ECONOMICS & Sociology

Astorquiza Bustos, B. A., Quintero Peña, J. W., & Ramos-Barrera, M. G. (2022). Differential effects of the lockdown on labour market outcomes. Evidence for an emerging economy. *Economics and Sociology*, *15*(1), 125-140. doi:10.14254/2071-789X.2022/15-1/8

DIFFERENTIAL EFFECTS OF THE LOCKDOWN ON LABOUR MARKET OUTCOMES. EVIDENCE FOR AN EMERGING ECONOMY

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Received: February, 2021
1st Revision: February, 2022
Accepted: March, 2022

DOI: 10.14254/2071-789X.2022/15-1/8

JEL Classification: J6, J25, I18, J7

Keywords: COVID-19, labour market, Oaxaca-Blinder, Colombia

ABSTRACT. COVID-19 created a market reconfiguration scenario: the match between supply and demand was disrupted due to social distancing measures. This investigation provides empirical evidence on the impacts of the pandemic on unemployment, wages, hours worked, and recent unemployment in an emerging economy like Colombia. The pandemic does not substantially amplify the negative / regrettable variation of the variables as it is due to a structural problem. Using a difference-in-difference models and the Oaxaca-Blinder decomposition, the results suggest that lockdown did not intensify unemployment or the reduction of wages for women, but it did for young people and in the artistic activities sector. So, strengthening fragile sectors and jobs is identified as the labour policy commitment to implement.

Introduction

According to the International Labour Organisation (2020), Colombia is the country with the third highest unemployment rate in Latin America, with 10.8% of the economically active population unemployed in 2019, following Costa Rica (11.5%) and Brazil (12.2%). This reflects a structural failure in terms of market efficiency in the sense that unemployment and informality are prevalent conditions in recent years in the country's economy. High levels of

unemployment and social distancing measures have had differential effects on the population in terms of gender, age, and stagnation in various economic sectors. For the May-June quarter, the unemployment rate for women was 25.5% compared to 17% for men, while young people between 14 and 28 years of age experienced unemployment rates of 29.7%. In terms of differential impacts across different sectors of the economy, the largest reductions were in the hospitality and food services sector and in commerce and vehicle repair, which showed negative variations of 45.8% and 17.4% respectively (DANE, 2020).

However, before the pandemic the Colombian labour market had undergone transformations in terms of technological innovations, which brough benefits in terms of job generation within the framework of the so-called fourth industrial revolution. At the same time, this evolution demanded the adaptation of the traditional workforce to an automated economy, where the lack of synergy between the education of young professionals and dominant social conceptions of the role of women (as those who do housework) have acted as the determinants for the choice of occupation in low-productivity sectors for these population groups.

The disruption imposed by Lockdown in terms of social distancing meant that traditional jobs that can only be done in a specific workplace (i.e., not from home) were at greater risk than those that could be done remotely. This revealed the limitations of lower-skilled jobs and manual work in the context of Lockdown, as they were affected the most. The development of remote activities, changes in the structure of working hours and even in payment for the functions performed or products created, and not necessarily for the hours worked, are emerging as the central axes of the new normality in the working environment after the economic recovery.

Considering the previous, this research presents empirical evidence of the impact of lockdown (Covid-19) on unemployment, wages, hours worked per week and the suspension of contracts and job losses (recent unemployment) that constitute the market outcomes for the 23 main cities of the country, focusing on differential impacts in terms of gender, age, and economic sector. The investigation use data from the National Integrated Household Survey for the first seven months of the year 2020 (January-July). In terms of methodology, the results are based on an econometric method of difference-in-difference models and the Oaxaca-Blinder decomposition that allow to isolate the attributable effects of the pandemic on the changes in the variables. The foregoing is motivated by the articles by Dingel and Neiman (2020) and Montenovo et al (2020), as they are the works with the greatest impact on the incidence of covid on the labor market.

The results suggest that the pandemic strongly influenced the increase in layoffs and reallocation of work activities, but there is insufficient evidence to suggest that social distancing measures increased unemployment or reduced wages among women. The evidence shows that weekly working hours increased by 3 hours, and there was a decrease in the probability of becoming unemployed. For young people between the ages of 20 and 24, the pandemic explains the increase in the overall unemployment rate by 2%, while reducing the probability of becoming newly unemployed by between 2.1% and 4.6%. In addition, the arts and entertainment sector were most affected as unemployment increased by 7.2% in the post-Covid period, working time per week increased by 3 hours, and the probability of being laid off or reassigned increased by 8.6% compared to other sectors.

This research is pioneering in its analysis of the impact of Lockdown on the Colombian labour market. The paper is organized in the following way: it first presents a review of the literature related to changes in labour markets, addressing the economic and social impacts before and after social distancing measures were implemented. It then describes the methodology used before analysing the results and concluding with a discussion of their implications and some of the limitations of the research.

1. Literature review

In 1928, Sumner Slichter showed evidence of increasing unemployment brought about using machines in production processes (Woirol, 2006). In 1938, Emili Lederer proposed differentiating the impact of technological advances under two circumstances: inventions that facilitated the production of new goods or the creation of new industries, and rationalisations that lowered production costs (Katselidis, Vouldis and Michaelides, 2016). According to this view, the lower costs generated by technology may put some jobs at risk (Rifkin, 1995). However, it can be argued that a decrease in costs leads to a decrease in retail prices, which encourages demand for goods and services, thereby mitigating job losses or at least spreading them among various sectors of the economy (Handel, 2003). Thus, the fundamental difference between the above scenarios is how workers adapt to change. This implies that skilled labour is more adaptable to external shocks because it can change its functions, implying that the level of education is a key factor in adapting to change (Author, Kat and Krueger, 1998).

