



Universidad de  
**SanAndrés**

**Universidad de San Andrés**

**Departamento de Economía**

**Maestría en Economía**

*Measuring the impact of minimum wage legislation in a  
high-informality economy: the case of Ecuador*

**Maria Sarrabayrouse**

**33.524.488**

**Mentor: Gabriela Ertola Navajas**

**Buenos Aires,**

**Argentina**

**14 de febrero, 2020**

**Tesis de Maestría en Economía**

**Maria Sarrabayrouse**

**“Medición del impacto de la política de salarios mínimos en una economía con alta informalidad: el caso de Ecuador”**

Resumen

A pesar de la falta de consenso sobre los efectos que tienen las políticas de salarios mínimos en variables como los ingresos laborales; el empleo; el producto; y, la educación, los aumentos en los salarios mínimos, juntamente con otras políticas que buscan aumentar la cobertura de esta medida, han sido parte del kit de herramientas estándar de varios gobiernos que buscan comprimir la distribución de ingresos. El impacto de variaciones en los salarios mínimos ha sido estudiado en profundidad en las últimas décadas. Sin embargo, la mayoría de las investigaciones se ha focalizado en países desarrollados. Mientras que la cobertura de estas medidas, el cumplimiento por parte de las firmas y la informalidad no presentan problemas significativos en economías desarrolladas, pueden afectar los mecanismos que orientan el proceso de toma de decisiones de los individuos y la estructura del mercado laboral en economías en vías de desarrollo. Este trabajo emplea técnicas semi-experimentales para datos de panel, basadas en el modelo presentado en la publicación de Card (1992) y las aplica a una economía en vías de desarrollo: Ecuador. Adicionalmente, el presente trabajo analiza los efectos de variaciones en el salario mínimo nacional en el empleo formal e informal, de manera diferenciada. Los resultados obtenidos están parcialmente alineados con los presentados en la publicación de Card (1992), aunque el impacto en el empleo formal y el informal difiere. Mientras que se verifica un efecto negativo y significativo en el empleo informal, el impacto en el empleo formal y el empleo total es ambiguo.

Palabras clave: Salarios mínimos, Países en vías de desarrollo, Empleo, Informalidad, Variables instrumentales

## **“Measuring the impact of minimum wage legislation in a high-informality economy: The case of Ecuador”**

### Abstract

Despite the lack of a generalized consensus on the effects that minimum wage policies have on variables such as earnings, employment, output and education, increases in minimum wages together with policies addressing coverage and employer compliance, have been part of the standard toolkit for various governments who ultimately intended to compress earnings distribution. Minimum wage impact has been vastly studied in the last decades. Nevertheless, while coverage, compliance and informality might not present severe issues in developed countries, they can affect mechanisms orienting actors' decision-making processes and labor market structure in developing economies. This paper uses semi-experimental techniques for panel data based on Card's (1992) model and it applies them to a developing economy, namely Ecuador. On the other hand, it analyzes the effects of the national minimum wage separately on both formal and informal employment. The results obtained in this study, are partially in line with those presented in Card (1992) but differ between formal and informal employment. While there is a clear negative, significant and strong effect in informal employment, the impact on overall and formal employment is ambiguous.

Keywords: Minimum wages, Developing countries, Employment, Informality, Instrumental variables, Labor economics

Códigos JEL: C19 C36 E24 J01 J08 J38

## Introduction

The impact of minimum wage legislation has been in the center of labor economics debate in the past century, both theoretically and empirically. Despite the lack of a generalized consensus on the effects that minimum wage policies have on variables such as earnings, employment and output, increases in minimum wages together with policies addressing coverage and compliance, have been part of the standard toolkit for various governments who ultimately intended to compress earnings distribution.

A milestone in minimum wage literature, that not only makes a thorough review of previous theoretical literature but, foremost, compiles empirical results and sets a numerical benchmark on the employment effects of minimum wages, is the study presented by Brown, Gilroy and Kohen (1982). In the theoretical framework they present both the simple competitive supply-demand model of the labor market and the Monopsony model. In the former, an introduction (or increase) of the minimum wage will result in an excess of labor supply and a fall in employment. In the latter, instead, employers hire the labor that results from equating marginal cost and demand and hence, a minimum wage set between the monopsony wage and the competitive wage will increase employment. As presented in their work, overall empirical results until that moment, showed evidence of a negative impact of the minimum wages in employment. Particularly, an average increase of 10% in the minimum wage was shown to decrease teenage employment on 1-3%, approximately and although the magnitude of the coefficient could marginally vary, the sign remained for different age, race and sex subgroups.

The estimation of the effects of minimum wages on employment might not be straightforward, when working at state or province level. Since minimum wages are usually determined by federal legislation, this cancels any possible source of variation across provinces.

If the case is such that one could construct a variable that uses the minimum wage but also accounts for spatial variation, the minimum wage, as it is, might be endogenous deriving to another set of problems. Along with a greater availability of microdata and novel estimation techniques addressing the issues mentioned above, another strand of literature emerged with disrupting evidence pointing that, in fact, minimum wage impacts on employment can be considerably smaller than the ones shown in previous studies and in some cases even non-negative impacts where proved. Such are the cases of Card (1992); Card and Krueger (1994); Dickens, Machin and Manning (1999), within others. In particular, Card (1992) pleads that the introduction of a federal minimum wage renders a natural experiment in which the "treatment effect" varies across states since the fraction of workers affected by the legislation (those initially earning less than the new minimum) will differ in different states.

A point worth noticing is that most of the literature has been focused on developed countries. While coverage, compliance and informality might not present severe issues in the former, they can affect mechanisms orienting actors' decision-making processes and labor market structure in developing economies. There is a small strand of the recent literature which address these questions on developing countries but, more specifically, on Latin America. Although scarce, these studies reach consensus suggesting that the minimum wage legislation matters for these countries. In contrast to latest research on developed economies, there is an important effect on both wages and employment. While evidence generally points to positive impacts on wages (on both formal and informal sectors) and general negative effects on employment, the direction of the effect on employment rates vary across sectors.

This paper addresses issues presented in the previous two paragraphs. In a nutshell, the contribution of this paper to the previous literature is twofold: first, it uses semi-experimental

techniques for panel data based on Card's (1992) model and it applies them to a developing economy, namely Ecuador, seldomly studied; second, it analyzes the effects of the national minimum wage separately on both formal and informal employment. Although Wong (2019) studies the impact of minimum wages in Ecuador and uses Card's treatment group definition ("affected workers"), her approach differs the one presented here in several ways. In the first place, using a matching algorithm she builds a panel at an individual level for two quarters (December 2011 and December 2012) to which she applies a difference-in differences model. Our study uses quarterly panel data from 2008 to 2015 at the province level. Secondly, her work aims to estimate the effects of the minimum wage on the intensive margin, namely hours worked by low waged workers. Our aim is to estimate the impact on the extensive margin, this is the employment rate, for both formal and informal workers, separately.

The results obtained in this study are partially in line with those presented in Card (1992) but differ between formal and informal employment. While there is a clear negative, significant and strong effect in informal employment, the impact on overall and formal employment is ambiguous. Although the implied demand elasticities for the formal employment models are negative and close to zero, they are mostly not significant. The coefficients of the IV estimation (where the mean log wage is instrumented by the fraction of affected workers) are initially significant to 10% level, but the instrument used is weak.

Although these results run counter Welch (1974) two sector model's predictions, there are various reasons (further explained in Section 2 and 5) to think this framework may not apply to developing economies. In addition, following Terrell and Almeida (2008), a greater unemployment effect for informal workers could be explained by a larger difference between the average informal wage and the minimum wage related to the average formal wage and the

minimum wage. Finally, the fact that unemployment effects are larger for informal workers, relative to formal employees could also be partially explained by a mix of both the monopsony and competitive theoretical models applied to each type of employment. Employers hiring formal workers in Ecuador could have a considerable degree of market power such as if the new minimum wage lies below the one that results from equating marginal cost and demand, there is a range of possible salaries they can pay without reducing the workforce significantly. In contrast, employers hiring informal work in Ecuador seem to behave accordingly to the competitive model characterized by the downward-sloping aggregate labor demand curve, where a rise in the minimum wage results in an increase of average salaries and unemployment.

The rest of the paper is organized as follows; Section 2 presents a review of the related literature; Section 3 shortly describes the evolution of informal employment in Ecuador and a selection of Latin American countries; Section 4 makes a synthetic description of the minimum wage legislation process in Ecuador and its evolution during 2008-2016, Section 5 explains the data used and presents the empirical model; and, Section 6 outlines concluding remarks and discusses potential extensions.

## **Literature review**

In the past century, the impact of minimum wage legislation has been thoroughly studied both theoretically and empirically. A critical assumption that divides past literature into two principal schools of thought is the level of competitiveness that the labor market is assumed to have. On the one hand side, “marginalists” pleaded that the labor market is better described by competitive features. On the other shore, “institutionalists” claimed that labor market is not quite characterized by these properties. Labor market features are key to understand the implications of the different models. In the theoretical framework of a simple competitive supply-demand model

of the labor market an introduction (or increase) of the minimum wage over the equilibrium wage will result in an excess of labor supply and a fall in employment. One exception to these results is the one that emerges from Welch (1974) two-sector (covered and uncovered) model. In this framework, a key underlying assumption is that these two sectors shape a dualistic market where the workers that cannot find a job in the formal sector will turn to inferior jobs in the informal sector. In this context, the minimum wage legislation, will decrease labor demand in the covered sector and workers displaced from the latter will move to the uncovered sector, increasing labor supply there and pushing uncovered wages downwards. As a result of lower wages in the uncovered sector and since displaced workers in the covered might take time to get employed in the uncovered sector, unemployment could rise. The magnitude will depend on the elasticity of labor supply, reservation wages of displaced workers, size of each sector and labor demand elasticity. In either case, the competitive model and the two-sector model, unemployment is a possible result of an increase in minimum wages. Yet neither predicts an increase in employment rates.

Initially, empirical studies presented evidence in this direction. The study presented by Brown, Gilroy and Kohen (1982) makes a comprehensive review of previous theoretical literature and, most importantly, it compiles empirical results setting a numerical benchmark. The authors collect the results of a vast number of time-series and cross-section studies, using different data periodicity, model specifications and periods. As presented in their work, overall empirical results until that moment, showed evidence of a negative impact of the minimum wages in employment. Particularly, for the time series studies on teenagers, an average increase of 10% in the minimum wage was shown to decrease teenage employment on 1-3%, approximately and although the magnitude of the coefficient could marginally vary, the sign remained for age, race and sex



subgroups. Immediately after, these benchmarks became part of the consensus standpoint. The negative impact of minimum wages is also evidenced in the cross-section studies but there is less stability in magnitudes and significance levels.

During 1990s there was a new wave of research. Although a strand of this more recent studies was rather a revision of previous work, including extra years to the time-series or using new time series techniques, another portion, which was later known as “the new minimum wage research”, presented novel techniques exploiting state level variation. Much of the studies within this new literature, found disrupting evidence pointing that, in fact, minimum wage impacts on employment can be considerably smaller than the ones shown in previous studies and even some non-negative impacts were proved. Although Grossman (1983); Katz and Krueger (1992); Card (1992); and, Card and Krueger (1994) within other authors, shown evidence that teenagers affected by the minimum wage law, on average have an immediate increase in their wages, Card (1992); Card and Krueger (1994); Dickens, Machin and Manning (1999); and others have shown that there is little or no impact on employment. In particular, Card (1992) pleads that the introduction of a federal minimum wage renders a natural experiment in which the "treatment effect" varies across states since the fraction of workers affected by the legislation (those initially earning less than the new minimum) will differ in different states. Exploiting this state level variation on the fraction of teenagers earning a salary in between the base year minimum and the following year's minimum wage, Card finds that there is no evidence of a teenage employment loss after 1990 minimum wage increase in the United States.

After this wave of studies, mainly applied to the United States and Western Europe, the new consensus reflected non-negative employment effects of minimum wage increases. Nevertheless, while matters such as minimum wage coverage, firm compliance and the size of the

informal sector might not present severe issues in developed countries, they can have an increased incidence in actors' decision-making mechanisms and, more generally, they can have an impact in labor market structure in developing economies. Hence, it would be only natural to expect different effects of minimum wage legislation in wages and employment in these countries than in developed economies.

For instance, Cunningham (2007) examines the effect of minimum wage legislation on the income poverty of workers, their households, and the state in Latin American Countries. As a starting point it presents a detailed analysis of the existent literature on the wage and employment effects of minimum wages in the Region, with the aim of achieving a better understanding of the distributional effects of minimum wage legislation in Latin American countries. Part of the study focuses on the effects of the minimum wage in groups which the author considers "vulnerable" in terms of their labor market participation and success, namely youth, women, the low-skilled, and informal sector workers. The main finding of this study is that, unlike "the new minimum wage research" predictions for United States or Western Europe, minimum wages in fact matter for Latin American countries. Another finding relevant to our study is that high minimum wages make a greater harm to what the author considers the most vulnerable workers. Moreover, even where minimum wages are not as high, such policies tend to have a disproportionate effect on certain groups, such as young, low-skilled and female workers. Although a fraction of the latter tends to experience wage gains, unemployment effects are also concentrated on these groups. This is partially in line with Lemos (2009), who on the one hand finds a compression in the wage distribution for both formal and informal sectors as a result of an increase in the minimum wage, but on the other does not evidence unemployment effects in either sector.

