Downward Wage Rigidities in the Mexican Labor Market 1996-2011*

Laura Juarez† and Daniel Casarin‡

October 3, 2014

Abstract

In this paper, we provide evidence on the existence and evolution of downward real and nominal wage rigidities (DRWR and DNWR, respectively) in Mexico in the period 1996-2011. We use a modified version of the model by Altonji and Devereux (2000), and extended by Goette et al (2007) to estimate the prevalence of both types of wage rigidities in the presence of measurement error in wage changes, and data from the Mexican Urban Employment Survey (ENEU, 1994-2004) and the Mexican Survey of Occupation and Employment (ENOE, 2005-2011). Our results suggest that a much larger fraction of private sector workers, who stay in the same job from one year to another, are subject to downward real wage rigidities than to nominal ones. We also find some evidence suggesting that wage rigidities are related to the macroeconomic environment.

JEL Classification: J30.

Keywords: downward wage rigidities, wage indexation.

*The views expressed in this article are exclusively those of the authors and do not necessarily reflect those of Banco de Mexico.

†*Corresponding author:* Direccion General de Investigacion Economica, Banco de Mexico. Avenida 5 de mayo #18, Centro, 06059, Mexico, D.F. Phone: +52 (55) 5237-2711. E-mail: ljuarezg@banxico.org.mx.

‡Direccion General de Investigacion Economica, Banco de Mexico. Avenida 5 de mayo #18, Centro, 06059, Mexico, D.F.

1 Introduction

In this paper, we provide evidence on the existence and evolution of downward real and nominal wage rigidities (DRWR and DNWR, respectively) in Mexico in the period 1996-2011. Gauging the relative importance of both types of wage rigidities is relevant because such rigidities prevent the adjustment of labor market and are among the leading explanations as to why demand shocks have significant effects on real output. In addition, Mexico experienced a sustained inflation decrease between 1996 and 2011, which can potentially affect the relative importance of both types of rigidites and the functioning of the labor market, particularly since the 2009 recession.

Previous studies, which focus mainly on developed countries, have used several methods to document the existence and extent of downward wage rigidities. The first one is graphical inspection of the histogram of nominal wage changes to detect asymmetries in their distribution (Card and Hyslop, 1997). For instance, if DNWR exist one would observe a "bunching" of wage change observations at zero, or at a positive value (e.g. expected or past inflation) if DRWR exist. Other studies have use regression-based methods to complement the graphical evidence and to measure whether the excess mass at zero or any other point is significant (Kahn, 1997; Castellanos et al, 2004; Castellanos, 2005). Finally, another set of studies use a particular censored regression model, which is estimated by maximum likelihood, to obtain the parameters of DNWR and DRWR, like the probability of being in a given wage regime and the focal point of wage negotiations (Altonji and Devereux, 2000; Bauer et al,2007; Devicienti et al, 2007; Barwell and Schweitzer, 2007; Messina and Sanz-de-Galdeano, 2014). Apart from the difference in the methods used, previous studies share some common features. All of them use micro data from firms, household surveys or administrative records and the key variable of interest is the annual change in log nominal wages. The majority of them focus on job stayers, i.e. workers who stayed in the same job from one year to another, to keep the job characteristics constant.

In this paper, we follow the studies that estimate the wage rigidities parameters by maximum likelihood. We use a modified version of the model by Altonji and Devereux (2000), which was extended by Goette et al (2007) to estimate the prevalence of both types of wage rigidities in the presence of measurement error in wage changes. This model distinguishes between the notional wage change, which is a latent variable capturing the wage change that employers would like to implement in the absence of any restrictions, and the observed wage change, which might be censored at zero if wages

are subject to DNWR, or at a non-zero value equal to the indexation point, not imposed but estimated within the model, if wages are subject to DRWR. The model is estimated via maximum likelihood to yield estimates for the indexation point and the fraction of workers belonging to each of three wage regimes: (i) flexible wages; (ii) wages subject to DNWR; and (iii) wages subject DRWR. In addition, the model also yields estimates for the fraction of reported wage changes that are subject to measurement error and for the actual incidence of wage rigidities, i.e. the probability that the wage change of a worker is constrained given that she belongs to the DNRW or DRWR regime.

We use data from the Mexican Urban Employment Survey (ENEU, 1996-2004) and the Mexican Survey of Occupation and Employment (ENOE, 2005-2011), which are household surveys collected by the Mexican Institute of Statistics and Geography (INEGI). For estimation, we focus on a subsample of salaried workers in the private sector who stayed in the same job from one year to another. The panel structure of both surveys allows identifying such "stayers", albeit not perfectly. We classify workers as "stayers" if they did not change industry and occupation from one year to another, as previous work by Castellanos (2001).

Our findings suggest that a much larger fraction of workers in our sample is subject to DRWR than to DNWR. This might be due to the lack of institutional changes in the labor market during this period. However, we also find that, as inflation decreased, the relative importance of DNWR increased, becoming particularly acute during the 2009 recession. Regarding the focal point for wage negotiations, we find that it decreased with inflation, but was above its lagged value until 2003, the year that the Mexican central bank adopted inflation targeting. We cannot reject that the focal point was statistically equal to the value of lagged inflation, the change in the minimum wage and the core inflation trend after 2003, but it had the highest correlation with the lagged change in the minimum wage. In 2009-2011, the focal point was not statistically different from zero, which reinforces the idea that nominal wage rigidities were particularly acute in Mexico during the latest recession.

Our paper contributes to the literature of wage rigidities by providing evidence for a developing country over a relatively long period, including the most recent years. So far this literature has mainly focused on the United States and Europe, with few exceptions: Messina and Sanz-de-Galdeano (2014) use the same methodology as we do to provide evidence for Brazil and Uruguay; for Mexico, the only previous studies that we are aware of are Castellanos (2001) and Castellanos et al (2004), which provide evidence up to the year 2001. We provide more recent evidence on wage rigidities in

Mexico, which is relevant because inflation became lower and relatively more stable after 2001. We also add to these previous studies for Mexico by jointly estimating the extent of nominal and real wage rigidities, by taking into account the possibility of measurement error in the estimation and by looking at year-to-year changes in the estimated parameters to explore their relation with the macroeconomic environment.

2 Previous evidence

As mentioned above, the majority of existing studies focus on developed countries, i.e, the U.S. and Europe, and the heterogeneity in their findings is attributed to the differences in the institutional setting in each particular country. Previous studies for the U.S. focus primarily on the existence of nominal wage rigidities using a variety of methods (e.g. Kahn, 1997; Altonji and Devereux, 2000, Barattieri et al, 2014). Studies for European countries look at the relative importance of both nominal and real wage rigidites, which typically reflect different labor market institutions across countries.

For the U.S., an early study by Card and Hyslop (1997) finds a "spike" at zero on the distribution of nominal wage changes, which is negatively correlated with inflation. Later work by Kahn (1997) uses a regression to test for nominal wage rigidities and finds that 9.4 wage workers did not receive a wage cut due to DNWR, and that the pile-up at zero wage change can be explained by the infrequency of small wage changes. Altonji and Devereux (2000) find evidence of substantial nominal wage rigidity: only 0.5 percent of salaried workers receive wage cuts in their data, which comes from a private corporation, and 11 percent had a wage freeze. The authors also find that these changes are mostly associated with changes between full time/part time status, and/or a switch in compensation involving incentives.

For Europe, Dickens et al (2007) use individual workers' earnings data for 16 countries. They find a high incidence of wage freezes and a lack of nominal wage cuts, which they take as evidence of DNWR. A second asymmetry they find is a tendency for workers' wage changes to clump in the vicinity of the expected rate of inflation, which suggest the existence of DRWR. They find substantial variation across European countries in the extent of both types of rigidities, even after controlling for dataset characteristics. For instance, in their data countries with the highest fraction of workers subject to DNWR are the U.S. (45%) and Portugal (56%), whereas those with the highest fraction subject to DRWR are Finland (65%) and Sweden (70%). After examin-

ing the relationship between their measures of wage rigidity and some characteristics of labor markets in the countries of their sample, they find that only greater union density appears to have a robust positive relationship with downward real wage rigidity.

Bauer et al (2007), Devicienti et al (2007), and Barwell and Schweitzer (2007) apply a common maximum likelihood estimator to three European countries: Germany, Italy and the UK. They find that real rigidities are far more prevalent in these countries than nominal ones, but their importance has declined over time.They also find that low inflation decreases DRWR, but increases the prevalence of DNWR.

Only a few studies provide evidence for developing countries: Messina and Sanz-de-Galdeano (2014) for Brazil and Uruguay, Castellanos (2005) and Castellanos et al (2004) for Mexico. Messina and Sanz-de-Galdeano (2014) use employer-employee administrative data and the same econometric model as Bauer et al (2007) to examine how wage rigidities change with rapid disinflation (starting mid-1990s) in Brazil and Uruguay. They find that in Uruguay, DRWR fall from 75 percent in 1996-99 to 7 percent by the 2000s, and DNWR become more prevalent (from 11 to 66%). In Brazil, DRWR are stable (around 43%), but the introduction of inflation targeting anchors wage negotiations to expected inflation.

For Mexico, the only previous studies that we are aware of are Castellanos (2005) and Castellanos et al (2004), which use the regression-based method proposed by Kahn (1997) to provide evidence of DNWR up to the year 2001. Castellanos (2005) uses data from ENEU, whereas Castellanos et al (2004) use individual IMSS administrative records. Both of these studies find some evidence of DNWR for a sample of job stayers, and especially in large, formal sector firms. Castellanos (2004) also provides some evidence of indexation to the minimum wage, by imposing this indexation point in the regression.

As mentioned before, we provide more recent evidence on wage rigidities in Mexico, which is relevant because inflation became lower and relatively more stable after 2001. We also add to these previous studies for Mexico by jointly estimating the parameters of nominal and real wage rigidities, and the focal point for wage negotiations; by taking into account the possibility of measurement error in the estimation; and by looking at year-to-year changes in the estimated parameters to explore their relation with the macroeconomic environment.

