AN ESTIMATION OF THE WAGE CURVE FOR URUGUAY

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Many studies have documented empirical evidence about a negative relationship between wages and unemployment that has been related to the behaviour of a non-competitive labour market. Blanchflower & Oswald (1990; 1994) were the first in pointing out the existence of a wage curve establishing a negative relation between wages and unemployment. These studies were followed by many others referred to different countries and, in spite of the different point estimations, their broad conclusion is that the elasticity between wages and unemployment is negative (for reviews see Blanchlower & Oswald, 1995; Nijkamp & Poot; 2005). The estimations by Blanchflower & Oswald (1994) for the United States and United Kingdom are around –0.10. Sanromá & Ramos (2003) estimate an elasticity of -0.13 for Spain. In turn, Hoddinott (1996) find for Cote d'Ivoire an elasticity of -0.12. In Eastern Europe, estimates are somewhat larger reaching in some cases -0.3 (Blanchlower, 2001). In Latin America, the estimations of the wage elasticity are -0.08 for Chile (Berg & Contreras, 2004), 0.07 for Colombia (Ramos *et al.*, 2010), and around -0.1 (in the long run) for Argentina (Galiani, 1999).

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However, criticisms to the estimation methods and issues of identification and measures have led to some scepticism about the existence of an empirical law. This debate motivated that Blanchflower & Oswald (2005) implemented different empirical alternatives to estimate a wage curve for the US. Thus, attempting to correct for endogeneity and measurement error, they found evidence consistent with the existence of a wage curve.

In Uruguay there are no empirical studies about the wage curve. However, many facts of the period 1986-2005 make this country an interesting case of study. Between 1986 and 2005 the unemployment rate ranged from 8 % to 17 %; indeed, the period comprises years of stable growth, a severe crisis, and a recovery. Additionally, during the growth period, the level at which wage bargaining took place changed from industry to firm level. Thus, the data allow exploring the reaction of the elasticity of wages to unemployment in different macroeconomic environments and different wage setting processes.

Besides, a set of empirical studies concludes that there are large differences in wage curve elasticities across groups: it is higher (in absolute terms) for young and low-educated than old and high-educated workers, in non-union than union sector, and in most of the cases, for women than for men (for a review, see Bart, Bratsberg, Naylor & Raaum, 2002). The Uruguayan case may help to explore a less studied dimension: formality and informality. We may expect that the elasticity will be higher in a sector in which labour regulations are not enforced, as found by Ramos *et al.* (2009) for Colombia. Surprisingly, Ramos *et al.* (2009) find a null elasticity for the average formal worker and especially, for public workers. We look for assessing the wage elasticity by formality in order to analyze if the average wage curve is composed by labour categories that do not react to labour market conditions.

The paper is structured as follows. In section two we briefly introduce the theoretical explanations for the wage curve focusing on the efficiency wage interpretation. In section three we analyze the main features of the Uruguayan labour market in the period 1986-2005. In section four we describe the data and present the empirical model. In section five we present the results and finally in section six, the main conclusions are drawn.

THEORETICAL INTERPRETATIONS

The evidence of the existence of a wage curve shows that the estimated elasticity of earnings with respect to unemployment is stable across countries. Specifically, empirical studies have found a negative short-term relationship between earnings and unemployment (for reviews see Blanchlower & Oswald, 1995; Blanchlower & Oswald, 2005).

As pointed out by several authors, this stylised fact does not just reflect a labour offer function (Card, 1995; Nijkamp & Poot, 2005). As unemployment decline

means an employment increase, we may infer that a contemporaneous wage rise and unemployment decrease could be just the reflection of a movement along an upward-sloping labour supply curve. For this reason, the empirical strategies propose including the employment rate or the labour force participation rate of the region as explanatory variables. The remaining negative relationship between unemployment and earnings has led to a rejection of the labour supply function as an interpretation of the wage curve.

And a wage curve is not a Phillips curve (Card, 1995). The wage curve has to do with the relationship of unemployment with the level of real wages at a micro level. The Phillips curve is an aggregate relation that can be derived from a model of adjustment of nominal wages to unemployment. Indeed it has to do with the relation between unemployment and the rate of change of nominal wages.

There is an agreement in the literature on the wage curve that the main explanations for this relationship are based on: (i) a labour contract model, (ii) a bargaining model, or (iii) an efficiency wage model. A summary assessment of these interpretations is given in Blanchflower & Oswald (1994) and in Card (1995).

