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Recovery of employment in México's states in the post-COVID-19 phase

Recuperación del empleo en los estados de México en la fase post COVID-19

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Abstract

The aim of this document is to explain the recovery of formal employment (total, permanent and temporary) in the Mexican states over the post COVID-19 pandemic phase, by means of an econometric analysis. The main results suggest the existence of a negative and robust relationship between the growth of state employment and the duration and depth of the preceding recession, as well as positive and significant effects of the degree of economic openness and market ability to adjust to shocks, but very limited public spending.

JEL Code: E24, E32, R11
Keywords: employment; COVID-19; recovery; recession; Mexican states

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Resumen

El objetivo de este documento es explicar la recuperación del empleo formal (total, permanente y eventual) de los estados mexicanos durante la fase post-pandemia del COVID-19, para lo que se realiza un análisis econométrico. Entre los resultados principales destacan una relación negativa y robusta entre el crecimiento del empleo estatal con la amplitud de la recesión precedente, lo que da evidencia del efecto "rebote", así como efectos positivos y significativos del grado de apertura económica y de la capacidad de ajuste de los mercados a los choques, pero muy limitados del gasto público.

Código JEL: E24, E32, R11
Palabras clave: empleo; COVID-19; recuperación; recesión; estados de México

Introduction

The resilience of the international economy's output and employment after the recession caused by the COVID-19 pandemic in 2020 has been a major concern of economic policymakers, academics, and the general public. The persistence of the pandemic, the growth of public debt as a result of the extraordinary expenditures to deal with it, and the restrictive monetary policy adopted to deal with the inflation outbreak that began in 2021 have caused great uncertainty about the time needed to fully reverse the impact of this health crisis and the pace of growth at which this will be achieved (IMF, 2021).

Indeed, the 2020 recession has been the most intense in almost a hundred years, both in terms of its depth and its international spread, since the combat against COVID-19 was mainly based on social distancing measures, which meant the closure of non-essential activities, home, and the cancellation of mass gatherings, among others (Adenauer, 2021; IMF, 2023). As a consequence, production and employment presented unprecedented[1] declines. In particular, between 2019 and 2020, weekly working hours equivalent to full-time jobs decreased by 8.0% worldwide, while in high and low-income economies, the drops were 7.4 and 4.0%, respectively (ILO, 2022).

To reverse the unprecedented impact of the COVID-19 pandemic, governments around the world adopted expansionary policies (fiscal and monetary) of different sizes to support families and companies to face what at first appeared to be a short-lived health crisis. In conjunction, lifting tighter restrictions in the second half of 2020 led to the revival of the economy (IMF, 2021). The so-called "rebound effect" permitted output growth rates to be above 5% in 2021 in many of the world's countries (IMF, 2023). Similarly, the labor market recovered rapidly, additionally boosted by the progress made in the vaccination process. Thus, pre-crisis employment levels had recovered by the end of that year and had

[1]The world economy fell by 3.1% in 2020, while advanced economies contracted by 4.5% on average, the United States (US) fell by 3.4%, and the eurozone by 6.3%. Latin America and the Caribbean, in turn, faced GDP reductions of 7.0% (IMF, 2021).

even been surpassed in most high-income countries, although deficits remained in most middle-income countries (ILO, 2021, 2022).

Nonetheless, the complications that followed throughout 2021 generated uncertainty about the recovery of the economies. The persistence of the pandemic due to the appearance of new variants of the virus that caused it and obstacles to vaccination, as well as the tightening of monetary policy, generally accompanied by a reduction in fiscal support to control inflation,[2] led to the reduction of growth estimates for 2022[3]. Employment had similar dynamics (ILO, 2022). It seemed that expectations about the recovery of employment to its pre-pandemic levels after four to six years (Altman, 2022) would materialize, with increases in the unemployment rate and informality, mainly among women (World Bank. 2022, ILO, 2022), and a decline in the quality of employment (ILO, 2022).

In Mexico, the situation was similar. Recovery at a decreasing pace followed the 8.2% drop in GDP in 2020, 4.7% in 2021, and 3.1% in 2022 because of global factors and insufficient[4] support from the federal government to address the pandemic. As a result, the recovery in employment that followed the steep drop in the second quarter of 2020 was slow and insufficient. Between February and June of that year, the period in which the pandemic had its most severe effects, formal employment, measured by the number of workers affiliated with the Mexican Social Security Institute (IMSS), decreased by 4.5%, at an average monthly rate of 1.1%, the lowest figure in previous recessions (ORBC, 2022).[5]

Similarly, the recovery of formal employment has been relatively slow and, in particular, heterogeneous across states due to the impact of the pandemic and pre-existing structural problems (Jiménez-Bandala et al., 2021). By the end of 2021, national formal employment was 0.7% above the February 2020 level, and by mid-2022, it exceeded it by 3.2%. Formal employment figures at the state level reflect a similar situation, although with notable differences. For example, according to IMSS data (2022), the steepest drops in the COVID-19 recession occurred in states specialized in tourism, such as Baja California Sur (13.1%), Guerrero (12. 3%), Nayarit (10.6%), and Quintana Roo (24.6%), or in highly integrated manufacturing, such as Aguascalientes (5.3), Coahuila (6.4%), Hidalgo (6.8%), Nuevo León (4.6), Puebla (7.7%), and Querétaro (5.3). Meanwhile, the different waves of the COVID-19 pandemic made employment recovery difficult in some states of the first group. For example, the cumulative growth of formal employment from February 2020 to December 2021 and June 2022 in Quintana Roo was -6.7%

[2]Inflation began to rise from 2021 as a result of increased demand derived, in turn, from government support during the pandemic and exacerbated by the escalation of the Russia-Ukraine conflict (IMF, 2022).
[3]Estimated growth figures for 2022 decreased to 3.2% for the world economy, 2.4% for advanced economies and 3.7% for emerging and developing economies (IMF, 2023).
[4]See Banxico (2020) and Mejía et al. (2022) for presentations on the strategies adopted to confront the pandemic and reactivate the economy.
[5]In the 2000-2003 and 2008-2009 recessions, formal employment fell at a mean monthly rate of 0.1 and 0.4%, respectively (ORBC, 2022).

and 0.4%, while in Guerrero the corresponding figures were -4.5 and -3.1%. Others had a rapid recovery, such as Baja California Sur, which by the same dates had higher employment by 2.7% and 12.3%, respectively. Similarly, manufacturing states gradually and heterogeneously recovered their pre-pandemic employment levels. Specifically, for the same periods, growth in Aguascalientes was 0.5 and 1.8%; in Coahuila, 2.2 and 5.1%; Guanajuato, 0.8 and 3.2%; and in Nuevo Leon, 3.8 and 7.0%, respectively.

These figures illustrate the association that may exist between the magnitude of the fall of recessions and the speed of recovery of economic activity in the first months of the subsequent expansion, a topic relatively little analyzed in the literature. Particularly, Friedman (1993) and Moore (1965) argue that the initial recovery of the economy after a recession may be negatively associated with the magnitude of the recession due to the so-called “rebound effect.” Wynne & Balke (1992) and Balke and Wynne (1996) have supported this hypothesis in the cases of the US and other developed countries. Extending this model, Mejía & Vergara (2017) present similar results for Mexican states in the 2001-2002 recession but not for the Great Recession of 2008-2009, when external demand played a more important role.

In this context, the objective of this document is to explain the recovery of formal employment (total, permanent, and casual) in Mexican states during the post-pandemic phase of COVID-19 in terms of the characteristics of the preceding recession, as well as the expansionary policies adopted by state governments, external shocks, and the structural characteristics of the economies, while also considering the possibility of spatial effects. For this purpose, the classical cycle approach of Artis et al. (1997) is used to identify recession and recovery phases, and cross-sectional econometric models that consider the possibility of spatial effects are estimated. The main results point to negative and robust effects of the depth of recession on employment recovery, as well as positive and meaningful effects of the degree of economic openness, the adjustment capacity of markets to shocks, and government spending on total employment.