These results can find several underpinning explanations. Latin American countries are usually characterized by considerably large shares of the labor force uncovered by minimum wage legislation, mainly due to the size of the informal sector. Moreover, even for covered sectors, weak institutional frameworks in these countries tend to reflect in low levels of enforcement, pushing firm compliance downwards. Although these two features would seem to indicate low or null impacts of the minimum wage legislation, according to Cunningham (2007), effects seem to be larger than expected for two reasons. In the first place, there is evidence that salaries from workers on both formal and informal sectors are affected by the minimum wage. Moreover, the minimum wage is shown to be more binding in the informal sector. As it appears, the dualistic structure of the two-sector model explained above, which assumes that informal sector will absorb displaced workers from the formal sector might fail to apply on developing economies. In this sense, the informal sector can be understood as one that holds participants who voluntarily choose to be there and can even enjoy gains of leaving formal sector. According to Cunningham (2007), recent literature for Mexico and Argentina evidenced that, the informal sector has greater unemployment effects, which makes it rather implausible to refuge formal sector displaced workers. Other studies, such as Maloney and Nuñez (2004) for Brazil, have found that minimum wages tend to have greater effects on informal salaried workers than the ones in the formal sector. Altogether, this suggests that that an increase in the minimum wage may increase unemployment due to a displacement of workers in the informal sector.

Secondly, in contrast to what is shown for OECD countries, in Latin American countries the effects of the legislation have an impact on a larger fraction of the labor force than just minimum wage earners. Although wage gains are higher for workers earning near the minimum

wage, the increases in wages and the corresponding employment losses can be seen throughout the entire wage distribution.

Although they vary in magnitude, several studies for Latin American countries present evidence of aggregate unemployment effects of the minimum wage legislation, such as Cunningham and Siga (2006); Fajnzylber (2001); Lemos (2002); and, Bell (1997) within others. When studying minimum wage impacts, it is important to understand if the wage legislation effectively works as a wage floor, this is if it is binding. In addition, a key factor to have into account is the magnitude of the minimum wage increase. In this sense, Terrell and Almeida (2008) argue that in Latin American countries minimum wages are frequently set at considerably high levels, which can account for the large unemployment effects found in the literature, especially for the low-wage workers.

Cunningham and Siga (2006) and Fajnzylber (2001) find stronger dis-employment effects in the informal sector. Nevertheless, some positive employment effects are also evidenced in the informal sector following the conventional two sector model predictions (See Carneiro and Corseuil (2001) and Foguel, Ramos, and Carneiro (2001)).

Using data for Ecuador, Wong (2019) studies the impact of minimum wages. Although her study also uses Card's treatment group definition ("affected workers"), her approach differs the one presented here in several ways. In the first place, using a matching algorithm she builds a panel at an individual level for two quarters (December 2011 and December 2012) to which she applies a difference-in differences model. On the other hand, while our study focuses on the extensive margin, Wong studies the impact of the minimum wage on the intensive margin, namely the hours worked. Main results show a positive effect on wages and a significant increase in hours worked

by affected workers relative to unaffected workers. Nevertheless, in general, she did not find evidence of significant indirect impacts or heterogeneous effects on hours worked.

In sum, although scarce, research applied to Latin American Countries suggest that the minimum wage legislation is relevant and in contrast to latest research on developed economies, there is an important effect on both wages and employment. While evidence generally points to positive impacts on wages (on both formal and informal sectors) and general negative effects on employment, the direction of the effect on employment rates vary across sectors.

## **Informal employment in Ecuador and Latin America**

Ecuador is characterized by a high level of informal employment, not only in comparison to developed countries but also to its regional peers. Figure 1 depicts the evolution of informal employment as a percentage of total non-agricultural employment for a selection of Latin American and the Caribbean countries<sup>1</sup>.

In 2008, Ecuador informal employment accounted for almost 76% of total non-agricultural employment, the second higher in Latin America after Bolivia. Informal employment has experienced a marked decline since then. Despite the downward trend shown during those years, levels are still high compared to other countries in the region. By 2015 Ecuador still had substantial room for improvement in this matter: out of the studied countries it was the sixth economy with greatest informal sector, which explained about 61% of total non-agricultural employment. Only Honduras (85.7%), Bolivia (78.2%), Guatemala (71.6%), Paraguay (64.6%) and El Salvador (62.9%) showed higher informality rates in 2015.

---

<sup>1</sup> This selection consists of those Latin American countries whose data is available in World Development Indicators Databank (WDI).

## **Minimum Wage Legislation in Ecuador in 2008-2015**

The process of setting minimum wages in Ecuador starts approximately in the second quarter of each year with multisectoral debate and ends with the legislation implementation in January the next year. Although there is one basic federal minimum wage, known as the SBU (from its acronym in Spanish), set by the National Wage Council (CONADES) which intends to serve as a wage floor, each of the twenty-one Sectoral Commissions negotiate their own minimum wage. The minimum wage is set in US dollars, since Ecuador became a dollarized economy in 2000. Nevertheless, inflation could still play an important role, eroding its purchasing power over time. **Table 1** shows the nominal and real SBU, its growth rate and inflation rates. Even though inflation rates were relatively low during the studied period, SBU did not quite move along with prices. As a result, in some years the real SBU yielded a stronger growth than inflation rates while in others the opposite happened. For the whole period the Real SBU average annual increase and the average inflation rate were similar, 4.4% and 4.3%, respectively. Yet there were salient periods in which one considerably exceeded the other, such as 2015 in which inflation rate surpassed minimum's wage growth by almost 4 percentage points.

### **Data and Identification Strategy**

#### **Data**

This paper uses micro-data that stems from the National Survey on Employment, Unemployment and Underemployment (ENEMDU), carried by the National Institute of Statistics and Census (INEC). In this survey, respondents provide information related to social infrastructure of employment, unemployment and underemployment, on earnings and on their personal and educational characteristics. The survey has a quarterly frequency and it is carried in March, June, September and December of each year. While survey information includes both rural and urban areas in June and December issues, it only covers the urban areas in March and September. During

the period spanning from 2008 to 2013, March and September issues covered 6,876 dwellings from 127 urban areas while June and December covered 21,768 from 579 urban and rural areas. As of 2013 the sample was expanded to cover 16,044 dwellings in 322 urban areas for March and September issues and 31,092 dwellings in 1,024 urban and rural areas. Since only semesterly and annual issues cover both urban and rural areas, we restrict our panel to urban data only.

The original dataset is a 2x2x2 household panel. This is a rotating sample, where the same households appear for two subsequent quarters, then are removed for the following two and finally included again for two more quarters before leaving the sample.

Ideally this study would have covered the period that goes from 2003 to the present. Nevertheless, since the rotation scheme explained above has been introduced in 2007, the study period is initially conditioned to 2008. In addition, as of 2016 only semesterly surveys have province coverage. As a result, the study period spans from 2008 to 2015 with quarterly information for urban areas.

A considerable strand of the relevant literature on the impact of minimum wages focuses in the teenager labor market. According to Card (1992) this is due to the fact that teenagers are usually located at the lower tail of the income distribution and because a considerable portion of the low-income employment is represented mostly by teenagers. Nevertheless, a substantial amount of studies focused on young adults, defined as those individuals between 15 to 24 years old (See Cunningham (2007)). Since sample size is considerably small for Ecuador's ENEMDU database, there are periods for which some provinces do not account for teenagers with salaried jobs, resulting in several discontinuities for the relevant variables. Therefore, this study focuses on youth, as defined above, rather than teenage population.

Finally, ENEMDU classifies four possible working sectors: formal, informal, domestic workers, and those who are not classified. The formal sector is composed by workers who are employed in firms that hire more than ten employees or those that hire less than ten employees but that have a taxpayer unique identification (RUC) and that have accounting records. On the contrary, ENEMDU classifies the informal sector as the one composed by firms with less than ten employees and do not have either RUC or accounting records. ENEMDU employment, unemployment and underemployment statistics' methodology is based on ILO's International Conferences of Labor Statistics (CIET). Yet, the 17<sup>th</sup> CIET<sup>2</sup>, included two extra criteria for the measurement of informal employment, one of which is not relevant for this study since it addresses self-employed workers which escape the scope our analysis. The other defines informal employment as those who are described as such in terms of the work relationship that by law or practice is not subject to national labor legislation, tax payments, social security or certain benefits related to employment, such as paid sickness leave. This is particularly relevant for the reminding categories that are not "Formal sector" and "Informal Sector" in the formality question, namely, domestic employment and not classified. In fact, according to an ILO publication on formalization policies of domestic workers in Latin American countries<sup>3</sup>, Ecuador demands mandatory registration to social security benefits for domestic workers. This means that those individuals assigned to the "domestic worker" category can be either formal or informal employees, according to this criterion. ENEMDU asks respondents if their employer pays their social security. Hence, using the CIET criterion and ENEMDU's question on social security, we assigned those domestic

---

<sup>2</sup> OIT 2013, Medición de la economía informal (Ginebra, OIT).  
[https://www.ilo.org/emppolicy/pubs/WCMS\\_229450/lang-es/index.htm](https://www.ilo.org/emppolicy/pubs/WCMS_229450/lang-es/index.htm)

<sup>3</sup> ILO 2016, Policies to Formalize Paid Domestic Work in Latin America and the Caribbean,  
[https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/documents/publication/wcms\\_534457.pdf](https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/documents/publication/wcms_534457.pdf)



and not classified workers whose employer pays their social security, to formal employment and those who don't the informal employment.

## Identification Strategy

### *a. Group Definition*

A substantial number of studies on the impact of minimum wages, focus in the teenager labor market. According to Card (1992), this can be explained by the fact that teenagers are usually located at the lower tail of the income distribution and because a significant fraction of the low-income employment is primarily represented by teenagers. Nevertheless, a sizable amount of studies focused on young adults, defined as those individuals between 15 to 24 years old<sup>4</sup>. Since sample size is considerably small for Ecuador's ENEMDU database, there are periods for which some provinces do not account for teenagers with salaried jobs, resulting in several discontinuities for the relevant variables. Therefore, this study will focus on youth, as defined above, rather than teenage population.

The approach of the studies mentioned above vary in several dimensions, particularly when it comes to defining the independent variable. When working at a state or province level, the estimation of the effects of minimum wages on employment might not be straightforward. Since minimum wages are usually determined by federal legislation, this cancels any possible source of variability across states. If the case is such that one could construct a variable that uses the minimum wage but also accounts for variability within States, the minimum wage, as it is, might be endogenous deriving to another set of problems. While some authors like Kaitz (1970) and Hashimoto and Mincer (1970) construct alternative independent variables such as the ratio of the

---

<sup>4</sup> With different empirical approaches, some examples of this are OECD (1998) study, which find negative and significant elasticities around -.13 and -.16; Neumark (2001) which find similar sign and magnitude effects but not significant for the group studied; and Neumark and Wascher (2002) which find somehow larger negative elasticities around -.13 and -.21, within others.

minimum to an industrial average wage (weighted by the coverage rate), others like Card (1992); Zavodny (2000); and Currie & Fallick (1996), sort this issues by studying the effects of changes in the minimum wage on workers initially earning a wage in between the base year and next year minimum wages in the different States, frequently called “fraction affected”.

In general, but particularly for developing economies, there are several reasons to believe a more accurate measure of the fraction of affected young adults is one that accounts for the portion of workers that in the base year earn a wage that lies below following year’s minimum wage. Welch (1973) makes a thorough analysis of both the competitive and monopsony labor market theoretical models. Although the predictions of the effect of the introduction of a legislated minimum wage on employment vary in each case, for the competitive model he argues that with a legislated wage floor sitting over the equilibrium wage, the greatest proportionate increase in wages is levied on workers who in absence of the policy would have earned least and, hence, the resulting fall in employment will be more adverse for this group. In other words, for workers who otherwise would have earned below the minimum set by the legislation, the strength of the adverse effect on employment increases with the distance to the new minimum.

Arguments presented above might be even more binding for developing economies, such as Ecuador, in which the bulk of workers earning wages below the next year’s minimum might in fact earn less than the base year minimum. Wong (2019), argues that this might be due to poor firm compliance of the minimum wage legislation or to a downward wage bias against particular groups of workers. If this was the case, creating a variable measuring the fraction of young workers that earn between both minimum wages be problematic since it would render discontinuities for several provinces in different periods. Figure 2 in the Appendix shows the mean wage of young salaried workers, the base period’s minimum wage and following period’s minimum wage (in real

terms), for Ecuador in 2008-2015. It is evident, especially in the first years, that mean wage of young adults sits below the minimum wage of the base period and not just below the minimum wage of the following period. This implies that a substantial fraction of this population effectively earns less than the current minimum wage at the province level. Figure 3, which replicates Figure 2 for each province, confirms what was observed at a national level. In most provinces there are several quarters for which youth mean wage stands below the minimum wage in the base period (and not just below the minimum wage in the following period). It therefore seems appropriate to define the affected (treated) youth working population as the salaried workers between 15 and 24 years old<sup>5</sup>, with jobs in the covered sector<sup>6</sup> which earn in the base period less than the following period's minimum wage ( $MW_{t+1}$ ).

Table 2 presents descriptive information on young adults, as previously defined, taken from the quarterly files from ENEMDU. To facilitate comparison, the data is aggregated annually for the first and last years studied, 2008 and 2015 respectively. The first and sixth columns show data for all young adults, namely all respondents between 15 and 24 years old in urban areas. The second and seventh columns present calculations for working young adults. The remaining columns, display information for salaried workers for each specific wage interval; where the first one applies to those who earn less than the minimum wage in the current year; the second to those earning a wage in between current and following year's minimum wage; and the third to those who earn a wage exceeding next year's minimum wage.

