Minimum wage and education premium in Argentina: 2004-2014

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Ponencia presentada en LI Reunión Anual de la Asociación Argentina de Economía Política realizado en 2016. Tucumán, Argentina

ASOCIACION ARGENTINA
DE ECONOMIA POLITICA

ANALES | ASOCIACION ARGENTINA DE ECONOMIA POLITICA

LI Reunión Anual

Noviembre de 2016

ISSN 1852-0022
ISBN 978-987-28590-4-6

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Abstract: During the period 2004 to 2014, as Argentina was recovering from one of its most important economic crisis, there was an important reduction of the education wage premium. Among the reasons for this behavior we find out that the increase in the minimum wage played an important role. However, while the average wage premium fell during the period here analyzed, there was an increase in the dispersion of wages, especially for informal workers. In this last regards, the relative minimum wage appears to have also influenced.

Keywords: wage premium, education, minimum wage, Argentina.

JEL Codes: J01, J31, J38

Resumen: Durante el período de 2004 a 2014, a medida que Argentina recuperaba de una de sus más importantes crisis económicas, hubo una reducción importante de la prima salarial a la educación. Entre las razones de este comportamiento encontramos que el aumento en el salario mínimo jugó un papel importante. Sin embargo, mientras que la prima salarial promedio se redujo durante el período aquí analizado, hubo un aumento en la dispersión de los salarios, especialmente para los trabajadores informales. En este último respecto, la evolución del salario mínimo relativo parece también haber influido.

Palabras clave: aumento del sueldo, educación, salario mínimo, Argentina.

Códigos JEL: J01, J31, J38

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1. Introduction

The severe political and economic crisis Argentina experienced at the end of 2001, which went on until most of 2003, meant a significant redistribution of income against poorer households, but with most of them affected to some extent. An example is the increase in the wage premium of people with higher levels of education. Later, as the country entered into a recovery path so did different measures reflecting the distribution of income, with the wage premium not being an exception. As reported in Table 1, in all comparisons of the average hourly wage between groups with different levels of education, there was an improvement for those with lower education, with the magnitude of these improvements increasing as we compare groups with a wider gap in terms of the their education levels.

[Table 1 about here]

Among the different reasons for the reduction in the wage premium, one that may have played an important role was the reduction of informality in the labour market (see Graph 1), which to some extent affects more severely jobs usually performed by workers with lower skills (see Table 2). Another reason, which we look to analyze here, was the increase in the legal minimum wage, which over the period 2004-2014 increased sharply, not only in nominal terms, but also after controlling by the rise in consumer prices (see Graph 2).

[Graph 1 about here]

[Table 2 about here]

[Graph 2 about here]

The influence of different labor market institutions, such as the minimum wage, has been widely studied.[2] Dias da Silva and Turrini (2015) point out that a minimum wage could compress the wage distribution at the bottom, thereby contributing to a lower permanent wage premium for low-skilled workers. Crivellaro (2014) in a review of some evidence points out that Di Nardo *et al*. (1996) found that declining minimum wages were important in explaining wage inequality, while Lee (1999) found out that for the United States in the 1980s the minimum wage was negatively correlated with rising inequality at the top end of wage distribution, and that the erosion of the real minimum wage explained much of the increase in the dispersion at the lower end of the distribution. Another evidence cited are that of Machin (1997) and Dickens *et al*. (1999) showing that in the UK a higher union density and a higher minimum wage reduce wage inequality; Manacorda (2004) and Edin and Holmlund (1995), for Italy and Sweden respectively, arrive to the conclusion that wage setting institutions are important for wage inequality.

After a brief discussion about the empirical approach (Section 2), in Section 3 we estimate the evolution of the education wage premium during the period 2004-2014, and then we test the hypothesis if the evolution of the legal minimum wage had an influence on the wage premium, and if that was the case, which type of workers benefit from that; we also look at the impact on wage dispersion. Section 4 is of conclusions.

2. Empirical approach

As pointed out by Santos-Silva and Tenreyro (2006) - SSR (2006) hereafter - economists have long been aware that Jensen's inequality implies that $E(\ln y) \neq \ln E(y)$, but even so it has been neglected in many econometric applications, becoming a workhorse the estimation of log-linear models by ordinary least squares (OLS), and interpreting the estimated

[2] See Fortin and Lemieux (1997) for a review of the effect of labor market institutions on the wage structure.

coefficients as elasticities, which can be highly misleading in the presence of heteroskedasticity. Thus, SST (2006) recommend that constant-elasticity models should be estimated in their multiplicative form using a pseudo-maximum-likelihood (PML) estimator, which besides being consistent in the presence of heteroskedasticity, it also provides a natural way to deal with zero values of the dependent variable. Even when SST (2006) are interested in the case of the Gravity Model which seeks to explain bilateral trade flows, the proposed estimator can also be applied to other models, such us the well known Mincer wage equation (Mincer, 1974), which historically uses the log-linear model to explain the determinants of individual income.

The Mincer wage equation in its multiplicative form can be expressed as follows:

$$w_i = \exp(x_i\beta) \quad (1)$$

where w_i is the wage of individual i, x_i is a set of explanatory variables, β is the vector that relates the values of x_i with that of w_i. Because equation (1) holds in average but not for each individual i, an error term is associated to each observation

$$w_i = \exp(x_i\beta) + \varepsilon_i \quad (2)$$

where $\varepsilon_i = w_i - \exp(x_i\beta)$, and $E[\varepsilon_i|x_i]=0$.

Equation (2) can be expressed as $w_i = \exp(x_i\beta)\eta_i$, with $\eta_i = 1 + \varepsilon_i / \exp(x_i\beta)$ and $E[\eta_i|x_i]=1$. Assuming that w_i is positive, we can take logs and obtain:

$$\ln w_i = x_i\beta + \ln \eta_i \quad (3)$$

SST (2006) point out that to obtain a consistent estimator of vector β when equation (3) is estimated by OLS, it is necessary that $E[\ln\eta_i|x_i]$ does not depend on x_i. Because $\eta_i=1+\varepsilon_i / \exp(x_i\beta)$, the condition requires $\varepsilon_i = \exp(x_i\beta)\upsilon_i$, where υ_i is a random variable statistically independent of x_i. If this requirement is met, then $\eta_i=1+\upsilon_i$ and therefore is independent of x_i, and $E[\ln \eta_i|x_i]$ is constant. In this case the conditional variance of w_i (and ε_i) is proportional to $\exp(2x_i\beta)$, condition for which, as the authors point out, there is not a priori theoretical reasons it holds.

Using the same argument SST (2006) make for the case of the Gravity Equation, in the case of the Mincer wage equation, since w_i is non-negative, we could expect that when $E[w_i|x_i]$ approaches 0, the probability of w_i being positive must also approach 0, while when $E[w_i|x_i]$ is far away from 0, it is possible to observe large deviations from the conditional mean in either direction, leading to greater dispersion. This argument means that ε_i will generally be heteroskedastic with its variance depending on $\exp(x_i\beta)$. Since there is not a priori any reason why we should observe $V[w_i|x_i]$ being proportional to $\exp(2x_i\beta)$, the OLS estimation of the log-linear version of the wage equation could lead to inconsistent estimates of β.

SST (2006) point out "*It may be surprising that the pattern of heteroskedasticity and, indeed, the form of all higher-order moments of the conditional distribution of the error term can affect the consistency of an estimator, rather than just its efficiency. ... Hence, unless very strong restrictions are imposed on the form of this distribution, it is not possible to recover information about the conditional expectation of y_i from the conditional mean of $\ln y_i$, simply because $\ln \eta_i$ is correlated with the regressors*".

