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**Minimum wage policy impact on enterprises in developing
countries: evidence from Ecuador**

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**UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ
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**HOJA DE APROBACIÓN DE TRABAJO DE
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**Minimum wage policy impact on enterprises in developing
countries: evidence from Ecuador**

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DEDICATORY

I would like to dedicate this Thesis to my parents Mauro and Marilu, thanks for all your support and guidance.

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To Julio, my advisor, thanks for guidance in this thesis.

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Minimum wage policy impact on enterprises in developing countries: evidence from Ecuador

Mauro Daniel Rivera Villarreal

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Resumen

La implementación e incremento del salario mínimo es una política que causa una gran controversia en la literatura económica dado a los diversos resultados sobre los efectos de esta. Dentro de esta investigación enfocada hacia los países en desarrollo, por medio de la utilización de datos administrativos del Ecuador y una metodología de diferencias en diferencias, se ha determinado que existe un efecto causal para las Grandes Empresas y pequeños negocios bajo el esquema RISE. Los resultados para las empresas con esquema Rise muestran una reducción en los salarios promedios pagados a los trabajadores en 6.79 %, además no se ha encontrado un impacto en el empleo para este tipo de empresas. Por otro lado, al evaluar el comportamiento de la Grandes Empresas, el incremento del salario mínimo no tiene un efecto en los salarios promedios y ventas anuales, sin embargo tiene un impacto positivo significativo en el número de empleados.

Palabras clave: Salario Mínimo, Diferencias en Diferencias, CIIU, DIEE

Abstract

The implementation and increase of the minimum wage is a policy that causes great controversy in economic literature due to the different results regarding its effects. This research focuses on developing countries, using administrative data from Ecuador and a difference-in-differences methodology, to determine the causal effect for big firms and small businesses under the RISE tax regime. The results for companies under RISE show a reduction in the average wages paid to workers by 6.79%, and no impact on employment has been found for this type of company. On the other hand, when evaluating the behavior of big firms, the increase in the minimum wage has no effect on average wages and annual revenue; however, it has a significant positive impact on the number of employees.

Keywords: Minimum Wage, Difference in Difference, CIU, DIEE

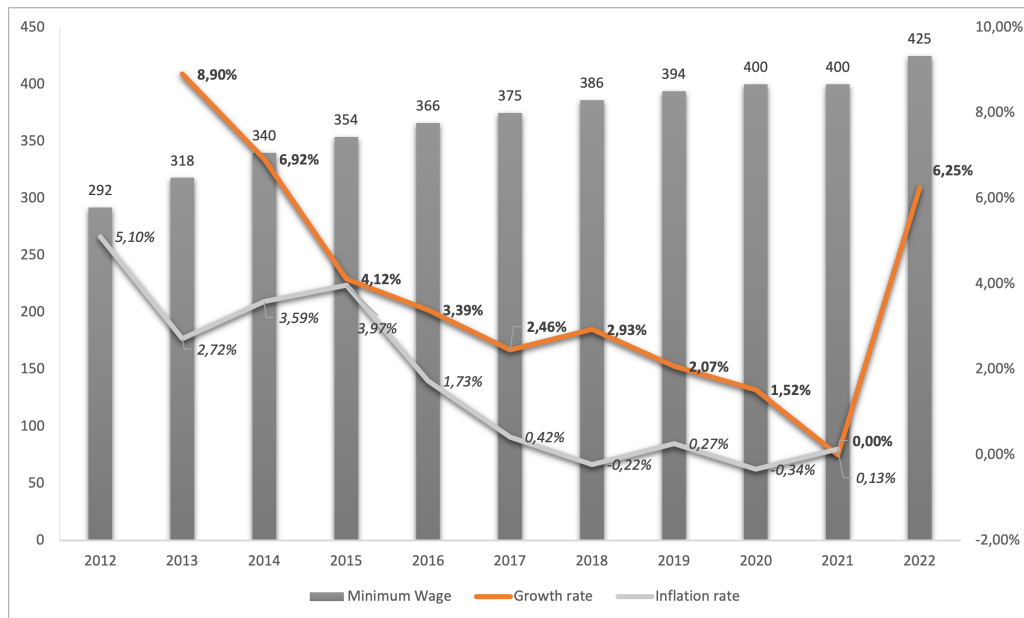
1 Introduction

The effects of minimum wage policy implementation have been a controversial topic for several decades, as there is not a complete understanding of their implications on enterprises and society. On one hand, there are papers that show that minimum wage policies reduce employment for low-skilled workers. Stigler argues that the policy's result for low-wage industries will be a displacement of low-wage employees, despite recognizing that minimum wage could increase employment in monopsonic or oligopsony markets (Stigler, 1946). Additionally, a summary of the minimum wage literature performed by Neumark and Wascher (2006) concludes that the balance of the empirical literature demonstrates negative employment effects

However, other papers suggest that low-wage workers, on average, experience wage growth relative to high-wage workers. This has led to the reallocation of low-wage workers from smaller to larger, lower- to higher-paying, and less to more productive enterprises.(Dustmann et al., 2022).

Evidence of the impact of minimum wage policy in developing countries is limited, as most of the literature is concentrated on US evidence where the policy compresses the wage distribution and has a trivial impact on employment (Card and Krueger, 2016; Neumark and Wascher, 1992; Brown, 1999). However, labor markets have a different structure in developing countries, where more workers could be affected by the introduction of the policy as the informal labor market is more prominent. Therefore, a higher impact on employment is expected (Lemos, 2009).

This paper aims to contribute to the minimum wage literature in developing countries by exploring the effects of the implementation of the minimum wage increase policy in Ecuador in 2018. Specifically, it presents the impacts on salaries paid, revenues, and employment for two types of companies: big firms and small businesses in the RISE tax regime, using administrative data from Ecuador from 2015 to 2020. The data used corresponds to the Directorio de Empresas y Establecimientos (DIEE) published by the Instituto Nacional de Estadísticas y Censos (INEC). This

Figure 1: Evolution of minimum wage in Ecuador

Notes: This graph shows the minimum wage established by the government through 2012 to 2022, also the annual growth rate and inflation rate of each year. Data obtained from Central Bank of Ecuador.

database collects data from the Tax Administration (SRI), Social Security (IESS), and Ministry of Education.

In Ecuador, the minimum wage has been a policy implemented several years ago, with several increments over the years. In 2020, the minimum wage was established at US\$400 and for 2022, it was increased to US\$425 with an increment of 6.25%. Moreover, the increment of the real minimum wage over the last eleven years, 2012-2022, is 32.54%. It is important to note that the growth rate of the minimum wage is generally higher than the inflation rate, providing real implications for the implementation of the policy, as shown in Figure 1.

The labor market in Ecuador is highly composed of informal workers. According to the International Labor Organization (ILO), the informal market makes up 51.1% of the working population (*En ecuador trabajadores independientes e informales se*

capacitan Con Metodología Empresarial de Oit Para recuperar sus Medios de Vida 2021). These groups of workers are not subject to the minimum wage policy, and therefore their wages could vary in comparison to the minimum wage set by the government.

I have found variations in the wages paid by Ecuadorian Big and RISE firms induced by the introduction of the minimum wage policy in Ecuador. Using a difference-in-difference methodology as a quasi-experimental technique to examine the impact of minimum wages on firm revenues, employment, and average salaries paid to employees, I have discovered important results to consider when implementing a policy of this nature. To apply the methodology, I first specified a treatment group consisting of those firms that are most likely to be affected by the minimum wage policy, i.e., enterprises that pay less than the minimum wage established in 2018. Then, I identified a comparison group comprising firms whose paid wages are less affected by the minimum wage increment policy imposed

Using a difference-in-differences dynamic treatment effect, I found a causal impact of the minimum wage increment policy that was implemented in 2018. The policy had an impact on the average salaries paid to employees in Big and Rise firms. Specifically, in Ecuador, the implementation of the minimum wage policy in 2018 had an impact on small businesses in the Rise tax regime, decreasing the average wages paid to employees by 6.79%. Small businesses in Rise tax regime are classified by DIEE as businesses with annual sales of less than US\$60,000 and fewer than 10 employees. This tax regime was created to bring the informal labor market in Ecuador into the tax culture. Furthermore, the results showed no impact on employment for Rise enterprises.

On the other hand, DIEE classifies Big firms as those with annual sales greater than US\$5,000,000 and more than 200 employees. The results for big firms show no statistically significant evidence of an increase or decrease in average salaries paid to employees or annual revenue due to the introduction of a minimum wage increment

policy. However, it was found that there was a positive effect on employment as a result of the policy's implementation in 2018.

The rest of this paper is organized as follows: Section 2 provides a literature review that highlights the main contribution of this paper to the minimum wage literature for developing countries, with evidence from Ecuador. Section 3 describes the data used and presents a descriptive analysis of the main exploration variables. Section 4 introduces the methodology used in the study, while Section 5 presents the identification strategy employed. Section 6 explores the main results, and in Section 7, we conclude the paper with a brief summary and discuss the implications for public policy execution consequences.