Nevertheless, the above principles will depend on the composition of the labour market, which in the case of developing economies (such as Colombia) tends to be characterised by high rates of informality. In these countries, given that changes in the number of formal jobs occur between similar industries with equivalent working conditions, positive productivity shocks and government policies generate lower unemployment rates as businesses create more jobs and are willing to offer formal contracts. In other words, a positive productivity shock would increase unemployment only if formal employment decreases (Bosch and Esteban-Pretel, 2012).

Thus, although this is not the first time that the transformation of the labour force and its relation to employment levels or its quality has been discussed, the specific conditions of the Lockdown pandemic have generated the need for unprecedented adaptations given the requirements of social distancing imposed to reduce the spread of the virus, which has generated shocks in both supply and demand. Therefore, the literature review presented here documents studies that relate the effects of Lockdown on labour market indicators and their relationship with jobs that may be more likely to be affected due to the specific adaptations required.

1.1. Social distancing and the labour market

Lockdown has provided a context in which technological progress facilitates the transformation of economic activity, but which does not impact all workers in the same way. For example, there is evidence that the higher the Gross Domestic Product (GDP) of a country, the higher the probability of developing remote jobs. This demonstrates the vulnerability of countries with lower growth (Dingel and Neiman, 2020). In addition, remote work activities are more easily implemented in some industries than others. Industries such as educational services, business management and administration, financial and insurance services, or information services can be developed remotely, while other industries such as manufacturing, mining and extraction, construction, tourism services, agribusiness, or artistic movements offer less scope for adapting to remote activities (Dingel and Neiman, 2020).

On the other hand, the rapid increase in remote work has facilitated the development of non-essential economic activities. However, essential industries have not been able to continue remotely and therefore have been less likely to be shut down, thereby generating greater exposure to Lockdown (Montenovo et al, 2020). This explains why workers who have not been able to work remotely are more vulnerable, not only because of their exposure to the virus, but also because they tend to have lower incomes, savings, education levels, work experience, or tend to work in the informal sector. They are also usually among the most affected groups such

as women, migrants, and African Americans (Fairlie, Couch, and Xu, 2020; Mongey, Pilossoph and Weinberg, 2020; Montenovo et al, 2020; Williams and Kayaoglu, 2020).

In the specific case of women, there are two vulnerabilities that have increased due to the pandemic. First, there are those health professionals (nurses, community workers, among others) who face a higher risk of infection when exercising their profession, but who are less likely to lose their jobs. Second, there are women who fulfil the social role of caring for the household, who are less exposed to the virus but are more likely to lose their source of income because they tend to be linked to the informal sector (Gausman and Langer, 2020). In fact, it is estimated that the COVID-19 crisis could set back women's participation in the labour market by a decade (OECD, 2020).

However, regarding gender differences, it is important to note that men's employment tends to be affected to a greater extent than women's, which is evident during different economic recessions. Indeed, the fluctuation in labour supply for single men is greater, while married women face only small variations. (Alon et al, 2020). This trend is observed in the macroeconomic and microeconomic aggregate, as female labour supply has a greater elasticity and partially offsets aggregate fluctuations. This indicates that adjustment policies implemented during recessions move in the opposite direction to aggregate changes. (Doepke & Tertilt, 2016).

Plus, focusing on age as a variable, the effects of Lockdown tend to be greater for young people who have barely attained secondary education and live in low-income countries. This is especially pronounced among those who were employed in the sectors most affected by social distancing measures, such as commerce (sales), food and recreation services. In most cases, unemployment was generated because the company ceased operations or decided to lay off less experienced staff. In the case of young people in these sectors who were not laid off, they nonetheless experienced a significant drop in income due to a reduction in working hours (ILO, 2020).

1.2. The efficacy of public policy

Although social distancing policies, emergency declarations, welfare packages and mobility restrictions implemented by national and local governments contributed to the reduction of infections, their impact depends on an institutional framework of collective action that articulates national and regional government responses, which may generate additional transaction costs within the process (Ramirez et al., 2020). Therefore, given the implicit trade-off between lives saved and avoiding economic decline, the reduction in production can be attributed to the health complications of the pandemic and not to the costs of public policies implemented to curb its impact (Gupta et al., 2020).

In this context it is important to consider that the population in rural areas, which tends to have lower income and receive a smaller share of the public budget, will be more affected. Actions such as increasing access to credit, subsidies, medical care, protection against violence, provision of computer equipment to carry out work or educational activities remotely, among other factors that protect the vulnerable population, are more likely to reach those in areas with higher incomes. For example, by April 2020, in Colombia, 76.8% of the population felt insecure about their chances of accessing food due to the pandemic; even in rural areas where access to food is characterized by self-sufficiency (Benitez-Zapata et. al, 2021) and Morales et al., (2020) found no significant effect on average hours worked or wages, arguing that most of the labour market adjustment took place at the extensive margin (jobs).

Likewise, in Latin-America the women face major barriers to participate in the formal economy: the Lockdown reduced formal attention options like schools, care centers, and even informal options (e.g. families, acquaintances); so working hours have increased due to the

greater demands placed on family care (housework, accompanying children in remote education, caring for the elderly, among others), and in the rural sector the jobs have increased in order to ensure food security.(OECD, 2020). Indeed, between 2019 and 2020 the female employment rate contracted by 10.2% while the male employment rate contracted by 7.2% in Latin America and the Caribbean (ECLAC, 2021).

Governments designed measures to relief their economies such as the suspension of evictions, or the freeze on mortgage. In Colombia debtors were help with a year-long grace period to clean their payments and the government implemented an additional monthly income support policy for those who could not work from home or with low incomes using an online platform (within limited time).

Therefore, the effects of Lockdown on employment will depend on the social conditions of workers. That is to say, the public policies implemented to reduce contagion will not be equally efficient across the population. The articles of Busso, et al., (2021), Acevedo et. Al (2021) and Alvarez and Pizzinelli (2021) develop hypothesis around informality and Covid. They found similar results when specifying that the informal sector acted as an important margin of adjustment, particularly in those industries most affected by the first lockdown.