This document is divided into three parts, including the introduction and conclusions. The first part introduces the main concepts of business cycles, highlighting the characteristics of recessions and their relation with recoveries. The second part details the methodology for identifying recession and recovery phases and the specifications of the econometric models to be estimated. The third section presents and analyzes the results. Finally, the conclusions are drawn.

Conceptual framework

The analysis of employment recovery in Mexico’s states is based on the classical view of the business cycle. This approach defines the cycle as a succession of alternating and sustained phases of upswing (divided into recovery and expansion) and downswing (separated into recession and contraction) of real economic activity, according to Burns & Mitchell (1946). Modern literature, nevertheless, considers that the economic cycle consists of two phases, expansion and recession, which are identified from the dating of two turning points that define the end of an expansion and the beginning of a recession: peak and the end of a recession and the beginning of an expansion, trough (Artis et al., 1997).

Nonetheless, one aspect of particular importance in the literature on cycles that has attracted attention is the dynamics of expansions, which can be complex in magnitude and intensity and can be explained by many factors, among which the nature and size of the initial shock that gives rise to them stand out. For some authors, expansions tend to be typically faster in their early stages, called recoveries (Fatás & Mihov, 2013), especially when the expansion follows a deep recession (Burns, 1969); that is, the speed of recovery depends on the characteristics of the preceding recession. Accordingly, Moore (1965) highlights three aspects: first, there is an inverse relation between the contraction and the subsequent recovery;[6] second, average growth rates in the first months of the recovery tend to be higher the deeper the preceding recession; and third, growth rates in the first 6 and 12 months of recovery are higher than those in later months.

Moreover, recessions, understood as deviations from the equilibrium level of production caused by demand or supply shocks, generate idle capacity that favors recoveries due to the absence of restrictions on increasing the level of production. Indeed, greater idle capacity can lead to faster recoveries so that deep recessions can be followed by vigorous recoveries, technically known as the “rebound effect” (Friedman, 1993).

Other factors that can influence the speed of recovery and mitigate the persistence of negative shocks are macroeconomic policies and external demand (Cerra et al., 2013). Particularly, expansionary fiscal policies can boost domestic demand (Auerbach & Gorodnichenko, 2010; Rodden & Wibbels, 2010; Akitoby et al., 2022; Filiani, 2021) and thus the output level. Conversely, external shocks, via higher demand for exports, positively affect output and employment in the tradable goods sector, especially in countries with robust trade relations (Baxter & Kouparitsas, 2005; Kose & Yi, 2001). Additionally, recoveries may also respond to a set of structural factors, including previous GDP per capita growth, as a proxy for potential output (Lavender & Parent, 2013); the flexibility of the economy to “accommodate” different shocks depending on its external exposure; and labor factor mobility (UKCES, 2014).

Methodology

Estimating the effects of recession characteristics on formal employment growth rates in Mexican states during the post-pandemic phase consists of two stages. The first consists of identifying and characterizing

[6] More vigorous recoveries follow more severe contractions, and vice versa (Moore, 1965).

the business cycle regimes, while the second is the econometric estimation of these effects. Recession and expansion regimes are identified and characterized by applying the classical business cycle methodology introduced by Artis et al. (1997), denoted AKO. These authors reference the work of Burns and Mitchell (1946) and a simplified version of the algorithm of Bry & Boschan (1971) to carry out a procedure that enables dating the turning points linked to economic activity's expansion and recession phases. In general, this methodology consists of a set of rules that enables one to exclude erratic short-run fluctuations and to focus attention on the "broad" upward (expansion) and downward (recession) movements of the variable of interest, generally output or employment.[7]

Once identified, a recession can be characterized by three properties: duration (DUR), measured by the number of periods between a peak and a trough; amplitude (or depth), calculated as the cumulative percentage change of the variable from peak to trough date (TCA); and intensity (or slope), obtained from the average growth rates (TCP) during the recessionary phase.

On the other hand, the classical concept of recovery ("revival" in the original terminology of Burns & Mitchell, 1946) can be defined as the first stage of the expansion that goes from the trough to the k-th subsequent period in which the value that the variable had in the previous peak is reached.[8] These first months are generally referred to as early expansions.

In the second stage, the effects of recession characteristics on growth during the early expansion are estimated based on the model suggested by Wynne & Balke (1992) and Balke & Wynne (1996), extended according to Mejía & Vergara (2017). Particularly, regarding the identification of the trough and, therefore, of the recession and the beginning of the early expansion, the following relation is estimated:

$$\mathrm{l_i(k) = \alpha + \beta s_i + \delta(L_{Ti} - L_{Pi}) + \gamma(P_i - V_i) + u_i} \tag{1}$$

where i denotes the i-th state; $\mathrm{l_i(k)}$ is the average monthly employment growth rate during the first k months of the expansion; $\mathrm{s_i}$ is the measure of intensity; P and V denote the peak and trough dates indicating the beginning and end of the recession, respectively; L represents the natural logarithm of employment,[9] while $\mathrm{u_i}$ is a disturbance term following a white noise process. Thus, the average employment growth rate ($\mathrm{l_i(k)}$) during the first k months of an expansion can be explained by the intensity

[7]The main advantage of the AKO methodology is that it is based on univariate analysis, which enables the identification of specific regimes for the variable of interest, while its relevance has been proven by the fact that it yields turning points very close to those defined by the National Bureau of Economic Research (NBER) for the US economy (Artis et al., 1997). See Moore & Zarnowitz (1986) and Boldin (1994) for additional information on the role of the NBER.
[8]This may be the phase that Moore (1965) and Friedman (1993) had in mind since it is related to the existence of excess installed capacity.
[9]More specifically, for example, $\mathrm{l_{Ti}}$ refers to the logarithm of employment at the trough date.

of the previous recession (s_i), its amplitude ($L_{Ti} - L_{Pi}$), and its duration in months (P_i - V_i). If intensity is a relevant explanatory factor, δ is expected to be negative and significant, whereas if deeper recessions precede stronger early expansions, γ would be negative and significant. Finally, if duration is an important determinant, γ would be positive and meaningful, implying that longer recessions favor stronger recoveries.

This formulation is extended to avoid possible specification errors. First, due to its construction, there may be some degree of collinearity between amplitude and duration on the one hand and intensity on the other.[10] Therefore, these variables are included separately in alternative models.

Second, even if rapid growth during early expansions can be seen as a self-correcting system response to low economic activity, as Friedman (1993) suggested, output reactivation can also be caused by external or policy shocks. The international literature has shown that trade has acted as a central mechanism in transmitting shocks from one country to another, contributing to the synchronization of their business cycles (Baxter & Kouparitsas, 2005; Kose & Yi, 2001). Thus, given the high degree of integration of the Mexican and US economies (Albarrán et al., 2022; Sánchez, 2022), the recovery of the latter can support the exit of the former from a recession through higher demand for exports, positively affecting the growth rate of the tradable goods sector. On the other hand, several authors have argued that fiscal policies can affect the cyclical dynamics of the economy (Fatás & Mihov, 2000; Iancu & Olteanu, 2022), especially during recessions (Auerbach & Gorodnichenko, 2010), while others have analyzed the same issue at the regional level (Rodden & Wibbels, 2010). Particularly in Mexico, the federal government pursued a counter-cyclical fiscal policy to address the effects of the COVID-19 pandemic, although it has been called into question for its low magnitude (Mejía et al., 2022). Nevertheless, the distribution of government spending increases across states may have boosted employment recovery (Villalva, 2022; Salazar, 2020).

Third, the rate of state employment growth during early expansions may also be affected by a set of structural factors. On the one hand, a state's ability to emerge from a recession (an idea related to the concept of resilience) may be linked to the historical growth rate of GDP per capita, which can be seen as an indicator of potential growth (Lavender & Parent, 2013).[11] On the other hand, the resilience of an economy may depend on its degree of exposure to the external sector (measured as the relation between tradable and non-tradable goods output or the relation between industrial and services output) and labor mobility (measured by the net migration rate), as economies with fewer restrictions on trade and capital

[10]Formally, Intensity = Amplitude/Duration and although they may be highly associated, they are not identical concepts.
[11]GDP per capita growth rates can also measure changes in population welfare, which in turn can be associated with amenities, a central variable in the analysis of Rickman and Guettabi (2015).

flows and fewer market barriers to adjustment to changes in factor supply and demand, respectively, are assumed to be more flexible in assimilating the shocks they experience (UKCES, 2014).[12]

Fourth, geographic location may also be important in the magnitude of employment recovery since the closer a state is to the US market, the main destination for Mexican export products, the higher the employment growth rate during early expansions. To measure geographic location, the distance (in kilometers) from the capital city of each state to the nearest major US city, namely San Diego (California), El Paso (Texas), or San Antonio (Texas), is used.

