The Employment and Wage Effects of Minimum Wages in a Context of Informality and Non-Compliance: Evidence from Chile

Leigh Wedenoja
Cornell University

October 31, 2013

Abstract

The impact of minimum wages on employment and the wage distribution has long been an important topic in labor economics. However, there is a death of information for developing and middle-income countries that takes into account the importance of non-compliance with labor standards and large informal sectors. This paper fills that gap by providing new empirical evidence on the impact of minimum wages in Chile on the wage distribution and on unemployment and type of employment. Using Chilean nationally representative household survey data, I find that the impact of minimum wages varies substantially between the informal and formal sectorfor formal and informal employment and that ignoring the difference leads to incorrect estimates and lost information. I can reject the predictions of a single-sector labor market model and I find mixed evidence for the Welsh-Gramlich-Mincer and lighthouse two-sector models.

1 Introduction

The impact of minimum wages on actual wages and employment is a well-studied and contentious topic for labor economists. There is a substantial body of work estimating the wage and employment impacts for economies as a whole and various high risk sub-populations. Most of this work has been concentrated on the US and other developed nations and finds a negative effect of minimum wages on employment (Brown, 1999; Brown *et al*, 1982; Neumark and Wascher, 1992; Williams, 1993; and Card and Krueger, 1995.) Much less work has been done estimating the effects of minimum wages in developing and middle income countries. Minimum wages will likely have a different distributional and employment effect in these countries because they are often set as a higher proportion of the average wage, there are more un-covered sectors in the economy, minimum wages can vary by age and industry, and there is a higher degree of non-compliance with labor standards legislation.

In particular, there is a dearth of research on the impact of minimum wage legislation on job formality. Existing research on minimum wages and informality focuses on a legal informal sector - industries or firms which are not legally subject to minimum wage legislation. Informal employment, by comparison, is an illegal work arrangement in which the worker does not hold a labor contract and may not be provided other mandatory work place benefits by the employer. This type of informal employment is very low in the US. Ashtenfelter and Smith (1979) found that compliance with the minimum wage in 1975 was only about 60% and 35% for teenage males[1]. Other recent work by Weil (2005) has focused on individual industries finding that only 46% of employers in the Los Angeles garment industry comply with statutory minimum wages. They find that compliance is likely low because employers face a low level of enforcement. The probability that they will be inspected and sanctioned for paying sub-minimum wages is low and the fines if they are found out are small. Weil (2005) found that the annual likelihood a firm in the US would be inspected by the wage and hour division of the Department of Labor is less than 10%.

US results are not likely to be externally valid to middle income countries because of the large informal sectors in many of these countries and higher levels of non-compliance. The

[1]Overall levels of non-compliance in the US are less than 1%

evidence that does exist suggests that minimum wages will function differently. Maloney and Mendez (2004) find that, in general, minimum wages are more likely to be binding in Latin American countries than in the US because they are usually set at a higher proportion of the average wage. In the US, the minimum wage is around 35% of the average wage and in Latin America it can be as high as 80% (Venezuela) which makes full compliance nearly impossible. Maloney and Mendez's findings also suggest that minimum wages are likely to have different effects depending on the wage dispersion within a country. Countries with high wage dispersion may have binding minimum wages even if the minimum wage is a small proportion of the average wage. In 1996, Brazil, Chile, Colombia, and Honduras all had minimum wages that were more than the wage at the 10th percentile of the wage distribution even though Chile's minimum wage was only 34% of the mean and Honduras's was 62% of the mean.

The contribution of this paper is to expand the literature to Chile, a severely understudied country and to highlight the importance of focusing on quality and type of employment in addition to level of employment. I find that minimum wages have different distributional effects for formal and informal workers and that while minimum wages increase the probability of employment in the informal sector, they decrease the probability of employment in the formal sector. Minimum wages are also less binding in the informal sector and enforcement is low.

I estimate the impact of minimum wages on the wage distribution and formality of employment in Chile. Although Chile is a middle-income country with a high average wage, it also has much higher levels of non-compliance with minimum wages and other labor standards than the US and a larger informal sector (Kanbur, Ronconi & Wedenoja, 2013). The evidence for Chile is sparse, and there is no study that differentiates between the informal and formal sectors in Chile. Montenegro and Pags (2004) use data from the capital city of Santiago from 1960-1998 and find that a 10% increase in the minimum wage decreases the probability of employment for men by 1.7% but that it appears to slightly increase employment for women. Grau and Landerretche (2011) use the Chilean National Employment survey to conclude that an increase in the minimum wage decreases the probability of employment and increases compensation. However, with their data it is impossible to distinguish formal

and informal employment. Infante *et al.* (2003) use the CASEN survey data to conclude that minimum wages are not enforced in Chile due to an increase in non-compliance with labor standards after an increase in minimum wage. The study, however, is primarily descriptive and overlooks differences in compliance across formal and informal workers. None of the existing Chilean minimum wage literature deals with the important consequences of informal employment and estimates are, therefore, likely to shroud the mechanisms through with the minimum wage affects workers.

A major barrier to studying the impact of labor laws on informal employment is that there is very little relevant data. Workforce surveys usually do not ask questions about contracting or other job characteristics, which would allow for identification of workers in informal employment, and administrative data does not contain records of informal employment. To overcome this problem I use a detailed nationally and regionally representative household survey, The National Socioeconomic Characterization Survey (CASEN), which allows me to identify whether workers are subject to the minimum wage based on their job characteristics, and whether they are in formal or informal employment as determined by their contractual status with their employer. The Chilean minimum wage is also changed every year, and it has been increasing in both nominal and real terms and increasing compared to the average wage.

2 Data

2.1 Minimum Wage Laws

Information on labor standards legislation comes from the Chilean Department of Labor and the levels and timing of minimum wages is from the Chilean Congressional Library. The nominal value of the Chilean minimum wage is set by the National Congress and the Ministry of Finance and a new wage takes effect on either the first of June or the first of July of each year. Table 1 describes the minimum wage laws in detail and Figure 1 shows a plot of the real minimum wage and the real average wage for prime aged employees for 1990-2009[2]. Nominal

[2]Author's calculation

wages are deflated using the Chilean Central Bank's yearly CPI. Since 1990, the minimum wage has increased consistently in real and nominal terms. The figure also shows that the minimum has increased relative to the the average wage. The minimum wage legally covers all sectors of the economy with the exception of self-employed workers and domestic workers. Domestic workers are covered by a separate minimum wage which depends on other forms of remuneration and is set in reference to the national minimum wage. Domestic workers represent a small section of the population (4-5% of full time workers) and the share of workers engaged in domestic service remains fairly constant over the period of the survey with a high of 5.6% in 1992 and a low of 3.8% in 2009[3]. Additionally, workers under 18 and over 65 are subject to a slightly lower minimum wage. 65 is the official retirement age in Chile.

2.2 Informality

Chile requires that all workers have a labor contract with their employer that is signed by both parties (Chilean Ministry of Labor). Seasonal workers, temporary workers, and piece-rate workers are required to have a contract as well. The work contract functions as basic proof of employment, much like tax forms in the US. It does not necessarily provide workers with a long term promise of employment or special status. I characterize a worker as informal if she reports that she works as an employee (rather than employer or self-employed person) and reports that she does not have a signed labor contract. This definition of the informality is derived from the definition of the ILO, often used in the literature, which defines the informal sector as one where labor relations are characterized by "casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees."[4] It is also similar to the definition used by Lemos (2009) for Brazil. Figure 2 shows how the fraction of workers in informal and formal employment has changed over time. It also shows the change over time of the fraction of workers in the uncovered sector.[5]

[3]Author's calculation based on CASEN survey data discussed below.

[4]International Labour Organization (ILO) Resolutions Concerning Statistics of Employment in the Informal Sector Adopted by the 15th International Conference of Labour Statisticians, January 1993, para. 5.

[5]Included in Figure 2 is the proportion of the workforce without a pension.

2.3 Wages and Employment

The main source of data on wages and employment is the CASEN (National Socioeconomic Characterization) household survey funded by the Chilean Social Development Agency and administered by the University of Chile. The survey is a repeated cross section that was administered between November and December (summer) every two years from 1990-2000 and every three years thereafter. The survey is intended to give a nationally representative snapshot of the country and to be comparable across waves. The sampling is representative at the regional and urban/rural level and weights are included based on the 1992 and 2002 census's population projections.[6] The survey includes modules on education, health, jobs and working conditions, and income. It is administered at the household level. Wages and minimum wages are adjusted to 2009 Chilean pesos using the CPI reported by the Chilean Central Bank. Most minimum wage and employment research in Chile uses the National Employment Survey and its yearly income supplement. Although that survey has higher frequency data, it does not make it possible to identify if workers are in formal or informal employment because they are not asked about their contractual status.

The main wage variable I use is the log of the hourly real wage for each employed individual[7]. There are potential issues with using the hourly wage. In CASEN respondents report their monthly wages and weekly or monthly hours depending on the survey wave. In Chile, and most of Latin America, wages are reported monthly and the official legal minimum wage corresponds to a monthly payment for a standard work week (48 hours before 2005 and 45 hours afterward.) However, the law also states that wages must be scaled exactly for any non-standard work week which results in a *de facto* hourly minimum wage (Chilean Library of Congress). The Chilean Labor Ministry considers any person working 35 hours or more to be full time.

Table 2 contains summary statistics about workers in formal and informal employment calculated from CASEN. On average, workers in formal employment have more education, are less likely to be rural and are older than informal workers. They also work more hours and are much more likely to have a pension. All differences in means are significantly different

[6] A more detailed description of the survey methodology is included in the appendix

[7] calculated from reported nominal monthly wage and reported hours in the survey

from zero.

3 Wage Effects

3.1 Kernel Density Estimates

I use two econometric methods to assess the impact of minimum wages on the wage distribution. Assessing the impact of minimum wages on actual wages is econometrically difficult because the minimum wages set by governments are likely to be in response to changes in the average wage. It is difficult to distinguish whether an increase in the minimum wage causes an increase in the average wage or whether it is merely responding to that increase. In order to address this identification problem I use non-parametric kernel density estimates and semi-parametric quantile regression. These methods allow me to disentangle the effect of minimum wages on different parts of the wage distribution. The minimum wage should disproportionately affect workers at the bottom of the distribution. If minimum wages actually bring up the wages of workers at the bottom of the distribution, there should be bunching around the minimum wage and the minimum wage should have relatively greater effects for workers at the bottom of the wage distribution.