This reality justifies the research, given that it is important to understand the behaviour of the labour market in emerging economies to get a better understanding of the structural problem: the generation of fragile jobs in contexts of high informality.

2. Methodology

2.1. Data sources

The data are taken from the National Integrated Household Survey, which covers January to July 2020, the month of the first strict Lockdown in Colombia (March) and the months in which the economy presented some first relaxations in its restriction, and is carried out in 23 main cities, including departmental capitals and others. Using data on the number of employed and unemployed people, the investigation considers the variables about current conditions in relation to wages, hours worked per week, and the probability that the person would be laid off or would be reassigned to other activities, which in this research is define as "recently unemployed". Publicly available data from the Ministry of Health and Social Protection on the number of Lockdown cases by city is used as a related source of information to create variables that represent the dynamics of the pandemic. This data displays information from case 0 to 756,109, which corresponds to the last case reported in July.

Using the above source, two variables were constructed: the first is the logarithm of the number of cases per city and the risk of dying from Lockdown. The latter follows the methodology used by the Cambridge Crystallographic Data Centre (CCDC) as well as the methodology of Montenovo et al. (2020), who determine the probability of dying from Lockdown based on the age and gender of the person infected. This same methodology for the construction of indicators was used in this research. Besides, the structure of the data is cross-sectional. In this sense, tests such as those proposed by Granger (1969) or Dickey-Fuller Augment, which are specific to time series data structures, are not used.

2.2. Specifications, models and descriptions

To evaluate the differential effects of Lockdown in terms of gender, age and economic sector, a difference-in-differences regression analysis was carried out. These effects were estimated independently for each of the four dependent variables: i) being unemployed, ii)

earnings, iii) number of hours worked and, lastly, iv) recently becoming unemployed, which corresponds to employed persons whose working hours were reduced in the week prior to being surveyed due to a suspension or termination of their contract or reduction in economic activity. Based on the results of the labour market analysis, the following linear regression models were proposed:

$$Y_i = \beta_0 + \sum_{j=1}^{19} \beta_j * X_j + \theta Post_{Covid} + \sum_{k=1}^{18} \varphi_k * Z_k + \mu_i + \varepsilon_i \quad (1)$$

Y_i represents the dependent variables mentioned above (i=1,2,3,4). Firstly, unemployment is constructed as a binary dependent variable that takes the value of 1 if the person is in this condition, and 0 if in employment; secondly, hours worked are included at level; thirdly, the category "wages" is transformed into logarithms in order to centre the mean and variance of the observations and, fourthly, the condition of recently becoming unemployed is constructed as a binary variable where 1 denotes that there was a suspension or termination of the contract or reduction in economic activity.

The vector of variables X_j represents the following variables: women; age ranges based on 3 variables to define the young population (Bell & Blanchflower, 2015); educational level, ranging from primary school to postgraduate level (6 variables); head of household; risk of death; non-remote work; fragile jobs; the logarithm of Lockdown cases by city, and main economic sectors (5 variables). The variable post-Covid is constructed as a dummy representing the months of April, May, June, and July. The vector of variables Z_k corresponds to the interactions with the post-Covid variable, except for the logarithm of cases per city, where the parameters φ_k capture the differences in differences in market outcomes. The model includes fixed effects μ_i and clusters by city ε_i.

Table 1. Descriptive statistics

Variables	Unemployment (N=86,735)	Wages (N=35,212)	Hours Worked (N= 63,280)	Recent Unemployed (N=63,896)
Woman	0.394	0.473	0.414	0.415
	[0.489]	[0.499]	[0.493]	[0.493]
15-19 age	0.025	0.023	0.021	0.021
	[0.156]	[0.150]	[0.144]	[0.144]
20-24 age	0.110	0.126	0.106	0.106
	[0.313]	[0.332]	[0.308]	[0.308]
25-29 age	0.153	0.184	0.157	0.157
	[0.360]	[0.387]	[0.364]	[0.364]
Elementary	0.139	0.084	0.124	0.125
	[0.346]	[0.277]	[0.330]	[0.331]
Middle School	0.123	0.094	0.127	0.127
	[0.328]	[0.292]	[0.333]	[0.333]
High School	0.359	0.414	0.388	0.388
	[0.480]	[0.493]	[0.487]	[0.487]
Technical and Technological	0.153	0.204	0.161	0.161
	[0.360]	[0.403]	[0.368]	[0.368]
Undergraduate	0.150	0.155	0.144	0.143
	[0.357]	[0.362]	[0.351]	[0.350]
Graduate	0.060	0.043	0.045	0.045
	[0.237]	[0.202]	[0.207]	[0.207]
Head household	0.465	0.425	0.465	0.466
	[0.499]	[0.494]	[0.499]	[0.499]

Variables	Unemployment (N=86,735)	Wages (N=35,212)	Hours Worked (N= 63,280)	Recent Unemployed (N=63,896)
Risk of Death	0.013 [0.018]	0.010 [0.015]	0.013 [0.018]	0.013 [0.0178]
Non-Remote Work		0.249 [0.432]	0.432 [0.495]	0.433 [0.496]
Fragile jobs		0.059 [0.236]	0.425 [0.494]	0.426 [0.495]
Ln (COVID Cases Cities)	3.765 [3.667]	3.608 [3.807]	3.483 [3.763]	3.510 [3.762]
Agriculture	0.064 [0.245]	0.009 [0.092]	0.006 [0.080]	0.006 [0.079]
Manufacturing	0.098 [0.298]	0.140 [0.347]	0.119 [0.323]	0.118 [0.323]
Retail and Wholesale Trade	0.201 [0.401]	0.217 [0.412]	0.238 [0.426]	0.238 [0.423]
Arts, entertainment and recreation	0.011 [0.102]	0.010 [0.102]	0.011 [0.105]	0.011 [0.105]
Construction	0.080 [0.272]	0.073 [0.261]	0.082 [0.275]	0.083 [0.275]
Post-Covid	0.552 [0.497]	0.511 [0.500]	0.497 [0.500]	0.501 [0.500]

Calculated using the Department for National Statistics (DANE) microdata from the National Integrated Household Survey for the period January to July 2020. The mean and standard deviation of the independent variables used in the estimates are presented in brackets.
Source: Authors' calculations.