In light of the potential drawback of the OLS-log-linear model, SST (2006) propose to use a PML estimator based on the assumption that $E[w_i|x_i] = \exp(x_i\beta) \propto V[w_i|x_i]$. In particular, the proposed estimator is a Poisson PML (PPML)[3], which only requirement to be consistent is the correct specification of the conditional mean: $E[w_i|x_i] = \exp(x_i\beta)$. Finally, because the assumption $V[w_i|x_i] \propto E[w_i|x_i]$ is unlikely to hold, the PPML estimator does not take full account

[3] The estimator is called Poisson pseudo-maximum-likelihood because the data do not have to be Poisson at all, moreover the dependent variable does not necessarily need to be an integer.

of the heteroskedasticity in the model, so all inference must be based on a robust covariance matrix estimator (SST, 2006).

Since a key requirement of the PPML estimator is the correct specification of the conditional mean, SST (2006) perform a heteroskedasticity-robust REST test, which is performed by checking the significance of an additional regressor: $\left(x\hat{\beta}\right)^2$, where $\hat{\beta}$ is the vector of estimated parameters. The rejection of null that the coefficient of the additional regressor is not statistically different from zero points out to a problem of misspecification of the conditional mean.[4]

Finally, to test for the pattern of heteroskedasticity, in particular the one under which OLS on the log-transformation is valid and the one that $V[w_i|x_i] \propto E[w_i|x_i]$, STT (2006) propose a Park- and GNR-type tests, respectively.

In the first case, after the estimation by PPML they run by OLS the following auxiliary regression:

$$\ln\left(w_i - \breve{w}_i\right)^2 = \ln \lambda_0 + \lambda_1 \ln \breve{w}_i + \mu_i \qquad (4)$$

where $\breve{w}_i$ is the estimated value of $E[w_i|x_i]$.

Then, under the null that OLS on the log-transformation is valid the test is H_0: $\lambda_1 = 2$, based on a non-robust covariance estimator.

Instead, to test for the adequacy of the PPML estimator, the proposed auxiliary regression is:

$$\frac{\left(w_i - \breve{w}_i\right)^2}{\sqrt{\breve{w}_i}} = \lambda_0 \sqrt{\breve{w}_i} + \lambda_0 \left(\lambda_1 - 1\right)\left(\ln \breve{w}_i\right)\sqrt{\breve{w}_i} + \varepsilon_i \qquad (5)$$

and then test the statistical significance of $\lambda_0(\lambda_1\text{-}1)$ using a Eicker-White robust covariance matrix estimator. If H_0: $\lambda_0(\lambda_1\text{-}1) = 0$ cannot be rejected neither is $V[w_i|x_i] \propto E[w_i|x_i]$.

Finally, and as mentioned before, another interesting feature of the PPML estimator is its capacity to deal naturally with zero values of the dependant variable. Since the seminal contribution of Heckman (1979), an issue to take into account is the potential problem of sample selection bias, which could arise when the variable we are looking to explain is only observed for a subsample of the population, with this subsample not being randomly selected from the whole population. In the case at hand, we only observe the wage rate when a person is employed. However, if employed individuals are self selected, in the sense those who are unemployed (or at least some of them) choose not to work because the market wage is below their reservation wage, the estimation of the wage equation considering only individuals who are actually working may render biased estimates of the coefficients. To deal with this issue, Heckman (1976) proposed an estimator which requires including an extra regressor (the well-known Inverse Mill's ratios) which helps to control for the presence of self-selection.[5] The inverse Mill's ratios are obtained after adjusting a selection equation that estimate the probability of a person being employed or unemployed, requiring the use of at least one variable which is not in the wage equation. The PPML estimator, since it can deal with zero values in a very straightforward way, avoids the need of estimating the selection equation as well as counting with at least one variable which affects the probability of being employed (selected in Heckman's terminology) but not the level of the wage rate, something is not always easy to find out in practice.

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[4] In the empirical applications we include three additional regressors: $\left(x\hat{\beta}\right)^2, \left(x\hat{\beta}\right)^3, \left(x\hat{\beta}\right)^4$; and then test their joint significance.

[5] In addition is also necessary to correct the standard errors of the estimated coefficients.

3. Evolution of the wage premium in Argentina, and the influence of the increase in the legal minimum wage.

In this section we estimate the evolution of the education wage premium during the period 2004-2014, and then test the hypothesis if the increase in the legal minimum wage contributed to the observed reduction in the wage premium. The analysis is carried out for the urban area of *Gran Buenos Aires* (GBA). The GBA includes the city of Buenos Aires and its surrounding areas (*Partidos del Gran Buenos Aires*) which are part of the Province of Buenos Aires.

The data used in the analysis comes from a household survey known as *Encuesta Permanente de Hogares* (EPH), collected by the *Instituto Nacional de Estadísticas y Censos* (INDEC). In particular, the sample used for the econometric analysis includes those who are classified as salaried employees[6] (excluding domestic servants), aged between 18 and 64 years old, and that were not enrolled in formal education at the time they were surveyed. We also exclude those who declared to work less than 20 hours a week.

As reported in Table 1, during the period here considered there was a convergence among average wages for people with different levels of education. Independently of the categories we compare, the figures show those with a lower level of education closing the gap relative to the ones who are more educated. However, as is well known, this convergence could be not only because the reduction in the wage premium of being more educated, but because of changes in other characteristics of the people that conform each educational group. To test if there have been a reduction of the education wage premium, we estimate a wage equation *à la* Mincer, which in addition to differences in educational attainment, we control for other personal characteristics, as well as by the inclusion of other control variables. For each year of the period under analysis, the equation to estimate is the following:

$$w_i = \exp\left(\alpha + \sum_{j=2}^{6} \varphi_j EDU_{ij} + Z_i' \beta + \sum_{q=2}^{4} \delta_q D_q \right) \eta_i \qquad (6)$$

where for each worker *i*, w_i is his/her average hourly wage (zero if unemployed), EDU_{ij} are four dummy variables that identify four different levels of education (the level of reference is *j=1* for incomplete secondary or less), D_q are four dummy variables to control for the quarter individual *i* was surveyed (the reference quarter is *q=1*), Z_i is a 1xK vector to control for personal characteristics other than education. The error term η_i is assumed $E[\eta_i|x_i]=1$.

The vector *Z* includes the following controls:

- A dummy variable equal to 1 if individual *i* is female, and 0 otherwise.

- Age (in years).

- Age squared.

- A dummy variable equal to 1 if individual *i* is single, divorced or a widower, and 0 otherwise.

- Three dummy variables with each one equal to 1 if the position of individual *i* in the household is: spouse, son/daughter, or other, respectively, and 0 otherwise. The category of reference is head of household.

- Two dummy variables to identify the size of the firm individual *i* is employed in: 6 to 40 employees, and 41 or more employees. The category of reference is up to 5 employees.

- A dummy variable equal to 1 if individual *i* has an informal job, and 0 otherwise.

- A dummy variable equal to 1 if individual *i* works in the private sector, and 0 otherwise.

[6] When considering also unemployed people we include only those that in their last employment declared themselves as salaried employees.

- Thirty eight dummy variables to identify the sector individual *i* works in. The sector of reference is agriculture, livestock, hunting, and their support activities. The sectors are a combination of the revisions 3 and 4 of the ISIC classifications.

- A dummy variable equal to 1 if individual *i* lives in the *Partidos del Gran Buenos Aires*, and 0 otherwise.