Figure 4 plots the kernel density estimates for the lower end of the wage distribution for workers in the formal, informal, domestic, and self employed sectors of the economy for the years 1998 and 2000. The vertical line in each plot corresponds to the 2000 real hourly minimum wage. In the formal sector there is clear evidence of wage compression at the minimum wage as would be expected from a binding minimum which increases the wages of low wage workers. The plot also shows that this wage compression is not perfect, and there is some evidence of non-compliance within the formal sector. Results for the informal sector are more ambiguous. There is more non-compliance in informal employment but there is still some wage compression and bunching at the minimum wage, although not nearly to the extent of the formal sector. To help eliminate the possibility that this bunching is driven by another factor I include kernel density estimates for domestic workers and the self employed. There is no evidence of wage compression for self-employed workers or domestic workers

which is to be expected because they are not subject to the minimum wage. This helps rule out alternative explanations for bunching around the minimum. Figure 5 plots the the kernel density wage estimates for the formal sector and Figure 6 plots them for the informal sector for all waves of the survey. There is a consistent compression effect of the minimum wage in the formal sector and higher non-compliance in the informal sector.[8]

It should not be a surprise that there is higher non-compliance with the minimum wage in the informal sector; for a worker to be categorized as informal in the context of this paper, the employing firm must already be non-compliant with one core labor standard, the labor contract law. Overall non-compliance with labor standards is low in Chile compared to the rest of Latin America but high compared to the US. Table 3 provides some basic descriptive statistics on other forms of non-compliance with labor law in Chile. In Table 3a the fraction of workers paid below the minimum wage ranges from 10% in 2009 to 21% in 2006. The fraction with a contract (formal employment) is highest in 1992 at 86% and lowest in 1998 at 80%. The extent of non-compliance also varies by industry with agriculture as the least compliant industry. Enforcement is low in Chile and has increased only slightly overtime. Figure 7 shows the change in the level of inspections over time and the composition of those inspections. For a detailed analysis of labor standards violations in Chile see Kanbur *et. al.* (2013).

3.2 Quantile Regression

The kernel density plots are convincing evidence that minimum wages cause wage compression in the formal sector and to a lesser degree in the informal sector. However, more detailed and precise estimates of the distributional impacts of minimum wages are necessary to arrive at policy relevant and economically interesting conclusions. To this end, I use conditional quantile regression to estimate the effect of the minimum wage on the entire wage distribution, specifically on each decile. In the context of minimum wages there are two problems with identification in mean regression, the first is that mean regression obscures the fact that minimum wages should only have an effect on populations for whom the minimum wage is

[8]Plots of the informal density and the formal density together for a given year are included in the appendix as Figure 11.

binding so the average effect of a minimum wage is only meaningful for a population for whom the minimum is likely to bind. Rather than restrict my sample to likely minimum wage earners, I estimate the effect for the entire distribution. Identification of a wage effect using mean regression also requires a credible story for why minimum wage legislation should drive changes in the average wage and not the other way around. Examples of this strategy include exploiting differences in state minimum wages or a new minimum wage in a previously un-covered sector. This is impossible in the case of Chile because the minimum wage is national and since before 1990 has had completely covered employees. If minimum wages are binding and raise wages (independent of other forces that would influence wages) then the estimates for the effect of minimum wages at the bottom quantiles should be higher than the upper quantiles. In other words, there should be an additional effect of the minimum wage itself rather than whatever factors in the labor market led to the choice of the level of the minimum wage.

Table 4 contains estimates of the coefficients of the deciles of the conditional wage distribution for workers in formal employment. The results are consistent with a binding minimum wage that raises wages for low wage workers in the formal sector. The coefficients have a clear downward trend in all specifications as the decile increases. In other words, the minimum wage has a larger impact on low wage workers than on high wage workers which results in the bunching seen in the kernel density estimates. Excluding the base specification, in which the only regressor is the minimum wage, the results are robust to the inclusion of industry and region fixed effects in addition to the standard worker characteristics: age, age-squared, years of education, and a dummy for female. The downward trend is even more clear in Figures 8 and 9. In Figure 8 the quantile regression coefficients are plotted against quantiles and in Figure 9 they are plotted against the quantile value.[9]

These results are inconsistent with those of Infante *et al.* (2003) which find, using the same data that the minimum wage is not enforced. My results show that although compliance is imperfect, there is clear evidence of a positive wage effect of the minimum wage at the bottom of the wage distribution for formal sector workers.

[9]Similar graphs for additional specifications are available in the appendix and display the same pattern. Figures 8 and 9 are conditioned only on worker characteristics.

The results for informal employment are significantly different from those for formal employment. Unlike the effect on formal wages, which exhibits a purely downward trend in Figures 8 and 9, the impact of the minimum wage on the wages of informal workers is actually increasing from the first to the third decile in Figure 8 and the coefficients level out after the eighth decile. Even scaling the results to the quartile values in Figure 9, it is clear that minimum wages have a different distributional effect in the informal sector than in the formal sector. Minimum wages have less of an effect in the informal sector than the formal sector at the low end of the distribution and a larger impact at the higher end of the distribution (scaled for decile value). Values for the informal sector quantile regressions are available in Table 5. Compliance with the minimum wage is lower in the informal sector. The workers with the most to gain from minimum wage legislation - those without contracts at the bottom of the wage distribution - are less affected by the minimum wage law than workers further up in the distribution.

To further address the potential concern that the impact of the minimum wage is really picking up other factors that influence the wage distribution, Figures 8 and 9 also include the quantile regression estimates for the distribution of self-employed workers' wages. There is virtually no difference in the impact of minimum wages across the distribution for the self employed. Table 6 Includes the regression coefficients for the self-employed.

Finally, Table 7 treats the formal and informal sectors as a single covered sector. As is clear from the estimates, when the existence of an informal sector is ignored, the distributional impact of the minimum wage looks like the impact in the formal sector. The non-monotonicity of the minimum wage impact on the informal sector quantiles is lost.

4 Employment Effects

The employment effect of interest is the effect of minimum wage legislation on the type of employment rather than the level of employment. I use a multinomial logit model. The advantage of the multinomial logit, rather than a traditional logit or other binary model, which would estimate the impact of the minimum wage on the probability of employment, is that I can estimate the impact of the minimum wage on type of employment relative to

a base category (or set of categories). I limit the sample to workers who report that they are in the labor force and break them into four categories: unemployed, formally employed, informally employed, and employed in any other sector. Results for the "other" category are somewhat difficult to interpret. This category includes potentially less desirable work such as domestic service and certain types of self-employment, however, it also includes workers who report the job of boss or owner. The impact of minimum wages on the probability of employment in the informal sector relative to the formal sector, and unemployment relative to the formal sector are the quantities of interest.

Table 8 contains the main employment results with formal as the omitted sector. Across all specifications, a higher minimum wage is associated with an increase in the probability that a worker is in the informal sector compared to the formal sector and an increase in the probability that she is unemployed compared to in the formal sector. The minimum wage variable in this case is not the log of the real hourly minimum wage, rather it is the real hourly minimum wage in 50 CLP which is about 0.10USD. The marginal effects and elasticities are taken at the mean, however the average marginal effects are almost identical. Columns 1 and 2 contain estimates for all workers in the labor force. A 10% increase in the minimum wage is associated with an 8.5% increase in the probability that a worker is unemployed compared to all employment categories, a 6% increase in the probability that she is in the informal sector, and a 1% decrease in the probability of employment in the formal sector. These results are robust to the inclusion of region fixed effects.

Columns 3 and 4 of Table 8 include industry fixed effects in addition to worker characteristics and regional fixed effects. Since unemployed workers do not report an industry, that category is omitted from the analysis. Despite this data concern, the results are robust. The 6% increase in the probability of informal employment remains and the signs for other employment and formal employment remain the same. However, the point estimates are cut in half. In all specifications, an increase in the minimum wage has a positive impact on probability of employment in the informal sector and a negative impact on the formal sector.

Table 9 provides an important contrast to Table 8. All specifications in Table 8 are identical to the corresponding column in Table 9, except the formal and informal sectors are treated as one covered sector. A 10% increase in the minimum wage is still associated with

an 8% increase in the probability of unemployment, but the effect on type of employment is completely obscured. Minimum wages appear to have a very small impact on employment type with a 10% increase in the minimum wage resulting in a 2% increase in employment in the covered sector. By treating the formal and informal employment as the same, it appears that minimum wage legislation increases unemployment but that it has a positive effect on workers choosing to work in the formal sector.

5 Discussion

5.1 Support for Single-Sector and Two-Sector Models

The results above strongly suggest that ignoring the existence of an informal sector when estimating the impact of minimum wages on employment and wage distributions will lead to incorrect conclusions. It is tempting to conclude based on the results in Table 9 that a 10% increase in the minimum wage does not have a large effect on workers' employment type because it actually increases employment in the covered sector by 2%. However, this figure is misleading because as is evident in Table 8, that effect is actually a decline in the probability of formal employment and an increase in the probability of informal employment.

The estimates above for both the minimum wage impact on the wage distribution and employment type that treat the formal and informal sectors as a single covered sector are largely consistent with predictions for a single labor market with non-compliance. There is direct evidence of non-compliance in both Table 3 and the kernel density plots, consistent with a single sector with non-compliance. There is also a positive impact of the minimum wage on the wage distribution, with a much larger impact at the low end of the wage distribution and an increase in the probability of unemployment. In a world of imperfect enforcement and non-compliance (non-compliant single-sector), employers may pay their workers less than the minimum wage, in some cases. Predictions of employment effects under non-compliance are mixed. Chang and Ehrlich (1985) and others (Chang, 1992; Yaniv, 1994 and 2001) predict a negative employment effect of the minimum wage, even with non-compliance, because the risk of being caught and punished increases the marginal cost of

labor. In Chile, if an employer is caught violating the minimum wage it faces both a fine and is required to make up the difference to workers. Let w^* be the pre-minimum wage equilibrium wage and marginal benefit of a worker and w^m be the minimum wage, and assume with $w^* < w^m$. If p is the probability of labor inspection then the marginal cost of a worker increases to $w^* + p(w^m - w^* + x)$ with an imperfectly enforced minimum wage. As long as there is a positive probability that an employer will be caught, the marginal cost of a worker will be higher than the pre-minimum wage equilibrium wage. In this version of the non-compliant single-sector model, there would be a weakly positive effect on wages and a negative effect on employment.

In contrast, Yaniv (2004 and 2006) allows non-compliance to affect the equilibrium wage rate. In this case, wages will fall for workers in sub-minimum wage employment in order to compensate for the probability of a fine. Let w' be the post-minimum wage equilibrium. The new equilibrium wage is characterized by $w^* = w' + p(w^m - w' + x)$ If the minimum wage is high enough relative to the original equilibrium wage, wages will fall in order to maintain full employment. This theory predicts no employment effect from the minimum wage but a negative wage effect for sub-minimum-wage workers.

However, those standard results hide the difference between formal and informal employment. While wages have a positive effect in both sectors, the effects are larger in the formal sector at the low end of the distribution than in the informal sector. Most importantly, the probability of formal employment decreases with an increase in the minimum wage but the probability of informal employment increases. This sectoral shift is obscured by only testing predictions from single-sector models.

