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"The Impact of a Minimum Wage Increase on Labour Market Outcomes: Evidence from the Northern Mexican Border"

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Abstract in english : A large informal sector and a low minimum wage have contributed to persistently high rates of inequality and poverty across Mexico. In particular, the development of cities located along the Mexico-US border has lagged behind in recent decades. The Northern Border Free Zone was implemented to counter this stagnation through economically stimulating policies, including a doubling of the minimum wage. This paper applies a Difference-in-Differences approach to estimate the impact of the minimum wage increase on low-wage workers. We find that the minimum wage significantly increased the wages of low-wage workers in both the formal and informal sector. Whilst we do not find any evidence of disemployment effects in either sector, we do find that the policy caused low-wage workers to work significantly less hours per week.

Abstract in catalan/ spanish (100 words): Altas tasas de informalidad y salarios bajos han contribuido al aumento de la pobreza y desigualdad en todo México. En particular, el desarrollo de las ciudades ubicadas a lo largo de la frontera entre México y Estados Unidos se ha visto comprometido por esta problemática. La Zona Libre de la Frontera Norte se implementó para contrarrestar este estancamiento mediante políticas de estímulo económico, incluida la duplicación del salario mínimo. En esta investigación se emplea el método de diferencias en diferencias para estimar el impacto del aumento del salario mínimo en los trabajadores con salarios bajos. Los resultados sugieren que esta política aumentó significativamente los salarios de los trabajadores con salarios bajos tanto en el sector formal como en el informal. Si bien no encontramos ninguna evidencia de efectos negativos sobre el empleo en ninguno de los sectores, sí encontramos que la política provocó que los trabajadores con salarios bajos trabajaran significativamente menos horas por semana.

Keywords in english (3): Minimum Wage, Labor Markets, Difference-In-Differences.

Keywords in catalan/ SPANISH (3): Salario Mínimo, Mercados Laborales, Diferencias en Diferencias.

The Impact of a Minimum Wage Increase on Labour Market Outcomes: Evidence from the Northern Mexican Border

Master's Project

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Abstract

A large informal sector and a low minimum wage have contributed to persistently high rates of inequality and poverty across Mexico. In particular, the development of cities located along the Mexico-US border has lagged behind in recent decades. The Northern Border Free Zone was implemented on January 1^{st} 2019 to counter this stagnation through economically stimulating policies including a doubling of the minimum wage. This paper applies a Difference-in-Differences approach to estimate the impact of the minimum wage increase on low-wage workers by comparing their labour market outcomes with those of higher-wage workers within the zone. We find that the minimum wage significantly increased the wages of low-wage workers in both the formal and informal sector. Whilst we do not find any evidence of disemployment effects in either sector, we do find that the policy caused low-wage workers to work significantly less hours per week. Finally, we find no evidence of reallocation effects between sectors.

Keywords: Minimum Wage, Labour Market Outcomes, Informality, Reallocation Effects, Mexico, Difference-In-Differences.

JEL Classifications: J20, J31, J38, J46.

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Contents

1 Introduction

The Mexican labour market is characterised by low levels of unemployment, partly sustained by a high rate of informality. Mexico is also typified by a lower minimum wage in comparison to countries at a similar stage of development. These features have contributed to high levels of inequality and poverty enduring across the country, as well as incentivising illegal migration to the United States (US). In particular, the development of cities located along the Mexico-US border has lagged behind in recent decades, impacting the millions of people that live there.

The Northern Border Free Zone (NBFZ) is comprised of 43 municipalities located within 25 kilometres of the Mexico-US border and was implemented as part of Mexico's wider development plan. Municipalities within the zone were subject to several economically stimulating policies, designed to promote development and disincentive migration to the US. In this study, we analyse the impact of an increase in the minimum wage within the NBFZ. The policy came into effect on January 1^{st} 2019, increasing the minimum wage within the zone from 88.36 MXN to 176.72 MXN per working day. This represents a 100% increase, whilst in the rest of Mexico the minimum wage rose by only 16%.

Exploiting the natural experiment created by the NBFZ leads to several possible avenues of investigation. We focus our research on evaluating the impact of the minimum wage on labour market outcomes in the formal and informal sector. Applying a Difference-in-Differences approach, we estimate the impact of the minimum wage by comparing the outcomes of higher and low-wage workers. Specifically, we estimate the policy effects on the minimum wage workers' i) earnings, ii) employment and iii) hours worked. We then extend our investigation to consider the reallocation effects of workers between the formal and informal sector. For this we use individual level panel data obtained from a survey conducted by the Mexican National Institute of Statistics and Geography.

This paper extends previous literature in several ways. First, Latin America and in particular Mexico have largely been neglected in minimum wage literature, with the vast majority of the research on minimum wage concerning the US and Europe. Second, we explore reallocation effects, which are largely under-researched. Such effects are of great importance in emerging economies with large informal sectors. Finally, the impact of the NBFZ is yet to be explored academically.

We find that the minimum wage significantly increased wages of low-wage workers in the formal and informal sector to similar extents. Whilst we do not find any evidence of disemployment effects in either sector, we find a significant reduction in the hours worked, regardless of the sector, which may reflect firms' response to higher labour costs. These findings suggest firms in the formal and informal sector compete for low-wage workers, which results in an increase in wages of informal workers. In line with this hypothesis, we find no evidence of reallocation effects between sectors.

The rest of this paper is organised as follows: In Section 2 we review previous literature on minimum wage policies, with focus on Latin American labour markets. Next, in Section 3 we present our data, the economic context and the scope of the policy. In Section 4 we present our main empirical methodology, before presenting our results and robustness analysis in Sections 5 and 6, respectively. Then, in Section 7, we highlight the limitations of our study before discussing our conclusions in Section 8.

2 Literature Review

The employment effects of minimum wages are one of the most disputed topics in labour economics, providing a source of fierce debate in both academic and political spheres. Despite almost three decades passing since Card and Krueger's (1994) seminal paper, consensus on the issue remains far from being reached. Standard neoclassical theory predicts that an increase in the minimum wage will result in an excess of labour supply which in turn will result in a reduction of employment, assuming that the minimum wage is set above the equilibrium wage level. However, if we are willing to depart from the assumption of perfect competition, it is possible to predict that the minimum wage may not impact employment negatively (Stigler (1946)). Some theoretical models that incorporate labour market frictions even predict positive employment effects (Rebitzer and Taylor, 1995; Bhaskar and To, 1999; Flinn, 2006).

The predictions of the standard neoclassical model were not questioned until the 1990's when Card and Krueger's (1994) aforementioned paper investigated the impact of an increase in the minimum wage in New Jersey on employment in fast food restaurants. The study found no disemployment effects and even some evidence of positive employment effects. Despite numerous critiques, the paper inspired a new wave of research in the field. Exploiting a similar approach, Dube et al. (2010) found no negative effects of minimum wages on earnings and employment across a range of low-wage sectors. Moreover, they suggested that large disemployment effects obtained using traditional specifications were due to differences in employment trends unrelated to minimum wage policies. However, empirical support also exists for the disemployment effects predicted by standard neoclassical theory. In one of the most extensive reviews of literature in this field, Neumark and Wascher (2008) concluded that a rise in the minimum wage reduces the employment of less skilled workers. More recently, Sabia et al. (2012) estimated an employment elasticity with respect to the minimum wage of -0.7. Robust to numerous specifications, this result provides evidence that the adverse effects of the minimum wage may be greater for certain groups than Neumark and Wascher's consensus.

Many studies highlight that minimum wage effects can spill over and indirectly affect those workers earning above the minimum wage (Gregory and Zierahn, 2022). Modern techniques are often used to deal with this type of spillover effects resulting from minimum wage policy. Cengiz et al. (2019) developed an empirical strategy that disaggregates the total employment effect into separate wage 'bins', before estimating the effect of the minimum wage on employment for each wage bin separately. This approach also allowed them to study the changes in the upper part of the wage distribution, where large changes could suggest estimates being contaminated by other shocks. Using this strategy, they found no decline in the number of lower-wage jobs in the period considered. Similarly, Dustmann et al. (2021) assign workers in their sample to wage bins. However, from here, they categorised bins into three groups: treated; partially treated; and control. By defining those earning just above the new minimum wage as partially treated, they were able to exclude those who may experience significant spillover effects of the policy from their control group. Using this technique, they found that the minimum wage raised wages but did not lower employment.

The composition of Latin American labour markets tend to differ from those in the US and Europe and so the effects of minimum wage policy may differ from that observed in the majority of literature. In particular, the effect of the minimum wage on the informal sector is often overlooked by the literature. Exploiting a fall in the real minimum wage in Mexico, Bell (1997) found no evidence of disemployment effects in the formal sector. Bell argued that the minimum wage was very low, making it ineffective in the formal sector and proposed instead that it may have had a larger effect in the informal sector where workers tend to be paid less. This could have been due to the lighthouse effect, whereby the minimum wage in the formal sector acts as a signal prompting workers in the informal sector to demand higher wages (Boeri et al., 2010). Also observing the Mexican labour market, Vázquez et al. (2017) explored the impact of an equalisation of minimum wage across states. Whilst they found that the minimum wage did not produce any disemployment effects, they observed workers relocating from the informal sector to the formal sector. Indeed, their analysis revealed that the probability of being an informal worker fell among those affected. Derenoncourt and Montialoux (2021) found no evidence of reallocation effects when exploring the impact of the minimum wage in Brazil. They explained this by demonstrating a substantial bunching of the minimum wage in the informal sector after the policy change – stating that these results could be rationalised in a context where the minimum wage strongly spills over into the informal sector.

It is important to clarify the channels through which this paper extends previous literature. Whilst it is true that the empirical study of minimum wages is very well-established, currently a paucity of research into the impact of the policy across Latin America and in particular Mexico exists. This is why we consider adding to the literature on the impact of the policy in this region specifically to be valuable. Moreover, the impact of the NBFZ is yet to be explored academically. Third, the potential reallocation effects of minimum wages are currently under-researched. In developing and emerging economies, where the proportion of workers employed informally tends to be higher, such effects are of great political importance. Our exploration of reallocation effects therefore adds value and insights into an under-researched area of this field.

