LABOR MARKET RIGIDITIES AND OKUN'S LAW ASYMMETRIES FOR LATIN AMERICA DURING THE PERIOD 2000-2018

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Abstract
This paper evaluates the relationship between market rigidity and Okun's law asymmetry, using a sample of six Latin American countries from 2000 to 2018. After econometric processing of the variables, the annual data show that the potential GDP of the six countries is negatively correlated with the unemployment rate. Latin American hiring regulations and the relationship between minimum wage and unemployment are opposite, and there is no explanation on how the significance of unemployment affects these variables, and there is a positive relationship with centralized collective bargaining
Keywords*: Asymmetry, Okun's Law, Unemployment, Market rigidity, Okun's Law*

1. INTRODUCTION

After the structural changes that took place in different Latin American countries, there was a change in labor legislation that made contracts less rigid, as well as in the determination of dismissals, working time, salary amounts and the cost of termination of employment. The purpose of this research is to determine the relationship between labor market rigidity and unemployment in Latin America, between 2000-2018.

The theory is based on modern methods whose main message is the possible conflict of interests between the employed and the unemployed. Such conflicts would undermine the political feasibility of labor market flexibility. The unemployed will support the change if the government wants more flexibility to increase employment, but as long as there are more employed than unemployed, the reform will never pass by majority vote. Furthermore, Rojas (2015) in his paper titled "Estimates of Okun's Law of the Mexican Economy from a Panel Method 2005-2016" concludes that the Mexican labor market is not very sensitive to economic growth due to the high share of informal work, which is distorted by a strict constitutional framework.

This research aims to determine the relationship between labor market rigidity and unemployment, in order to explain the different Okun's coefficients for the six Latin American countries. Therefore, it will be supported through theoretical conceptions that help to determine how each of these variables influences in the last two decades where a structural labor reform was initiated in many countries. The results will contribute empirical knowledge for the following research.

2. LITERATURE REVIEW

Ball et al. (2019), in their article entitled "Does One Law Fit All? Cross-Country Evidence on Okun's Law", Compare the performance of Okun's Law in advanced and emerging economies. The database consists of 71 countries which are classified into 29 advanced and 42 developing countries, the study period is from 1980 to 2015 and the econometric model applied is panel data. Finally, stronger employment protection may slow hiring and firing in response to changes in output, reducing the responsiveness of employment. Moreover, there is minimal correlation between the Okun coefficient and aggregate measures of labor market or product market flexibility, but the Okun coefficient is related to the average unemployment rate and the share of services in GDP.

Betcherman (2015), in his paper titled "Labor market regulations: What do we know about their impacts in developing countries?" focuses on the employment, examines the effects on income and

productivity of two important types of labor market regulation, namely minimum wages and employment protection legislation (EPL). Methodological concerns in analyzing the effects of labor market regulation. A review of the empirical evidence on the effects of minimum wages and employment protection legislation. The available literature allows some conclusions about the impact of minimum wages and employment protection legislation on labor markets and output in developing countries. The effect on efficiency appears to be small, with most studies reporting little or no negative effects and some reporting positive results. There is no clear unidirectional effect of EPLs on output.

de Guzmán & Salas, E. (2015), in their article entitled "Okun's Law and labor flexibility in Mexico: a cointegration analysis, 1997Q3-2014Q1", aims to study the relationship of labor flexibility on unemployment, so, they perform an estimation with an Error Correction Model (VECM), based on Okun's Law. The results show a positive elasticity of 1.28 on unemployment. Therefore, it provides evidence contrary to the expected negative relationship, which means that labor flexibility does not decrease unemployment, as it does in developed countries in times of expansion.

Ontaneda (2020), in his article entitled "Okun's law in Ecuador. A cointegration analysis, 2007-2019", aims to analyze Okun's law in the Ecuadorian case. The empirical analysis of Okun's law confirms that there is a long-run cointegration relationship between output and unemployment, and this relationship is negative, which is consistent with Okun's law. In this sense, there is evidence that Ecuador supports Okun's law, it should be noted that the estimated value of the Okun's coefficient of Ecuador obtained in this study is lower than that of developed countries, which may respond to various factors such as labor rigidity and the characteristics of the Ecuadorian labor market.