For both years, young adult population included a high percentage of non-whites (over 90%). Even though women represented about half of the youth sample, only around 20% of the

---

<sup>5</sup> The age group is defined within the specified limits since this is the range most commonly studied by teenager labor literature and because the minimum age for employment in Ecuador is set at 15 years old.

<sup>6</sup> These are the workers subject to minimum wage legislation which include private sector wage workers, domestic workers, day laborers “jornaleros”, and outsourced workers “tercerizados”.

workers were females. While around 22% of the sample was between 16 and 17 years old, young working population seemed to be older since only roughly 8% of the young workers in 2008, and around 3% in 2015 belonged to this age group. Approximately 60% of the youth population was enrolled in school.

Between 2008 and 2015, young working population characteristics considerably changed. In the first place, participation rates fell. While working youth in 2008 represented about 41% of total young adults, this number declined to approximately 34% in 2015. Secondly, non-white population explained about 63% of young workers in 2008 and 61% in 2015. Workers aged between 16 and 17 accounted for only 8% and 3% of workers in 2008 and 2015, respectively. Finally, 19% of young workers attended to school in 2008, while only 12% did in 2015. In average, this group worked around 44 hours a week in 2008 while in 2015 the number of hours dedicated to work declined to 40. Moreover, hours worked for each salary intervals seem to have fallen significantly compared to the same wage interval between the two analyzed years. The mean wage for young workers was \$239.9 a month in 2008 and of \$341.3 in 2015.

In 2008, approximately 37% of the young salaried workers earned less than that year's federal minimum, 8% earned a wage between the minimum that year and next year's minimum, and 22% had earnings exceeding 2009 minimum wage. The remaining 34% were unpaid workers, self-employed or worked for the government. In contrast, in 2015, about 31% of the young salaried workers earned less than the federal minimum wage, 5% earned a wage in between that year and next year's minimum, and approximately 27% had earnings exceeding 2016 minimum wage, whereas 38% were unpaid, self-employed or government workers.

Female individuals explain a larger fraction of workers earning low wages than the ones earning in between current and new minimum wages and earning above new minimum, both in

2008 and 2015. Similarly, individuals enrolled in school most probably earned a wage below the new minimum, for both studied years. Although smaller in magnitude, this also occurs for individuals aged between 16 and 17 years old.

Table 2 shows that, both in 2008 and 2015, the percentage of workers earning less than the minimum wage for those years exceeded the ones in the other salary intervals. This might be partially explained by employer's noncompliance. Naturally, noncompliance should be more frequent in economies with larger informal sectors. Another possible reason for subminimum payment may be explained by the fact that some of the workers in the survey might have been hired by the hour and work less hours than the ones needed to yield a monthly minimum wage.

According to the definition of "affected workers" explained above, this would be the sum of those earning less than the base year's minimum wage (third column for 2008 and eighth column for 2015) and the ones earning a wage in between the base year and the following year's minimum (fourth column for 2008 and ninth column for 2015). These added up to 45% of the young workers in 2008 and 36% in 2015. For both years, workers earning a wage in the intervals for the lower salaries were more likely to be enrolled in school than the workers in the reminding two wage intervals.

When comparing both years, respondents reported lower school enrollment rates in 2015 than in 2008. Additionally, youth employment rate fell by 7.7 percentage points between these years. In reference to the youth wage distribution, shifted to higher earnings since the percentage of both workers earning less than the base year minimum wage and between the base year and following year's minimum fell at expense of a rise in the fraction of those earning more than next year's minimum wage.

Even though these statistics seem to imply a pattern between the increases in minimum wages and the wage distribution, Figure 4 proves sounder evidence of this. Total fraction of affected workers gradually decreased in almost every year, but it particularly did when comparing 2008 and 2015. In most cases this fall can be explained by the fraction of young adult workers earning less than next year's minimum wage, and particularly in those earning less than the base year's minimum wage. Hence, it can be inferred that the impact of the minimum wage legislation had a concentrated effect on the workers who earned less than next year's minimum wage.

*b. The model*

This study is based in the State Analysis Model presented by Card (1992), where each state is treated as separate observations in order to correlate changes in employment and wages with the fraction of affected workers in each state. As mentioned in previous section, this study departs from Card's in several ways. In the first place, he studies the impact of a discrete change in the minimum wage in USA in 1990 using Current Population Survey (CPS) data. Second, he aggregates quarterly data for the last three quarters of 1989 and 1990 for each state and in order to make a "pre/post" comparison of the impact of the minimum wage legislation. Third, he constrains the sample to teenage population. Finally, he defines his independent variable, namely fraction of teenage affected workers, as those individuals whose earnings lie in between the base year and next year's minimum wage.

In contrast, this study uses household quarterly data, aggregated to province level and exploits the fact that minimum wage changes in January each year at different rates, depending on inflation rates and sectoral commission negotiations. Hence, the model is based on a panel of quarterly information for years 2008-2015 for 21 provinces. Since sample size is relatively smaller than the CPS used by Card our study group restrains to youth (known as young working adults in

the literature). Additionally, since employer noncompliance can be greater in developing countries, such as Ecuador, using Card's independent variable could render discontinuities, considering that much of the workers earning below next year's minimum wage might in fact earn below the base year's minimum wage. Thus, we define the fraction affected by the minimum wage legislation as those young adults whose minimum wage in the base year lies below the following year's minimum. Workers whose wage sits above this minimum wage bite, remain in the sample since ultimately the regressions will seek to estimate how the size of the fraction affected explains mean wages and aggregate employment for all workers, and not just the ones affected by the minimum wage, at the province level. Finally, we make our estimations for both formal and informal employment, as defined in the previous section, separately.

Figure 5 plots the interprovince correlation between the average of the fraction affected young workers and the average change in mean log wages. Figures 6 and 7 show the same for formal and informal employees, respectively. The estimated regression model underlying these figures is:

$$\Delta W_{it}^S = a + bFA_{it}^S + cX_{it}^S + e_{it} \quad (1)$$

Where  $\Delta W_{it}^S$  measures the change in the mean log wage between  $t$  and  $t+1$  for each province  $i$ , and is a function of the fraction of affected young workers in  $t$  ( $FA_{it}^S$ ), and variables related to labor supply characteristics ( $X_{it}^S$ ), for each sector  $S$  (namely formal and informal). Results for these regressions are presented in the first column of Table 3 (for the estimation of the effect of the fraction of affected workers over the total labor force), Table 4 (for the estimation of the effect of the fraction of affected formal workers over formal labor force) and Table 5 (for the estimation of the effect of the fraction of affected informal workers over informal labor force). For all cases, as implied by the figures, the slopes are positive, high and statistically significant at the 1% level.

While the estimated elasticity for all young adults is 0.77, and 0.78 for formal workers, for informal working young adults is around 0.71. Around 23% of the inter-province formal wage variation is explained by the fraction of affected formal workers and about 18% of the informal wage variation is explained by the fraction of affected informal workers.

Columns 2 and 3 of the corresponding tables include what Card calls “macro-level” labor market indicators, namely change in overall employment population rate and in unemployment population rate<sup>7</sup>. These variables intend to control for potential state specific shocks in the labor market. Both indicators are constructed with the same ENEMDU database using all the population in working age. Estimation results show that the inclusion of these covariates have almost no effect in significance levels or magnitude of the coefficients.

Figure 8 graphs the average of the fraction affected young workers and the average change in mean employment rates for each province. Figures 9 and 10 show the same for formal and informal employment, respectively. These figures show a less evident relationship between the studied variables. Figure 11 graphs the dependent variable, namely the change in formal, informal and overall youth employment in time for each province. The series in these figures show no visible time trend patterns, thus regressions henceforth will not control for time trends. The estimated regression models in Figures 8-10 can be represented by the following equation:

$$\Delta E_{it}^S = \varphi + \rho FA_{it}^S + \sigma X_{it}^S + \epsilon_{it} \quad (2)$$

Where  $\Delta E_{it}^S$  measures the employment rate variation between t and t+1 for each province i, and is a function of the fraction of affected young workers in t ( $FA_{it}^S$ ), and variables related to labor supply characteristics ( $X_{it}^S$ ), for each sector S (namely, formal and informal). Results for these

---

<sup>7</sup> The global employment (unemployment) rate is defined as the population within 15 and 65 years old who are employed (unemployed) over the economically active population (PEA):

$$ER(UR) = \frac{Employed \ (Unemployed)}{PEA} * 100$$



regressions are presented in the fourth, fifth, and sixth column of Table 3 (for total employment), Table 4 (for the formal employment) and Table 5 (for informal employment). Estimated coefficients for both fraction of formal affected workers and fraction of all workers on the variation in formal employment rates and total employment rates, respectively, are very small. In particular, the estimated effects for the whole sample using the fraction of all affected young workers as an independent variable show a positive and small correlation between studied variables, in line with Card's findings. Instead, the effect in formal employment rate is negative. However, in either case magnitudes are near zero and not significantly different from zero. On the other hand, the coefficient for the informal employment rate is negative, considerably larger in magnitude (around 0.18) and significant to 1% level.

The estimated models in columns 1-3 for the effect on the wage variation and in columns 4-6 for the impact on employment variation, according to Card, can be interpreted as the reduced form of simple structural model of two equations:

$$\Delta W_{it}^S = a + bFA_{it}^S + cX_{it}^S + e_{it} \quad (3)$$

$$\Delta E_{it}^S = \alpha + \beta \Delta W_{it}^S + \gamma X_{it}^S + \varepsilon_{it} \quad (4)$$

Where  $\beta$  can be interpreted as the labor demand elasticity, and  $e_{it}$  and  $\varepsilon_{it}$  are the residuals of wage growth and labor demand equations. Hence, replacing with (3) in (4) we can obtain the reduced form employment equation, which can be estimated using two-stage least squares using  $FA_{it}^S$  as an instrument for the change in young adults wage change:

$$\Delta E_{it}^S = \alpha + b\beta FA_{it}^S + (\gamma + c\beta)X_{it}^S + \beta e_{it} + \varepsilon_{it} \quad (5)$$

The estimates for (5) are presented in columns 7-9 of Table 3 (for total employment), Table 4 (for the formal employment) and Table 5 (for informal employment). The implied demand elasticities remain small and not significant for the variation in the whole sample employment

rates. On the contrary, the coefficients become negative, slightly higher (approximately 0.11) and significant to 10% level for the formal employment rates. Estimated elasticities remain negative and statistically significant for the variation on informal employment rates and slightly higher in magnitude. However, the robust first-stage F-statistic lies far below from 10 in both cases, implying the instrument used is weak.

*c. Discussion*

Results presented above indicate that the minimum wages have a strong, positive and significant effect on wages for the affected population, both in the formal and informal sectors in Ecuador. The effect of minimum wages on youth employment positive but very small and not significantly different from zero. On the other hand, the IV estimation indicates a negative and statistically significant relationship between the minimum wage and employment rate variation for formal workers. However, the instrument is proven to be weak. These results are in line the literature on Latin American Countries, since there is a dis-employment effect in the formal sector and with Card's findings, since this effect is close to zero. Estimations for the informal sector show larger and statistically significant negative results, meaning that unemployment effects are stronger here than in the formal sector, in accordance with some of the studies mentioned above (see Cunningham and Siga (2006) and Fajnzylber (2001)). The latter results are invariant to labor market controls.

Although this runs counter Welch (1974) two sector model's predictions, where the displaced formal workers increased labor supply in the uncovered sector, there are various reasons to think this framework may not apply to developing economies where the informal sector might be workers' first choice and not a sole shelter for displaced formal employees. Latin American countries are usually characterized by a considerably large informal sector. Following Terrell and

Almeida (2008), who pose that large unemployment effects in Latin American Countries can be a result of minimum wages set at high levels, a larger unemployment effect for informal workers could be explained by a larger difference between the average informal wage and the minimum wage related to the average formal wage and the minimum wage.

The fact that unemployment effects are larger for informal workers, relative to formal employees could also be partially explained by a mix of both the monopsony and competitive theoretical models applied to each type of employment. Employers hiring formal workers in Ecuador could have a considerable degree of market power so that if the new minimum wage lies below the one that results from equating marginal cost and demand, there is a range of possible salaries they can pay without reducing the workforce significantly. In contrast, employers hiring informal work in Ecuador seem to behave accordingly to the competitive model characterized by the downward-sloping aggregate labor demand curve, where a rise in the minimum wage results in an increase of average salaries and unemployment.

## **Conclusions**

In the past century, despite the lack of a generalized consensus on the effects that minimum wage policies have on variables such as earnings, employment and output, increases in minimum wages have been part of the standard toolkit for various governments who ultimately intended to compress earnings distribution.

In the meantime, empirical literature oscillated between strong negative effects to non-negative or even positive impacts on employment rates. A milestone in minimum wage literature is the study presented by Brown, Gilroy and Kohen (1982) which stated that an average increase of 10% in the minimum wage had a negative impact of 1-3% in teenage employment. After this, with a greater availability of microdata and novel estimation techniques, a bundle of new studies

emerged with disrupting evidence of non-negative employment impacts. Such are the cases of Card (1992); Card and Krueger (1994); Dickens, Machin and Manning (1999), within others. Nevertheless, this literature mostly focused on developed countries. While matters such as minimum wage coverage, firm compliance and the size of the informal sector might not present severe issues in developed countries, they can have an increased incidence in actors' decision-making mechanisms and, more generally, they can have an impact in labor market structure in developing economies.