2 Literature Review

The economic literature on the minimum wage has evolved over the decades. In the 1980s, there was a consensus that the policy led to a slight increase in wages and a decrease in employment, consistent with economic theory (Brown, Gilroy, and Kohen, 1982). In the 1990s, new evidence, mostly from the US, sparked a debate about the impact of the policy. Some results suggested negative effects on wages (Deere, Murphy, and Welch, 1995; Neumark and Wascher, 1992), while others estimated non-negative effects (Machin, Manning, and Rahman, 2003; Card and Krueger, 1995). However, the methodologies used to obtain those results varied, with some papers using time series models and others using quasi-experimental techniques with panel data.

The recent literature, known as the new minimum wage research, focuses on specific groups to identify the policy's impacts, such as low-skilled workers (Williams and Mills, 2001) and young workers entering the labor market, among others. Despite this, there is still no consensus on the impact of the policy (Wascher and Neumark, 2006).

As part of the new minimum wage research, there is a paper that studies the case of Germany, in which the national minimum wage was introduced at 8.50/hour in 2015. This policy caused controversy since 60% of the population earned less than what was established in the policy, and many economists predicted a loss of 900,000 jobs nationwide as a result. However, the final results suggest that there was an increase in wages for both high wage workers (Dustmann et al., 2022), and there was no evidence found of a significant decrease in wages for low-wage workers. Other evidence even suggests that wage inequality was reduced as a result of the policy's implementation (Bossler and Schank, 2020)

Another example is an investigation that used a general equilibrium model incorporating heterogeneity among companies and workers. The study found that the impact of raising the minimum wage policy is heterogeneous across companies: generally, companies with low productivity will exit the market, but their workers do

not exit the labor market as they are reassigned to companies with higher productivity. In highly competitive markets, when a company voluntarily raises its minimum wage, evidence suggests that it tends to increase the wages of its competitors due to the cross-elasticity of employee wages (Berger, 2022).

A common explanation for the results found in evaluations of minimum wage policy where increments or not affection of the policy is the existence of monopsony and oligopsony in the market (Manning, 2012). In markets that are not perfectly competitive, companies may have the decision-making power to choose to hire workers at a certain salary, exhibiting monopsonistic or oligopsonic behavior. This means that they can opt for low salaries, and the employee has no influence in determining the salary they would like to be employed for. Although there may be several companies offering work, an individual cannot work in all job offers, and job search entails a cost in time. If the labor market has high exit barriers, there will be limited mobility for the employee.

To test the theory that the effects of minimum wage on employment vary as a function of market concentration, a recent study found that there is a positive correlation between market concentration and the effects of employment for minimum wage (Azar, Berry, and Marinescu, 2022). While concentration maintains a bias due to omitted variables, the behavior of monopsony and oligopsony can explain the null or even positive effects on employment due to increases in the minimum wage.

There is another type of minimum wage literature that focuses on the effects of the policy on enterprises. It is expected that the company's reaction to the policy will be to reduce its employees or directly lead to business failure in the face of the increase in minimum wage. However, a study conducted by Fair Work Australia (2010) states that the adjustments that companies make in case of increases in the minimum wage includes:

- Strategies that reduce labor costs: change the category of employees, cut work hours, replace staff with lower paid personnel.

- Strategies that do not reduce labor costs: reduction in travel expenses, insurance, tools, among others
- Strategies that increase sales
- Increase in prices of products and/or services

These strategies applied by companies could be related to some research that has been carried out. For example, it has been found that there is no discernible correlation between increases in the minimum wage and an increase in business failures, either in the year the increase occurred or in subsequent years (Waltman, McBride, and Camhout, 1998).

The firms' reactions to variations in the minimum wage also depend on the cost share of certain production factors such as capital, working capital, intermediate goods, and the elasticity of substitution between labor and other factors such as capital and intermediate goods (Hamermesh, 2021).

A research conducted in Vietnam revealed that there have been thirteen increases in the minimum wage since 1993, and the impact of these increases on the profitability of companies and business failure is very small and statistically insignificant (Cuong, 2017).

The evidence from Hungary shows that adjustments made by firms in response to steady increases in the minimum wage are mostly reflected in increases in wages, rather than unemployment. The study found that only 0.076% of workers lost their job, while 60% of workers experienced wage increases. These wage increases were largely absorbed by increases in prices, indicating that the burden of the wage increases falls on consumers (Harasztosi and Lindner, 2019).

However, the literature on minimum wage for developing countries in firms and society is limited, as the impact of the policy on employment and wages depends on minimum wage variations over the years and the labor market circumstances of each country. The lack of administrative data and low variations in minimum wages over the years in Latin America have been constraints in obtaining evidence. Neverthe-

less, some studies that have analyzed the impacts of the minimum wage policy in developing countries suggest that the employment effects and wage compression are more prominent in comparison to developed countries (Lemos, 2009).

The main contribution of this paper is to provide new evidence for the minimum wage literature in developing countries by using data from Ecuador. Specifically, it evaluates the impacts of the implementation of minimum wage policy from a firm perspective, using an administrative database from Ecuador with a panel structure.

Taking advantage of the variation in the minimum wage over the last 5 years in Ecuador and using a Difference-in-Differences methodology, I found a causal effect of the minimum wage policy on employment, total revenues, and average wages paid to workers in two types of enterprises: big firms and small businesses in the RISE tax regime. The obtained results contribute to future recommendations for the implementation of this policy, focusing on developing countries where high informal labor markets and low concentration of big enterprises predominate.

3 Data and Descriptive Analysis

For obtaining the results of the paper, we used the Directorio de Empresas y Establecimientos (DIEE) database published by the Instituto Nacional de Estadísticas y Censos (INEC) from 2012 to 2020. This database generates statistical information on the Ecuadorian business structure from administrative data and provides information on the total number of economic units, sales, and employed personnel (measured through employment positions registered in social security) from an economic sectors and geographic perspective. The information in this database is collected from the Ecuadorian Tax Administration (SRI), Social Security (IESS), and Ministry of Education.

Additionally, the database contains information on both public and private enterprises that operate within the national territory and have generated economic activity within a certain period of time.

It is important to note that the DIEE database used in this study is considered reliable and widely used in Ecuadorian economic research due to its comprehensive coverage of the entire Ecuadorian business sector. The database provides information on both formal and informal businesses, making it an ideal source for studying the impacts of minimum wage policy on different types of enterprises. Additionally, the panel structure of the database allows for the tracking of individual businesses over time, which is critical for identifying the causal effects of minimum wage policy on employment, revenues, and wages.

I have focused on data from 2015 to 2020, using a panel dataset of enterprises in Ecuador. The dataset contains 5,319,994 observations, with each year accounting for approximately 16-17% of the observations. We have also included information on the minimum wages for each year. Furthermore, the DIEE dataset includes a division of economic sectors based on the Clasificación Internacional Industrial Uniforme (CIIU).

The data contains the annual salaries paid to workers as reported to the Tax Administration by enterprises from 2015 to 2020. To appropriately apply the method-

ology, the wages paid were deflated by the Consumer Price Index, using the year 2014 as the base year (2014 = 100). As a result, the minimum wages are expressed in real terms. Additionally, the wages were transformed into monthly average real wages paid by each enterprise for each year.

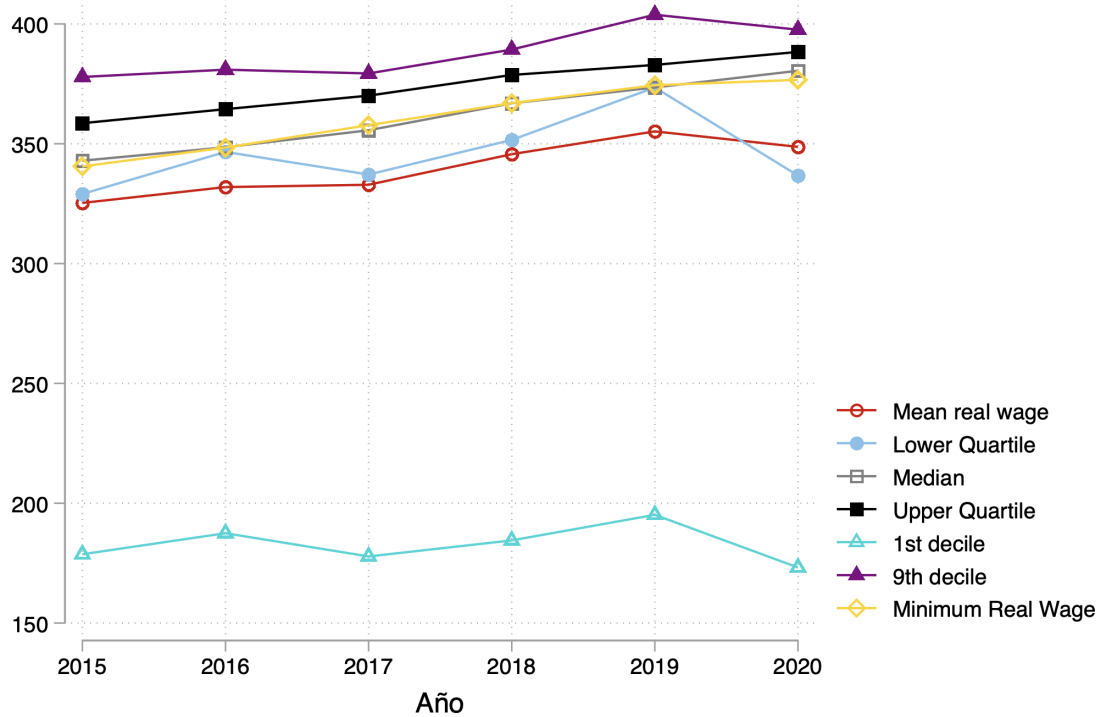
In this section, a descriptive analysis is presented for the main variables of interest, including the average monthly wages paid to employees, the number of employees, and the total annual revenue. The analysis focuses on two types of enterprises: Big Firms and Small businesses in RISE tax regime, which were affected by the minimum wage policy. These are enterprises that paid monthly wages in average less than the minimum wage established in 2018.