3 Data and Estimation Sample

We use data from two household surveys collected by the Mexican Institute of Statistics and Geography (Instituto Nacional de Estadistica Geografia e Informatica, INEGI) to generate labor market statistics. The first one is the Mexican Urban Employment Survey (Encuesta Nacional de Empleo Urbano, ENEU) which is a rotating panel of households in a subsample of Mexican cities. The ENEU data are available from 1987 to 2004, but we use only the data for the period 1996-2004. The sample of cities changed over this period, as more cities were added every few years. The second dataset is the Mexican Survey of Occupation and Employment (Encuesta Nacional de Ocupación y Empleo, ENOE), which is a nationally representative household survey, available from 2005 to 2011. The ENOE survey has both urban and rural households, and as such it replaced the ENEU. It also has a very similar panel structure. In both surveys, each household is followed for a maximum of 5 quarters. To maximize comparability between the two datasets, for both we focus on the 27 cities that were included in all the ENEU years and, as described below, we define the variables accordingly.

For the whole period, we focus on a subsample of salaried workers age 18 to 65 who are full-time (i.e. have at least 30 hours of work per week) in the private sector. Thus, we drop the self-employed, unpaid, comission and piece-rate workers. We do not include workers in government and other public institutions because wage-setting practices in the public sector might be different from those in private firms. In addition, given that the literature focuses on private-sector workers, we will be able to compare our results with previous studies. Also for comparability, from this sample, we focus on job stayers, i.e. those workers that remained in the same job between their first and fifth interview. The ENEU and ENOE do not have a variable that allows us to clearly identify whether a worker stayed in exactly the same job during a year. So, we classifiy a worker as a job stayer if she had the same 4-digit occupation and 4-digit industry in her first and fifth interview, as in previous work by Castellanos (2005) using the ENEU. After applying these restrictions and dropping out observations with missing values in the variables we use in the analysis, we are left with 50,446 individual observations for the ENEU 1996-2004 and with 14,623 in the ENOE 2005-2011.

Our key variable of interest is the change in the log nominal wage per hour between the first and fifth interview, i.e. between a given quarter and the same one in the following year. Both surveys have information on nominal monthly earnings, the hours usually worked by each individual per week and the hours worked in the week previous

to the survey. We construct the hourly wage as monthly earnings divided by usual weekly hours of work multiplied by 4.3, for our main results. However, using the hours worked during the previous week does not change our results significantly.

4 Econometric Model

We use a censored regression model with measurement error proposed by Altonji and Devereux (2000) to analyze DNWR in the U.S. and extended by Goette et al (2007) to include also DRWR. In this section we outline the basic features of the model, following closely the technical note by Goette et al (2007), so interested readers are referred to that work for additional details.[1]

The model has a latent variable: the "notional" wage change for worker i at time t, which is the nominal wage change that would be implemented in the absence of any wage rigidites and measurement error. This notional wage change is not always observed, but can be described by the following equation:

$$\Delta w_{it}^{n} = X_{it-1}\alpha + \epsilon_{it}$$

where Δw_{it}^{n} is the notional wage change between t-1 and t for individual i, X_{it-1} are worker (age, education, female dummy) and job (industry, occupation, firm size, IMSS, contract) characteristics at t-1 and $\epsilon_{it} \sim N(0, \sigma_w^2$ is an error term. For estimation, we will include worker characteristics as age (and its square term), years of schooling (and its square term), a female dummy, and job characteristics such as a formal dummy, equal to 1 if the job is covered by social security benefits (IMSS), a contract dummy, equal to 1 if the worker has a written job contract, and industry, firm size and occupation dummies. Descriptive statistics for these control variables are presented in Tables A1 and A2 in the appendix. To control for any other factors affecting all workers in a given year, we will also include year dummies.

The actual wage change for worker i at time t is Δw_{it}. Each actual wage change observation can belong to one of the following three wage regimes: a regime with downward nominal rigidities (N), one with real wage rigidities (R), and the regime with flexible wages (F). As shown below, the actual wage change, Δw_{it}, will be zero if the

[1]Please refer to "Technical Appendix for Real and Nominal Wage Rigidities and the Rate of Inflation: Evidence from West German Micro Data" by Goette et al. (2007) available at: http://www.iza.org/files/EJ-WageRigidityFeature-TechApp.zip.

observation belongs to the nominal regime and the notional wage change is less than or equal to zero. So, if the wage change that would be implemented in the absence of nominal rigidities is a nominal wage decrease, then the worker would actually receive a wage freeze. The actual wage change received by the worker will be equal to r_{it}, which is the focal point of wage negotiations (or wage indexation point) if the observation belongs to the real regime and the notional wage change is less than r_{it}. The actual wage change will be equal to the notional one in any other case, for instance, if the observation belongs to the flexible regime. Note that a given observation can belong to the nominal or real regimes without being necessarily constrained. In such a case, the actual wage change would also be equal to the notional one.

$$\Delta w_{it} = \begin{cases} 0 & \text{if } \Delta w_{it}^n \leq 0 \ \wedge \ i \ \epsilon \ N \\ r_{it} & \text{if } \Delta w_{it}^n \leq r_{it} \ \wedge \ i \ \epsilon \ R \\ \Delta w_i^n & \text{otherwise}^* \end{cases}$$

An advantage of this model is that the focal point of wage negotiations (r_{it}) is not imposed, but estimated jointly within the model with the following equation:

$$r_{it} = Z_{it}\gamma + \upsilon_{it}, \upsilon_{it} \sim N(0, \sigma_r^2)$$

Thus, in principle, the focal point of wage negotiations can be a function of worker and job characteristics too. In this paper, we only include year dummies in Z_{it} to be able to estimate an average focal point that varies over time. Each worker i has an index p_i^j that affects the probability of being in regime j ($j = N, R, F$), but, as mentioned before, she can only be in one regime at time t. For instance, $P(N) = Prob(p_i^N > p_i^R$ and $p_i^N > p_i^F)$. Such index p_i^j may also be a function of worker's characteristics, but we include only year dummies in our main results.

Let Δw_{it}^o be the observed wage change. To account for measurement error, in the model the equation for the observed wage is as follows:

$$\Delta w_{it}^o = \Delta w_{it} + \tilde{u}_{it}, \text{ where } \tilde{u}_i = \begin{cases} u_i & \text{w/probability } p_i^m \\ 0 & \text{w/probability } 1 - p_i^m \end{cases} \quad \text{and } u_i \sim N(0, \sigma_m^2)$$

Thus, Δw_{it}^o potentially differs from Δw_i^n due to wage rigidities and measurement error.[2] The measurement error is specified in this way to allow some wage changes to

[2]In the original model by Goette et at (2007), the measurement error affects wage levels in each

be accurately measured.

To summarize, the table below shows all the possible cases that apply to a given wage change observation, according to the empirical model. Such observation can belong to any of the three regimes already defined above. If the observation is in either the nominal or real regime, it can either be constrained or unconstrained within that regime. And finally, each observation can be measured with or without error. Each cell in the table contributes with a term in the likelihood function. For instance, the part of the likelihood that corresponds to an observation that is in the nominal regime, constrained and measured without error (NC0) is $L_{NC0} = P(N)P(\Delta w_{it}^n \leq 0|N)(1 - p_i^m)$.[3]

	Wage Regime				
	Flexible	Real		Nominal	
		C	U	C	U
W/o error	F0	RC0	RU0	NC0	NU0
W/ error	F1	RC1	RU1	NC1	NU1

5 Descriptive Evidence

Figures 1 and 2 show histograms of annual nominal wage changes for our sample of salaried, job stayers in the private sector in two different years. Figure 1 shows the distribution of such wage changes for 1996, a high-inflation year. The vertical lines show the different cutoffs that the literature has used to show the presence of DNWR and DRWR. The first line is corresponds to zero, and the distribution shows a spike at this value, which is visual evidence suggesting the presence of DNWR. About 5% of workers in our sample experience a wage freeze in this year. In addition, the bar just below the zero is far smaller than the one just above, which reinforces the idea that some negative wage changes might have been instead converted to wage freezes. Note also that despite the recession experienced in 1996 in Mexico, overall more mass is observed to the right of zero than to the left. The other two vertical lines correspond to the annual inflation rate (around 30%) and the change in the minimum wage in that year (around 20%). At those positive values, it is possible to observe some bunching

period. We introduce this slight modification, a measurement error in the observed wage change, to simplify the model.

[3]Note that this expression relies on the assumption that the error terms of the index variables and the notional wage are independent. This is a strong assumption but it is standard in this framework. For a more thorough explanation of this and other details of the model, please refer to the technical note by Goette et al (2007).

of observations, suggestive of DRWR, but not as salient as the bunching at zero. The spikes at -1 and 1 are merely due to the fact that all changes that are either below -1 or above 1 are grouped together in those values.

Figure 2 shows the histogram of wage changes for 2006, a low-inflation year. The spike at zero is still observed, and it is higher than the one in Figure 1. About 7.5 percent of workers in 2006 received a wage freeze. Once again, the bar just below zero is much lower than the one just above it, suggesting the presence of DNWR. The vertical lines corresponding to the annual inflation and the change in the minimum wage overlap each other in this year and are fairly close to zero, due to the much lower levels of inflation observed in 2006 compared to 1996. Just by visual inspection of Figure 2, it is not easy to distinguish between the spike at zero and that, if there is one, at the inflation rate. As shown in our results, the model will also have difficulty distinguishing between the two in periods of low inflation.[4]

Figure 3 shows the evolution of the fraction of workers in our sample who receive a wage freeze during the period 1996-2006. This fraction is just below 0.05 in 1995, when the annual inflation rate was about 40 percent. Inflation starts to decrease in 1996, due to the stabilization policies implemented by the goverment after the 1994 peso crisis. The fraction of wage freezes remains low and stable until 1999. After that, such fraction starts to increase steadily, as inflation continues to decrease to one-digit levels, reaching about 0.065 in 2004. This suggests that, as inflation decreased in Mexico, DNWR gained importance, and even more so during recessions. In fact, after 2004, the fraction of wage freezes continue to increase but a a much lower rate, which also coincides with a stabilization of inflation at low levels. After 2009, the slope of the wage freezes curve rises again, suggesting the strenghtening on DNWR in the latest recession, in which inflation did not increase as substantially as in the Mexican crises of the 1980s and 1990s.

