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 the modern approach where the main message is that a conflict of interest is likely to exist between the employed and the unemployed. This conflict will undermine the political feasibility of labor market flexibility. If the government wants to increase employment through greater flexibility, the unemployed will support that reform; however, as long as the employed outnumber the unemployed the reform will never be implemented through a majority vote. Furthermore, Rojas (2015), in his thesis entitled "Estimating Okun's law for the Mexican economy from a panel approach, 2005-2016", concludes that Mexico's labor market is little sensitive to economic growth as a consequence of a rigid constitutional framework which leads to the distortion of high rates of labor informality.

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 developing 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, it is concluded that higher employment protection may slow down hiring and firing as output fluctuates, which reduces the responsiveness of employment. In addition, there is little association between the Okun coefficient and aggregate measures of labor market flexibility or product market flexibility, while the average unemployment rate and the share of services in GDP are associated with the Okun coefficient.
Betcherman (2015), in his paper entitled “Labor market regulations: What do we know about their impacts in developing countries?”, focuses on the impacts of two important types of labor market regulation, minimum wage and employment protection legislation (EPL), on employment, income and productivity. Methodological issues in assessing the impacts of labor market regulation. Review of empirical evidence on the impacts of minimum wage and employment protection regulations. The available literature suggests some conclusions on how minimum wages and EPL affect labor market and production outcomes in developing countries. Impacts on efficiency appear small, and studies mostly show no or small negative effects, but some find positive effects. EPL does not have a significant unidirectional impact on productivity.

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”, following the flexible labor market hypothesis which states that a higher responsiveness of the employment rate and aggregate hours is due to the greater ability of firms to fire workers freely incurring lower firing costs. The data base is considered from the period 1963-2009 with data from the United States, the econometric methodology applied is Ordinary Least Squares. Finally, it is concluded that the Okun’s coefficient as the coefficient of aggregate hours increased because firms can fire employees with lower firing costs in a flexible labor market.

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.

\[
\text{Labor force} = \text{Number employed} + \text{Number unemployed}
\]

\[
\text{Tasa de desempleo} = \frac{\text{Number of unemployed}}{\text{Labor force}} \times 100
\]

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:
\[ y_t - y_{t-1} = \alpha + \beta (u_t - u_{t-1}) + \eta_t \]

**Gap model:**
\[ y_t - y^*_t = \alpha + \beta (u_t - u^*_t) + \eta_t \]

Where, \( y^* \) is the potential product, \( u^* \) is the unemployment rate, \( \alpha \) is the intercept, and finally \( \beta \) 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:
\[ \frac{N}{N_f} = \left( \frac{A}{P} \right)^a \]

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 \( t \), the concluding equation is expressed as:
\[ \log N_t = \frac{N_f}{P_0} + a \log A_t - (ar)t \]

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 recruitment rate \( h \), for each instant of time, which is defined as the flow probability of an unemployed person finding a job, is summarized in the following equation:
\[ h_t = m(u_t, v_t) = g(\theta_t) \]

Where \( m(u_t, v_t) \) is the constant-returns matching function, \( u_t \) is the unemployment rate, \( v_t \) is the vacancy rate (in terms of labor force), and \( \theta = v/u \) and \( g(\theta) = m(1, \theta) \). The matching function, which gives the total number of hires as a function of the two inputs to the search process, i.e., vacancies and unemployment, has received a lot of attention in recent years and is now a standard tool in macroeconomics. However, in my model it plays only a minor role.

Firms are subject to idiosyncratic shocks as follows: With a certain flow probability, they experience a negative shock in the demand for their product, so that it is no longer profitable to continue operating. However, they may not be able to close down due to labor market regulations (firing costs). The more rigid the labor market, the smaller the proportion of firms that will actually close operating. However, they may not be able to close down due to labor market regulations (firing costs). The more rigid the labor market, the smaller the proportion of firms that will actually close operating. However, they may not be able to close down due to labor market regulations (firing costs). The more rigid the labor market, the smaller the proportion of firms that will actually close operating. However, they may not be able to close down due to labor market regulations (firing costs).

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\[ v_t = s(F) + \rho \]

\( s < 0 \), where \( F \) is the firing cost. Note that \( s \) does not depend on time.

Focusing now on labor demand, it is very convenient to use the following result established by Pissarides (1989): Under constant yields and a fixed vacancy flow cost, it is optimal for firms to set a vacancy rate so that \( \theta_t \) is constant and equal to its steady state value along the transition path.

In effect, this means that, regardless of the initial level of unemployment, the hiring rate is constant and equal to its steady state value along the transition path \( h \) will be constant.