Sanchez (2015), in his article entitled "Output, unemployment and Okun's Law in the Dominican Republic", aims to answer whether there is an empirical relationship between unemployment and output in the Dominican Republic. In this way, using Okun's Law the transitory effects on output and unemployment empirically evidence that an Okun's statistical relationship is present in the last half century. This number is very impressive, but according to recursive estimates, the value of the coefficient linking output and unemployment has gradually decreased. This trend is accompanied by a decline in the real potential output of the economy that is implicit in the econometric estimates.

Seok Oh (2017), in his paper "Changes in cyclical patterns of the USA labor market: from the perspective of nonlinear Okun's law", is based on the flexible labor market theory, which argues that the higher responsiveness of the employment rate and total hours worked is related to the increased freedom of employers to fire workers easily, resulting in lower firing costs. The database is based on US data from 1963 to 2009, and the econometric approach used is the least squares method. Finally, we find that Okun's coefficient, which is a coefficient on total hours worked, increases as labor markets become more flexible, allowing employers to lay off workers at a lower cost.

2.1. Unemployment rate

For Mankiw (2012), it is the proportion of the labor force that is unemployed. On the other hand, unemployed people, who are those who are able to go to work and are trying to find a job, are needed to find this rate. It also includes those who expect to be laid off in the last four weeks. The labor force, this condition contains all those who are not suitable with the first categories; such as full-time students, housewives and retirees.

$$Labor\ force = Number\ employed + Number\ unemployed$$

$$\frac{Number\ of\ unemployed}{Labir\ force}\ x\ 100$$

2.2. Okun's law

According to Paez (2013), the empirical relationship between changes in output and changes in the unemployment rate is called Okun's Law. Through these equations, the most common formula to empirically study this relationship is: First difference model:

$$\gamma_t - y_{t-1} = \alpha + \beta(u_t - u_{t-1}) + \eta_t$$

Gap model:

$\gamma_t - y_{t*-1} = \alpha + \beta(u_t - u_{t*-1}) + \eta_t$

Where, y^* is the potential product, u^*, is the unemployment rate, α is the intercept, and finally ß is Okun's coefficient with negative sign.

Fixed trend and elasticity model:

In this model, there is an invariant elastic relationship between the existing production rate and the potential production rate, and the employment rate (N=100) is expressed as part of its potential level (N_f). The equation is formulated as follows:

$\frac{N}{N_t} = \left(\frac{A}{p}\right)^a$

In the case where the observed GDP is A and the potential GDP is P, this symbolizes the growth rate P_0. In this way, at the time $t\ p_t = p_o e^{rt}$, the concluding equation is expressed as:

$LogN_t = \frac{N_f}{p_0^a} + \mathfrak{a} log A_t - (\mathfrak{a} r)t$

Then, the coefficient related to the logarithm of A is the output-employment elasticity. The time coefficient is the product of the elasticity and the potential growth rate is an estimate of the potential growth rate of output.

And to link with the labor market, we will use the modern approach of Pissarides (1989) and Blanchard and Diamond (1989).

A hiring rate h, defined as the flow probability of an unemployed person to get a job at any point in time, is described by the following equation:

$h_t = m(u_t, v_t) = g(\theta_t)$

Where $m(ut,\ vt)$ is the constant return matching function, ut is the unemployment rate, vt is the vacancy rate (relative to the labor force), $P = v/u$ and $g(\theta) = m(1,\ \theta)$. A matching function that returns the total number of functions, H, that are the two inputs to the search procedure, vacancies. In recent years, the unemployment rate has received a lot of attention and has become a common tool in macroeconomics. In my model, however, it is only a minor factor.

Firms are exposed to a certain shock: with a given flow probability, the demand for their products is negatively affected, making it financially impossible for them to operate. However, due to labor market laws (firing costs), closure may be impossible. The lower the fraction of firms that actually close in the face of a shock, the more inflexible the labor market. In addition, I think that voluntary resignations are another reason for the dissolution of a party. These have a constant outflow probability. As a result, the job destruction rate is equal to the product of the quit rate and the layoff rate:

$v_t = s(F) + \rho \qquad (1)$

$s' < 0$, where F is the firing cost. Note that s is not time-dependent.

