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Trade and Wages in Uruguay in the 1990's

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Resumen: En el Mercado laboral uruguayo en los años 90', los principales fenómenos observados son una mayor desigualdad salarial, con incremento en el premio a la calificación y cambios en la estructura interindustrial de los salaries, la destrucción de puestos de trabajo no calificados asociada a la apertura comercial y cambios en la especialización productiva que implicaron cambios tecnológicos sesgados hacia el empleo de trabajo calificado, y un a reducción del peso de los sindicatos en la negociación salarial. En este trabajo se intenta una aproximación empírica para evaluar el impacto del incremento en la apertura comercial en los premios salariales sectoriales y por calificación, combinando datos individuales y agregados. Encontramos un vínculo entre la apertura comercial y los premios salariales en Uruguay en los 90': dentro de un sector determinado, la reducción de la protección implica un incremento en el premio a la calificación, al mismo tiempo que una reducción del premio sectorial.

Abstract: The main facts of the Uruguayan labour market along the nineties may be summarized in three main phenomena: increase in wage inequality with an increase of the skill wage premium and changes in the inter-industrial wage structure; destruction of unskilled jobs, associated to trade openness and changes in the productive specialization that implied technical change biased to the employment of workers with higher skill; decrease of the role of unions in wage negotiation. This paper attempts an empirical strategy to evaluate the impact of increased trade openness in the industry wage premiums and in the skill wage premiums, combining micro and macro data. We find a link between trade openness and both industry and wage premiums in the 1990's in Uruguay: in a given industry, reduced protection implied an increase in the skill premium and a lower industry relative wage

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Trade and wages in Uruguay in the 1990's

a) Introduction

In many advanced economies a tendency towards the increase in wage inequality and the skill premium was observed and documented in a vast literature. Several directions of research have been pursued, such as supply and demand shift analysis, including analysis of the changes in labour supply by education level and potential demand changes related to skill biased technological change or trade, and the analysis of the effects of changes in institutions, particularly unionisation and government regulation. In the case of a developing economy as is the case of Uruguay, an increase in wage inequality and in the skill premium is also observed in the 1990's, hence it is interesting to explore the possible explanations for such a phenomenon.

There is a debate on the effects of increased openness to trade in labour demand and wage inequality, both in industrialised and developing economies. In this latter case, opinions seem to be divided between those who favour increased openness and those that point to the potential risks and dangers of what has been described by the elusive term "globalisation" (See Rodrik, 1999, Wood, 1999). We intend to provide evidence that might be useful to evaluate the effects of such changes in a small developing economy that undertook a significant trade reform during the nineties.

A traditional argument to promote trade openness in developing countries is one based on an income distribution improvement effect, since openness brings about factor reallocation towards sectors with comparative advantage, which, in a neoclassical vision, are those intensive in the relatively abundant factors. In this context, the relevant result is the Stolper-Samuelson theorem linking changes of prices of production factors to changes in the prices of the goods produced. If a developing country has relative abundance of unskilled labour, when opening to trade the relative wage of unskilled labour should rise, which in turn improves the income distribution. Observed changes in relative wages in East Asian countries that opened to trade early is often cited as evidence of this. In such case trade openness would bring an additional benefit to the conventional gains of trade. In the case of industrialized economies the argument would run in the opposite direction. Increasing social conflict and overt resistance of many pressure groups, particularly labour unions, to globalisation, could be interpreted as a consequence of distributive conflicts

arising from higher trade with economies relatively abundant in unskilled labour. The stylised facts of the labour markets in industrialized economies point to an increase of the skill premium and in the skilled to unskilled employment ratio.

In the nineties a number of empirical papers were devoted to developing countries, particularly Latin American, analysing changes in the labour market associated to the deepening of trade openness processes. A striking result is that in many countries in the region the labour market effects were very similar to those described for industrial economies. Wood (1999) sets two possible explanations for this. One is related to the differences in the relative factor endowments: the comparative advantage of Latin America stems from a relatively abundant endowment of natural resources, [1] not of unskilled labour. The second argument stresses that the world has changed since between the 1960-70 and 1980-90 decades, in that the low wage exporters have already made their entry into the world markets. This causes that the skilled/unskilled employment ratios of middle-income economies, being lower than that of the industrialized countries, are now above the world average. Somehow both arguments are the same, both in the geographical and the time dimension, and the questioned point is if these countries are really in the international economy as suppliers of unskilled labour. In the case of Uruguay, Wood's argument applies since this country participates in the world markets as a supplier of goods intensive in natural resources apt for agriculture based food production.

Other perspective arises when the specific factor model point of view is adopted, which allows to establish a general theoretical link between changes in relative prices (due to trade liberalisation) and productive factor prices. In this context, a positive association between the protection level in a given industry and the relative wage (in deviation with respect to the average) is expected to exist. In the case of the HOS model, if labour freely moves between sectors, there would be a global link between liberalisation and general wage level for different types of labour according to the relative factor abundance in the economy and its comparative advantage pattern, but industry deviations in wages with respect to the average there won't be expected (see Gaston and Trefler, 1994).

Our paper seeks to investigate the correlation of both kinds of wage premiums, the skill premium and the industry premium, and measures of trade openness that track the intense reform processes of the 1990's in Uruguay. However, labour demand is not only affected by trade openness and

[1] When a factor "land" is introduced in a simple, Heckscher-Ohlin model, higher trade openness may, in principle, cause the skilled/unskilled wage differentials to widen even in a country with a relatively low

globalisation. First, the acceleration of technical progress has implied a strong reduction of the use of unskilled work and a bias towards the use of skilled work. Secondly, changes in institutional and regulatory frameworks in the Uruguayan labour market have also affected the working and payment conditions of unskilled workers. Finally, it is necessary also to control for changes in the relative supplies of skilled and unskilled labour.

Due to these reasons, it is not possible to predict an unambiguous relationship between trade policy (protection) and relative wages, both between industries and different skills. The objective of this paper is to set up a preliminary empirical exploration of the changes in the labour market in relation to the process of reduction of trade protection. Particularly, we seek to find the effect of the trade openness process in wages of different sectors and skill levels, in order to gain insight about winners and losers of the trade reform process and its political economy aspects.

The paper is organised in five sections. Section b) is devoted to an analysis of changes in openness, specialization pattern, employment and wages by sector and skills. Section c) develops an empirical strategy for testing the effect of trade on the wage premiums by skill and industry, section d) presents and discusses the results, and finally section e) concludes.

b) Openness and wage structure in the 1990's

i) *Trade openness in Uruguay in the 1990's*

Uruguay experienced a gradual, slow and long process of trade reform, that did not experience serious reversals along the three decades that lasted. The trade reform process was dampened according to the bargaining power of each industry, so that the magnitude of the costs that every sector of the society had to face was not even. In other words, even though there were compensations and gradualism, those were not oriented to the most vulnerable sectors unprotected from the ongoing changes, but rather the traditional scheme was followed and compensation was directed to industries with larger power to influence the government. Additionally, the instruments used to protect certain industries from increased competition did not necessarily imply a successful renovation, but instead simply postponed the moment in which those industries adjusted themselves to reduce their output.

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skilled/unskilled employment ratio.

What is new about the nineties is the acceleration in the fall of import tariffs and the commitment that the country adopted with respect to trade policy, adhering to international agreements. While there were several sectors previously isolated from the reforms, in the nineties the reciprocal liberalization agreements (both regionally with the creation of MERCOSUR and multilaterally with the end of the Uruguay Round of the GATT and the creation of WTO) modified this situation and reduced the discretionary power of the government to offer protection to any particular industry. In this sense, the international agreements have deepened the liberalization process, increasing the number of included sectors and decreasing the probability of a discretionary use of protectionist instruments.

To measure the effects of trade reform on economic activity, we present estimates of the degree of trade openness in Uruguay. The alternatives considered are in the first place indices based on the intensity of trade, and then those based on the measurement of relative price distortions. Two versions of the trade openness coefficients [2] are displayed in Graph No. 1.

The stories they tell differ, since the openness coefficient in current prices is virtually stabilized around 0,4, while that at constant prices grows steadily.

A specific feature of the Uruguayan openness process of the nineties is that, contrary to experiences in other developing countries, the real exchange levels (p_T / p_{NT}) where p_T is the price of tradable goods and p_{NT} the price of non tradables,. were low. The Uruguayan government pursued in the 1990's stabilization policies based in the management of the exchange rate, which produced a significant appreciation of the national currency.

This affects the calculation of the trade openness coefficients, and is the reason why we compute such coefficients at constant prices. If we consider an economy where sectors 1, 2 and 3 denote respectively the exportable, the import competing and the non tradable goods, income can be written as

$$Y = p_1 x_1 + p_2 x_2 + p_3 x_3 \tag{2}$$

where p_i is sector i' s price and x_i is sector i' output (value added). Tradable (Y_T) and non tradable (Y_{NT}) outputs are defined as

$$Y_T = p_T x_T = p_1 x_1 + p_2 x_2 \tag{3}$$

[2] They are defined by $ca = (X + M)/Y$ (where X is exports, M is imports and, Y is GDP), They were calculated

$$Y_{NT} = p_{NT} x_{NT} = p_3 x_3 \tag{4}$$

and the tradables price can be derived as:

$$p_T = \frac{p_1 x_1 + p_2 x_2}{x_T} \tag{5}$$

Trade flows are given by

$$X = p_1 (x_1 - c_1) \tag{6}$$

$$M = p_2 (c_2 - x_2) \tag{7}$$

where c_i is domestic consumption of sector i. Substituting in gives

$$ca = \frac{p_1 (x_1 - c_1) + p_2 (c_2 - x_2)}{p_T x_T + p_{NT} x_{NT}} = \frac{\left((p_1 x_1 - p_2 x_2) + (p_2 c_2 - p_1 c_1)\right) \Big/ p_T x_T}{1 + \frac{p_{NT}}{p_T} \frac{x_{NT}}{x_T}} \tag{8}$$

A relation can be derived between the openness coefficient and the relative size of the non tradable sector (x_{NT} / x_T) and the real exchange rate (p_T / p_{NT}) and trade policy.

$$ca = \frac{(2\alpha - 1) + \gamma(1 - 2\beta)}{1 + \frac{1}{tcr} \frac{x_{NT}}{x_T}} = \frac{2(\alpha - \gamma\beta) + (\gamma - 1)}{1 + \frac{1}{tcr} \frac{x_{NT}}{x_T}} \tag{9}$$

where: $\alpha = \frac{p_1 x_1}{p_T x_T}$; $\beta = \frac{p_1 c_1}{p_T c_T}$; $\gamma = \frac{p_T c_T}{p_T x_T}$. The coefficient α measures the share of exportables in tradable output, and β the share of consumption of exportables in expenditure in tradables, while γ gives the relationship between expenditure and output of tradables. If $\gamma = 1$ there trade is balanced. α and β depend on trade policy. With itrade liberalization, the share of exportables in the tradables supply (α) will increase, and their share in tradables expenditure (β) will decrease, hence the coefficient will increase. However, the openness coefficient will also increase (reduce) with a devaluation (appreciation) in the real exchange rate. So the effects of liberalization on the real exchange rate are ambiguous, hence it is not possible to establish a single relationship with the openness coefficient measured at current prices.