Tables 3 and 4 report the evolution of the education wage premium (relative to those with incomplete secondary or less). In the first case we work only with employed people, while in the second case we include also those reported as unemployed. In all cases the results are statistically significant at 1%, with both cases providing similar estimates, with an important reduction, up to 36%, of the wage premium to education over the period considered. The reduction is more important for those with the highest level of education, almost 10 p.p more. This larger reduction is explained by the behavior during the first four years of the period here considered. During 2013 and 2014 it appears to be a small reversion of the tendency, which coincides with the process of stagnation suffered by the Argentinean economy (see Graph 3).

In terms of the differences in the magnitudes obtained with the two samples (employed only vs. unemployed and employed), there is not a clear pattern. However, in general we observe the estimates considering employed and unemployed individuals give a lower wage premium, especially for those with a lower level of education (Complete Secondary).

With regards to the different specification tests discussed in the previous section, the RESET tests are not particularly encouraging, especially when working only with employed individuals. However, this result is not much surprising, because one of the well-known problems of cross-section analysis is the impossibility of controlling for the unobserved heterogeneity across individuals, this in despite of the large set of control variables included in the regressions. A similar picture emerges when we look at the Park and GNR tests, with the null that $V[w_i|x_i] \infty E[w_i|x_i]$ rejected in most of the occasions, but as pointed out before, even when may be not the most efficient, the PPML estimator remains consistent under the assumption of the right specification of the conditional mean.

[Table 3 about here]

[Table 4 about here]

[Graph 3 about here]

3.1. Legal minimum wage and the education wage premium

As shown in Graph 2, during the period here considered it took place an important increase in the legal minimum wage, both in nominal and real terms, but with a partial reversion in the latter when inflation soared during the last years. Despite of this at the end of 2014 the real legal minimum wage was 32% higher than in 2004.

As mentioned before, the empirical evidence is abundant in terms that institutional wage setting has influence in wage inequality. A rise in the legal minimum wage could compress the wage distribution, especially at the bottom of it, reducing the wage premium, mostly between worker with a smaller gap in terms of skills and education.

To estimate the effect that the raising legal minimum wage could have had on the evolution of the education premium, we estimated an extended wage equation for the period 2004-2014:

$$w_{it} = \exp\left(\alpha + \sum_{j=2}^{6} \varphi_{jt} \left(EDU_{ijt} \times D_t \right) + \sum_{j=1}^{6} \theta_j \left(EDU_{ijt} \times mw_t \right) + Z_{it}' \beta + \sum_{q=2}^{4} \delta_q D_q + \sum_{t=2005}^{2014} \tau_t D_t \right) \eta_{it} \quad (7)$$

where mw_t is the log of the hourly legal minimum wage, and D_t are annual dummy variables. Additionally, we also estimate equation (7) where the term $\left(EDU_{ij} \times mw_t\right)$ is interacted with two dummy variables to distinguish between workers with formal and informal jobs.

As in the case of equation (6) we work with two samples, one considering only employed individuals, and another in which we also include those reported as unemployed.

In equation (7) the interactions of the education dummy variables with the annual dummy variables allows for the education wage premium to change because of other reasons than changes in mw_t. For instance, consider two individuals with the same characteristics but with different education levels (one with complete tertiary/university -TUC- and the other with incomplete tertiary/university -TUI-), then the change in the wage premium (ΔSP) between times *t* and *t+n* is given by:

$$\Delta SP_{t,t+n} = \left(\Delta\varphi_{TUC,t,t+n} - \Delta\varphi_{TUI,t,t+n}\right) + \left(\theta_{TUC} - \theta_{TUI}\right)\Delta mw_{t,t+n} \qquad (8)$$

The first term on the RHS of (8) captures the change in SP due to other reasons than changes in mw_t, while the second term measures the change in SP due to the change in mw_t. It is the second term we are interest on.

Tables 6 and 7 report the results of equation (7), showing the effects of changes in the legal minimum wage over the education premium. However, it is worth looking first to another interesting result. As reported in Table 3 and 4, during the period 2004-2014 there was a reduction in the wage premium, with this reduction being more important in the case of more educated individuals. However, as reported in Table 5, after we control for the effect of the changes in the minimum wage, we obtain that the returns to education did not fall, but indeed increased substantially, especially for those with lower levels of education.

[Table 5 about here]

Then, it does not come as a surprise that the increase in the minimum wage helped to reduce the magnitude of the wage premium, with this effect being more important, and also statistically significant, for people with lower levels of education. As reported in Table 6 the rise in the minimum wage has a positive and larger impact on the wages of those with lower education. In Table 7 we allow for the effect of the minimum wage to vary according to the person is in the formal or informal sectors of the economy. Here again, the positive effect of the rise in the minimum wage is larger for the less educated people, and also for those in the informal sector. A possible explanation for this last result is that, as the minimum wage increases, this exerts a pressure on the wages of those who are less educated, so employers have more incentives to hire informal workers in order to escape the burden of a higher minimum wage.[7]

[Table 6 about here]

[Table 7 about here]

3.2. Minimum wage and wage dispersion

As mentioned in the introduction, besides the effects on the magnitude of the wage premium derived from institutional factors such as the minimum wage, another, and to some extent related, question is how the dispersion of wages is also affected, either between or within groups with different educational backgrounds. As depicted in the previous section, the

[7] However this result is sensible to the econometric specification of equation (7). The opposite arises, formal workers benefit slightly more from a rise in the minimum wage, when we allow for the effects of the other covariates (those included in *Z*) vary over time.

increase in the minimum wage that took place during 2004-2014 helped to reduce, in average, the income premium of more educated individuals, however it is not difficult to envisage a scenario in which not all individuals with lower education benefited from that process.

Graphs 4 to 9 report the empirical density functions of the hourly real wage for different groups of individuals depending on their education and if working on the formal or informal sector for years 2004 and 2014. Even when in general the wage distribution in 2014 appears to be less dispersed than in 2004 (see top figure in Graph 4), it is also possible to observe some heterogeneity, especially when we distinguish in terms of the formal or informal sectors of the economy.

In order to analyze further this issue, and in the spirit of the work of Lee (1999), we estimate the following equation:

$$w_{gt}^{10} - w_{gt}^{50} = \alpha_t + \beta\ mw_{gt} + u_{ut} \qquad (9)$$

where w_{gt}^{10} and w_{gt}^{50} are the log of the 10th and 50th real hourly wage percentile for education group *g* at time *t*, and mw_{gt}, which Lee (199) refers as the relative minimum wage, is the difference between the log of the minimum wage at time *t* (MW_t) and w_{gt}^{50}. The intuition behind mw_{gt} is to have a measure of incidence of the minimum wage for the different education groups, with a higher mw_{gt} interpreted as the minimum wage having a larger incidence on the wages paid to individuals with education level equal to *g*.[8] As it is clear from Graphs 4 to 9 this is the case for those with lower education and those working in the informal sector. Finally, the coefficients α reflect the changes in latent dispersion of wages which is common across all education groups and measured by the 10-50 log-wage differential. A significant estimate for β would mean that changes in the minimum wage have an effect on the lower tail of the wage distribution.

Graph 10 reports the relationship between the $w_{gt}^{10} - w_{gt}^{50}$ and mw_{gt} for formal and informal workers, distinguishing also according to their educational background. While in the first case there is not an overall apparent relationship, in the case of informal labor that appears to be negative. However, as with the densities, is possible to identify some heterogeneity. On the one hand, in the case of formal workers, for those with some sort of tertiary/university education there is an apparent slightly positive relationship, especially for those with a complete degree. On the other hand, for informal workers those with an education less than tertiary/university (either complete or incomplete) the relationship is clearly negative, while for the other two groups it looks like there is none.