The DIEE dataset classifies small businesses with annual sales of less than US\$60,000 and with less than 10 employees as RISE. In addition, small businesses whose owners receive annual dependent income of less than the basic fraction of income tax and whose sales, together with the business, do not exceed US\$60,000 per year are also classified as RISE. Furthermore, those who start economic activities and do not expect to exceed sales of US\$60,000 per year are also included in this category. However, this tax regime was created with the purpose of providing simplicity to small taxpayers and micro-entrepreneurs in complying with their tax obligations. In Ecuador, according to the International Labor Organization, 51.1% of employees are part of the informal labor market, and RISE is a mechanism to encourage the informal sector to comply with tax laws.

Figure 2 shows the evolution of real wages for small businesses in RISE tax regime shows that average real wages have an upward trend from 2015 to 2019. However, there is a decline in 2020, which is even more evident for the lower decile of the wage distribution. It is also important to note that the 1st decile of wages is consistently lower than the real minimum wages for each year. This pattern is replicated for the lower quartile and median as well.

This is important because the treatment group consists of firms that are most likely to be affected by the minimum wage policy, i.e., those whose real average wages

Figure 2: Evolution of Rise Wages in Ecuador



Notes: This graph illustrates the evolution of real wages paid to workers by Small Business in Rise tax regime in mean, median, quartiles and specific deciles and comparing them with the real minimum wage for years 2015 to 2020. **Source:** Author's own elaboration, data obtained from DIEE.

are below the minimum wage imposed in 2018. Therefore, RISE companies below the real minimum wage are likely to be the most affected by the introduction of the policy.

I have identified 90,011 small business companies in the RISE tax regime that have complete information from the years 2015 to 2020. Of those, 9.6% correspond to the treatment group, i.e., Rise-Low Wage Firms.

RISE-Non Low Wage Firms show an upward trend in the average wages paid to employees, in contrast to Rise-Low Wage Firms. This difference is more evident in 2020, with a decrease of 84% compared to 2015. The gap in average salaries between the control and treatment groups has increased over time, with a threshold of US\$3 in 2015 and US\$150 in 2020, as shown in Table 5 in the appendix. This trend is also reflected in Figure 4, where the distribution of the treatment group shows lower average monthly salaries compared to the control group. According to Table 1, average wages for affected RISE firms have decreased in the post-period of minimum wage implementation, whereas those not affected have shown an increase in salaries paid. This same trend is observed for big firms, where the treatment group has lower average monthly salaries compared to the control group.

On the other hand, the average total revenue for Big Firms in 2018 decreased by 9.2%. Both affected and non-affected Big Firms also experienced a decline in revenue. RISE small businesses also experienced a significant decrease in revenue for 2019 and 2020. However, figure 7 shows that the treatment group has a high concentration of revenues in the middle of the distribution.

In terms of employment for RISE small firms, there is a minimum of 1 employee and a maximum value of 40 employees. Figure 9 shows that the control group has a higher density of businesses with only one employee compared to the treatment group. This suggests that the treatment has increased employment in RISE small firms.

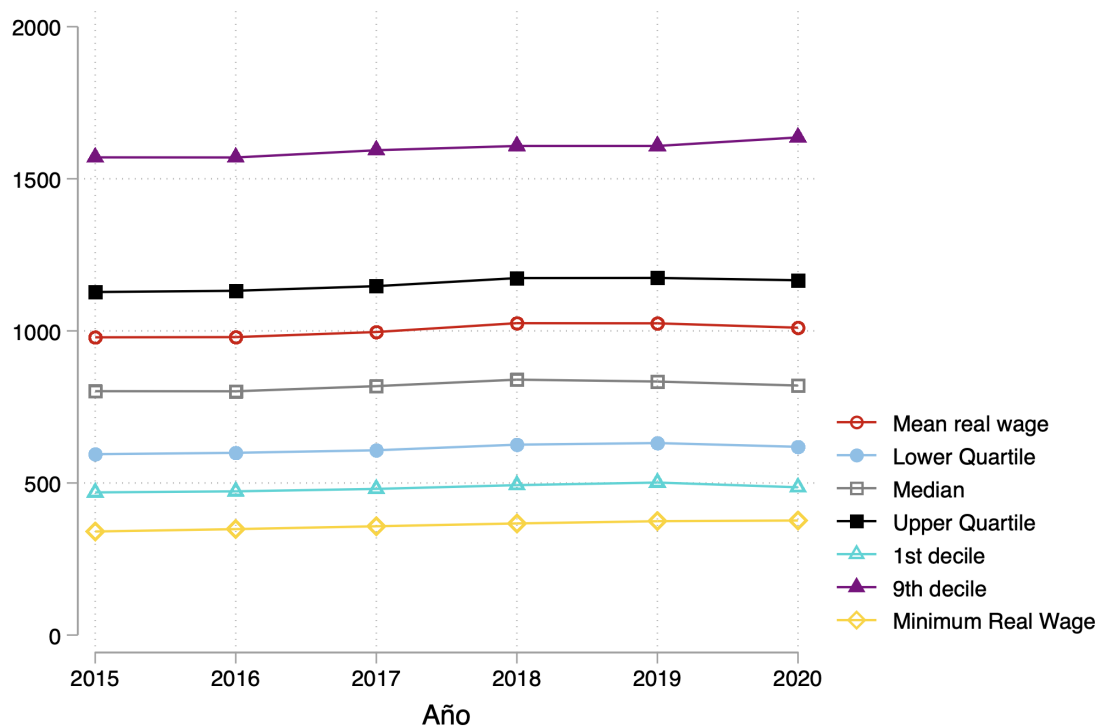
Other types of companies that are affected by the introduction of the minimum wage policy are Big Enterprises, which DIEE recognizes as those with annual sales

Table 1: Descriptive analysis of the treatment and control Groups through pre and post periods of minimum wage implementation for the main exploration variables

		Big Firms				Small Business in Rise Tax Regime			
		Affected		Not Affected		Affected		Not Affected	
Dependent Variable	Periods	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Real Average Monthly Paid Wages In US\$	Pre MWP	743.32	395.36	1,002.57	825.37	387.79	65.01	393.38	95.96
	Post MWP	635.60	398.05	1,041.937	884.73	373.11	42.81	415.66	76.76
Observations		22,495				35,558			
Number of Employees	Pre MWP	180.90	136.85	306.11	649.87	1.94	1.53	1.32	0.80
	Post MWP	193.42	142.36	303.45	632.20	1.64	1.14	1.27	0.71
Observations		21,600				35,558			
Annual Average Real Revenue in thousand of US\$	Pre MWP	8,681.87	3,696.45	32,570.45	136,262	0	0	3.12	44.52
	Post MWP	8,169.25	3,255.02	32,099.55	152,177.7	0	0	0.13	3.50
Observations		21,600				3,656			

Notes: This table compares the characteristics of Big and Rise Firms that are affected for the implementation of minimum wage policy with Big and Rise Firms that are not affected for the policy within the pre and post periods of implementation. MWP refers to Minimum Wage Policy Implementation. Summary statistics data come from DIEE for the period 2015-2020. Low Wage Firm refers to firms with an average wage lower than the real minimum wage in 2018, the Non Low Wage firms are defined as firms with average wages higher than the real minimum wage in 2018.

Figure 3: Evolution of Big Firms Wages in Ecuador



Notes: This graph illustrates the evolution of real wages paid to workers by Big Firms in mean, median, quartiles and specific deciles and comparing them with the real minimum wage for years 2015 to 2020. **Source:** Author's own elaboration, data obtained from DIEE.

greater than US\$5,000,000 and with more than 200 employees. I have identified 5,249 enterprises in the category of Big Firms, of which 3.2% are part of the treatment group.