3 Background and Data

3.1 National Survey of Occupation and Employment

The dataset used in our analysis is the National Survey of Occupation and Employment (ENOE), released quarterly by the Mexican National Institute of Statistics and Geography. This survey is the main source of information on the Mexican labour market, across the formal and informal sectors. The individual level dataset is a rotating panel design, whereby a predetermined proportion of sample units are replaced at each wave of the survey. Typically, respondents are observed for five consecutive quarters, before being replaced by individuals with similar characteristics. This ensures the reliability of the information obtained, since 80% of the sample is maintained each quarter. The provision of expansion factors allows estimates produced using this dataset to represent the real distribution of the country. Whilst the survey covers all Mexican states, our focus is the NBFZ, which comprises 43 municipalities found within the six states that border the United States: Baja California, Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas.

Our primary dataset consists of individual-level data during the period 2018-2019, considering four quarters before and four after the policy implementation.[1] This leaves us with approximately 165,000 observations. The rotating panel nature of our data allows us to follow each individual only for five quarters before they are replaced. Thus, defining our time-period as explained guarantees that workers who enter the survey before the policy implementation are also observed in at least one quarter after the policy. Although this does not ensure that we can observe all the individuals before and after the policy, it guarantees this for a minimum share of individuals.[2] Likewise, the expansion of the period past 2019 is not possible as none of the individuals observed after 2019 could be observed before the policy.

3.2 Economic Context

To illustrate the socioeconomic conditions of the NBFZ, we begin our analysis by providing some descriptive statistics. Out of the 17.1 million individuals living in the 6 border states at the last quarter of 2018, 37% of them were inside the NBFZ. Within the zone, 51% of the individuals were female and the average age was 39. Additionally, the average years of education is 10 years, which means that, on average, individuals inside the NBFZ are two years short of finishing high school.

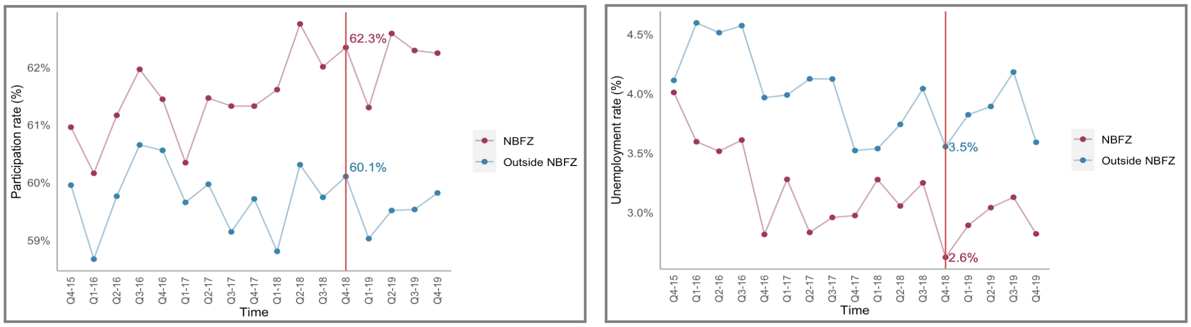
When compared to other municipalities in the border states, the NBFZ has a persistently higher participation rate as well as lower levels of unemployment.[3] Specifically, the participation rate in the NBFZ rose from 61% at the end of 2015, to above 62% right before the policy implementation. One year later, the participation rate remained at a similar level. The above can be observed in Figure 1a. Moreover, the unemployment rate, shown in Figure 1b, had a cyclical but decreasing trend from the end of 2015 to the end of 2019. Specifically, the unemployment rate was 2.6% in the last quarter of 2018, before the policy implementation, and it barely varied one year after.

[1] This dataset is a subsample obtained from the ENOE, used for our Difference-in-Differences models. For Section 3.2, Economic Context, we used a larger time span, which dates from the last quarter of 2015 to the last quarter of 2019.

[2] See Section 4.2 for a more detailed explanation of this feature.

[3] In Mexico, the minimum working age is 15 and retirement age is 65 years old.

Figure 1: Evolution of the Participation and Unemployment Rates



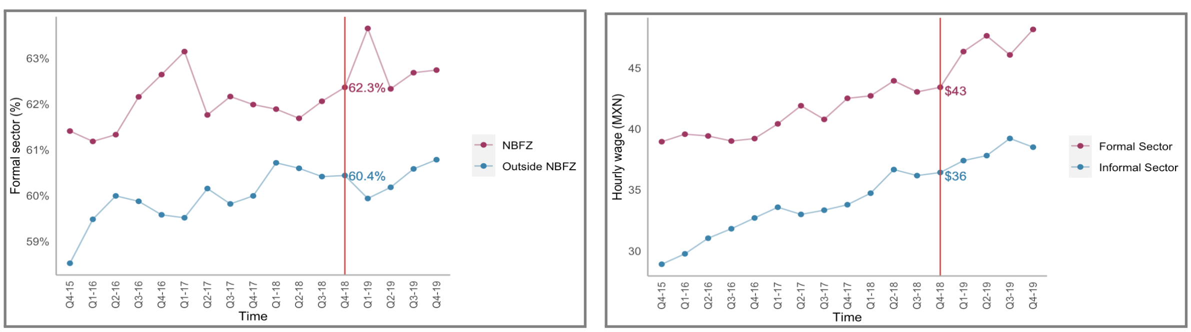
(a) Participation

(b) Unemployment

Source: ENOE.

The Mexican labour market is characterised by the presence of a large informal sector. The formality rate in the last quarter of 2018 was only 52%, whilst in the NBFZ it was 62%. As shown in Figure 2a, this proportion has increased in recent years. In the formal sector, the average hourly wage was 43 MXN in the last quarter of 2018. This figure is almost 20% above the equivalent for the informal sector, as shown in Figure 2b. Nevertheless, both sectors have followed a largely similar increasing trend, since the end of 2015.

Figure 2: Formal Sector Share and Wages Decomposition by Sector



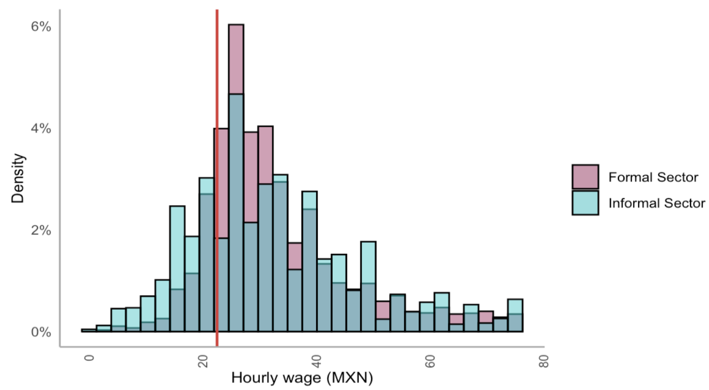
(a) Formal Sector Share

(b) Hourly Wages (MXN) by Sector

Source: ENOE.

To analyse differences in the wage distribution between sectors, in Figure 3 we present the histograms of the hourly wage distribution for the formal and the informal sector, at the last quarter of 2018. We observe that both distributions are slightly skewed to the left, being more pronounced in the informal sector. Moreover, the formal sector presents a more concentrated distribution around the median salary, indicating less inequality than the informal sector.

Figure 3: Wages Distribution Before the Policy Implementation (Q4-2018)



Source: ENOE.

3.3 Policy Background and Scope

Historically, the Mexican minimum wage has been set below that of countries at a similar stage of development. Combined with a high rate of informality, this has contributed to high levels of inequality and poverty enduring across the country, as well as incentivising illegal migration to the US. Economic deprivation and emigration flows are particularly severe along the 3,145 km of border that Mexico shares with the US, where in recent decades development has lagged behind adjacent areas impacting the millions of people that live there.

The NBFZ came into effect on January 1^{st} 2019, as part of Mexico's wider national development plan. Municipalities within the zone were subject to several economically stimulating policies designed to promote development, create jobs, and disincentive migration to the US. These include a 100% increase in the minimum wage; an 8% reduction in the tax on consumption; a 20% reduction in the tax on income; and fiscal incentives for the tax set for gasoline and for energy prices. The minimum wage increase added to a series of recent minimum wage reforms across Mexico. In 2015, the minimum wage was equalised across Mexico at a rate of 70.1 MXN per full working day.[4] In the following years the minimum wage was adjusted annually for inflation, culminating in a minimum wage of 88.4 MXN per day in 2018. The minimum wage jumped to 176.7 MXN per full working day when the NBFZ was implemented, which is equivalent to 22.5 MXN per hour worked.This represents a 100% increase in the minimum wage within the NBFZ, whilst it was only increased by 16% in the rest of Mexico. Since then, the minimum wage has been adjusted annually for inflation across the country, with some additional increments to subdue the economic impacts of the COVID-19 pandemic.

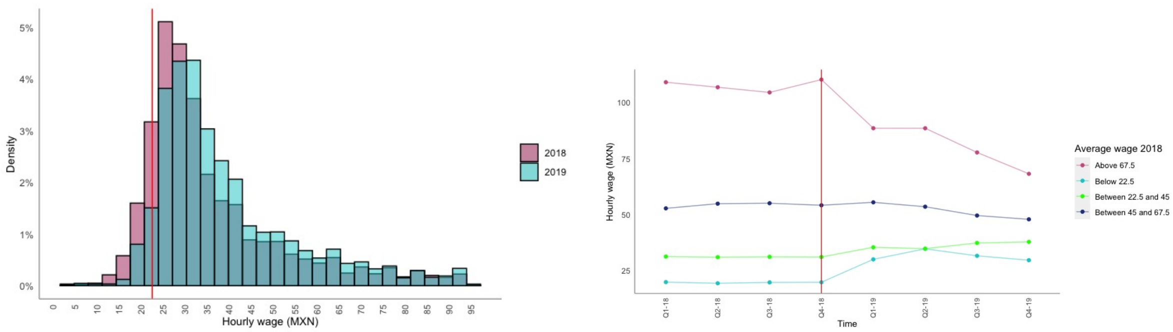
The year before the NBFZ was implemented, 13% of the formal workers within the zone earned an hourly wage of less than 22.5 MXN and thus were directly affected by the policy. Figure 4a shows the hourly wage distribution in NBFZ in 2018 and 2019. As the vertical line indicates the new minimum wage level, the 2018 density accumulated up to the cutoff gives the share of affected workers. The shift in the distribution indicates how the share of workers below 22.5 MXN per hour decreased in 2019. In addition, the share of the earnings slightly above the new minimum decreased, suggesting potential spillover effects. However, adjustments in the wage distribution might reflect compositional changes to the pool of workers driven by employment effects. The policy reduced the share of workers below the new minimum wage by 44%, although 6% of formal workers still earned below 22.5 MXN per hour in 2019 due to noncompliance with the law.