In the labour contract model, amenity values differ among regions but unemployment benefits and reservation wage do not. Thus, differences in amenities generate differences in wages: regions with higher amenities will offer contracts with lower wages and lower employment (higher unemployment) probability. However, based on an international review of empirical studies, Nijkamp & Poot (2005) pointed out that the evidence does not support this kind of explanation. Indeed, the labour contract model proposes a negative long term relationship but the wage curve reflects a negative short term relationship. Moreover, there is some evidence that unemployment and wages are positively related in the long term.

In the union bargaining model, the "alternative" wage available for union workers in the event of dispute, declines with unemployment. Therefore, the unionised negotiated wage depends negatively on unemployment as predicted by the wage curve. Nevertheless, Nijkamp & Poot (2005) remarked once again that the evidence is not consistent with this explanation because the slope of the wage curve is usually less for union workers than for non-union workers.

The efficiency wage model seems to give the most attractive explanation. Card (1995) argues that this model is more suitable than the labour contract and bargaining models to explain the wage curve. Based on the Shapiro & Stiglitz (1984) proposal, the model assumes that the wage premium to be paid to promote worker's effort declines with unemployment. Indeed, the expected penalty of being caught shirking increases when unemployment rises. Efficiency wages also rely on turnover considerations. Recruiting and training are costly for the firms so they attempt to minimise costs paying a premium to retain workers. Once again, the premium will decrease when unemployment rises because it will be less likely that the worker quit and find a new job.

Barth *et al.* (2002) propose a model that combines an efficiency wage behaviour and a wage bargaining behaviour. As pointed by the authors, it could be expected that this model would generate a stronger wage curve than that expected by each model on its own. However, they find that the combination of the two behaviours generates a third effect (rent effect) that makes the wage curve less elastic in the presence of unions. This prediction is more consistent with the evidence than the predictions of the union bargaining model. The intuitive reasoning behind this result is as follows. The increase in unemployment leads to a decline in turnover costs per worker. The efficiency wage behaviour makes the premium wage to decline and hence rents (net of turnover costs) increase. This has a positive effect on the bargaining wage, because the generated rents are shared by the union in the form of lower reductions in wages. Thus, Barth *et al.* (2002) expect a greater negative correlation between unemployment and wages in non-union sectors than in union sectors. In fact, they do not find a statistically significant wage curve for union workers in their empirical work for Norway, the US, or Great Britain. As they point out, '*these results suggest that efficiency wage mechanisms, rather than collective bargaining, are driving the negative relationship between wages and local labor market conditions*'. On the basis of this model, they also expect less elastic wage curves in countries with stronger unions and stronger union wage bargaining.

THE URUGUAYAN LABOUR MARKET

Compared to other Latin American countries, Uruguay has usually had a high level of unemployment, particularly among women and young people. Indeed, average unemployment rates in the 1986-2005 period were 11 percent overall, 14.4 percent for women and 8.7 percent for men. The rate was 25 percent for people aged 18-24 but only 7 percent for people in the 25-59 age range.

In Table 1 we show the evolution of unemployment, wages and GDP from 1986 to 2005. After the crisis that affected the Latin American countries at the beginning of the 1980s, the Uruguayan economy went through a period of growth that lasted until 1998, and there was only one year in which GDP decreased (1995). During this period of growth, wages rose steadily and they only declined in 1990, a year of high inflation, and in 1995.

Overall, economic activity increased in 1986-1998 but we can distinguish two periods in terms of labour market performance (Bucheli & Casacuberta, 2005). Until 1994, the unemployment rate was quite stable although the output/labour ratio increased and employment composition changed, mainly due to a decline in manufacturing jobs in the first half of the 1990s (De Brun & Labadie 1997). 1995 was a turning point in the level of unemployment. Indeed, the unemployment rate grew from 8-9 percent in 1987-1994 to 10-12 percent in 1995-1998, and mainly affected unskilled workers and men (see Table 1). This increase in unemployment

was also related to a loss of jobs in manufacturing. But in those years, service and commerce did not counterbalance this process and the output/labour ratio rose in most industries (Bucheli, Diez de Medina & Mendive, 2001).