Now that we are focusing on labor demand, it is quite straightforward to use the following result from Pissarides (1989): Firms should set the vacancy rate so that θt is constant and equal to its steady-state value along the transition path when returns are constant and vacancy flow costs are fixed. As a result, regardless of the initial level of unemployment, the hiring rate remains constant and equal to its steady-state value along the transition path h.

How does labor market regulation affect h? Firms allocate vacancies in such a way that the cost of a vacancy is balanced against its expected return. The latter is equal to the present discounted cash flow of a filled job multiplied by the flow probability of filling the vacancy $m(u,\ v)/v$. As a position becomes less flexible, the vacancy rate decreases and the probability of filling a vacancy increases. As a result, the firm is more likely to retain unprofitable employees or incur the costs associated with terminating them. To maintain equilibrium, this increase must correspond to a decrease in the ADV of a job. For θ and h to fall, it must be accompanied by rising labor market slack. Hence:

$h_t = h(F), h' < 0 \qquad (2)$

To simplify the analysis, I do not go any further in explaining the dependence on h of F: its impact on the ADV of a job would normally have to be calculated.

When removing F between equations (1) and (2) a positive relationship is obtained between h and s:

$$h = h(s), h' > 0 \quad (3)$$

The main assumption I use to analyze this trade-off is that h is concave, which means that h'' < 0. This implies that as the labor market becomes more flexible, the marginal impact of an increase in the separation rate on the hiring rate declines. In other words, if the labor market is less flexible at entry, the benefits of increasing flexibility are greater. Since the change in employment is equal to inputs minus outputs, we can now derive the equation for the evolution of employment. Employment equals the sum of inputs minus the sum of outputs:

$$\frac{dL}{dt} = h(s).(N - L) - (s + \rho).L \quad (4)$$

Where L is total employment and N is total labor force. Equations (3) and (4) outline the labor demand side of the model. In order to estimate political support for different initiatives, the utility function of different individuals in the labor market must be computed. Assuming that agents are risk neutral (or have access to perfect financial markets), each agent's utility function at time t is:

$$V_t = \int_t^{+\infty} (Z_u - \epsilon\xi(F))e^{-r(u-t)}du \quad (5)$$

In the equation (5), r represents the discount rate, z is the rent at the time u, ξ is an increasing function, and ϵ is a very small integer. The expression in $\epsilon\xi(F)$ refers to the resource cost of policing a controlled labor market, which is assumed to increase ad firing costs increase. Equation (5) establishes a lexicographic ordering, which is small: Agents prioritize rent over flexibility; given two possibilities, the one with the larger predicted current discounted rent is preferred. In case of a tie, the one with the lower F is chosen. Unless, I will not consider the tracking fee in the future. $Ve(t)$ represents the utility of being employed at the time t, while $Vu(t)$ represents the utility of being unemployed. I assume that the employed receive a wage w and the unemployed receive a benefit $\bar{w}$ < w. Both are assumed to be constant in space and time. I also assume that voluntary quits are aimed at retirement, which does not provide income indefinitely. Retirements correspond to a continuous flow ρN of new entrants into the labor force in order to keep the labor force constant. Equation (5) can therefore be obtained from the evolution equations of the Ve (t) and $Vu(t)$:

$$\frac{dV_e}{dt} = (r + \rho + s)V_e - sV_u - w \quad (6)$$

$$\frac{dV_u}{dt} = (r + \rho + h(s))V_u - h(s)V_e - \bar{w} \quad (7)$$

After removing the explosive solutions of equations (6) and (7), it follows that V and V are temporal constants and are given by:

$$V_e = \frac{(r + \rho + h(s))w + s\bar{w}}{(r + \rho)(r + \rho + s + h(s))} \quad (8)$$

$$V_u = \frac{h(s)w + (r + \rho + s)\bar{w}}{(r + \rho)(r + \rho + s + h(s))} \quad (9)$$

Now it is possible to evaluate the political support for labor market flexibility. Let's assume that the government wants to increase both s and h by decreasing F for all current and future employment contracts. To answer this question, one must first consider whether workers would support the plan. After differentiating equation (8) with respect to s, the following happens.

$$\frac{\partial V_e}{\partial s} = \frac{(w - \bar{w})(h'(s)s - r - \rho - h(s))}{(r + \rho)(r + \rho + s + h(s))^2} \quad (10)$$