Therefore, the specifications of the econometric model to be estimated are as follows:

$$l_i(k) = \alpha + \beta d_i + \delta a_i + \eta k_i + \phi g_i + \mu y_i + u_i \tag{2.1}$$

$$l_i(k) = \alpha + \beta d_i + \delta a_i + \varphi t_i + \phi g_i + \mu y_i + u_i \tag{2.2}$$

$$l_i(k) = \alpha + \beta d_i + \gamma s_i + \eta k_i + \phi g_i + \mu y_i + u_i \tag{3.1}$$

$$l_i(k) = \alpha + \beta d_i + \gamma s_i + \varphi t_i + \phi g_i + \mu y_i + u_i \tag{3.2}$$

Equations (2.1) and (2.2), which will also be referred to as Models A1 and A2, relate the average employment growth rate during the first k months (k = 9, 12 and number of periods until reaching the level of the previous peak) of an expansion to the duration (d) and amplitude (a) of the previous recession, while Equations (3.1) and (3.2) or Models B1 and B2 do so for the intensity (s) of the same recession. The expected signs of the coefficients of these variables have been described previously.

On the other hand, both pairs of models include the growth rates of federalized spending in the states (g) as a measure of economic policy and the average growth rates of GDP per capita over the previous five years (y) as a measure of the potential output of each state. The expected sign of the coefficient of g can be positive or negative depending on the nature of the fiscal policy followed in the Mexican states: if g increases in the year in which the trough is dated, then $\omega > 0$ because its increase would drive up employment in the early expansion, and vice versa. On the other hand, if the growth potential of the state economy y is high, its resilience will be higher, so $\mu > 0$.

[12]The variables measuring structural factors are calculated as averages of the five years prior to each recession.

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Furthermore, models 1 (2.1 and 3.1) consider the measure of geographic location (k), while models 2 (2.2 and 3.2) include the tradable goods sector (t)[13] of the year in which the early expansions begin (the year in which the trough occurs) to capture the initial impulse of the shocks. It is expected that the greater the distance separating each state from its main external market, the smaller the effect of external shocks ($\eta < 0$), while external demand is expected to affect the production of tradable goods positively and, hence, the recovery of employment ($\varphi > 0$).

Moreover, estimated models consider the trough that determines the end of the national recession (June 2020) as a common reference point for all states. Since the same date is assumed as the simultaneous start of the early expansions, the possibility of spatial transmission of the employment recovery can be analyzed. To analyze this possibility, spatial models are used according to the following specifications:

$$\begin{gathered} l_i(n) = \alpha + \rho W l_i(n) + \beta d_i + \delta p_i + \eta k_i + \phi g_i + \mu y_i + \theta m_i + u_i \\ u_t = \lambda W u_t + \varepsilon_t \end{gathered} \tag{4}$$

where W is the spatial weights matrix, with queen contiguity standardized by rows. If ρ is statistically significant and λ is not, a spatial lag model is obtained, while if the opposite occurs, a spatial error model is obtained. As for model selection, it is conducted based on Lagrange multiplier (LM) tests, included in the maximum likelihood theory. The decision to choose the model depends on the statistical significance of the LM in its robust version (LM - error or LM - lag) if the normality hypothesis is met. When both tests offer high values, the one with the maximum value will be the one that shows the correct structure of the spatial dependence (Anselin, 1988). In practical terms, this implies identifying which model best captures the spatial dependence phenomenon.

The 2020 net interstate migration rate is included in this specification.

Econometric estimation of employment recovery in Mexican states

In this section, the effects of the recession caused by the COVID-19 pandemic, the opening of the economy, the flexibility of labor markets, and government spending on the employment recovery of Mexican states, following the model presented in the previous section, are estimated. The characteristics

[13]The tradable goods sector includes agriculture, stockbreeding, forestry, fishing, hunting, mining, manufacturing, temporary housing, and food and beverage preparation services.

of recessions and recoveries are based on formal employment data published by the Mexican Social Security Institute (IMSS) (Spanish: Instituto Mexicano del Seguro Social).

The turning points that enable dating the cycle phases (peak for the beginning of the recession and trough for the end of the recession and beginning of the recovery) are identified with the AKO methodology for total, permanent, and casual employment for each Mexican state.[14] Based on these dates, Table 1 shows the main characteristics of the recessions in terms of their duration (DUR), amplitude (TCA), and intensity (TCP), as well as the average growth rates of the first 9, 12, and k months of the recoveries that follow.

The figures presented in Table 1 show that employment growth during the first 9 (EG9), 12 (EG12), and k (EGk) months (until the end of the sample) from the state trough and the national trough is higher and more volatile for contingent employment according to its basic statistics, such as mean, median, maximum, and standard deviation. This fact seems to be a characteristic of the Mexican labor market, in which companies replace permanent employment with casual employment as a strategy to gain competitiveness (Mejía & Vergara, 2017) because they are jobs with low wages, few benefits, and short-run labor contracts, which benefits the companies, but generates uncertainty and labor instability for workers. It can also be noticed, as documented in the literature, that there is a negative relation between average growth rates in the first months of the recovery and the amplitude and intensity of the COVID-19 recession. Finally, the data reveal a mean value for the duration of recessions equal to 8.3 months, with a maximum value of 28 months and a minimum of 2.

Table 1
Characteristics of recessions and recoveries of formal employment in Mexican states, 2020-2021

	Recession characteristics			Average growth rates on initial recovery								
	TCA	DUR	TCP	Total employment			Temporary employment			Permanent employment		
				EG9	EG12	EGK	EG9	EG12	EGK	EG9	EG12	EGK
National Trough												
Mean	-5.9	8.3	-1.1	3.0	5.4	5.4	13.8	10.8	10.8	1.6	5.4	5.4
Median	-4.6	6.0	-0.8	2.8	4.5	4.5	11.1	5.2	5.2	1.7	5.2	5.2
Maximum	0.4	28.0	0.1	12.4	18.5	18.5	55.4	57.4	57.4	8.0	12.3	12.3
Minimum	-23.1	2.0	-6.4	-2.4	-0.8	-0.8	0.8	-4.0	-4.0	-4.8	0.5	0.5
Std. dev.	4.2	5.9	1.1	3.1	4.4	4.4	13.2	14.5	14.5	3.1	2.9	2.9
Skewness	-2.2	1.6	-3.3	0.6	1.5	1.5	2.0	1.7	1.7	-0.2	0.5	0.5
Kurtosis	8.0	3.1	15.2	4.1	5.2	5.2	6.6	5.6	5.6	2.5	2.8	2.8
Jarque Bera	112.3	27.3	365.5	4.0	18.6	18.6	39.4	24.0	24.0	0.4	1.3	1.3

[14]The use of this variable is justified by its high degree of co-movement with other indicators of the cycle (Mejía, 2003; Antón, 2011), especially with production, as shown by empirical evidence (Mejía, 2002). Moreover, it is a variable that is available for all states in the country on a consistent basis.

State Trough												
Mean	-5.9	8.3	-1.1	4.9	6.2	6.6	16.3	17.3	14.5	7.1	6.9	7.0
Median	-4.6	6.0	-0.8	4.9	5.7	5.8	14.5	15.3	8.6	5.0	5.6	5.6
Maximum	0.4	28.0	0.1	12.4	18.3	18.5	53.4	68.7	58.9	42.4	42.4	42.4
Minimum	-23.1	2.0	-6.4	-6.2	-3.6	-0.2	-14.1	-7.7	-5.4	0.1	1.3	1.3
Std. dev.	4.2	5.9	1.1	3.1	4.1	4.1	14.1	16.0	17.2	7.1	7.2	7.1
Skewness	-2.2	1.6	-3.3	-0.9	0.9	1.2	1.1	1.6	1.1	4.0	4.0	4.0
Kurtosis	8.0	3.1	15.2	7.0	5.2	4.6	4.6	5.6	3.3	20.5	20.1	20.3
Jarque Bera	112.3	27.3	365.5	25.8	11.0	11.2	9.5	23.2	7.2	490.2	475.8	485.1

Source: created by the authors with data from IMSS (2022).