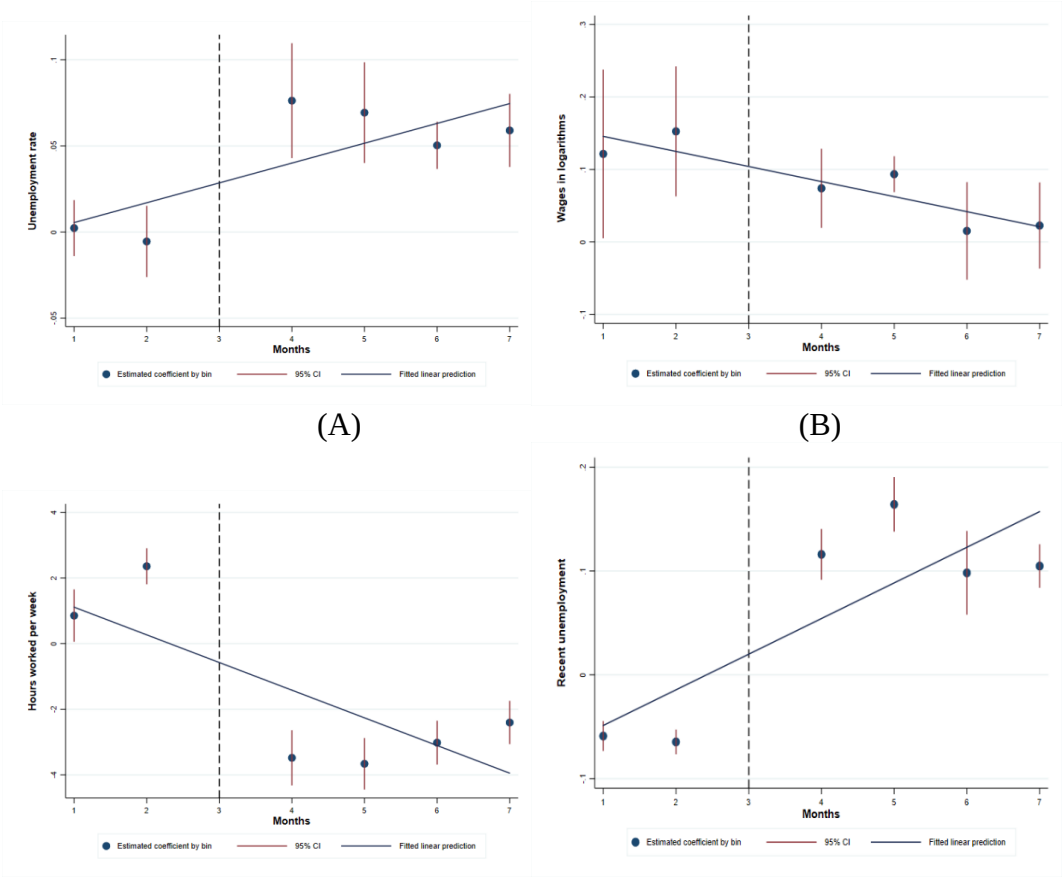

Figure 1. Labour Market Outcomes by Month

Note: The figures correspond to the estimated values in a simple regression model where the dependent variables are months. The vertical dashed line represents the reference month (March). The vertical lines represent the confidence intervals and the line of fit for the model is presented. The results show how the unemployment rate (A) increased in the month of April, although a slight reduction began in the following months (A). Also, a reduction in wages (B) is observed, especially in the month of June. As for hours worked per week (C), the months of April and May were characterized by strict social distancing measures, which explains the observed declines, although there was a rebound in the following months. Finally, recent job losses (D) increased in the month of May, with an apparent stabilization in June. In general terms, the variables exhibit the expected behaviour of the Lockdown effect in the Colombian labour market.
Source: Authors' calculations.

3. Empirical results and discussion: Lockdown results

3.1. Unemployment

The results of the specification are shown in Table 2. The model show that the post-Covid variable resulted in an increase in unemployment of nearly 7%. For women, there are no significant differences between the period before and after Lockdown. 15–19 years old have also not suffered significant impacts due to the pandemic and, although the value is negative, it is not significant for 20-24 years old either.

Column 1 in Table 2 (Apendix) shows that being a woman is negatively associated with the probability of being unemployed in comparison to men. However, this coefficient is not statistically significant, indicating that there are no differences between men and women in terms of unemployment. When the effects of the pandemic are analysed in terms of gender differences, the coefficient remains non-significant. With respect to the specified age ranges, a positive and statistically significant association is found between young people and being unemployed. In particular, the effect shows a decreasing tendency as age increases: those in the 15-19 range have a 6% higher probability of being unemployed compared to those in the 25-29 range. The results of the effects of the pandemic are significant only for the 20-24 age range, given that the probability of being unemployed increases in the post-Covid period.

In relation to different education levels, there are no statistically significant differences across different levels of study. However, when review the interaction between educational levels and the impact of Lockdown, is find that for university and post-graduate educational levels the coefficients are negative and significant. That is, the probability of becoming unemployed because of the pandemic decreases by 7% in comparison to those with no education at all. The risk of death from Lockdown and being head of household are both negatively related to being unemployed and to the impact of the pandemic.