Table 4 in Appendix A provides some descriptive statistics on the sociodemographic characteristics of minimum wage workers (workers who earned an hourly wage of less than 22.5 MXN in 2018). Compared with the workers earning between one and two times the new minimum wage and those earning between two and three times the new minimum wage, the minimum wage workers are more likely to be male, have no completed education, be married, reside in an urban area and be less likely to have higher education.

[4]In October 2015, the exchange rate was 18.8 MXN per 1 EUR.

In a preliminary attempt to assess the degree to which the minimum wage increase could have indirectly affected other workers, Figure 4b shows the evolution of the hourly wages by group of formal workers based on their average wage in 2018. Whilst the earnings of all the groups remained largely constant during 2018, the mean hourly wages of the minimum wage workers and the workers earning between one and two minimum wages raised considerably after the policy. This may indicate that those earning between one and two minimum wages were indirectly affected by the policy. By the end of 2019, the dispersion of the mean wages of these groups is remarkably reduced.

Figure 4: Formal Sector's Hourly Wage Distribution and Evolution



(a) Hourly Wage Distribution (b) Hourly Wage Evolution by Group of Workers

Source: ENOE.

The large presence of informal workers in the NBFZ also leads us to analyse whether the minimum wage could have affected informal workers. Almost 25% of the informal workers were earning below 22.5 MXN per hour in 2018. By 2019, the share of the workers earning below 22.5 MXN per hour had reduced to around 20%. Figure 8a in Appendix A shows a shift in the wage distribution one year after the policy was implemented. Although less pronounced than in the formal case, this seems to indicate a fall in the share of workers earning around 22.5 MXN per hour. Moreover, the evolution of the hourly wages (Figure 8b) shows an increase in the earnings of the workers below 22.5 MXN and the ones between 22.5 and 45 MXN after the policy. This suggests similar dynamics to those observed in the formal sector.

4 Empirical Methodology

The objective of this paper is to estimate the impact of the minimum wage increase on the labour market outcomes of those workers directly affected by the policy. In the first part of our analysis, this target group consists of the formal sector workers earning below the new minimum wage before its implementation. Next, we extend our analysis to assess the effects on the low-wage workers in the informal sector. Although these workers are not directly affected, the labour market outcomes for these workers could have been affected if we assume that formal and informal sector firms compete for workers. Finally, we study the potential reallocation of the low-wage workers across sectors. A common empirical methodology is applied to the three analyses, with the only difference of the sample of workers considered.

The empirical strategy of this paper is guided by the necessity to isolate the effect of the minimum wage from the other policies introduced as part of the NBFZ program. To achieve such disentanglement, we use a Difference-in-Differences (DiD) approach comparing the labour market outcomes of low-wage workers within the NBFZ, directly affected by the policy, with those earning higher wages and thus not directly affected. In the following section, we discuss the details of our empirical strategy and key assumptions required for our estimates to yield causal effects of the minimum wage increase.

4.1 Identification Strategy

The aim of this identification strategy is to estimate the effect of the minimum wage increase on the earnings, employment status and the intensive margin measured by hours worked, part-time and extra hours worked of the low-wage workers in the NBFZ. Formally, we define the affected workers as those whose average wage in the year previous to the policy, 2018, was below the new minimum wage, 22.5 MXN per hour. These are the workers who should be directly affected by the minimum wage policy and thus constitute our treatment group.

The estimation of an average treatment effect on the treated by the comparison with a control group not affected by the policy is possible through a DiD approach, which allows to eliminate confounders that are fixed over time. This method relies on the parallel trends assumption (PTA), which states that the evolution of the outcome pre- and post-treatment would be the same in the absence of treatment. Consequently, before applying this methodology to our three different settings in Sections 5.1, 5.2, and 5.3 an event study approach is applied to each of our dependent variables to provide support for the PTA, by allowing the effect of the minimum wage to vary during the quarters before its introduction.

Figure 4b suggests the policy indirectly impacted workers earning between one and two minimum wages through spillover effects. Thus, we define those workers as indirectly treated. This increase is not observed for the workers whose average wage was between two and three minimum wages. In order to confirm the causal effect of the policy on the indirectly treated workers' earnings and support our decision to exclude them from our control group, we conduct a DiD analysis where the hourly wages of this group of workers is compared to the group of workers between two and three minimum wages (control group in this case). After providing support for the PTA through an event study model, the DiD results reveal that the minimum wage policy had a significant impact on the wages of the indirectly treated group both in the formal and informal sector (Appendix B). Specifically, the wages of the indirectly treated workers increased by 7.7 and 12.9 MXN per hour, respectively, relative to the control group, as a consequence of the policy.

Finally, we rule out using the individuals earning more than 67.5 MXN per hour (three times the new minimum wage). They represent the highest earners within the wage distribution and so are unlikely to have the same counterfactual trends as those in our treatment group. Consequently, we define our control group as the workers whose average wage in 2018 was between two and three times the new minimum wage, this is, between 45 and 67.5 MXN per hour. This group is not expected to be affected by the policy and shows no evidence of an increase in their earnings after the policy.

4.2 Empirical Model

We implement the DiD models explained in Section 4.1 estimating the following equation:

$$Y_{it} = \beta_0 + \beta_1 D_i + \beta_2 T_t + \beta_3 D_i T_t + U_{it} \tag{1}$$

where Y_{it} represents the outcome of interest for individual i at time t. Specifically, Y_{it} represents i) hourly wage, ii) a dummy variable indicating employment status, iii) number of hours worked per week, iv) a dummy variable for part-time employment and v) a dummy indicating whether the individual worked extra-hours. D_i is the treatment dummy variable that takes value 1 if individual i belongs to the treatment group and 0 if control. The variable T_t is a dummy variable that takes value 1 for observations after the policy (2019) and 0 before (2018). U_{it} is the error term. Finally, the parameter of interest is the DiD coefficient, given by the coefficient of the interaction term, β_3. The DiD coefficient identifies an average treatment effect on the treated.

An extension of Equation 1 consists of including control variables (X_{it}) that may have an effect on labour market outcomes and time fixed-effects (δ_t), which constitutes our preferred specification:

$$Y_{it} = \beta_0 + \beta_1 D_i + \beta_2 T_t + \beta_3 D_i T_t + X'_{it}\gamma + \delta_t + U_{it}. \tag{2}$$

In all our estimations, the set of controls includes sex, age, age squared, years of education, urban residence, and marriage status. We also include time-fixed effects to account for differences by quarter such as seasonal employment.

Additionally, to provide support for the PTA, an event study approach is applied by allowing the effect of the minimum wage to vary during the four quarters before and the four quarters following its introduction by estimating the following equation:

$$Y_{it} = \beta_0 + \beta_1 D_i + \sum_{j=-4}^{-2} \alpha_j Q_{jt} + \sum_{j=0}^{3} \alpha_j Q_{jt} + \sum_{j=-4}^{-2} \delta_j D_i Q_{jt} + \sum_{j=0}^{3} \delta_j D_i Q_{jt} + X_{it}'\gamma + U_{it} \tag{3}$$

where Q_{jt} is a dummy variable that takes value 1 for observations in the quarter j and 0 otherwise and the remaining variables have the same meaning as in Equation 2. The coefficients of interest are the δ_j, which capture the difference between treated and control workers in quarter j, compared to the prevailing difference in the omitted base period, -1 (the last quarter in 2018). Therefore, no significant coefficients δ_j for $j = -4... -2$ will provide support for the parallel trend assumption, while the coefficients δ_j for $j = 0...3$ will capture the effects of the policy on each quarter of 2019.

The rotating panel nature of our data allows us to follow each individual for five quarters before they are replaced. As we consider a period of two years in our analysis, some of the individuals who are observed in the year before the policy are not observed after. Specifically, we lose approximately two-thirds of the individuals. This could threaten our identification strategy by altering the composition of our sample if they share certain characteristics that could affect the outcomes of interest, making confounders among control and treatment groups not fixed anymore.

To deal with this, we test that our covariates are not affected by the treatment by estimating our DiD models with each of our controls as dependent variable (Appendix B, Tables 7 and 8).[5] No statistically significant DiD coefficients suggest that the loss of observations is a random process that mostly responds to the survey design. Only the covariate indicating residence in an urban area presents a significant DiD coefficient and we account for this fact controlling for this variable in all our models. With the purpose of incorporating as much variation as possible in the pre-policy period, we decide to include all the individuals in our analysis regardless of whether they appear in the post-period. In addition to this, in Appendix C, we present results that are robust to a more restrictive selection criterion, when only those individuals who appear both in the pre and post-policy periods are included in the sample.

5 Results

5.1 Minimum Wage Increase Effect on the Formal Sector

We start our study by analysing the effect of the minimum wage increase in the formal sector, where the minimum wage is legally binding. As mentioned in the previous section, we are interested in analysing how this policy impacts the probability of being employed, hourly wages, hours worked per week, the probability of working part-time, and the probability of working extra hours.

We define our sample of formal workers as the ones that were employed in the formal sector at least one quarter of the year before the implementation of the policy (2018). For the analysis of hourly wages, hours worked, part-time and extra hours, we only include in our sample the observations of these individuals when they were employed in the formal sector. Doing so, we guarantee that the analysis of these variables only captures the impact of the policy in the formal sector of the economy.

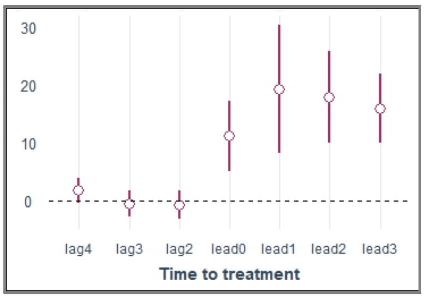
As mentioned in Section 4.1, to assess the PTA of our dependent variables, we perform an event study regression to test that the coefficients of the interactions between the pre-treatment quarter dummies and the treatment dummy variable ("lags") are not statistically different from 0. The period before the policy change is chosen as the reference point to which the other periods are compared against.[6] For each of the event studies, we also conducted an F-test to indicate whether the lags were jointly

[5] We run these DiD models twice, for the samples used in the analysis of the formal and the informal sector.