Meanwhile, the effects of the characteristics of the recessions and the other previously mentioned factors on formal employment growth during Mexico's states' employment recovery in the post-COVID-19 phase are estimated using cross-sectional models (Models A and B) when state troughs are taken because there is no temporal coincidence in the onset of the recoveries, so their spatial transmission would be unlikely. On the contrary, when considering the onset of state recoveries from the national trough, spatial models are estimated as extensions of Models A and B based on expression (4).

The estimates obtained for total employment are shown in Tables 2 and 3: the block on the left shows the results for the national trough, and the block on the right shows the results for the state trough.[15] At the bottom of the tables, the statistics and p-values (in parentheses) of the normality (Jarque Bera) and heteroskedasticity (Breusch-Pagan-Godfrey) specification tests are reported. In general, they all indicate an adequate specification of the estimated models.[16] The spatial autocorrelation tests, in turn, suggest that the spatial lag model in A1 and A2 (national trough) adequately captures the spatial dependence phenomenon, except for the case of total employment during the first nine months (A1) and k months, given that the coefficient of the lagged endogenous variable is non-significant (ρ), while the Anselin Kelejian statistic enables rejecting the null hypothesis of remaining spatial autocorrelation in the residuals (see Table 2). On the other hand, in model B, for total employment at 12 and k months, the joint presence of the lag and spatial error proved significant, while for model B2, the inclusion of the spatial lag for 9, 12, and k months proved significant, confirming the spatial transmission between states through the dependent variable or the values of the error term (Table 3).

[15]The results for casual and permanent employment, models A1, A2, B1 and B2, are shown in Annex A1.
[16]In some cases, nevertheless, it was necessary to correct the non-normality caused by the existence of some residual values greater than three standard deviations (outliers) by introducing binary variables for specific states.

Table 2
Effects of recession characteristics on total employment
Models A1 and A2

	National Trough						State Trough					
	Model A1			Model A2			Model A1			Model A2		
	ETE9	ETE12	ETEK	ETE9	ETE12	ETEK	ETE9	ETE12	ETEK	ETE9	ETE12*	ETEK
C	4.785	2.756	2.756	1.059	0.972	0.989	6.491	4.803	5.023	5.661	3.279	4.516
	(0.011)	(0.087)	(0.088)	(0.056)	(0.372)	(0.399)	(0.000)	(0.007)	(0.003)	(0.000)	(0.005)	(0.000)
DUR	-0.083	-0.136	-0.137	-0.089	-0.122	-0.112	-0.856	-0.137	-0.193	-0.076	-0.098	-0.151
	(0.197)	(0.037)	(0.037)	(0.004)	(0.014)	(0.012)	(0.286)	(0.076)	(0.019)	(0.254)	(0.0876)	(0.047)
TCA	-0.202	-0.575	-0.575	0.076	-0.167	-0.096	-0.366	-0.747	-0.609	0.006	-0.509	-0.382
	(0.071)	(0.000)	(0.000)	(0.074)	(0.162)	(0.415)	(0.008)	(0.000)	(0.000)	(0.960)	(0.0124)	(0.009)
SB				0.449	0.365	0.386				0.071	0.080	0.103
				(0.000)	(0.000)	(0.000)				(0.105)	(0.196)	(0.039)
G	-0.060	-0.057	-0.057	0.038	0.041	0.054	0.014	-0.015	0.051	-0.007	0.023	0.038
	(0.529)	(0.534)	(0.534)	(0.291)	(0.697)	(0.604)	(0.751)	(0.888)	(0.095)	(0.852)	(0.865)	(0.174)
GDPPC	0.605	0.039	0.039	0.309	0.134	0.243	-0.707	-0.696	-0.395	-0.516	-0.490	-0.322
	(0.808)	(0.868)	(0.868)	(0.000)	(0.413)	(0.165)	(0.009)	(0.013)	(0.129)	(0.005)	(0.005)	(0.133)
DKM	-0.002	-0.001	-0.001				-0.002	-0.001	-0.000			
	(0.034)	(0.118)	(0.119)				(0.039)	(0.264)	(0.695)			
NIR	0.052	0.074	0.075	0.021	0.041	0.036						
	(0.030)	(0.004)	(0.004)	(0.056)	(0.048)	(0.107)						
W_ETN	0.058	0.346	0.346	0.297	0.296	0.299						
(ρ)	(0.829)	(0.047)	(0.047)	(0.008)	(0.089)	(0.102)						
R^2	0.615	0.806	0.801	0.915	0.889	0.892	0.498	0.736	0.730	0.652	0.756	0.772
Jarque-Bera							0.985	0.533	0.324	0.716	0.559	0.345
Breusch-Pagan							0.080	0.701	0.674	0.102	0.039	0.518
Anselin-Kelejian	0.039 (0.844)	0.360 (0.548)	0.360 (0.548)	0.003. (0.957)	0.006 (0.939)	0.019 (0.889)						

Table 3
Effects of recession characteristics on total employment
Models B1 and B2

	National Trough						State Trough					
	Model B1			Model B2			Model B1			Model B2		
	ETE9	ETE12	ETEK	ETE9	ETE12	ETEK	ETE9	ETE12	ETEK	ETE9*	ETE12*	ETEK
C	5.356	1.689	1.689	0.931	0.809	0.899	6.584	4.786	4.332	5.691	2.642	4.209
	(0.000)	(0.177)	(0.177)	(0.101)	(0.422)	(0.362)	(0.000)	(0.005)	(0.009)	(0.000)	(0.048)	(0.001)
DUR	0.024	0.154	0.154	-0.104	-0.066	-0.087	0.021	0.159	0.031	-0.080	0.101	-0.020
	(0.742)	(0.009)	(0.010)	(0.006)	(0.273)	(0.149)	(0.818)	(0.053)	(0.727)	(0.2362)	(0.191)	(0.819)
TCP	-1.446	-3.088		0.137	-0.638	-0.277	-1.508	-3.536	-2.466	0.048	-2.418	-1.458
	(0.012)	(0.000)		(0.493)	(0.152)	(0.568)	(0.009)	(0.000)	(0.000)	(0.9469)	(0.020)	(0.041)
SB				0.440	0.362	0.399				0.072	0.040	0.097
				(0.000)	(0.000)	(0.000)				0.1634)	(0.636)	(0.105)
G	-0.155	-0.173	-0.174	0.031	0.036	0.058	0.001	-0.150	0.034	-0.007	-0.022	0.031
	(0.130)	(0.040)	(0.040)	(0.412)	(0.603)	(0.393)	(0.980)	(0.177)	(0.279)	(0.8620)	(0.867)	(0.299)
GDPP	-0.104	-0.102	-0.102	0.299	0.143	0.257	-0.906	-0.853	-0.424	-0.515	-0.530	-0.322
C	(0.129)	(0.654)	(0.654)	(0.000)	(0.379)	(0.109)	(0.001)	(0.003)	(0.115)	(0.0423)	(0.004)	(0.155)
DKM	-0.002	-0.002	-0.002				-0.002	-0.002	-0.000			
	(0.006)	(0.000)	(0.000)				(0.044)	(0.064)	(0.638)			
NIR	0.047	0.063	0.064	0.019	0.040	0.034						
	(0.066)	(0.010)	(0.010)	(0.093)	(0.058)	(0.105)						
W_ET		0.510	0.511(	0.301	0.304	0.311						
N (ρ)		(0.000)	0.000)	(0.014)	(0.019)	(0.014)						
λ		-0.563	-0.563									
		(0.022)	(0.022)									
R^2	0.673	0.831	0.831	0.908	0.884	0.890	0.434	0.767	0.720	0.652	0.738	0.746
Jarque -Bera	1.25 (0.535)						0.743	0.316	0.587	0.719	0.325	0.504
Breusch-Pagan	4.63 (0.705)						0.054	0.170	0.829	0.036	0.016	0.528
Anselin-Kelejian				0.034 (0.853)	0.004 (0.951 9	0.036 (0.849)						

http://dx.doi.org/10.22201/fca.24488410e.2023.4611

*Standard errors were estimated with the Huber-White-Hinkley correction matrix. Dummy variables were included for Tabasco (national and state trough) and Yucatan (state trough).
Source: created by the authors with data from IMSS (2022) and with Geodaspace and Eviews 9 software.