The employment results are consistent with the Welsh-Gramlich-Mincer (WGM) two sector model (Welsh, 1974; Gramlich, 1976; and Mincer, 1976), but the wage effects are more ambiguous. WGM predicts that there should be a negative effect on wages in the informal sector. Evidence for the lighthouse model is equally mixed. While there is a positive impact on the wage in both sectors, there is a negative effect on the probability of employment in the formal sector, but a positive impact on the probability of employment in the informal sector. In most variations of this two sector model, the imposition of a minimum wage in the covered (formal) sector results in a drop in employment in the covered sector, but

unlike in a full-coverage model, where the drop in employment means an increase in overall involuntary unemployment, workers who lose jobs in the covered sector compete for jobs in the uncovered sector. The result is an increase in wages and a decrease in employment in the covered sector, and an increase in employment and a decrease in wages in the uncovered sector.

The above results, however, are consistent with a variation of WGM discussed initially by Mincer (1976) and immediately following by Gramlich (1976). In this variation, workers choose between sectors and are willing to stay unemployed in the formal sector if the expected value of eventually finding a job and earning the formal sector wage is greater than earning a lower wage in the informal sector. In this version of the model the minimum wage would increase unemployment and would not bid the informal wage down to the market wage.

While the results do not provide definitive proof in support of a particular two-sector model, they reject models that treat formal and informal employment as one covered sector. Both the employment effects and wage distribution effects differ across the two sectors. They also demonstrate the danger of simply testing predictions of single-sector models. When the informal and formal sectors are treated as a single sector, the results support a single-sector model.

6 Conclusion

In this paper I expand estimates of the impact of minimum wages to Chile and find substantial evidence of the importance of two-sector models incorporating both a formal and informal sector in measuring minimum wage impacts. When the covered sector is treated as a single sector, estimates do not accurately reflect the dynamics of minimum wage impacts on employment and the wage distribution. While the results do not fully support any particular two sector model, I find substantially more evidence for WGM in Chile than is found in other literature. While minimum wages do not have a negative wage effect in the informal sector, they have a smaller wage effect than in the formal sector, and that difference changes throughout the wage distribution. I do find that the WGM model is more consistent with the employment effects than either a single-sector model or the lighthouse model as an increase

in minimum wages shifts the probability of employment from the formal to informal sector. In contrast to previous research, I also find evidence that the minimum wage is binding and enforced, though not completely, for formally employed workers.

These results shed light on the importance of incorporating an informal sector into minimum wage analysis in Chile, and potentially elsewhere in Latin America, and any country in which informal employment plays an important economic role. Informal sector jobs are lower quality than formal sector jobs and are much less likely to provide pensions and other benefits.

7 References

Arellano,M and Bond, S. Some Tests of specification for Panel Data: Monte Carlo Evidence and an application to employment equations. Review of Economic Studies 58(2), 1991

Ashenfelter, O., Smith, R., 1979. Compliance with Minimum Wage Law. Journal of Political Economy 87, 333350.

Baker, Michael, Dwayne Benjamin and Shuchita Stanger (1999), "The highs and lows of the minimum wage effect: a time-series cross-section study of the Canadian law", Journal of Labor Economics 17: 318-350.

Basu, Arnab; Chau, Nancy and Kanbur, Ravi, Turning a Blind Eye: Costly Enforcement, Credible Commitment and Minimum Wage Laws. The Economic Journal, 120 (2009) 244-269

Bell, Linda. The Impact of Minimum Wages in Mexico and Colombia. Journal of Labor Economics 15(3), 1997

Brown, Charles, 1999. Minimum Wages, Employment, and the Distribution of Income. In: Ashenfelter, O. (Ed.), Handbook of Labor Economics, North Holland.

Brown, Charles (1996), "The old minimum wage literature and its lessons for the new", in: Marvin Kosters, ed., The effects of the minimum wage on employment (AEI Press Washington, DC) pp. 87-98.

Brown, Charles, Curtis Gilroy and Andrew Kohen (1982), "The effect of the minimum wage on employment and unemployment", Journal of Economic Literature 20: 487-528.

Brown, Charles, Curtis Gilroy and Andrew Kohen (1983), "Time-series evidence of the effect of the minimum wage on youth employment and unemployment", Journal of Human Resources 18: 3-31.

Card, David (1992a), "Using regional variation in wages to measure the effects of the federal minimum wage", Industrial and Labor Relations Review 46: 22-37.

Card, David (1992b), "Do minimum wages reduce employlnent? A case study of California", Industrial and Labor Relations Review 46: 38-54.

Card, David and Kruger, Alan Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania The American Economic Review (1994).

Card, David and Kruger, Alan Time Series Minimum Wage Studies: A Meta-Analysis The American Economic Review Papers and Proceedings (1995).

Card, David, Krueger, Alan B., 1995. Myth and Measurement: The New Economics of the Minimum Wage. Princeton University Press, Princeton, N.J.

Cuentas Nacionales de Chile 2003-2011 (Referencia 2008). Central Bank of Chile. 2011-03-19. Retrieved 2011-03-20.

Danziger, Leif. Noncompliance and the effects of the minimum wage on hours and welfare in competitive labor markets Labour Economics16 (2009) 625-630.

Taryn Dinkelman, Vimal Ranchhod, Evidence on the impact of minimum wage laws in an informal sector: Domestic workers in South Africa, Journal of Development Economics, Volume 99, Issue 1, September 2012

Djankov, Simeon and Ramalho, Rita, Employment laws in Developing Countries. Journal of Comparative Economics 37 (2008) 3-13

Feldmann, Horst, 2009. The unemployment effects of labor regulation around the world. Journal of Comparative Economics 37 (1), 7690.

Galli, Rossana and Kucera, David, Labor Standards and Informal Employment in Latin America. World Development 32.5 (2004) 809-828.

Gindling, T.H., Terrell, Katherine, 2005. The effect of minimum wages on actual wages in the formal and informal sectors in Costa Rica. World Development 33 (11), 19051921.

Gindling, T.H., Terrell, Katherine, 2009. Minimum wages, wages and employment in various sectors in Honduras. Labour Economics 16.

Gindling, T.H., Terrell, Katherine, 2007. The effects of multiple minimum wages throughout the labor market: the case of Costa Rica. Labour Economics 14 (3), 485511.

Gramlich, Edward, 1976. Impact of minimum wages on other wages, employment and family income. Brooking Papers on Economic Activity 7, 409451.

Grau, N & Landerretche, O. The Labor Impact of Minimum Wages: A Method for Estimating the Effect in Emerging Economies using Chilean Panel Data. Serie de Documentos de Trabajo del Departamento de Economia de la Universidad de Chile. 2011.

"Human Development Report 2011". United Nations. 2011. Retrieved 2 November 2011.

Infante, R; Marinakis, A & Velasco, Jacob. Minimum wage in Chile: An example of the potential and limitations of this policy Instrument. Employment Paper International Labor Office Geneva. 2003

Kanbur, Ravi; Ronconi, Lucas; Wedenoja, Leigh. Labor Law Violations in Chile. International labour review. Vol. 152, no. 3-4 (2013)

Kaplan, David S. Job Creation and Labor Reform in Latin America Journal of Comparative Economics (2008), doi:10.1016/j.jce.2008.10.02

Khamis, Melanie, 2013. Does the minimum wage have a higher impact on informal than on formal labor markets? Evidence from quasi-experiments. Applied Economics 45:4, 477-495

Lemos, Sara, 2007. The effects of the minimumwage in the private and public sectors in Brazil. Journal of Development Studies 43 (4), 700722.

Lemos, Sara. Minimum Wage Effects in a Developing Country. Labour Economics 16(2009) 224-237

Levinsohn, James, Employment Responses to international liberalization in Chile. Journal of International Economics 47 (1999) 321-344

Maloney, William, Nez, Mendes Jairo, 2004. Measuring the impact of minimum wages evidence from Latin America. In: Heckman, J., Pags, C. (Eds.), Law and Employment: Lessons from Latin America and the Caribbean. University of Chicago Press.

Masters, Adrian, 2010. A theory of minimum wage compliance (or voluntary recognition of unions). Labour Economics 17.

Mincer, Jacob, 1976. Unemployment effects of minimum wages. Journal of Political Economy 84 (4, part 2), S87S104.

Mondino, Guillermo, Montoya, Silvia, 2004. The effect of labor market regulations on employment decisions by firms: Empirical evidence for Argentina. In: Heckman, James, Pags, Carmen (Eds.), Law and Employment: Lessons from Latin America and the Caribbean. The University of Chicago Press, Chicago.

Montenegro, Claudio, Pags, Carmen, 2004. Who benefits from labor market regulation? Chile 19601998. In: Heckman, J., Pags, C. (Eds.), Law and Employment: Lessons from Latin America and the Caribbean. University of Chicago Press.

Neumark, David, Cunningham, Wendy, Siga, Lucas, 2006. The effects of the minimum wage in Brazil on the distribution of family incomes: 19962001. Journal of Development Economics 80, 136159.

Pags, Carmen, Montenegro, Claudio, 2007. Job security and the age-composition of employ-

ment: Evidence from Chile. Estudios de Economia 34 (2), 165187.

Ronconi, Lucas, 2008. Enforcement and Compliance with Labor Regulations. Industrial and Labor Relations Review 63(4), 719-36

Schurman, Rachel, Uncertain Gains: Labor in Chiles New Export Sectors. Latin American Research Review 26 (2001), 3-29

Solon, Gary The Minimum Wage and Teenage Employment: A reanalysis with Attention to Serial Correlation and Seasonality. Journal of Human Resources, Spring 1985, 20(2)

Weil, D Public Enforcement/Private Monitoring: Evaluating a new approach to regulating the minimum wage Industrial and Labor Relations Review 58 2005, 238-257

Welsh, Finis, 1974. Minimum wage legislation in the United States. Economic Inquiry.

Yaniv, G. Minimum Wage Noncompliance and the Employment Decision. Journal of Labor Economics 19:3(2001)

Yaniv, G. Minimum wage Noncompliance and the sub-minimum wage rate. Economics Bulletin 10:9(2004)

Yaniv, G. On the Employment effect of noncompliance with the minimum wage law. International Review of Law and Economics. 26(2006)

8 Tables

Table 1: Chilean Minimum Wage Law

	Nominal Minimum Wage (CLP)			Real Minimum Wage (CLP)		
Effective Date:	Monthly	Hourly	cpi	Monthly	Hourly	Official Law
June 1 1990	26000	128.97	0.2978	87306.92	433.07	Ley 18.981
June 1 1991	33000	163.69	0.3626	91009.38	451.44	Ley 19.060
June 1 1992	38600	191.47	0.4186	92212.14	457.40	Ley 19.142
June 1 1993	46000	228.17	0.4718	97498.94	483.63	Ley 19.222
June 1 1994	52150	258.68	0.5258	99182.20	491.98	Ley 19.307
June 1 1995	58900	292.16	0.5691	103496.75	513.38	Ley 19.392
June 1 1996	65500	324.90	0.6110	107201.31	531.75	Ley 19.457
June 1 1997	71400	354.17	0.6485	110100.23	546.13	Ley 19.502
June 1 1998	80500	399.31	0.6816	118104.46	585.84	Ley 19.564
June 1 1999	90500	448.91	0.7044	128478.14	637.29	Ley 19.564
June 1 2000	100000	496.03	0.7314	136724.09	678.19	Ley 19.564
June 1 2001	105500	523.31	0.7575	139273.93	690.84	Ley 19.729
June 1 2002	111200	551.59	0.7764	143225.14	710.44	Ley 19.811
July 1 2003	115648	573.65	0.7982	144885.99	718.68	Ley 19.883
July 1 2004	120000	595.24	0.8066	148772.63	737.96	Ley 19.956
July 1 2005	127500	674.60	0.8313	153374.23	811.50	Ley 20.039
July 1 2006	135000	714.29	0.8595	157068.06	831.05	Ley 20.039
July 1 2007	144000	761.90	0.8973	160481.44	849.11	Ley 20.204
July 1 2008	159000	841.27	0.9756	162976.63	862.31	Ley 20.279
July 1 2009	165000	873.02	0.9900	166666.67	881.83	Ley 20.359

Source: Biblioteca Nacional de Chile (leychile.cl) and Instituto Nacional de Estadistica de Chile (National Statistics Institute) All laws are written by the Ministerio de Hacienda.