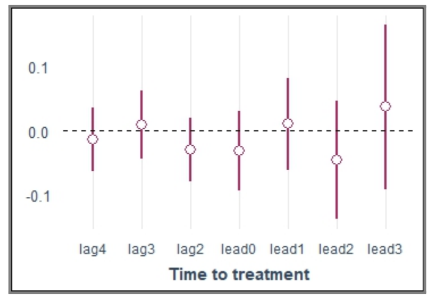
[6] As suggested in Roth et al. (2023) we include a set of covariates (gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas) that provides us an extra degree of robustness when examining the PTA.

significant.[7] In Figure 5, we present plots of the coefficients of the lags and leads[8] for our five dependent variables, as well as their confidence intervals at a 95% level. Notice that for the case of hourly wages, probability of being employed, and hours worked per week, there are no statistically significant lags. Moreover, since two of the lags for the probability of working extra hours are statistically significant we also checked the results of the F-test to confirm that they are not jointly significant. The results of the F-test presented in Table 9 indicate that the lags are not statistically significant, reinforcing our support for the PTA. For the probability of working part-time, we observe that lag 3 is statistically different from zero, in line with the F-test results. This imposes a caveat on the validity of the causal analysis that can be carried out on this variable.

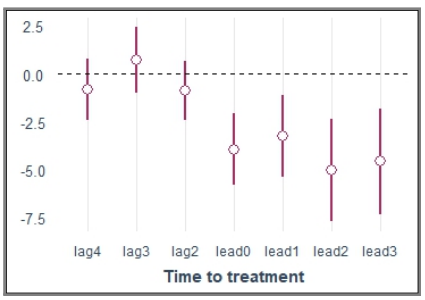
Figure 5: Event Studies of Labour Market Outcomes in the Formal Sector



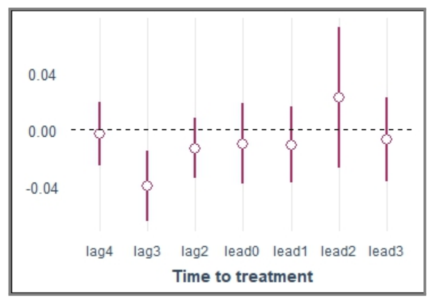
(a) Wages



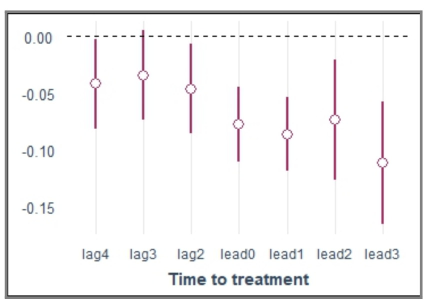
(b) Formal Employment



(c) Hours Worked



(d) Part-time Employment



(e) Extra Hours Worked

Table 1 presents the results of the DiD estimates for the different labour market outcomes. The odd-numbered columns show the regression results without covariates or time-fixed effects and the even-numbered columns do include them. We begin by analysing the effect of the policy on hourly wages. The DiD coefficients presented in the first and second columns of Table 1 show a significant and positive impact of the policy on hourly wages. This suggests that, on average, the increase in the minimum wage is associated with an increase of 15.6 MXN in hourly wages compared to the control group. This represents an average increase of 77% in the wages of the affected workers. This result is

[7]The results of this test are included in Appendix A.

[8]We refer to the interactions between the post-treatment quarter dummies and the treatment dummy variable as "leads".

in line with the lead coefficients presented in Figure 5, which are all statistically different from 0.

Columns 3 and 4 of Table 1 shows the results for the DiD coefficient of formal employment. No coefficient is statistically significant, which suggests the policy did not impact employment in the formal sector. Figure 5 supports this conclusion, as none of the leads are statistically significant.

When focusing on the impact of hours worked per week we observe that the policy had a significant but negative impact. Column 5 of Table 1 presents the results for the regression without covariates and time fixed effects. In this case, the coefficient indicates that the policy decreased the hours worked per week by 4.1 hours. We also observe a decrease when we include the covariates and time-fixed effects in the estimation, although smaller than in the previous case at just 3.8 hours. This represents an average decrease of 7% hours worked of the affected workers. Once again, it is possible to verify the previous results with the coefficients obtained from the event study. Here, the leads plotted in Figure 9 are further from 0.

One channel that may explain this reduction in hours worked is the probability that individuals now work part-time. Columns 7 and 8 of Table 1 present the DiD coefficients for the probability of being employed part-time. However, none of the specifications reported a statistically significant DiD coefficient. Additionally, Columns 9 and 10 of Table 1 report the DiD coefficient for the probability of working extra hours without and with time-fixed effects and covariates, respectively. Both specifications reported the same DiD coefficient, which suggests that the increase in the minimum wage is associated with a decrease of 5.2% in the probability of working extra hours, compared to the control group.

Given that we did not observe disemployment effects, it is possible that employers reduced the number of hours worked by their employees in order to reduce their labour costs and minimise adverse effects of the policy on their profits. In the short-run, it is easier for firms to adjust hours and not employment levels. In particular, they might have cut extra hours which are usually costly.[9]

Table 1: Effect of the Policy on Labour Market Outcomes in the Formal Sector

	Wages		Formal Employment		Hours Worked		Part-time Employment		Extra Hours Worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD	16.023***	15.115***	0.003	−0.008	−4.069***	−3.761***	0.012	0.010	−0.052***	−0.052***
	(2.684)	(2.565)	(0.027)	(0.026)	(0.797)	(0.761)	(0.009)	(0.010)	(0.009)	(0.009)
Treated	−34.678***	−30.930***	−0.008	0.050***	6.490***	6.372***	−0.039***	−0.041***	0.048***	0.050***
	(0.251)	(0.589)	(0.012)	(0.013)	(0.416)	(0.461)	(0.005)	(0.006)	(0.007)	(0.007)
Post	−3.771***	−4.826**	−0.021*	−0.022	0.957**	1.571**	−0.009	−0.009	−0.007	0.016
	(1.234)	(1.975)	(0.012)	(0.026)	(0.387)	(0.747)	(0.007)	(0.012)	(0.004)	(0.019)
Constant	54.268***	33.508***	0.808***	0.028	45.515***	39.241***	0.049***	0.072**	0.019***	−0.097***
	(0.230)	(3.027)	(0.006)	(0.058)	(0.215)	(1.831)	(0.004)	(0.032)	(0.003)	(0.023)
Mean	39.461	39.461	0.801	0.801	47.398	47.398	0.037	0.037	0.028	0.028
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	5,021	5,021	11,845	11,833	8,905	8,895	8,905	8,895	9,355	9,343

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

5.2 Minimum Wage Increase Effect on the Informal Sector

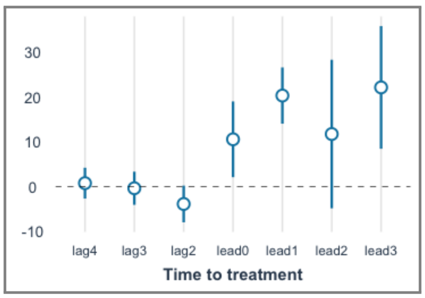
As mentioned previously, the Mexican labour market is characterised by having a large informal sector. Hence, the following section seeks to analyse if the minimum wage increase also had an impact in the informal sector. First, we hypothesise the presence of a lighthouse effect, in which the minimum wage increase in the formal sector acts as a signal prompting workers in the informal sector to demand higher wages. In other words, we hypothesise that firms in the formal and the informal sector are competing for workers so informal firms have to increase their wages to avoid workers switching to the formal sector.

[9] It is also possible that the results obtained can be explained by changes in worker behaviour. In this case, the increase in the minimum wage could cause the income effect to dominate the substitution effect, causing workers to reduce the number of hours worked per week. However, we find this explanation largely implausible as the minimum wage remains at a relatively low level after the change.

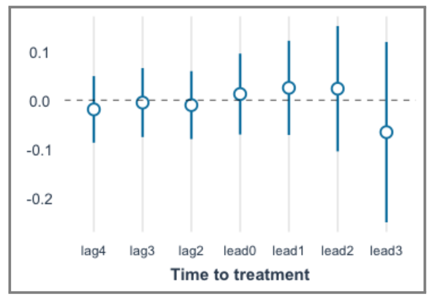
To test these hypotheses, we follow the same DiD approach described in Section 4.2 and the empirical model described in Equations 1 and 2 for our five dependent variables. Similarly to the formal sector, we define our sample of informal workers as the ones that were employed in the informal sector at least one quarter of the year before the implementation of the policy (2018). For the analysis of hourly wages, hours worked, part-time and extra hours, we only include in our sample the observations of these individuals when they were employed in the informal sector, as we guarantee that the analysis of these variables only captures the impact of the policy in the informal sector of the economy.

In an effort to provide support for the PTA, we provide an event study analysis for each of our five dependent variables. From the plots shown in Figure 6, it becomes clear that there are no statistically significant lags for any of the dependent variables.

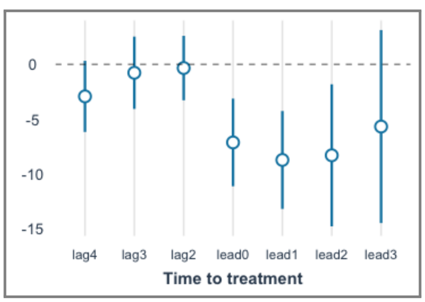
Figure 6: Event Studies of Labour Market Outcomes in the Informal Sector



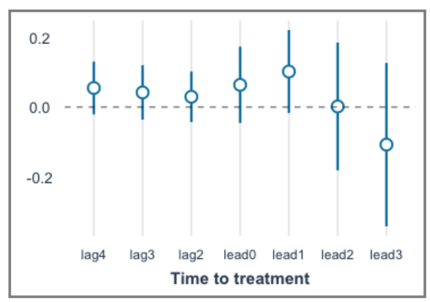
(a) Wages



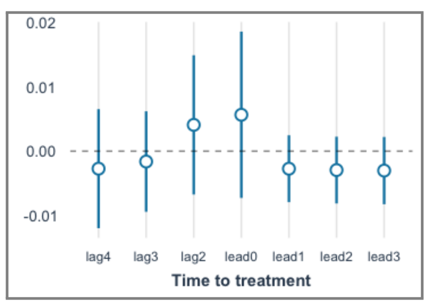
(b) Informal Employment



(c) Hours Worked



(d) Part-time Employment



(e) Extra Hours Worked

Our results, shown in Table 2, are largely similar to the ones obtained for the formal sector. Whilst the DiD coefficient for wages is positive and statistically significant, 15.6 (which represents an average increase of 89% in wages), we observe no disemployment effects in the informal sector. The results for wages provide evidence that the minimum wage enforced in the formal sector spills over to the informal sector. This provides support for our hypothesis that the Mexican labour market features competition for workers across both the formal and informal sectors.