TABLE 1.
MACROECONOMIC DATA

Year	Unemployment rate (%)	GDP variation (%)	Real wage index (1986=100)	Inflation (%)
1986	10.1	8.9	100.0	70.7
1987	9.1	7.9	104.7	57.3
1988	8.6	0.0	106.2	69.0
1989	8.0	1.1	105.8	89.2
1990	8.5	0.3	98.1	129.0
1991	8.9	3.5	101.8	81.5
1992	9.0	7.9	104.1	58.9
1993	8.3	2.7	109.1	52.9
1994	9.2	7.3	110.0	44.1
1995	10.3	-1.4	106.9	35.4
1996	11.9	5.6	107.6	24.3
1997	11.4	5.0	107.8	15.2
1998	10.1	4.5	109.8	8.6
1999	11.3	-2.8	111.5	4.2
2000	13.6	-1.4	110.1	5.1
2001	15.3	-3.4	109.7	3.6
2002	17.0	-11.0	98.0	25.9
2003	16.9	2.2	85.8	10.2
2004	13.1	11.8	85,7	7.6
2005	12.2	6.6	89,6	4.9

Source: Banco Central del Uruguay; Instituto Nacional de Estadística.

In 1999 the labour market was affected by a downturn in economic activity, and this worsened in subsequent years. In 1998-2002, GDP suffered an accumulated fall of nearly 18 percent, the unemployment rate rose in 2002 to an unprecedented 17 percent and real wages decreased. Once again, it was mostly unskilled workers who were negatively affected by unemployment (Bucheli & Casacuberta, 2005).

During the whole period under consideration, informality was quite high and tended not to increase very much (Bucheli, 2004). In recent years, around 35-40 percent of the labour force has been informal (not covered by the social security system). Informality is rather higher among unskilled workers than those who are skilled: almost half of workers with primary school are in the informal economy while more than of 90 percent of workers who finished college are in the formal economy.

In addition, wages tended to become more concentrated, mainly due to the rise in education rewards (Arim & Zoppolo, 2000). There have been many studies that focus on wage concentration and the widening of the gap between the skilled and the unskilled in the labour market. In any case, as is pointed by Amarante & Arim

(2004) in a review of labour market performance, the analysis of the concentration of earnings in Uruguay between 1986 and 2002 is still weak.

Indeed, beyond general macroeconomic performance, in all these years there were changes in Uruguay's economic policy that affected the labour market. International insertion changed due to tariff reduction: the maximum tax was lowered from 150 percent in 1980 to 20 percent in January 1993. Besides this, in the 1990s Uruguay, Argentina, Brazil, and Paraguay set up an imperfect customs union (the Mercosur) to establish free trade within the bloc and a common trade policy *vis à vis* outsiders. Casacuberta & Vaillant (2004) adduce that the trade liberalization process led to the adoption of new technologies that increased the relative demand for skilled workers and thus increased the education premium.

Other explanations of the increase in earnings dispersion are based on changes in wage policy (Arim & Zoppolo, 2000; Miles & Rossi, 2001). One factor was that real minimum wages fell. Indeed, at the end of 1985 they were 94 percent of the level in 1980; this figure shrank to 79 percent in 1989, 42 percent in 1994, and 32 percent in 2004. In addition, the mechanism of bargaining negotiations changed in the 1990s. In the latter half of the 1980s, wages were set in collective bargaining negotiations at industry level. The State ratified the agreements and made them mandatory for all workers. In 1990, the government withdrew the wage setting procedure and as agreements expired, collective bargaining was abandoned. Only some firms with strong union workers continue to fix wages through collective negotiations.

In 2003, a period of recovery began but the unemployment rate only started to decrease in 2004, and it was in 2005 that real wages grew. It is worth noting that important institutional changes took place in 2005: the minimum wage was raised by 83 percent and collective bargaining was re-established. These very recent years have not been analyzed as much as the 1986-2002 period, but the most documented facts of the recovery have to do with the difficulties in trying to bring unemployment down.

DATA AND MODEL

We use micro data provided by the Continuing Household Survey (*Encuesta Continua de Hogares –ECH- for its initials in Spanish*) collected by the National Institute of Statistics (*Instituto Nacional de Estadística –INE– for its initials in Spanish*) in 1986-2005. The *ECH* is a one-off urban monthly survey. Until 1997 it collected information on the population in cities and towns with more than 900 inhabitants, but since 1998 the sample has been limited to towns with more than 5,000 inhabitants. In order to have a similar coverage for the whole period, we drop the data on small towns for the years before 1998. As 12 percent of the population lives in towns with less than 5,000 inhabitants, we can assume that the results

obtained with this sample are representative of the whole country. However, the survey under covers the labour force in agricultural activities.

We use the pool of the annual cross section information on workers between 18 and 59 years old. We drop people younger than 18 because the law establishes specific regulations for them, and we drop people over 59 years old because retirement is frequent in that age bracket. The two dropped groups amount to 10 percent of the active population.