Note: Minimum wages are officially listed as monthly, but must legally be scaled for non-standard work hours. A standard work week was 48 hours until 2004 and 45 hours thereafter.

For ease of understanding 500 real CLP $\approx$ 1 USD

Table 2a:Formal Sector

Variable	Mean	Std. Dev.
female	0.334	0.472
years of education	11.453	3.944
hours	47.569	11.370
age	37.013	11.725
rural	0.098	0.297
no pension	0.057	0.233
low education	0.148	0.355
illiterage	0.014	0.118
age >65	0.015	0.120
age <20	0.024	0.154
age <18	0.004	0.066

Table 2b: Informal Sector

Variable	Mean	Std. Dev.
female	0.317	0.465
years of education	9.510	4.105
hours	44.227	16.829
age	35.070	13.380
rural	0.204	0.403
no pension	0.663	0.473
low education	0.284	0.451
illiterage	0.042	0.201
age >65	0.030	0.170
age <20	0.085	0.280
age <18	0.032	0.176

Table 3.a: Extent of Non Compliance

Year	under hour	contract	over hours	undermin
1990	0.135	0.85	0.125	0.084
1992	0.145	0.868	0.117	0.091
1994	0.13	0.815	0.1	0.094
1996	0.127	0.814	0.085	0.182
1998	0.123	0.807	0.09	0.1469
2000	0.177	0.821	0.085	0.1434
2003	0.176	0.809	0.07	0.207
2006	0.211	0.821	0.137	0.203
2009	0.103	0.83	0.1	0.078

Table 3.b: Contract by Year and Industry

Year	agriculture	mining	manufacturing	utlities	construction	business	transport	finance	services
1990	0.69	0.94	0.9	NA	0.84	0.88	0.86	0.95	0.94
1992	0.74	0.94	0.92	0.97	0.87	0.86	0.85	0.96	0.91
1994	0.59	0.94	0.89	0.88	0.78	0.87	0.78	0.93	0.89
1996	0.63	0.93	0.87	0.95	0.79	0.82	0.76	0.95	0.88
1998	0.62	0.96	0.88	0.89	0.72	0.85	0.74	0.91	0.88
2000	0.66	0.96	0.89	0.92	0.74	0.86	0.74	0.91	0.88
2003	0.67	0.94	0.87	0.91	0.75	0.86	0.73	0.89	0.86
2006	0.7	0.95	0.86	0.95	0.78	0.87	0.76	0.89	0.87
2009	0.7	0.96	0.87	0.92	0.78	0.86	0.8	0.89	0.87

Table 3.c: Minimum Wage Violation by Year and Industry

Year	agriculture	mining	manufacturing	utlities	construction	business	transport	finance	services
1990	0.3	0.05	0.096	NA	0.1	0.165	0.101	0.034	0.055
1992	0.31	0.07	0.096	0.055	0.125	0.161	0.13	0.036	0.106
1994	0.35	0.05	0.072	0.07	0.096	0.116	0.134	0.028	0.067
1996	0.34	0.04	0.072	0.04	0.112	0.11	0.125	0.038	0.064
1998	0.33	0.04	0.066	0.036	0.11	0.116	0.148	0.032	0.062
2000	0.419	0.027	0.12	0.06	0.176	0.153	0.227	0.088	0.098
2003	0.4	0.03	0.13	0.08	0.157	0.188	0.184	0.059	0.108
2006	0.42	0.09	0.17	0.143	0.212	0.191	0.219	0.112	0.147
2009	0.22	0.02	0.08	0.05	0.101	0.107	0.12	0.047	0.071

Table 4: Quantile Regressions: Impact of Minimum Wage on Wages (Formal Sector)

	Quantile								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Base	0.8104***	0.8390***	0.7128***	0.6364***	0.5946***	0.5916***	0.5727***	0.6055***	0.5574***
	(0.0001)	(0.0001)	(0.0002)	(0.0006)	(0.0003)	(0.0012)	(0.0008)	(0.0015)	(0.0014)
Worker Character	0.5939***	0.5257***	0.4580***	0.4110***	0.3605***	0.3205***	0.2675***	0.2178***	0.1830***
	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0008)	(0.0009)
Industry	0.6011***	0.5287***	0.4658***	0.4158***	0.3738***	0.3277***	0.2874***	0.2408***	0.1964***
	(0.0007)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0007)	(0.0010)
Industry and Region	0.5967***	0.5273***	0.4698***	0.4200***	0.3802***	0.3410***	0.3018***	0.2614***	0.2177***
	(0.0006)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0007)	(0.0009)
Region	0.6014***	0.5269***	0.4631***	0.4115***	0.3714***	0.3255***	0.2900***	0.2492***	0.2098***
	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0008)	(0.0009)

Base regression includes only ln(real hourly minimum wage) as a regressor. All other regressions include worker characteristics: age, age-squared, years of education, and a dummy for female. "Industry" or "Region" regressions include industry and/or region fixed effects. All dependent variables are ln(real hourly wage). Column numbers are quantile numbers.

Standard errors in parentheses

="* p<0.05 ** p<0.01 *** p<0.001"

Table 5: Quantile Regressions: Impact of Minimum Wage on Wages (Informal Sector)

	Quantile								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Base	0.7750***	0.7829***	0.8104***	0.8089***	0.7974***	0.7710***	0.8182***	0.7895***	0.9030***
	(0.0020)	(0.0016)	(0.0004)	(0.0005)	(0.0015)	(0.0009)	(0.0009)	(0.0027)	(0.0043)
Worker	0.4983***	0.5476***	0.5640***	0.5464***	0.4968***	0.4279***	0.3867***	0.3346***	0.3420***
Character	(0.0025)	(0.0015)	(0.0012)	(0.0011)	(0.0011)	(0.0013)	(0.0014)	(0.0018)	(0.0023)
Industry	0.4825***	0.5319***	0.5444***	0.5278***	0.4844***	0.4322***	0.3859***	0.3655***	0.3066***
	(0.0019)	(0.0014)	(0.0013)	(0.0010)	(0.0011)	(0.0013)	(0.0013)	(0.0016)	(0.0022)
Industry	0.5060***	0.5160***	0.5323***	0.5206***	0.4849***	0.4474***	0.3972***	0.3787***	0.3286***
and Region	(0.0022)	(0.0016)	(0.0012)	(0.0011)	(0.0010)	(0.0011)	(0.0015)	(0.0016)	(0.0023)
Region	0.5209***	0.5361***	0.5380***	0.5355***	0.4984***	0.4536***	0.3957***	0.3531***	0.3523***
	(0.0019)	(0.0014)	(0.0010)	(0.0011)	(0.0010)	(0.0011)	(0.0013)	(0.0017)	(0.0020)

Base regression includes only ln(real hourly minimum wage) as a regressor. All other regressions include worker characteristics: age, age-squared, years of education, and a dummy for female. "Industry" or "Region" regressions include industry and/or region fixed effects. All dependent variables are ln(real hourly wage). Column numbers are quantile numbers.

Standard errors in parentheses

="* p<0.05 ** p<0.01 *** p<0.001"

Table 6: Quantile Regressions: Impact of Minimum Wage on Wages (Self Employed Sector)

	Quantile								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Base	0.8276***	0.8742***	0.8592***	0.8762***	0.8742***	0.8820***	0.8680***	0.8670***	0.8924***
	(0.0027)	(0.0006)	(0.0018)	(0.0017)	(0.0009)	(0.0009)	(0.0014)	(0.0025)	(0.0032)
Worker Char	0.5835***	0.5930***	0.5985***	0.5888***	0.5765***	0.5653***	0.5424***	0.5111***	0.5085***
	(0.0021)	(0.0015)	(0.0014)	(0.0013)	(0.0013)	(0.0014)	(0.0015)	(0.0018)	(0.0021)
Industry	0.5342***	0.5485***	0.5502***	0.5526***	0.5563***	0.5407***	0.5109***	0.4967***	0.4838***
	(0.0018)	(0.0017)	(0.0013)	(0.0012)	(0.0013)	(0.0014)	(0.0015)	(0.0018)	(0.0023)
Industry and Region	0.5432***	0.5510***	0.5613***	0.5751***	0.5571***	0.5503***	0.5386***	0.4955***	0.4937***
	(0.0020)	(0.0016)	(0.0013)	(0.0013)	(0.0012)	(0.0012)	(0.0015)	(0.0017)	(0.0024)
Region	0.5920***	0.5833***	0.5989***	0.5959***	0.5791***	0.5655***	0.5508***	0.5372***	0.5189***
	(0.0021)	(0.0016)	(0.0013)	(0.0013)	(0.0013)	(0.0014)	(0.0016)	(0.0019)	(0.0024)

Base regression includes only ln(real hourly minimum wage) as a regressor. All other regressions include worker characteristics: age, age-squared, years of education, and a dummy for female. "Industry" or "Region" regressions include industry and/or region fixed effects. All dependent variables are ln(real hourly wage). Column numbers are quantile numbers.

Standard errors in parentheses

="* p<0.05 ** p<0.01 *** p<0.001"

Table 7: Quantile Regressions: Impact of Minimum Wage on Wages (Covered Sector)

	Quantile								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Base	0.8609***	0.8168***	0.7773***	0.7147***	0.6366***	0.6207***	0.5669***	0.6329***	0.6269***
	(0.0000)	(0.0002)	(0.0008)	(0.0006)	(0.0006)	(0.0004)	(0.0010)	(0.0011)	(0.0012)
Worker Char	0.5511***	0.5092***	0.4564***	0.4035***	0.3575***	0.3187***	0.2664***	0.2227***	0.1845***
	(0.0007)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0009)
Industry	0.5488***	0.5104***	0.4612***	0.4149***	0.3732***	0.3282***	0.2922***	0.2418***	0.1940***
	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0010)
Industry and Region	0.5464***	0.5144***	0.4609***	0.4162***	0.3763***	0.3435***	0.3009***	0.2620***	0.2225***
	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0010)
Region	0.5468***	0.5100***	0.4603***	0.4121***	0.3670***	0.3278***	0.2851***	0.2542***	0.2155***
	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0007)	(0.0009)

Base regression includes only ln(real hourly minimum wage) as a regressor. All other regressions include worker characteristics: age, age-squared, years of education, and a dummy for female. "Industry" or "Region" regressions include industry and/or region fixed effects. All dependent variables are ln(real hourly wage). Column numbers are quantile numbers.