In line with the results of the formal sector analysis, the DiD coefficient for hours worked is negative and statistically significant, around 7 hours; even more negative than in the formal sector. This represents an average decrease of 14% hours worked of the affected workers. To better understand the channels through which the increase in the minimum wage could affect the amount of hours worked, we proceed to analyse the probability of working part-time and extra hours. However, we do not observe a significant impact on any of these variables.

Table 2: Effect of the Policy on Labor Market Outcomes in the Informal Sector

	Wages		Informal Employment		Hours Worked		Part-time Employment		Extra Hours Worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD	15.775***	15.592***	0.028	0.021	−7.103***	−6.747***	0.043	0.022	0.001	0.001
	(2.913)	(2.836)	(0.035)	(0.034)	(1.657)	(1.635)	(0.044)	(0.044)	(0.003)	(0.003)
Treated	−36.312***	−35.806***	0.012	0.008	11.446***	13.431***	−0.190***	−0.240***	0.003	0.003
	(0.391)	(0.420)	(0.014)	(0.015)	(0.854)	(0.867)	(0.018)	(0.018)	(0.002)	(0.002)
Post	−5.950**	−7.838**	−0.131***	−0.166***	0.149	0.685	0.004	0.047	−0.002*	−0.003
	(2.657)	(3.811)	(0.020)	(0.049)	(1.286)	(2.555)	(0.036)	(0.070)	(0.001)	(0.003)
Constant	53.887***	46.857***	0.657***	0.434***	37.294***	5.413*	0.326***	0.884***	0.002*	0.002
	(0.364)	(1.961)	(0.008)	(0.052)	(0.615)	(3.147)	(0.014)	(0.072)	(0.001)	(0.005)
Mean	32.347	32.347	0.637	0.637	42.071	42.071	0.241	0.241	0.002	0.002
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,834	2,830	9,069	9,053	4,247	4,239	4,247	4,239	5,713	5,701

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age squared, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

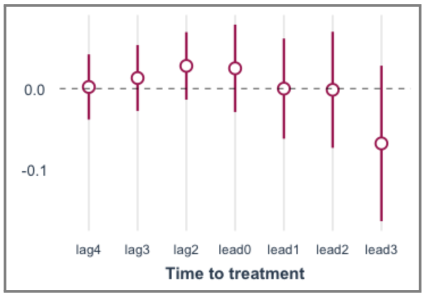
5.3 Reallocation Effects of the Minimum Wage Increase

In the final section of results, we investigate the effect of the minimum wage increase on the probability of reallocation. Here, we present both formal-to-informal and informal-to-formal reallocation to identify the presence of such effects in each direction. To measure the formal-to-informal reallocation we use the sample of workers described in 5.1 and to measure the informal-to-formal reallocation we use the sample described in 5.2, considering their observations when employed in either sector.

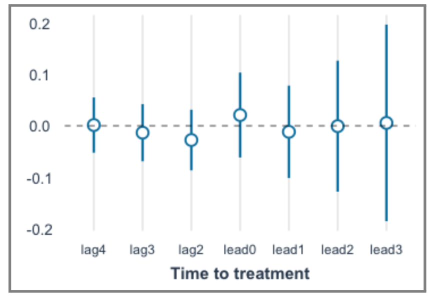
One hypothesis for reallocation effects resulting from a minimum wage would be from the formal to informal sector as a result of disemployment effects in the formal sector. However, it has also been theorised that informal workers could relocate to the formal sector due to the increased wage differential. We do not observe disemployment effects in the formal sector and do observe an increase in the wage in the informal sector. Hence, the aim of this identification strategy is to test the hypothesis that there are no reallocation effects resulting from the minimum wage. To test this hypothesis we use a DiD approach as described in Section 4.1.

For formal-to-informal sector reallocation, the empirical model is as described in Equations 1 and 2 in Section 4.2, but now Y_{it} is a dummy variable that takes the value 1 if the individual is employed in the informal sector and 0 if employed in the formal sector. Similarly, for informal-to-formal sector reallocation the empirical model remains the same, but now Y_{it} is a dummy variable that takes the value 1 if the individual is employed in the formal sector and 0 if employed in the informal sector. We conduct an event study to provide support for the PTA, crucial to DiD. As can be seen in Figure 7, the event study produces no statistically significant coefficient of lags for either formal-to-informal or informal-to-formal reallocation.

Figure 7: Event Studies of Reallocation Effects



(a) Formal-to-Informal



(b) Informal-to-Formal

The results presented in Table 3 show the reallocation effects of the policy. In the first two columns we estimate formal-to-informal reallocation effects. In the third and fourth columns, we estimate informal-to-formal reallocation effects. Considering first the formal-to-informal reallocation, the DiD coefficient is not statistically significant, which suggests that this policy did not produce a formal-to-informal reallocation effect. Again, if we consider the informal-to-formal reallocation, the DiD coefficient is not statistically significant, which suggests that this policy also did not produce an informal-to-formal reallocation effect. Both sets of results are in line with the lead coefficients presented in Figure 7. In both event studies all leads are not significantly different from 0 verifying the finding of no reallocation effects. Our findings are inconsistent with the hypothesis that formal and informal sectors are fully segmented. Instead, our findings suggest firms are competing for workers across sectors and so are more consistent with the theory of oligopsonistic competition between informal and formal employers. This is in line with the conclusions made by Derenoncourt and Montialoux (2021) who also observed insignificant reallocation effects and an increase in the informal sector wage after a minimum wage increase.

Table 3: Effect of the Policy on Reallocation Effects

	Reallocation Effects			
	Formal-to-Informal		Informal-to-Formal	
	(1)	(2)	(3)	(4)
DiD	-0.013	-0.005	0.008	0.016
	(0.020)	(0.020)	(0.034)	(0.034)
Treated	0.012	-0.007	-0.035^{***}	0.020
	(0.010)	(0.011)	(0.013)	(0.013)
Post	0.024^{**}	0.032	0.110^{***}	0.183^{***}
	(0.010)	(0.022)	(0.021)	(0.049)
Constant	0.091^{***}	0.297^{***}	0.160^{***}	-0.203^{***}
	(0.005)	(0.049)	(0.008)	(0.050)
Mean	0.106	0.106	0.151	0.151
Covariates	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes
Observations	10,118	10,106	6,425	6,416

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age squared, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

6 Robustness

In this section we provide robustness analysis to support the findings obtained using our main specification. First, we repeat our analysis with an alternate control group comprised of all workers earning above the new minimum wage the year before its introduction. Second, we repeat our analysis using a sample restricted to those who are observed at least once after the policy change. As explained in Section 4.2, imposing this restriction reduces our sample to approximately one third of the size, but confirms that our estimates are not biased by changes in the composition of the panel, supporting the validity of our results.

6.1 Minimum Wage Increase Effect on the Formal Sector

First, we use the alternate control to provide robustness of our previous results. Figure 10 in Appendix C provides support for the PTA for hourly wages, probability of being employed, and hours worked per week. However, we do observe significant lag coefficients in the probability of working part-time and extra hours. Therefore, we should be cautious when interpreting the results obtained for these variables.[10] Table 10 presents the results. For all our dependent variables, we observe that the results are in line with the ones obtained with our baseline model.

Now, we analyse how the impacts of the policy on the labour market outcomes vary with the restricted sample. The plots for the event study regression are presented in Figure 11 of Appendix C and indicate that the PTA for the probability of being employed and working extra hours is not supported for this specification. The results presented in Table 11 are in line with our main findings. In particular, the positive and significant DiD coefficient for the probability of being employed supports the lack of disemployment effects.

6.2 Minimum Wage Increase Effect on the Informal Sector

We re-estimate the effects on the informal sector using the alternate control group before re-estimating the effects using the restricted sample. The results can be found in Appendix C in Tables 12 and 13 respectively. Support for the PTA associated with each dependent variable in this section is provided through event study analysis found in Figures 12 and 13.

The DiD coefficients for wages are positive and significant across each robustness check, in line with the findings of our main specification. When using the alternate control group the magnitude of the estimate falls to roughly 10 MXN, whilst it remains at approximately 15 MXN when re-estimating with the restricted sample. Across each specification, the DiD coefficients for probability of employment in the informal sector remain statistically insignificant.

In line with the findings obtained from the main specification, the DiD coefficients for hours are negative and significant across each robustness check, approximately -7 hours worked per week. The DiD coefficient for probability of part-time employment suggests that the policy increased the probability of working part-time by 5.8% compared to the control. However, when we include covariates and time-fixed effects the significance of this result is lost. Moreover, the coefficients remain statistically insignificant when using the restricted sample. In line with the findings obtained from the main specification, the DiD coefficients for probability of working extra hours are not statistically significant, regardless of the specification used or whether we include covariates and time fixed effects. Thus, we conclude that robustness checks reinforces our main findings.

6.3 Reallocation effects of the Minimum Wage Increase

The two robustness mechanisms provide very similar results and can be found in Appendix C. The DiD coefficients for formal-to-informal are slightly negative, whilst the informal-to-formal are slightly positive. All but one estimate for both reallocation effects remain statistically insignificant. The estimate obtained for formal-to-informal reallocation effects without covariates and time-fixed effects when using the restricted sample is statistically significant at the 10% level. This suggests that the

[10] Including all persons earning above the minimum wage as a control may explain these results; including people at the top of the income distribution decreases the comparability of the groups.

policy reduced the probability of those treated relocating from the formal to the informal sector by 5%.

7 Limitations

Despite the large number of observations in the database, given that the policy of interest was only applied in 43 municipalities, only a small share of our sample was directly impacted by the policy. Among the formal workers, 13% were treated and 25% in the case of the informal sector. Additionally, the rotating nature of the panel reduces in around two thirds the number of treated individuals that can be observed after the policy. However, applying the expansion factors improves how representative our analysis is.