In general, regarding both troughs, most of the estimated econometric models imply a negative and robust relation between employment growth (total, permanent, and casual) at 9, 12, and k months and duration (DUR), on the one hand, and the amplitude of the recession (ATT), on the other (models A1 and A2). This evidence is consistent with the hypothesis of Friedman (1993) and Moore (1965) in the sense that growth during the initial stage of the recovery may be stronger than in the rest due to the “rebound” effect, a sort of self-correction of the system, given the fall in the level of economic activity in the recessionary stage and the excess installed capacity that this would generate. Particularly, the steep fall in employment during this COVID-19 recession and the substantial growth in employment once “normal conditions” for the functioning of the economy began to be restored may explain this significant negative relation.[17] The short duration of the COVID-19 recession, on the other hand, translates into a negative relation with rapid employment growth in the initial phase of the recovery, opposite to what was expected and in contrast to the experience of the 2008-2009 recession when the prolonged recession was followed by a rapid recovery (Cervantes & Serrano, 2021).

In any case, the results regarding the previous recession amplitude align with those of Wynne and Balke (1992) and Balke & Wynne (1996) for the US and G-7 countries. Moreover, for the same variable, the results are similar to those of Mejía & Vergara (2017) for the effects of the 2000-2001 recession in Mexican states but contrast with those they report for the Great Recession.

Regarding the other explanatory variables, there is evidence of effects in line with expectations, although not always robust. Indeed, a positive and relevant effect of the degree of foreign integration of Mexican states on the recovery of total and casual employment is found when the benchmark is the national trough, and the basic sector is used as a measure of openness, results that coincide with those of Mejía &Vergara (2017) for the 2008-2009 recession. Moreover, the recovery of permanent employment is negatively and significantly affected by distance (from Mexican state capitals to major US border cities), as suggested by the gravity theory of trade. At the same time, the basic sector positively affects the same type of employment (state trough). The results are less robust in the other specifications.

In general, then, it can be argued that the reactivation of the external sector (mainly US demand) has played an important role in the recovery of formal employment in Mexican states, such that those with greater linkages have grown more, and vice versa, especially those where the weight of manufacturing is

[17]Moreover, manufacturing seems to have played an important role in this process, since it was one of the first sectors to reestablish its activities once the initial emergency had passed, driven by the dynamism of U.S. manufacturing and non-oil exports (Cervantes & Serrano, 2021).

greater (Andres-Rosales et al. 2021), which is consistent with the literature on the synchronization of Mexico's regional cycles.[18]

As a measure of potential GDP, previous average per capita GDP growth (1997-2019) does not seem to have played an important role in the recovery of state employment: its effects are positive and significant, no matter which trough is used, only in eventual employment growth. A possible explanation for this result is that the states that had grown the most in the previous years (mainly located in the north and north-central region) were also the ones that had the steepest declines, so the explanation for total and permanent employment growth, mainly, may be the extent of the previous recession rather than productive potential.[19]

It is important to note, moreover, that potential output has significant effects on casual employment because its flexibility enables it to recover faster in response to output impulses, albeit with an increase in its precariousness (Cervantes & Serrano, 2021) and the displacement of permanent employment, especially in the manufacturing sector (Andres-Rosales et al., 2021).

Similarly, the net interstate migration rate (NIR) -which seeks to measure the mobility of productive factors and, to this end, the adjustment capacity of state economies to the shocks they receive- has positive and relevant effects in the different time horizons only in the cases of total and permanent employment (which represents around 85% of the former), but not in the case of temporary employment, which can be explained by the stability that workers seek when they decide to moving to other locations.

Finally, government spending has no statistically relevant effect on employment recovery, which is understandable given the limited support granted by federal and state governments to families and companies to face the health crisis (Banxico, 2020; Mejia et al., 2022). The federal government policy, based on the so-called "republican austerity" and the high dependence of local governments on federal transfers, in a context of low revenue collection due to the impact of the recession, limited the action of the different levels of government even after the most severe phase of the pandemic had passed (Ortiz, 2022). As a result, government spending at the state level is irrelevant in recovering permanent and casual employment, although it seems to have a (limited) counter-cyclical effect on total employment (model B1).

[18]In the US, employment began to recover rapidly between May and August 2020, especially in companies with 50 workers or less (Weber, *et al.* 2020).
[19]Similarly, in the US, vigorous recovery occurred in the industries that were most affected by the pandemic (Weber, *et al.* 2020).

Conclusions

The characteristics of recessions are negatively associated with employment recovery, which supports the hypothesis of the "bootstrap" model in the sense that the "rebound" is greater when there is more idle capacity. There is evidence that the external sector has had a positive effect on employment, although not in all cases, which could reflect the supply constraints (microchips, transportation costs) faced by states more integrated into the international market. The fact that GDP per capita is irrelevant for the state trough may be explained by the fact that the states that have grown the most in the past are the most dependent on production that requires key inputs.

On the other hand, fiscal policy only seems to have a counter-cyclical effect on total employment. Labor mobility seems to have had some relevance (net migration rate), reflecting the economy's capacity to adjust to different types of shocks. There is evidence of spatial autocorrelation when analyzing growth from the national trough. The permanence of the pandemic conditions, these results, and the pandemic's effects are attractive research areas.

Based on these results, higher government spending with effective employment protection measures is desirable to contribute to stronger output growth and increased employment in quantity and quality. This, in turn, could help reduce the social vulnerabilities of the population, especially poverty, and increase the long-run potential of the Mexican economy.

References

Adenauer, K. (2021). Recuperación económica tras la pandemia COVID-19. Naciones Unidas, KonradAdenauer-Stiftung y Banco Interamericano de Desarrollo. Disponible en: https://repositorio.cepal.org/bitstream/handle/11362/47308/1/S2100678_es.pdf Consulted: 09/02/2023

Akitoby, B., J. Honda H. Miyamoto. (2022). Countercyclical fiscal policy and gender employment: evidence from the G-7 countries. IZA Journal of Labor Policy, 12, (1). 1-23. https://doi.org/10.2478/izajolp-2022-0005

Albarrán, D., Mejía, P., & López, F. (2022). Sincronización de los ciclos económicos de México y Estados Unidos: un enfoque de correlación dinámica. Investigación Económica, 81(319), 37–62. https://doi.org/10.22201/fe.01851667p.2022.319.77444

Altman, M. (2022). Trajectories for South African employment after COVID-19. South African Journal of Science, 118 (5-6), 1-9. https://doi.org/10.17159/sajs.2022/13289

Andrés-Rosales, R., De Jesús-Almonte, L. & Carbajal-Suárez, Y. (2021). Empleo, producción y salario manufacturero en México ante la pandemia por la COVID-19. Un análisis de VAR espacial. Ciencias Administrativas Teoría y Praxis, 2(17), 32-49. https://doi.org/10.46443/catyp.v17i2.285

Anselin, L. (1988) Econometría espacial: métodos y modelos. Academia Kluwer, Dordrecht. https://doi.org/10.1007/978-94-015-7799-1

Antón, A. (2011). Efectos del ciclo económico en Estados Unidos sobre la producción y el empleo en México, en P. Mejía y M. E. Morales (coords.). Integración y recesión económica en el binomio México-Estados Unidos, Universidad Autónoma del Estado de México, Toluca, pp. 143-162.