The numerator is now negative because $sh'(s)$ < $h(s)$ due to concavity. As a result, any increase in labor market flexibility will be resisted by workers. This is easy to understand: because they are now employed, they place a higher value on increasing the firing rate than on increasing the hiring rate, which only comes into play when they are unemployed. Moving on to the utility of the unemployed:

$$\frac{\partial V_u}{\partial s} = \frac{(w-\bar{w})(r+\rho+s)h'(s)-h(s))}{(r+\rho)(r+\rho+s+h(s))} \quad (11)$$

By concavity, the numerator is strictly decreasing in *s*. It is positive for *s* close enough to zero if $\frac{h(0)}{h'(0)} < r+\rho$. Finally, it becomes negative when *s* increases beyond s'' where s, is defined by $\frac{h(s_u)}{h'(s_u)} - s_u = r+\rho$.

Thus, equation (11) shows that the unemployed are likely to support the plan if the labor market is initially sufficiently tight $(s < s_u)$. In this case, the direct benefits of increased hiring outweigh the indirect costs of increased layoffs. However, this procedure has limitations, since larger initial values of s imply smaller marginal benefits with respect to h. As a result of the flexibility associated with the rotation su, the unemployed are also averse to any increase in s. The effect of increased flexibility on employment is also considered. According to equation (4), the steady state level of employment is given by:

$$L^* = \frac{Nh(s)}{\rho + s + h(s)} \quad (12)$$

Differentiating the equation (12) with respect to *s* obtains:

$$\frac{\partial L^*}{\partial s} = N[(\rho + s)h'(s) - h(s)]/(\rho + s + h(s))^2 \quad (13)$$

The analysis of equation (13) is formally similar to that of equation (11). Greater flexibility will benefit employment if and only if $s \in [0, s_e]$, with $\frac{h(s)}{h'(0)} < \rho$. Note that these conditions are stricter than those necessary to make the unemployed better off. Therefore, the unemployed will support any plans that increase employment. The main message is that there is likely to be a conflict of interest between the employed and the unemployed. This disagreement will have a negative impact on the political viability of labor market flexibility. If the government intends to expand employment by allowing more flexibility, the unemployed will favor such a change; if the employed outnumber the unemployed, the reform will never be approved by a majority vote.

If the Okun's law is extended to include its connection with the Phillips curve, further explanations of the asymmetry can be provided. Dupasquier & Ricketts (1998), considered four models to explain the asymmetry of the Phillips curve: The first model is called capacity constraints, where it is believed that some firms cannot improve their production capabilities. Therefore, in the short run, when economic demand increases, the more firms there are the greater the impact on inflation with a capacity constraint. The signal extraction model considers agents to economic factors cannot accurately distinguish the total impact and, on the contrary, since the impact cannot be observed directly, it must be inferred from relative prices.

The third model, costly adjustments, which implies that the relationship between inflation and unemployment varies with the level of inflation and ultimately declining nominal wages, indicates that more workers are unwilling to accept a decline in nominal wages rather than a decline in real wages. This behavior is due to the monetary illusion, system and behavior. In a tariff environment, as inflation falls, it can adjust more slowly relative to relative wages, leading to inefficiency. If rigidity only applies to a decrease in wages, the inflation rate should have a smaller result on excess supply than excess demand, leading to an asymmetry in the unemployment rate.

2.3. Gross domestic product (GDP)

It is an important economic indicator that manifests monetary value. Therefore, the Ministry of Economy and Finance (2019) states that GDP is the monetary value of the conclusive goods and services coming from the economy at a set time stage. Product refers to value added. Domestic refers to production within economic boundaries; gross refers to the fact that inventory changes in depreciation or appreciation of capital are not taken into account.

2.4. Rigidity in the labor market

It will be mentioned what rigidity in the labor market consists of and what effects it produces in employment. Summers (2018) mentions that Labor rigidity infringes against one of the primordial rules of the development knowledge of industrialism, because it calms the original mobility that must coexist in the labor part, by not admitting that new people who want to be included continuously to the labor market and are occupying their positions in an easy way, since if they decide to change work center. This is why the existence of labor rigidity generates vacuums and holes for jobs, since a greater rotation of personnel is required and even the renewal of personnel and this in turn generates greater physical effort, finally generating a distortion in the salary curve of companies.