[Graph 10 about here]

The results from equation (9) confirm to some extent the graphical conclusions. For formal workers the estimated coefficients are in all cases not statistically significant, while for the ones working in the informal sector the estimates are all negative and decreasing in magnitude as we move from lower to upper education levels, while they are significant for those with incomplete secondary school and with either level of tertiary/university education. These results together with the fact that between 2004 and 2014 mw_{gt} experienced a reduction for those working in the informal sector, especially for those with some secondary education, means that changes in the legal minimum wage contributed in some degree to an increase in the dispersion of wages.

[8] By having a relative minimum wage which is specific to each education group it becomes possible to distinguish between the effects of changes in the legal minimum wage from those of a time trend.

Finally, the values obtained for the coefficients α_t[9] shows that besides the effect working through changes in the minimum wage, there was an increase in the latent dispersion of wages which is common across all education groups.

[Table 8 about here]

4. Summary and conclusions.

The severe political and economic crisis Argentina experienced at the end of 2001, which went on until most of 2003, meant a significant redistribution of income against poorer households, but with most of them affected to some extent. An example is the increase in the wage premium of people with higher levels of education. Later, this process was reversed as the economy entered into a recovery path.

Using a wage equation *à la* Mincer, we found out that among the reasons for the reduction in the education wage premium, the increase in the legal minimum wage appears to have played a role. Differently from most of the existing literature, our results were obtained though the use of a Poisson PML estimator, which on addition of being consistent under the correct specification of the conditional mean, it allows for an easy and natural way to deal with unemployed individuals, under the assumption that there could be a sample selection issue.

While the average wage premium fell during the period here analyzed, there was an increase in the dispersion of wages, especially for informal workers. In this last regards, the relative minimum wage appears to have also influenced. However, further analysis is required in this topic.

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[9] These results are not reported for reasons of space. They are available upon request.

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Table 1

Annual growth rate[1] of relative average hourly wage of salaried workers. 2004-2014

		Numerator		
		Incomplete Secondary or less	Complete Secondary	Incomplete Tertiary/University
Denominator	Incomplete Secondary or less	.		
	Complete Secondary	0.00766**	.	
	Incomplete Tertiary/University	0.0112***	0.00352	.
	Complete Tertiary/University	0.0308***	0.0232***	0.0197***

*** p<0.01, ** p<0.05, * p<0.1.

[1] Obtained using a liner regression: ln(wi/wj) = a + b*time.

Source: own based on Encuesta Permanente de Hogares (INDEC).

Table 2

Labor informality of salaried workers (%)

	2004	2014	Change (p.p)
Incomplete secondary or less	55.6	42.1	-13.5
Complete secondary	38.4	26.6	-11.8
Incomplete tertiary/university	28.7	15.7	-13.0
Complete tertiary/university	18.9	10.9	-8.0
Total	41.8	27.5	-14.3

Source: own based on Encuesta Permanente de Hogares (INDEC).

Table 3

Evolution of education wage premium[#]. Employed individuals only

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Complete Secondary	0.2551***	0.2621***	0.2452***	0.2259***	0.1735***	0.1639***	0.1846***	0.1586***	0.1929***	0.1861***	0.1898***
	(0.022)	(0.018)	(0.016)	(0.022)	(0.017)	(0.020)	(0.017)	(0.016)	(0.019)	(0.019)	(0.015)
Incomplete Tertiary/University	0.4630***	0.4986***	0.3985***	0.4113***	0.3890***	0.3618***	0.3412***	0.3754***	0.3304***	0.3577***	0.3464***
	(0.037)	(0.030)	(0.026)	(0.037)	(0.029)	(0.030)	(0.025)	(0.028)	(0.029)	(0.030)	(0.026)
Complete Tertiary/University	0.8822***	0.7902***	0.7248***	0.6740***	0.5954***	0.5972***	0.6038***	0.5908***	0.5162***	0.5544***	0.5638***
	(0.065)	(0.025)	(0.024)	(0.030)	(0.022)	(0.027)	(0.021)	(0.025)	(0.022)	(0.025)	(0.019)
Observations	6,091	6,720	7,280	4,775	6,669	5,066	6,586	6,627	6,134	6,172	7,967
RESET test (p. value)	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.011	0.000	0.001	0.248
Park test (p. value)	0.000	0.002	0.564	0.054	0.020	0.362	0.045	0.580	0.003	0.230	0.166
GNR test (p. value)	0.254	0.000	0.001	0.284	0.040	0.000	0.000	0.000	0.023	0.210	0.001

Relative to Incomplete Secondary or less.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: own based on Encuesta Permanente de Hogares (INDEC).

Table 4

Evolution of education wage premium[#]. Employed and unemployed individuals

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Complete Secondary	0.2218***	0.2444***	0.2366***	0.2267***	0.1779***	0.1514***	0.1738***	0.1597***	0.1790***	0.1747***	0.1795***
	(0.024)	(0.019)	(0.018)	(0.024)	(0.019)	(0.022)	(0.018)	(0.018)	(0.021)	(0.020)	(0.016)
Incomplete Tertiary/University	0.4387***	0.4777***	0.3930***	0.3858***	0.3869***	0.3417***	0.3230***	0.3763***	0.3322***	0.3446***	0.3334***
	(0.039)	(0.032)	(0.027)	(0.040)	(0.031)	(0.033)	(0.027)	(0.029)	(0.031)	(0.032)	(0.027)
Complete Tertiary/University	0.8587***	0.7718***	0.7247***	0.6730***	0.5987***	0.5915***	0.6123***	0.6011***	0.5318***	0.5502***	0.5596***
	(0.065)	(0.026)	(0.025)	(0.031)	(0.023)	(0.028)	(0.022)	(0.026)	(0.023)	(0.025)	(0.020)
Observations	6,822	7,471	7,977	5,181	7,180	5,525	7,057	7,091	6,578	6,598	8,547
RESET test (p. value)	0.000	0.000	0.000	0.048	0.190	0.000	0.020	0.462	0.084	0.258	0.001
Park test (p. value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GNR test (p. value)	0.251	0.000	0.000	0.265	0.014	0.000	0.000	0.000	0.011	0.188	0.000

Relative to Incomplete Secondary or less.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: own based on Encuesta Permanente de Hogares (INDEC).

Table 5

Evolution of education wage premium after controlling for the evolution of Minimum wage[#]. Employed and unemployed individuals

	Complete Secondary	Incomplete Tertiary/University	Complete Tertiary/University
2004	0.2757***	0.6247***	1.0011***
	(0.061)	(0.097)	(0.073)
2005	0.3160***	0.7165***	0.9862***
	(0.076)	(0.121)	(0.084)
2006	0.3453***	0.7004***	0.9996***
	(0.092)	(0.145)	(0.101)
2007	0.3421***	0.7391***	0.9990***
	(0.105)	(0.167)	(0.115)
2008	0.3165***	0.7756***	0.9746***
	(0.122)	(0.193)	(0.134)
2009	0.2934**	0.7585***	1.0036***
	(0.134)	(0.212)	(0.147)
2010	0.3386**	0.7813***	1.0326***
	(0.149)	(0.236)	(0.164)
2011	0.3421**	0.8889***	1.0760***
	(0.166)	(0.262)	(0.182)
2012	0.3653**	0.8707***	1.0325***
	(0.179)	(0.283)	(0.197)
2013	0.3703*	0.9199***	1.0630***
	(0.194)	(0.306)	(0.217)
2014	0.4014*	0.9622***	1.1320***
	(0.213)	(0.338)	(0.234)
Observations		76,027	

Relative to Incomplete Secondary or less.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: own based on Encuesta Permanente de Hogares (INDEC).

