, to facilitate notation, we call ip_{jt}) over time and regress them on trade industry characteristics (included in the vector T_{jt}), namely tariffs, value of imports, degree of openness, productivity, multilateral real exchange rate and some interactions. Additionally, we include year and sector fixed effects in D_{jt} .

Eq. (2) estimates the response of relative wages to trade policy changes, controlling for other observables.

$$ip_{jt} = T_{jt}\beta_T + D_{jt}\beta_D + u_{jt} \quad (2)$$

Although there probably are other variables affecting industry wage premiums, data constraints prevent us from including them in the analysis. For instance, if omitted variables are correlated with tariff changes, the OLS estimated coefficients would be biased. However, if these variables affecting industry wage premiums are not correlated with trade policy changes, our estimated trade policy effects would be correct.

Another problem arises if we think that policymakers take into account industry characteristics when deciding the degree of protection they will apply. This could be captured in the second stage of the estimation through industry fixed effects, if political economy factors that are important do not change much over time. However, if they do, for example responding to other variables that also affect wages (such as real exchange rates), our estimations would be biased. We address this concern controlling for MRER (multilateral real exchange rate).

Given that during the nineties Argentina's trade policy was largely influenced by unilateral, bilateral and multilateral commercial agreements, such as the General Agreement on Trade and Tariffs (GATT), we can conjecture that tariffs were not the main channel through which discretion in policy decisions to specific sectors took place. However, the use of an instrument to control for this endogeneity bias would be desirable.

Finally, as the dependent variable in eq. (2) is estimated, it is measured with error. Although this does not affect consistency if this measurement error is uncorrelated with the independent variables, additional noise is introduced in eq. (2), which increases the variance of the estimators. To account for the fact that usually the noise in the dependent variable differs across sectors and depends on the variance of the estimated coefficients on industry dummies in eq. (1), we use weighted least squares (WLS) following Krueger and Summers (1988). This methodology consists on approximating the standard errors of the normalized wage premium coefficients by the standard errors of the coefficients of the original regression, and for the omitted base category by the standard error of the constant term.

5 Main Results

The results we are interested in are those related to the second equation of the empirical strategy. We want to know if changes in trade policy affect industry wage premiums through different hypothetical channels such as labor stickiness or imperfect competition in labor or product markets.

Although we count on tariff information since 1991, output data is only available since 1993, and that is why our regression sample consists on twenty-six industries with available data for the period 1993-1999. Six industries lack output information for the last three years but we decided to keep them anyway, in order to avoid taking any arbitrary decision with possible endogeneity bias behind.

Our most relevant results are shown in Tables III and IV. The former shows estimations of eq. (2) using OLS method and the latter using WLS.

In both tables, specifications are the same. Specification (1) is a simple regression of the normalized industry premium in the log of tariffs with three controls: log of openness (imports/value-added), log of productivity (value-added/number of employees) and MRER. Specification (2) is the same but it includes year fixed effects. Specifications (3) and (4) are preferred, as they control also for industry fixed effects. Specification (3) instead of using MRER includes an interaction of it with the degree of openness of the sector. The inclusion of productivity as a control variable results of importance because otherwise we could be estimating spurious correlation. If more productive industries pay higher wages, and they receive the lowest protection because government thinks that they can survive international competition without it, we could falsely conclude that lower tariffs raise industry wage premiums when the factor behind the higher wages is just higher productivity.

It is remarkable the importance of accounting for unobserved time-invariant industry characteristics, since doing it reverses the sign of the tariff coefficient in both tables, making it positive and statistically significant for explaining industry wage premiums. The reversion of the sign of the tariff coefficient is in line with the results of Goldberg and Pavcnik (2005), who also find that including industry fixed effects turns the coefficient from negative to positive in their study for Colombia's liberalization.

The tariff coefficients in specifications (3) and (4) in both tables are very similar, lying between 0.143 and 0.149. This is an economically significant effect. The difference

between Tables III and IV is not the magnitude of the coefficients but their explanation power. Given that standard errors are overestimated in the OLS regressions, the introduction of the WLS method helps us to increase the statistical significance of our estimators.

Table III: OLS estimations

	(1)	(2)	(3)	(4)
Tariff (log)	-0.0560 (0.0477)	-0.0568 (0.0492)	0.143* (0.0765)	0.146* (0.0761)
Openness (log)	-0.0112 (0.00930)	-0.0106 (0.00952)	0.0349 (0.0642)	0.0494 (0.0604)
Productivity (log)	0.111*** (0.0254)	0.113*** (0.0258)	0.0646 (0.101)	0.0470 (0.0973)
MRER*Openness			0.00113 (0.00166)	
MRER	0.00352 (0.00700)	0.00458 (0.0133)		0.00457 (0.0142)
Year fixed effects	No	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes
Observations	158	158	158	158

Note: standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Industry Wage Premium is the dependent variable.

Table IV: WLS estimations

	(1)	(2)	(3)	(4)
Tariff (log)	-0.0221 (0.0282)	-0.0273 (0.0288)	0.144*** (0.0478)	0.149*** (0.0474)
Openness (log)	0.0104* (0.00607)	0.0114* (0.00621)	0.0389 (0.0388)	0.0501 (0.0360)
Productivity (log)	0.133*** (0.0166)	0.132*** (0.0167)	0.0523 (0.0726)	0.0392 (0.0706)
MRER*Openness			0.000961 (0.00125)	
MRER	-0.000306 (0.00383)	0.00583 (0.00712)		0.00713 (0.00863)
Year fixed effects	No	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes
Observations	158	158	158	158

Note: standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Industry Wage Premium is the dependent variable.

6 Conclusions

Like many other Latin American countries, Argentina went through a broad liberalization program during the nineties. At the same time, wage inequality rose largely over this period.

Using data from household surveys and tariffs for Argentina, we find that worker affiliation is an important factor for explaining labor earnings, and that trade protection creates specific industry rents probably due to imperfect competition or labor stickiness. We also find that accounting for unobservable time-invariant industry characteristics is crucial for understanding this relationship. Once we control for industry fixed effects in our regressions, we find that tariff protection has a positive and statistically significant effect on industry wage premiums.

Combining the above results with Argentina's tariff structure during this period, which protected relatively more sectors that employed higher proportions of skilled workers, we conclude that nineties trade policy has contributed to the rise in inequality documented in this paper.

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