2.5. Labor market regulations

The most prominent of these are: (i) minimum wages, (ii) dismissal regulations, (iii) centralized wage setting, (iv) the extension of union contracts to non-participating parties. To score high marks in regulating the qualification of labor market components, a country must allow market forces to set wages and institute hiring and firing conditions.

3. RESEARCH MODEL AND HYPOTHESES

The independent variable is unemployment and the independent variable is market rigidity. The general hypothesis is that labor market rigidity has a positive relationship on unemployment in Latin America, between 2000-2018. In addition, the specific hypotheses are: hiring and minimum wage regulations, hiring and firing rules on unemployment, centralized collective bargaining, hours regulations and mandatory cost of firing workers have a positive relationship on unemployment in Latin America, between 2000-2018.

4. METHOD

The research has a quantitative approach and the deductive method, the longitudinal panel design is applied since it segments a certain area for the study. The econometric model used in this research is unbalanced panel data, this econometric model is based on repeated observations over a long period of time for the same individuals. The sample to be used is the annual data of the labor market regulation indices, between the years 2000-2018. Due to the dimensions of labor market rigidity, it was convenient to use observation as a tool for data collection.

Because of its ability to handle time series and generate appropriate regressions, Stata 14 software was used for the methodological and statistical analysis of the annual data collected from the World Bank and Fraser Institute online sites. Reliable and truthful data are required for the independent and dependent variables; therefore, data are extracted from institutions such as the World Bank and the Fraser Institute, which help to perform an efficient econometric regression. This regression is based on unbalanced panel data and the theoretical basis of Okun's Law, which includes independent variables that explain unemployment between 2000 and 2018.

Model in differences:

$$u_t - u_{t-1} = \alpha + \beta(y_t - y_{t-1}) + \varepsilon_t$$

Where

u_t: Unemployment rate in t

y_t: Logarithm of GDP in t

ε_t: Waste white noise

Model in gaps:

$$u_t - u_{t-1} = \alpha + \beta(y_t - y_{t-1}) + \varepsilon_t$$

Where

$u^*{}_t$: Unemployment rate in t

y^*_t: Logarithm of GDP in t

μ_t: Waste white noise

The theoretical model comprises the variables unemployment and potential GDP, but extensions of variables are made (hiring regulations and minimum wage; hiring and firing regulations; centralized collective bargaining; hours regulations; mandatory cost of unemployment taking into account scientific research by Porras & Martín, Páez J., Orsini, Gisela & Scott, and Briceño. In effect, the econometric equation (based on unbalanced panel data) considered for the present research is detailed as follows:

$$u_{it} = \beta_0 + \beta_1 Y_{itB} + \beta_2\, NCSM_{it} + \beta_3 NCD_{it} + \beta_4 NCC_{it} + \beta_5 RH_{it} + \beta_6 COD_{it} + V_{it}$$

Where:

u_{it}: Unemployment rate by entity and period.

$Y_{it}{}^B$: Potential output by entity and period.

$NCSM_{it}$: Hiring standards and minimum wage by entity and period.

NCD_{it}: Hiring and firing rules by entity and period.

NCC_{it}: Centralized collective bargaining by entity and time period.

RH_{it}: Hourly regulations by entity and period.

COD_{it}: Mandatory unemployment cost by entity and period.

V_{it} : Composite error of estimation with panel data.

Likewise, the instrumental variables that have been considered for this research are the first lag of the variable, GDP, hiring regulations and minimum wage; hiring and firing regulations; centralized collective bargaining; hours regulations; mandatory cost of unemployment. Thus, this econometric equation allows capturing the relationship existing between the variables.

Instrument Specification

The instruments required for the econometric estimation are then determined.

u_{it}: Unemployment rate by entity and period.

$Y_{it}{}^B$: Relative gap between potential GDP and observed GDP by entity and period

$NCSM_{it}$: Hiring regulations and minimum wage

NCD_{it}: Hiring and dismissal rules

NCC_{it}: Centralized collective bargaining

RH_{it}: Hours regulations

COD_{it}: Mandatory unemployment cost.