We estimate the following wage equation:

$$lnW_{irt} = \alpha + \beta lnU_{rt} + \delta X_{irt} + \epsilon_{irt} \quad (1)$$

Where i represents an individual, r names the region where he lives, t represents the year of the interview, W refers to the wage (in logs), U_{rt} is the annual unemployment rate of the worker's region, and X is a vector of personal characteristics. We use five regions following an usual geographical criterion proposed by *INE*.

We use two different proxies of the wage. The first includes regular labour income in cash and in kind received in the preceding month divided by 4.2 (the number of weeks in a month) multiplied by the hours worked the preceding week. This amount is deflated using the consumer price index in order to avoid the effect of price changes through time. We refer to this proxy as the "wage".We use the expression "adjusted wage" when we add three social benefits to the "wage". We calculate these benefits only for formal workers, that is, for the labour force that is covered by formal arrangements. As the *ECH* does not allow us to detect formality before 1991, we calculate the "adjusted wage" only for the 1991-2005 period. The benefits are as follows.

First, we assign an estimation of health benefits. According to the law, private workers have to contribute to the social security system and to a health fund, specifically to the Board of the Social Security for the Sick (*DISSE for its initials in Spanish*). *DISSE* supports membership of a private health system. Membership requires the payment of a monthly fee that is financed by *DISSE*. In order to detect the contributors, we use information about medical insurance collected in the *ECH*. Specifically, the survey allows us to identify *DISSE* beneficiaries since 1991. On the basis of this information, we assign to these workers a benefit equivalent to the price of an ordinary fee.

Although public servants do not contribute to *DISSE*, some sections of the public sector provide some kind of health benefit. However, the *ECH* does not identify the recipients of these benefits so we do not assign health benefits to public workers.

The second benefit taken into account is the so-called thirteenth wage received by public and private wage earners. The ECH has been inquiring this benefit since 2001. This recent information indicates that enforcement is weak among private wage earners and that the presence of the benefit is highly correlated with contribution to *DISSE*. Therefore, we add an amount equivalent to 1/12 of the monthly wage to public workers and to *DISSE* beneficiaries.

Thirdly, the law establishes a specific retribution (two-thirds of regular monthly cash labour income) to be paid to private wage earners when they have their annual vacation. The *ECH* does not collect information about this benefit. Therefore, we estimate the benefit on the base of the reported labour income when the worker is a *DISSE* recipient.

The vector of characteristics X includes years of schooling; potential experience (calculated as *age –years of schooling–* 6) and the square of this figure; a female dummy; dummies for the relationship with the head of the household (head, wife of the head, or other); dummies for the marital status (single, in couple, or other); dummies for occupation (private wage earner, public servant, self employed with some capital, or self employed without capital); dummies for industry (manufacturing and energy, agriculture, construction, commerce, services, and transport); and a part time dummy for those who work less than 30 hours per week.

Besides personal and labour characteristics, vector X includes dummies for the year of the interview and for the region. It also includes the mean of the annual regional labour participation rate.

As local unemployment is defined at a more aggregated level than wages, the estimated standard errors may be biased downwards (Moulton, 1986). Thus, in line with previous studies we estimate an OLS regression and we always perform the Moulton correction as specified by Angrist and Piskhe (2009) and programmed by Pischke in STATA:

$$lnW_{rt} = \alpha + \beta lnU_{rt} + \delta X_{rt} + \epsilon_{rt} \tag{2}$$

Where W_{rt} is the average log wage for all individuals in region r in year t; U_{rt} is the annual unemployment rate of the worker's region r in year t, and X_{rt} is a vector of average values over characteristics included in the previous vector X in region r at time t. We present these results in the next section and we analyze the sensibility of these results to the treatment of some known problems mentioned in the literature.

First, we study the effect of the regional partition. We work with 19 regions that correspond to the political divisions of the country. Second, as the consumer price index collects information about the prices in the capital city, the variable "wage" does not capture eventual differentiated price changes among regions. Though it is possible that a price of a specific good varies differently by region, there is recent evidence that the price index of the capital city and the rest of the country have the same evolution (INE, 2011). However, following Blanchard and Oswald (1994), we also estimate a model for nominal earnings including a combination of regional and time dummy variables.