A recent strand of studies analyzes the impact of minimum wage legislation in wages and employment in developing countries. Cunningham (2007) finds that, unlike “the new minimum wage research” predictions for United States or Western Europe, minimum wages in fact matter for Latin American Countries and that high minimum wages make a greater harm to what the author considers the most vulnerable workers, such as young, low-skilled and female workers. As it appears, the dualistic structure of the two-sector model, which assumes that informal sector will absorb displaced workers from the formal sector might fail to apply on developing economies where the informal sector might be workers first choice and not the shelter of displaced formal workers. According to Cunningham, unemployment effects are larger in Latin American countries due to various reasons. In the first place, and in contrast to developed countries, wages from workers on both formal and informal sectors are affected by the minimum wage. Moreover, the minimum wage is shown to be more binding in the informal sector. Secondly, in contrast to what is shown for OECD countries, in Latin American Countries minimum wage legislation has an impact on a larger fraction of the labor force than just minimum wage earners. Although wage gains are higher for workers earning near the minimum wage, the increases in wages and the corresponding employment losses can be seen throughout the entire wage distribution. In sum,

although scarce, research applied to Latin American Countries suggest that the minimum wage legislation matters. While evidence generally points to positive impacts on wages (on both formal and informal sectors) and general negative effects on employment, the direction of the effect on employment rates vary across sectors.

The contribution of this paper to the previous literature is twofold: first, it uses semi-experimental techniques for panel data based on Card's (1992) model and it applies them to a developing economy, namely Ecuador, seldomly studied; second, it analyzes the effects of the national minimum wage separately on both formal and informal employment. Using quarterly data for years 2008-2015, this paper exploits the natural experiment that results of a national increase in national minimum wage on the provinces wage floors. In other words, the minimum wage legislation creates a "treatment effect" that varies across provinces since the fraction of workers affected by the new law (those initially earning less than the new minimum) will differ across provinces.

Results presented above indicate that the minimum wages have a strong, positive and significant effect on wages for the affected population, both in the formal and informal sectors in Ecuador. The effects on overall and on formal employment rates are low and not significantly different from zero. These results are in line with Card's findings. On the other hand, results for the informal sector show a negative, larger and statistically significant impact of the minimum wage on employment rate variation of informal workers. The fact that unemployment effects are stronger here than in the formal sector is in accordance with some of the studies mentioned above (see Cunningham and Siga (2006) and Fajnzylber (2001)).

Although this runs counter Welch (1974) two sector model's predictions, as mentioned above there are various reasons to think this framework may not apply to developing economies.

In addition, following Terrell and Almeida (2008), a larger unemployment effect for informal workers could be explained by a larger difference between the average informal wage and the minimum wage related to the average formal wage and the minimum wage. Finally, the fact that unemployment effects are larger for informal workers, relative to formal employees could also be partially explained by a mix of both the monopsony and competitive theoretical models applied to each type of employment. Employers hiring formal workers in Ecuador could have a considerable degree of market power such as if the new minimum wage lies below the one that results from equating marginal cost and demand, there is a range of possible salaries they can pay without reducing the workforce significantly. In contrast, employers hiring informal work in Ecuador seem to behave accordingly to the competitive model characterized by the downward-sloping aggregate labor demand curve, where a rise in the minimum wage results in an increase of average salaries and unemployment.

There are questions that remain unexplored and could be further studied. Card extends his analysis to model the dynamic structure of employment growth, where he includes lagged values of the dependent variable to the reduced-form employment growth regressions. He also takes into consideration a wider range of more general measures of the impact of the minimum wage on wage variations. Finally, an interesting extension could be the study of the impact of minimum wages on youth education decisions.

If the minimum wage is part of the standard toolkit of Latin American governments seeking to compress earnings distribution, careful thought should be given to its efficiency. Although this study poses evidence on the positive and significant effects than minimum wages have in average wages in all sectors, it also proves the existence of large and significant unemployment effect in the informal sector, making a greater harm in the most vulnerable. Since ultimately governments

intend to benefit this group, and only those workers in the informal sector who remain employed benefit from wage raises, minimum wage increases should be complemented with other welfare policies focusing on those who are forced to leave labor market.



## References

Brown, Charles, Curtis Gilroy, and Andrew Kohen. 1982. "The Effect of the Minimum Wage on Employment and Unemployment." *Journal of Economic Literature*, Vol. 20, No. 2 (June), pp. 487-528.

Card, David. 1992 "Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage." *Industrial and Labor Relations Review*, Vol. 46, No. 1 (Oct. 1992) pp. 22-37

Card, David, and Alan Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review* (September): 772-93

Cunningham Wendy. 2007 "Minimum Wages and Social Policy Lessons from Developing Countries." *The World Bank*

Corseuil, C., and Francisco Carneiro. 2001. "Os impactos do salário mínimo sobre emprego e salários no Brasil: evidências a partir de dados Longitudinais e Series Temporais." *Texto para Discussão No. 849, IPEA, Rio de Janeiro.*

Currie, Janet, and Bruce Fallick. 1996. "The Minimum Wage and the Employment of Youth Evidence from the NLSY." *The Journal of Human Resources* 31(20): 404-28.

Dickens, R., S. Machin, and A. Manning (1999). *The Effects of Minimum Wages on Employment: Theory and Evidence from Britain.* *Journal of Labor Economics*, 17 (1), 1-22

Fajnzylber, P. 2001. "Minimum Wage Effects Throughout the Wage Distribution: Evidence from Brazil's Formal and Informal Sectors". Department of Economics, Universidade Federal de Minas Gerais. Mimeo, unpublished



Foguel, Miguel, Carlos Henrique Corseuil, Ricardo Paes de Barros, and Phillippe Leite. 2000. "Uma Avaliação dos impactos do salario mínimo sobre o nível de pobreza Metropolitana no Brasil." Texto para Discussão No. 739, IPEA, Rio de Janeiro

Grossman, J. 1983. "The Impact of Minimum Wage on Other Wages." *Journal of Human Resources* (Summer): 359–78

Kaitz, Hyman. 1970. "Experience of the Past: The National Minimum," *Youth unemployment and minimum wages. Bulletin 1657. U.S. Department of Labor, Bur. of Labor Stat., 1970, pp. 30-54*

Lemos, S. 2002. "The Effects of the Minimum Wage on Wages and Employment in Brazil – A menu of minimum wage variables". Discussion Paper 02-02, Department of Economics, University College London.

Lemos, S. 2009. "Minimum wage effects in a developing country". *Labour Economics*, 16, 224–237.

Maloney, W. F., and J. Nunez. 2004. "Measuring the Impact of Minimum Wages, Evidence from Latin America." In *Law and Employment: Lessons from Latin America and the Caribbean*, ed. James Heckman and Carmen Pages, 109–30. Chicago: University of Chicago Press, National Bureau of Economic Research

Neumark, David. 2001. "The Employment Effects of Minimum Wages: Evidence from a Prespecified Research Design." *Industrial Relations*, Vol. 40, No. 1, January, pp. 121-44

Neumark, David, and William Wascher. 2002. "State-Level Estimates of Minimum Wage Effects: New Evidence and Interpretations from Disequilibrium Models." *Journal of Human Resources*. Vol. 37, No. 1 (Winter), pp. 35-62

Organization for Economic Co-operation and Development. 1998. Employment Outlook. Paris: OECD.

Terrell, K., and R. K. Almeida 2008. "Minimum Wages in Developing Countries: helping or hurting workers?". World Bank Employment Policy Primer, 10, Washington, D.C.: The World Bank.

Welch, Finis. 1974. "Minimum Wage Legislation in the United States," *Econ. Inquiry*, 12(3), pp. 285-318.

Welch, Finis. 1976. "Minimum Wage Legislation in the United States." In Orley Ashenfelter and James Blum, eds., *Evaluating the Labor Market Effects of Social Programs*. Princeton, N.J.: Princeton University Industrial Relations Section

Wong, Sara A. "Minimum Wage Impacts on Wages and Hours Worked of Low-income Workers in Ecuador." *World Development* 116 (2019): 77-99. Web.

Zavodny, Madeline. 2000. "The Effect of the Minimum Wage on Employment and Hours." *Labour Economics* 7 (6): 729–50.



## Appendix 1

**Table 1:** Nominal and real SBU, SBU growth rate and inflation rates, National Average, 2008-2016

Year	Basic Unified Minimum Wage (USD)	Inflation Rate (%)	Monthly average CPI	Real Basic Unified Minimum Wage (USD 2014=100)	Nominal Basic Unified Minimum Wage Growth Rate (%)	Real Basic Unified Minimum Wage Growth Rate (%)
2008	200	8.39	78.0	256.3	17.65	8.53
2009	218	5.20	82.1	265.7	9.00	3.65
2010	240	3.56	85.0	282.4	10.09	6.31
2011	264	4.47	88.8	297.4	10.00	5.29
2012	292	5.11	93.3	313.0	10.61	5.24
2013	318	2.73	95.8	331.8	8.90	6.02
2014	340	3.59	99.3	342.5	6.92	3.21
2015	354	3.97	103.2	343.0	4.12	0.15
2016	366	1.73	105.0	348.6	3.39	1.63

**Table 2:** Characteristics of Young Adults and Young Adult Workers, 2008 and 2015

Description	2008					2015				
	All	Workers with wage				All	Workers with wage			
		All Workers	<MWt	MWt- MWt+1	>=MWt+1		All Workers	<MWt	MWt- MWt+1	>=MWt+1
1. Percent of All	-	41.2	14.9	3.2	9.0	-	33.5	10.1	1.7	8.8
2. Percent of Workers	-	100.0	36.6	8.0	21.5	-	100.0	30.7	5.0	26.4
3. Female (%)	49.8	23.6	41.1	26.7	30.3	50.8	19.4	34.5	27.5	28.0
4. Nonwhite (%)	94.6	62.5	95.1	95.3	94.0	98.6	61.4	99.1	99.4	98.5
5. Age 16-17 (%)	22.3	7.9	17.6	5.7	5.3	21.4	2.7	6.9	3.7	1.7
6. Enrolled in School (%)	60.2	19.4	36.7	19.8	22.2	55.8	12.2	25.0	14.4	14.2
7. Hours/Week	-	43.8	40.7	46.0	48.0	-	39.8	35.1	42.8	44.8
8. Avg. Wage (USD/month)	-	239.9	135.0	257.4	409.4	-	341.3	190.3	345.6	510.6
9. Sample size	23434	9757	3374	799	2508	34176	10979	3259	615	3276

Universidad de  
San Andrés

**Table 3:** Estimated Regression Equations for Province-Average Changes in Wages and Employment Rates of Young Adults, 2008 and 2015

	Equations for Change in Mean Log Wage			Equations for Change in Young Adults-Population Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fraction of Affected Young Adults	<b>0.771***</b> (0.095)	<b>0.770***</b> (0.093)	<b>0.770***</b> (0.093)	<b>0.011</b> (0.062)	<b>0.004</b> (0.065)	<b>0.004</b> (0.065)	-	-	-
Change in Overall Employment Rate	-	<b>0.190</b> (0.558)	-	-	<b>1.338***</b> (0.168)	-	-	<b>1.337***</b> (0.130)	-
Change in Overall Unemployment Rate	-	-	<b>-0.190</b> (0.558)	-	-	<b>-1.338***</b> (0.168)	-	-	<b>-1.337***</b> (0.130)
Change in Mean Log Young Adult Wage	-	-	-	-	-	-	<b>0.014</b> (0.047)	<b>0.005</b> (0.043)	<b>0.005</b> (0.043)
R2	0.200	0.200	0.200	0.073	0.231	0.231	0.074	0.231	0.231
F	-	-	-	-	-	-	5.63	5.46	5.46

**Notes:** Estimated on a sample of 21 province observations. All regressions include an unrestricted constant, province and time fixed effects and quarterly dummies. In columns 7-9, the change in mean log wage is instrumented by the fraction of young adult workers earning a salary that in the base year sits below next year's minimum wage

**Table 4:** Estimated Regression Equations for Province-Average Changes in Formal Wages and Formal Employment Rates of Young Adults, 2008 and 2015

	Equations for Change in Mean Log Formal Wage			Equations for Change in Formal Young Adults-Population Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fraction of Affected Formal Young Adults	<b>0.779***</b> (0.085)	<b>0.776***</b> (0.085)	<b>0.776***</b> (0.085)	<b>-0.087</b> (0.053)	<b>-0.091</b> (0.056)	<b>-0.091</b> (0.056)	-	-	-
Change in Overall Employment Rate	-	<b>0.741</b> (0.672)	-	-	<b>0.854***</b> (0.246)	-	-	<b>0.912***</b> (0.251)	-
Change in Overall Unemployment Rate	-	-	<b>-0.741</b> (0.672)	-	-	<b>0.854***</b> (0.246)	-	-	<b>-0.912***</b> (0.251)
Change in Mean Log Young Adult Wage	-	-	-	-	-	-	<b>-0.103*</b> (0.061)	<b>-0.108*</b> (0.060)	<b>-0.108*</b> (0.060)
R2	0.229	0.234	0.234	0.091	0.112	0.112	0.056	0.076	0.076
F	-	-	-	-	-	-	5.81	5.76	5.76

**Notes:** Estimated on a sample of 21 province observations. All regressions include an unrestricted constant, province and time fixed effects and quarterly dummies. In columns 7-9, the change in mean log wage is instrumented by the fraction of young adult workers earning a salary that in the base year sits below next year's minimum wage.