Table 6

The effect of the legal minimum wage on education wage premium

	Employed only	Employed and unemployed
Incomplete Secondary or less	0.3793***	0.3222***
	(0.106)	(0.110)
Complete Secondary	0.2980***	0.2470**
	(0.108)	(0.112)
Incomplete Tertiary/University	0.1820	0.1077
	(0.139)	(0.144)
Complete Tertiary/University	0.1770	0.1251
	(0.108)	(0.111)
Observations	70,087	76,027
RESET test (p. value)	0.000	0.000
PARK test (p. value)	0.278	0.012
GNR test (p. value)	0.008	0.001

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: own calculations based on EPH.

Table 7

The effect of the legal minimum wage on education wage premium

		Employed only	Employed and unemployed
Incomplete Secondary o less	**Formal**	0.3520***	0.2843***
		(0.106)	(0.110)
	Informal	0.4438***	0.4193***
		(0.106)	(0.111)
Complete Secondary	**Formal**	0.2820***	0.2284**
		(0.108)	(0.112)
	Informal	0.3657***	0.3338***
		(0.108)	(0.113)
Incomplete Tertiary/University	**Formal**	0.1804	0.1012
		(0.138)	(0.144)
	Informal	0.2722**	0.1846
		(0.138)	(0.143)
Complete Tertiary/University	**Formal**	0.1731	0.1211
		(0.108)	(0.111)
	Informal	0.2356**	0.1922*
		(0.108)	(0.112)
Observations		70,087	76,027
RESET test (p. value)		0.000	0.022
PARK test (p. value)		0.000	0.000
GNR test (p. value)		0.008	0.001

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: own based on Encuesta Permanente de Hogares (INDEC).

Table 8

The effect of the legal minimum wage on the dispersion of wages

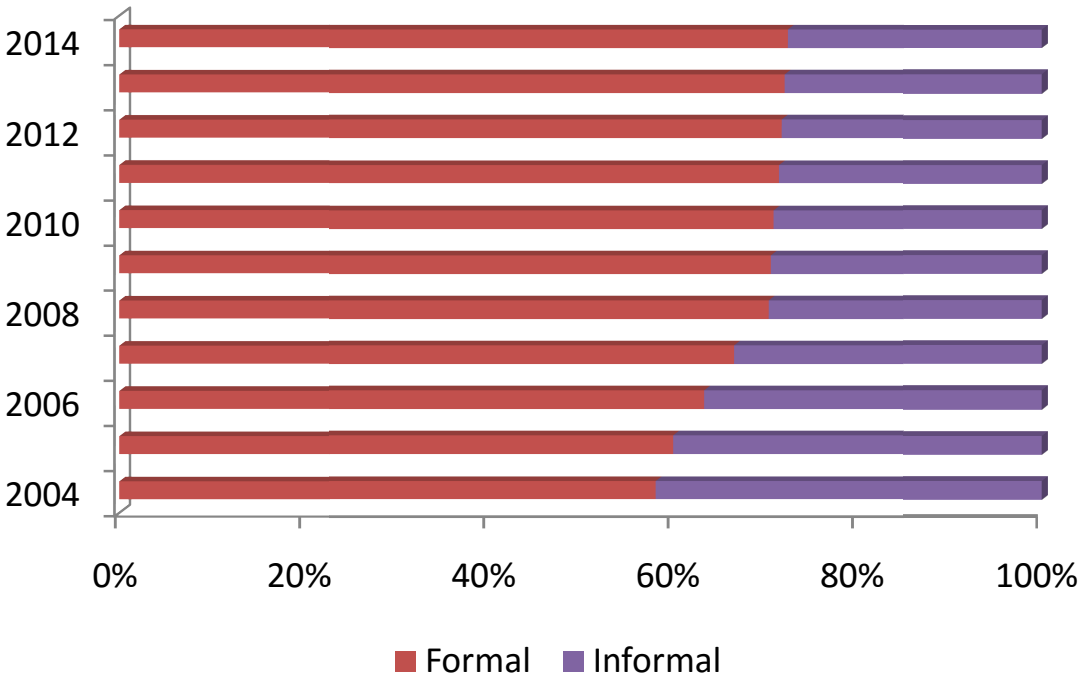
	Formal	Informal
mw * Incomplete Sec. or less	0.1506	-3.3161***
	(0.211)	(0.780)
mw * Complete Secondary	0.0038	-1.1739
	(0.166)	(0.945)
mw * Incomp. Tertiary/University	-0.0409	-0.9482**
	(0.117)	(0.370)
mw * Comp. Tertiary/University	-0.0875	-0.9313***
	(0.096)	(0.223)
Observations	172	166
R-squared	0.651	0.577

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: own based on Encuesta Permanente de Hogares (INDEC).

Graph 1

Labour formality of salaried workers

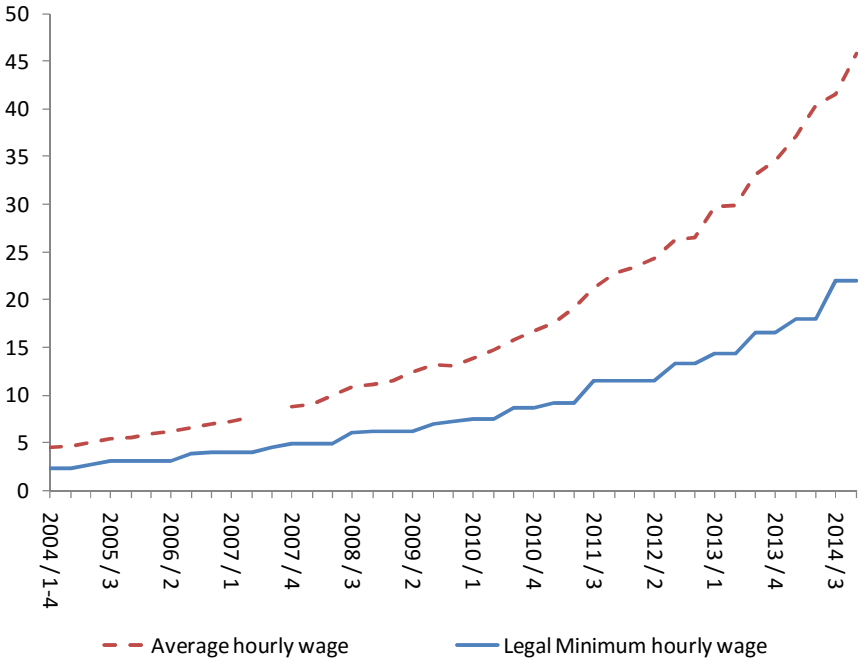


Source: own based on Encuesta Permanente de Hogares (INDEC).