Artis, M. J., Z. G. Kontolemis, & D. R. Osborn (1997). Business cycles for G7 and European countries. The Journal of Business, 70 (2), 1–16. https://doi.org/10.1086/209717

Auerbach, A. J. & Y. Gorodnichenko. (2010) Measuring the output responses to fiscal policy. NBER Working Paper 16311. https://doi.org/10.3386/w16311

Balke, N. S. & M. A. Wynne. (1996). Are deeper recessions followed by stronger recoveries? Results for the G-7 countries. Applied Economics, 28(7), 889–897. https://doi.org/10.1080/000368496328344

Banxico (2020). Políticas económicas consideradas en México para enfrentar el panorama adverso generado por la pandemia de COVID-19. Taken from: https://www.banxico.org.mx/publicaciones-y-prensa/informestrimestrales/recuadros/%7B455A13D4-524F-84CE-704E-8045ED092A0C%7D.pdf Consultado: 06/10/2022.

Baxter, M. & M. A. Kouparitsas. (2005) Determinants of business cycle comovement: a robust analysis. Journal of Monetary Economics, 52(1), 113–157. https://doi.org/10.1016/j.jmoneco.2004.08.002

Boldin, M. (1994). Dating turning points in the business cycle. The Journal of Business, 67(1), 97–131. https://doi.org/10.1086/296625

Bry, G. & C. Boschan (1971). Cyclical analysis of time series: Selected procedures and computer programs. NBER, pp. 7-63. Taken from: https://www.nber.org/books-&-chapters/cyclicalanalysis-time-series-selected-procedures-and-computer-programs Consulted: 30/10/2022.

Burns A. & W. Mitchell (1946). Measuring Business Cycles. Studies in Business Cycles, NBER, No. 2: New York. Disponible en: https://www.nber.org/books-and-chapters/measuring-businesscycles Consulted: 23/11/2022.

Burns, A. (1969). The nature and causes of business cycles, en The Business Cycle in a Changing World, NBER, pp. 3-53. Taken from: https://www.nber.org/system/files/chapters/c1174/c1174.pdf Consulted: 23/11/2022

Cervantes, D. & Serrano, C. (2021). Débil recuperación del empleo formal con un fuerte ajuste en la distribución salarial. BBVA Research. Taken from: https://www.bbvaresearch.com/wp-content/uploads/2021/02/210222_ObservatorioEmpleo_Ene21-1.pdf Consulted: 15/04/2023.

Cerra, V., Panizza, U. & Saxena, S. C. (2013). International evidence on recovery from recessions. Contemporary Economic Policy, 31(2), 424-439. https://doi.org/10.1111/j.1465-7287.2012.00313.x

Fatás, A. & I. Mihov. (2000). Fiscal policy and business cycles: an empirical investigation, INSEAD and CEPR Working Paper. 1-37. Taken from: https://faculty.insead.edu/fatas/myc.pdf Consulted: 23/11/2022.

Fatás, A. & I. Mihov (2013). Recoveries. CEPR Discussion Papers 9551, C.E.P.R. Discussion Papers. 1-35. Taken from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2294810 Consulted: 23/11/2022.

Filiani, P. (2021). Optimal monetary–fiscal policy in the euro area liquidity crisis. Journal of Macroeconomics, 70. https://doi.org/10.1016/j.jmacro.2021.103364

Friedman, M. (1993). The "plucking model" of business fluctuations revisited. Economic Inquiry, 31, 171–177. https://doi.org/10.1111/j.1465-7295.1993.tb00874.x

Iancu, A. & D. Olteanu. (2022). Procyclical and countercyclical fiscal policies in non-euro EU member countries. Romanian Academy, National Institute for Economic Research, Bucharest. Working Papers No. 221220. Taken from: https://www.econstor.eu/bitstream/10419/267912/1/1830349384.pdf Consulted: 15/04/2023.

Instituto Mexicano del Seguro social (IMSS) (2022). Consulta dinámica (Cubos). Taken from: http://www.imss.gob.mx/conoce-al-imss/cubos. Consulted: 07/01/2022.

Internacional Labor Organization (ILO) (2022). La recuperación del mercado de trabajo a escala mundial se ve dificultada por múltiples crisis. Observatorio de la OIT sobre el mundo del trabajo, décima edición. Taken from: https://www.ilo.org/global/publications/books/WCMS_859264/lang--es/index.htm Consulted: 09/02/2023.

International Labor Organization (ILO) (2021). Observatorio de la OIT sobre el mundo del trabajo. Octava edición. Taken from: https://www.ilo.org/global/about-theilo/newsroom/news/WCMS_824103/lang--es/index.htm Consulted: 04/10/2022

International Monetary Found (IMF) (2023). Crecimiento del PIB real. Taken from: https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD. Consulted: 12/04/2023

International Monetary Found (IMF) (2022). Declaración conjunta del FMI y el Grupo Banco Mundial sobre la guerra en Ucrania. Comunicado de prensa núm. 2252. Taken from: https://www.imf.org/es/News/Articles/2022/03/01/pr2252-joint-imf-world-bank-groupstatement-on-the-war-in-ukraine Consulted: 24/11/2022.

International Monetary Found (IMF) (2021). Recovery during a pandemic. Health concerns, supply disruptions, and price pressures. World Economic Outlook, Washington, DC. Taken from: https://www.imf.org/en/Publications/WEO/Issues/2021/10/12/world-economic-outlookoctober-2021 Consulted: 04/12/2022.

Jiménez-Bandala, C. A., L. A. Andrade, A. Balam, J. A. Soto & J. E. Guzmán (2021). Panorama del mercado laboral mexicano post-pandemia: recuperación asimétrica, Revista internacional de salarios dignos, 3 (1), 116-132. Taken from: https://revistasinvestigacion.lasalle.mx/index.php/OISAD/article/view/3008/2951 Consulted: 14/10/2022.

Kose, M. A. & Yi, K. M. (2001). International Trade and Business Cycles: Is Vertical Specialization the Missing Link? American Economic Review, 91(2), 371–375. https://doi.org/10.1257/aer.91.2.371.

Lavender, B. & N. Parent. (2013). The U.S. Recovery from the Great Recession: A Story of Debt and Deleveraging, Bank of Canada Review, Winter (2012-2013), pp. 13–26. Taken from: https://www.bankofcanada.ca/wp-content/uploads/2013/02/boc-review-winter-12-13-lavender.pdf Consulted: 15/11/2022.

Mejía, P., M. R. Reyes & R. Vergara (2022). La pandemia de COVID 19 en la economía mexicana: condiciones iniciales, estrategias de política y efectos productivos. Paradigma Económico, 14 (2), páginas 55-83. https://doi.org/10.36677/paradigmaeconomico.v14i2.19351

Mejía, P. & R. Vergara. (2017). Are More Severe Recessions Followed by Stronger Early Expansions of Employment in the Mexican States? The Review of Regional Studies, 47(3), 243–269. https://doi.org/10.52324/001c.8012

Mejía, P. (2003). Regularidades empíricas en los ciclos económicos de México: producción, inversión, inflación y balanza comercial. Economía Mexicana. Nueva Época, 12(2), 231–274. Taken from: https://www.redalyc.org/articulo.oa?id=32312203 Consulted: 15/11/2022.

Mejía, P. (2002). Ciclos económicos en México. Documento de investigación núm. 68, El Colegio Mexiquense, 2-40. Taken from:

https://www.cmq.edu.mx/libreria2/index.php?id_product=155&rewrite=ciclos-economicosen mexico&controller=product Consulted: 15/11/2022.

Moore, G. & V. Zarnowitz. (1986). The development and role of the National Bureau of Economic Research's business cycle chronologies, en R. J. Gordon (ed.), The American Business Cycles. Chicago University Press: Chicago, pp. 735–779. https://doi.org/10.3386/w1394

Moore, G. (1965). Tested knowledge of business cycles, en R. A. Gordon & L. R. Klein (eds), Readings in Business Cycles. American Economic Association: Nashville. Taken from: https://www.nber.org/books-and-chapters/tested-knowledge-business-cycles Consulted: 15/11/2022.