As mentioned, our dataset is a rotating panel which restricts us to following individuals for five quarters. This means that roughly two thirds of the individuals who are observed in the year before the policy are not observed after. This could threaten our identification strategy if the dropouts are not the result of the survey design, but are triggered by the policy, making confounders among control and treatment groups not fixed anymore.This threat is addressed by testing that our covariates are not affected by the treatment by estimating our DiD models with each of our controls as dependent variable.[11] No statistically significant DiD coefficients suggest that the loss of observations is a random process that mostly responds to the survey design. Moreover, our results are robust to a more restricted sample including only those individuals who appear both in the pre and post policy periods.

Our period of analysis only allows us to study the impact of the minimum wage increase for one year, as beyond 2019 none of the observed individuals would appear before the policy due to the rotation. This is potentially problematic as Baker et al. (1999) suggest that the short-term effects of minimum wages are close to 0, while the longer-run effects are more negative. It is worth noting that Dube et al. (2010) finds no evidence to support this conclusion, obtaining similar short and long-term results. Therefore, we maintain that the short-term nature of our study does not diminish the validity of the results, whilst acknowledging time period should be considered when interpreting estimates.

Finally, despite the fact that one of the main objectives of this policy was to reduce migration from NBFZ, the lack of data did not allow us to expand our analysis in this subject. The only variable in ENOE that contains information about migration refers to the intention to migrate. However, the large number of missing values impedes the analysis.

8 Conclusion

In this paper, we examine the 100% increase in the minimum wage implemented in the NBFZ on January 1^{st} 2019. Applying a DiD methodology, we estimate the effect of the minimum wage increase on the labour market outcomes of low-wage workers by the comparison with those of higher-wage workers within the NBFZ.

First, we focus our analysis in the formal sector and we find that the impact of the policy on hourly wages was an increase of 15.1 MXN. Moreover, we do not observe a significant impact on the probability of being employed in the formal sector. However, we find a negative effect on the hours worked of 3.8 hours per week. Thus, we analyse the policy effect on the probability of working part-time and extra hours as potential channels. The results show that the policy did not have a significant impact on the probability of being employed part-time, but a significant and negative effect on extra hours.

Our findings suggest that, although the enforced raise in salaries did not have disemployment effects, it might have motivated employers to reduce the working hours of their employees, with the aim of minimising the negative impacts of the policy on their profits through higher labour costs. A possible explanation is that in the short-run it is easier for firms to adjust hours than employment levels and particularly extra hours, which are usually costly. However, this decrease in working hours was not strong enough for firms to significantly substitute full-time for part-time employees.

[11] We run these DiD models twice, for the samples used in the analysis of the formal and the informal sector. They can be found in the Appendix B.

Given that the Mexican labour market is characterised by a large informal sector, which represents around 40% of the labour force, we extend our analysis to the effects of the policy in this sector. First, we find that the policy increased hourly wages in 15.6 MXN, similar to the formal sector. These results provide evidence to support the lighthouse effect hypothesis, where the minimum wage in the formal sector prompts informal workers to demand higher wages. In other words, the labour market seems to feature competition for low-wage workers across both the formal and informal sectors. The difference in wages amplified by the new minimum wage might have pushed informal employers to increase these workers' wages to avoid them moving to formality. As in the formal sector, we find no evidence of disemployment effects, but a significant decrease in hours worked of 6.7 per week. Again, this result is not driven by a substitution of full-time for part-time employees nor fewer extra hours.

Finally, we assess the reallocation between sectors and find no evidence of such effects in either direction. These findings are in line with the hypothesis of an increase in the informal workers' wages as a result of competition between sectors for the low-wage workers, which avoids the reallocation of workers to the formal sector. Our results are robust to an alternative control group, as well as to the restricted sample of individuals observed before and after the policy.

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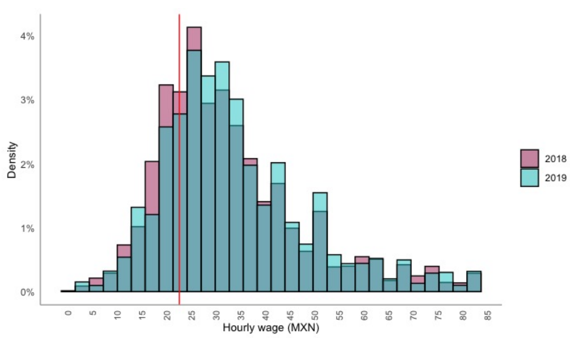
A Appendix: Context Plots and Tables

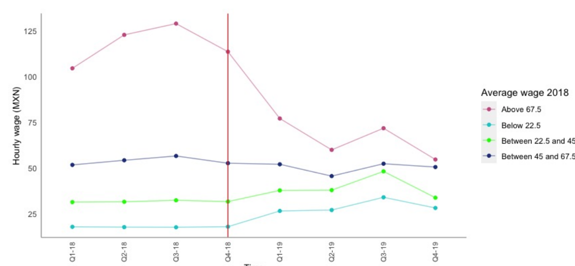
Table 4: Average Characteristics of the Minimum Wage Formal Workers, 2018

Hourly wage (MXN)	Below 22.5	Between 22.5 and 45	Between 45 and 67.5	Above 67.5
Men	0.603	0.599	0.594	0.604
Age				
15-20	0.036	0.040	0.036	0.038
21-30	0.297	0.304	0.295	0.280
31-40	0.266	0.266	0.249	0.269
41-50	0.238	0.241	0.252	0.248
51-60	0.140	0.124	0.144	0.143
61+	0.023	0.025	0.025	0.022
Education				
No completed education	0.033	0.032	0.029	0.035
Primary education	0.128	0.131	0.133	0.142
Secondary education	0.334	0.331	0.335	0.331
High school	0.318	0.306	0.313	0.314
Higher education	0.187	0.200	0.191	0.179
Married	0.413	0.403	0.399	0.433
Urban	0.229	0.214	0.213	0.217

Figure 8: Informal Sector's Hourly Wage Distribution and Evolution



(a) Hourly wage distribution

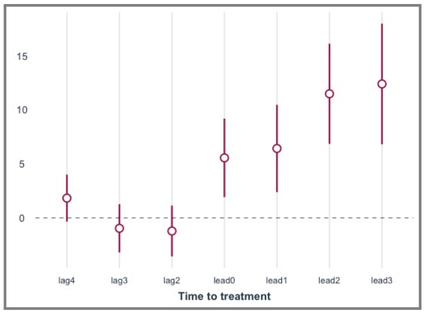


(b) Hourly wage evolution by group of workers

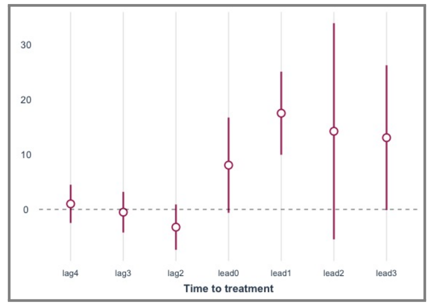
Source: ENOE.

B Appendix: Empirical Methodology Plots and Tables

Figure 9: Event Studies of Indirectly Treated Workers



(a) Hourly Wages, Formal Sector



(b) Hourly Wages, Informal Sector

Table 5: Effect of the Policy on Indirectly Treated Formal Workers

	Wages	
	(1)	(2)
DiD	8.282***	7.727***
	(1.297)	(1.258)
Treated	−23.423***	−21.021***
	(0.249)	(0.283)
Post	−3.771***	−2.851*
	(1.233)	(1.584)
Constant	54.268***	35.091***
	(0.230)	(1.416)
Mean	35.806	35.806
Covariates	No	Yes
Time fixed effects	No	Yes
Observations	15,037	15,021

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age squared, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

Table 6: Effect of the Policy on Indirectly Treated Informal Workers

	Wages	
	(1)	(2)
DiD	13.246***	12.901***
	(3.133)	(3.040)
Treated	−22.288***	−21.836***
	(0.397)	(0.416)
Post	−5.950**	−11.899***
	(2.656)	(3.414)
Constant	53.887***	45.349***
	(0.364)	(2.225)
Mean	36.805	36.805
Covariates	No	Yes
Time fixed effects	No	Yes
Observations	5,602	5,590

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age squared, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

Table 7: DiD Results for Control Variables on the Formal Sector's Sample

	Sex	Age	Age squared	Schooling years	Married	Urban
	(1)	(2)	(3)	(4)	(5)	(6)
DiD	−0.035	0.162	−13.241	0.218	0.008	−0.067*
	(0.040)	(0.157)	(12.863)	(0.242)	(0.036)	(0.028)
Treated	−0.168***	−0.730***	55.279***	−3.222***	−0.039*	−0.250***
	(0.023)	(0.117)	(10.120)	(0.139)	(0.021)	(0.014)
Post	−0.001	0.292**	−19.731*	−0.844***	−0.041	0.067**
	(0.035)	(0.122)	(10.458)	(0.281)	(0.032)	(0.032)
Constant	1.085***	19.134***	−1, 498.008***	14.285***	−0.996***	0.328***
	(0.094)	(0.255)	(28.627)	(0.667)	(0.077)	(0.076)
Mean	0.591	37.953	1590.658	11.423	0.400	0.278
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,833	11,833	11,833	11,833	11,833	11,833

Note: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age squared, years of schooling, marital status, and a dummy for observations in urban areas, excluding in each case the control that appears as dependent variable. Standard errors are clustered at the individual level.

Table 8: DiD Results for Control Variables on the Informal Sector's Sample

	Sex	Age	Age squared	Schooling years	Married	Urban
	(1)	(2)	(3)	(4)	(5)	(6)
DiD	−0.002	−0.212	20.549	−0.345	−0.031	−0.153***
	(0.039)	(0.234)	(20.259)	(0.251)	(0.032)	(0.029)
Treated	−0.052**	−0.912***	58.323***	−2.373***	−0.033	−0.135***
	(0.024)	(0.145)	(12.493)	(0.153)	(0.021)	(0.017)
Post	0.007	−0.062	13.777	0.041	0.015	0.120***
	(0.046)	(0.257)	(22.789)	(0.305)	(0.042)	(0.041)
Constant	1.004***	18.612***	−1,443.532***	11.821***	−0.775***	0.097
	(0.081)	(0.302)	(33.875)	(0.528)	(0.062)	(0.064)
Mean	0.626	37.988	1673.055	9.892	0.318	0.258
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,053	9,053	9,053	9,053	9,053	9,053

Note: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age squared, years of schooling, marital status, and a dummy for observations in urban areas, excluding in each case the control that appears as dependent variable. Standard errors are clustered at the individual level.