Finally, we address the endogeneity of wages and unemployment problem. A common approach to take into account the simultaneity issue is to use an instrumental variable estimator. Thus, following the proposal of Blanchflower and Oswald

(2005) we instrument the log of the unemployment rate with one and two lags of itself. According to the C-test of exogeneity performed for an estimation in average aggregate levels, we cannot reject the null hypothesis of exogeneity (both for the total wage and the adjusted wage). Therefore, in the next section we also present the results for the IV estimation with microdata and Moulton correction.

In addition to the estimation for the whole sample, we run the model for groups of individuals disaggregated by level of education, gender, age, and occupation. In all these estimations we use the overall regional unemployment rate.

RESULTS

Estimations for different periods

We estimate the wage curve considering alternatively the two measures of wages and different periods. In Annex 1 we present the results for the period 1991-2005.[3] As expected, the average return to education is around 10 % and the wage increases with experience at a decreasing rate. Besides, wages are lower for women and self-employed than for men and wage earners.

In Table 2 we present the unemployment coefficients for all the periods. In all cases, we find a negative relationship between unemployment and wages. Anyway, we observe some differences between the estimations.

TABLE 2.
UNEMPLOYMENT COEFFICIENTS FROM MICRO DATA REGRESSIONS (+)

	1986-2005 (A)	**1991-2005** (B)	**1986-1998** (C)	**1999-2005** (D)	**1986-1990** (E)	**1991-1998** (E)
Log wage	-0.087 (3.63)**	-0.120 (5.59)**	-0,086 (0.030)**	-0.154 (3.29)**	-0.006 (0.19)	-0.094 (3.60)**
Log adjusted wage	n/a	-0.110 (4.67)**	n/a	-0.164 (3.37)**	n/a	-0.096 (3.30)**

Note 1. (+) Moulton correction for OLS standard errors.
Note 2. Absolute value of t statistics in parentheses
Note 3. * significant at 5 %; ** significant at 1 %.
Note 4. n/a The "adjusted wage" is not available for 1986-1990.
Source: based upon author main results.

As shown in column A, we find an elasticity of –0.087 for 1986-2005. Thus, an increase of 10 percent in unemployment leads to a drop in pay of around 0.9 percent. In column B we report the results obtained when working with data from 1991-2005. Remind that the advantage of this period is that it allows calculating the "adjusted wage", which is a better approach to labour earnings than "wage".

[3] The results for other periods are available by request.

We find an elasticity of -0.12 when the dependent variable is "wage" (in logs) and -0.11 when we use "adjusted wage". It can be seen that we do not find important differences when using alternatively the "wage" or the "adjusted wage" as the dependent variable. All these values are in accordance with the range of other countries´ estimated elasticities, which turn around -0.1 as reported by Blanchfower & Oswald (2005) and Nijkamp & Poot (2005) in reviews of the evidence.

In column C and D we report the estimations for the growth period 1986-1998 and for the cycle 1999-2005. They are -0.086 and -0.154, respectively. This result supports the idea that the wage curve changes under different macroeconomic environments: wage flexibility would increase in an unstable context. Additionally, in 1999-2005 the negative relation is stronger when the dependent variable is "adjusted wage" than when it is "wage" suggesting that benefits, though mandatory, are a channel of adjustment.

In columns E and F we report the wage-elasticity in 1986-1990 and 1991-1998. Remind that the wage setting process was different among periods. In 1986-1990, although the relationship between unemployment and wages is negative, the estimated coefficient is not significant at the usual standard levels. In 1991-1998, the wage-elasticity is -0.09. These results suggest that the wage bargaining at industry level hindered the adjustments of wages to labour market conditions.

Other specifications

To estimate the wage curve, the geographical labour market has to be delimited. As was pointed out by Longhi, Nijkamp, & Poot (2004), the geographical divisions are not "independent islands" but connected regions. Thus, local labour markets are affected by the labour force movements between regions and the more connected the regions are, the weaker the relation between wages and unemployment. Notice that the closeness between labour markets is related to geographical proximity and communications development. In the estimations in the previous section, we use a five-group division based on geographical criteria.

However, little is known about institutional or cultural barriers to internal migration and commuting. So, we perform an estimation based on the political divisions of the country. Uruguay is small and is not a federated system of states, and it is divided into nineteen political units that have some measure of autonomy. Obviously, each one of these units is quite small. and we expect them to be closely connected. In Table 3 we show the estimated unemployment coefficient under each geographical classification.

We find that the estimated relationship between wages and unemployment is sensitive to the geographical classification. As expected, the elasticity is lower (in absolute terms) when considering nineteen than when considering five local labour markets. As mentioned in section 5.1, when using the micro-data from 1986-2005 and five-region division, we obtain an elasticity of -0.087. This figure is more in

line with the international estimations than that obtained with the nineteen-region division (-0.029).