San Andrés

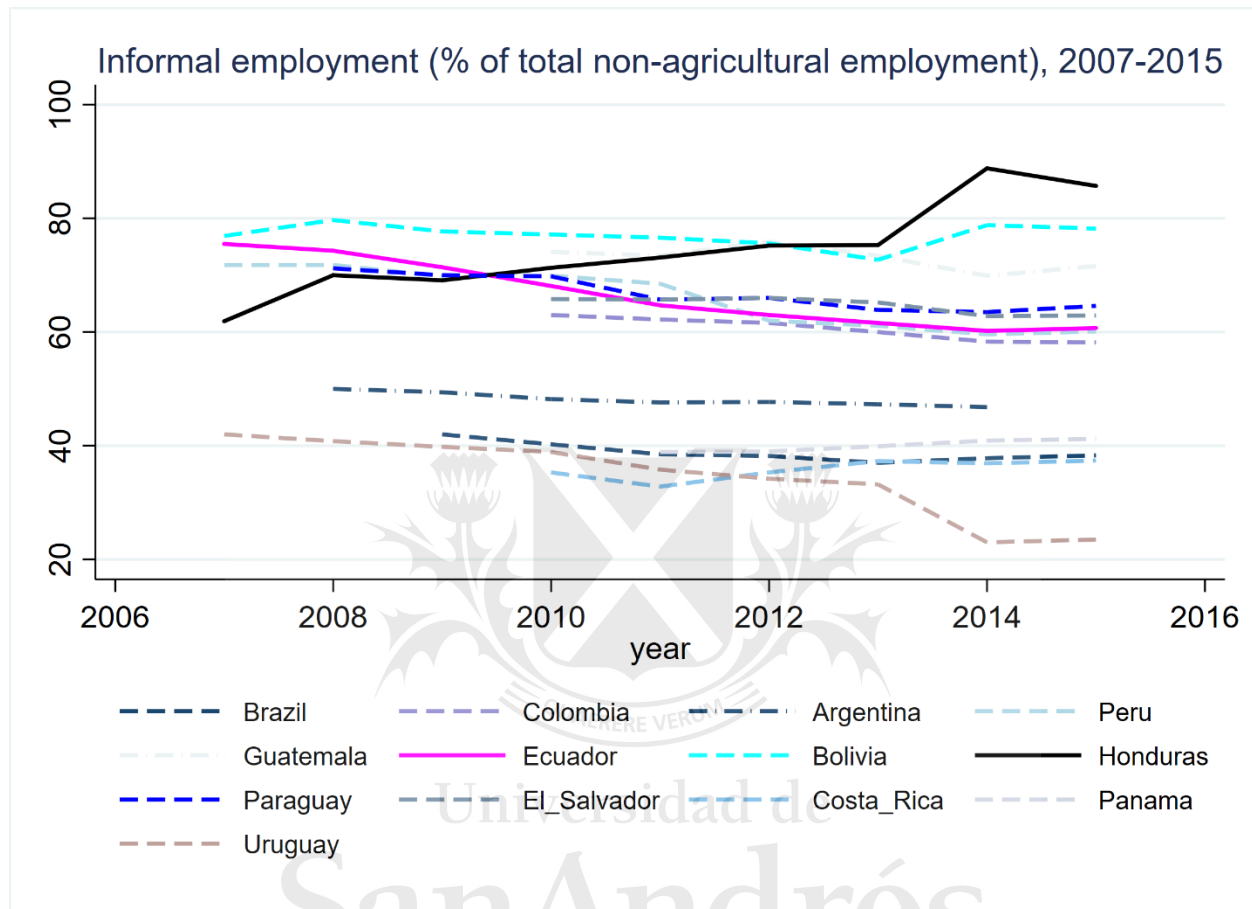
**Table 5:** Estimated Regression Equations for Province-Average Changes in Informal Wages and Informal Employment Rates of Young Adults, 2008 and 2015

	Equations for Change in Mean Log Informal Wage			Equations for Change in Informal Young Adults-Population Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fraction of Affected Informal Young Adults	<b>0.714***</b>	<b>0.714***</b>	<b>0.714***</b>	<b>-0.183***</b>	<b>-0.183***</b>	<b>-0.183***</b>	-	-	-
	(0.099)	(0.099)	(0.099)	(0.060)	(0.060)	(0.060)			
Change in Overall Employment Rate	-	<b>0.0036</b>	-	-	<b>0.531*</b>	-	-	<b>0.580*</b>	-
		(0.627)	-		(0.271)			(0.266)	
Change in Overall Unemployment Rate	-	-	<b>-0.004</b>	-	-	<b>-0.531</b>	-	-	<b>-0.580*</b>
			(0.627)			(0.271)			(0.266)
Change in Mean Log Young Adult Wage	-	-	-	-	-	-	<b>-0.238***</b>	<b>-0.236***</b>	<b>-0.236***</b>
							(0.066)	(0.066)	(0.066)
R2	0.176	0.176	0.176	0.086	0.097	0.097	0.019	0.023	0.023
F	-	-	-	-	-	-	3.58	3.46	3.46

**Notes:** Estimated on a sample of 21 province observations. All regressions include an unrestricted constant, province and time fixed effects and quarterly dummies. In columns 7-9, the change in mean log wage is instrumented by the fraction of young adult workers earning a salary that in the base year sits below next year's minimum wage.

## Appendix 2

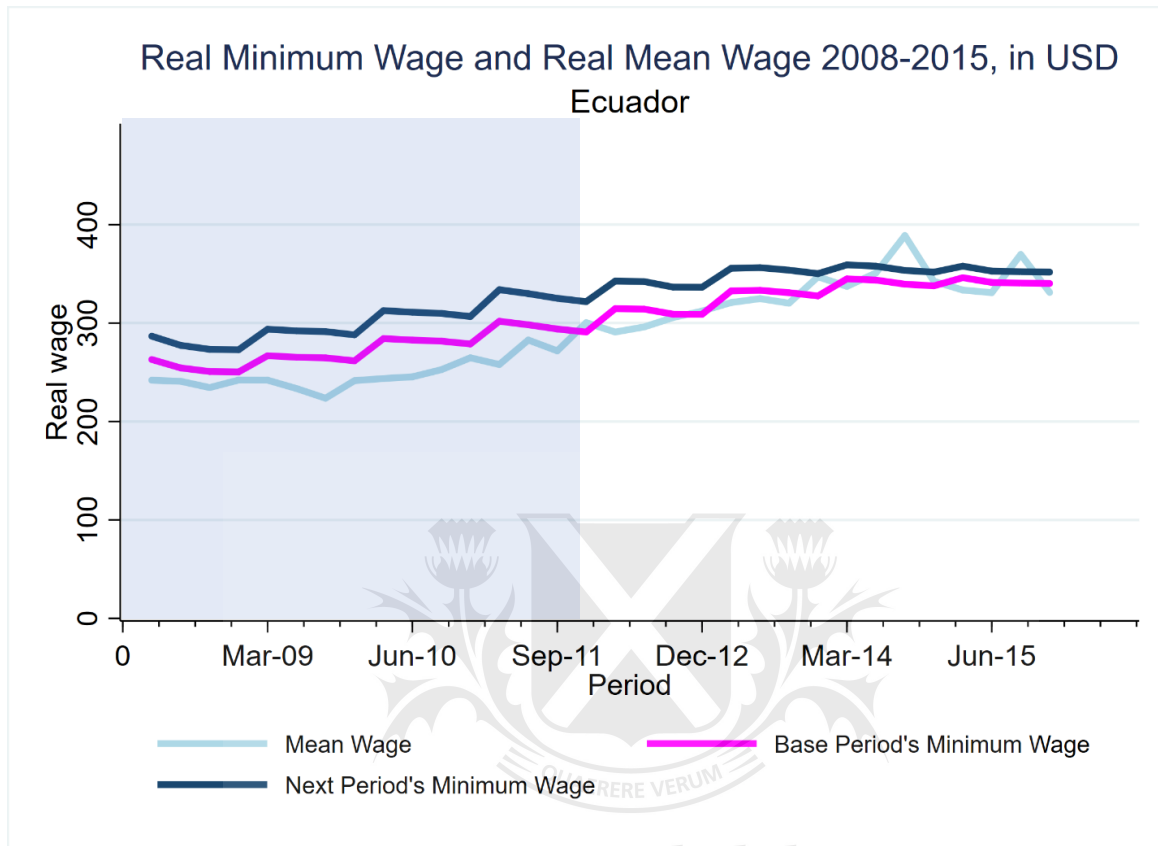
**Figure 1:** Informal employment (% of total non-agricultural employment), selected Latin American and the Caribbean Countries (excluding small countries and islands) 2007-2015