Table 9: F-test of Joint Significance of the Lags (Formal Sector)

	Wages	Formal Employment	Hours Worked	Part-time Employment	Extra Hours Worked
	(1)	(2)	(3)	(4)	(5)
F	1.621	0.903	2.208	4.625	1.982
$\Pr(> F)$	0.183	0.4389	0.085*	0.003**	0.114

Notes: *p<0.1; **p<0.05; ***p<0.01

C Appendix: Robustness Results Plots and Tables

Table 10: Effects of the Policy on the Formal Sector Robustness: Alternative Control Group

	Wages		Formal Employment		Hours worked		Part-time Employment		Extra hours worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD	12.251***	12.534***	0.034	0.030	−3.587***	−3.476***	0.010	0.010	−0.048***	−0.049***
	(2.498)	(2.462)	(0.025)	(0.024)	(0.726)	(0.699)	(0.008)	(0.008)	(0.008)	(0.008)
Treated	−24.550***	−17.841***	−0.046***	−0.020*	6.033***	5.997***	−0.035***	−0.031***	0.046***	0.046***
	(0.477)	(0.562)	(0.011)	(0.011)	(0.373)	(0.362)	(0.004)	(0.004)	(0.006)	(0.007)
Post	0.001	−0.398	−0.052***	−0.040**	0.474**	1.327***	−0.008*	−0.006	−0.010***	0.013
	(0.747)	(1.413)	(0.007)	(0.018)	(0.204)	(0.493)	(0.004)	(0.010)	(0.002)	(0.011)
Constant	44.140***	−18.209***	0.845***	0.253***	45.971***	39.645***	0.045***	0.071***	0.021***	−0.058***
	(0.467)	(4.832)	(0.003)	(0.031)	(0.109)	(1.109)	(0.002)	(0.026)	(0.001)	(0.012)
Mean	41.522	41.522	0.831	0.831	46.602	46.602	0.040	0.040	0.022	0.022
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	18,893	18,876	32,096	32,056	25,558	25,525	25,558	25,525	26,359	26,324

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

Table 11: Effects of the Policy on the Formal Sector Robustness: Restricted Sample

	Wages		Formal Employment		Hours worked		Part-time Employment		Extra hours worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD	16.381***	14.422***	0.132***	0.143***	−2.892***	−2.434***	0.014	0.014	−0.043***	−0.043***
	(2.713)	(2.619)	(0.026)	(0.025)	(0.844)	(0.798)	(0.010)	(0.010)	(0.012)	(0.012)
Treated	−35.036***	−26.886***	0.163***	0.219***	5.312***	4.333***	−0.042***	−0.038***	0.039***	0.037***
	(0.476)	(1.408)	(0.021)	(0.022)	(0.844)	(0.894)	(0.007)	(0.010)	(0.012)	(0.013)
Post	−4.339***	−2.419	−0.092***	0.049	0.755*	−2.040	−0.003	−0.005	0.003	0.008
	(1.262)	(2.570)	(0.014)	(0.038)	(0.395)	(1.370)	(0.007)	(0.022)	(0.004)	(0.022)
Constant	54.836***	5.875	0.709***	−0.440***	45.717***	49.265***	0.043***	0.040	0.009***	0.001
	(0.421)	(7.691)	(0.010)	(0.071)	(0.376)	(3.691)	(0.007)	(0.059)	(0.003)	(0.030)
Mean	43.231	43.231	0.701	0.701	47.060	47.060	0.033	0.033	0.015	0.015
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,231	2,231	6,825	6,825	3,785	3,785	3,785	3,785	3,937	3,937

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

Table 12: Effects of the Policy on the Informal Sector Robustness: Alternative Control Group

	Wages		Informal employment		Hours worked		Part-time		Extra hours worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD	10.971***	11.114***	0.044	0.039	−7.525***	−7.028***	0.058*	0.043	0.002	0.002
	(2.208)	(2.254)	(0.031)	(0.031)	(1.227)	(1.238)	(0.031)	(0.032)	(0.003)	(0.003)
Treated	−27.259***	−26.329***	−0.019	−0.022	10.572***	11.803***	−0.156***	−0.185***	0.001	0.001
	(0.941)	(1.232)	(0.012)	(0.013)	(0.662)	(0.637)	(0.013)	(0.013)	(0.002)	(0.002)
Post	−1.147	−2.096	−0.147***	−0.180***	0.571	−0.665	−0.010	0.039	−0.003***	−0.005**
	(1.857)	(2.299)	(0.013)	(0.036)	(0.644)	(1.693)	(0.018)	(0.048)	(0.001)	(0.002)
Constant	44.834***	32.220***	0.688***	0.488***	38.167***	11.670***	0.292***	0.816***	0.003**	0.003
	(0.930)	(7.629)	(0.005)	(0.036)	(0.295)	(1.960)	(0.007)	(0.050)	(0.001)	(0.004)
Mean	21.397	21.397	0.646	0.646	47.370	47.370	0.126	0.126	0.004	0.004
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	7,891	7,879	17,940	17,913	9,963	9,945	9,963	9,945	11,623	11,601

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

Table 13: Effects of the Policy on the Informal Sector Robustness: Restricted Sample

	Wages		Informal employment		Hours worked		Part-time		Extra hours worked	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD	15.296***	14.878***	−0.020	−0.026	−6.831***	−7.036***	0.062	0.062	−0.001	−0.002
	(2.970)	(2.895)	(0.037)	(0.036)	(1.955)	(1.883)	(0.050)	(0.048)	(0.005)	(0.006)
Treated	−35.833***	−34.183***	0.059*	0.052	11.174***	12.825***	−0.209***	−0.245***	0.005	0.006
	(0.926)	(1.198)	(0.025)	(0.027)	(1.909)	(1.974)	(0.046)	(0.045)	(0.005)	(0.006)
Post	−5.662*	−9.569*	−0.110***	−0.021	0.639	2.071	−0.024	−0.017	−0.002	0.0002
	(2.720)	(4.716)	(0.021)	(0.060)	(1.475)	(3.825)	(0.041)	(0.099)	(0.002)	(0.002)
Constant	53.599***	39.549***	0.636***	0.262**	36.803***	20.278**	0.354***	0.548**	0.002	−0.007
	(0.878)	(5.974)	(0.015)	(0.095)	(1.418)	(7.029)	(0.037)	(0.174)	(0.002)	(0.011)
Mean	23.722	23.722	0.632	0.632	44.739	44.739	0.143	0.143	0.005	0.005
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,058	1,055	4,086	4,081	1,451	1,448	1,451	1,448	1,981	1,977

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

Table 14: Effects of the Policy on Reallocation Effects Robustness: Alternative Control Group

	Reallocation Effects			
	Formal-To-Informal		Informal-To-Informal	
	(1)	(2)	(3)	(4)
DiD	−0.019	−0.016	0.008	0.014
	(0.019)	(0.018)	(0.030)	(0.030)
Treated	0.012	0.003	−0.076***	−0.040***
	(0.009)	(0.009)	(0.011)	(0.011)
Post	0.030***	0.017	0.109***	0.138***
	(0.006)	(0.015)	(0.013)	(0.036)
Constant	0.092***	0.222***	0.201***	−0.145***
	(0.003)	(0.027)	(0.005)	(0.035)
Mean	0.106	0.106	0.151	0.151
Covariates	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes
Observations	29,464	29,425	14,864	14,837

Notes: *p<0.1; **p<0.05; ***p<0.01
The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

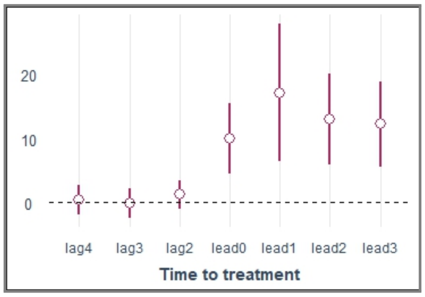
Table 15: Effects of the Policy on Reallocation Effects Robustness: Restricted Sample

	Reallocation Effects			
	Formal-to-Informal		Informal-To-Formal	
	(1)	(2)	(3)	(4)
DiD	-0.050^{*}	-0.039	0.017	0.016
	(0.024)	(0.023)	(0.036)	(0.035)
Treated	0.050^{*}	0.026	-0.045	0.030
	(0.022)	(0.025)	(0.024)	(0.026)
Post	0.028^{*}	-0.062	0.104^{***}	0.111
	(0.012)	(0.041)	(0.022)	(0.063)
Constant	0.088^{***}	0.401^{***}	0.166^{***}	-0.138
	(0.010)	(0.095)	(0.017)	(0.104)
Mean	0.127	0.127	0.183	0.183
Covariates	No	Yes	No	Yes
Time fixed effects	No	Yes	No	Yes
Observations	4,423	4,423	2,626	2,621

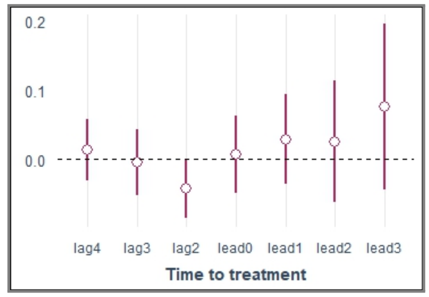
Notes: *p<0.1; **p<0.05; ***p<0.01

The controls included in the regressions are gender, age, age square, years of schooling, marital status, and a dummy for observations in urban areas. Standard errors are clustered at the individual level.