Among the economic sectors analysed, only the construction industry shows a positive association with increases in the unemployment rate. The impact of Lockdown by sector shows the same tendency. It is worth highlighting the arts sector, since the probability of being unemployed increases by 7% for workers in this economic activity compared to others.

3.2. Hours worked

On average, women work 4 hours less than men. Among young people, statistically significant coefficients are evident for the 15- 19 and 20- 24 age groups, with a reduction of three and one hour, respectively. The impact of the pandemic does not show significant effects

for any age range. When analysing the impact of Lockdown, an increase is found of nearly three hours worked by women compared to men.

Regarding levels of education, there are negative effects on the number of hours worked, particularly for workers with lower levels of education. The effects of the pandemic generated an average reduction of two hours worked for those with no education at all. For those with basic secondary education, the reduction was two hours. In contrast, for those with postgraduate education there was an increase of three hours per week. On average, heads of household work one hour more; however, due to the impact of Lockdown, their participation in the labour market was reduced by half an hour per week.

With respect to the ability to perform activities remotely, workers who are unable to do so do not show statistically significant differences with respect to the effects of the pandemic. Workers in more vulnerable jobs saw a reduction of an average of four hours per week. This is an expected result insofar as it is related to labour informality combined with containment measures to slow the infection rate. The group of informal workers was one of the most affected. In addition, the informal sector was already in a precarious state compared to the formal sector, which has deepened income inequalities between these population groups.

The effects of Lockdown on workers across different economic sectors are shown in Panel B of Table 2. Notwithstanding the effects of the pandemic, all sectors performed negatively, with the exception of the construction sector. For the period from April to July (in terms of the impact of Lockdown), workers in the agricultural sector increased their working hours by an average of five hours, while the commercial sector saw a decrease of an average of two hours per week.

3.3. Wages

The impact of the pandemic on the incomes of Colombian workers is evident in a 20% reduction in their monthly income. Panel A of Table 2 shows that women earn on average 12% less than men. At the same time, 15-19 years old earn on average 34% less, while 20 to 24 years old earn 11% less compared to other age groups. In general, younger age ranges are negatively associated with lower wages. The results by educational level are as expected: the higher the level of education, the better the income; and there are no significant differences because of the pandemic. Those employed in fragile jobs saw their income decrease by 30%; however, no significant increases were observed as a result of Lockdown.

The dynamics of the pandemic have generated negative effects on wages. Although the impact is negative and significant, the elasticity of the number of cases per city with respect to wages is inelastic and negative, i.e., in relation to variations in the number of cases, the variation in wages is proportionally lower. In contrast, the risk of death has a positive relationship with wages. This result is in line with expectations, since as age increases, the greater the accumulation of human capital, the higher the wages, and the greater the risk of death due to Lockdown.

Panel B of Table 2 shows the effects of the pandemic. No significant impacts are found for the variables analysed, except in the case of two economic sectors (manufacturing and commerce) which show negative effects in the order of a 7% reduction in wages. The greatest effect is seen in the construction sector, with a 13% decrease in wages.

3.4. Recent Unemployment: layoffs and reassignment of work activities

The last column in Table 2 shows the probability of a decrease in hours worked due to a reduction in the economic activity of the company, or the suspension or termination of employment. A positive and significant association is found with the risk of dying from Lockdown. This reflects the fact that older people in employment who have underlying health conditions that put them at greater risk were particularly affected by layoffs and reduction in hours worked.

The effects of Lockdown generated a 9% increase in the likelihood of becoming unemployed, although women and young people saw a decrease in the probability of reducing their work activity. This can be explained, among other factors, by the fact that women and young people are less likely to have health complications in the event of contracting the virus. With respect to educational level, it is shown that workers with a lower level of education have a higher probability of becoming unemployed. Also, heads of household had a positive probability of being made unemployed because of the pandemic. There are various possible explanations for this. Among them is the substitution of household activities, which many heads of household had to assume. Again, in line with the previous results, fragile jobs show that the effects of the pandemic are important since the probability of being made unemployed increases by 13%.

When analysing the effects of Lockdown by economic sector, the results show that workers in the agricultural sector have a negative probability of a 16% decrease in their work activities compared to other sectors. This can be explained by the essential nature of the sector in terms of its provision of necessities. The effects of the pandemic on the decrease in working hours in the artistic and commercial sectors are reflected in the positive probabilities that workers in these sectors would be laid off. The manufacturing and construction sectors do not show statistically significant impacts caused by Lockdown.

3.5. Oaxaca-Blinder

Table 3 presents the results of the Oaxaca-Blinder decomposition for each of the outcomes. These show that the pandemic increased unemployment by 5%, reduced work time by 5 hours, led to a reduction in income of 2% and to an increase of 22.7% in the probability of being laid off or having work hours reduced, which is in line with the results previously presented.

However, when examine the differentials between outcomes, in some cases there are no substantial effects. The average wage in the post-Covid period, considering the set of explanatory variables, was COP 1,052,838, while in the first months of the year it was COP 1,074,106. Although the result is consistent, the empirical evidence suggests that Lockdown did not affect the wages of the employed population. However, when it comes to analysing wages, it is important to consider the selection bias which was incorporated in the estimation. Using the bias correction method proposed by Heckman (1979), it is found that the inverse Mills' ratio is equal to -0.098 with an associated p-value of 0.510, which implies that the statistical evidence is not sufficient to reject the null hypothesis of the test: there is no selection bias.

The second section in Panel A contains the decomposition segment, which shows how the decomposition method disaggregates the effect of Lockdown into three elements: endowments reflect the average effect of Lockdown on outcomes while preserving the structural characteristics of the labour market before social distancing; coefficients quantify the variation in outcomes considering the difference between the regression coefficients of equation 1; lastly, interaction refers to the simultaneous effect of the differences in endowments and

coefficients. Only the first two elements are analysed since they provide insight into the effect of Lockdown on the labour market.