How does labor market regulation affect \( h \)? Companies set vacancies in such a way as to match the cost of a vacancy with its expected return. The latter is equal to the flow probability of filling the vacancy \( m(u, v)/v \) by the current discounted cash flow of a filled job. This discounted present value (DCV) is lower, so the firm is more likely to have to keep unprofitable workers and/or pay the cost of firing them when their job is more rigid, the vacancy rate decreases to induce an increase in the probability of filling a vacancy. To restore equilibrium, this increase must be proportional to the drop in the ADV of a job. This must be accompanied by increased slack in the labor market so that \( \theta \) and \( h \) decrease. Therefore:
\[ h_t = h(F), h' < 0 \]
To simplify the analysis, I do not go any further in explaining the dependence on $\mathbb{F}$ of $V$; its impact on the ADV of a job would normally have to be calculated.

When removing $\mathbb{F}$ between equations (1) and (2) a positive relationship is obtained between $h$ and $s$: 
\[
h = h(s), h' > 0
\]  
(3)

The key assumption I make about this trade-off throughout the paper is that $h$ is concave, that is, $h'' < 0$. That to say, the marginal impact on the hiring rate of increasing the separation rate decreases as the labor market becomes more flexible. In other words, the gains from greater flexibility are greater when the labor market is more rigid at entry.

It is now possible to derive the equation for the evolution of employment by writing that the change in employment is equal to the inputs minus the outputs:
\[
\frac{dL}{dt} = h(s).N - (s + \rho).L
\]  
(4)

Where $L$ is total employment and $N$ is the total labor force. Equations (3) and (4) summarize the labor demand side of the model.

To analyze the political support for the different measures, it is necessary to calculate the utility function of the different individuals in the labor market. I assume that agents are risk neutral (or equivalently have access to perfect financial markets) so that the utility function of any agent at time $t$ is:
\[
\begin{align*}
V_t &= \int_{\infty}^{+\infty} (z_u - \epsilon \xi(F)) e^{-r(u-t)}du \\
\end{align*}
\]  
(5)

In the equation (5), $r$ is the discount rate, $z$ is the rent at the time $u$, $\xi$ is an increasing function, and $\epsilon$ is a very small number. The term in $\epsilon \xi(F)$ describes the resource cost of overseeing a regulated labor market, presumably an increasing function of firing costs. Given that $\epsilon$ is small, equation (5) defines a lexicographic ordering: Agents prefer rent first and then flexibility; of two outcomes, the one that produces higher expected present discounted rent is preferred. In case of a tie, the one with the lower $F$ is preferred. Henceforth, I will ignore the tracking cost, except where relevant.

$V_e(t)$ is the usefulness of being employed. I assume that the enterprise earn a wage $w$ and the unemployed earn a benefit $\bar{w} < w$. Both are assumed to be constant over time. I also assume that voluntary quits are toward retirement, which does not produce income forever. To keep the labor force constant, retirements correspond to a constant flow $\rho N$ of new entrants into the labor force. The evolution equations of the $V_e(t)$ and $V_u(t)$ can then be derived from the equation (5): 
\[
\begin{align*}
\frac{dV_e}{dt} &= (r + \rho + s) V_e - s V_u - w \\
\frac{dV_u}{dt} &= (r + \rho + h(s)) V_u - h(s) V_e - \bar{w}
\end{align*}
\]  
(6)  
(7)

Eliminating the explosive solutions of the equations (6) and (7), it follows that $V_e$ and $V_u$ are constant in time and are given by:
\[
\begin{align*}
V_e &= \frac{(r + \rho + h(s))w + s\bar{w}}{(r + \rho)(r + \rho + s + h(s))} \\
V_u &= \frac{h(s)w + (r + \rho + s)\bar{w}}{(r + \rho)(r + \rho + s + h(s))}
\end{align*}
\]  
(8)  
(9)

The political support for labor market flexibility can now be assessed. Suppose the government wants to reduce $F$ for all existing and future employment contracts, thereby increasing both $s$ as $h$. Will the majority support this plan? To answer this question, one must first consider whether employees would support it. Differentiating equation (8) with respect to $s$ then:
\[
\begin{align*}
\frac{\partial V_e}{\partial s} &= \frac{(w - \bar{w})(h'(s)s - r - \rho - h(s))}{(r + \rho)(r + \rho + s + h(s))^2}
\end{align*}
\]  
(10)

Now, the numerator is negative because $sh'(s) < h(s)$ due to concavity. Therefore, employees will oppose any increase in labor market flexibility. This is easy to understand: since they are currently
employed, they put more weight on increasing the firing rate than on increasing the hiring rate, which enters into their utility only through the probability of becoming unemployed.