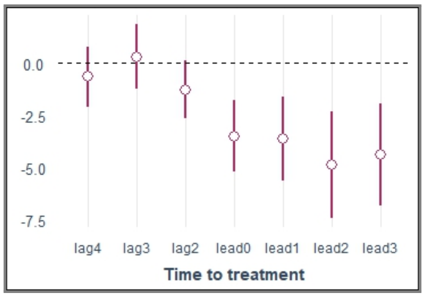
Figure 10: Event Studies of Formal Sector Robustness: Alternative Control Group



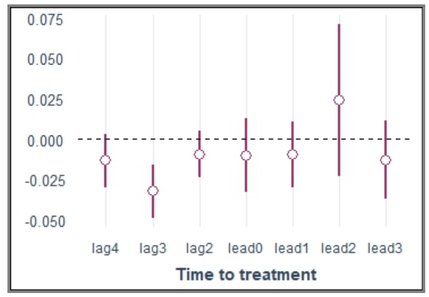
(a) Wages



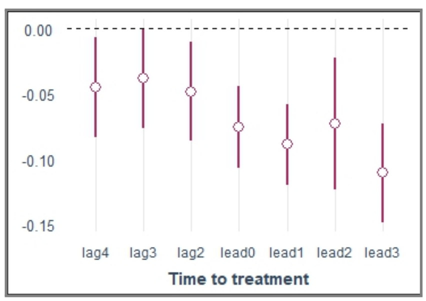
(b) Formal Employment



(c) Hours Worked

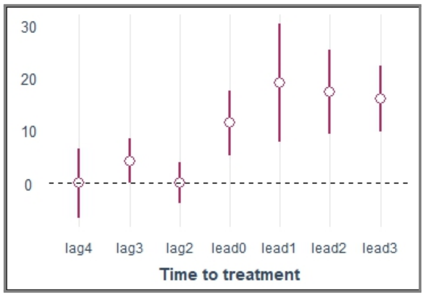


(d) Part-time Employment

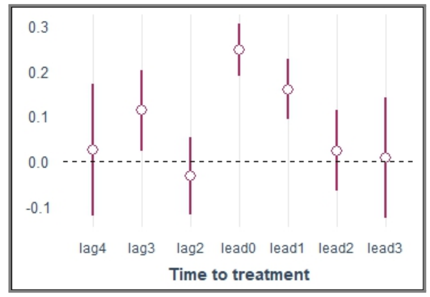


(e) Extra Hours Worked

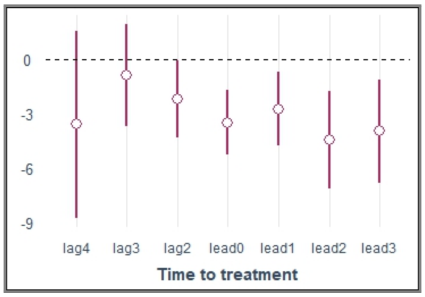
Figure 11: Event Studies of Formal Sector Robustness: Restricted Sample



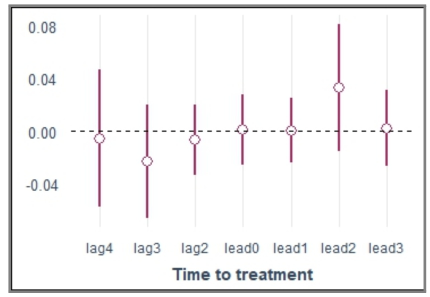
(a) Wages



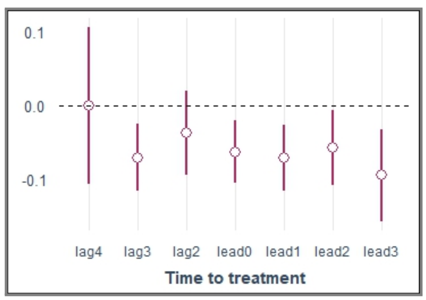
(b) Formal employment



(c) Hours worked

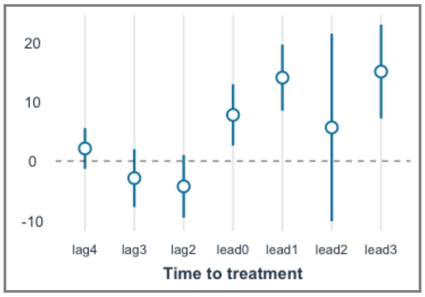


(d) Part-time employment

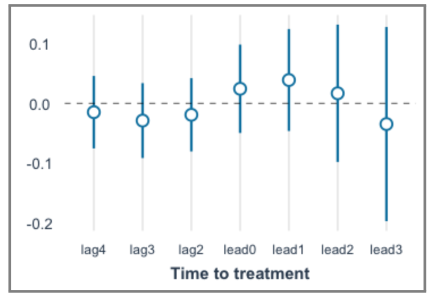


(e) Extra hours worked

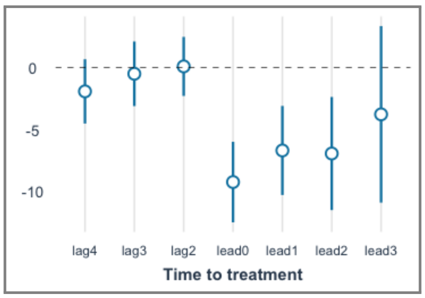
Figure 12: Event Studies of Informal Sector Robustness: Alternative Control Group



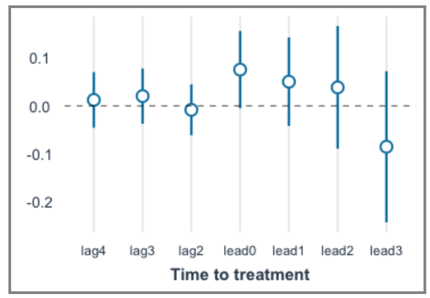
(a) Wages



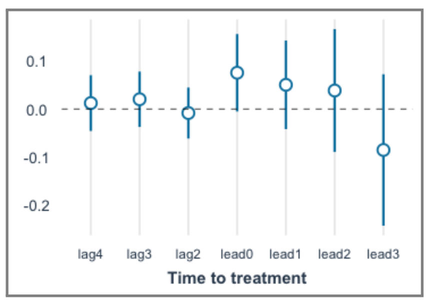
(b) Informal employment



(c) Hours worked

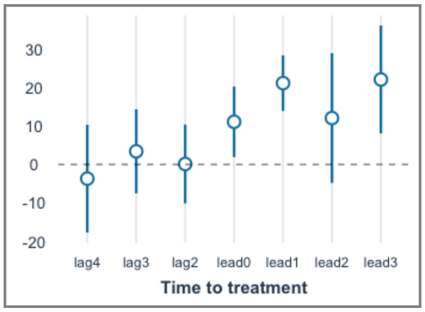


(d) Part-time employment

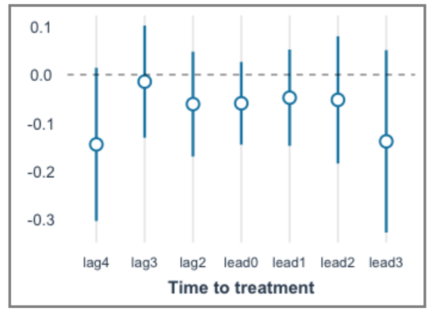


(e) Extra hours worked

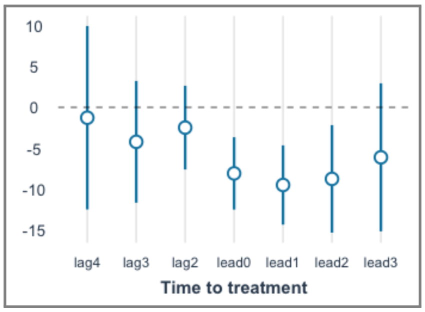
Figure 13: Event Studies of Informal Sector Robustness: Restricted Sample



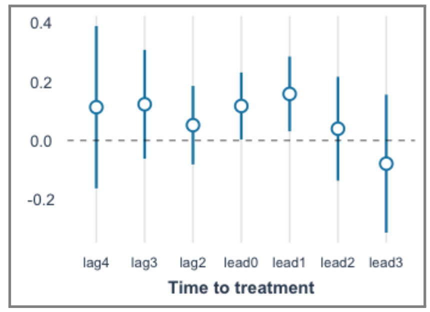
(a) Wages



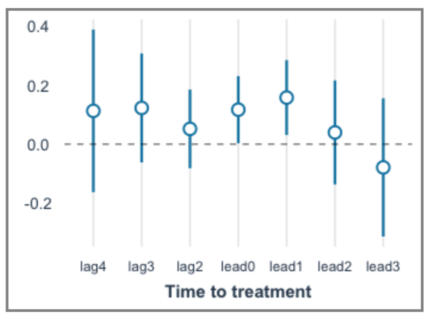
(b) Informal employment



(c) Hours worked

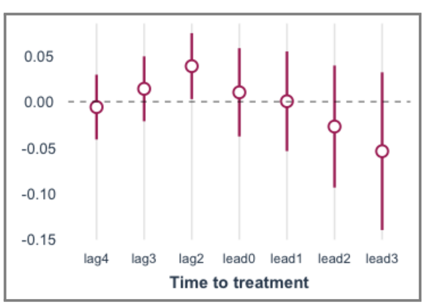


(d) Part-time employment

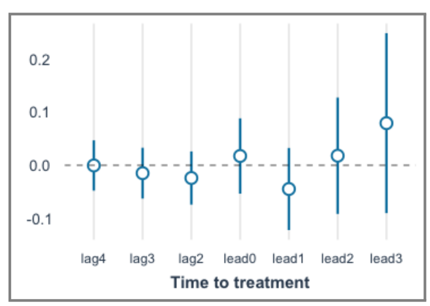


(e) Extra hours worked

Figure 14: Event Studies of Reallocation Effects Robustness: Alternative Control Group

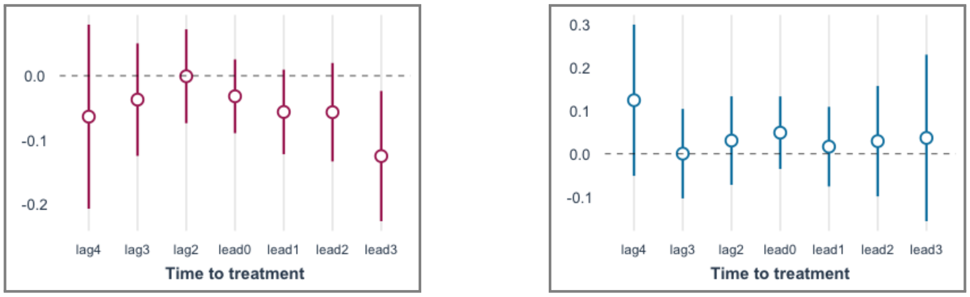


(a) Formal-to-Informal



(b) Informal-to-Formal

Figure 15: Event Studies of Reallocation Effects Robustness: Restricted Sample



(a) Formal-to-Informal (b) Informal-to-Formal