In summary, Figures 1, 2 and 3 suggest the presence of both DNWR and DRWR in the Mexican labor market, and they also suggest that DNWR gained importance as inflation decreased to one-digit levels in Mexico, and became particularly acute during recessions.

To continue describing our data before turning to our main estimation results, Table 1 shows the average annual changes in the nominal hourly wage, measured using usual and previous week work hours, in nominal monthly earnings, and in usual and previous

[4]Put differently, the model requires a very large number of observations to be able to distinguish between DNWR and DRWR at low levels of inflation, as mentioned in Goette et al (2007).

week hours. The annual change in the two measures of nominal hourly wage averaged 14-15 percent during 1996-2004 and 4 percent during 2006-2011. This difference is probably due to the decrease in inflation over the whole period. Table 1 also shows that most of the mean change in the nominal hourly wage is due to the mean annual change in monthly earnings and not to those in hours of work, which have a mean annual change close to zero, especially in the ENOE period.

6 Estimation results

Figures 4 and 5 show the histograms of the wage changes predicted by the model compared to those actually observed to get a sense of the fit of the model. Figure 4 shows that in a high-inflation year (1996) the model performs very well, and it is able to match the mean and the standard deviation of observed wage changes almost exactly. Figure 5 shows that in a low-inflation year (2006) the model performs still farily well, which is reassuring.

Table 2 shows the coefficients of the notional wage equation, estimated for the whole sample of stayers in 1996-2011. Age has a negative effect on the notional wage change and its square term is positive. Both age coefficients are statistically significant at 1 percent. In contrast, education and its square term are not significant at any conventional levels. Being female has a negative and statistically significant effect on the notional wage, as having a job covered by IMSS and a written contract.

At the bottom of Table 1, the estimate for the dummy indicating that the workers herself answered the survey has a negative and significant effect on the probability that her wage change is measured with error, as would be expected. This dummy also has a negative effect on the variance of the measurement error, but it is not significant.

Using these estimates, we obtain the parameters of DNWR and DRWR shown in Table 3. We report all parameters year by year to see their evolution over time.The first three columns show the probabilities of being in each of the wage regimes. Column 1 shows that between 10 and 17 percent of salaried job stayers in the private sector are subject to DNWR, whereas between 82 and 90 percent of them are subject to DRWR. Thus, real rigidites are much more important during the whole period than nominal ones. However, the probability of being in the nominal regime increases slightly over time, consistent with the descriptive evidence in Figures 1 to 3 and the decrease in inflation during the period. Note that the estimated probability of being in the

nominal regime is also larger than the spike at zero shown in Figures 1 and 2. This is because the model accounts for measurement error that might make nominal wages appear more flexible, by misclassifying small changes around zero as actual changes instead of freezes. Column 3 shows that the probability of being in the flexible regime is very small and almost constant throughout the period.

Column 5 shows the estimated focal point for wage negotiations, which decreases steadily from 13 percent in 1996 to 1-2 percent in 2009-2011. This decline is probably explained by the decrease in inflation during this period. Later, we show in a graph how the focal point relates to past inflation and the change in the minimum wage. Column 5 shows that about 56 percent of wage changes are measured with error.

Recall that a given observation can be in the nominal or real regime without necessarily being constrained. Columns 6 and 7 show the joint probabilities of being in the nominal and real regime, respectively, and being constrained, and columns 8 and 9 show the conditional probabilities of being contrained given that the observation belongs to a given wage regime. Overall, columns 6 to 9 show that most of the observations in a given regime are constrained in any given year.

To see more clearly how these wage rigitidites parameters have evolved over time and their potential correlation with the inflation rate, in Figure 6 we report the probabilities of being in the nominal and real regimes (columns 1 and 2 in Table 3) together with the annual inflation rate. All variables are normalized to 100 in 1996. The shaded areas are recession periods. Figure 6 shows that inflation decreased consistently since 1996, reached one-digit levels in 2001 and remained relatively stable after 2003. The graph also shows that starting in 1999, the probability of being in the real regime decreases slightly, and it dips in 2009. Conversely, also starting in 1999, as inflation resumed its fall, the probability of being in the nominal regime increased sharply until 2004, decreased a little bit between 2005 and 2009, and then jumped after the 2009 recession. In summary, Figure 6 shows that, as found by some previous studies, as inflation decreases DRWR also decrease and DNWR increase, and that the latter become more acute during recessions in which inflation is also low. However, recall from Table 3 that in terms of proportions, DRWR are still the most important for the workers in our sample.

Figures 7 and 8 show the probabilities of being in the nominal and real regimes, together with the joint probability of being in that regime and being constrained. As seen before in Table 3, most of the observations in each of these regimes are constrained. However, for both of them, the probability of being also constrained increases during

recessions, as seen in the narrowing of the vertical distance between P(N) and P(N&C) in Figure 7 and the corresponding probabilities for the real regime in Figure 8. In particular, Figure 7 shows that the distance between those two probabilites for the nominal regime closes the most after the 2009 recession, which reinforces the idea that nominal rigidities became particularly acute during this last crisis.

Figure 9 shows the evolution of the focal point for wage negotiations over the period. We plot the point estimate in each year, together with its 95 percent confidence interval. The figure also plots the lagged values of the annual inflation rate, the change in the minimum wage and the core inflation trend.[5] The focal point decreased from 1999 to 2004 as inflation did, but stayed above lagged inflation, the minimum wage change and the core inflation trend between1998 to 2002. Starting in 2003, the same year that the Mexican central bank officially adopted inflation targeting, the confidence interval of focal point includes the lagged values of these three variables until 2008. After 2008, the focal point of wage negotiations is below lagged inflation, the minimum wage change and the core inflation trend. In addition, its point estimate is close to zero (see also Table 3) and its confidence interval actually includes zero. This might be due to the 2009 recession, which caused an increase in unemployment in Mexico, thus lowering the focal point of wage negotiations to almost zero. In fact, given that its confidence interval includes zero, we cannot reject that during the Great Recession the focal point was zero wage change. This, together with the jump in the probability of being in the nominal regime, reinforces the idea that DNWR became particularly acute during the latest recession in Mexico. So, even if the probability of being in the real regime remained relatively high in 2009-2010, those workers in that regime had their wages indexed to a focal point not statistically different from zero.

To estimate the correlation between our estimated focal point with the inflation rate and the change in the minimum wage, we ran first-differences OLS regressions.[6] Given that we have few observations (13 years), these results must be interpreted merely as suggestive correlations. Table 4 shows the results of adding these variables, one at a time. Across columns, the focal point had the highest positive correlation with the lagged change in the minimum wage (0.71-0.79), whereas the correlation with the inflation rate is not significant at 5 percent. This suggests,that although the behavior

[5] Figure A1 in the appendix presents a similar graph, but using the current values of the inflation measures and the change in the minimum wage.

[6] We tested whether each of the variables, and their first differences, were stationary using Dickey-Fuller tests. The original variables are not stationary, but their first-differences are.

of the general inflation and the change in the minimum wage are similar, especially for the later years, the minimum wage is a relatively stronger reference point for other wage changes in the Mexican labor market.

7 Robustness checks

We conduct several estimations to check the robustness of our main results. First, we re-estimate the model using the survey sampling weights. Second, we use the hourly wage calculated using the hours worked last week, instead of the usual hours worked. Figure 10 shows the probability of being in the real regime for our main estimation and for the two alternative exercises just described. Some differences can be observed, but they are relatively small. For instance, using the last week's wage yields a slightly higher proportion of workers in the real regime compared to our main results, but the average difference is about 0.015 for the whole period. Using sampling weights in the estimation also yields slightly different results, but the three estimates are fairly close to each other and behave similarly for most years.The estimated probabilities of the other regimes -nominal and flexible- are also comparable across these estimations, so they are omitted for brevity. Figure 11 shows that the corresponding estimates of the focal point obtained in these three exercises are also similar. Once again, using sampling weights in the estimation seems to affect the results a bit more than changing the wage variable, but the differences are small.

As explained before, in our main estimation we impose no specific value for the focal point, so that it is estimated jointly with the regime probabilities. As an additional check, we re-estimate the model imposing either the lagged change in the minimum wage or the lagged inflation rate as focal points and obtain the regime probabilities. Figure 12 shows our main results for the probability of being in the real regime in comparison to these estimations. Given that in these alternative checks the focal point is imposed, the resulting estimate for P(R) is the proportion of wage changes that are subject to that particular indexation point. As shown in Figure 12, the probability of being in the real regime when the focal point is the change in the minimum wage is almost identical (above 0.80) to that of our main results. This is perhaps not surprising given the high correlation between this variable and our main estimate for the focal point, shown in Table 4. In contrast, the proportion of wage changes subject to the inflation rate is lower, between 0.32 to 0.65, depending on the year. This confirms that

the change in the minimum wage is relatively more important than the inflation rate as a reference point for wage changes.

Finally, we also re-estimated the model (i) using monthly earnings rather than the hourly wage, (ii) using the entire sample of cities available in each year (rather than only those that consistently enter the whole period), and (iii) introducing city-level fixed effects in the estimation. These additional checks, not shown but available upon request, yield similar results, except for (i). Using monthly earnings yields a lower probability of being in the real regime, and a larger one for the nominal regime. However, the focal point obtained from (i) is not comparable with the variables that are thought to have influence in wage negotiations, like inflation measures or the change in the minimum wage.