Standard errors in parentheses

="* p<0.05 ** p<0.01 *** p<0.001"

Table 8: Multinomial Logit, Impact of Minimum Wage on Employment Type

	(1)	(2)	(3)	(4)
Unemployed				
coefficient	0.0734***	0.0738***	omitted	omitted
	(0.000220)	(0.000221)		
marginal effect	0.004198	0.0042184		
elasticity	0.8447226	0.8528071		
Employed Other				
minscale	-0.0104***	-0.0107***	-0.00551***	-0.00563***
	(0.000128)	(0.000128)	(0.000131)	(0.000131)
marginal effect	-0.0050899	-0.0051109	-0.0028055	-0.0028291
elasticity	-0.2339648	-0.2352868	-0.1231641	-0.1244692
Informal Sector				
minscale	0.0550***	0.0544***	0.0502***	0.0504***
	(0.000177)	(0.000177)	(0.000180)	(0.000180)
marginal effect	0.0051417	0.0050628	0.0052284	0.0052429
elasticity	0.608375	0.602278	0.5920064	0.595883
Foral Sector				
		Base Category		
marginal effect	-0.0042497	-0.0041704	-0.0024229	-0.0024138
elasticity	-0.1000381	-0.0979364	-0.0523904	-0.0521026
includes worker characteristics	Y	Y	Y	Y
includes region fixed effects	N	Y	N	Y
includes industry fixed effects	N	N	Y	Y
N (weighted)	38556369	38556369	36002170	36002170
pseudo R-sq	0.043	0.047	0.074	0.077

All specifications include worker characteristics: age, age-squared, years of education, a dummy for female. The base category is employed in the formal sector. The minimum wage variable is the real hourly minimum wage divided by 50. A unit increase in this table corresponds to a 50 CLP increase in the minimum wage or about a 0.10USD increase. Industry is unknown for unemployed workers. "Employed other" includes employment in all sectors not covered by the minimum wage. Marginal effects and elasticities are reported at the mean.

Standard errors in parentheses: * p<0.05 ** p<0.01 ** p<0.01

Table 9: Impact of Minimum Wage on Employment Type: A Single Covered Sector

	Multinomial Logit		Logit	
	(1)	(2)	(3)	(4}
Unemployed				
coefficient	0.0833***	0.0840***	omitted	omitted
	(0.000231)	(0.000231)		
Marginal Effect	0.0040815	0.0040946		
elasticity	0.8341518	0.8416218		
Employed Other				
coefficient	0	0		
	(.)	(.)		
Marginal Effect	-0.0050914	-0.0051176		
Elasticity	-0.237971	-0.2398172		
Employed Covered				
coefficient	0.0200***	0.0202***	0.0143***	0.0144***
	(0.000123)	(0.000124)	(0.000127)	(0.000127)
Marginal Effect	0.00101	0.0010229	0.00291	0.00294
Elasticity	0.0196608	0.0198813	0.0524	0.0529
N	38556369	38556369	36002072	36002072
pseudo R-sq	0.040	0.043	0.076	0.079

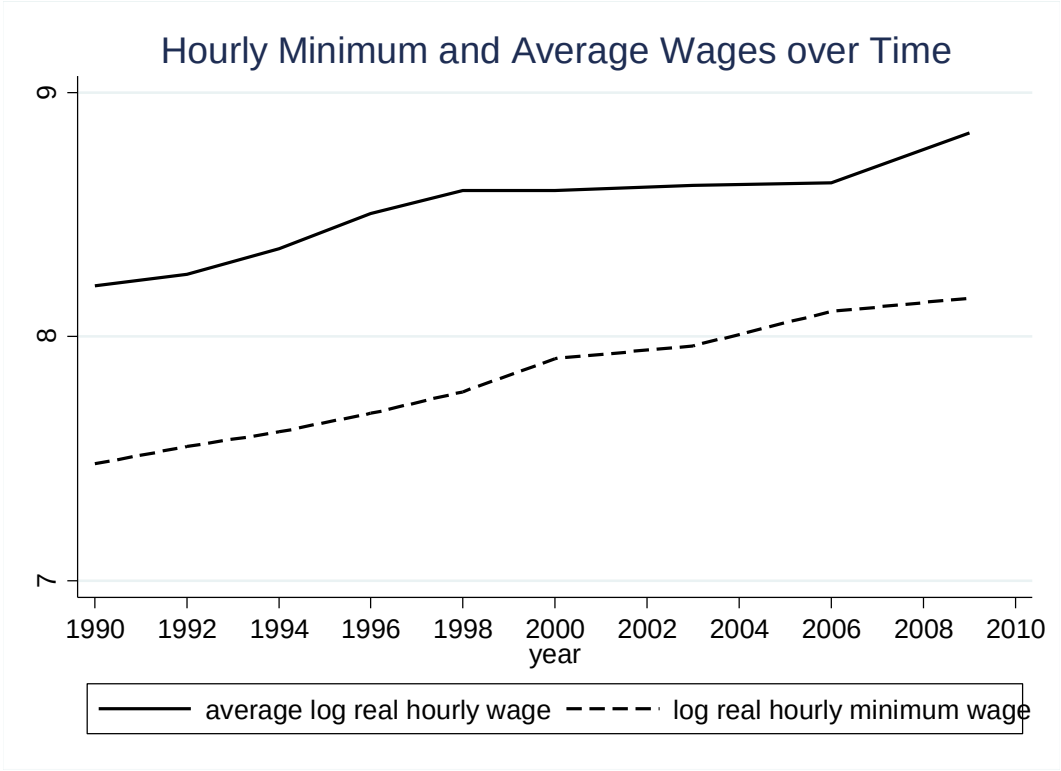
All specifications include worker characteristics: age, age-squared, years of education, a dummy for female. The base category is employed in the non-coverd sector for the multinomial logit. The minimum wage variable is the real hourly minimum wage divided by 50. A unit increase in this table corresponds to a 50 CLP increase in the minimum wage or about a 0.10USD increase. Industry is unknown for unemployed workers. "Employed other" includes employment in all sectors not covered by the minimum wage. Marginal effects and elasticities are reported at the mean. For the logit specification the omitted category is employed other.

Standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001"

9 Figures

Figure 1: Wages Over Time



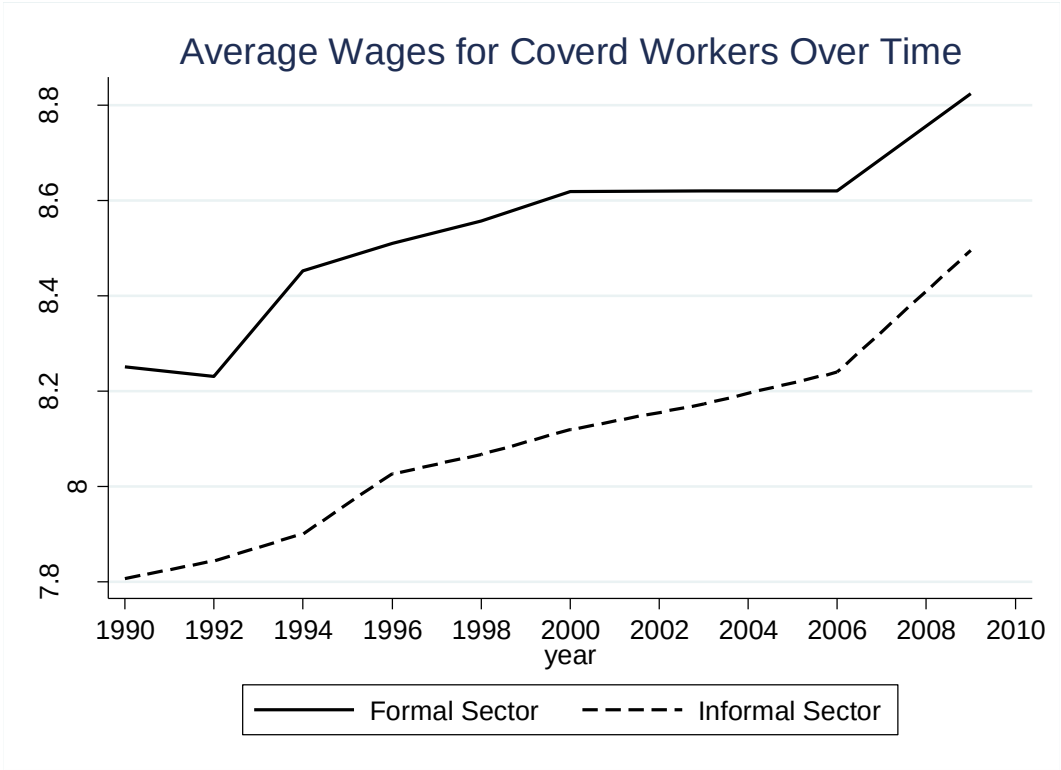
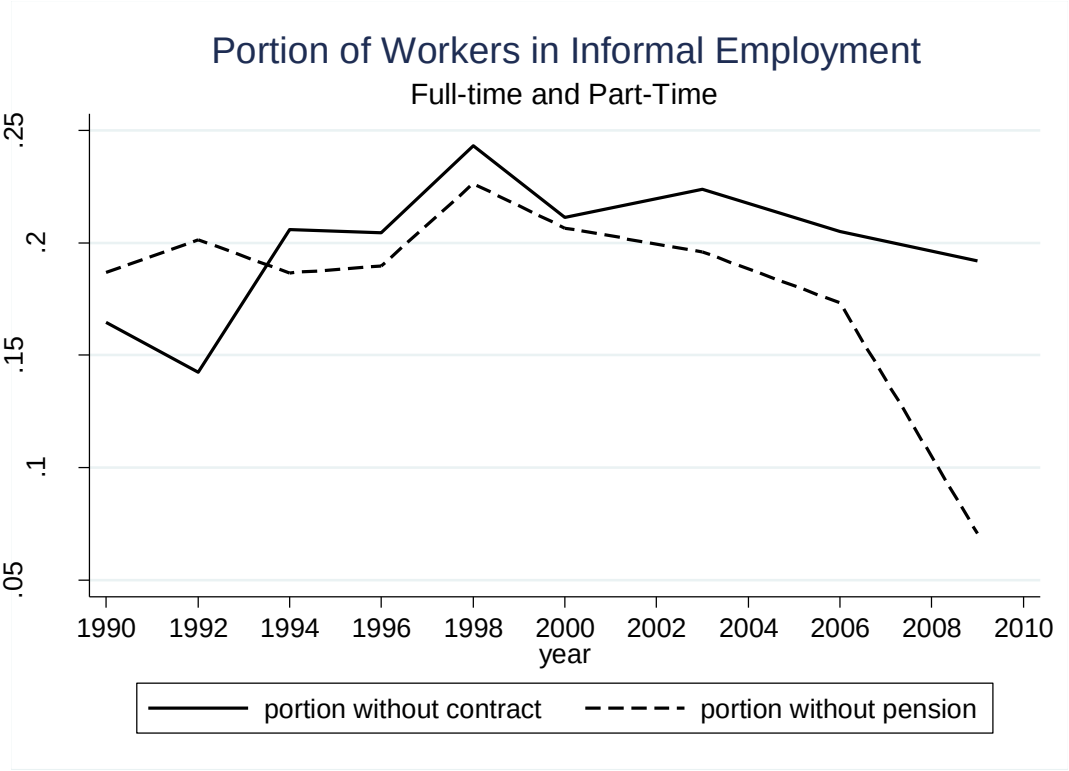