Source: Own elaboration using WDI

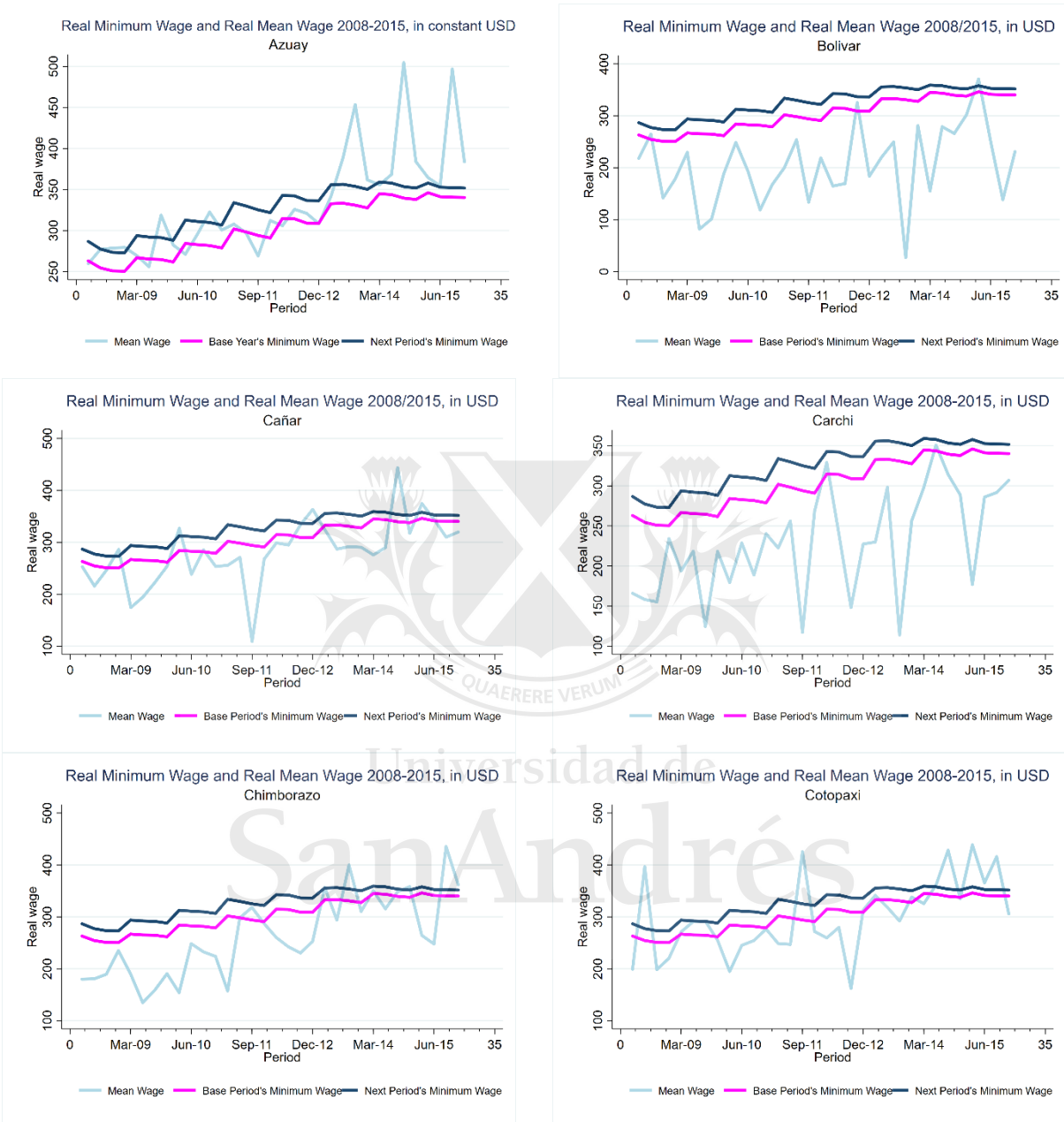


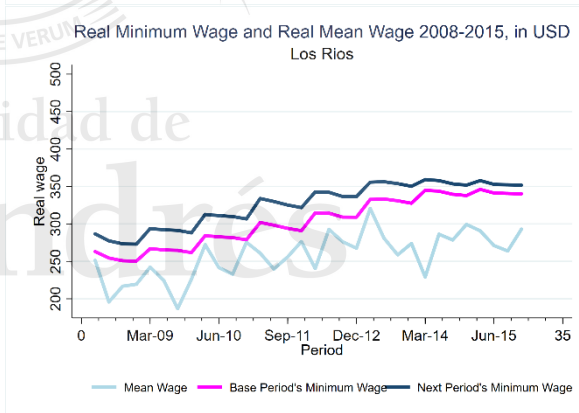
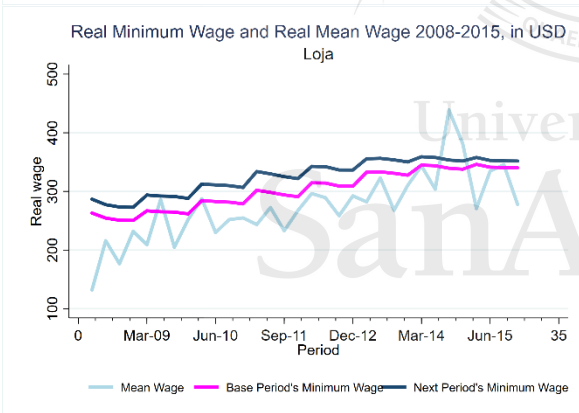
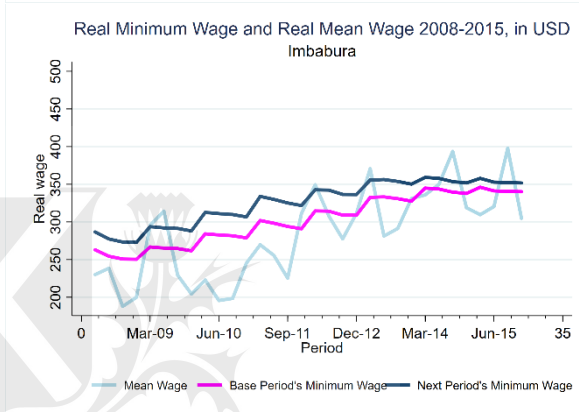
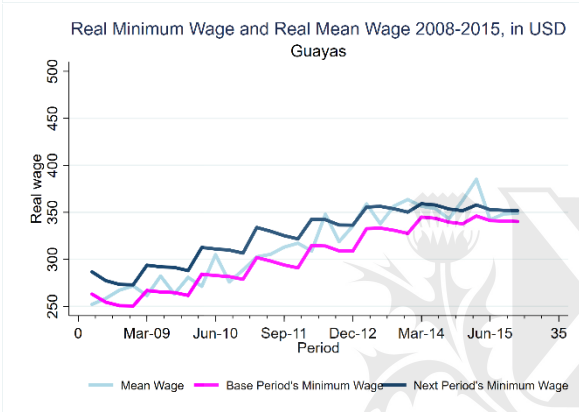
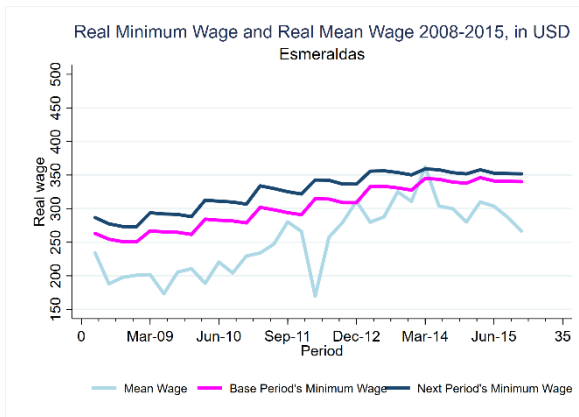
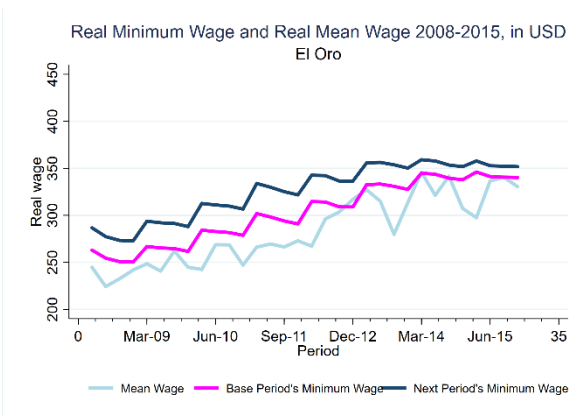
**Figure 2:** Real Average Teenage Wage and Real Minimum Wage (in the base period and the period after), National Average, 2008-2015

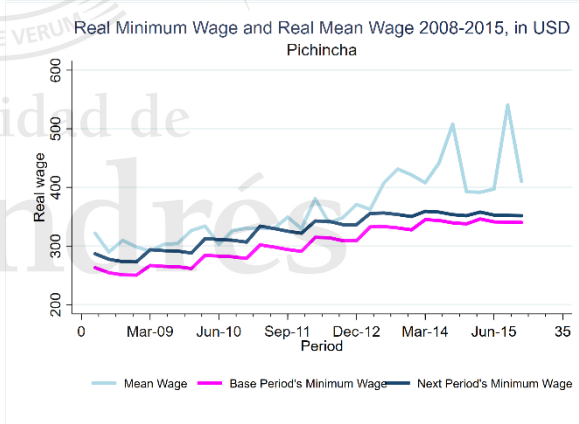
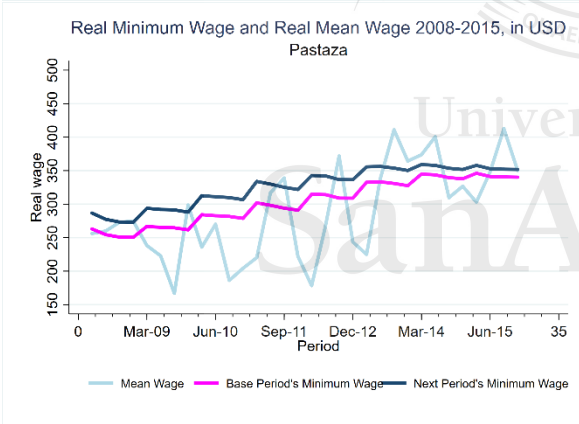
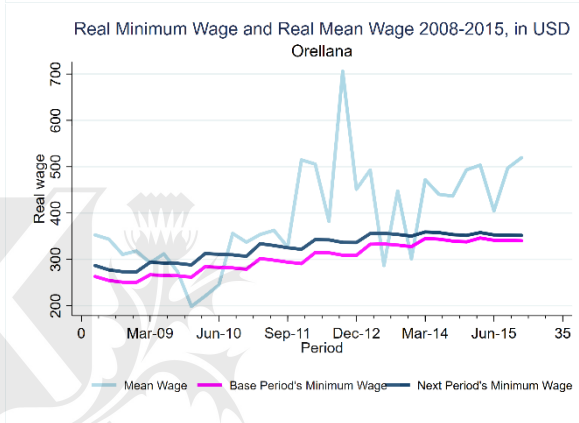
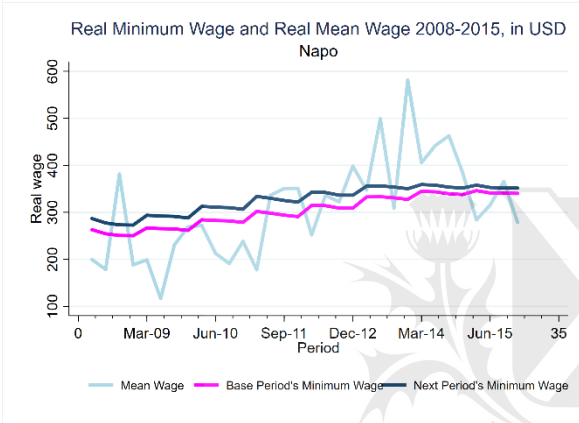
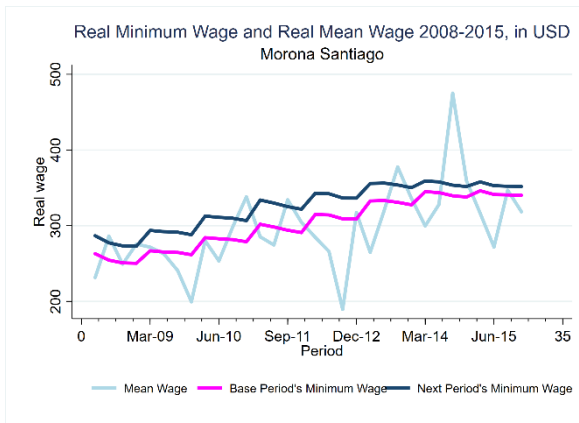
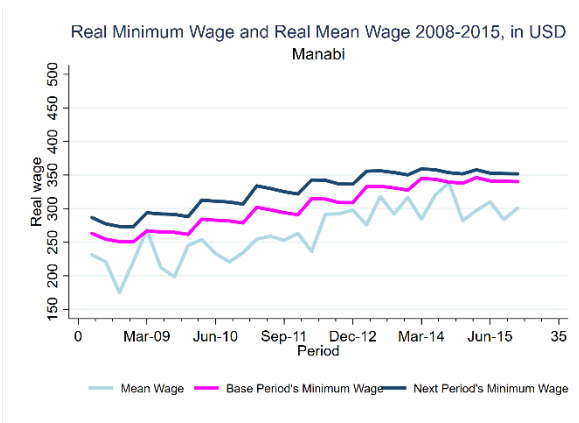


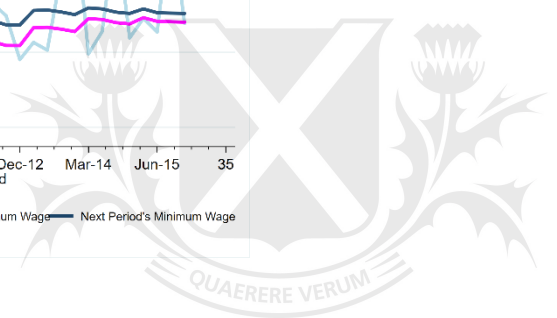
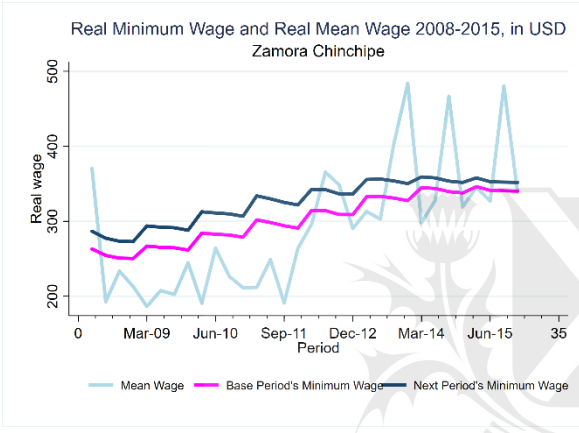
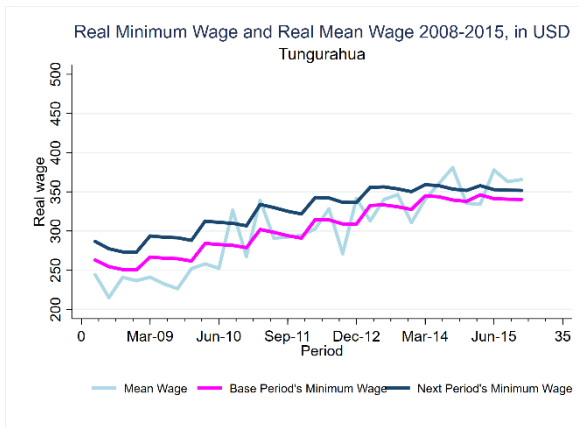
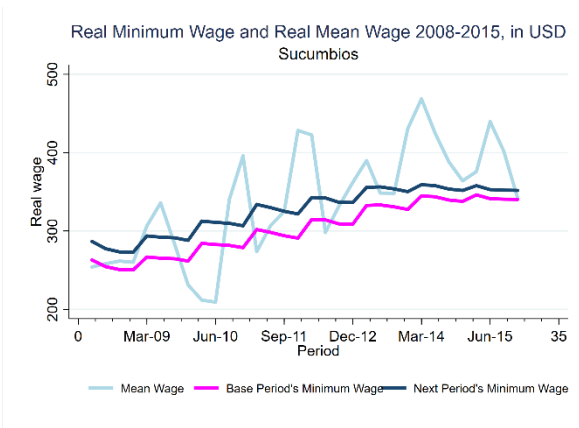
Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

**Figure 3: Real Average Teenage Wage and Real Minimum Wage (in the base period and the period after), by province 2008-2015**