8 Discussion

In summary, our results suggest that for our sample of salaried, private-sector job stayers, DRWR are the most prevalent in Mexico. Our estimated fraction of wage changes subject to DRWR is higher than the one estimated for Uruguay and Brazil by Messina and Sanz-de-Galdeano (2014), and similar to that estimated by similar studies for some European countries. In addition, we find that the extent of such rigidities did not change significantly over the period 1996-2011, even though inflation decreased. Such persistence of DRWR in a low-inflation context is mostly associated in the literature to the labor institutions and the power of labor unions in a given country. In Mexico, the labor law remained practically constant throughout the period, changing substantially only in 2012, which would be consistent with the little change observed in DRWR. In addition, in Mexico the minimum wage is used as a reference price in the law for many purposes, which affects not only workers who are actually earning the minimum wage. These factors make our estimates for DRWR plausible. Regarding DNWR, we do find that, even though they affect a relatively lower fraction of workers in our sample, they increase as inflation decreases, and become particularly acute during the 2009 recession, as would be expected.

Additional evidence on the plausibility of our estimates is presented in Figure 13, where we plot our estimate of the focal point with the sum of inflation and the change in labor productivity. To obtain the annual change in labor productivity we use data from two sources: the data on real Mexican gross domestic product and hours worked

used in Kehoe and Meza (2011) for 1996-2005, and the global labor productivity index (IGPL), based on hours of work, calculated by the INEGI for the period 2006-2011. We calculate the annual percentage change in the real output per work hour using these two sources.[7] As shown in Figure 13 our estimated focal point for wage negotiations is consistent with the sum of inflation and the change in labor productivity. Even though, admittedly, labor productivity growth was relatively low during these period, this confirms that it is reasonable to observe that a large fraction of wage changes are subject to our estimated focal point.

A few caveats about our results. We focus on a selected sample of salaried, private-sector job stayers. Even though this is the sample that previous literature has focused on, so we can directly compare our results with it, one should be careful before extending our findings to the all Mexican workers. In addition, the literature has found more wage rigidities among job stayers than job switchers, so our estimates might be an upper bound for the DNWR and DNWR in the Mexican labor market. We are not studying wage rigidites arising in the public sector, which is still heavily unionized. Finally, we rely on self-reported wage measures typically available in household surveys. Some previous studies that apply the econometric model of this paper use administrative records to reduce the extent of measurement error in self-reported wage measures. However, our model corrects for measurement error and it is unclear whether administrative data in Mexico truly reflects actual wage changes. Kumler, Frías and Verhoogen (2014) find evidence of subreporting in IMSS administrative records, presumably with the objective of evading social security contributions. Nevertheless, doing our analysis with IMSS administrative data would be a necessary robustness check. In addition, the ability to clearly identify job stayers and the large number of observations in such records would be of great value, especially because when inflation is low, the model has a harder time separating DNWR from DRWR and needs a large number of observations to do so.

9 Summary and conclusions

In this paper, we provide evidence on the existence and prevalence of DNWR and DRWR in the Mexican labor market during 1996-2011 using data from the ENEU and ENOE and maximum likelihood estimation.We improve upon previous studies for

[7] We use both sources of data to get the change in labor productivity for the whole period. Both datasets yield very similar in the few years that they overlap (2006-2011).

Mexico in several ways. First, we provide updated evidence on relative importance of both DNWR and DRWR. This is relevant because in recent years inflation has become lower and more stable in Mexico, which can change the relative importance of both types of rigidities, as suggested by previous literature. In addition, previous work for Mexico focuses mostly on nominal rigidities. Second, we estimate the focal point of wage negotiations within the model and account for measurement error in wage changes. Third, we look at year-to-year changes in the estimated parameters to explore their evolution over time and their correlation with the macroeconomic environment.

Our findings suggest that a much larger fraction of workers in our sample is subject to DRWR than to DNWR. This might be due to the lack of institutional changes in the labor market during this period. However, we also find that, as inflation decreased, the relative importance of DNWR increased, becoming particularly acute during the 2009 recession. Regarding the focal point for wage negotiations, we find that it decreased with inflation, but was above its lagged value until 2003, the year that the Mexican central bank adopted inflation targeting. We cannot reject that the focal point was statistically equal to the value of lagged inflation, the change in the minimum wage and the core inflation trend after 2003, but it had the highest correlation with the lagged change in the minimum wage. In 2009-2011, the focal point was not statistically different from zero, which reinforces the idea that nominal wage rigidities were particularly acute in Mexico during the latest recession.

References

[1] Akerlof, George A., William R. Dickens, and George L. Perry (1996). "The Macroeconomics of Low Inflation." *Brookings Papers on Economic Activity*, 27, 1.76.

[2] Altonji, Joseph G. and Paul J. Devereux, (2000) "The Extent and Consequences of Downward Nominal Wage Rigidity," *Research in Labor Economics*, 19, 383-431.

[3] Dickens, William T., Lorenz Goette, Erica L. Groshen, Steinar Holden, Julian Messina, Mark E. Schweitzer, Jarkko Turunen, and Melanie E. Ward (2007). "How Wages Change: Micro Evidence from the International Wage Flexibility Project." *Journal of Economic Perspectives* 21 (2): 195–214.

[4] Bauer, Thomas, Holger Bonin, and Uwe Sunde (2007). "Real and Nominal Wage Rigidities and the Rate of Inflation: Evidence from West German Microdata". *Economic Journal*. 117, F499.F507.

[5] Card, David and Dean Hyslop (1997). "Does Inflation Grease the Wheels of the Labor Market? in Reducing Inflation: Motivation and Strategy", NBER Chapters, 71.122.

[6] Castellanos, Sara G (2005). "La rigidez a la baja de los salarios nominales en México: Una medición con datos a nivel individual". *Monetaria*, XXVIII, 1, 35.75.

[7] Castellanos, Sara G., Rodrigo Garcia-Verdu, and David S. Kaplan (2004). "Nominal wage rigidities in Mexico: evidence from social security records. *Journal of Development Economics*, 75, 507.533.

[8] Goette, Lorenz, Uwe Sunde, and Thomas Bauer (2007). "Wage Rigidity: Measurement, Causes and Consequences. *Economic Journal*, 117, F499.F507.

[9] Goette, Lorenz, Uwe Sunde, and Thomas Bauer (2007). "Technical Appendix for Real and Nominal Wage Rigidities and the Rate of Inflation: Evidence from West German Micro Data", available at: http://www.iza.org/files/EJ-WageRigidityFeature-TechApp.zip.

[10] Kahn, Shulamit (1997). "Evidence of Nominal Wage Stickiness from Microdata." *American Economic Review*, 87, 993.1008.

[11] Kehoe, Timothy J. y Felipe Meza (2011), "Catch-up Growth Followed by Stagnation: Mexico, 1950-2010", *Latin American Journal of Economics*, 48(2), 227-268.

[12] Kumler, Todd Johnson, Eric A Verhoogen, and Judith Frias (2012). "Enlisting-Workers in Monitoring Firms: Payroll Tax Compliance in Mexico". Mimeo

[13] Messina, Julián, and Anna Sanz-de-Galdeano (2014). "Wage Rigidity and Disinflation in Emerging Countries." *American Economic Journal: Macroeconomics*, 6(1): 102-33.

Table 1. Annual changes in wages and work hours for estimation sample. Full-time salaried workers who are job stayers in selected cities

	ENEU 1996-2004		ENOE 2006-2011	
	Mean	St. Dev	Mean	St. Dev
Annual change in nominal hourly wage (usual work hours)	0.14	0.45	0.04	0.42
Annual change in nominal hourly wage (hours worked last week)	0.15	0.46	0.04	0.44
Annual change in monthly nominal earnings	0.13	0.42	0.04	0.39
Annual change in usual work hours	-0.02	0.21	0.00	0.18
Annual change in hours worked last week	-0.03	0.24	0.00	0.23
Number of observations	50466		14623	

Note: In both periods, the sample consists of salaried workers in the private sector who work full time (30+ hours per week) and who did not change their industry and occupation between their first and fifth survey interview (a year). Only the 27 cities that were surveyed consistently during the whole period 1996-2011 are included.

Table 2. Estimates of the Notional Wage Change Equation 1996-2011

	Coefficient
Notional Wage Change	
Age	-0.024***
	(0.008)
Age^2	0.000***
	(0.)
Education (years)	0.014
	(0.015)
Education^2	0
	(0.001)
Female	-0.115***
	(0.033)
Formal job (=1 if job is covered by IMSS, =0 otw)	-0.168***
	(0.048)
Contract (=1 if the worker has a written contract, 0 otw)	-0.143***
	(0.052)
Industry dummies	Yes
Firm size dummies	Yes
Occupation dummies	Yes
Year dummies	Yes
City dummies	Yes
P(DNWR)	
Year dummies	Yes
P(DRWR)	
Year dummies	Yes
Focal point	
Year dummies	Yes
Variance of wages	
Year dummies	Yes
Variance of focal point	
Year dummies	Yes
Probability of wages measured with error	
Worker herself answered survey	-0.146***
	(0.033)
Year dummies	No
Variance of measurement error	
Worker herself answered survey	-0.009
	(0.008)
Year dummies	No
Number of observations	66080

Note: Robust standard errors in parenthesis. The estimation sample consists of salaried workers in the private sector who work full time (30+ hours per week) and who did not change their industry and occupation between their first and fifth survey interview (a year) for 1996-2011. Only the 27 cities that were surveyed consistently during that period are included.
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Parameter estimates for downward nominal and real wage rigidities 1996-2001