Figure 2: Sectoral Participation Over Time



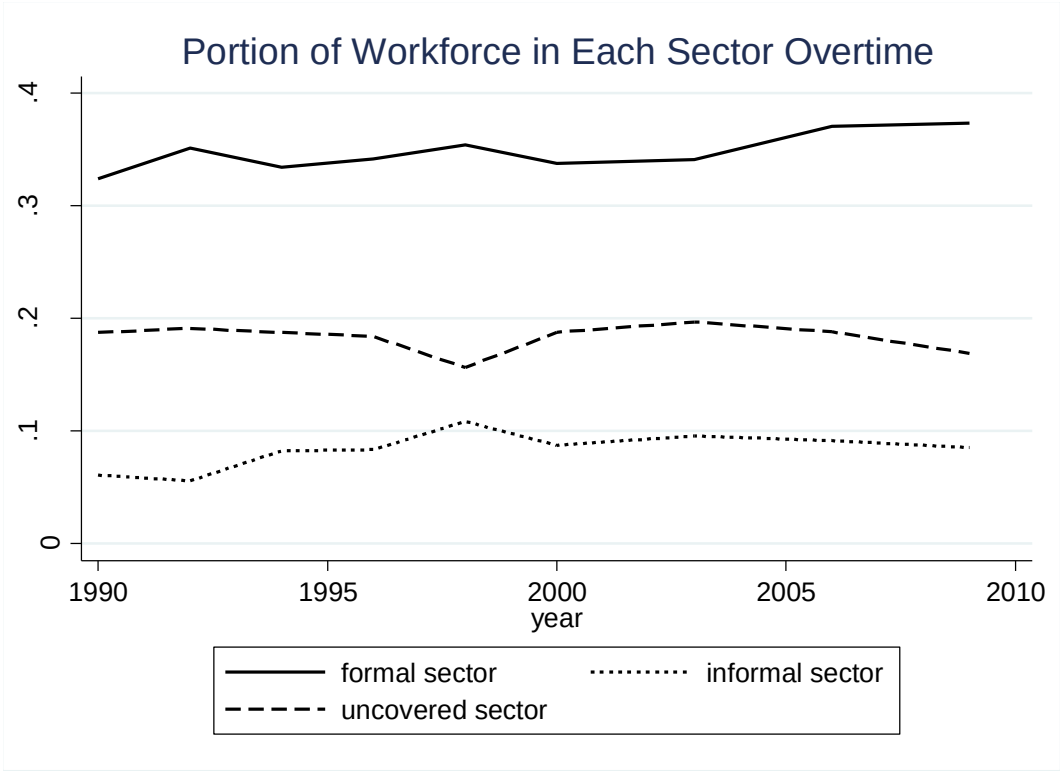
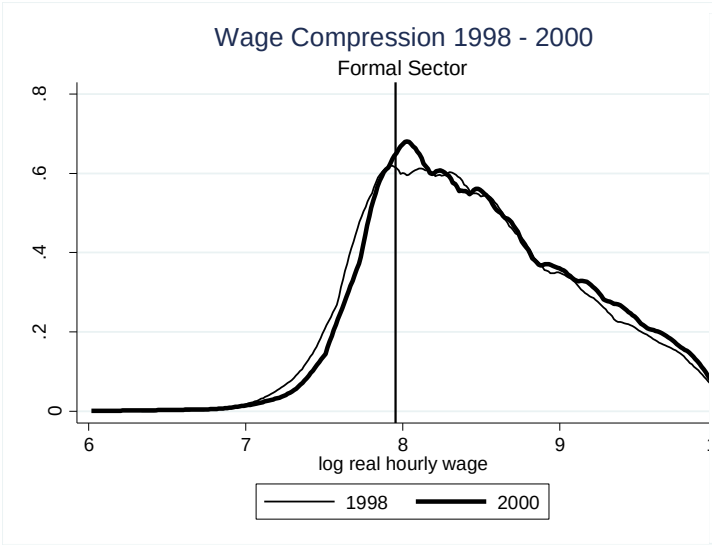
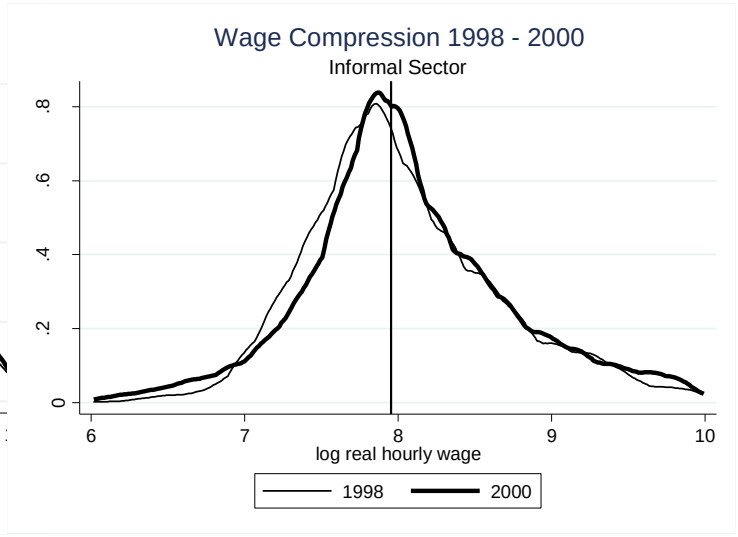
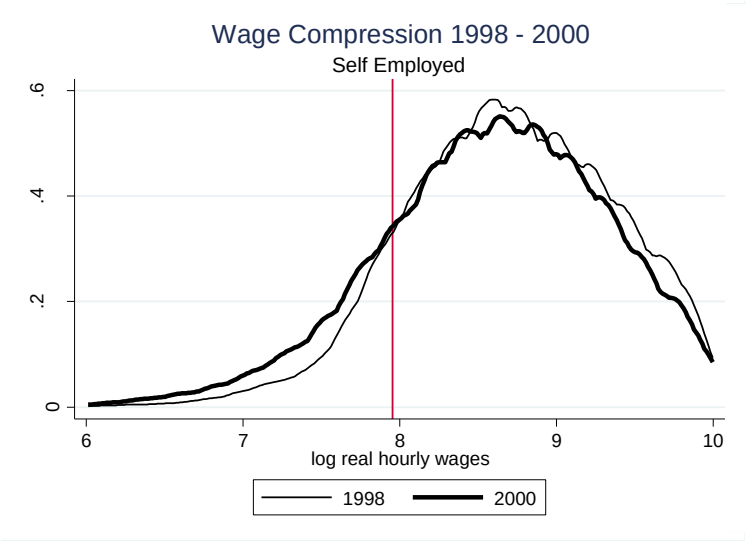
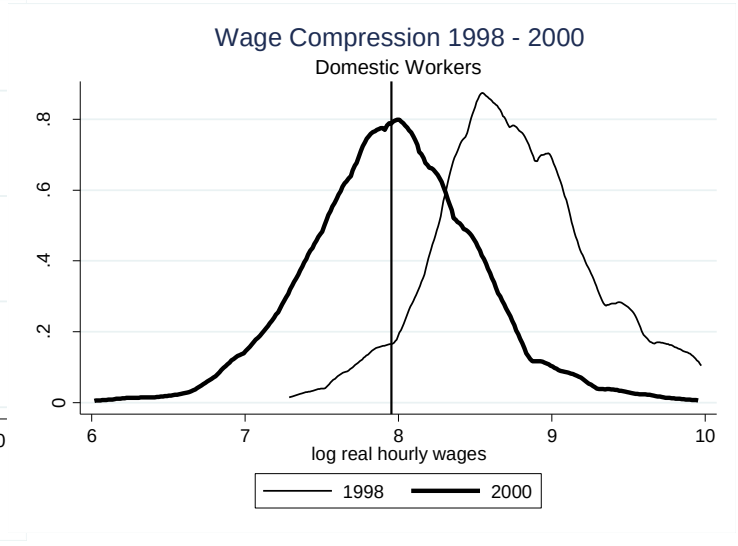