The results show that 36% of unemployment and 30.68% of wages are explained by structural characteristics of the economy. The second element, conventionally interpreted as a measure that captures the phenomenon under analysis, suggests that Lockdown was responsible for 24.5% of the increase in unemployment, 20.32% of the reduction in wages, 43.69% of the reduction in hours worked, and 74.86% of the increase in the probability of being laid off. Thus, although the Colombian economy presents structural problems in its labour market, the pandemic generated impacts in terms of reallocation of hours, layoffs, unemployment, and wages.

Table 3. Decomposition of labour market results

Dependents Variables:	**Unemployment**	**Wages logarithms**	**Hours Worked**	**Recent Unemployment**
	(1)	**(2)**	**(3)**	**(4)**
Panel A: Oaxaca-Blinder				
Diferencial				
Predicción 1	0.125***	13.867***	43.848***	0.251***
	(0.003)	(0.007)	(0.130)	(0.002)
Predicción 2	0.076***	13.887***	48.996***	0.024***
	(0.002)	(0.007)	(0.126)	(0.001)
Diferencia total	0.050***	-0.020**	-5.148***	0.227***
	(0.003)	(0.010)	(0.181)	(0.003)
Descomposición				
Endowments	-0.067***	-0.305**	-3.647485	-0.005
	(0.013)	(0.130)	(2.478)	(0.017)
Coefficients	0.045***	-0.202***	-7.436***	0.274***
	(0.008)	(0.026)	(0.485)	(0.008)
Interaction	0.072***	0.487***	5.935**	-0.042
	(0.016)	(0.132)	(2.527)	(0.019)
Panel B: Bootstrap replication				
Diferencial				
Predicción 1	0.161***	13.825***	42.843***	0.251***
	(0.002)	(0.006)	(0.090)	(0.003)
Predicción 2	0.092***	13.794***	48.359***	0.024***
	(0.001)	(0.005)	(0.068)	(0.001)
Total differential	0.068***	0.031***	-5.516***	0.227***
	(0.002)	(0.008)	(0.113)	(0.003)
Decomposition				
Explained	-0.053***	0.156***	1.669***	-0.049***
	(0.005)	(0.014)	(0.271)	(0.010)
Unexplained	0.122***	-0.126***	-7.185***	0.276***
	(0.005)	(0.015)	(0.293)	(0.011)
Observations	86,735	35,212	63,280	63,896

Source: Authors' calculations.

The next step in arguing that Lockdown has impacted he labour market requires substantiation of the conclusions presented. To do this, it is necessary to verify that the reported coefficients are consistent across different subsamples based on resampling. The results given

in Table 3, which are presented in Panel B, show consistency and a lack of bias in the estimated coefficients, which demonstrate the impact of the pandemic on the labour market, given that the explained and unexplained elements are significant for all the dependent variables.

Conclusion

The article empirically studies the impacts of Lockdown on labour market outcomes in Colombia. Using the exogenous variation generated by the confinement measures implemented since April, the findings show that the pandemic has caused an increase in unemployment of 7%. However, there is no generalized evidence that women and young people are affected by the crisis generated by the containment measures to mitigate the spread of Lockdown. In fact, the results suggest that these two population groups are less likely to be made unemployed, and for women the number of hours worked increased.

This can be explained by the fact that women tend to work in essential sectors, particularly in health, personal care, and disinfection activities, so in the context of the pandemic demand for their labour increased. It is also worth pointing out that in Colombia 73% of the population employed in the healthcare sector are women, who perform 77% of their work in hospitals as well as outpatient clinics (DANE, 2020b). This context would lead to conclusions like to those observed in developed countries, where job losses for women would be lower in the initial stages of the pandemic but would gain in vulnerability due to exposure to the virus.

At the same time, young people have a lower risk of developing health complications if they contract the virus, therefore they are less likely to lose their job, a result that is reinforced in the negative probability of becoming unemployed in the period considered as post-Covid. Additionally, the fact of having little work experience and only basic formal education means younger workers with lower skills are more likely to be employed in unskilled, rote jobs that were created (or increased) because of the pandemic. This conclusion is in line with the expected behaviour within the labour market as a result of the creation of these kinds of jobs.

Due to the characteristics of this pandemic, the effects of the current crisis on labour market outcomes for women and young people are very different from those found in previous crises. While the effect is global, there are heterogeneous results depending on economic sector or type of employment. Thus, fragile jobs increased the probability of becoming unemployed, which is also reflected in a decrease in hours worked. On the other hand, more qualified workers (identified by education level) are less likely to be affected in the labour market, a result that is consistent with the 1995, 2001 and 2008 crises, where skilled workers were less vulnerable to economic downturns than unskilled workers (Campos-Vázquez, 2010). Finally, the Oaxaca-Blinder decomposition leads to the conclusion that the pandemic explains 85% of recent job losses, 24% of the increase in unemployment, and 44% and 23% of the reduction in working hours and wages respectively.

Acknowledgement

The authors are thankful to the Internal Grant of University of Manizales for financial support to carry out this research and the participation of the co-researchers

References

Acevedo, I., Castellani, F., Lotti, G., & Székely, M. (2021). Informality in the time of COVID-19 in Latin America: Implications and policy options. *PloS one*, *16*(12), e0261277.Alon, T., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020). *The Impact of COVID-19 on Gender Equality*. NBER Working Paper 26947. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w26947

Alvarez, J., & Pizzinelli, C. (2021). COVID-19 and the Informality-driven Recovery: The case of Colombia's Labor Market. *IMF W*arket. *IMF Working Pking Papers*, *2021*(235).Mora*pers*, *2021*(235).