Year	Prob(NR) (1)	Prob(RR) (2)	Prob(FR) (3)	Focal point of wage negotiations (4)	Prob (ME) (5)	Prob (C&NR) (6)	Prob (C&RR) (7)	Prob (C|NR) (8)	Prob (C|RR) (9)
1996	0.12	0.87	0.01	0.13	0.56	0.11	0.80	0.90	0.91
1997	0.10	0.89	0.01	0.18	0.56	0.09	0.80	0.87	0.90
1998	0.10	0.89	0.01	0.17	0.56	0.08	0.80	0.86	0.89
1999	0.09	0.90	0.01	0.18	0.56	0.08	0.83	0.89	0.92
2000	0.11	0.88	0.02	0.16	0.56	0.09	0.77	0.85	0.88
2001	0.10	0.88	0.01	0.14	0.56	0.09	0.80	0.89	0.91
2002	0.14	0.85	0.01	0.09	0.56	0.12	0.77	0.89	0.90
2003	0.14	0.85	0.00	0.06	0.56	0.13	0.78	0.91	0.91
2004	0.16	0.83	0.01	0.04	0.56	0.14	0.73	0.88	0.88
2006	0.15	0.84	0.00	0.06	0.56	0.14	0.77	0.91	0.92
2007	0.15	0.85	0.00	0.04	0.56	0.14	0.80	0.94	0.94
2008	0.14	0.85	0.01	0.02	0.56	0.13	0.80	0.94	0.94
2009	0.14	0.85	0.01	0.01	0.56	0.13	0.81	0.95	0.95
2010	0.17	0.82	0.01	0.01	0.56	0.16	0.76	0.94	0.93
2011	0.14	0.85	0.01	0.02	0.56	0.13	0.80	0.93	0.93

Note: Sample: salaried workers in the private sector who work full time (30+ hours per week) and who did not change their industry and occupation between their first and fifth survey interview (a year). Only the 27 cities that were surveyed consistently during the whole period 1996-2011 are included. Columns 1 to 3 report the probability of being in the nominal, real and flexible wage regimes for a given worker, respectively. Column 4 reports the estimated indexation point. Column 5 reports the probability that wage changes are measured with error. Columns 6 and 7 report the probability of a wage change being constrained given that the worker belongs to the nominal or real wage regimes, respectively. Columns 8 and 9 report the joint probability of being constrained and in the nominal and real regime, respectively.

Table 4: First-differences regressions of the estimated focal point on inflation and the change in the minimum wage

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Change in the MW (t)	-0.739				-0.187	-0.685***	-0.543
	(0.531)				(0.652)	(0.194)	(0.588)
Inflation (t)		-0.398*			-0.340		-0.028
		(0.211)			(0.325)		(0.238)
Change in the MW (t-1)			0.733***			0.712***	0.789***
			(0.223)			(0.124)	(0.185)
Inflation (t-1)				0.129			-0.100
				(0.146)			(0.155)
Constant	-0.019**	-0.017**	-0.003	-0.007	-0.019**	-0.012***	-0.012**
	(0.007)	(0.006)	(0.005)	(0.008)	(0.006)	(0.004)	(0.004)
Observations	13	13	13	13	13	13	13
Adjusted R sq	0.148	0.272	0.502	-0.0516	0.208	0.677	0.612
F	1.939	3.544	10.78	0.781	1.858	62.35	37.86

Robust standard errors in parentheses

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

Table A1. Descriptive statistics for estimation sample. Full-time salaried workers who are job stayers in selected cities

	ENEU 1996-2004		ENOE 2006-2011	
	Mean	St. Dev	Mean	St. Dev
Age	32.99	10.79	35.12	11.25
Years of education	8.57	3.98	9.47	3.86
Female	0.41	0.49	0.39	0.49
Formal job (=1 if job is covered by IMSS, =0 otw)	0.67	0.47	0.68	0.47
Industry dummies				
Agriculture, fishing and hunting	0.01	0.09	0.00	0.02
Mining	0.00	0.05	0.00	0.05
Electricity, natural gas and water	0.00	0.02	0.00	0.02
Manufacturing	0.25	0.43	0.23	0.42
Construction	0.07	0.26	0.13	0.34
Wholesale, retail, restaurants and hotels	0.31	0.46	0.31	0.46
Transportation, storage and communications	0.06	0.23	0.05	0.22
Finance, insurance and real state	0.02	0.14	0.02	0.15
Services	0.29	0.45	0.25	0.43
Government	0.00	0.00	0.00	0.00
Firm size dummies				
5 or fewer employees	0.31	0.46	0.29	0.46
6-10 employees	0.08	0.28	0.13	0.34
11-15 employees	0.05	0.21	0.07	0.26
16-50 employees	0.14	0.35	0.22	0.41
51-100 employees	0.07	0.25	0.10	0.30
101-250 employees	0.04	0.20	0.08	0.27
251 or more employees	0.32	0.47	0.10	0.31
Occupation dummies				
Professionals	0.03	0.18	0.04	0.19
Technicians	0.04	0.20	0.04	0.20
Education workers	0.01	0.10	0.02	0.14
Workers in the arts, entertainment and sports	0.01	0.08	0.01	0.08
Officers and chief executives	0.02	0.14	0.01	0.11
Workers in agriculture	0.00	0.07	0.00	0.02
Production supervisors	0.02	0.15	0.02	0.13
Production workers and operators	0.32	0.47	0.41	0.49
Administrative supervisors and managers	0.02	0.14	0.01	0.12
Administrative employees	0.12	0.32	0.12	0.33
Traders and sellers in establishments	0.15	0.35	0.15	0.36
Street vendors	0.00	0.03	0.00	0.04
Workers in personal services	0.10	0.29	0.11	0.32
Workers in domestic services	0.12	0.32	0.00	0.03
Security and surveillance workers (guards)	0.04	0.19	0.06	0.23
Other	0.00	0.00	0.00	0.00
Worker herself answered survey	0.27	0.44	0.30	0.46
Contract (=1 if the worker has a written contract, 0 otw)	0.66	0.48	0.60	0.49
Hours of work per week (usual)	48.76	9.44	50.09	10.01
Hours of work in the previous week	48.40	9.81	49.36	10.79
Real hourly wage (usual work hours in YEAR pesos)	21.08	27.64	24.06	19.31
Real hourly wage (hours worked previous week in YEAR pesos)	21.29	27.86	24.79	21.04
Number of observations	50466		14623	

Note: In both periods, the estimation sample consists of salaried workers in the private sector who work full time (30+ hours per week) and who did not change their industry and occupation between their first and fifth survey interview (a year). Only the 27 cities that were surveyed consistently during the whole period 1996-2011 are included. Real wages were calculated using the Mexican Consumer Price Index (INPC).

Table A2. Differences in means between the sample of selected cities and the complete survey sample. Full-time salaried workers who are job stayers

	ENEU 1996-2004		ENOE 2006-2011 (national sample)	
	Difference in means	P-value	Difference in means	P-value
Age	0.005	0.929	-0.663	0.000
Years of education	-1.493	0.743	-50.104	0.000
Female	-0.023	0.310	-0.328	0.000
Formal job (=1 if job is covered by IMSS, =0 otw)	-0.623	0.151	-6.413	0.000
Industry dummies				
Agriculture, fishing and hunting	0.001	0.000	0.001	0.000
Mining	0.004	0.000	0.004	0.000
Electricity, natural gas and water	0.000	0.416	0.000	0.416
Manufacturing	0.005	0.264	0.005	0.264
Construction	0.034	0.000	0.034	0.000
Wholesale, retail, restaurants and hotels	-0.009	0.063	-0.009	0.063
Transportation, storage and communications	-0.003	0.207	-0.003	0.207
Finance, insurance and real state	-0.002	0.221	-0.002	0.221
Services	-0.031	0.000	-0.031	0.000
Government	0.000	0.000	0.000	0.000
Firm size dummies				
5 or fewer employees	0.050	0.000	0.050	0.000
6-10 employees	0.001	0.738	0.001	0.738
11-15 employees	-0.004	0.090	-0.004	0.090
16-50 employees	-0.021	0.000	-0.021	0.000
51-100 employees	-0.016	0.000	-0.016	0.000
101-250 employees	-0.009	0.002	-0.009	0.002
251 or more employees	-0.002	0.436	-0.002	0.436
Occupation dummies				
Professionals	-0.008	0.000	-0.008	0.000
Technicians	-0.003	0.144	-0.003	0.144
Education workers	-0.003	0.063	-0.003	0.063
Workers in the arts, entertainment and sports	-0.001	0.062	-0.001	0.062
Officers and chief executives	-0.002	0.036	-0.002	0.036
Workers in agriculture	0.001	0.001	0.001	0.001
Production supervisors	-0.002	0.188	-0.002	0.188
Production workers and operators	0.046	0.000	0.046	0.000
Administrative supervisors and managers	-0.003	0.005	-0.003	0.005
Administrative employees	-0.012	0.000	-0.012	0.000
Traders and sellers in establishments	0.004	0.322	0.004	0.322
Street vendors	0.000	0.293	0.000	0.293
Workers in personal services	-0.009	0.007	-0.009	0.007
Workers in domestic services	0.000	0.522	0.000	0.522
Security and surveillance workers (guards)	-0.008	0.001	-0.008	0.001
Other	0.000	0.000	0.000	0.000
Worker herself answered survey	-0.008	0.105	-0.008	0.105
Contract (=1 if the worker has a written contract, 0 otw)	-0.060	0.000	-0.060	0.000
Hours of work per week (usual)	0.357	0.001	0.357	0.001
Hours of work in the previous week	0.364	0.001	0.364	0.001
Real hourly wage (usual work hours in YEAR pesos)	-0.956	0.000	-0.956	0.000
Real hourly wage (hours worked previous week in YEAR pesos)	-0.972	0.000	-0.972	0.001

Note: Difference between the mean for the whole sample of cities and the 27 cities used in the estimation, which are consistently surveyed during the period 1996-2011. In all cases, the sample is of salaried workers in the private sector who work full time (30+ hours per week) and who did not change their industry and occupation between their first and fifth survey interview (a year). The reported p-value corresponds to the test for equality in means between samples.