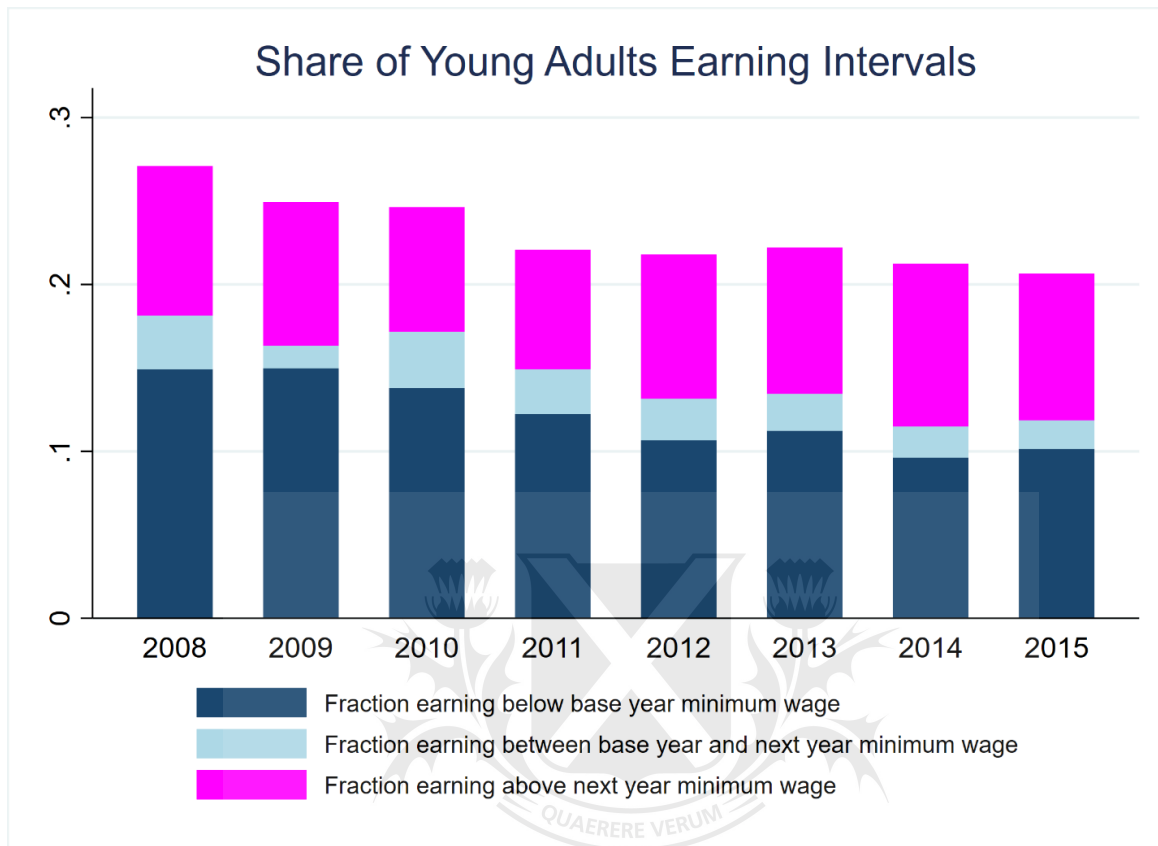






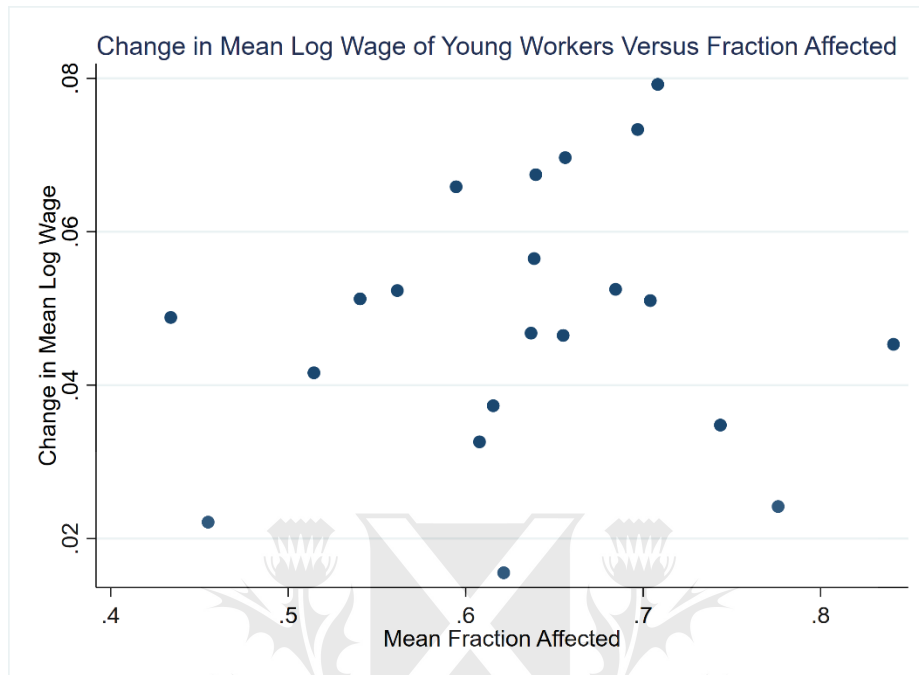
Universidad de  
**San Andrés**

**Figure 4:** Share of Young Adults Earning Intervals, national average, 2008-2015



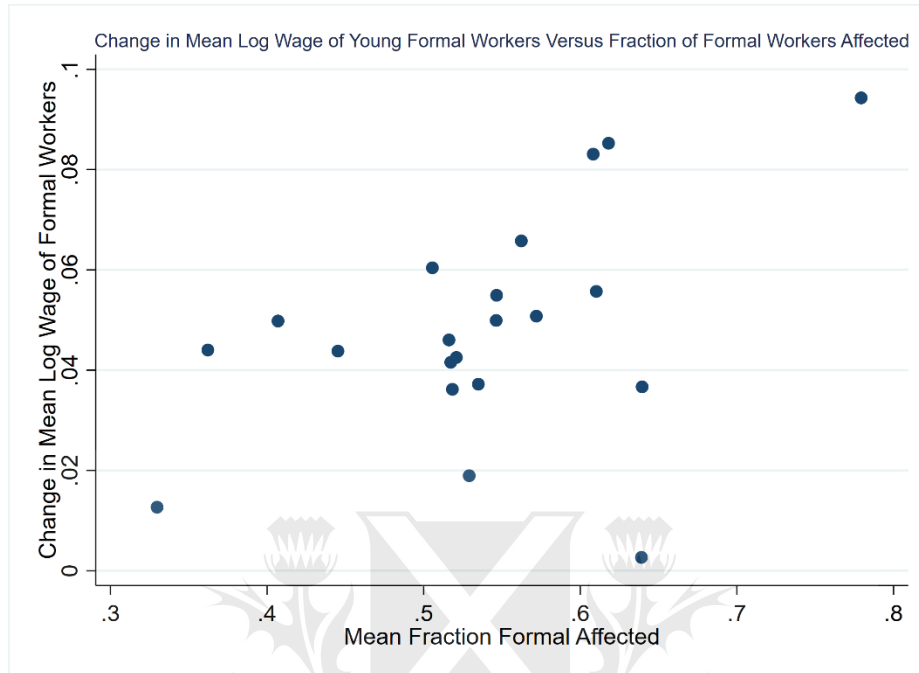
Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

**Figure 5:** Change in Mean Log Wage of Young Workers Versus Fraction Affected, yearly average by province



Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

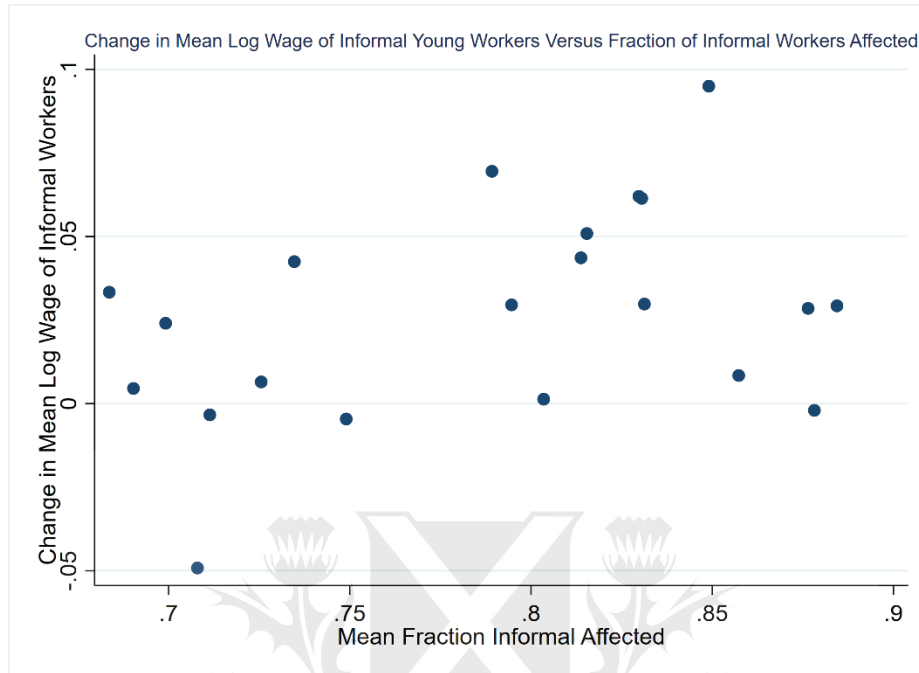
**Figure 6:** Change in Mean Log Wage of Formal Young Workers Versus Fraction of Formal Workers Affected, yearly average by province



Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

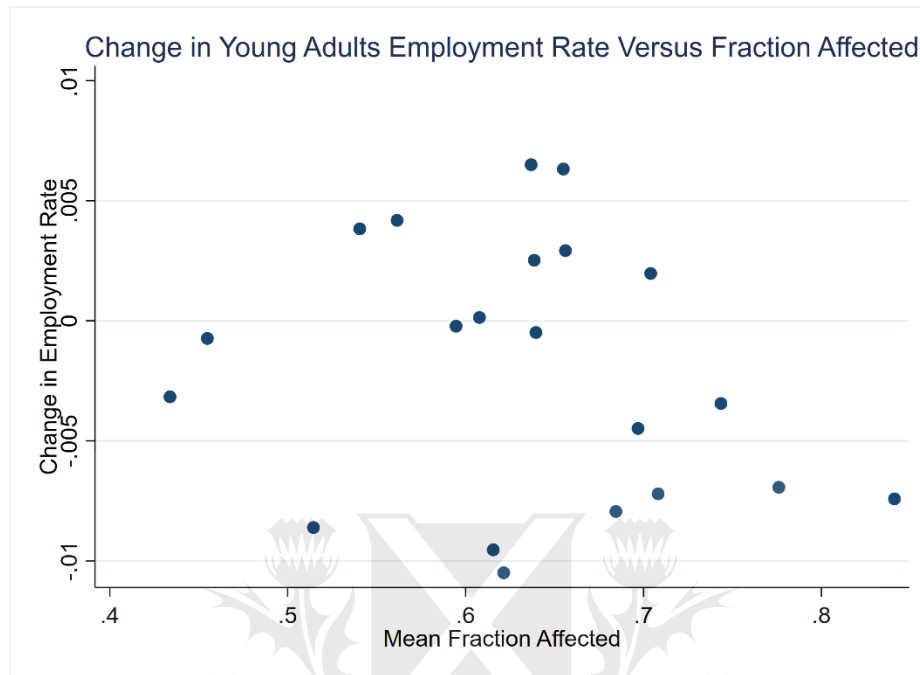


**Figure 7:** Change in Mean Log Wage of Informal Young Workers Versus Fraction of Informal Workers Affected, yearly average by province



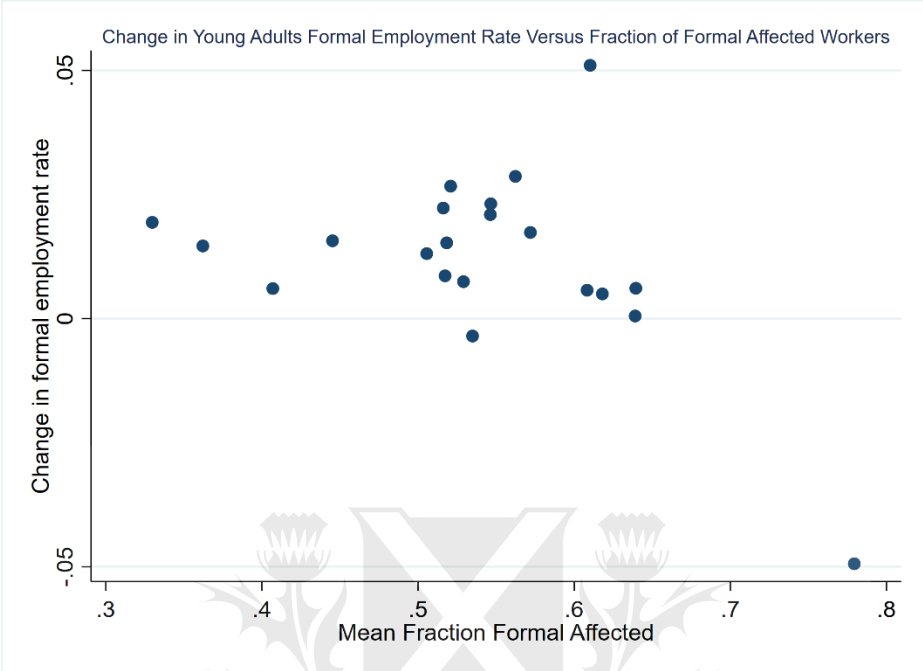
Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

**Figure 8:** Change in Young Adults Employment Rates Versus Fraction Affected, yearly average by province



Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

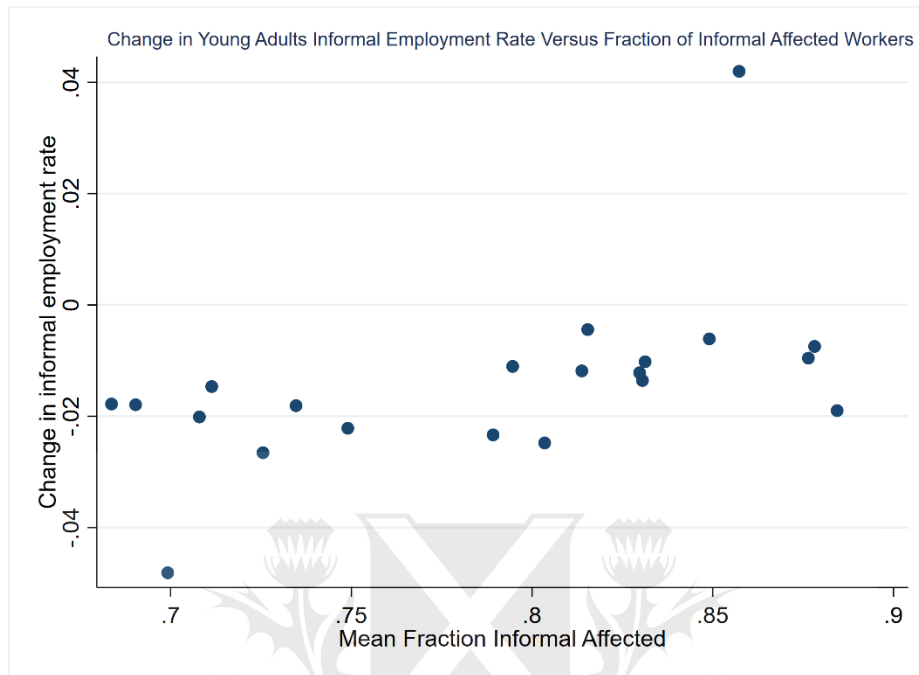
**Figure 9:** Change in Young Adults Formal Employment Rates Versus Fraction of Formal Affected Workers, yearly average by province