In the case of the trade openness coefficient at current prices, it can be shown that while trade policy caused the ratio of exports plus imports to tradable output to increase, this was counteracted by a reduction in the price ratio of tradables to non tradables (exchange rate appreciation), which in turn

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using data both at current and 1983 constant prices.

was also accompanied by a shift of production from tradables to non tradables. The relatively stable evolution of the trade openness index at current prices coefficient results from the balance of such forces. In the case of the trade openness index at constant prices it increases sharply, since the effect that matters most is the one in quantities derived from greater trade openness.

Two other indices complement the analysis. The first follows the correction proposed by Low et al (1999), and consists of constructing the trade intensity index used below, but using the reference prices of USA at parity of purchasing power, computing five year moving averages of the variables, and normalizing by a fitted trade openness coefficient as predicted from a cross country regression in which several variables indicating the size and development of the country were included. In graph No. 2 the trade openness index at 1987 constant prices is displayed along with the same index calculated using 1987 purchasing power parity constant 1987 USA prices, as well as the predicted openness of an economy with Uruguay's characteristics [3].

Finally, we show the relative price distortions based index of trade openness [4], that tracks the changes of the relationship between import substituting and exportable goods that can be attributable to changes in trade policy. In a small open economy, domestic prices of both sectors are a function of trade policy. Their price ratio, normalized with respect to the international price ratio is also a function of trade policy. An equivalent tariff rate is defined, that equals the net effect of tariffs and subsidies in the price ratio of exportable to import substituting goods. This index of trade policy is constructed for each year, as a function of the same indicator in the base period and the current price ratio. The results are displayed in graph No. 3.

In summary, both indexes show the same story, using different methodologies and processing information from different sources. The stylised facts are as follows. In the first place, the Uruguayan economy underwent a significant openness process, with almost no reversions. Secondly, the process accelerated particularly in the 1990's. At the same time, it is evident that, besides an important exchange rate appreciation, within the tradables sector the trade reform also altered significantly the price ratio between exports and imports in favour of the former, which is precisely the change to be expected from the trade openness policy.

[3] When USA purchasing power parity prices are used the coefficient moves downward, since GDP is valued higher with respect to trade, but the evolution looks similar. The fitted value (that corresponding to Uruguay's size and development) shows a less increasing evolution, which reflects the structural pattern of the international economy, while the Uruguayan economy steadily approaches it along the period.
[4] This follows Berlinski (2000).

ii*) Employment and wages by industry and skill level in the 1990's*

The 1991-1999 period in Uruguay was characterized until the end by positive growth in real GDP, that halted only in 1995. Total employment shows an increase through the decade, but for two points where a net loss of employment is observed: 1996 and 1999. The aggregate growth rate in the total employed persons is an annual 0,7% in 1991-1999 [5]. Output increases at an annual rate of 3,2% in the same period.

We use micro data from the Uruguayan Household Survey and classify workers according their educational attainment into three groups: unskilled (primary or incomplete secondary school or technical education), basic skilled (completed secondary school, or technical, or teaching, or military), and high skilled (complete or incomplete university education). We analyze salaried workers, hence excluding employers, unpaid workers and self employed. Workers are classified according to 2 digit industry ISIC codes.

This classification follows Wood (1994), who argues that these three categories are required to analyse the North-South trade relations. The first one is that of workers with very little or no education [6], the second is that of workers with a general primary or secondary schooling but no further, and the third comprises the workers with an education beyond the basic, including professional and technical workers and managers.

Labour can also be heterogeneous according to the degree in which its skills are specific to the industry in which is employed, which in turn restricts the degree of mobility it can have between sectors. This specific characteristics may or may not be associated to the education of workers, though it might be conjectured that for medium or high education workers their ability to develop learning processes and gain specific experience will be higher, hence their degree of industry specificity may be more significant.

The decade of 1990 shows an important shift in the structure of employment both by industry and by skill group. Total employment grew slowly in a context of intense reallocation across sectors

[5] To emphasize structural changes, averages of 1991-1993 and 1997-1999 three-year periods are compared.
[6] To Wood, this is relevant for developing countries since this particular group is hardly employable in modern manufacturing (which may in turn call into question the existence of relative abundance and comparative advantage in labour intensive manufacturing sectors).

There was significant destruction in manufacturing, particularly in the textile, along with creation in the services sectors (see table 1). Unskilled employment share fell by 5 percent points to 46%, while the basic skills group increases its share in 5 percent points reaching 40% of total salaried employment. The high skilled group increases by 3 percentage points and represents 14% at the end of the same period. In absolute figures, through the 1991-1999 period there is a net loss of about 47,000 unskilled jobs, while the basic skilled jobs increased by 46,000, and about 22,000 new skilled salary jobs were created. (see table 1). The sectors that lead the reduction in the unskilled jobs are in the manufacturing sectors.

Another relevant phenomenon during the nineties is the reduction in public employment as a result of the undergoing state reform process. Comparing the initial and final three-year averages there was a decrease of more of 3% in public employment's share in total employment. Even though this structural change is different in nature, its effects go in the same direction of that observed in the rest of the economy.

In Table 2 real hourly wages by skill for salaried workers are presented for each sector and skill level. The average wage shows a slightly increasing trend, growing at an annual rate of 2%. Wages of the unskilled and basic skilled grow considerably slower than those of the skilled workers on the aggregate.

Focusing on the unskilled workers, the wages fall in some of the manufacturing sectors, as well as in retail and restaurants and hotels. There are sharp differences between the public sector and private dependent workers. In the first cases wage increases were far larger, across every skill level. If we focus on the high skilled (basic skill) to unskilled employment and wage ratios, we observe that the skilled/unskilled employment ratio is lower in the tradable sector (natural resource and manufacturing sectors), and is larger in the non tradable sectors. The generalized trend in the nineties is an increase of such ratio. We also identify that there is a trend across the economy to the increase in the high skill/unskilled wage ratio also, and that a positive covariance of both changes is widespread across sectors.

Previous studies as Arim and Zoppolo (2000) have provided evidence on the subject, applying a methodology similar to that in Murphy and Katz (1992) to the Uruguayan labour market to analyse changes in employment and wages for 216 groups (by sex, region, education and experience) through the inner-product tests. They conclude that between 1986 and 1990, an increasing supply

and decreasing returns to skill is consistent with a story based in the increase of the relative skill supply against a stable demand. Standard models yield that when factor demand functions are stable, wages and employment must display positive covariance. If this is so, changes in supply are the potentially most powerful explanation for changes in relative wages.

Graph No. 4 illustrates this. The horizontal axis represents relative supply and demand of unskilled to skilled labour. The vertical axis measures the relative wage. The downward slope of the demand curve reflects substitution in production induced by changes in relative wages, whereas the positive slope of supply indicates that the relative wages affect the relative availability of both types of work. In the case displayed the relative supply is contracting against a stable demand. The induced changes in relative wages have a negative covariance with changes in quantities. As the working force gets more educated, the relative supply curve shifts upward, unskilled work is scarcer and its price rises, hence the wage dispersion falls, which is consistent with the labour demand prevailing in a highly protected economy.

In a standard two good trade model, a small open economy (taking prices from abroad), located in the incomplete specialization locus, the relative labour demand is infinitely elastic. In the case of real economies, where many goods are produced and specialization might be complete, labour demand tends to be infinitely elastic as the economy becomes more open (Wood, 1999). The increase in the elasticity of unskilled labour demand associated to the globalisation process of the international economy has also been highlighted by Rodrik (1997 y 1999) as the main reason behind the changes taking place in the developed countries' labor markets.
According to Arim and Zoppolo (2000) in the nineties, it is no longer possible to maintain the hypothesis of supply shifts as the dominant force behind the observed changes in relative wages and employment. The evidence they introduce shows that relative employment and wages show a positive covariance, hence it is necessary to introduce demand shifts in the interpretation of these phenomena.

In contrast with what has been pointed out about the eighties, in the nineties the wage dispersion increases, and broadly speaking the situation of the high skilled workers improves. There is ample evidence of positive covariance between employment quantities and wages, for different types of workers, skills and sectors. The results are condensed in Table 3.

Graph No. 5 may help to outline an interpretation of the facts of the Uruguayan labour market in the nineties. Consider for instance the tradable sector, and the labour market for private dependent workers. Let us assume that there is a secular trend to the decline of the relative supply of unskilled to high skilled workers (from S^0 to S^1). However, in the nineties two additional changes affected labour demand: on the one hand the elasticity of the demand curve increased, hence the substitutability increases (a tilt from D^0 to $D^{1'}$) and on the other hand the demand of unskilled workers relative to high skilled decreases (a downward shift from $D^{1'}$ to D^1).This hypothesis seems consistent with the empirical evidence presented. Changes in labour demand relate directly or indirectly to the intensification of the trade openness process as well as to the introduction of skill biased technical progress.

The direction of changes in relative supply and demand of unskilled to high skill labour affect in the same sense (a reduction) the relative employment of both types of labour.

To evaluate changes in employment and wages by sector and skill level, we decompose the overall changes in the shares of the high skilled workers in employment and the wage bill of salaried workers. The overall variation of the share of skilled workers in total can be presented as the sum across industries of the changes in the shares of the skill group in the industry weighted by the average share of the industry in the endpoints of the period (within variation) plus the sum across industries of the changes in the shares of each industry in the total, weighted by the average of the share of the group in each industry in the endpoints of the period (between variation) (see Autor, Katz and Krueger, 1997). The results are displayed in table 4.

The increase in the share of the highs skilled in the wage bill exceeds that on total employment, pointing to the increase in the skill premium that is an important feature of the 1990's in the case of Uruguay. The results show that around 25% of the gain in share can be explained by between variation. The importance of between variation is usually associated with an interpretation that involves shifts in production related to trade, while within variation is usually linked to broad skill biased technological change. In our case the results show the existence of some scope for a mixture of both kinds of explanations.

In what follows we analyze the main changes in the structure of wages in Uruguay along the 1990's, considering the evolution of the overall inequality, the changes in the skill premiums, and the evolution of changes in industry employment and wages. Our analysis is directed towards the

set of basic facts of the wage structure along the nineties. The issue was taken before by Arim and Zoppolo (2000) and we confirm and extend some of their results. First we consider the changes in log hourly wages by percentile of the distribution (see graph 6). Wage increases in the upper part of the distribution are larger than those in the lower tail, hence the wage differential between the upper and lower percentiles widened significantly along the decade.

This might be confirmed when the ratio of 90/10 percentiles of the wage distribution is calculated across the decade, which illustrates the conclusion of Arim and Zoppolo about the deepening in wage inequality along the period (see graph 7).