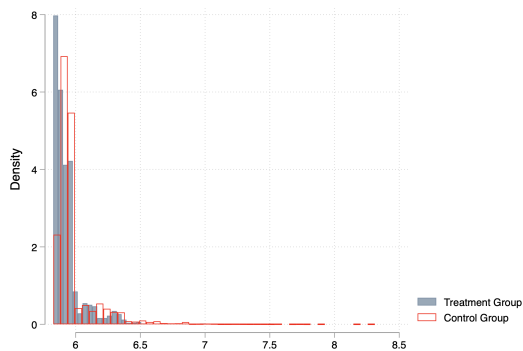
In the case of Big Firms, the evolution of real wages is higher compared to RISE firms as expected. On average, the real wages paid to employees are US\$1,003.11. Most of the employees that are part of the Big Firms earn more than the minimum wage. Even the 1st decile of the average paid wages to employees is greater than the minimum wage. Therefore, it is expected that these firms would not be affected by the introduction of the minimum wage policy.

However, Big Firms - Non Low Wage Firms registered almost twice the average salaries paid to employees compared to Big Firms - Low Wage Firms from 2015 to 2020. Additionally, both groups have opposite trends, as Big Firms - Low Wage Firms tend to decrease salaries over the years, whereas Big Firms - Non Low Wage Firms have a positive trend. This trend is reflected in Figure 5, where the distribution of average salaries in the control group is right-skewed in comparison to the distribution of the treatment group.

In the case of the total revenues of Big Firms, it is notable that the revenues of Big Firms - Non Low Wage Firms are greater than Big Firms - Low Wage Firms, as they are almost triple their revenues, as shown in table 5 in the appendix. However, in both groups, there is not a clear trend in revenues through the years 2015 to 2020 that suggests an impact of the minimum wage policy introduction. For both groups, revenues remain similar, which is congruent with figure 8 as both distributions are almost aligned.

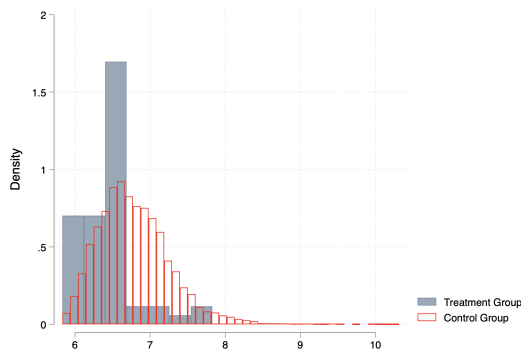
Big firms concentrates the 45% of employment in Ecuador. The treatment Group have an average of 169 employees in 2015, however from 2017 the employment have an important increase of 28% being contradictory with the Big Firms - Non Low Wage Firms as they have downward trend until 2019. Therefore, as other investigations suggest there could be a positive impact in employment by the introduction of the minimum wage policy.

Figure 4: Histograms of Average Wages in treated and control group for Rise Firms



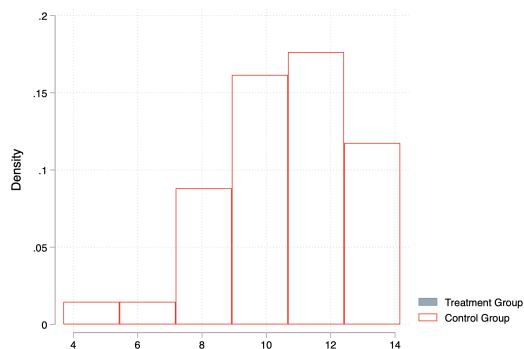
Notes: This graph shows a comparison of the distributions of the treated and control groups on Ln of average wages paid to employees by Rise firms. Control Group - Not Low Wage Firms distribution in red. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 5: Histograms of Average Wages in treated and control group for Big Firms



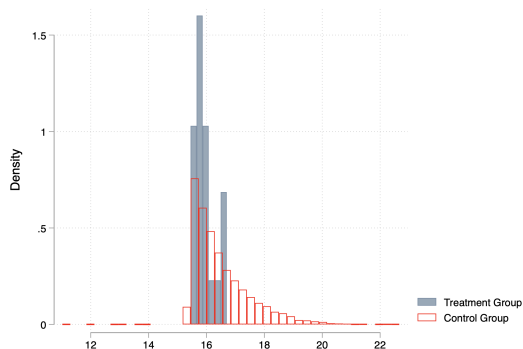
Notes: This graph shows a comparison of the distributions of the treated and control groups on the Ln of average wages paid to employees by Big firms. Control Group - Not Low Wage Firms distribution in red. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 6: Histograms of Annual Revenue in treated and control group for Rise



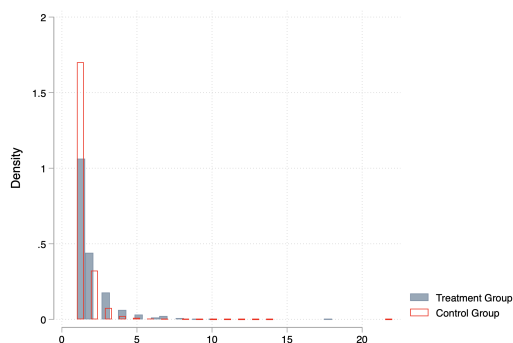
Notes: This graph shows a comparison of the distributions of the treated and control groups on the Ln of annual revenue of Rise Firms. Control Group - Not Low Wage Firms distribution in red. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 7: Histograms of Annual Revenue in treated and control group for Big Firms



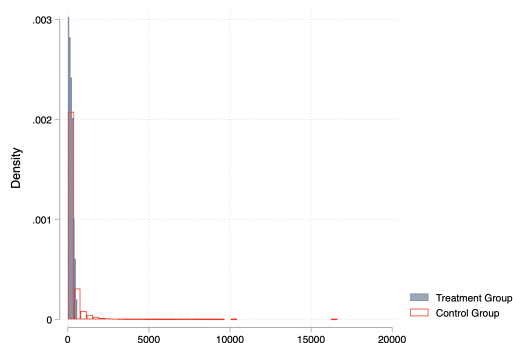
Notes: This graph shows a comparison of the distributions of the treated and control groups on the Ln of annual revenue of Big Firms. Control Group - Not Low Wage Firms distribution in red. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 8: Histograms of Employment in treated and control group for Rise Firms



Notes: This graph shows a comparison of the distributions of the treated and control groups on employment of Rise Firms. Control Group - Not Low Wage Firms distribution in red.
Source: Author's own elaboration, data obtained from DIEE.

Figure 9: Histograms of Employment in treated and control group for Big Firms



Notes: This graph shows a comparison of the distributions of the treated and control groups on employment of Big Firms. Control Group - Not Low Wage Firms distribution in red.
Source: Author's own elaboration, data obtained from DIEE.

4 Methodology

”Following Draca, Machin, and Van Reenen (2011), Babiak, Chorna, and Pertold-Gebicka (2019), and Card and Krueger (1993), a difference-in-differences approach is used to measure the effects of minimum wage policies on the average monthly wages paid to employees, employment, and total annual revenues of enterprises.

Using a Difference in Difference approach is a common method for measuring the impact of a policy intervention on an outcome of interest. It involves comparing changes in the outcome over time between a treatment group ,those who are affected by the policy intervention, and a control group, those who are not affected by the policy intervention.

In the case of measuring the effects of minimum wages on enterprise average monthly wages paid to employees, employment, and total annual revenues, the Difference in Difference approach involves comparing the changes in these outcomes over time between firms that are affected by the minimum wage policy ,treatment group, and those that are not affected, control group.

This approach allows us to isolate the effect of the minimum wage policy from other factors that may be affecting these outcomes over time, such as changes in the overall economy or industry-specific trends. By comparing the changes in the outcomes between the treatment and control groups, we can estimate the causal impact of the policy intervention.

First, a treatment group is specified consisting of firms that are most likely to be affected by the minimum wage policy. Then, a comparison group is identified, comprising firms whose paid wages are less affected by the policy. The aim is to examine the response of total annual revenues, average wages, and number of employees before and after the policy change in both treatment and control groups to evaluate the impact of the minimum wage on enterprises.

The baseline specification defines a treatment indicator variable for each firm in our sample based on the firm’s pre-policy average wage $W = \ln(W_t)$, where t is the

period when the policy is implemented and $t-1$ is the period preceding the minimum wage implementation (Draca, Machin, and Van Reenen, 2011).

The treatment indicator is defined as $P = 1$ if $W_{t-1} < W_t$ and $P = 0$ otherwise. The difference in responses of firm revenues across the treatment and control firms evaluates the impact of the minimum wage increase on their revenue, employment and average wages paid to employees (Draca, Machin, and Van Reenen, 2011).

I have estimate a Difference in Difference regression model for validating the wages impacts for Rise and Big firms in the treatment group compared to those in the control group as follows:

$$W_{i,t} = \beta_0 + \beta_1 X_{i,t} + \delta Y_t + \theta I(W_{i,t-1} < W^*) + \psi [I(W_{i,t-1} < W^*) MWP] + \epsilon_{i,t}$$

Where:

In the model, $W_{i,t}$ represents the natural logarithm of the average monthly wage of firm i at time t .