Observatory of Real Business Cycles (ORBC) (2022). Centro de Investigación en Ciencias Económicas (CICE) (2022). Observatorio de los Ciclos Económicos de México, diciembre. Taken from: https://oeemcice.wixsite.com/ciceuaemex Consulted: 23/11/2022.

Ortiz, D. (2022). Los desafíos del Federalismo fiscal mexicano en la pospandemia, solidaridad y responsabilidad fiscal. En E. Basilio Morales (Coord.). Políticas macroeconómicas y estancamiento económico en México y América Latina; implicaciones ante la COVID-19. (pp.231-251). México. Taken from: https://libros.iiec.unam.mx/sites/libros.iiec.unam.mx/files/2022-10/Politicas_macroeconomicas_Eufemia.pdf#page=231 Consulted: 22/01/2023.

Rickman, D. & M. Guettabi. (2015). The Great Recession and nonmetropolitan America. Journal of Regional Science, 55(1), 93–112. https://doi.org/10.1111/jors.12140

Rodden, J. & E. Wibbels. (2010). Fiscal decentralization and the business cycle: an empirical study of seven federations. Economics & Politics, 22(1), 37–67. https://doi.org/10.1111/j.1468-0343.2009.00350.x

Salazar, C. (2020). Gasto público y crecimiento económico: Controversias teóricas y evidencia para México. Instituto de Investigaciones Económicas, UNAM. Taken from: http://revistaeconomia.unam.mx/index.php/ecu/article/view/519 Consulted: 22/01/2023.

Sánchez, A. A. (2022). Sincronización de los ciclos económicos de México y Estados Unidos: Un estudio desagregado. Universidad Autónoma de Baja California. Taken from: https://repositorioinstitucional.uabc.mx/bitstream/20.500.12930/9604/1/TIJ137852.pdf Consulted: 22/01/2023.

UKCES. (2014).The labour market history: The UK following recession. Briefing Paper. UK Commission for Employment and Skills. Taken from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/f ile/344439/The_Labour_Market_Story-_The_UK_Following_Recession.pdf Consulted: 20/01/2023.

Villalva A. M. (2022). El gasto público y su relación con el empleo en el Ecuador. Período 2016 – 2020. Universidad de Guayaquil. Taken from: http://repositorio.ug.edu.ec/handle/redug/65829 Consulted: 20/01/2023.

Weber, E., Meyer, P., Piacentini, J., Schultz, M. & Sveikauskas, L. (2020). Employment recovery in the wake of the COVID-19 pandemic," Monthly Labor Review, U.S. Bureau of Labor Statistics, December 2020. https://doi.org/10.21916/mlr.2020.27

World Bank (2022). Uneven recovery in Latin America and the Caribbean: are women being left behind? Development programme. Junio (2022) Washington, D.C. World Bank Group., Taken from: https://policycommons.net/artifacts/2608027/uneven-recovery-in-latin-america-and thecaribbean/3630472/ Consulted: 04/10/2022.

Wynne, M. A. & N. S. Balke. (1992). Are deep recessions followed by strong recoveries? Economics Letters, 39, 183–189. https://doi.org/10.1016/0165-1765(92)90288-A

Annex

Table A1
a. Effects of the characteristics of the recession on contingent employment
Models A1 and A2

	National Trough						State Trough					
	Model A1			Model A2			Model A1			Model A2		
	EEE9	EEE12	EEEK	EEE9	EEE12	EEEK	EEE9	EEE12	EEEK	EEE9	EEE12*	EEEK
C	-6.858	-6.689	-7.01	-7.497	-4.133	-3.700	-2.912	-5.973	-5.072	4.382	4.689	5.563
	(0.149)	(0.117)	(0.091)	(0.047)	(0.190)	(0.176)	(0.558)	(0.389)	(0.527)	(0.107)	(0.436)	(0.380)
DUR	-0.119	-0.290	-0.287	-0.087	-0.217	-0.257	-0.229	-0.361	-0.499	-0.161	-0.227	-0.231
	(0.586)	(0.174)	(0.144)	(0.636)	(0.191)	(0.118)	(0.298)	(0.239)	(0.164)	(0.317)	(0.529)	(0.560)
TCA	-0.812	-0.760	-0.785	-0.587	-0.266	-0.386	-0.677	-0.940	-0.898	-0.917	-1.213	-0.836
	(0.002)	(0.000)	(0.000)	(0.009)	(0.154)	(0.066)	(0.009)	(0.008)	(0.028)	(0.000)	(0.009)	(0.094)
SB				0.139	0.188	0.171				0.004	0.070	0.200
				(0.006)	(0.000)	(0.000)				(0.920)	(0.519)	(0.127)
G	-0.010	-0.047	-0.058	0.021	-0.026	-0.011	-0.035	-0.075	-0.151	0.006	-0.056	-0.127
	(0.794)	(0.251)	(0.305)	(0.552)	(0.287)	(0.824)	(0.388)	(0.360)	(0.108)	(0.836)	(0.575)	(0.226)
GDPPC	0.655	1.460	1.433	2.226	1.940	1.521	1.316	1.127	0.9701	-0.081	-1.540	-1.628
	(0.401)	(0.040)	(0.072)	(0.015)	(0.000)	(0.024)	(0.117)	(0.317)	(0.460)	(0.879)	(0.155)	(0.168)
DKM	0.007	0.002	0.002				0.009	0.010	0.010			
	(0.023)	(0.472)	(0.427)				(0.008)	(0.026)	(0.078)			
NIR	0.062	-0.008	-0.016	0.067	0.015	0.032						
	(0.509)	(0.924)	(0.867)	(0.433)	(0.799)	(0.691)						
W_ETN (p)		0.560	0.551	0.720	0.814	0.740						
		(0.012)	(0.008)	(0.000)	(0.000)	(0.000)						
R2	0.761	0.782	0.785	0.772	0.850	0.847	0.760	0.631	0.219	0.883	0.420	0.405
Jarque-Bera	2.145 (0.342)						0.232	0.441	0.062	0.408	0.730	0.174
Breusch-Pagan	6.362 (0.498)						0.555	0.867	0.334	0.882	0.062	0.820
Anselin-Kelejian		0.041 (0.834)	0.084 (0.772)	0.001 (0.972)	0.433 (0.511)	0.150 (0.699)						

*Standard errors were estimated with the Huber-White-Hinkley correction matrix. Dummy variables were included for Tabasco (national and state trough) and Yucatan (state trough).
Source: created by the authors with data from IMSS (2022) and with Geodaspace and Eviews 9 software.

b. Effects of the characteristics of the recession on contingent employment
Models B1 and B2