Source: Own elaboration using ENEMDU and Ecuador Central Bank Data



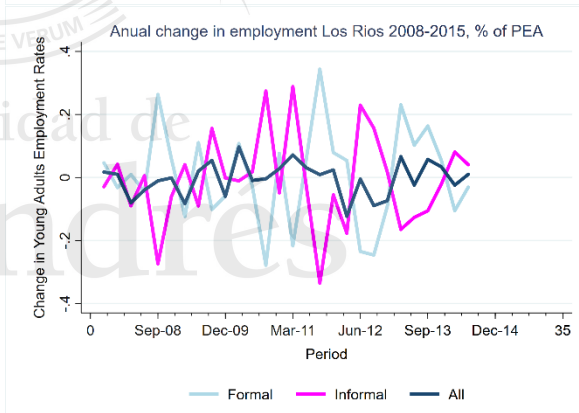
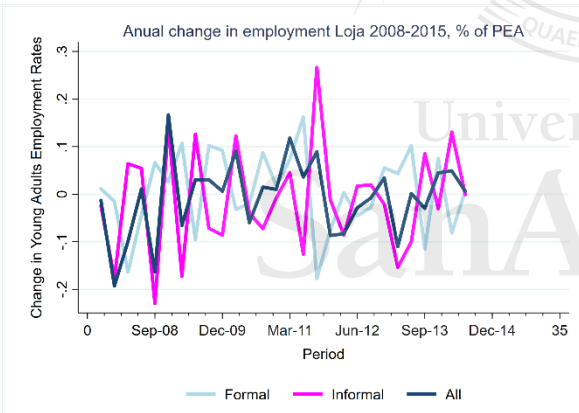
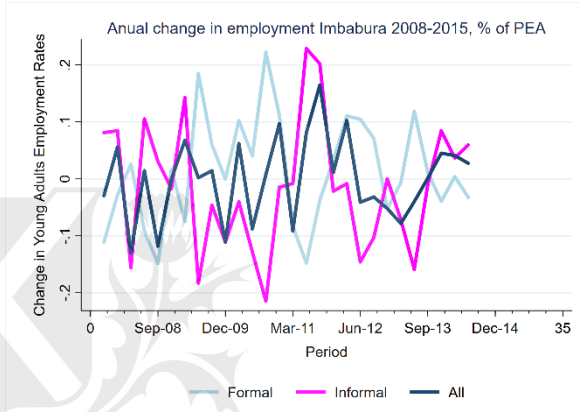
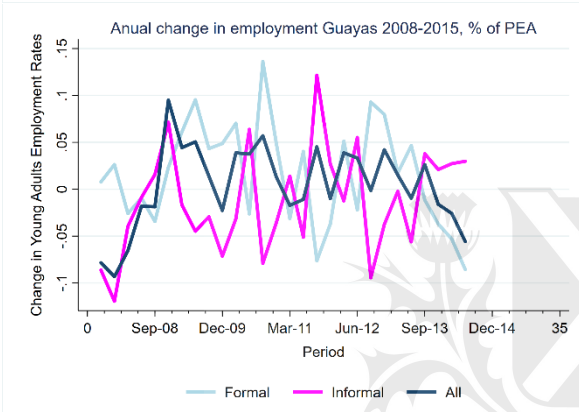
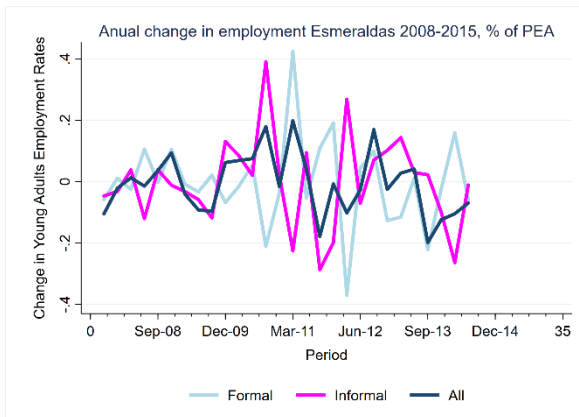
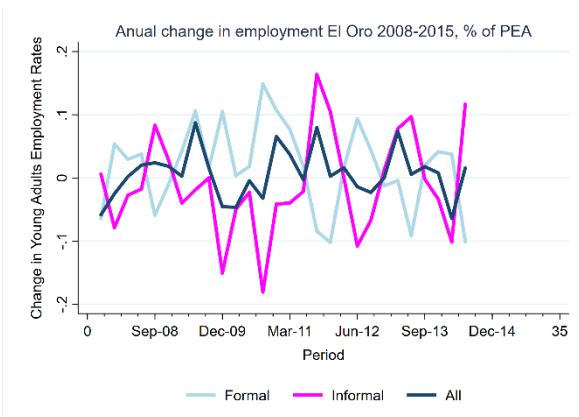
**Figure 10:** Change in Young Adults Informal Employment Rates Versus Fraction of Informal Affected Workers, yearly average by province

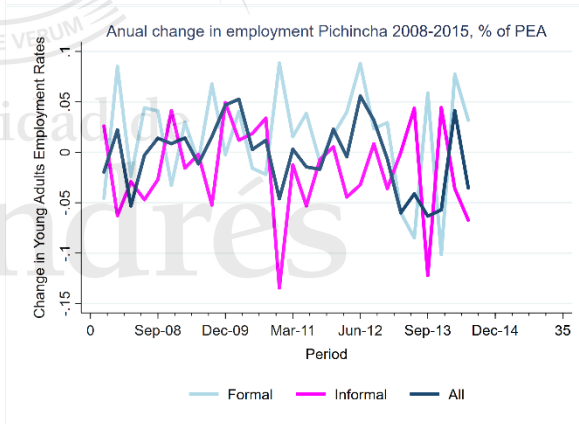
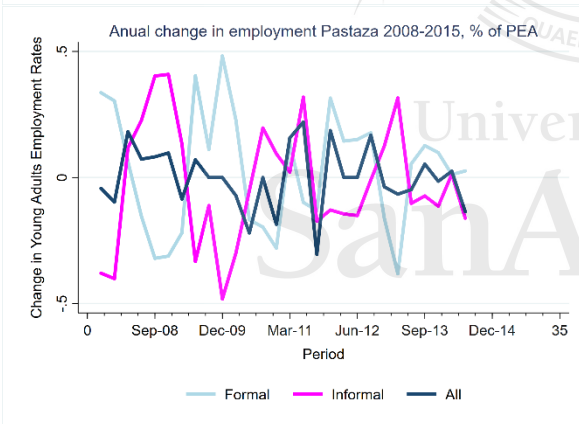
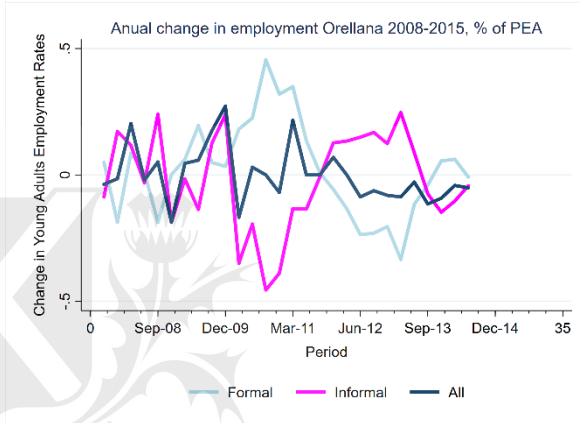
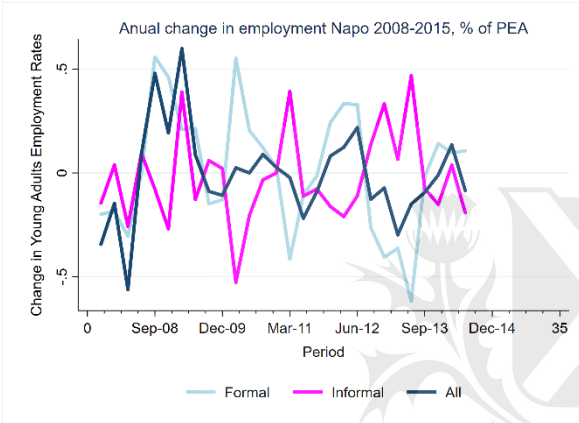
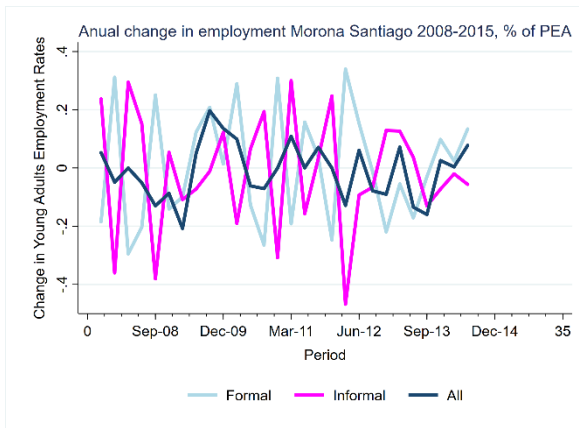
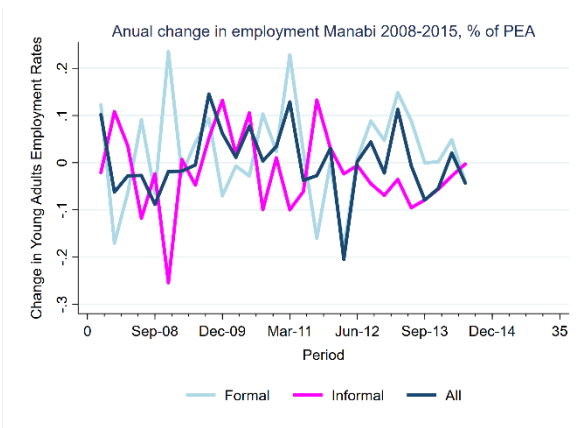


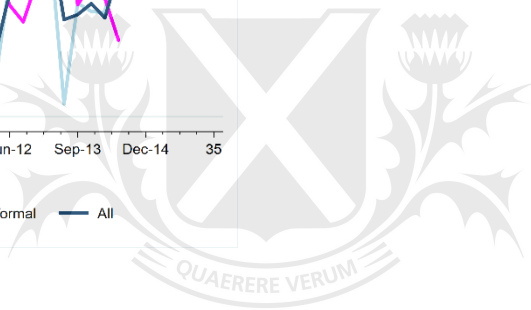
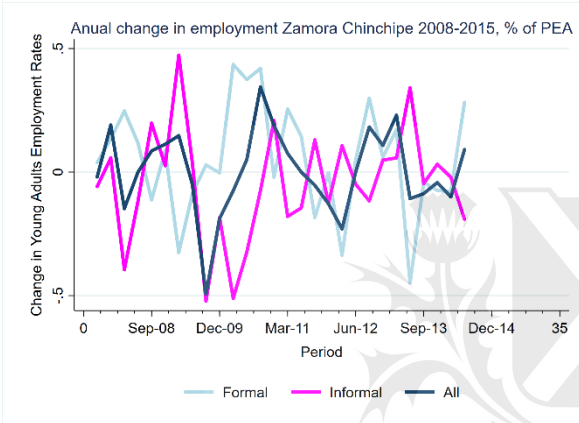
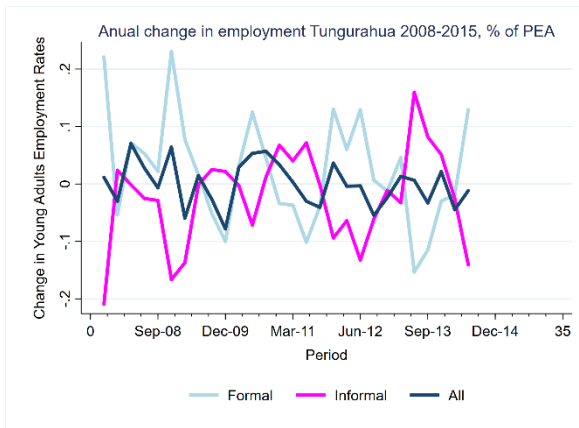
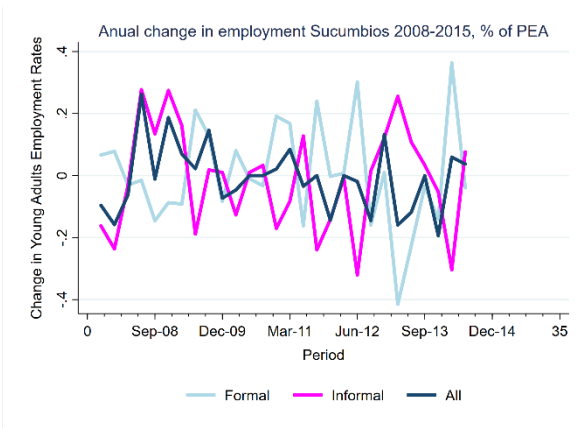
Source: Own elaboration using ENEMDU and Ecuador Central Bank Data

**Figure 11:** Annual change in employment by province 2008-2015, % of PEA









Universidad de  
**San Andrés**