The second feature of the changes in the wage distribution that we want to emphasize is the increase in the skill premium, as measured by the coefficients of the skill level dummies in a standard Mincer equation. In this cross section regressions in which we included skill dummies, there is a pattern of increase in the skill premium of the high-skill versus low skill, whereas the ratio of wages of the medium skilled to the low skilled remains fairly stable (see graph 8).

While wage equations account for less than 40 percent of overall variation in log wages, there is a clear scope for a role of within variation to contribute substantially to overall wage inequality. The 90/10 percentile ratio of the residuals from cross sectional year wage regressions show an increasing pattern through the decade that can be interpreted as an increased within variation (see graph 9).

Finally we take the study of the changes in wages by industry. Some previous findings about interindustry wage differentials relate to the stability of their magnitudes and the relative ranking of industries through time. In the case of Uruguay this seems to be the conclusion (specifically for manufacturing) of Rossi (1985) and Rossi and Tansini (1992), paralleling those obtained for the US by Krueger and Summers (1988) and others. Recent important shocks related to increased openness to trade and reduced protection may have affected significantly such results.

From Table 4, a raw calculation of the correlation of the ranking of industries between 1991-1993 and 1997-1999 by the deviations of their hourly wage to the overall mean gives a 0,93 coefficient. We observe that the ordering of industries according to the average hourly wages has changed along the decade, the most notable changes being the fall of the manufacturing industries and the rise of

the government sector. The wage differentials suggest also a decreasing relation with the exposure to international competition of the industries.

This discussion is associated with the analysis of the role of unions in wage determination. While en the 1980's centralized wage bargaining took place with a decisive participation of unions and the government, in the 1990s the setting for wage negotiations in Uruguay changed markedly, with the withdrawal of the government from negotiations and the establishment of decentralized mechanisms at a firm level. The issue was taken by Cassoni in a number of papers (1999, 1999a). She focused in manufacturing, estimating labour demand, and her results point to changes in the elasticity of labour demand in the presence of unions after their reappearance when the military government that banned them ended in 1984. From 1993 she finds a shift in labour demand, and the union effect tends to disappear in some industries. Increased openness and sharp decreases in union affiliation are coincident.

c) The effect of trade on wage premiums by skill and by industry

The literature about wage premium by skill and by industry followed two different traditions, i.e. the returns from education literature and the interindustry wage differentials literature, and there are recent attempts to combine both, particularly applied to the analysis of the influence of trade in the labour market (see Lovely and Richardson, 1998). The general problem we deal with is related with both wage premiums, between skills and industries, and their interactions. Both premiums are associated with the heterogeneity of labour as a productive factor and with its capabilities of mobility between industries to equalize the value of its marginal product, for different activities and levels of skill. In the trade literature this may broadly correspond to the Heckscher Ohlin approach (comprising one or several different labour productive factors) or to the specific factors literature (in which those attributes of labour specific to each industry may or may not be related to the educational level of workers). We may as a general summary characterize this phenomenon as comprising eight typical cases. The first one considers labour as a homogenous factor; in this case, there would not be any wage premiums, neither for skill nor industry affiliation ($w=\mu$). The second case is where there only exists an industry wage premium (so $w = \mu_j$). In the third case, we have a premium for skill but is specific by industry (hence $w = \mu_{sj}$). In the fourth, the different returns of skill in the different industries are complemented with a homogenous (by skill) industry wage premium ($w = \mu_j + \mu_{sj}$). In the fifth case, we have a premium by skill which is homogenous across industries and an industry specific skill premium also ($w = \mu_s + \mu_{sj}$). The sixth case is the one in

which there is a premium by skill, by industry and also an interaction industry-skill premium ($w = \mu_s + \mu_{sj} + \mu_j$). The seventh case is the one only with skill wage premium ($w = \mu_s$), and the final one is the case with skill and industry wage premium ($w = \mu_s + \mu_j$). We summarise this general map of possible outcomes in table 5.

Within this general framework our empirical strategy will pursue two different directions. The first one is to assess the impact of trade policy and specialization pattern attributes of the industries directly on the skill premium, using pooled cross-sectional yearly data. We proceed to the estimation of a standard earnings equation in the tradition of Mincer (1974), controlling for all the traditional individual characteristics that influence earnings. In our estimation, we add variables that also control for trade policy and specialization pattern at an industry level, in order to test to what extent those sectors where trade liberalization took place and openness increased are as well those in which an increase in the wage premium by skill is observed.

The second procedure is to analyze the impact of trade policy changes and trade specialization patterns in the inter-industry wage differentials. This is also an avenue by which trade can affect the overall wage inequality by skill, particularly since if wages have risen in those industries employing relatively more of a specific kind of skill.

We analyze the estimated skill premiums for a panel of industries, in a two-step procedure. We first obtain estimates of these wage differentials. Then we analyse how those industry wage differentials are explained by a series of industry characteristics related to trade and trade policy variables. This follows the tradition of Dickens and Katz (1987) and others.

Traditionally, for developed countries, the studies about wage premium and links with trade and trade policy (see Gaston and Trefler, 1994) uses only cross sectional data, since they argue that the structure of wages is stable along time and the same with protection and other trade variables. As Koujianou and Pavcnik (2001) show for the case of Colombia, the situation is different from the perspective of developing countries that pursued trade liberalization strategies during the nineties. As it was shown in section b), in Uruguay both the wage structure and trade liberalization experienced significant changes along the decade. so we attempt to use all the information of the decade to research the link between trade variables and wage premium (by skill and by industry).

i) Skill premium: impact of trade

The first equation to be estimated is a standard human capital regression, and the procedure is inspired in Lovely and Richardson (1998). The education levels are included as a set of dummy variables, and as in the previous section we consider three levels, i. e. primary and incomplete secondary school, complete secondary school, and complete or incomplete college. They are in turn interacted with the trade policy and trade specialization variables related to the industry in which the worker is employed. The usual controls are also added. The regression function is as follows:

$$\log w_{ijt} = \mu + \mu_{st} S_{ist} + \mu_j I_{ijt} + \mu_{sT} T_{jt} S_{ist} + \xi_t H_{it} + \varepsilon_{ijt} \quad (10)$$

where: w_{ijt} is the log of hourly earnings; S_{ist} is a dummy variable indicating schooling group *s* in time *t;* and μ_{st} a schooling group effect in period *t*; I_{ijt} is an industry affiliation variable of individual i in time t with and μ_j an industry effect; T_{jt} is an industry variable defined at an industry level and μ_{sT} is the industry variable effect on schooling group *s; H_{ijt}* are the traditional individual controls in earnings equations, such as experience, sex, tenure, etc. Finally, ε_{ijt} is the error term with the usual properties. As we specify the equation with a constant, in the dummy variables there is always an omitted category.

The definition of industry characteristics (T_{jt}) could have different alternatives. The first would be using the affiliation itself (defined by as set of dummy variables). Different variables as trade policy measures (nominal average tariff by tradable industry), and indexes of trade specialization will be used to track the industry characteristics. The trade specialization variables we will consider are import penetration (share of imports in total domestic demand) and export orientation, i. e. the share of exports in domestic production. Sanguinetti et al (2000) in a similar estimation include only tradable sectors (i. e. manufacturing) arguing that there is no variation outside those sectors in the trade indexes, that take a value zero for the non traded sectors. We choose instead to specify the equation including the whole employed workers both in tradable and non tradable industries, public and private, then having twenty-five sectors identified at a 2 digit level ISIC codes, and also estimate separately for the manufacturing sector only. This impact may not account for the whole general equilibrium story, particularly in the presence of highly mobile labour, which could weaken the link between trade openness at an industry level and the changes in the skill premium.

The set of individual controls, different from schooling group, are specified in the following auxiliary equation:

$$\xi_t H_{it} = \alpha_t + t_{it}\ \phi_t + \kappa_{1t}\exp_{it} + \kappa_{2t}\exp_{it}^{\ 2} + \sum_{m=1}^{M-1} dca_{it}\ \nu_{mt} + \sum_{k=1}^{K-1} doc_{it}\ \lambda_{kt} + sex_{it}\ \delta_t + reg_{it}\ \eta_t$$

whereas t_{it} indicates tenure and ϕ_t tenure effect in period t; $\kappa_{1t}\ exp_{it} + \kappa_{2t}\ exp_{it}^{\ 2}$ is the impact of potential experience (defined as age minus schooling years minus six) in period t. In turn, ν_t is the occupation category (public, private, self-employed) effect for year t,, λ_t is the occupation effect for year t, δ_t is the gender impact in period t, and η_t is the effect of living in the capital for year t. There is also a period effect (α_t).We also include a dummy variable that takes the value 1 when the individual works in a firm that employs 10 or less persons.

Under this specification we are able to estimate the educational group specific impact of trade in the skill wage premium (*swp*), which is given by the expression:

$$swp_{sjt} = \exp\{\mu_{st} + (\mu_{sT} - \mu_{0T})T_{jt}\} = \frac{\overline{w}_{st}}{\overline{w}_{0t}} \qquad (11)$$

where μ_{0T} is the coefficient for the baseline education group in the regression function. The key evidence is then the difference between the coefficients of the different skill groups.

To construct our data set we pooled data of The Household Survey by the National Statistics Institute of Uruguay (INE) for the period 1991-1999. The variables at an industry level are obtained from the National Accounts and Trade Data Base by the Central Bank of Uruguay (BCU). We match the two data sets to perform the estimations. The technique of estimation considered the possibility that the random disturbances are heteroskedastic, most likely correlated within groups, as was noted by Moulton (1989). We thus computed robust standard errors clustering by year and industry using the Huber-White methodology. As trade specialization indexes suggest the possibility of endogeneity arising from their relationships to costs and wages, the instrumental variables method was used, being the instruments their lagged values interacted with the current industry affiliation of the worker.

ii) Industry wage premium (relative): the estimation of inter-industry wage differentials

Our second approach consists of estimating the inter-industry wage differentials and study their evolution conditional on industry trade variables. This means asking a different question as that related to the return to specific worker characteristics, i. e. skills. The industry wage premium is a part of earnings that cannot be explained by individual worker characteristics, but by industry affiliation. As to the interpretation of stable wage differentials, they correspond to a world in which mobility of labour is reduced between sectors (specific factor trade model). The Heckscher-Ohlin model, on the contrary, establishes a long run world of relative mobility, in which we should not expect to observe stable industry wage differentials.

The empirical approach has been outlined in Koujianou and Pavcnic (2001), who base their strategy in a two-stage estimation as was first proposed by Gaston and Trefler (1994).

In order to estimate the industry effects in individual earnings we use data from the yearly cross sections of the Uruguayan Household Survey for the 1991-1999 period, conducted annually by the National Institute of Statistics. Our earnings variable consists of monthly earnings divided by 4.23 times usual weekly hours. Our controls are the traditional ones: education (three levels); potential experience; sex; region of residence; tenure; size of the firm; occupation; and private, public or self-employed status.