Figure 1: Descriptive Evidence: Histogram, High-Inflation Year

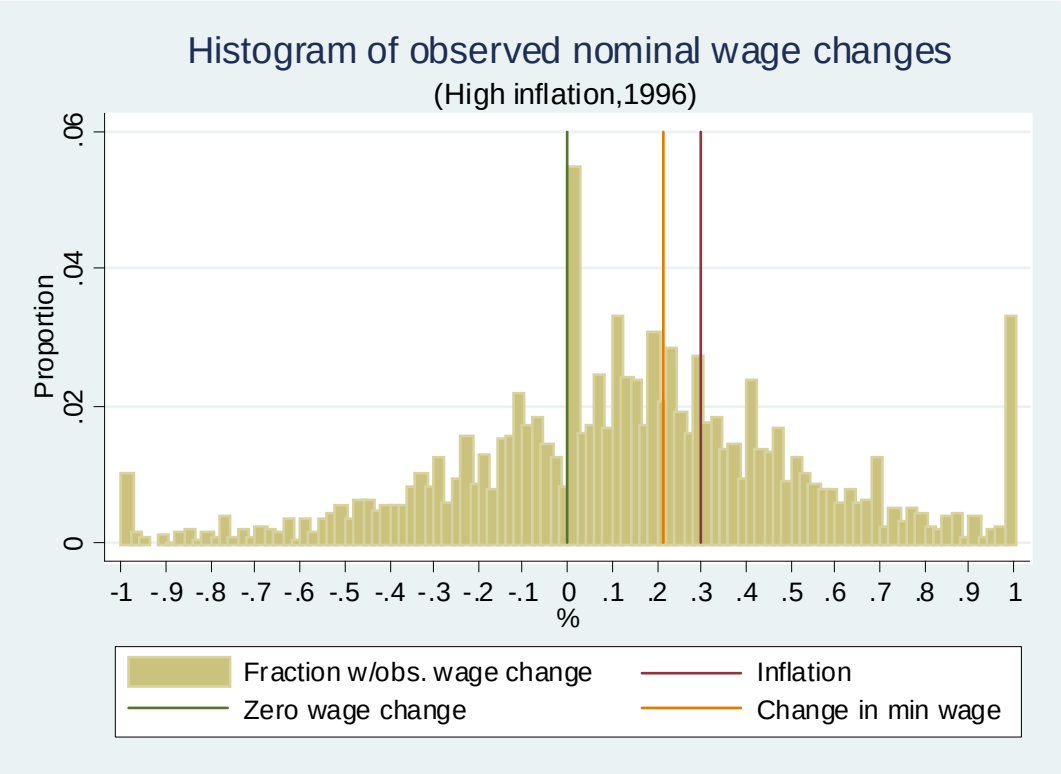

Figure 2: Descriptive Evidence: Histogram, Low-Inflation Year

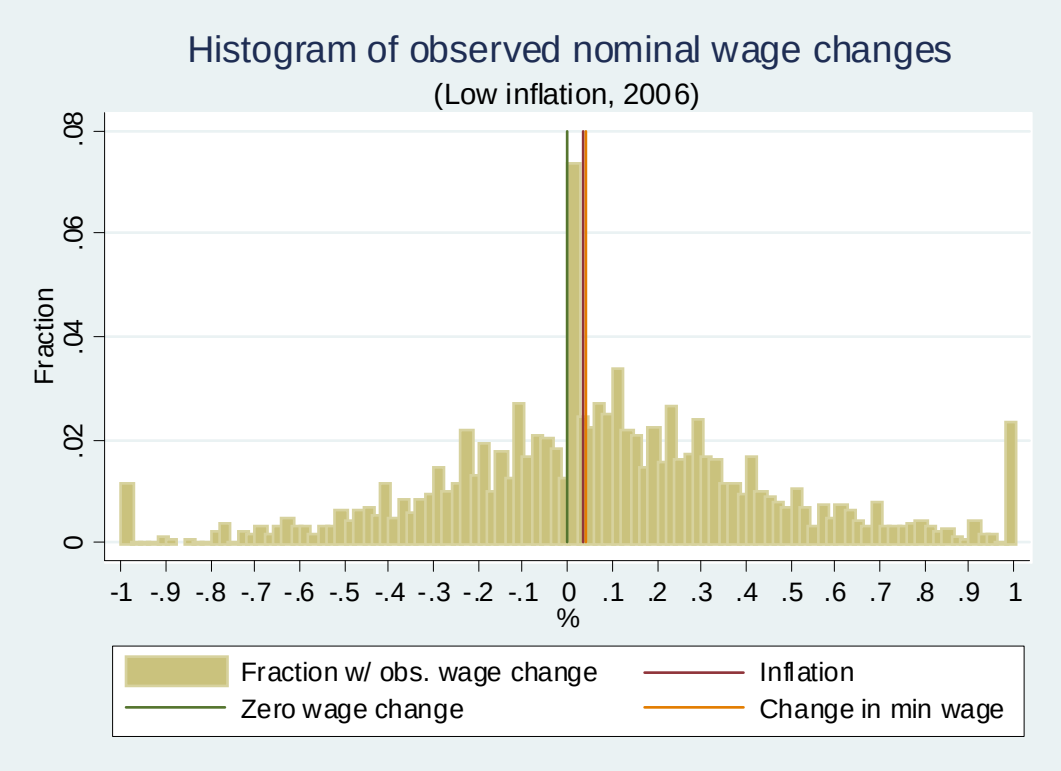

Figure 3: Fraction of Zero Wage Changes Over Time

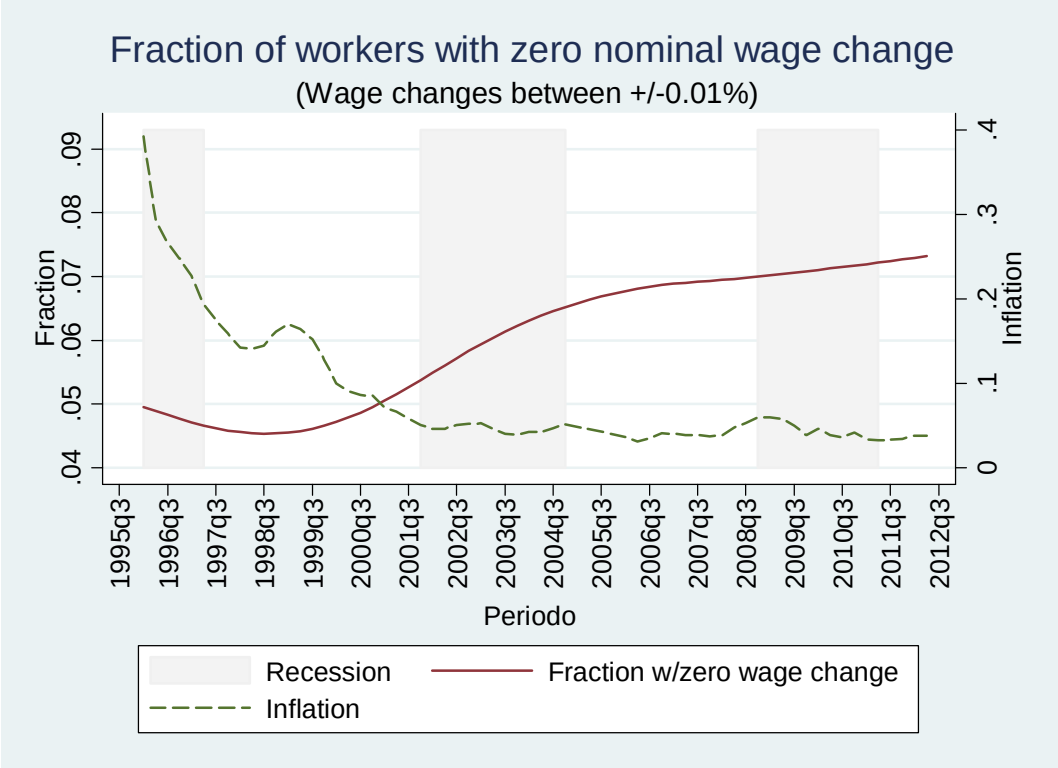

Figure 4: Performance of the model: High-inflation year

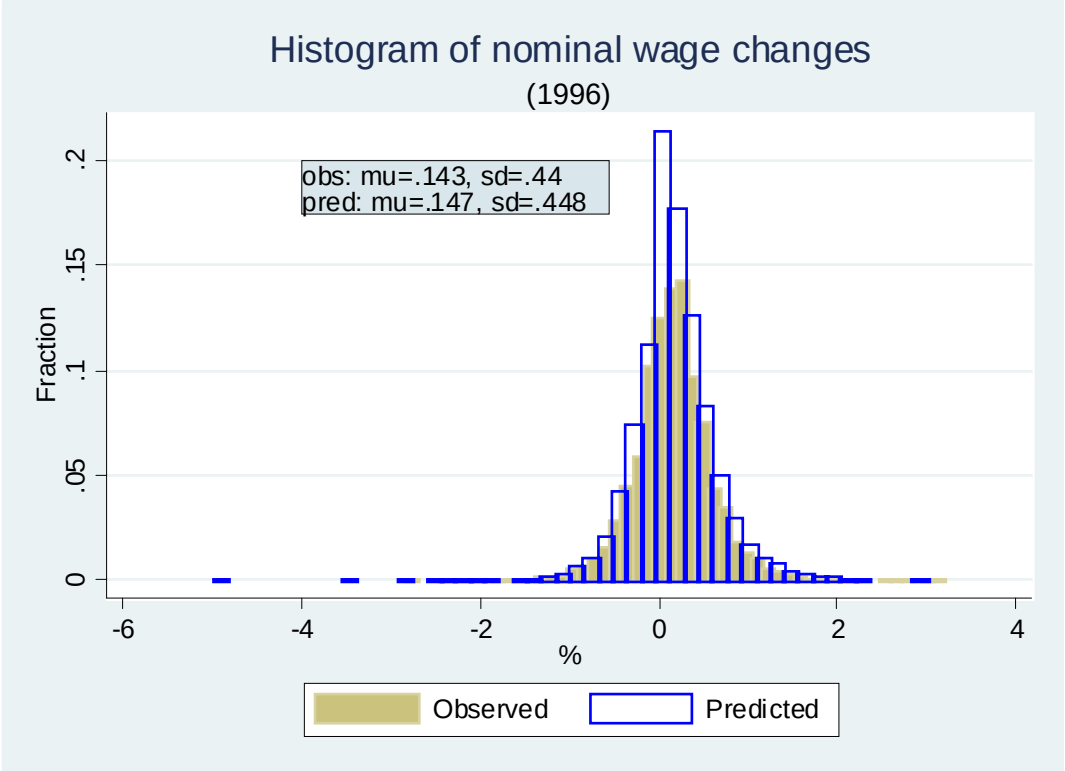

Figure 5: Performance of the model: Low-inflation year

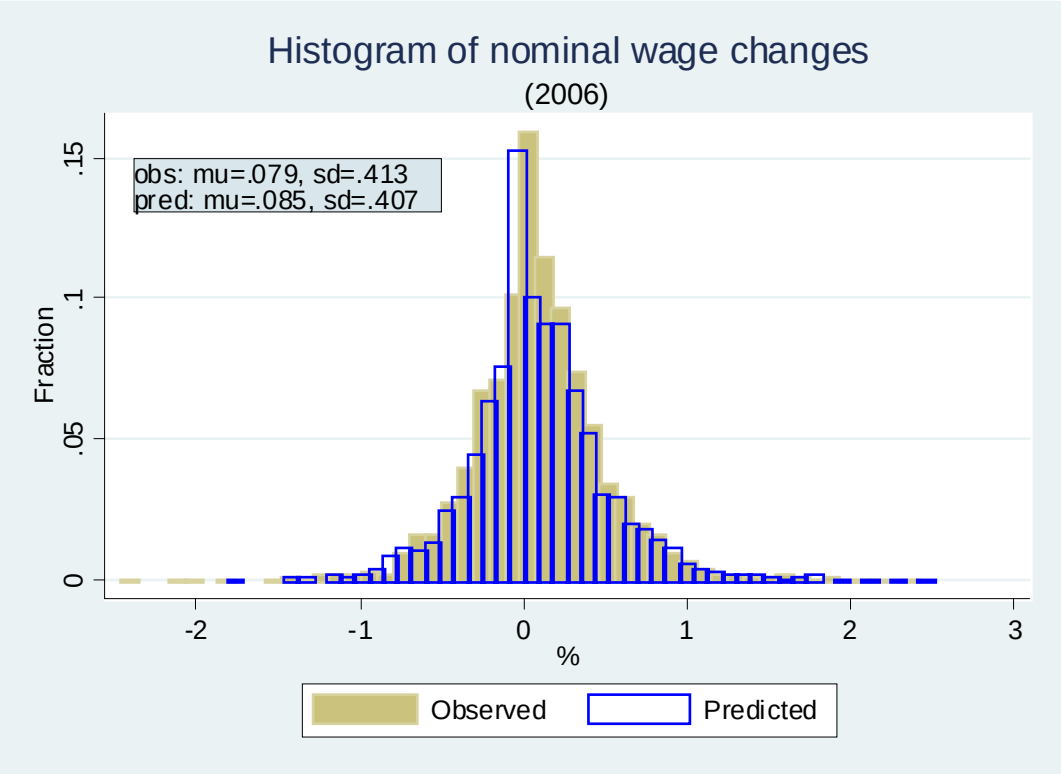

Figure 6: Regime probabilities and inflation, (Normalized, 1996=100)