$X_{i,t}$ represents a vector of control variables that may affect wages,

Y_t represents a vector of time fixed effects,

δ represents the coefficients for the time fixed effects, and

$\epsilon_{i,t}$ is the error term.,

$I(.)$ is an indicator function

MWP_t is a policy dummy variable. that is equal to 0 for pre-policy periods and to 1 for years where policy was already in place.

The impact of the minimum wage increase or decrease is captured by the diff in diff coefficient θ . Also, it is possible to calculate an unconditional diff in diff estimator by the following formula:

$$(W_{MWP=1}^{T=1} - W_{MWP=0}^{T=0}) - (W_{MWP=1}^{T=0} - W_{MWP=0}^{T=0})$$

where $W = \ln(\text{AverageWages})$, MWP is a dummy variable which obtain a value of 1 for the years in which the policy is implemented and 0 for pre-implementation years. This difference-in-difference estimate is just the simple difference in means unconditional on other characteristics of firms (Draca, Machin, and Van Reenen, 2011).

A similar difference in Difference approach for revenue impacts on Rise and Big enterprises by the increments in minimum wage could be reach by following the next formula:

$$(\text{Revenue}_{MWP=1}^{T=1} - \text{Revenue}_{MWP=0}^{T=0}) - (\text{Revenue}_{MWP=1}^{T=0} - \text{Revenue}_{MWP=0}^{T=0})$$

In a regression context the Difference in Difference methodology will be as follows:

$$\ln(\text{Revenue})_{i,t} = \beta_0 + \beta_1 X_{i,t} + \delta Y_t + \theta_1 I(W_{i,t-1} < W^*) + \psi_1 [I(W_{i,t-1} < W^*) MWP] + \epsilon_{i,t}$$

where the variable X is a set of control variables; Y denotes a set of year effects. Here, the regression corrected difference-in-difference estimate of the impact of MWP introduction on the $\ln(\text{Revenue})$ is the estimated coefficient on the low wage treatment dummy in the periods when the MWP was in operation, $\psi_{i,t}$.

For employment a Difference in Difference approach its also performed on Big enterprises by the increments in minimum wage could be reach by following the next formula:

$$(\text{Employees}_{MWP=1}^{T=1} - \text{Employees}_{MWP=0}^{T=0}) - (\text{Employees}_{MWP=1}^{T=0} - \text{Employees}_{MWP=0}^{T=0})$$

In a regression context the Difference in Difference methodology will be as follows:

$$\text{Employees}_{i,t} = \beta_0 + \beta_1 X_{i,t} + \delta Y_t + \theta_1 I(W_{i,t-1} < W^*) + \psi_1 [I(W_{i,t-1} < W^*) MWP] + \epsilon_{i,t}$$

where:

Employees refers to the number of employees in a firm i in time t
the variable X is a set of control variables
 Y denotes a set of year effects.

Here, the regression corrected difference-in-difference estimate of the impact of MWP introduction on the Number of Employees is the estimated coefficient on the low wage treatment dummy in the periods when the MWP was in operation, $\psi_{i,t}$.

5 Identification Strategy

The identification strategy employed in this study utilizes the variation in wages paid by Ecuadorian Big and Rise firms, as well as changes in the number of employees in Big Firms, resulting from the introduction of the minimum wage policy in Ecuador. This quasi-experimental technique, known as difference in differences, is used to examine the impact of minimum wages on firm annual revenues, employment, and average monthly wages paid to employees.

As previously explained, the treatment group consists of firms that are likely to be affected by the minimum wage policy, i.e., firms that pay real average salaries less than the minimum wage established in 2018. The comparison group, on the other hand, consists of firms that are less affected by the policy.

One of the difficulties with the identification strategy in our methodology is that Ecuador introduced a minimum wage policy every year from 2015 to 2020. Therefore, it is necessary to examine the effects of the policy's introduction in each year. The use of a Difference-in-Difference dynamic treatment effect will allow us to examine how the effect works throughout the pre- and post-periods.

A dynamic treatment effect approach can help us understand the effects of the minimum wage policy introduction in each year, and how the effects vary over time. This approach allows us to examine the pre and post policy period separately, and to estimate the effects of the policy in each period. By doing so, we can better

understand the dynamics of the policy and how it affects the outcomes of interest over time.

First, we generated a centered time variable, which is the original time variable minus one period (Huntington-Klein, 2021). In our case, the baseline year is 2017. Therefore, the pre-period includes the years 2015 and 2016, while the post-period consists of the years 2018, 2019, and 2020. We will use this dynamic treatment approach to examine how the effects of the minimum wage policy work throughout the pre and post periods.

In an ideal scenario, there should not be any effects in the before-treatment coefficients, as they must be closer to zero and not statistically significant. Performing a placebo test would help determine if there are effects in the policy periods. If there are no effects in the placebo period, then the after-period coefficients would demonstrate the effect after the relevant period.

It was found that the introduction of the minimum wage policy in 2018 had a significant impact on the average real salaries of two types of companies: Rise and Big Firms, as shown in Figures 10 and 11.

The DIEE data defines small businesses as those with annual sales of less than US\$60,000 and less than 10 employees, and this category is referred to as RISE. Additionally, small businesses whose owners receive annual dependent income less than the basic fraction of income tax and whose combined sales and income do not exceed US\$60,000 per year are also included in the RISE category. This category also includes businesses that are starting their economic activities and do not expect to exceed sales of US\$60,000 per year.

It is observed that there is an immediate effect on average real wages for all post-periods after the implementation of the minimum wage policy for Rise firms. Figure 11 shows a significant impact on average wages in these types of firms, which constitute a substantial part of the informal labor market in Ecuador.

On the other hand, the other type of companies that are affected by the introduction of the minimum wage policy are Big Enterprises, which DIEE recognizes as

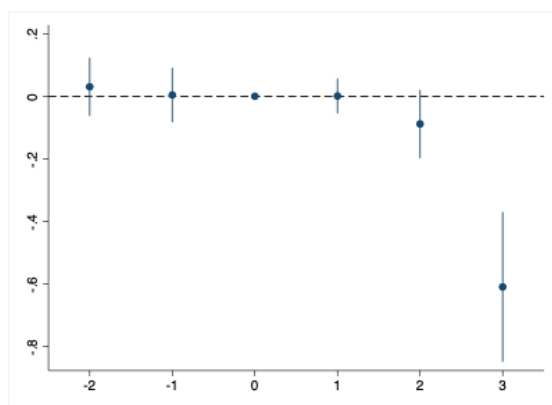
those with annual sales greater than US\$5,000,000 and more than 200 employees. For these types of companies, the effect on average wages arose in the last period, showing that the effect of the policy was not present in period 1 (2018) and period 2 (2019), but appeared in period 3 (2020), as shown in figure 10. However, 2020 - period 3 was the year when the COVID-19 pandemic took place, causing firms to change their behavior significantly due to the consumption constraints caused by the lockdowns.

Moreover, the causal effect of the implementation of the minimum wage policy in 2018 is shown on employment for Big Firms in figure 12, which suggests that no effect on employment should arise due to the treatment for the three periods after the year of treatment implementation. A similar behavior is shown for Annual Revenues in figure 15.

In the results section, we discuss the effects of the minimum wage policy on RISE and Big Enterprises, focusing on the variables where a causal effect was found.

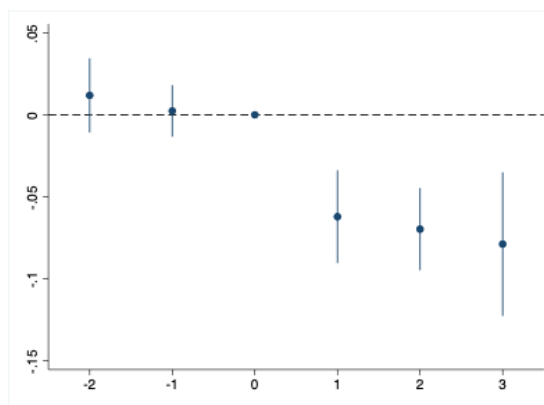
To ensure a more accurate analysis of the policy's effect, treated enterprises prior to the implementation of the policy were removed from the dataset. This was done to avoid any confounding factors that may have affected the results, since there should not be any treated firms in the previous treatment years.