The parameters of interest are the coefficients associated with a set of industry dummies. We use 2 digit ISIC codes, which leaves us with 25 different sectors. We also define ten broad industries based on their exposure to international competition. For each year cross section in the period 1991-1999, the estimated equation is as follows:

$$\log w_{ij} = \mu + \xi H_i + \mu_j I_j + \varepsilon_{ij} \qquad (12)$$

where H_i is a set of individual worker characteristics, and I_j is a set of industry indicators according to the worker's industry affiliation, and the parameter μ_j is the industry wage premium. The omitted industry is the agriculture (ISIC code 11). The industry wage premiums are computed in the regression equation as deviations from the omitted industry. We then normalize the industry wage premiums as deviations from the employment weighted wage premium (iwp_j). As Koujianou and Pavcnic (2001) point out, the normalized wage premium can be interpreted as the proportional

difference in wages for a worker in a given industry relative to a worker with the same observable individuals characteristics. We computed normalized wage differentials and their exact standard errors with the procedures suggested by Haisken-DeNew and Schimdt (1997)[7].

The second stage consists of using such industry wage premiums (iwp_j) as the explained variable of an equation that is estimated using panel data over the period 1991-1999 of 2 digit ISIC industries. We used weighted LS, using the inverse of the variance of the wage premium estimated in the first stage (see Koujianou and Pavcnic, 2001) and compute robust standard errors clustered by industry (Huber-White). The second stage is specified in equation (4):

$$iwp_{jt} = \mu + T_{jt}\mu_{jT} + D_{jt}\mu_{jD} + \varepsilon_{jt} \qquad (13)$$

where T_{jt} is a trade policy variable that approximates the process of trade liberalization in Uruguay in the nineties; D_{jt} is a set of time and industry variables; ε_{jt} is the error term that follows the traditional assumptions. Trade specialization indexes were instrumented by their lags.

d) Empirical Results

i) Skill wage premium and trade variables

The general results of the estimation of the trade-augmented Mincer equations (and also of the same without trade variables) are reported in table 6. In table 7 the results for the schooling group effect in period t (μ_{st}) are presented, including all the alternative specifications of equation (1) (without trade variables, with trade specialization and with nominal tariff) and all the different samples considered (all industries [8], tradable, and only manufacturing workers). In all cases, the data verify the existence of a significant positive return to education. The evolution in the nineties is different when we consider the skill premium 1 (w_1/ w_0, medium /low skill) than when we consider the skill premium 2 (w_2/ w_0, high/low skill). The evolution of skill premia in the control specification without trade variable interactions (see table 7 part a) is similar to their evolution with import penetration and export orientation (see table 7 part b). In fact, in the all sample estimation the skill premium 1 is basically constant over the whole period, whereas the skill premium 2 is increasing. In the manufacturing sample, both increase. In the case of the model with trade policy in the tradable

[7] We thank the authors, who kindly provided us with program code to perform these calculations.

[8] In the case of trade specialization variables, the sample of all industries does not include the natural resources intensive sectors (ISIC 1 and 2), because the observations were missing. For that reason we did not use the tradable sample in this case. In the case of the trade policy variable (average nominal tariff by industry) we only study the tradables and manufacturing samples.

sample (see table 7 part c) the skill premium explained by the schooling group effect decreases in both definitions.

In table 8 the results for the interaction parameter between schooling group, trade specialization indexes and trade policy are reported (parameters μ_{sT} of equation (1)). The trade specialization indexes used were import penetration and export orientation. The trade policy variable is the average nominal tariff by industry. More export orientation and more import penetration imply in both cases a larger skill premium. In the case of the whole sample, we observe that for all types of skill, workers in sectors with more import penetration have lower wages and workers in more export oriented sectors have higher wages. When the sample is restricted only to manufacturing workers, the conclusion for the export orientation variable is maintained, but the import penetration variable is not significantly different from zero. A previous exercise of this kind using Uruguayan data (Sanguinetti et al, 2001) does not find any significant impact of import penetration. With the trade policy variable, the result are significantly different from zero in the case of the tradables sample but in the manufacturing sample they are not significant. When the tariff is lower (more liberalization) the skill premium increases.

In the nineties, trade specialization in the manufacturing industry has increased (more import penetration and more export orientation at the same time); in almost all sectors this change is associated with an increase in the wage skill premium (in both definitions).
Similar and indeed more amplified results are obtained with the trade policy variable. In summary, in the nineties we observe an increase in the observed skill premium and in the global predicted skill premium. The movement in the predicted skill premium is associated with the fact that the skill premium in both definitions (μ_{sT} -μ_{0T}) increases with the trade openness (measures by trade specialization or by trade policy variable). As we have shown in section b) in the nineties there was an important movement to more open orientation of the economy.

ii) Industry wage premium and trade policy

We turn now to the analysis of the relationship between industry wage premiums and trade policy, i.e. the second stage of the two-step estimation. Our results concerning the impact of the nominal tariff in the industry wage premium are displayed in table 9. We estimate equation (4) using weighted least squares, being the weights the inverse of the variance of the estimated wage premium for each industry/year. We carry on the estimation for three different samples, i.e. all 2

digit ISIC sectors, tradable sectors and manufacturing. In the case of non tradable sectors, where no trade is observed, nominal tariff is set to zero. We follow the suggestion in Kouijanou and Pavcnic (2001) in the sense that these industries might act as a control group. i.e. no variation in trade policy is observed in them. This has the disadvantage of attributing to industries in which trade is not feasible due to costs or barriers a protection level lower than that of the tradable ones. We use also two different specification of the wage premiums, one of them in which we have included all the customary controls of the Mincer style equations, and other in which we simply regress the log of wages on a set of industry and time dummies with no additional controls.

The first two columns present the results for specifications that do not include industry effects. In all of them the sign of the impact of the nominal tariff on the wage premium is negative, but in only few of them is significant, particularly in the tradable and manufacturing samples. We note also that the magnitude of the impact is reduced when we turn from a specification of the wage premium with no controls in the first stage to another controlling for individual characteristics, i.e. we control, for that part of the correlation between tariffs and wages that may be associated to observable characteristics of workers (such as the mix of skilled and unskilled labour that might be related to political economy aspects of protection).

The inclusion of industry fixed affects allows controlling for other potential source of spurious correlation between protection and wages, the one based on unobservable worker and industry attributes, as long as those effects remain time invariant. When industry fixed effects are included, the sign of the estimated coefficients turns positive, and more clearly significant in all the samples and all the specifications used. The reversal in the signs might be read as implying that the negative relation was driven by unobserved industry characteristics. Higher protection levels imply higher wage premiums. This result is similar to that obtained by Kouijanou and Pavcninc (2001) for Colombia in the 1990's decade.

Regarding the size of the effects, the estimations imply that a worker in a sector with a 22% tariff (as was the case of manufacturing by 1990), would receive a wage loss of 10% (22*0,0047) if it was shifted to an industry without tariff.

We attempt to evaluate the effect of the macroeconomic conditions that affect relative wages. We do this by considering the year effects estimation as shown in the fourth column of Table 9. Sizes

and signs of the coefficients are maintained, though their standard deviations increase and their significance decreases particularly in manufacturing and tradable sectors samples.

Additionally, we use trade specialization variables to control for the effect of trade related channels, apart from tariff levels, in wages. We include in the regressions as controls the import penetration (share of imports in domestic demand) and export orientation (share of exports in domestic output). Those variables were available only for a sub-sample of sector that excluded natural Given the endogeneity of trade flows arising form their relation to wages, we estimate using the instrumental variables method, using as instruments their lagged values. The results are displayed in table 10.

The tariff coefficients are slightly larger when trade controls are included, and their significance tends to rise. The tariff coefficients show the same sign change, from negative to positive, when industry effects are considered in the case of manufacturing. When wage premiums arise from controlled regressions, the same happens to the export penetration coefficients. The import penetration variable does not seem to have a significant impact.

We also investigate the influence on our estimations of real exchange rate fluctuations; in particular in the period under study there was a significant real exchange rate appreciation. It might be suspected that changes in tariffs may reflect attempts to compensate for variation in the real exchange rate. In the case of Uruguay this was not the case, though non tariff barriers may have been used. The real exchange rate (ratio of tradable to non tradable price) was included as a control in our estimations. The results are displayed in table 11. They show that, when controls are added to the estimation of industry wage premiums, and when industry effects are added, both the significance and the size of the coefficients on the nominal tariff and the real exchange rate vanish. This could reflect that their evolution along the 1990's was exactly opposite: the real exchange rate increased along the decade while the tariffs decreased. These two changes affecting relative prices in the 1990's work in opposite directions.

Finally, we try to investigate the direct effect of the relative sector price (output deflator in deviation from average) in the industry wage premium. In a way, relative prices condense both the influence of exchange rate appreciation (that changes the relative price of tradable to non tradable) and tariffs (that affect the relative prices within the tradable sector). The results are displayed in table 10. We find a positive significant impact, particularly when wage premiums are estimated with controls,

and when industry dummies are included in the specification. This can be read as indirect evidence favouring the specific factor hypothesis.

e) Conclusions

The Uruguayan labour market in the nineties was characterized by: a generalized increase in labour productivity; the destruction of unskilled jobs, associated to trade openness and changes in the productive specialization that implied technical change biased to the employment of workers with higher skill; and an increase in the wage dispersion with an improvement of the relative wages of the skilled workers and changes in the interindustrial wage structure. The objective of our empirical research is analysing the links between the deepening of trade openness and this last fact: changes in wage premiums by skill and industry.

When earning equations were estimated in which the effect of educational levels on earnings was interacted with nominal tariffs and trade specialization variables, their impact has proven to be significant. In this regressions we attempted to control for potential endogeneity issues as well as for heteroskedasticity arising form the use of aggregate data in a pooled cross section context. The data have shown that when industry protection decreased, the skill premium tended to increase.
On the other hand, inter-industry wage premiums were estimated from wage equations in which we controlled for all the observable individual characteristics. When we regress those industry wage premiums -in a panel estimation- on a set of industry specific trade characteristics, such as the nominal tariff, specialization indexes, and industry price deviations from the average, we also find a significant effect. In those estimation, we control for potential enodogeneity issues and heteroskedastic disturbances. The use of industry fixed effects also helps to get rid of (time invariant) unobserved elements that condition the relation of wages to trade. The impact of protection (measured as the industry-level nominal tariff), is that more heavily protected industries tend to have higher industry wage premiums when industry fixed effects are included in the estimation.

In summary, our results show a link between trade protection and wage premiums, in both the skill and the industry dimensions. This suggests that an increment in protection is associated both with decreases in the skill premium and increases in the industry premium. Trade liberalization, in the nineties in Uruguay, seems able to explain a portion of the well documented increment in wage skill premium, particularly in those industries that were confronted with more international competition.

Those industries were forced to gain productivity, by an increment in the rate of adoption of technical progress, that can be presumed to be complementary to the use of skilled labour. With respect to the industry wage premium, more openness implied, in those industries, lower industry relative wages.