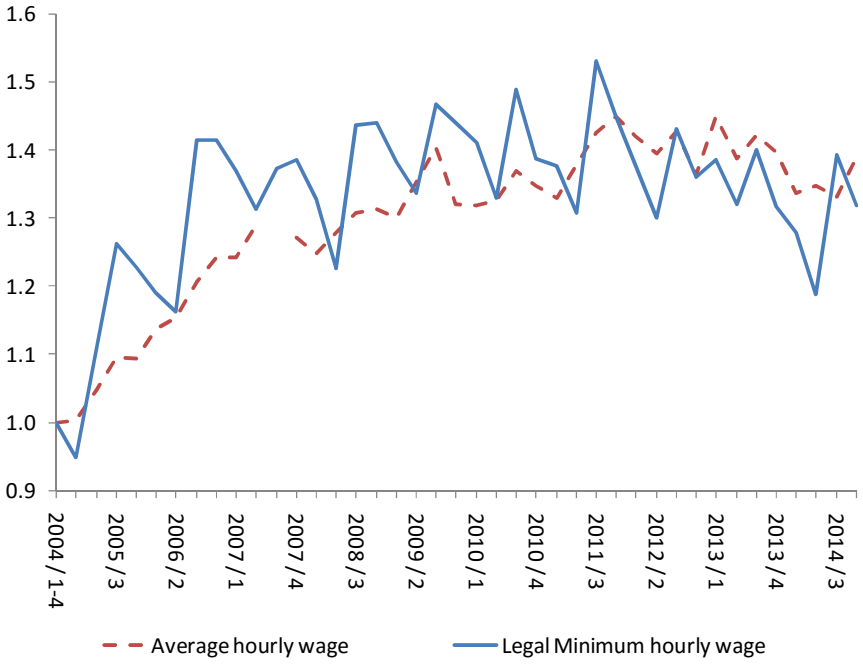
Graph 2

Hourly Wage of Salaried Workers

A) Nominal



B) Deflated by CPI#: 2004 = 1

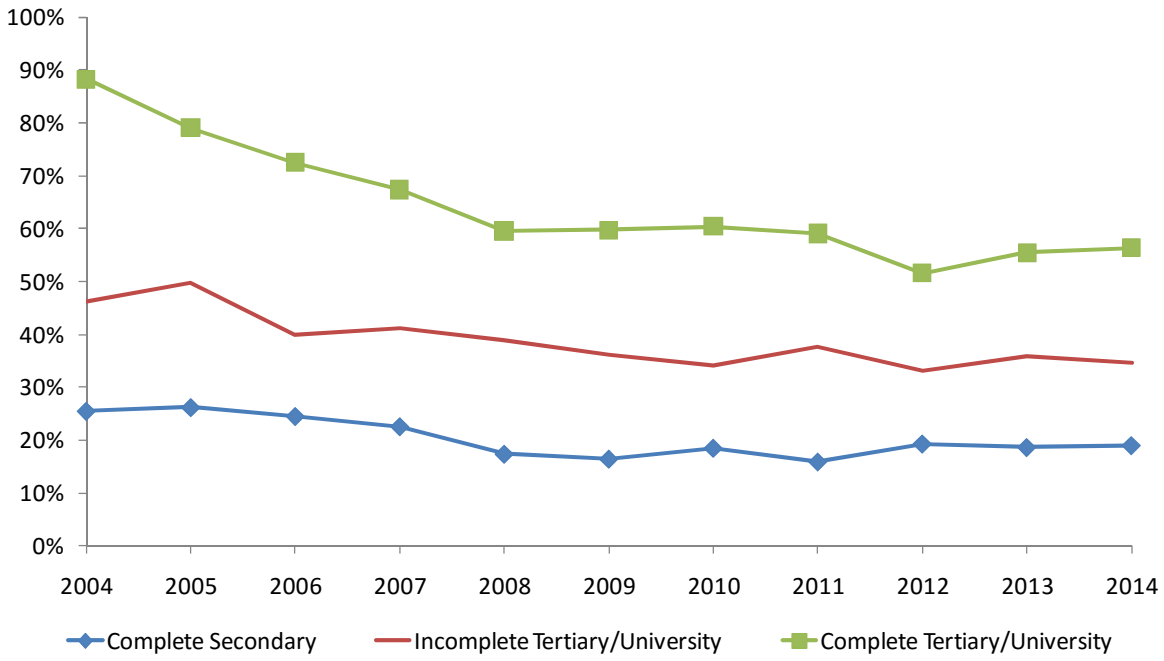


Due to the growing distrust on official CPI figures since 2007, we updated INDEC's CPI with data for the Province of San Luis.
Source: own based on Encuesta Permanente de Hogares (INDEC), Consumer Price Index (INDEC), Consumer Prince Index (Secretaría de Estadísticas de la Provincia de San Luis), and Ministerio de Trabajo de la Nación.