Autor, D., Katz, L., & Kruger, A. (1998). *Computing Inequality: Have Computers Changed the Labor Market?*. NBER Working Paper 5956. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w5956

Bell, D., & Blanchflower, D. (2015). Youth unemployment in Greece: measuring the challenge. *IZA J Labor Stud*, 4(1). https://doi.org/10.1186/2193- 9012-4-1

Benites-Zapata, V., Urrunaga-Pastor, D., Solorzano-Vargas, M., Herrera-Añazco, P., Uyen-Cateriano, A., Bendezu-Quispe, G., Toro-Huamanchumo, C., Hernandez A. (2021). Prevalence and factors associated with food insecurity in Latin America and the Caribbean during the first wave of the COVID-19 pandemic. Heliyon, 7(10), 1-8. https://doi.org/10.1016/j.heliyon.2021.e08091

Bosch, M., & Esteban-Pretel, J. (2012). Job creation and job destruction in the presence of informal markets. *Journal of Development Economics*, 98(2), 270-286. https://doi.org/10.1016/j.jdeveco.2011.08.004

Busso, M., Camacho, J., Messina, J., & Montenegro, G. (2021). Social protection and informality in Latin America during the COVID-19 pandemic. PloS one, 16(11), e0259050.

Campos-Vázquez, R. M. (2010). The effects of macroeconomic shocks on employment: The case of mexico. *Estudios Económicos*, 25(1), 177-246. https://doi.org/10.24201/ee.v25i1.114

Departamento Administrativo Nacional de Estadística. (2020). Gran Encuesta de Hogares. Dirección de Metodología y Producción Estadística. http://microdatos.dane.gov.co/index.php/catalog/659/get_microdata

Dingel, J. & Neiman, B. (2020). *How many jobs can be done at home?*. NBER Working Paper 26948. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w26948

Doepke, M., & Tertilt, M. (2016). *Families in Macroeconomics*. NBER Working Paper 22068. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w22068

Economic Commission for Latin America and the Caribbean, ECLAC (2021). Decent work for platform workers in Latin America. *Employment Situation in Latin America and the Caribbean*, 24 (LC/TS.2021/71).

Fairlie, R., Couch, K., & Xu, H. (2020). *The impacts of COVID-19 on minority unemployment: first evidence from April 2020 CPS microdata*. NBER Working Paper 27246. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w27246

Gausman, J., & Langer, A. (2020). Sex and Gener Disparities un the COVID-19 Pandemic. *Journal of Women's Health,* 29(4), 465-466. https://doi.org/10.1089/jwh.2020.8472

Granger, C. (1969): Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica*, 37, 424-438.

Gupta, S., Nguyen, T., Lozano, F., Raman, S., Lee, B., Bento, A., Simon, K., & Wing, C. (2020). *Tracking Public and Private Responses to the COVID-19 Epidemic: Evidence*

from State and Local Government Actions. NBER Working Paper 27027. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w27027

Handel, M. (2003). *Implications of Information Technology for Employment, Skills and Wages: A Review of Recent Research.* SRI Project Number P10168. https://mpra.ub.uni-muenchen.de/80077/1/MPRA_paper_80077.pdf

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), pp. 153-161.

International Labour Organisation, OIT (2020). *Impactos en el mercado de trabajo y los ingresos en América Latina y el Caribe.* https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/documents/publication/wcms_749659.pdf

Katselidis, I., Vouldis, A., & Michalides, P. (2016). Sumner Slichter and Emil Lederer on technological umeployment. *International Journal of Social Economics*, 38(6), 537-556. https://doi.org/10.1108/03068291111131391

Mongey, S., Pilossoph, L., & Weinberg, A. (2020). *Which Workers bear the burden of social distancing policies?*. NBER Working Paper 27085. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w27085

Montenovo, L., Jiang, X., Lozano, F., Schmutte, I., Simon, K., Weinberg B., & Wing, C. (2020). *Determinants of Disparities in COVID-19 Job Losses.* NBER Working Paper 27132. National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w27132

Morales, L., Bonilla-Mejía, L., Pulido, J., Flórez, L. A., Hermida, D., Pulido-Mahecha, K. L., & Lasso-Valderrama, F. (2020). Efectos de la pandemia por COVID 19 en el mercado laboral colombiano: identificando el impacto de las restricciones sectoriales a la movilidad. *Borradores de Economía No. 1129*.

Organisation for Economic Co-operation and Development, OECD (2020). COVID-19 in Latin America and the Caribbean: An overview of government responses to the crisis. In *Tackling Coronavirus (COVID-19).* Organisation for Economic Co-operation and Development. https://www.oecd.org/coronavirus/policy-responses/covid-19-in-latin-america-and-the-caribbean-an-overview-of-government-responses-to-the-crisis-0a2dee41.

Ramírez, E., Grin, E., Sanabria, P., Cravacuore, D., & Orellana, A. (2020). The Transaction Costs of Government Responses to the COVID-19 Emergency in Latin America. *Public Administration Review*, 80(4), 683-695. https://doi.org/10.1111/puar.13259

Rifkin, J. (1995). *The End of Work. The decline of the Global Labor Force and the Dawn of the Post-Market Era*. Tarcher/Putnam.