The results also suggest directions to further analysis, particularly to consider empirical strategies in which in the interactions of industry and skill levels in wage, determination could be integrated in nested models. This may help also to perform decomposition exercises to measure the relative contributions of the explanatory variables to wage inequality. Another interesting direction of research to follow would be to investigate if there are different patterns of correlation between trade variables and wage premiums when considering different trade partners, i.e. regional trade within the Mercosur versus trade with developed countries, etc., in the spirit of Lovely and Richardson (1998).

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Table 1

Employment, salaried workers, by sector and skill (private-public)

(thousands of workers and %)

	average 1991-93				average 1997-99				growth rate 91-93/97-99			
Sector	U	B	H	all	U	B	H	all	U	B	H	all
Agriculture and cattle	14.1	2.3	0.8	17.2	14.9	3.6	1.0	19.5	1.0	7.8	2.4	2.1
Forestry	2.4	0.4	0.1	2.9	3.0	0.6	0.3	3.9	3.9	4.4	27.5	4.8
Fishing	0.6	0.3	0.0	1.0	0.9	0.5	0.1	1.5	6.5	5.2.		7.0
Mining	0.8	0.2	0.0	1.1	0.7	0.3	0.1	1.2	-1.7	4.2	19.1	1.1
Food, beverages	34.1	14.3	2.7	51.1	27.5	16.7	2.6	46.8	-3.5	2.5	-0.8	-1.5
Textile, apparel	31.5	15.8	1.9	49.2	13.6	10.0	1.1	24.7	-13.0	-7.3	-8.9	-10.8
Paper and printing	4.6	4.4	1.2	10.1	3.4	4.6	1.5	9.5	-4.6	0.7	3.8	-1.1
Chemical	9.2	6.7	3.1	19.0	5.8	6.7	2.7	15.2	-7.5	0.1	-2.3	-3.6
Non metal minerals	4.4	1.8	0.3	6.6	3.6	1.6	0.4	5.6	-3.4	-2.2	5.8	-2.5
Basic metallic	0.3	0.2	0.0	0.5	0.2	0.1	0.0	0.3	-11.4	-6.5		-8.3
Machinery and equip.	11.3	6.9	1.4	19.6	8.6	6.6	1.2	16.4	-4.4	-0.8	-2.9	-2.9
Other manufacturing	7.7	3.7	0.3	11.7	4.5	3.3	0.3	8.1	-8.7	-1.8	-1.4	-6.0
Electricity and gas	4.7	3.5	1.3	9.5	2.4	3.1	1.4	6.8	-10.9	-2.2	1.9	-5.3
Water	2.6	1.8	0.8	5.2	2.2	1.5	0.7	4.4	-3.0	-2.3	-3.2	-2.8
Construction	36.2	7.3	1.3	44.8	33.7	9.4	1.5	44.6	-1.2	4.3	3.0	0.0
Wholesale and retail	41.5	39.7	8.5	89.7	38.7	53.7	11.5	103.9	-1.2	5.1	5.2	2.5
Hotels & restaurants	11.6	4.0	0.7	16.3	11.7	8.7	1.6	22.0	0.2	13.8	14.2	5.1
Transport and storage	22.8	11.5	2.3	36.7	21.0	16.2	2.8	40.0	-1.4	5.9	2.7	1.5
Communications	4.0	4.2	1.0	9.1	3.3	5.1	2.0	10.3	-3.2	3.2	12.4	2.0
Banking /insurance	4.1	12.9	6.0	23.0	2.3	11.9	8.3	22.5	-9.0	-1.4	5.5	-0.4
Real estate	3.9	8.4	6.5	18.9	6.5	12.4	9.1	28.0	8.9	6.7	5.6	6.8
General government	42.0	35.1	11.2	88.3	36.1	34.1	13.7	83.9	-2.5	-0.5	3.5	-0.8
Social services	24.8	54.0	29.0	107.8	24.1	61.2	36.9	122.2	-0.5	2.1	4.1	2.1
Entertainment	10.0	9.0	2.5	21.4	7.9	10.8	3.6	22.4	-3.8	3.2	6.7	0.7
Services to households	83.8	19.8	1.9	105.5	88.5	31.6	2.6	122.8	0.9	8.1	5.7	2.6
All	413.0	268.3	84.8	766.1	365.1	314.4	106.9	786.4	-2.0	2.7	3.9	0.4

U= Unskilled workers: their maximum educational level attained is primary, or incomplete high school (less than 3 years) or technical education; B= basic skilled workers: their maximum educational level is completed high school (more than 3 years), completed technical education, teaching or military education; H=high skilled workers: have attained university education (complete or incomplete).

Source: based on Household Survey, INE.

Table 2
Hourly wages of salaried workers by sector and skill (private-public)
(March 1997 pesos and and %)

	average 1991-93				average 1997-99				growth rate 91-93/97-99			
Sector	U	B	H	all	U	B	H	all	U	B	H	all
Agriculture and cattle	11.7	19.1	42.8	13.9	12.0	19.1	35.0	14.3	0.5	0.0	-3.3	0.5
Forestry	10.2	19.8	37.8	12.2	12.7	18.9	61.1	16.1	3.6	-0.8	8.3	4.7
Fishing	30.1	28.6		29.5	30.4	46.4	37.9	35.8	0.2	8.4		3.3
Mining	19.1	21.6	42.3	20.6	24.7	34.4	53.2	30.4	4.3	8.0	3.9	6.8
Food, beverages	21.4	26.6	60.6	24.9	20.8	25.0	52.5	24.0	-0.5	-1.0	-2.4	-0.6
Textile, apparel	18.7	22.6	39.6	20.8	19.0	22.5	61.4	22.3	0.3	0.0	7.6	1.2
Paper and printing	22.8	28.4	46.2	27.6	24.8	31.4	51.7	32.1	1.4	1.7	1.9	2.6
Chemical	25.4	38.6	55.9	35.0	25.8	40.5	83.1	42.0	0.2	0.8	6.8	3.1
Non metal minerals	19.1	30.7	57.2	23.9	18.0	30.9	47.9	23.6	-0.9	0.1	-2.9	-0.2
Basic metallic	25.4	35.1		28.1	30.3	28.6	60.7	32.2	2.9	-3.4		2.3
Machinery and equip.	22.8	29.1	55.9	27.3	22.9	28.0	52.7	27.0	0.1	-0.6	-1.0	-0.2
Other manufacturing	16.1	17.6	22.1	16.7	15.5	19.3	35.8	17.8	-0.6	1.6	8.4	1.0
Electricity and gas	27.4	32.7	54.7	32.4	33.6	34.4	70.5	40.7	3.5	0.8	4.3	3.9
Water	26.2	27.5	42.6	29.2	33.9	38.5	63.4	40.2	4.4	5.8	6.9	5.5
Construction	20.6	24.2	51.9	22.0	20.5	25.8	57.1	22.9	0.0	1.1	1.6	0.6
Wholesale and retail	17.9	23.1	36.0	21.7	17.3	22.2	37.1	21.9	-0.6	-0.7	0.5	0.1
Hotels & restaurants	18.5	19.7	28.3	19.2	17.9	22.1	27.0	20.1	-0.6	1.9	-0.8	0.8
Transport and storage	21.9	27.1	47.3	25.0	23.7	29.7	46.5	27.5	1.3	1.5	-0.3	1.6
Communications	22.9	26.3	35.5	25.6	28.3	32.8	58.2	36.0	3.6	3.7	8.6	5.9
Banking /insurance	49.2	54.7	64.4	56.1	54.2	69.4	91.6	75.9	1.6	4.1	6.1	5.2
Real estate	18.1	29.1	39.0	29.8	16.9	28.9	47.1	31.2	-1.1	-0.1	3.2	0.8
General government	21.2	26.2	41.5	25.1	25.0	30.8	55.2	31.4	2.8	2.7	4.9	3.8
Social services	21.9	31.9	44.4	32.4	23.8	34.9	53.1	38.0	1.4	1.5	3.0	2.7
Entertainment	22.2	29.2	39.8	26.9	24.0	33.8	43.1	31.5	1.4	2.4	1.3	2.7
Services to households	13.7	17.8	43.9	15.1	15.2	17.8	37.5	16.4	1.7	-0.1	-2.6	1.4
All	19.3	27.5	45.4	24.6	20.0	28.9	53.9	27.6	0.6	0.8	2.9	2.0

Hourly wages from principal occupation are deflated by the consumer price index (base march 1997.
U= Unskilled workers: maximum educational level attained is primary, or incomplete high school (less than 3 years) or technical education; B=basic skilled workers: their maximum educational level is completed high school (more than 3 years), completed technical education, teaching or military education; H= high skilled workers: have attained university education (complete or incomplete).

Source: based on Household Survey, INE.

Table 3

Relative employment and wages of salaried workers by sector and skill (private-public)

(ratios and %)

	Employment ratio Salaried workers				Wage ratio Salaried workers				Employment ratio growth rate		Wage ratio growth rate		Covariance employment ratio -wage ratio	
	avg 1991-93		avg 1997-99		avg 1991-93		avg 1997-99		91-93/97-99		91-93/97-99			
Sector	H/ U	B/ U	H/ U	B/ U	H/ U	B/ U	H/ U	B/ U	H/ U	B/ U	H/ U	B/ U	H/ U	B/ U
Agriculture and cattle	0,06	0,16	0,06	0,24	3,7	1,6	2,9	1,6	1,4%	6,8%	-3,8%	-0,5%	-	-
Forestry	0,03	0,18	0,09	0,18	3,7	1,9	4,8	1,5	22,7%	0,5%	4,6%	-4,2%	+	-
Fishing	0,00	0,54	0,08	0,50	0,0	1,0	1,2	1,5		-1,2%		8,2%		-
Mining	0,06	0,28	0,19	0,40	2,2	1,1	2,2	1,4	21,1%	6,0%	-0,4%	3,6%	-	+
Food, beverages	0,08	0,42	0,09	0,61	2,8	1,2	2,5	1,2	2,8%	6,2%	-1,9%	-0,6%	-	-
Textile, apparel	0,06	0,50	0,08	0,74	2,1	1,2	3,2	1,2	4,8%	6,6%	7,2%	-0,3%	+	-
Paper and printing	0,26	0,96	0,43	1,33	2,0	1,2	2,1	1,3	8,9%	5,6%	0,5%	0,3%	+	+
Chemical	0,34	0,72	0,47	1,16	2,2	1,5	3,2	1,6	5,6%	8,2%	6,6%	0,6%	+	+
Non metal minerals	0,07	0,42	0,12	0,45	3,0	1,6	2,7	1,7	9,6%	1,2%	-2,0%	1,1%	-	+
Basic metallic	0,00	0,46	0,16	0,64	0,0	1,4	2,0	0,9		5,6%		-6,1%		-
Machinery and equip.	0,13	0,61	0,14	0,77	2,5	1,3	2,3	1,2	1,5%	3,7%	-1,1%	-0,8%	-	-
Other manufacturing	0,04	0,49	0,07	0,75	1,4	1,1	2,3	1,3	8,0%	7,5%	9,1%	2,2%	+	+
Electricity and gas	0,27	0,74	0,60	1,30	2,0	1,2	2,1	1,0	14,5%	9,9%	0,8%	-2,5%	+	-
Water	0,31	0,67	0,31	0,70	1,6	1,0	1,9	1,1	-0,2%	0,7%	2,4%	1,3%	-	+
Construction	0,03	0,20	0,04	0,28	2,5	1,2	2,8	1,3	4,2%	5,6%	1,6%	1,1%	+	+
Wholesale and retail	0,20	0,96	0,30	1,39	2,0	1,3	2,2	1,3	6,4%	6,4%	1,1%	-0,1%	+	-
Hotels & restaurants	0,06	0,35	0,14	0,74	1,5	1,1	1,5	1,2	14,0%	13,6%	-0,2%	2,5%	-	+
Transport and storage	0,10	0,50	0,13	0,77	2,2	1,2	2,0	1,2	4,1%	7,4%	-1,6%	0,2%	-	+
Communications	0,25	1,07	0,61	1,56	1,6	1,1	2,1	1,2	16,1%	6,6%	4,8%	0,1%	+	+
Banking /insurance	1,46	3,12	3,55	5,08	1,3	1,1	1,7	1,3	16,0%	8,5%	4,3%	2,4%	+	+
Real estate	1,68	2,16	1,40	1,92	2,2	1,6	2,8	1,7	-3,0%	-2,0%	4,3%	1,0%	-	-
General government	0,27	0,83	0,38	0,95	2,0	1,2	2,2	1,2	6,1%	2,1%	2,0%	-0,1%	+	-
Social services	1,17	2,18	1,53	2,55	2,0	1,5	2,2	1,5	4,6%	2,6%	1,6%	0,1%	+	+
Entertainment	0,25	0,90	0,46	1,37	1,8	1,3	1,8	1,4	11,0%	7,3%	0,0%	1,1%	+	+
Services to households	0,02	0,24	0,03	0,36	3,2	1,3	2,5	1,2	4,8%	7,1%	-4,2%	-1,7%	+	-
All	0,21	0,65	0,29	0,86	2,4	1,4	2,7	1,4	6,1%	4,8%	2,3%	0,3%	+	+