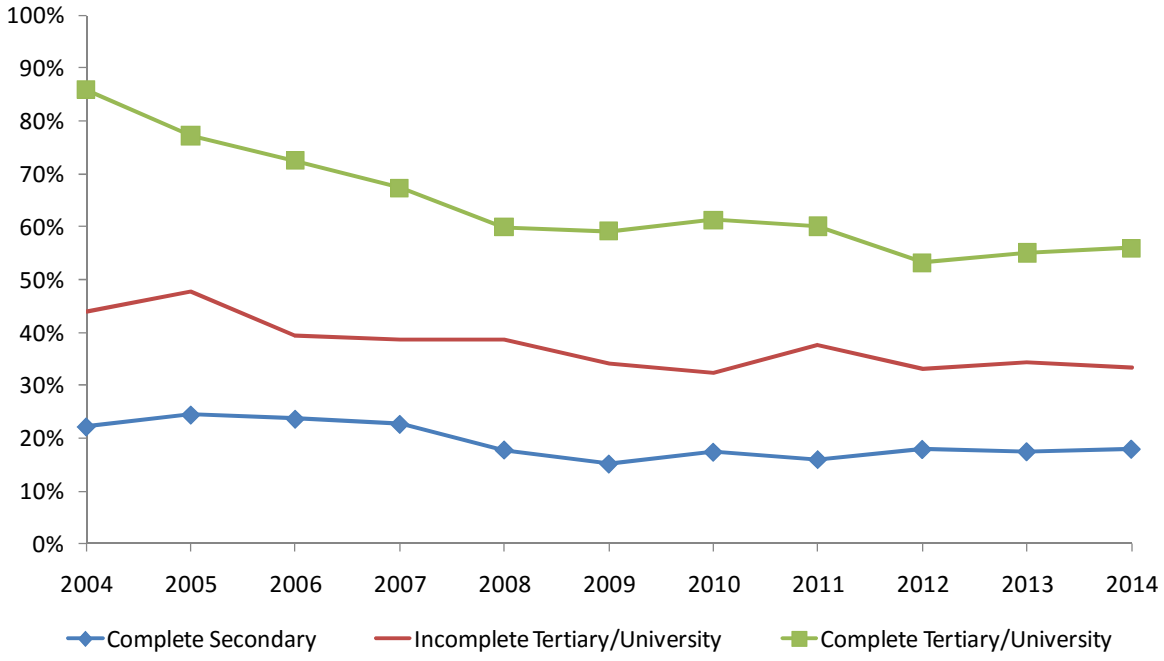
Graph 3

Evolution of wage premium#

A) Employed individuals only

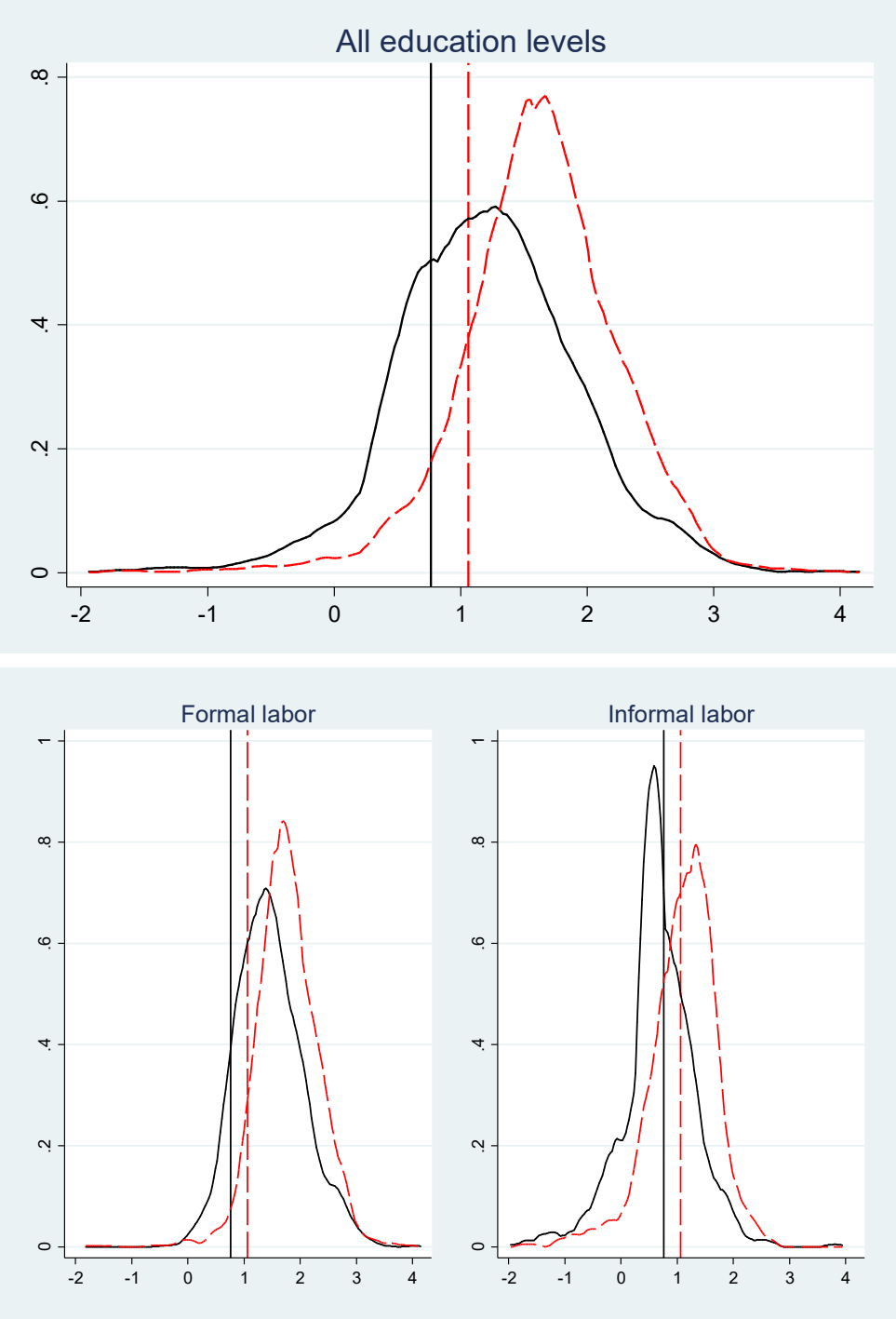


B) Employed and unemployed individuals



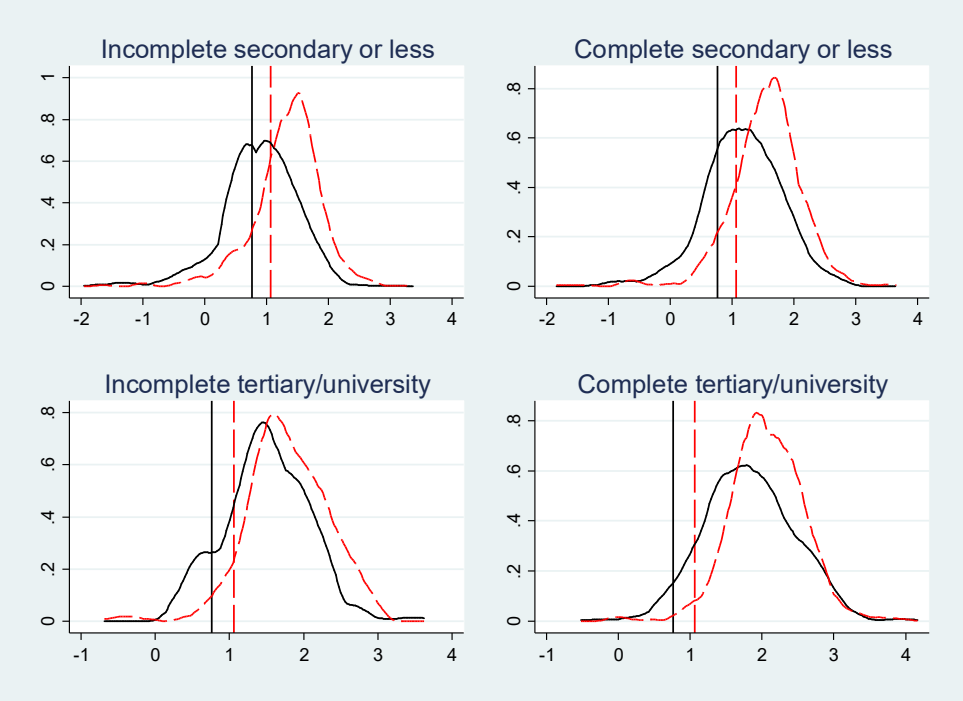
Relative to Incomplete Secondary or less.
Source: own based on Encuesta Permanente de Hogares (INDEC).

Graph 4
Hourly wage[#] dispersion



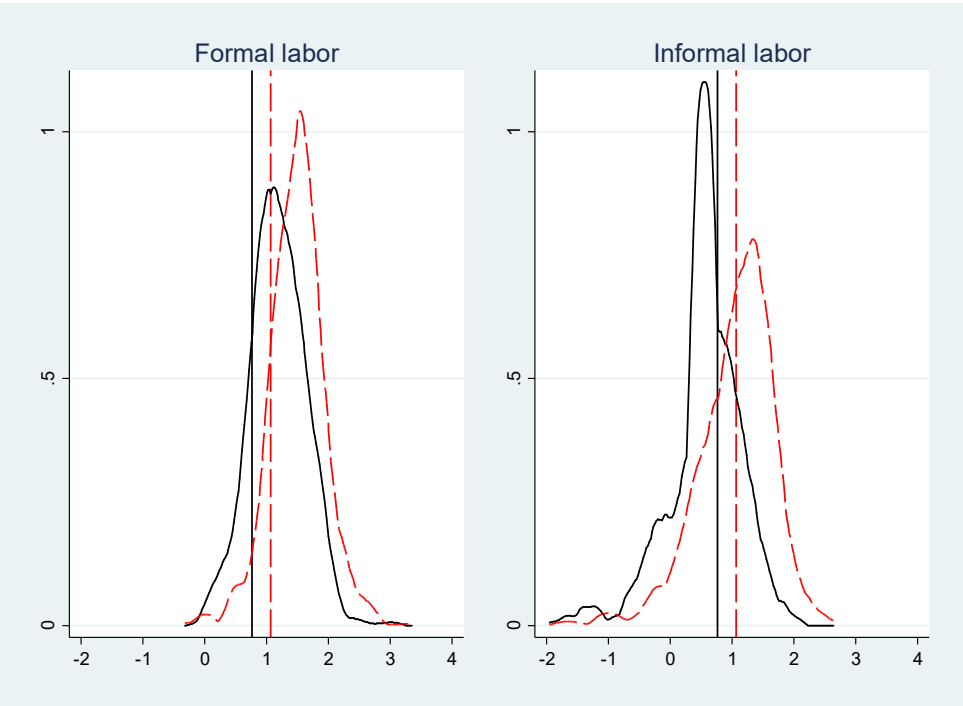
CPI deflated real wage.
Notes: 2004: solid line; 2014: dashed line; y-axis: density; x-axis: log of hourly real wage. Vertical lines are log of minimum wage.