TABLE 3.
ESTIMATED UNEMPLOYMENT COEFFICIENTES IN OTHER SPECIFICATIONS (+)

	1986-2005 (i)	**1991-2005 (i)**	**1991-2005 (ii)**
Five-regions division	-0.087 (3.63)**	-0.120 (5.59)**	-0.110 (4.67)**
Nineteen-regions division	-0.029 (3.43)**	-0.071 (8.59)**	-0.068 (7.85)**
Dependent variable: nominal wage	-0,086 (-3.78)**	-0.119 (-5.97)**	-0.109 (-5.10)**
IV estimation	-0,081 (-5.70)**	-0.124 (-7.70)**	-0.113 (-6.78)**

Note 1. (+)Moulton correction for standard errors.
Note 2. (i) Dependent variable: log wage; (ii) Dependent variable: log adjusted wage.
Note 3. Absolute value of t statistics in parentheses.
Note 4. * significant at 5 %; ** significant at 1 %.
Source: based upon author main results.

As mentioned in section 4 we also examine the effect of deflating the labour earnings when we do not have regional consumer price data. In Table 3 we report the wage elasticity obtained with a model in which the dependent variable is the nominal wage, and a combination of regional and time dummy variables are included as covariates. The estimated parameters are quite close to the ones obtained in the previous section.

Finally, we also estimate an IV model using the lagged unemployment rates (one and two lags) as instruments. Indeed, there is a potential simultaneously bias problem: the wage curve behaviour states that wages depend on unemployment but unemployment may also depend on wages.[4] We do not find important differences between these estimations and the ones obtained as in studies for other countries (see Blanchflower and Oswald, 1995).

Groups Elasticities

In this section we estimate the elasticity of wages to unemployment for disaggregated groups of workers. This analysis allows us to know if unemployment affects groups of workers differently. We always use the overall regional unemployment rate, so this rate extends beyond the group local labour market. We work with

[4]Notice that as pointed by Njjkamp & Poot (2005), few studies control for endogeneity of unemployment because of a theoretical argument when using micro-data set. The local unemployment rate affects the wage of an individual worker, but we may not expect that the wage of an individual affects a macro-variable (the unemployment rate).

the data from 1991-2005 because we can use both "wage" and "adjusted wage" as dependent variables. As the two estimations show a similar structure of elasticities, we analyze the results focusing on the point estimations obtained when using "wage". The coefficients are reported in Table 4.

TABLE 4.
UNEMPLOYMENT COEFFICIENTS FOR GROUPS OF INDIVIDUALS (1991-2005) (*)

	Log wage	**Log adjusted wage**
All workers	-0.120	-0.110
	(5.59)**	(4.67)**
Age		
18 - 24	-0.265	-0.242
	(6.14)**	(5.51)**
25 - 49	-0.090	-0.081
	(4.15)**	(3.39)**
50 - 59	-0.092	-0.090
	(2.31)*	(2.26)*
Sex		
Male	-0.103	-0.096
	(3.64)**	(3.18)**
Female	-0.152	-0.137
	(5.77)**	(5.22)**
Years of schooling		
0 - 8	-0.158	-0.145
	(5.09)**	(4.69)**
9 - 11	-0.144	-0.139
	(4.15)**	(4.09)**
12 or more	-0.041	-0.034
	(1.17)	(0.98)
Occupation		
Public wage earner	-0.040	-0.040
	(1.47)	(1.47)
Private wage earner	-0.132	-0.125
	(5.26)**	(4.44)**
Self-employed	-0.178	-0.173
	(4.08)**	(3.97)**
Formality		
Formal	-0.058	-0.057
	(2.88)**	(3.05)**
Informal	-0.241	-0.241
	(5.88)**	(5.88)**

Note 1. (*) Moulton correction for OLS standard errors.
Note 2. Absolute value of t statistics in parentheses.
Note 3. * significant at 5 %; ** significant at 1 %.
Source: based upon author main results.

Age

We distinguish three groups of ages: a youth group (18-24 years old), prime-age workers (24-49 years old), and seniors (50-59 years old). We find that the wage curve is deeper for the younger workers as is reported for other countries (Blanchflower & Oswald, 1994; Hoddinott, 1996). Specifically in the Uruguayan case, we find an elasticity of -0.265 for the 18-24 youth and an elasticity of around -0.09 for workers over 24 years old. Notice that the earnings of young people are more sensitive but we do not find a big difference between prime-age workers and seniors.