Figure 4: Wage Compression in Various Sectors 1998-2000









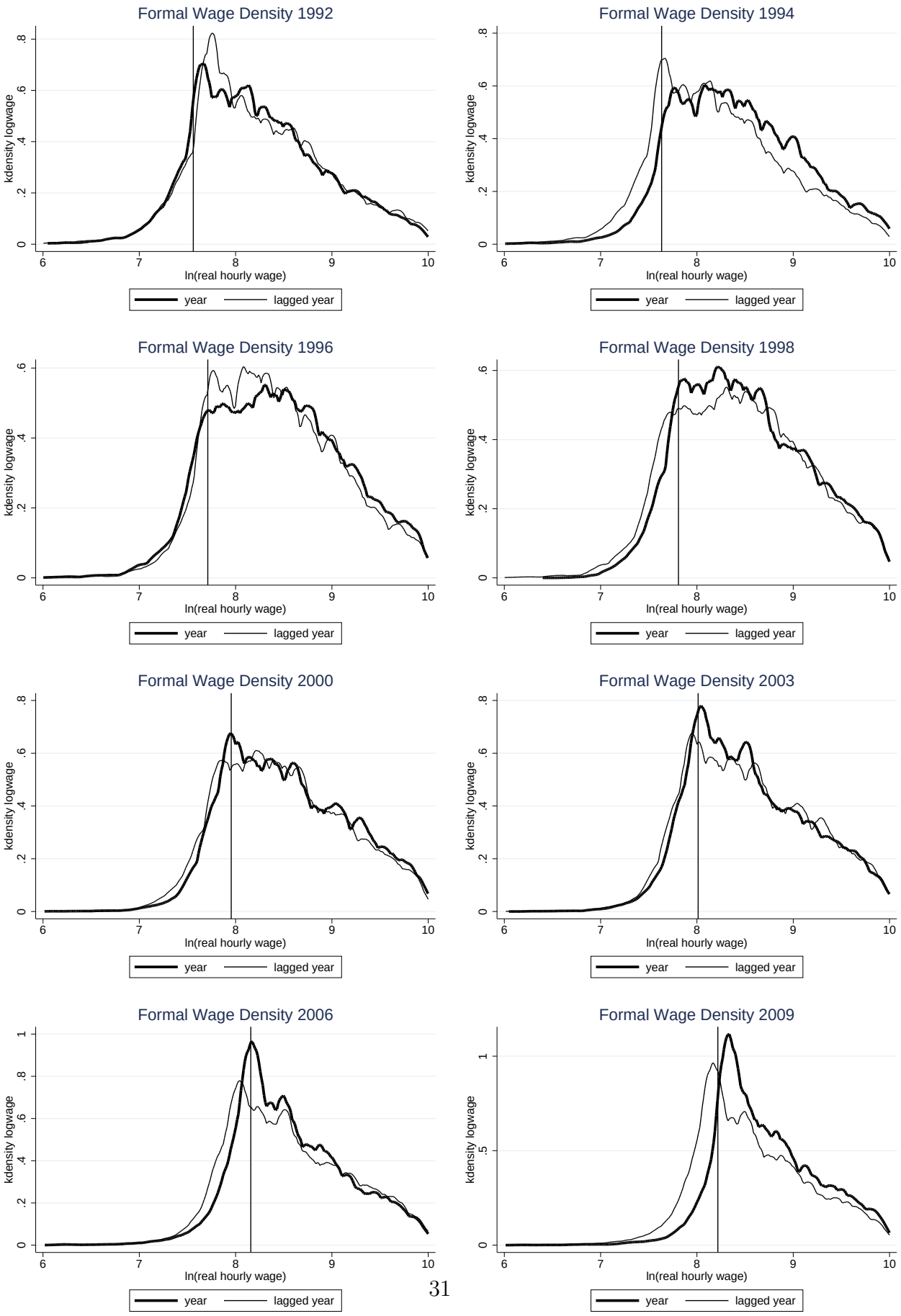


Figure 5: Formal Wage Density

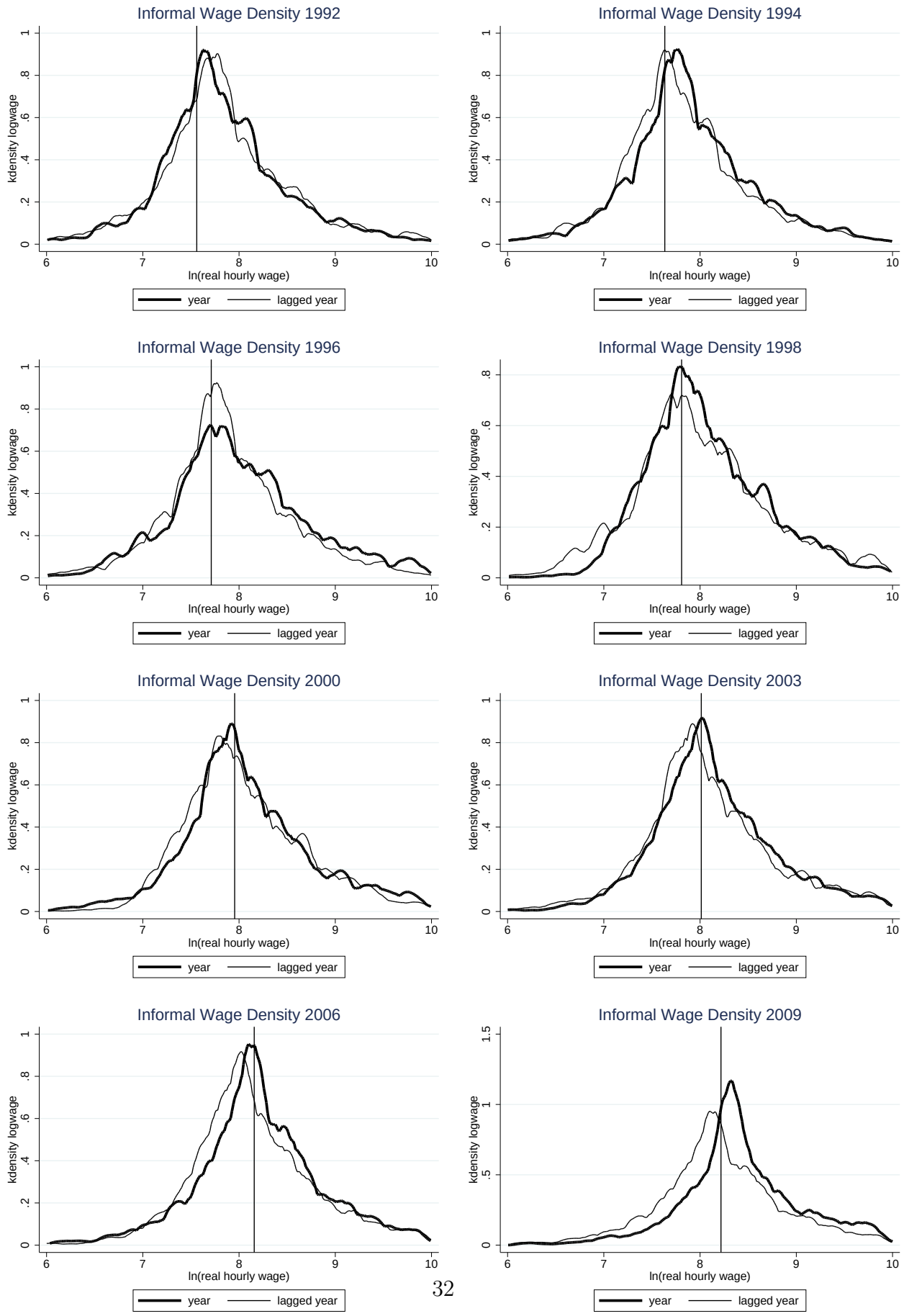


Figure 6: Informal Wage Density

Figure 7: Labor Inspections

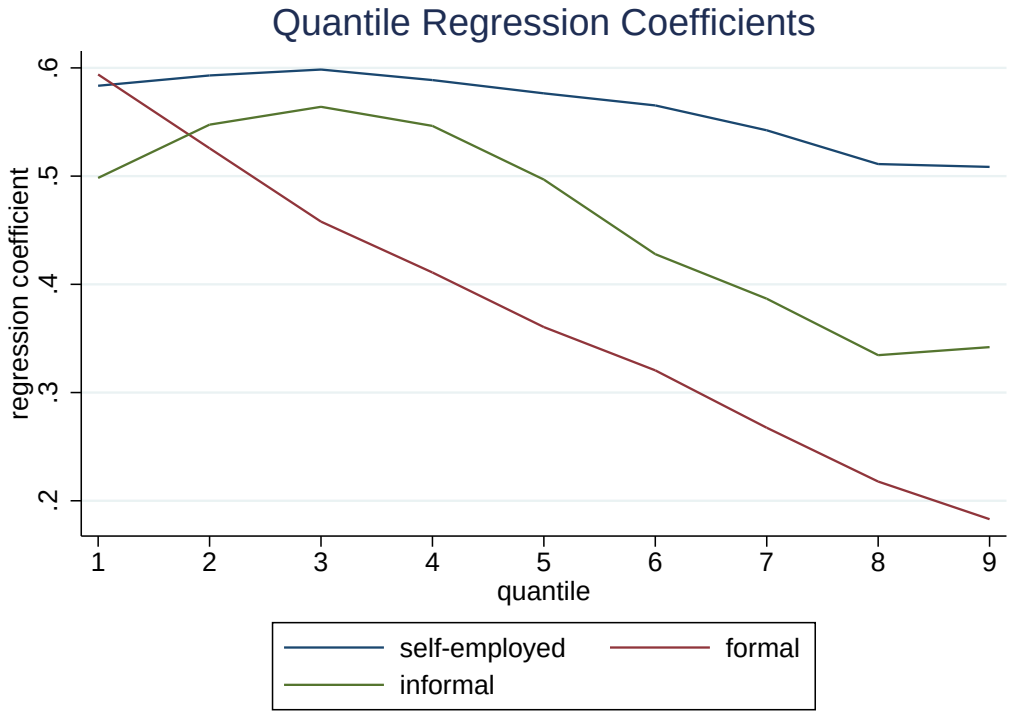


Figure 8: Quantile Regression Coefficients (worker characteristics)

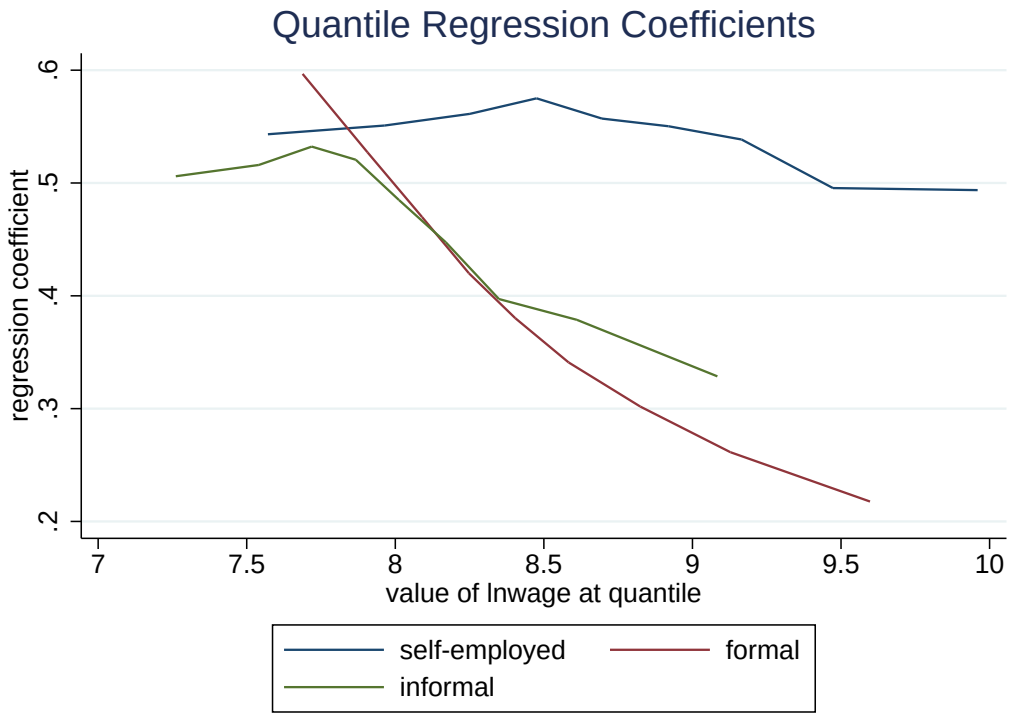


Figure 9: Quantile Regression Coefficients (worker characteristics)

A CASEN survey details

All information in this section is from the CASEN Informes Metodologicos (Methodology Reports) and codebooks. Mistranslations are my own.