U=Unskilled workers: their maximum educational level attained is primary, or incomplete high school (less than 3 years) or technical education; B= basic skilled workers: their maximum educational level is completed high school (more than 3 years), completed technical education, teaching or military education; H= high skilled workers: have attained university education (complete or incomplete).

Source: Based on the Household Survey, INE.

Table 4

Within and between decomposition of the increase of the share of High skilled workers in salaried employment and wage bill 1991-1993/1997-199 averages

Employment		
between	within	TOTAL
0,005	0,020	0,025
Wage bill		
0,015	0,049	0,063

High skilled workers: have attained university education (complete or incomplete).

Source: Based on the Household Survey, INE.

Table 5

Types of heterogeneity of labour

	No Industry wage premium	With Industry wage premium
Without Skill premium	μ	μ_j
Skill-Industry premium	μ_{sj}	$\mu_j + \mu_{sj}$
Skill-Industry & Skill	$\mu_s + \mu_{sj}$	$\mu_s + \mu_{sj} + \mu_j$
Skill premium	μ_s	$\mu_s + \mu_j$

Table 6

Global results earnings equation alternatives specifications Salaried workers

	All sample		Tradable		Manufacturing	
	Number obs	R2	Number obs	R2	Number obs	R2
a) Traditional Mincer	132940	0.4576	27930	0.4721	24057	0.4579
b) Trade specialization	116213	0.4573			21121	0.4614
c) Trade policy			27930	0.4728	24057	0.4582

Note: robust standard errors, clustered on industry.

Source: own elaboration using household survey EHI, INE data.

Table 7

Skill premium (μ_{st})in the nineties

Salaried workers

	1991	1992	1993	1994	1995	1996	1997	1998	1999
a) Traditional Mincer without trade variables									
a.1) All sample									
Skill Pre. 1	1.227	1.212	1.229	1.277	1.251	1.250	1.220	1.230	1.219
Skill Pre. 2	1.496	1.565	1.583	1.670	1.683	1.703	1.620	1.650	1.636
a.3) Tradables									
Skill Pre. 1	1.172	1.219	1.241	1.263	1.266	1.263	1.237	1.240	1.266
Skill Pre. 2	1.623	1.759	1.699	1.679	1.962	1.969	1.639	1.805	1.854
a.3) Manufacturing workers									
Skill Pre. 1	1.161	1.204	1.231	1.250	1.256	1.248	1.223	1.216	1.253
Skill Pre. 2	1.532	1.712	1.643	1.662	1.861	1.890	1.635	1.798	1.891
b) With trade specializations (instrumented with lagged variable)									
b.1) All sample									
Skill Pre. 1		1.202	1.217	1.265	1.240	1.240	1.209	1.218	1.208
Skill Pre. 2		1.529	1.537	1.628	1.633	1.657	1.585	1.612	1.605
b.2) Manufacturing workers									
Skill Pre. 1		1.197	1.220	1.235	1.243	1.235	1.211	1.204	1.240
Skill Pre. 2		1.666	1.588	1.601	1.793	1.822	1.579	1.729	1.828
c) With trade policy									
c.1) Tradables									
Skill Pre. 1	1.467	1.470	1.446	1.471	1.415	1.421	1.406	1.425	1.442
Skill Pre. 2	2.538	2.569	2.315	2.283	2.438	2.490	2.116	2.397	2.392
c.2)) Manufacturing workers									
Skill Pre. 1	1.268	1.296	1.307	1.327	1.315	1.309	1.289	1.287	1.321
Skill Pre. 2	2.147	2.275	2.074	2.094	2.201	2.267	1.998	2.243	2.304

Note: all return to education are significant at 5% level.

Source: own elaboration using household survey EHI, INE data.

Table 8

Effect of trade variables in individual earnings by skill level (μ_{sT})

Salaried workers

	All sample		Tradables		Manufacturing	
	coefficient	t	coefficient	t	coefficient	t
a) Trade specialization interacted with skill						
a.1) Export orientation (instrumented with lagged variable)						
Skill 0	0.133	0.99			0.316	2.63
Skill 1	0.160	1.08			0.326	2.5
Skill 2	0.398	2.19			0.345	1.64
a.2) Import Penetration(instrumented with lagged variable)						
Skill 0	-0.269	-5.46			-0.092	-1.04
Skill 1	-0.232	-3.38			-0.067	-0.71
Skill 2	-0.072	-0.41			0.001	0.01
b) Trade policy interacted with skill						
Skill 0			0.006	1.90	0.007	2.12
Skill 1			-0.004	-0.69	0.003	1.08
Skill 2			-0.014	-1.78	-0.008	-1.17

Source: own elaboration using household survey EHI, INE data.

Table 9

Second stage industry wage premium and trade policy (weighted regression results)

Salaried workers

	No year dummies No industry dummies	Year dummies No industry dummies	No year dummies Industry dummies	Year dummies Industry dummies
Variable				
Sample= all				
Wage premium Nominal Tariff	-0,0071	-0,0074	0,0041*	0,0073**
no controls	0,0073	0,0074	0,0021	0,0031
Wage premium Nominal Tariff	-0,0045	-0,0047	0,0042**	0,0059**
Controls	0,0032	0,0033	0,0020	0,0026
Sample= tradables				
Wage premium Nominal Tariff	0,0030	-0,0033	0,0041*	0,0024
no controls	0,0138	0,0325	0,0022	0,0067
Wage premium Nominal Tariff	-0,0070	-0,0236**	0,0042*	0,0007
Controls	0,0070	0,0093	0,0021	0,0044
Sample= manufacturing				
Wage premium Nominal Tariff	-0,0166	-0,0562**	0,0046	0,0081
no controls	0,0113	0,0124	0,0025	0,0063
Wage premium Nominal Tariff	-0,0102	-0,0337**	0,0046*	0,0035
Controls	0,0076	0,0050	0,0022	0,0046

Note: Robust standard errors, clustered on industry, in parenthesis; * indicates significant at 10% level; ** indicates significant at 5% level; weighted by the inverse of the corrected variance of the wage premiums.

Source: own elaboration using household survey EHI, INE data.

Table10

Second stage industry wage premium, trade policy, trade specialization controls
Salaried workers (weighted regression results)

		No year dummies No industry dummies	Year dummies No industry dummies	No year dummies Industry dummies	Year dummies Industry dummies
	Variable				
Sample= all excluding natural resource based exporters					
Wage premium no controls	Nominal	0,0013	0,0010	0,0072*	0,0094**
	Tariff	0,0084	0,0084	0,0037	0,0035
	Lagged Export	-0,4758	-0,4698	-0,1362	-0,1831
	Orientation	0,2768	0,2855	0,1778	0,1710
	Lagged Import	0,1365	0,1382	0,0847	0,2130
	Penetration	0,1774	0,1815	0,1673	0,1598
Wage premium controls	Nominal	0,0019	0,0019	0,0057*	0,0077**
	Tariff	0,0041	0,0042	0,0030	0,0036
	Lagged Export	-0,3997**	-0,3985**	0,2550**	0,2986**
	Orientation	0,1607	0,1688	0,0920	0,1028
	Lagged Import	0,0224	0,0227	-0,1542	-0,2202
	Penetration	0,1007	0,1015	0,1197	0,1363
Sample= manufacturing					
Wage premium no controls	Nominal	-0,0180	-0,0585*	0,0072	0,0031
	Tariff	0,0172	0,0271	0,0039	0,0077
	Lagged Export	-0,4231	0,0460	-0,1362	-0,0886
	Orientation	0,2657	0,3003	0,1878	0,1466
	Lagged Import	-0,0158	-0,0540	0,0847	0,3519
	Penetration	0,2075	0,1430	0,1767	0,2480
Wage premium controls	Nominal	-0,0116	-0,0323**	0,0057	0,0046
	Tariff	0,0083	0,0088	0,0032	0,0074
	Lagged Export	-0,3618**	-0,1125	0,2550**	0,2543
	Orientation	0,1186	0,1189	0,0972	0,1767
	Lagged Import	-0,0944	-0,1195**	-0,1542	-0,0811
	Penetration	0,0872	0,0488	0,1265	0,3239

Note: Robust standard errors, clustered on industry, in parenthesis; * indicates significant at 10% level; ** indicates significant at 5% level; weighted by the inverse of the corrected variance of the wage premiums. Trade variables are instrumented using their lagged values.

Source: own elaboration using household survey EHI, INE data.