5. RESULT

According to the generalized method of moments, econometric model and data processing, the following result is presented between the dependent and independent variables:

$$u_{it} = 167.77 - 6.46 Y_{it}{}^B - 0.47\, NCSM_{it} - 0.63 NCD_{it} + 0.46 NCC_{it} - 0.09 RH_{it} + 0.10 COD_{it}$$

The complete results of the estimation are shown in Figure 1. The model presents an explanatory efficiency of 83.24% for its independent variables, as shown by the adjusted R-squared. The independent variables therefore strongly explain unemployment for the 6 countries studied. It is also noted that an instrumental variable (conscription) was omitted.

On the other hand, it is shown that, with a one percentage point increase in potential GDP, unemployment falls by 6.46, which corroborates the validity of the Okun's law model that predicts this inverse relationship. Likewise, with a percentage increase in the index of hiring regulations and minimum wage, unemployment falls by 0.47, having a different sign than expected. This implies that with greater rigidity in hiring regulations and minimum wage, unemployment is reduced. Also, with the increase in the index of hiring and firing rules, there is a reduction in unemployment by 0.63, when it increases by one percentage point. While, with the centralized collective bargaining index,

the expected sign in relation to unemployment is fulfilled, which, with a percentage increase of one point, increases unemployment by 0.46. Thus, there is a positive relationship the more rigid centralized collective bargaining is. In addition, it is observed that the index of hours regulations presents an inverse relationship of 0.09 in relation to unemployment. Meanwhile, the index of mandatory cost of unemployment has a positive relationship with unemployment of 0.10, when it varies by one percentage point.

The general and particular hypotheses are accepted based on the data, except for the index of hiring and firing standards and the index of collective bargaining. The positive relationship between the years 2000 and 2018 is satisfied by the index of hiring standards and minimum wage, the index of hiring and firing standards, and the index of mandated cost of unemployment.

5.1 Contrast of results

Through the data obtained by the econometric process, it is possible to make inferences about the variables treated, as well as to contrast the general hypothesis and the specific hypotheses already stated in chapter 3.

The independent variable, potential GDP turns out to have a negative influence on unemployment, besides being significant at a level of 5%, likewise it has a coefficient of -6.46, which allows contrasting the first specific hypothesis, which states Okun's law, since the relationship between unemployment and potential GDP is negative in the six Latin American countries from 2000 to 2018, the first particular hypothesis is contrary and compatible with the results of the econometric and theoretical model.

The independent variable, hiring regulations and minimum wage has a negative influence of 0.47 on unemployment, but it is not significant for the 6 Latin American countries, between 2000-2018, so there is no consistency in being able to deny the specific hypothesis, although it is contrary to the expected relationship in the econometric and theoretical model.

The independent variable, Hiring and firing rules by entity and period, has a negative influence on unemployment and is significant at 5%, but it does not contrast the specific hypothesis, which states that unemployment has a positive relationship with hiring and firing rules by entity and period for the 6 Latin American countries between 2000-2018, since its coefficient is -0.63.

The independent variable, Centralized collective bargaining, turns out to have a positive influence on unemployment, it is also significant at 5%, and has a positive correlation coefficient of 0.46, which allows contrasting the specific hypothesis, which states that unemployment has a positive relationship with Centralized collective bargaining for the 6 Latin American countries, between 2000-2018.

The independent variable, Hours Regulations, turns out to have a negative influence on unemployment, but it is not significant, its coefficient is -0.92, so it does not allow contrasting the specific hypothesis, which states a positive relationship between unemployment and Hours Regulations for the 6 Latin American countries, between 2000-2018.

The independent variable, Mandatory cost of unemployment, has a positive influence on unemployment, but it is not significant, its coefficient is 0.10, so it does not allow contrasting the specific hypothesis with significance, which states that unemployment has a positive relationship with the Mandatory cost of unemployment for the 6 Latin American countries, between 2000-2018.

Thus, after the regression of each of the independent variables, the general hypothesis is tested, which states that labor rigidity has a positive relationship with unemployment for the 6 Latin American countries between 2000 and 2018. Therefore, the general hypothesis is tested and is consistent with the results of the econometric model and the theoretical model of Okun's Law.