The differences in the wage curves for different ages could be explained by their different behaviour as regards shirking and turnover. Hoddinott (1996) argues that the higher the specific human capital of the worker, the more costly it is to dismiss him or her and to recruit and train a new worker. In the efficiency model framework, the wage premium needed to promote non-shirking decreases with unemployment. But, as prime age workers have a higher investment in specific human capital, the premium will not decline as much as it will for younger workers. This means that firms are more tolerant of shirking by highly specific human capital workers. Hence, as unemployment exerts a greater effect on workers with less specific human capital, young people's wages are more influenced by unemployment.

Gender

In the empirical literature, the analysis of the wage curve by gender does not lead to similar conclusions. Our estimations indicate that in Uruguay the elasticity is greater for women (-0.152) than for men (-0.103). This gender pattern is similar to that obtained for East Germany (Baktagi, Blien, & Wolf, 2000), Turkey (Ilkkaracan & Selim, 2003), and Chile (Berg & Contreras, 2004). However, the opposite result is obtained for the USA and the UK (Blanchflower & Oswald, 1994). In the case of Spain, Sanromá & Ramos (2003) find a strong wage curve for men but a non-significant unemployment effect for women.

Groot *et al.* (1992) do not find a wage curve for women either. They suggest that there is a wage curve for women but the negative relation is not captured by the data because of a discouraged worker effect. This phenomenon means that when unemployment rises, women react by leaving the labour market. Therefore, although a rise in unemployment pushes down wages, this effect is outstripped by an increase in wages caused by a decrease in the female labour supply caused by the discouragement effect.

Using an analogous reasoning, we could argue that in Uruguayan female behaviour an added worker effect would prevail. In fact, Bucheli (2002) finds some indication of the presence of an added worker behaviour among Uruguayan married women. Thus, when unemployment rises, women's wages would decrease for two reasons.

First, there is a wage curve effect. Second, the decline in household earnings leads to an increase in female labour supply that pushes down female wages reinforcing the first effect. Consequently, the estimated wage curve would be deeper for women than for men.

Besides, as for age differences, the gap in elasticity could be the result of a gender difference in specific human capital accumulation or in unionised behaviour.

Schooling

We classified workers on the basis of years of schooling, considering three levels. The first one contains workers who did not finish the prevailing compulsory legal minimum level of education, which means they have less than 9 years of schooling. The second group is made up of workers with 9 to 11 years of schooling. This group corresponds to people who completed the minimum level of education but have not finished high-school. Finally, the third category is for workers who finished high-school and eventually attended college.

We do not find a significant effect of unemployment on wages for workers with college studies. However, a wage curve relation exists for workers with less than 12 years of schooling. This relationship is stronger for the less educated (-0.158) than for workers with between 9 and 11 years of schooling (-0.144). These results are in harmony with estimations for other countries; said estimations also find higher elasticities for the less educated such in the US and the UK (Blanchflower & Oswald, 1994), Turkey (Ilkkaracan & Selim, 2003), Chile (Berg & Contreras, 2004). Once again, low specific capital endowment may explain this result. Indeed, at least in the Uruguayan case, the less educated were specially affected by the changes in the 1990's. With the loss of jobs in manufacturing and the adoption of new technologies, we may suppose that less-educated workers lost specific capital (they had accumulated specific capital for tasks that disappeared).

Occupation

We also estimate different wage curves for private wage earners, public workers and the self-employed. We find that the coefficient for public employees is negative but it is not significant at the usual standard levels, as found by Ramos *et al.* (2010) for Colombia. We may conclude that there is no wage curve for the public sector and that the degree of wage flexibility is higher in the private sector. Indeed, private wage earners and self-employed workers have a significant negative wage curve.

The relationship is stronger for the self-employed (-0.178) than for private wage earners (-0.132). This result may be caused by movements between salaried market and self-employment driven by unemployment. Indeed, it has been argued that in Latin American countries, self-employment takes the role of "hidden-unemployment" in the downturns. Thus, a rise in unemployment would lead to

a shift from private salaried market to self-employment. The consequent increasing competition among the self-employed would push down their earnings and hence, the wage curve of this group would be deeper than the salaried group.

This conclusion is not shared by Berg & Contreras (2004), who do not confirm this elasticity pattern with Chilean data. On the contrary, they find that unemployment elasticity is more negative for salaried workers and conclude that, possibly because to enter self-employment is not easy, this strategy does not act as a buffer in economic recessions.