Table 11
Industry wage premiums and tariffs with exchange rate control
Salaried workers
(weighted regression results)

		No year dummies No industry dummies	No year dummies Industry dummies
	Variable		
Sample= all			
Wage premium	Nominal	-0,007	0,007**
no controls	Tariff	0,007	0,003
	Real exchange	0,120	-0,089
	rate	0,085	0,085
Wage premium	Nominal	-0,005	0,005*
controls	Tariff	0,003	0,002
	Real exchange	0,079	-0,045
	rate	0,056	0,063
Sample= tradables			
Wage premium	Nominal	-0,004	-0,005
no controls	Tariff	0,025	0,003
	Real exchange	0,412	0,350**
	rate	0,669	0,186
Wage premium	Nominal	-0,019**	-0,002
controls	Tariff	0,008	0,002
	Real exchange	0,709**	0,218*
	rate	0,151	0,118
Sample= manufacturing			
Wage premium	Nominal	-0,044**	-0,005
no controls	Tariff	0,011	0,003
	Real exchange	1,443**	0,346
	rate	0,308	0,211
Wage premium	Nominal	-0,026**	-0,001
controls	Tariff	0,006	0,002
	Real exchange	0,884**	0,193
	rate	0,105	0,126

Note: Robust standard errors, clustered on industry, in parenthesis; * indicates significant at 10% level; ** indicates significant at 5% level; weighted by the inverse of the corrected variance of the wage premiums.

Source: own elaboration using household survey EHI, INE data.

Table 12

Industry wage premiums and relative prices

Salaried workers

		No year dummies No industry dummies	No year dummies Industry dummies
	Variable		
Sample= all			
Wage premium	Sector	0,106	0,148**
no controls	price	0,197	0,055
Wage premium	Sector	0,087	0,106**
controls	price	0,056	0,042
Sample= tradables			
Wage premium	Sector	0,552*	0,617*
no controls	price	0,253	0,287
Wage premium	Sector	0,134	0,047
controls	price	0,087	0,077
Sample= manufacturing			
Wage premium	Sector	0,121	0,107
no controls	price	0,125	0,167
Wage premium	Sector	0,062	0,042
controls	price	0,063	0,087

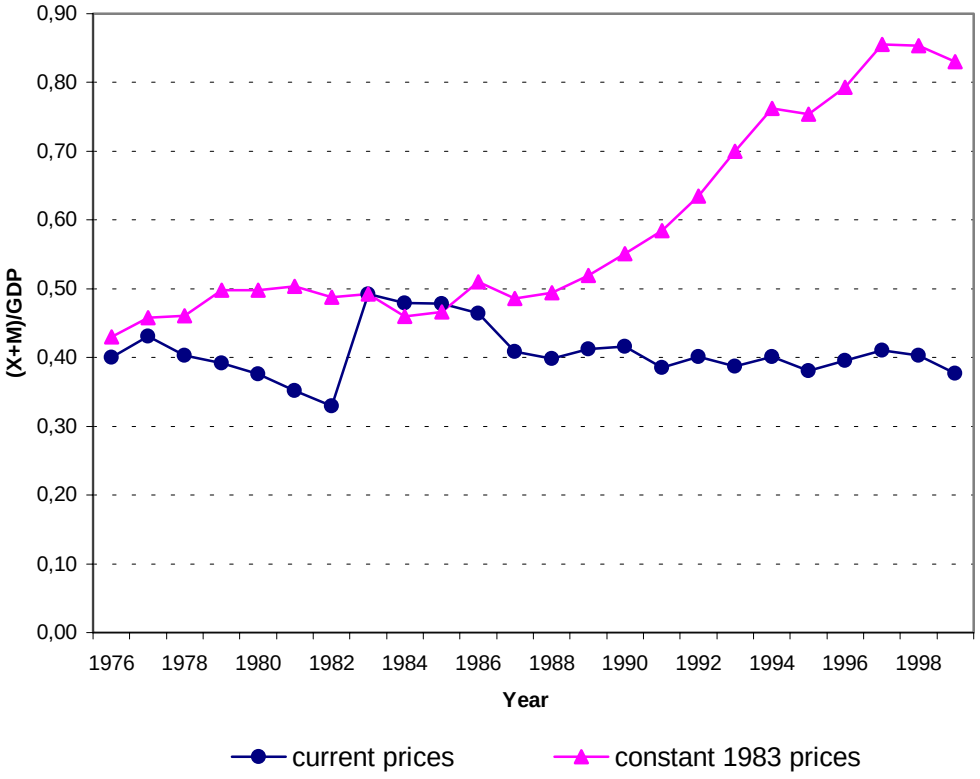
Note: Robust standard errors, clustered on industry, in parenthesis; * indicates significant at 10% level; ** indicates significant at 5% level; weighted by the inverse of the corrected variance of the wage premiums.

Source: own elaboration using household survey EHI, INE data.

Graph 1

Trade openness coefficient, 1976-1999

Current and constant 1983 prices

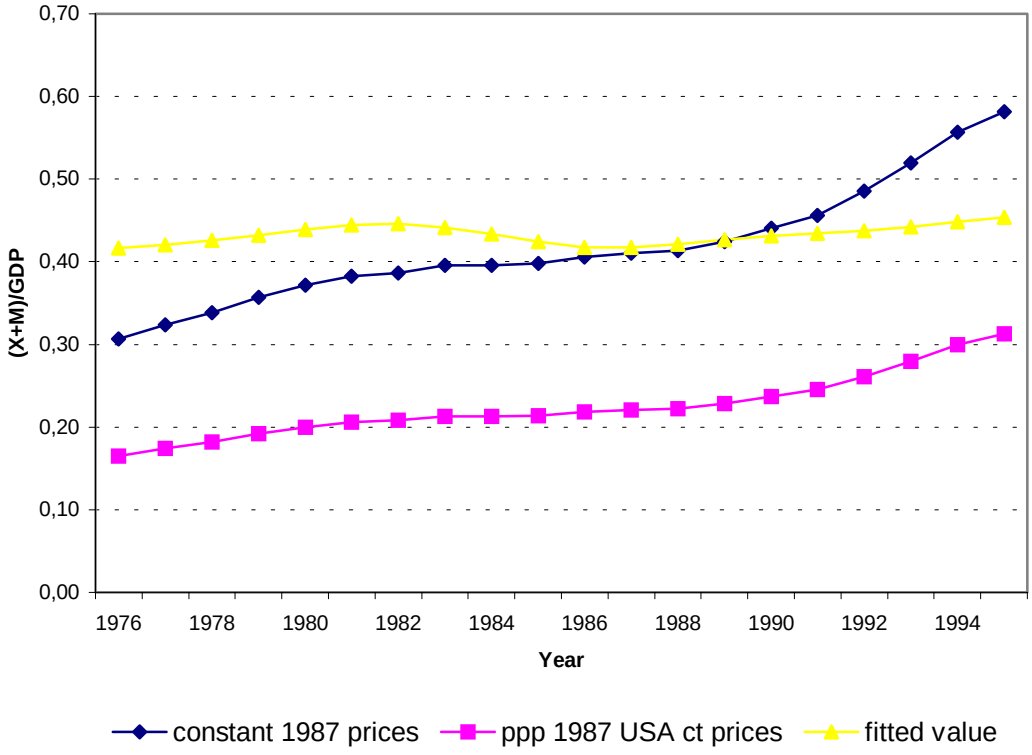


Source: **Central Bank of Uruguay, National Accout Statisticts.**

Graph 2

Trade openness coefficient (5 year moving averages 1976-1995)

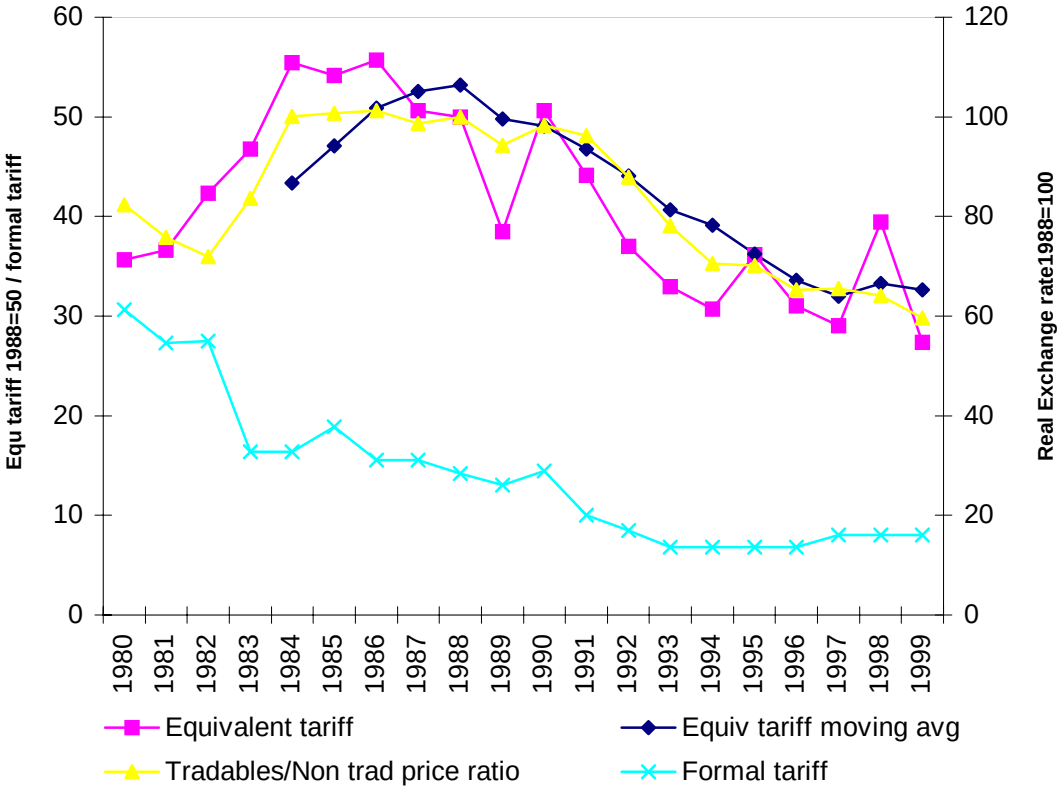
(constant 1987 prices and ppp constant 1987 USA prices)



Source: own elaboration using Low et al (1999).

Graph 3

Equivalent tariff, formal trade policy and real exchange rate

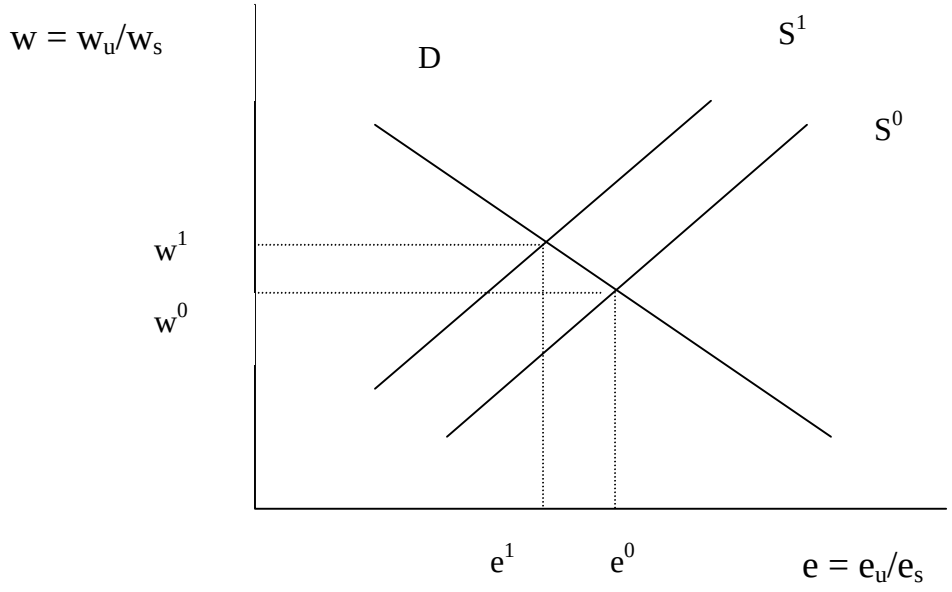


Source: own elaboration using National Accout Statisticts.