	National Trough						State Trough					
	Model B1			Model B2			Model B1			Model B2		
	EEE9	EEE12	EEEK	EEE9	EEE12	EEEK	EEE9	EEE12	EEEK	EEE9*	EEE12*	EEEK
C	-13.213	-10.564	-10.688	-11.657	-4.124	-3.514	-5.487	-11.507	-8.851	4.886	13.029	5.350
	(0.040)	(0.043)	(0.038)	(0.054)	(0.249)	(0.330)	(0.375)	(0.174)	(0.350)	(0.498)	(0.018)	(0.545)
DUR	0.333	0.118	0.119	0.226	-0.110	-0.101	0.058	0.141	-0.103	0.249	-0.059	0.198
	(0.235)	(0.603)	(0.593)	(0.318)	(0.517)	(0.563)	(0.827)	(0.696)	(0.800)	(0.437)	(0.806)	(0.639)
TCP	-2.865	-1.663	-1.604	-2.293	-0.305	-0.541	-1.262	-3.311	-1.721	-3.474	1.550	-2.660
	(0.369)	(0.423)	(0.439)	(0.356)	(0.831)	(0.717)	(0.566)	(0.267)	(0.611)	(0.396)	(0.473	(0.457)
SB				0.200	0.222	0.215				0.105	0.190	0.310
				(0.000)	(0.000)	(0.000)				(0.063)	(0.003)	(0.009)
G	-0.003	-0.008	-0.010	0.034	-0.012	0.021	-0.045	-0.070	-0.137	0.010	-0.018	-0.110
	(0.928)	(0.900)	(0.873)	(0.252)	(0.803)	(0.673)	(0.345)	(0.446)	(0.177)	(0.595)	(0.767)	(0.313)
GDPPC	2.311	2.088	2.001	2.973	2.153	1.745	1.992	1.810	1.814	-0.013	-0.423	-1.438
	(0.001)	(0.024)	(0.028)	(0.000)	(0.001)	(0.012)	(0.040)	(0.153)	(0.208)	(0.985)	(0.570)	(0.239)
DKM	0.006	0.005	0.006				0.013	0.014	0.015			
	(0.072)	(0.145)	(0.112)				(0.001)	(0.003)	(0.009)			
NIR	0.058	0.074	0.083	0.104	0.041	0.080						
	(0.678)	(0.533)	(0.472)	(0.293)	(0.610)	(0.339)						
W_ETN (ρ)	0.509	0.644	0.603	0.945	0.881	0.824						
	(0.021)	(0.008)	(0.012)	(0.000)	(0.000)	(0.000)						
R2	0.640	0.702	0.705	0.727	0.841	0.829	0.683	0.533	0.465	0.714	0.816	0.350
Jarque							0.286	0.261	1.497	4.752	2.784	3.928
Bera							(0.867)	(0.878)	(0.473)	(0.093)	(0.249)	(0.140)
Breusch-							0.709	1.705	1.223	3.033	0.403	0.687
Pagan							(0.665)	(0.161)	(0.328)	(0.018)	(0.907)	(0.637)
Anselin-	0.721	0.744	0.621	0.003	0.387	0.296						
Kelejian	(0.396)	(0.388)	(0.431)	(0.953)	(0.534)	(0.586)						

*Standard errors were estimated with the Huber-White-Hinkley correction matrix. Dummy variables were included for Tabasco (national and state trough) and Yucatan (state trough).
Source: created by the authors with data from IMSS (2022) and with Geodaspace and Eviews 9 software.

c. Effects of the characteristics of the recession on permanent employment
Models A1 and A2

	National Trough						State Trough					
	Model A1			Model A2			Model A1			Model A2		
	EPE9	EPE12	EPEK	EPE9	EPE12	EPE1K	EPE9	EPE12	EPEK	EPE9	EPE12*	EPEK
C	7.381	9.716	7.550	3.957	4.813	4.280	11.019	6.115	5.387	1.611	-1.241	-0.686
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.017)	(0.027)	(0.476)	(0.492)	(0.685)
DUR	-0.219	-0.272	-0.219	-0.185	-0.166	-0.150	0.004	-0.071	-0.044	-0.128	-0.067	-0.079
	(0.000)	(0.006)	(0.023)	(0.002)	(0.028)	(0.036)	(0.969)	(0.474)	(0.699)	(0.523)	(0.577)	(0.524)
TCA	0.158	-0.376	-0.359	0.266	-0.193	-0.228	-0.039	-0.102	-0.048	-0.926	-0.762	-0.751
	(0.053)	(0.009)	(0.014)	(0.000)	(0.051)	(0.015)	(0.859)	(0.663)	(0.862)	(0.077)	(0.001)	(0.001)
SB				0.040	0.115	0.095				0.257	0.448	0.445
				(0.645)	(0.153)	(0.225)				(0.253)	(0.000)	(0.000)
G	0.015	-0.206	0.0251	0.043	-0.045	0.025	-0.112	-0.050	-0.024	-0.032	0.114	-0.007
	(0.686)	(0.118)	(0.197)	(0.252)	(0.651)	(0.103)	(0.161)	(0.771)	(0.413)	(0.760)	(0.569)	(0.814)
GDPPC	0.075	-0.092	0.165	0.153	0.181	0.309	-0.847	-0.167	-0.198	-0.038	0.403	0.319
	(0.606)	(0.687)	(0.509)	(0.347)	(0.319)	(0.105)	(0.005)	(0.580)	(0.599)	(0.925)	(0.228)	(0.404)
DKM	-0.002	-0.002	-0.002				-0.003	0.000	0.001			
	(0.005)	(0.027)	(0.077)				(0.012)	(0.968)	(0.587)			
NIR	0.049	0.038	0.033	0.057	0.041	0.036						
	(0.002)	(0.131)	(0.218)	(0.001)	(0.062)	(0.096)						
Lambda	0.580			0.659	0.380	0.444						
	(0.000)			(0.000)	(0.026)	(0.008)						
R2	0.655	0.605	0.591	0.472	0.526	0.540	0.890	0.883	0.830	0.585	0.799	0.784
Jarque-Bera		0.460	1.568				0.498	0.334	0.062	0.986	0.709	0.702
		(0.794)	(0.457)									
Breusch-Pagan		2.965	5.385				0.590	0.619	0.921	0.000	0.195	0.104
		(0.888)	(0.613)									
Anselin-Kelejian												

*Standard errors were estimated with the Huber-White-Hinkley correction matrix. Dummy variables were included for Tabasco (national and state trough) and Yucatan (state trough).
Source: created by the authors with data from IMSS (2022) and with Geodaspace and Eviews 9 software.

d. Effects of the characteristics of the recession on permanent employment

Models A1 and A2

	National Trough						State Trough					
	Model A1			Model A2			Model A1			Model A2		
	EPE9	EPE12	EPEK	EPE9	EPE12	EPE1K	EPE9	EPE12	EPEK	EPE9	EPE12*	EPEK
C	7.381	9.716	7.550	3.957	4.813	4.280	11.019	6.115	5.387	1.611	-1.241	-0.686
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.017)	(0.027)	(0.476)	(0.492)	(0.685)
DUR	-0.219	-0.272	-0.219	-0.185	-0.166	-0.150	0.004	-0.071	-0.044	-0.128	-0.067	-0.079
	(0.000)	(0.006)	(0.023)	(0.002)	(0.028)	(0.036)	(0.969)	(0.474)	(0.699)	(0.523)	(0.577)	(0.524)
TCA	0.158	-0.376	-0.359	0.266	-0.193	-0.228	-0.039	-0.102	-0.048	-0.926	-0.762	-0.751
	(0.053)	(0.009)	(0.014)	(0.000)	(0.051)	(0.015)	(0.859)	(0.663)	(0.862)	(0.077)	(0.001)	(0.001)
SB				0.040	0.115	0.095				0.257	0.448	0.445
				(0.645)	(0.153)	(0.225)				(0.253)	(0.000)	(0.000)
G	0.015	-0.206	0.0251	0.043	-0.045	0.025	-0.112	-0.050	-0.024	-0.032	0.114	-0.007
	(0.686)	(0.118)	(0.197)	(0.252)	(0.651)	(0.103)	(0.161)	(0.771)	(0.413)	(0.760)	(0.569)	(0.814)
GDPPC	0.075	-0.092	0.165	0.153	0.181	0.309	-0.847	-0.167	-0.198	-0.038	0.403	0.319
	(0.606)	(0.687)	(0.509)	(0.347)	(0.319)	(0.105)	(0.005)	(0.580)	(0.599)	(0.925)	(0.228)	(0.404)
DKM	-0.002	-0.002	-0.002				-0.003	0.000	0.001			
	(0.005)	(0.027)	(0.077)				(0.012)	(0.968)	(0.587)			
NIR	0.049	0.038	0.033	0.057	0.041	0.036						
	(0.002)	(0.131)	(0.218)	(0.001)	(0.062)	(0.096)						
Lambda	0.580			0.659	0.380	0.444						
	(0.000)			(0.000)	(0.026)	(0.008)						
R^2	0.655	0.605	0.591	0.472	0.526	0.540	0.890	0.883	0.830	0.585	0.799	0.784
Jarque-Bera		0.460	1.568				0.498	0.334	0.062	0.986	0.709	0.702
		(0.794)	(0.457)									
Breusch-Pagan		2.965	5.385				0.590	0.619	0.921	0.000	0.195	0.104
		(0.888)	(0.613)									
Anselin-Kelejian												

*Standard errors were estimated with the Huber-White-Hinkley correction matrix. Dummy variables were included for Tabasco (national and state trough) and Yucatan (state trough).

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