Figure 10: Dynamic Treatment on Ln Real Average Wage for Big Firms



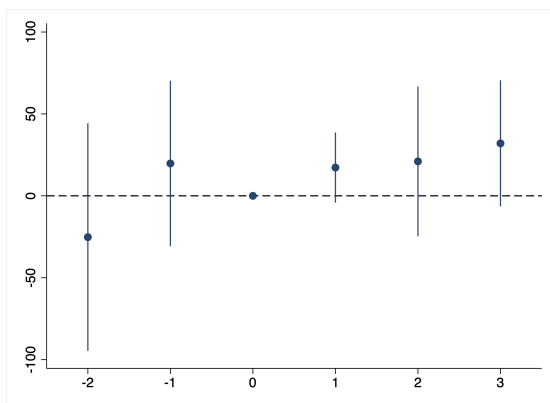
Notes: This graph shows the dynamic treatment effect of Ln Real Average Wages for Big Firms following the implementation of the minimum wage policy in 2018. The treatment group consists of companies that are most likely to be affected by the policy, i.e., low wage firms, while the control group consists of companies that are not affected by the policy, i.e., Non Low Wage Firms. The standard errors are clustered by industry, and the baseline is the year 2017. The pre-period corresponds to the years 2015 and 2016, and the post-period corresponds to the years 2018, 2019, and 2020. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 11: Dynamic Treatment on Ln Real Average Wage for Rise Firms



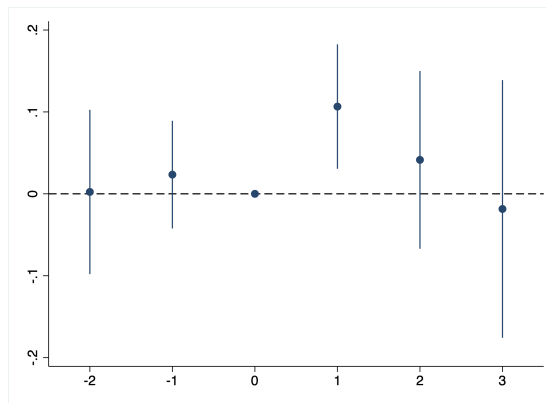
Notes: This graph shows the dynamic treatment of Ln Real Average Wages for Small Businesses in the Rise tax regime due to the implementation of the minimum wage policy in 2018. The treatment group consists of low-wage firms that are most likely to be affected by the policy, while the control group includes Non Low Wage Firms that are not affected by the policy. Standard errors are clustered by industry. The baseline is the year 2017, the pre-periods correspond to the years 2015 and 2016, and the post-periods correspond to the years 2018, 2019, and 2020. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 12: Dynamic Treatment on Employment for Big Firms



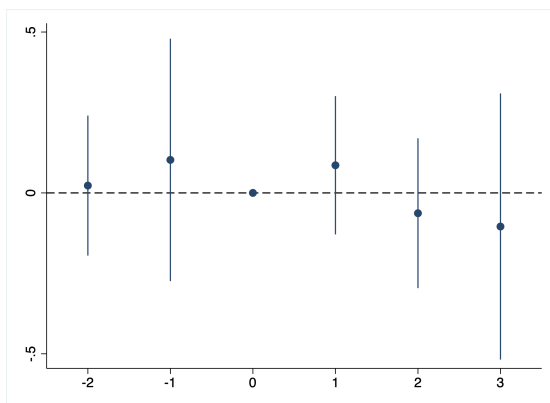
Notes: This graph illustrates the dynamic treatment effect on employment due to the introduction of the minimum wage policy in 2018 for Big Enterprises, considering the treatment group as those companies that are most likely to be affected by the minimum wage, i.e., low-wage firms, and the control group as those companies that are not affected by the policy, i.e., non-low wage firms. Standard errors are clustered by industry. The baseline is the year 2017, the pre-periods correspond to the years 2015 and 2016, and the post-period corresponds to 2018, 2019, and 2020. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 13: Dynamic Treatment on Employment for Rise



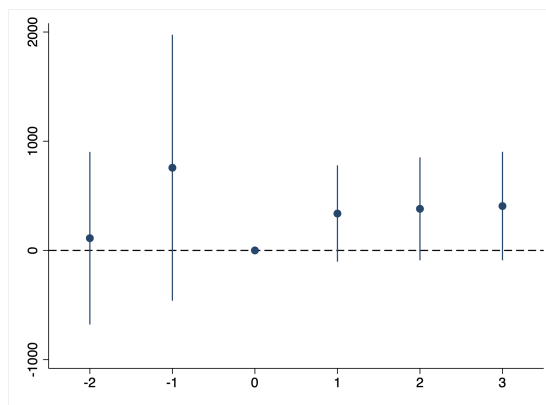
Notes: This graph illustrates the dynamic treatment of employment by the introduction of the minimum wage policy in 2018 for Big Enterprises, considering the treatment group as those companies that are most likely to be affected by the minimum wage policy (i.e., low wage firms), and the control group as those companies that are not affected by the policy (i.e., non-low wage firms). The standard errors are clustered by industry. The baseline year is 2017, the pre-periods correspond to the years 2015 and 2016, and the post-period corresponds to the years 2018, 2019, and 2020. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 14: Dynamic Treatment on Ln Real Revenue for Big Firms



Notes: This graph illustrates the dynamic treatment of Ln real revenue for small businesses in the Rise tax regime by the introduction of the minimum wage policy in 2018. The treatment group consists of low wage firms that are most likely to be affected by the policy, while the control group consists of non-low wage firms that are not affected by the policy. Standard errors are clustered by industry. The baseline year is 2017, and the pre-periods correspond to the years 2015 and 2016, while the post-periods correspond to 2018, 2019, and 2020. **Source:** Author's own elaboration, data obtained from DIEE.

Figure 15: Dynamic Treatment on Real Revenue for Rise



Notes: This graph illustrates the dynamic treatment of Ln real revenue for Big Firms by the introduction of the minimum wage policy in 2018. The treatment group consists of low wage firms that are most likely to be affected by the policy, while the control group consists of non-low wage firms that are not affected by the policy. Standard errors are clustered by industry. The baseline year is 2017, and the pre-periods correspond to the years 2015 and 2016, while the post-periods correspond to 2018, 2019, and 2020. **Source:** Author's own elaboration, data obtained from DIEE.

6 Results

Panel A of Table 2 presents the results from an unconditional difference-in-difference analysis of the mean natural logarithm of average wages for the treatment and control groups for the three years before and after the introduction of the minimum wage policy for Big Firms. The results show that wages decreased by 17.6% in the lower initial wage group (i.e., $T = 1$) across the pre- and post-policy period, compared to a wage growth of 3.7% in the higher initial wage group (i.e., $T = 0$). However, the difference-in-difference coefficient is not statistically significant, which is consistent with the economic labor literature that suggests the minimum wage policy variable does not increase wages for big firms with low wages. This may be explained by the presence of a monopsonistic or oligopsonistic labor market behavior in Ecuador, which is also in line with the economic labor literature.

In Panel B of Table 2, the results for the number of employees in Big Firms suggest an increase of 12 employees after the implementation of the minimum wage policy, while there was a decrease of 3 employees in the Non Low Wage Firms. This shows that the policy had a greater impact on employment of Big Firms. The Diff in Diff coefficient is statistically significant, indicating an increase of 27.29 employees due to the implementation of the minimum wage policy.

For Panel C of Table 2, the results for Annual Revenue in Big Firms suggest that the Diff in Diff coefficient is not statistically significant, indicating that there was no significant impact on revenues due to the introduction of the policy.

Panel A of Table 3 presents results from unconditional difference-in-differences for the natural logarithm of average wages paid to employees in small businesses in the RISE tax regime for treatment and control groups for three years before and after the minimum wage increment policy introduction. Wages decreased across the pre- and post-policy three-year implementation period by 3% in the lower initial wage group (i.e., $T=1$) compared to wage growth of 5.3% in the higher initial wage group (i.e., $T=0$). The diff-in-diff coefficient is not statistically significant; therefore, it suggests no impact in the implementation of the minimum wage policy on the average wages paid to employees. The diff-in-diff coefficient of the number of employees shows a positive sign; however, it is not statistically significant, presenting no impacts on employment for RISE firms.

Table 4 presents the main results of the introduction of the minimum wage policy in 2018, considering Big and Rise - Low Wage Firms, i.e., the firms most likely to be affected by the policy, compared to those not affected by the policy, with the addition of control variables. Despite the inclusion of control variables such as geographic location, economic sector, employment, and revenue dummies, the diff and diff model regression coefficient maintains a negative sign for average wages for Big Firms, but it remains statistically insignificant. Therefore, the implementation of the minimum wage policy does not generate an impact on average wages for Big Firms.

In contrast, for Small Businesses in the RISE tax regime, the diff in diff coefficient is statistically significant and has a negative impact on average wages. The introduction of the minimum wage increment policy results in a decrease of 6.79% in the wages of RISE companies. This finding is consistent with economic literature, which suggests that low-skilled workers are more likely to be affected by the introduction of such policies. It is important to note that the RISE tax regime was created with the aim of introducing a tax culture to Ecuadorian informal sector and it primarily includes companies with lower revenues and wages. Moreover, most of the wages

paid in RISE firms are already below the minimum wage in each year and as they are part of the informal sector, they are not subject to the minimum wage policy.