Graph 4

The Uruguayan labour market in the eighties

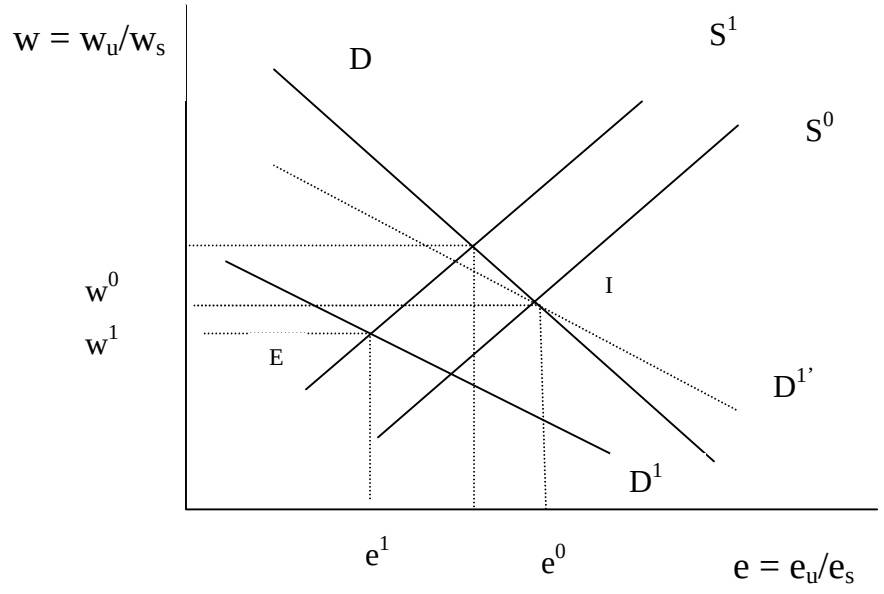
Negative covariance between wages and employment



Graph 5

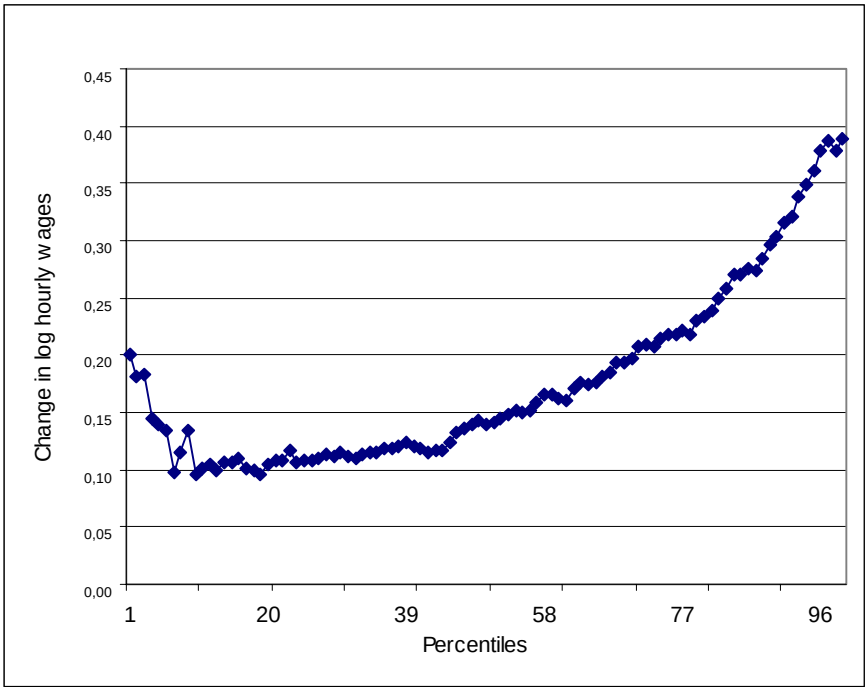
The Uruguayan labour market in the nineties

Positive covariance between wages and employment



Graph 6

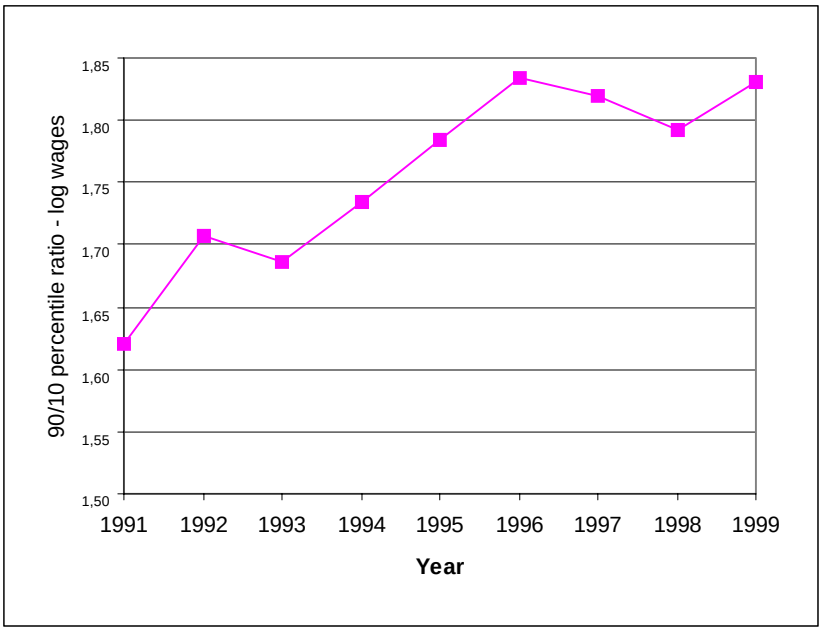
Change in log hourly wages by percentile of the distribution in the nineties



Source: Own elaboration using Household Survey, INE, Uruguay

Graph 7

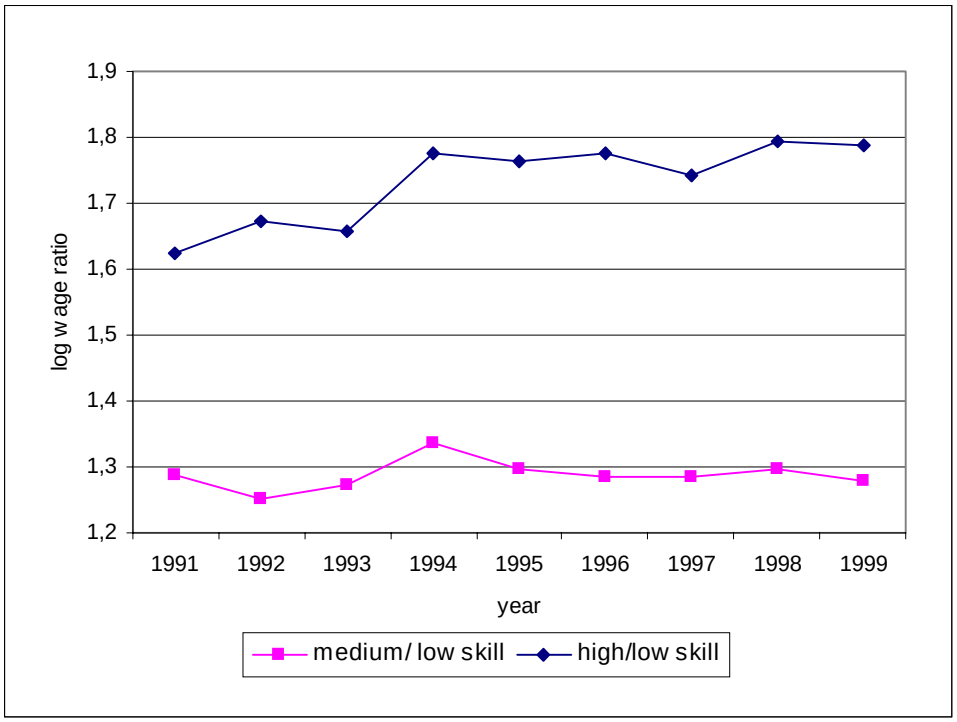
Percentile ratio (90/10) of the log wage distribution



Source: Own elaboration using Household Survey, INE, Uruguay

Graph 8

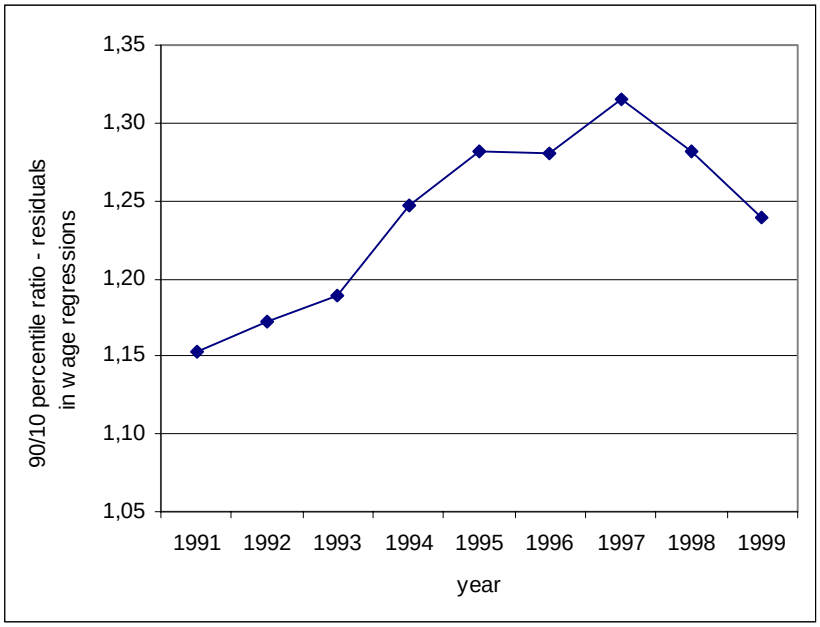
Skill premium 1991-1999



Source: Own elaboration using Household Survey, INE, Uruguay

Graph 9

Percentile ratio (90/10) of the residuals of log wage equation distribution



Source: Own elaboration using Household Survey, INE, Uruguay