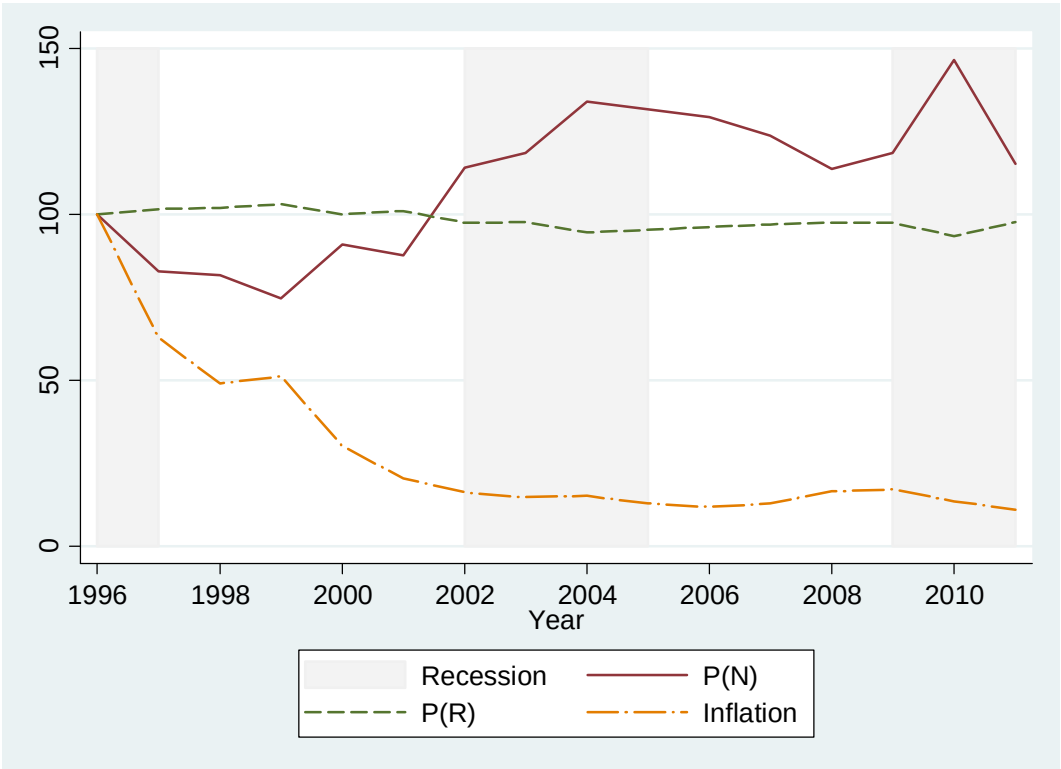

Figure 7: Nominal regime probabilities

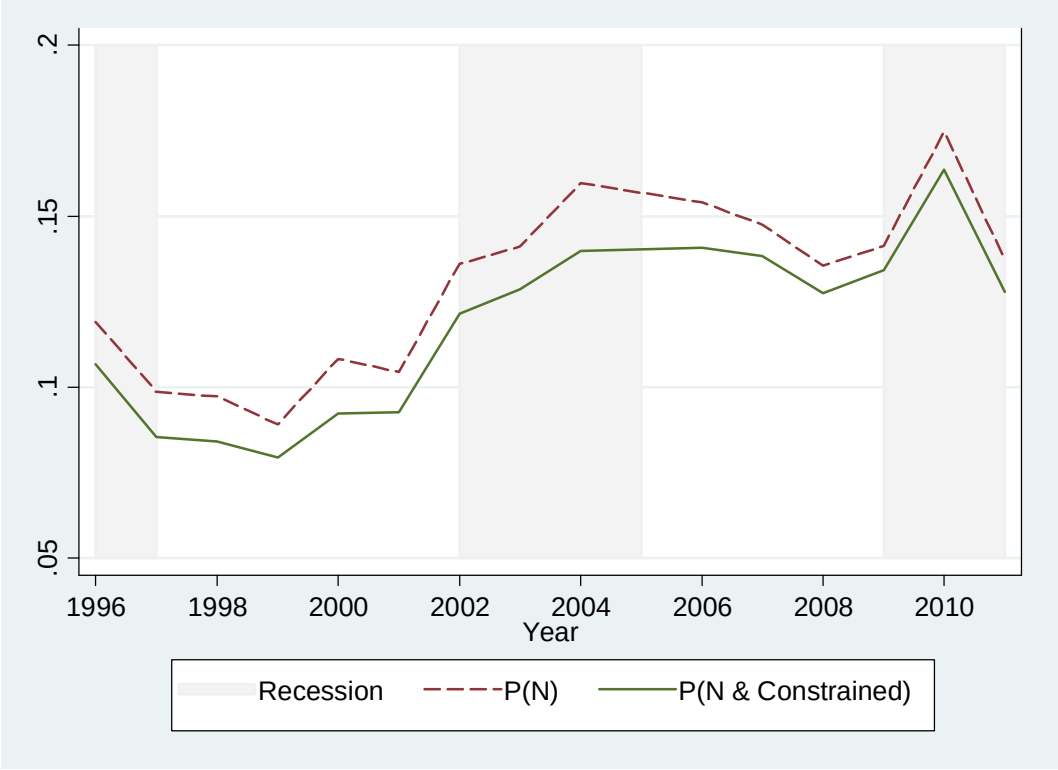

Figure 8: Real regime probabilities

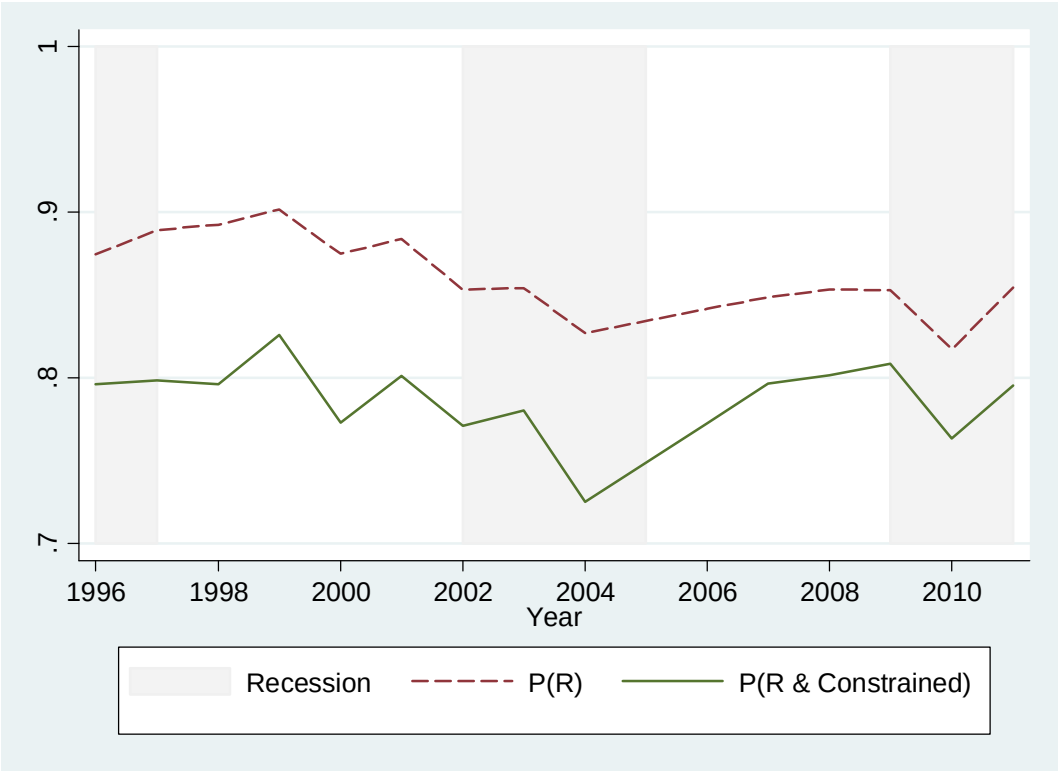

Figure 9: Focal point, inflation (t-1) and change in the minimum wage (t-1)

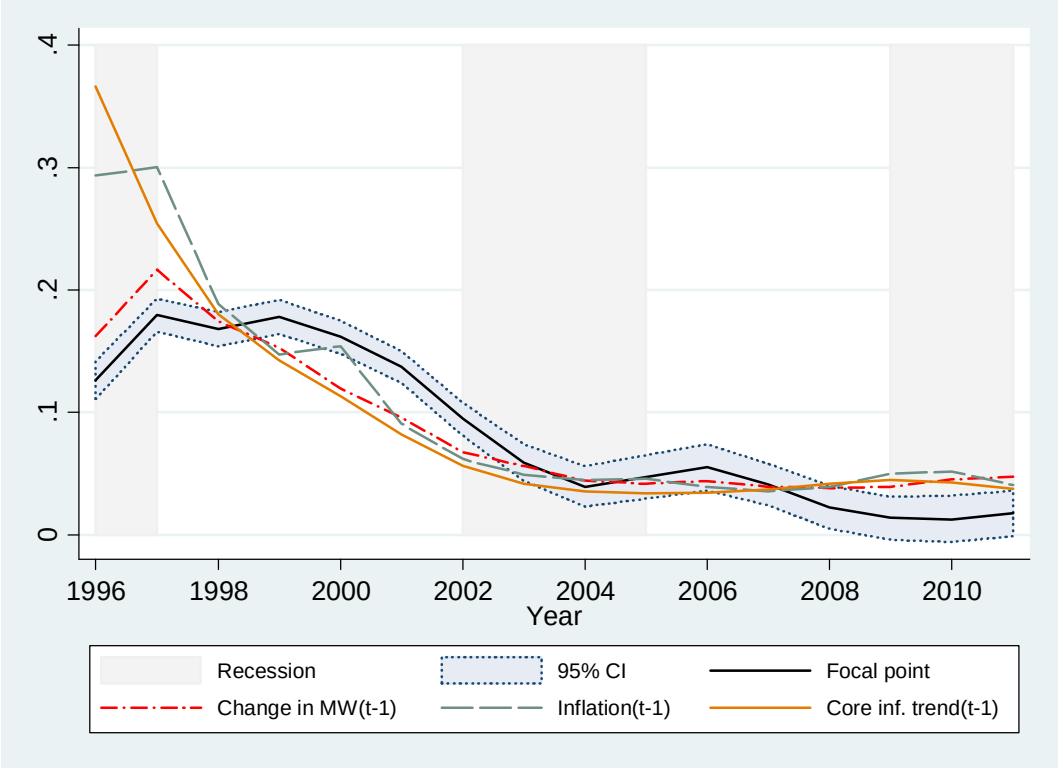

Figure 10: Probability of being in the real regime (robustness)