In the case of employment, Big Firms show an impact from the introduction of the minimum wage policy as the diff in diff coefficient is statistically significant for employees and suggests an increase of 25 employees on average due to the introduction of the minimum wage increment policy in 2018. On the other hand, there is no effect on employment for the Small Business in the Rise tax regime, as the coefficient remains statistically insignificant. There is no evidence of an impact on revenues for Big Firms.

Table 2: Differences in Big Firms Average Wages, sales and employment before and After the Introduction of the National Minimum Wage

Panel A -Average Wages Effects	Pre-MWP introduction	Post-MWP introduction	Difference
Big Firms - Ln (Average Wage)			
Pre-MWP Low Wage Firm T=1	6.526	6.350	-0.176
Pre-MWP Non Low Wage Firm T=0	6.769	6.806	0.037
Diff in Diff			-0.098 (0.075)
Panel B - Number of Employees Effects	Pre-MWP introduction	Post-MWP introduction	Difference
Big Firms- # Employees			
Pre-MWP Low Wage Firm T=1	181	193	12
Pre-MWP Non Low Wage Firm T=0	306	303	-3
Diff in Diff			27.29*** (9.053)
Panel C - Real Revenue Effects	Pre-MWP introduction	Post-MWP introduction	Difference
Big Firms- ln (Real Annual Revenue)			
Pre-MWP Low Wage Firm T=1	15.944	15.910	-0.044
Pre-MWP Non Low Wage Firm T=0	16.498	16.503	-0.005
Diff in Diff			0.04 (0.049)

Notes: Pre-MWP corresponds to the three financial years 2015, 2016 and 2017 and Post-MWP refers to the three financial years 2018,2019 and 2020. T = 1 indicates the treatment group and T = 0 indicates the comparison group. The treatment group, i.e. Pre- MWP Low Wage Firm, is defined as firms with an average wage lower than the real minimum wage in 2018, the comparison group is defined as firms with average wages higher than the real minimum wage in 2018. Standard errors in parentheses are clustered by firm and sample size is 18,161 (there are 3,705 firms).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Differences in Firm Average Wages, sales and employment before and After the Introduction of the National Minimum Wage

Panel A - Average Wages Effects	Pre-MWP introduction	Post-MWP introduction	Difference
RISE - Ln (Average Wage)			
Pre-MWP Low Wage Firm T=1	5.950	5.917	-0.033
Pre-MWP No Low Wage Firm T=0	5.958	6.012	0.053
Diff in Diff			-0.015 (0.007)
Panel B - Number of Employees Effects	Pre-MWP introduction	Post-MWP introduction	Difference
Rise- # Employees			
Pre-MWP Low Wage Firm T=1	2	2	0
Pre-MWP Non Low Wage Firm T=0	1	1	0
Diff in Diff			0.013 (0.04)

Notes: Pre-MWP corresponds to the three financial years 2015, 2016 and 2017 and Post-MWP refers to the three financial years 2018,2019 and 2020. T = 1 indicates the treatment group and T = 0 indicates the comparison group. The treatment group, i.e. Pre- MWP Low Wage Firm, is defined as firms with an average wage lower than the real minimum wage in 2018, the comparison group is defined as firms with average wages higher than the real minimum wage in 2018. Standard errors in parentheses are clustered by firm and sample size is 18,161 (there are 3,705 firms).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Complete Model Results for Big and Rise Firms

	Big Firms			Rise		
	Ln Real Average Wage (1)	Number of Employees (2)	Ln Real Revenue (3)	Ln Real average Wage (4)	Number of Employees (4)	
Diff in Diff	-0.0293 (-0.71)	24.59* (2.24)	-0.0193 (-0.21)	-0.0679*** (-5.89)	0.0462 (0.88)	
Observations	17901	20943	17901	34305	34305	34305

Notes:

t statistics in parentheses

Diff in Diff variable refers to the interaction between the MWP_t and the treatment group variable

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Control variables:

Geographic Variables used in models 1, 2, 3, 4 and 5

Economic Sectors Variables used in models 1, 2, 3, 4 and 5

Employees Summary used in models 1, 3 and 4

Revenue Summary used in model 1, 4 and 5

7 Conclusions

In Ecuador, Minimum Wage Increment Policies have been a common practice in recent years. The real minimum wage has increased by 32.54% over the last eleven years, and the current president plans to raise the minimum wage to US\$500 by 2025. However, the potential effects of these increases on the Ecuadorian labor market remain unknown until now.

In this investigation, my focus was on evaluating the impact of the minimum wage policy introduced in Ecuador in 2018 on the average wage paid to employees, firm revenue, and employment for Big and RISE firms, using administrative data with a panel structure.

The economic literature suggests that minimum wage increment policies do not affect firms' salaries or profitability. However, in developing countries where the informal sector dominates, the introduction of these policies can have the opposite effect, as we have shown for RISE Enterprises. Our results demonstrate that the introduction of a minimum wage policy led to a decrease in average wages paid to employees by 6.79% for RISE firms. Nevertheless, we found no impact on employment.

However, for Big Firms, the results suggest that the average salaries paid to workers were not impacted by the introduction of the policy, which is consistent with monopsonic or oligopsonic behavior in the labor market. Additionally, annual average revenues were not affected by the policy, and there was an average increase of 25 employees following the introduction of the minimum wage policy.

The proposed increase in the national minimum wage to US\$500 by 2025 in Ecuador could have a controversial effect, particularly on small businesses in the Rise tax regime. These businesses are not subject to the minimum wage policy as most of them operate in the informal labor market. This could lead to an unexpected outcome from the policy as the average wages in Rise firms may be reduced, resulting in a compression of the wages distribution.

These findings suggest that the implementation of minimum wage increment policies in developing countries with prominent informal sectors should be approached with caution, as it may have unintended consequences on wages and employment. Policymakers should consider the characteristics of the labor market and the potential impact on different types of firms before implementing such policies.

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9 Appendix

Table 5 shows a descriptive analysis per year of the main exploration variables: real average wages, number of employees and annual real revenue through periods 2015 to 2020 sorted by the treatment and control Group.

I also present the results of the effect of the introduction of control variables for each regression model for constructing the final results present in table 4.

Table 5: Descriptive Analysis of the treatment and control Groups through years 2015 -2020 for the main exploration variables

Dependent Variable	Year	Big Firms				Small Business in Rise Tax Regime			
		Treatment Group		Control Group		Treatment Group		Control Group	
		Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Real Average Paid Wages In US\$	2015-2020	529.13	337.77	1,013.00	853.74	295.44	117.91	365.19	95.96
	2015	556.48	265.73	988.54	876.94	305.47	111.05	334.95	98.73
	2016	583.76	376.50	988.18	801.52	309.71	104.75	343.15	93.97
	2017	526.29	276.08	1,007.19	801.52	308.18	114.98	345.82	108.81
	2018	555.40	339.81	1,035.62	868.52	282.18	122.44	390.34	79.35
	2019	514.20	356.87	1,034.18	898.87	297.73	120.76	397.57	79.30
	2020	409.01	404.14	1,021.21	864.68	270.18	125.88	404.09	76.76
Observations		22,495				157,892			
Number of Employees	2015-2020	178.54	232.41	300.50	635.15	1.68	1.25	1.29	0.77
	2015	169.00	220.01	309.09	685.14	1.83	1.43	1.35	0.88
	2016	174.25	232.87	303.59	626.34	1.80	1.37	1.32	0.81
	2017	152.91	211.13	297.12	622.77	1.74	1.30	1.29	0.76
	2018	176.60	238.21	292.56	616.20	1.64	1.17	1.26	0.73
	2019	194.19	247.04	292.95	614.29	1.58	1.10	1.26	0.72
	2020	217.01	253.59	309.34	646.41	1.48	1.04	1.22	0.62
Observations		22,495				157,892			
Annual Average Real Revenue in thousand of US\$	2015-2020	9,743.268	8,057.8	32,481.85	142,980.7	2.56	53.95	1.89	35.40
	2015	10,082.65	8,448.85	32,944.78	140,503.8	3.85	30.30	3.34	34.22
	2016	9,729.50	7,069.96	31,504.21	126,565.1	1.77	20.45	1.53	19.48
	2017	8,905.99	7,289.79	32,344.04	137,969.2	3.12	81.23	4.49	70.53
	2018	9,230.72	7,027.57	33,009.75	157,967.8	3.73	85.04	.05	1.32
	2019	10,158.57	7,944.93	32,861.31	160,000.1	0.40	8.50	.21	5.07
	2020	10,877.06	11,246.88	32,099.55	127,342.5	0	0	.22	4.65
Observations		19,715				5,760			