Formality

Finally, we distinguish between formal and informal workers. As presented in section 3, we define formal workers as those who contribute to the social security system.

We find that both formal and informal workers have negative unemployment elasticity. The relation is more negative for informal (-0.241) than for formal workers (-0.058). Once again, we may infer that the contribution to the social security system changes during the business cycle. First, in economic recessions when unemployment rises, non-contributors would accept more severe pay cuts than contributors, because they have less bargaining power. Second, the businesses that are more affected would not only reduce earnings more sharply but also opt more frequently for evasion. Third, it has been argued that in downturns large enterprises try to avoid labour regulation costs by subcontracting workers in little units in which non-contribution is more likely. Finally, the above-mentioned shifts between private salaried labour market and self-employment during recessions are also important. Indeed, when self-employment increases as a strategy reaction to unemployment, these new jobs are usually informal.

CONCLUSIONS

We estimated a wage curve for the period 1986-2005 using two different proxies of real wages, two proxies of nominal wage (controlling inflation with time and regional dummies), and two different geographical divisions. We alternatively run an OLS model and an IV estimation. In all cases we obtain a negative wage elasticity that indicates the presence of a wage curve behaviour. Nevertheless, the elasticity is sensitive to the period chosen and is different for different group of workers.

The estimations suggest that the relationship depends on institutional arrangements. Indeed, when we estimate the wage curve for 1986-1990 (when the rule in wage determination was the collective bargaining at the industry level), the estimation of the elasticity is non-different from zero... But in 1991-1998, when this policy was abandoned, a wage curve behaviour emerges. We may conclude that the

decentralization (that is, the wage bargaining at firm level) gave room to increase the responsiveness of wages to market conditions.

The estimations also indicate that the wage curve is stronger under instability conditions. Notice that we also find that it is stronger when including the mandatory labour benefits in the wage and for informal workers. Thus, we may interpret that non-compliance with (at least some) labour norms works as an adjustment mechanism in downturns. Indeed, our results are consistent with the idea that informality acts as a buffer under adverse macroeconomic shocks. Similar conclusion arises from the results for Colombia (Ramos *et al.*, 2010) but does not for the case of Chile (Berg & Contreras, 2004) suggesting that the informality is a heterogeneous phenomenon in the Latin-American region.

We also find that the elasticity is higher for the population groups with higher unemployment rate: the young, women, and low-educated workers. Two other explanations may be considered. First, these workers are more likely informal than formal, and the wage elasticity is higher for informal workers. Second, we may think that those groups have less specific capital. In the case of some low-educated workers, the low specific capital would be a consequence of the structural changes stemmed from trade-openness and technological change that characterized the 1990's.

Finally, the elasticity varies among groups of workers and for some of them there is not a significant effect of unemployment in wages. This is the case among higher-educated workers and the public workers. At the other end of the scale, wage curve behaviour is strong for the lower-educated, young, informal workers, private salaried, and the self-employed. Also, the relation is stronger for women than for men.

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ANNEX 1.
RESULTS OF OLS ESTIMATIONS WITH MOULTON CORRECTION (1991-2005)

Regressors	**Dependent variable**	
	Wage	**Adjusted w**
Log unemployment rate	-0.120 (5.59)**	-0.110 (4.67)**
Years of schooling	0.101 (247.85)**	0.103 (249.42)**
Potential experience	0.029 (68.25)**	0.029 (66.86)**
Square of potencial experience	-0.000 (42.33)**	-0.000 (40.65)**
Women	-0.223 (65.76)**	-0.216 (62.96)**
Head of the household	0.181 (45.65)**	0.176 (44.05)**
Wife of the head	0.047 (8.98)**	0.041 (7.59)**
Single	0.007 (1.44)	0.012 (2.42)*
Married or in couple or other	0.108 (23.24)**	0.121 (25.83)**
Part time	0.306 (91.80)**	0.264 (78.61)**
Private	0.209 (42.72)**	0.366 (74.03)**
Public	0.289 (51.72)**	0.349 (62.01)**
Self-employed	0.160 (28.74)**	0.159 (28.31)**
Industry	Yes	Yes
Year	Yes	Yes
Region	Yes	Yes
Labour participation rate	Yes	Yes
Constant	Yes	Yes
Observations	278.730	278.730

Note 1. Absolute value of t statistics in parentheses.
Note 2. * significant at 5 %; ** significant at 1 %.
Source: based upon author main results.