Graph 5
Hourly wage# dispersion: Incomplete secondary or less



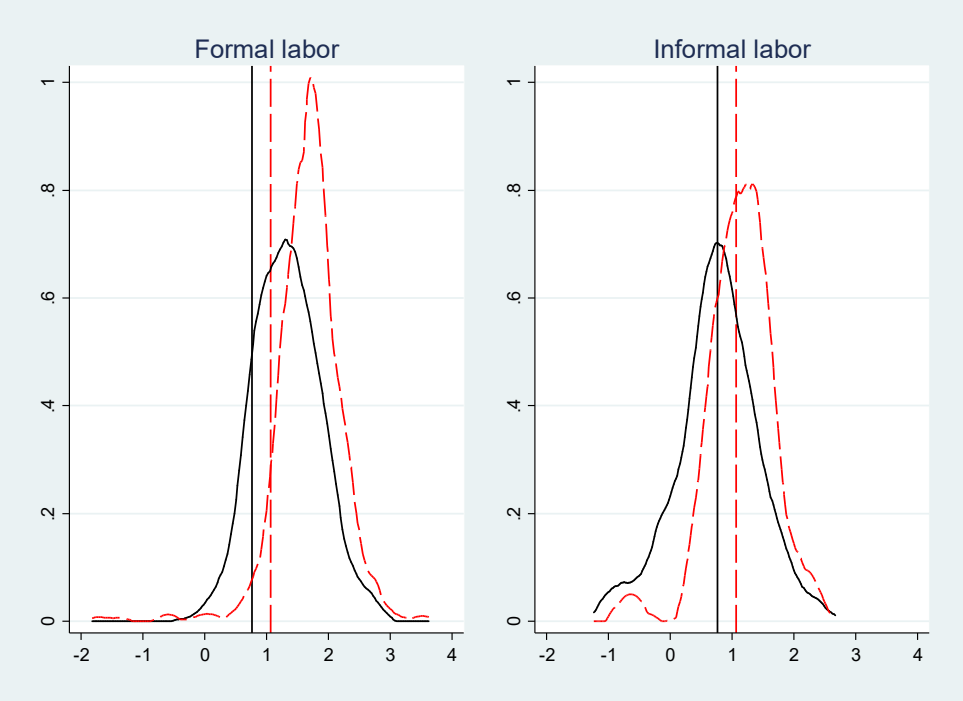
CPI deflated real wage.
Notes: 2004: solid line; 2014: dashed line; y-axis: density; x-axis: log of hourly real wage. Vertical lines are log of minimum wage.

Graph 6
Hourly wage# dispersion: Incomplete secondary or less



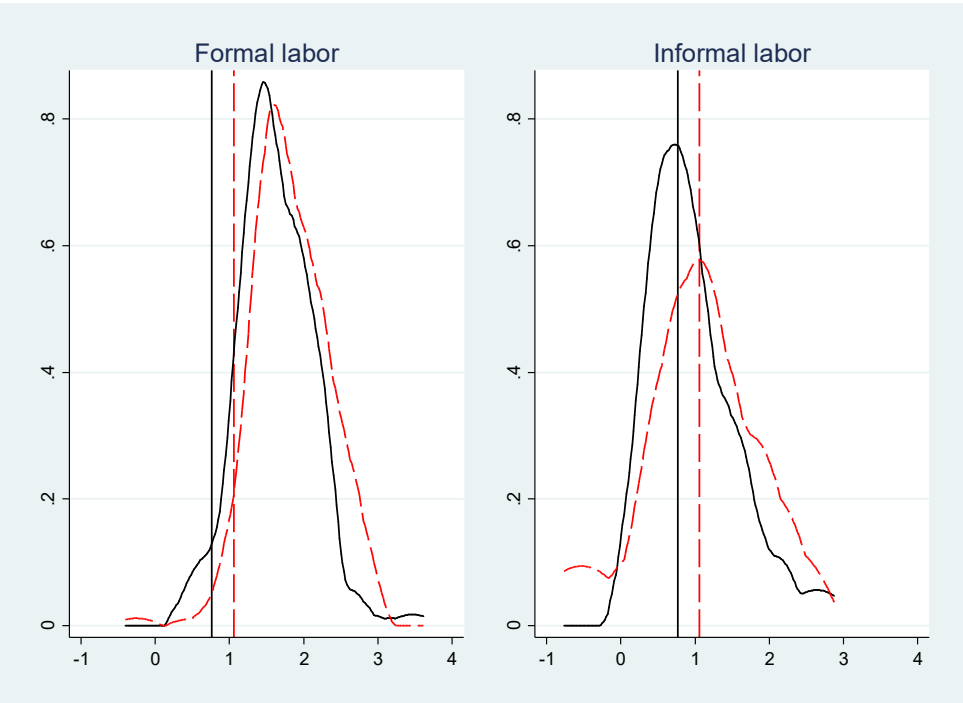
CPI deflated real wage.
Notes: 2004: solid line; 2014: dashed line; y-axis: density; x-axis: log of hourly real wage. Vertical lines are log of minimum wage.

Graph 7
Hourly wage# dispersion: Complete secondary



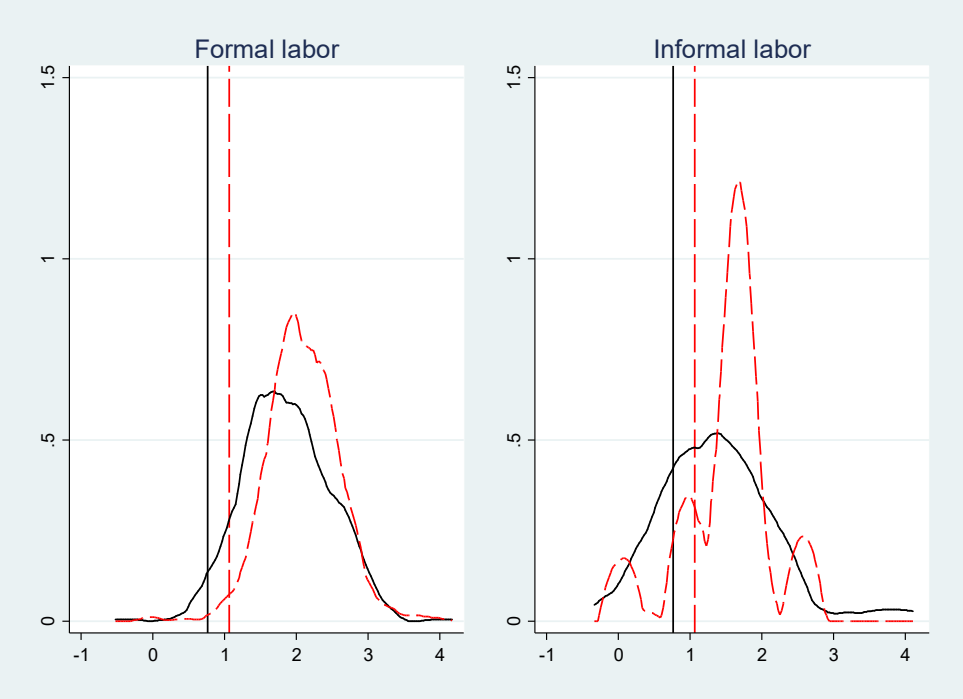
CPI deflated real wage.
Notes: 2004: solid line; 2014: dashed line; y-axis: density; x-axis: log of hourly real wage. Vertical lines are log of minimum wages.

Graph 8
Hourly wage# dispersion: Incomplete tertiary/university



CPI deflated real wage.
Notes: 2004: solid line; 2014: dashed line; y-axis: density; x-axis: log of hourly real wage. Vertical lines are log of minimum wage.

Graph 9
Hourly wage# dispersion: Complete tertiary/university



CPI deflated real wage.
Notes: 2004: solid line; 2014: dashed line; y-axis: density; x-axis: log of hourly real wage. Vertical lines are log of minimum wage.

Graph 10
10-50 ln(wage) differential and relative minimum wage