Table 6: Model Results for Small Business in RISE Tax Regime in Average Wages

	RISE				
	Log Average Wages				
	(1)	(2)	(3)	(4)	(5)
Diff in Diff	-0.0151 (-1.20)	-0.0679*** (-5.90)	-0.0679*** (-5.89)	-0.0679*** (-5.89)	-0.0679*** (-5.89)
<u>Geography Variables</u>					
Reference: Not Delimited Zone					
Azuay		0.0188*** (31.44)	0.0188*** (31.35)	0.0188*** (31.03)	0.0190*** (31.26)
Guayas		0.0187*** (31.64)	0.0187*** (31.55)	0.0188*** (31.23)	0.0189*** (31.46)
Pichincha		0.0188*** (31.92)	0.0188*** (31.84)	0.0188*** (31.51)	0.0190*** (31.74)
<u>Economic Sector Variables</u>					
Reference: Service Sector					
Agriculture			0.00000596 (1.03)	0.00000596 (1.03)	0.00000596 (1.03)
Mining and Quarrying			0.0000133** (2.74)	0.0000133** (2.74)	0.0000132** (2.74)
Manufacture Industry			0.00000238 (0.63)	0.00000238 (0.63)	0.00000238 (0.63)
Comerce Sector			-0.000000424 (-0.19)	-0.000000425 (-0.19)	-0.000000425 (-0.20)
Construction			0.0000137 (1.50)	0.0000137 (1.50)	0.0000137 (1.50)
Services			0 (.)	0 (.)	0 (.)
<u>Employment Summary</u>					
Estrato Empleo I (≤ 9)				-0.0000593 (-1.20)	-0.0000593 (-1.20)
Estrato Empleo II (10-49)				0 (.)	0 (.)
<u>Revenue Summary</u>					
Estrato Ventas I (≤ 100.000)					-0.000130*** (-444.14)
Estrato Ventas II (100.001 - 1.000.000)					0 (.)
Observations	34305	34305	34305	34305	34305

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Model Results for Big Firms in Average Wages

	Big Firms				
	Log Average Wages				
	(1)	(2)	(3)	(4)	(5)
Diff in Diff	-0.0980 (-1.31)	-0.126 (-1.75)	-0.126 (-1.75)	-0.123 (-1.68)	-0.0293 (-0.71)
<u>Geographic Variables</u>					
Azuay		0.0123*** (7.38)	0.0123*** (7.36)	0.0125*** (7.37)	0.0142*** (9.84)
Guayas		0.0123*** (7.37)	0.0123*** (7.35)	0.0125*** (7.36)	0.0142*** (9.81)
Pichincha		0.0123*** (7.37)	0.0123*** (7.34)	0.0125*** (7.35)	0.0143*** (9.80)
<u>Economic Sector Variables</u>					
Agriculture			-0.0000351 (-1.52)	-0.0000376 (-1.61)	-0.0000381 (-1.52)
Mining and Quarrying			0.0000938*** (6.88)	0.0000761*** (4.59)	0.0000739*** (4.28)
Manufacture Industry			-0.0000472* (-2.52)	-0.0000469* (-2.45)	-0.0000481* (-2.41)
Commerce Sector			-0.00000714 (-0.56)	-0.00000956 (-0.74)	-0.00000866 (-0.63)
Construction			-0.0000395 (-0.90)	-0.0000403 (-0.80)	-0.0000424 (-0.84)
<u>Employment Summary</u>					
I (≤ 9)				0.0000725** (2.91)	0.0000726** (2.93)
II (10-49)				0.0000532** (3.27)	0.0000529** (3.27)
III (50-99)				0.0000306** (2.70)	0.0000299** (2.65)
IV (100-199)				0.0000159** (2.76)	0.0000152** (2.67)
<u>Revenue Summary</u>					
I (≤ 100.000)					-0.0138*** (-4.32)
II (100.001 – 1.000.000)					-0.0138*** (-4.31)
III (1.000.001 – 2.000.000)					-0.0138*** (-4.31)
Observations	20943	20943	20943	20943	17901

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Model Results for Big Firms in Annual Revenue

	Big Firms			
	Log Real Revenue			
	(1)	(2)	(3)	(4)
Diff in Diff	-0.0980 (-1.31)	-0.126 (-1.75)	-0.123 (-1.68)	-0.0293 (-0.71)
<u>Geographic Variables</u>				
Azuay		0.0123*** (7.36)	0.0125*** (7.37)	0.0142*** (9.84)
Guayas		0.0123*** (7.35)	0.0125*** (7.36)	0.0142*** (9.81)
Pichincha		0.0123*** (7.34)	0.0125*** (7.35)	0.0143*** (9.80)
<u>Economic Sector Variables</u>				
Agriculture		-0.0000351 (-1.52)	-0.0000376 (-1.61)	-0.0000381 (-1.52)
Mining and Quarrying		0.0000938*** (6.88)	0.0000761*** (4.59)	0.0000739*** (4.28)
Manufacture Industry		-0.0000472* (-2.52)	-0.0000469* (-2.45)	-0.0000481* (-2.41)
Commerce Sector		-0.00000714 (-0.56)	-0.00000956 (-0.74)	-0.00000866 (-0.63)
Construction		-0.0000395 (-0.90)	-0.0000403 (-0.80)	-0.0000424 (-0.84)
<u>Employment Summary</u>				
I (≤ 9)			0.0000725** (2.91)	0.0000726** (2.93)
II (10-49)			0.0000532** (3.27)	0.0000529** (3.27)
III (50-99)			0.0000306** (2.70)	0.0000299** (2.65)
IV (100-199)			0.0000159** (2.76)	0.0000152** (2.67)
<u>Revenue Summary</u>				
I (≤ 100.000)				-0.0138*** (-4.32)
II (100.001 - 1.000.000)				-0.0138*** (-4.31)
III (1.000.001 - 2.000.000)				-0.0138*** (-4.31)
Observations	20943	20943	20943	17901

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Model Results for Big Firms for Employment

	Big Firms		
	Number Of Employees		
	(1)	(2)	(3)
Diff in Diff	27.30*	24.56*	24.59*
	(2.06)	(2.23)	(2.24)
<u>Geographic Variables</u>			
Azuay		-0.0479	-0.0800
		(-0.03)	(-0.04)
Guayas		-0.00844	-0.0406
		(-0.00)	(-0.02)
Pichincha		-0.0393	-0.0714
		(-0.02)	(-0.04)
<u>Economic Sector Variables</u>			
Agriculture			-0.0603*
			(-1.98)
Mining and Quarrying			0.000431
			(0.03)
Manufacture Industry			0.0411
			(1.12)
Commerce Industry			0.00666
			(0.47)
Construction			-0.0552**
			(-2.87)
Observations	20943	20943	20943

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: Complete Model Results for Big and Rise Firms

	Big Firms			Rise	
	Inrealavewage (1)	Number of Employees (2)	Inrealrevenue (3)	Inrealavewage (4)	Number of Employees (4)
Diff in Diff	-0.0293 (-0.71)	24.59* (2.24)	-0.0194 (-0.21)	-0.0679*** (-5.89)	0.0462 (0.88)
<u>Geographic Variables</u>					
Azuay	0.0142*** (9.84)	-0.0800 (-0.04)	0.0000577 (0.01)	0.0190*** (31.26)	-0.0121** (-3.22)
Guayas	0.0142*** (9.81)	-0.0406 (-0.02)	-0.00000528 (-0.00)	0.0189*** (31.46)	-0.0123** (-3.26)
Pichincha × Año	0.0143*** (9.80)	-0.0714 (-0.04)	-0.0000473 (-0.01)	0.0190*** (31.74)	-0.0122** (-3.25)
<u>Economic Sector Variable</u>					
Agriculture	-0.0000381 (-1.52)	-0.0603* (-1.98)	-0.0000708 (-0.99)	0.00000596 (1.03)	-0.0000154 (-0.84)
Mining and Quarrying	0.0000739*** (4.28)	0.000431 (0.03)	0.0000271 (0.83)	0.0000132** (2.74)	0.00000223 (0.11)
Manufacture Industry	-0.0000481* (-2.41)	0.0411 (1.12)	0.0001000 (1.22)	0.00000238 (0.63)	0.0000689*** (3.86)
Commerce Sector	-0.00000866 (-0.63)	0.00666 (0.47)	0.0000357 (1.14)	-0.000000425 (-0.20)	0.00000771 (0.60)
Construction	-0.0000424 (-0.84)	-0.0552** (-2.87)	0.000326*** (8.44)	0.0000137 (1.50)	0.000119 (1.75)
<u>Employees Summary</u>					
I (≤ 9)	0.0000726** (2.93)		-0.000502*** (-19.26)	-0.0000593 (-1.20)	
II (10-49)	0.0000529** (3.27)		-0.000426*** (-21.24)		
III (50-99)	0.0000299** (2.65)		-0.000315*** (-16.89)		
IV (100-199)	0.0000152** (2.67)		-0.000171*** (-10.91)		
<u>Revenue Summary</u>					
I (≤ 100.000) × Año	-0.0138*** (-4.32)			-0.000130*** (-444.14)	0.000490*** (263.04)
II (100.001 - 1.000.000) × Año	-0.0138*** (-4.31)				
III (1.000.001 - 2.000.000) × Año	-0.0138*** (-4.31)				
Observations	17901	20943	17901	34305	34305

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$