- The studied population is a nationally representative sample of households excluding remote areas and difficult to access areas. The definition of the studies population has not changed over time.
- The unit of analysis is households and individuals within households
- The survey is carried out by face-to-face interview with the head of household or his or her partner. If neither is available than an adult over 18 years of age is surveyed.
- The estimation level is the country by urban/rural and region by urban/rural for all waves. Later waves include self-representing communities, the number of which increases overtime.
- The survey size for regions is designed to have a maximum absolute error of 5% and a confidence level of 95% assuming maximum variance. For self-representing communities the absolute error is limited to 7%
- The survey is conducted in November and December of each year.

A.1 1990 - 1994 waves

- The survey methodology for these waves was designed by Economics Department at the University of Chile. The survey was administered by the University's Statistics Unit
- Sampling was based on the Chilean National Statistics Institute 1982 census and areal photography from the Areal-photographic service of the Chilean Air Force. For rural areas areal photographs from the National Resources Institute (CIREN) and the Corporation for Promoting Production (CORFO).
- Three stages of selection: (1) Selection of cities (all cities with population greater than 40,000 were automatically included). (2) Within cities housing blocks were selected. (3) Within housing blocks, residences were selected.
- Observation weights are based on the selection method.

Figure 10: Number of Individuals and Households Included in Survey by Year

A.2 1996 - 2003 waves

- The survey design was re-evaluated in 1995 by MIDEPLAN with input from The University of Chile, The Inter-American Center for Statistic Teaching of the OEA (CIENES), and the National Statistics Institute (INE) .
- The size of the survey was expanded and self-representing communities were added to the sampling structure.
- Changes in the survey were designed to keep the surveys comparable across waves.
- Sampling was based on the 1992 Census and 2002 Census for 2003.
- The sampling mechanism changed with the inclusion of self-representing communities and standardized statistical units (similar to census tracks) were used for sampling. Survey weights were adjusted for this change.
- UPMs (areas) were selected by the INE and selection of houses and enumeration were done by the University of Chile.

A.3 2006 - 2009 waves

- The survey frame was expanded to be representative for more communities.
- The INE replaced the University of Chile in all levels of selection and enumeration.
- Again, survey weights were adjusted for the changes.
- The 2006 and 2009 waves also expanded the number and types of questions asked of households.

B Additional Tables and Figures

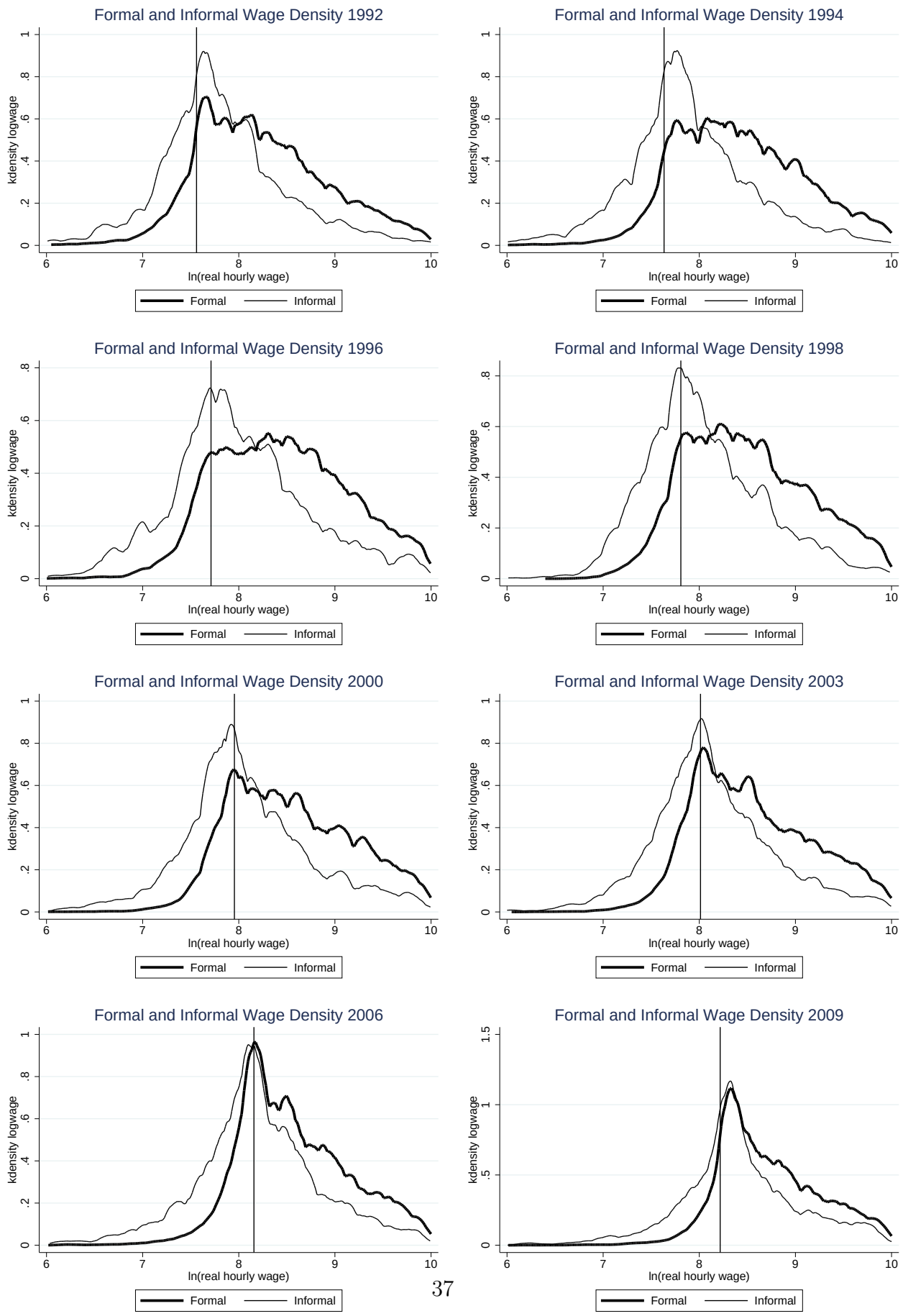


Figure 11: Formal and Informal Wage Density

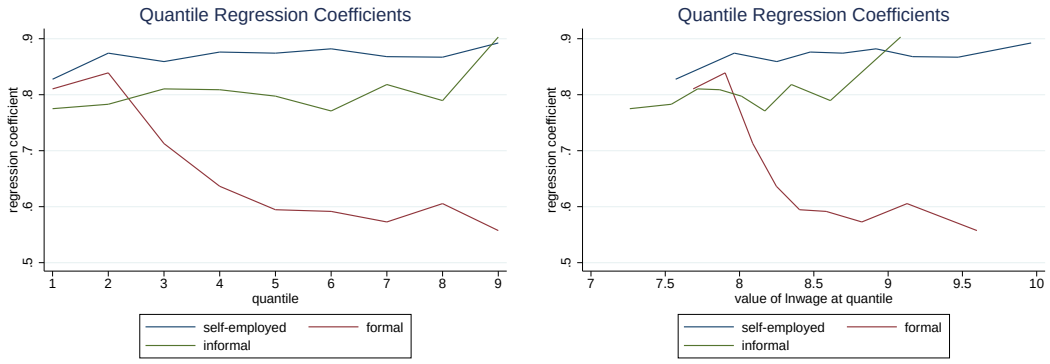


Figure 12: Base Specification

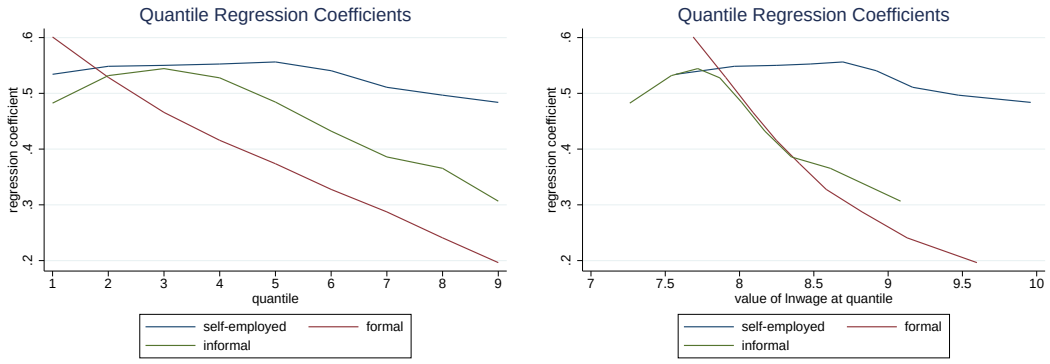


Figure 13: Region FE

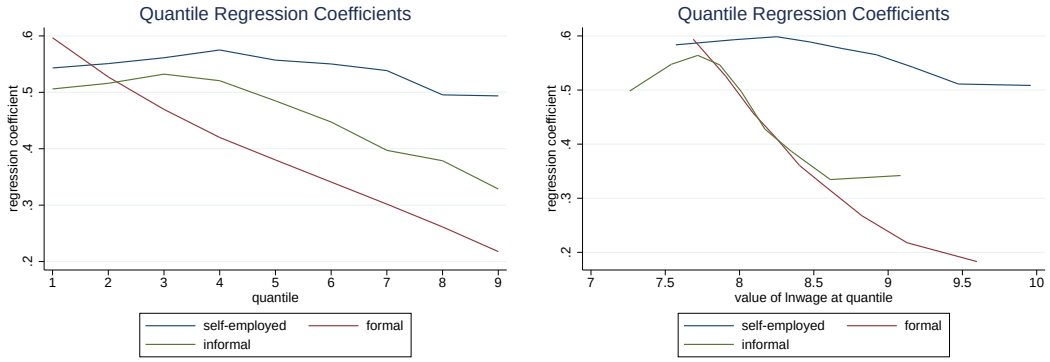


Figure 14: Industry FE

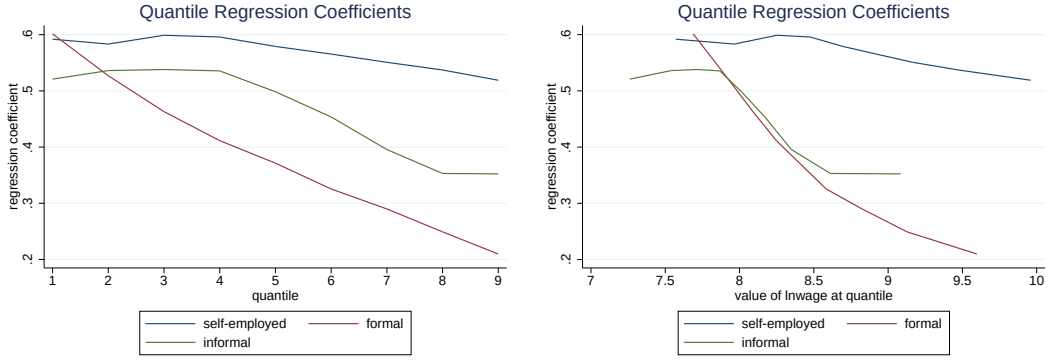


Figure 15: Region and Industry FE