Williams, C., & Kayaoglu, A. (2020). COVID-19 and undeclared work: impacts and policy responses in Europe. *The Service Industries Journal*, 40(13), 914-931. https://doi.org/10.1080/02642069.2020.1757073

Woirol, G. (2006). New Data, New Issues: The Origins of the Technological Unemployment Debates. *History of Political Economy*, 38(3), 473-496. https://doi.org/10.1215/00182702-2006-003

Apendix

Table 2. Estimates of the impacts of Lockdown on the results of the Colombian labour market

Panel A: Independents variables (levels)	**Unemployment**	**Wages logarithms**	**Hours worked**	**Recent Unemployment**
	(1)	(2)	(3)	(4)
Woman	-0.009	-0.126***	-3.842***	0.002
	(0.009)	(0.013)	(0.332)	(0.002)
15-19 age	0.087***	-0.348***	-2.925***	0.007
	(0.009)	(0.026)	(0.846)	(0.006)
20-24 age	0.055***	-0.119***	-1.006**	0.001
	(0.009)	(0.012)	(0.364)	(0.002)
25-29 age	0.029***	-0.046***	-0.208	-0.001
	(0.006)	(0.007)	(0.139)	(0.004)
Elementary	0.007	0.239**	3.010***	-0.027
	(0.008)	(0.115)	(0.657)	(0.022)
Middle School	-0.005	0.302**	3.188***	-0.019
	(0.009)	(0.115)	(0.646)	(0.023)
High School	-0.001	0.419***	2.107***	-0.015
	(0.009)	(0.118)	(0.694)	(0.023)
Technical and Technological	0.002	0.579***	1.014	-0.02
	(0.011)	(0.124)	(0.736)	(0.024)
Undergraduate	0.016	1.106***	-0.656	-0.021
	(0.013)	(0.121)	(0.655)	(0.022)
Graduate	-0.012	1.813***	-2.183***	-0.017
	(0.009)	(0.104)	(0.716)	(0.022)
Head household	-0.039***	0.062***	1.049***	0.002
	(0.003)	(0.013)	(0.141)	(0.001)
Risk of Death	-0.102**	1.716***	-20.952**	0.282**
	(0.042)	(0.164)	(8.211)	(0.102)
Non-Remote Work		-0.058**	-0.992***	0.004
		(0.027)	(0.219)	(0.003)
Fragile jobs		-0.306***	-1.221	0.028***
		(0.058)	(1.139)	(0.008)
Ln (COVID Cases Cities)	0.003	-0.008**	0.141	0.001
	(0.002)	(0.003)	(0.115)	(0.004)
Agriculture	-0.051***	-0.011	-3.311**	0.017
	(0.012)	(0.092)	(1.594)	(0.022)
Manufacturing	-0.013**	-0.01	-1.117***	0.009
	(0.005)	(0.019)	(0.375)	(0.007)
Retail and Wholesale Trade	-0.014***	-0.035**	2.243***	-0.002
	(0.004)	(0.015)	(0.348)	(0.002)
Arts, entertainment and recreation	-0.01	-0.097	-5.447***	0.005
	(0.008)	(0.057)	(0.485)	(0.007)
Construction	0.045***	0.059**	-3.581***	0.041***
	(0.007)	(0.023)	(0.637)	(0.009)
Panel B: Independents variables (interactions Post-COVID)				
Post-Covid	0.073***	-0.207	-4.462***	0.097*
	(0.021)	(0.222)	(1.474)	(0.049)
Woman x Post-Covid	-0.006	0.019	2.548***	-0.030**
	(0.007)	(0.014)	(0.317)	(0.012)
15-19 age x Post-Covid	0.019	-0.016	-0.335	-0.044
	(0.039)	(0.076)	(2.051)	(0.033)
20-24 age x Post-Covid	0.020*	0.023	-0.005	-0.046***
	(0.010)	(0.023)	(0.350)	(0.011)
		-0.013		

25-29 age x Post-Covid			0.042	-0.021***
	-0.01			
	(0.010)	(0.020)	(0.298)	(0.006)
Elementary x Post-Covid	-0.01	0.241	-2.172**	0.095*
	(0.017)	(0.239)	(0.856)	(0.047)
Middle School x Post-Covid	0.013	0.235	-3.045**	0.105**
	(0.020)	(0.216)	(1.101)	(0.038)
High School x Post-Covid	0.007	0.26	-1.572	0.07
	(0.017)	(0.213)	(0.926)	(0.042)
Technical and Technological x Post-Covid	-0.015	0.298	-0.46	0.056
	(0.018)	(0.215)	(1.043)	(0.044)
Undergraduate x Post-Covid	-0.062***	0.235	0.462	0.017
	(0.015)	(0.216)	(0.956)	(0.043)
Graduate x Post-Covid	-0.079***	0.192	3.330***	-0.062
	(0.018)	(0.243)	(0.990)	(0.047)
Head household x Post-Covid	-0.013***	-0.013	-0.547***	0.015*
	(0.004)	(0.015)	(0.177)	(0.009)
Non-Remote Work x Post-Covid		-0.001	0.216	-0.004
		(0.025)	(0.427)	(0.008)
Fragile jobs x Post-Covid		-0.084	-3.763***	0.135***
		(0.063)	(0.655)	(0.019)
Agriculture x Post-Covid	-0.072***	-0.061	5.209*	-0.162***
	(0.016)	(0.125)	(3.024)	(0.051)
Manufacturing x Post-Covid	-0.022*	-0.067**	-0.623	0.018
	(0.013)	(0.028)	(0.679)	(0.024)
Retail and Wholesale Trade x Post-Covid	-0.009*	-0.074***	-2.011***	0.052***
	(0.005)	(0.015)	(0.693)	(0.013)
Arts, entertainment and recreation x Post-Covid	0.072*	0.016	2.780**	0.086***
	(0.042)	(0.072)	(1.136)	(0.027)
Construction x Post-Covid	0.036**	-0.136*	1.933**	0.002
	(0.014)	(0.077)	(0.749)	(0.021)
Fixed Effects	YES	YES	YES	YES
Mean dependent variable	0.102	13.877	46.362	0.125
Mean Observations variable	86,735	35,212	63,280	63,896

The estimated model has fixed effects (city level) and the standard deviation is in parentheses. Significance levels are ***1%, **5% *10%. The table has two panel. Panel A presents variables in levels and Panel B presents interactions with post-covid variable. Both panels were estimated in a single model.

Source: Authors' calculations