6. DISCUSSION AND CONCLUSION

Okun's law is used to determine that there is a negative relationship between potential GDP and unemployment, as well as the rigidity of the labor market in the extension of the econometric model,

a positive relationship between Centralized Collective Bargaining and unemployment. While the hiring and firing rules by entity show a negative relationship with unemployment, contradicting the theory, considering the empirical evidence for the 6 Latin American countries between 2000 and 2018.
There are also studies that achieve similar results to those mentioned above, a research conducted by Sanchez and Garcia (2020), who analyzed the elasticity of employment with respect to economic freedom, within which is the rigidity of the labor market, analyzed for Mexico, northern region and southern region, a panel of fixed and random effects, finding that there is an exaggerated value to give the importance of economic freedom as a cause of unemployment reduction.
Also, the estimation of Okun's law with potential GDP can be checked, by obtaining a similar result in terms of impact on unemployment, as the research conducted by Rojas (2019), which analyzes a panel model for 32 entities in twelve annual periods, 2005 to 2016. In his estimation, this results in a negative association of 0.13% before the percentage growth of the observed product. This provides evidence of the influence of product growth on unemployment, as demonstrated in this study.
Finally, it is concluded that after performing the econometric treatment for the variables of this study, it is possible to determine that the potential GDP has a negative relationship with unemployment for the 6 Latin American countries, between the years 2000-2018, under an annual data, that is, with an increase in the potential GDP, unemployment falls by 6.46. This result shows that the relationship between potential GDP and unemployment is inverse, since, if potential GDP increases, it affects the elasticity of unemployment which implies in the ease of finding a job in the economy. Therefore, a countercyclical economic policy can be taken in order to solve the increase of unemployment in the economies of the world. The relationship between hiring regulations and minimum wage on unemployment in Latin America, between 2000-2018, is inverse, not having significance to explain how it influences unemployment, besides having a coefficient of -0.47, quite low for the analysis. It should also be noted that the hiring and firing rules by entity and period have a negative relationship of 0.63 with unemployment, i.e., with an increase in the hiring and firing rules by entity, there is less unemployment, the conclusion is contrary to theory, therefore, the rigidity that occurs in the hiring and firing rules can be beneficial, because it helps reduce unemployment.
Finally, centralized bargaining has a correlation of 0.46 with unemployment, indicating that the rigidity of centralized bargaining has a positive effect on unemployment. This positive relationship is significant because it helps us to be more cautious when taking a policy stance on the degree of flexibility that we want for centralized collective bargaining. Likewise, the hours regulations turn out to have a negative influence of 0.92 on unemployment, but it is not significant, having no effect for the 6 Latin American countries studied. Therefore, it was not possible to determine the relationship with unemployment.
Finally, the mandatory cost of unemployment turns out to have a positive influence on unemployment, but it is not significant, its coefficient is 0.10, so it is not possible to explain how it is related to unemployment, given a higher degree of rigidity of this variable, in order to know its direct effect.

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Appendix

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note: 6.Id omitted because of collinearity

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic with cross-sectional correlation
Correlation:   common AR(1) coefficient for all panels  (0.4625)

Estimated covariances      =        21          Number of obs      =       114
Estimated autocorrelations =         1          Number of groups   =         6
Estimated coefficients     =        12          Time periods       =        19
                                                Wald chi2(11)      =    496.87
                                                Prob > chi2        =    0.0000
```

u	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Id						
1	-10.41338	.7074148	-14.72	0.000	-11.79988	-9.026869
2	15.77398	1.765069	8.94	0.000	12.3145	19.23345
3	8.489525	1.54722	5.49	0.000	5.457029	11.52202
4	14.64948	1.787147	8.20	0.000	11.14673	18.15222
5	-4.231289	.8554712	-4.95	0.000	-5.907982	-2.554596
6	0	(omitted)				
Yb	-6.462045	.714278	-9.05	0.000	-7.862004	-5.062086
NCSM	-.047929	.0679985	-0.70	0.481	-.1812035	.0853455
NCD	-.6355157	.0960207	-6.62	0.000	-.8237129	-.4473185
NCC	.4875388	.1175093	4.15	0.000	.2572247	.7178529
RH	-.0925907	.1241612	-0.75	0.456	-.3359422	.1507609
COD	.1079577	.0921732	1.17	0.241	-.0726984	.2886139
_cons	167.7768	17.26327	9.72	0.000	133.9414	201.6122

Figura 1. Resultados de la estimación.