Figure 11: Focal point (robustness)

Figure 12: Probability of being in the real regime (focal point imposed in estimation)

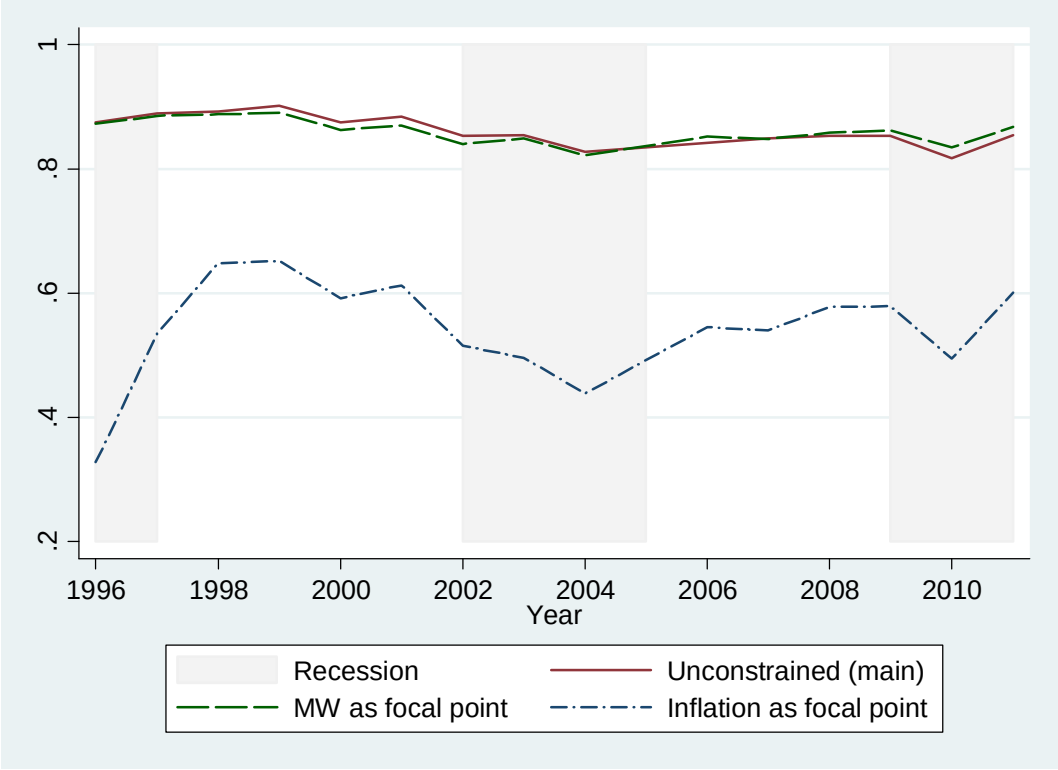

Figure 13: Focal point and [inflation+ change in labor productivity] (t-1)

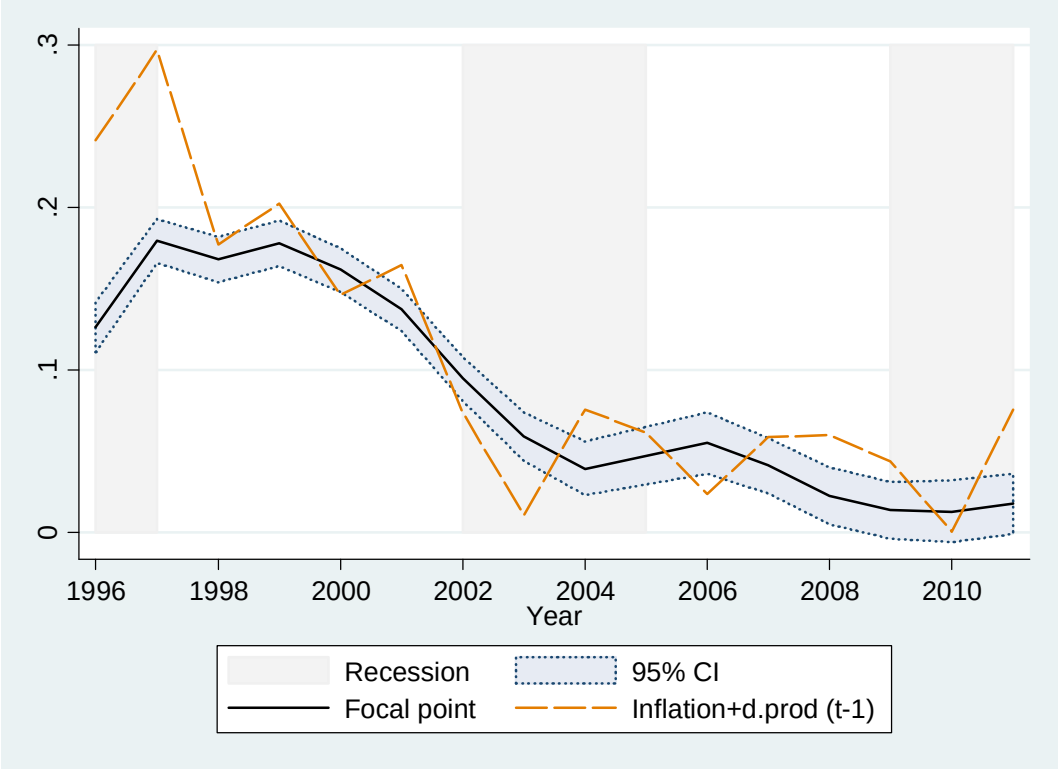

Figure A1: Focal point, inflation (t) and change in the minimum wage (t)