Turning to the utility of the unemployed, then:

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

(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 that case, the direct gains from higher hiring outweigh the indirect losses from higher layoffs. However, there are limits to this process, since higher initial values of s imply lower marginal gains in terms of h. Therefore, from a certain level of flexibility associated with the rotation \( s_u \), the unemployed are also opposed to any increase in the s.

For completeness, consider also the impact of greater flexibility on employment. Equation (4) indicates that the steady-state level of employment is given by:

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

(12)

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

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

(13)

The analysis of equation (13) is formally similar to that of equation (11). Greater flexibility will benefit employment if and only if \( s \in [0, s_c] \), with \( \frac{h(s)}{h'(s)} < \rho \). Note that these conditions are stricter than those necessary to make the unemployed better off. Therefore, the unemployed will support all 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 conflict will damage the political viability of labor market flexibility. If the government wants to increase employment through greater flexibility, the unemployed will support such a reform if the employed outnumber the unemployed the reform will never be implemented 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. Ridigity 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 determined range 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 indexes, between the years 2000-2018. Through the dimensions of labor market rigidity, it was propitious to use observation as a tool for data collection.

For the procedure and statistical analysis of the annual data, which were extracted from the web portals of the World Bank and Fraser Institute, Stata 14 software was used, due to its capacity to work with time series and obtain optimal regressions. Reliable and truthful data is required for the independent and dependent variables, therefore data is 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 2000-2018.

Model in differences:

\[ u_t - u_{t-1} = \alpha + \beta(y_t - y_{t-1}) + \epsilon_t \]

Where
- \( u_t \): Unemployment rate in t
- \( y_t \): Logarithm of GDP in t
- \( \epsilon_t \): Waste white noise

Model in gaps:

\[ u_t - u^*_{t-1} = \alpha + \beta(y_t - y^*_{t-1}) + \mu_t \]

Donde
- \( u^*_t \): Unemployment rate in t
\( y^*_t \): Logarithm of GDP in \( t \)
\( \mu_t \): 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:

\[
    u_{it} = \beta_0 + \beta_1 Y_{it}^B + \beta_2 NCSM_{it} + \beta_3 NCD_{it} + \beta_4 NCC_{it} + \beta_5 RH_{it} + \beta_6 COD_{it} + \nu_{it}
\]

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.
- \( \nu_{it} \): 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.

With the results obtained, the general and specific hypotheses are accepted, although with exceptions for the index of hiring and firing norms; and the index of collective bargaining. While with the index of hiring standards and minimum wage; the index of hiring and firing standards; and the index of mandatory cost of unemployment, the positive relationship between the years 2000-2018 is fulfilled.

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, that the relationship between unemployment and potential GDP is negative in the 6 Latin American countries, between the year 2000-2018, therefore the first specific hypothesis is contrasted and consistent 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

Through Okun's law, it is determined that there is a negative relationship between potential GDP and unemployment, and also finding in the extension of the econometric model the rigidity of the labor market, 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. That in his estimation finds a negative relationship of 0.13% before the percentage growth of the observed product. This shows evidence of the impact of product growth on unemployment, as in this research work.

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 collective bargaining has a positive relationship of 0.46 with unemployment, which explains that rigidity of centralized collective bargaining has a positive impact 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.

REFERENCES


Anexos

| Coef. | Std. Err. | t | P>|t| | 95% Conf. Interval |
|-------|-----------|---|------|-----------------|
| 1     | -1.42324  | .707414 | -2.74 | .004 | -2.80649 -1.04029 |
| 2     | 1.77758   | 1.78289 | 0.94 | .351 | 1.23482 2.32034 |
| 3     | 0.49303   | 0.64729 | 0.76 | .444 | -0.50709 1.49315 |
| 4     | 1.44094   | 1.78527 | 0.80 | .419 | 1.26273 1.61915 |
| 5     | -1.25125  | 0.55812 | -2.25 | .028 | -2.30706 -0.29540 |
| 6     | 0         | (omitted) | 0     | 0     | 0.00000 0.00000 |
| 7     | -4.62046  | .714278 | -6.45 | .000 | -6.06204 -4.17890 |
| UCHB  | -0.47929  | 0.67982 | 0.70 | .481 | -1.21005 0.25145 |
| BCC   | -0.35513  | 0.60207 | -0.60 | .552 | -1.63123 1.92093 |
| BDC   | 0.07558   | 0.11703 | 0.64 | .525 | 0.272747 0.77503 |
| RH    | 0.05959   | 0.07482 | 0.00 | 1.000 | 0.35907 0.50988 |
| ODG   | 0.07987   | 0.09218 | 0.87 | 0.381 | -0.11651 0.27626 |
| cons  | 1.67774   | 1.74227 | 0.97 | .333 | 1.33461 2.02082 |

Figura 1. Resultados de la estimación.