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Informal Labor Markets in Times of Pandemic: Evidence for Latin America and Policy Options

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Abstract: We document the evolution of labor markets of five Latin American countries during the COVID-19 pandemic, with emphasis on informal employment. We show, for most countries, a slump in aggregate employment, mirrored by a fall in labor participation, and a decline in the informality rate. The latter is unprecedented since informality used to cushion the decline in overall employment in previous recessions. Using a business cycle model with a rich labor market structure, we recover the shocks that rationalize the pandemic recession, showing that labor supply shocks and productivity shocks to the informal sector are essential to account for the employment and output loss and for the decline in the informality rate.

Keywords: COVID-19, labor markets, informality, structural model, Brazil, Chile, Colombia, Mexico, Peru

JEL Classification: E24, E32, F44, J65

Resumen: Se documenta la evolución de los mercados laborales de cinco países latinoamericanos durante la pandemia del COVID-19, con énfasis en el empleo informal. Se muestra, para la mayoría de países, una caída en el empleo agregado, reflejada en una caída en la participación laboral y una disminución de la tasa de informalidad. Esto último no tiene precedentes ya que la informalidad solía amortiguar la caída del empleo agregado en recesiones anteriores. Usando un modelo de ciclos económicos con una detallada estructura del mercado laboral, se recuperan los choques que racionalizan la recesión pandémica, mostrando que choques en la oferta laboral y de productividad en el sector informal son esenciales para dar cuenta de la pérdida de empleo y producción y del descenso en la tasa de informalidad.

Palabras Clave: COVID-19, mercados laborales, informalidad, modelo estructural, Brasil, Chile, Colombia, México, Perú

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1. Introduction

The COVID-19 outbreak of early 2020 triggered a truly global crisis with already profound yet uncertain economic consequences. Policymakers worldwide responded by implementing immediate lockdown policies to arrest the spread of the virus at the cost of putting the global economy on hold. The Great Lockdown (Gopinath, 2020a) may already be singled out for the massive job losses and the sudden, unprecedented withdrawals from the labor market.

The so-called pandemic slump has affected the world unequally. Differences in compliance with confinement and social distancing policies, the resilience of labor markets, and the deployment of stimulus policies may all account for heterogeneous recoveries across countries.[1] The Latin American region is a case in point. A unique feature that has remained entrenched in the region, accounting for half of employment, claims a decisive role across all three themes: informality.

Since informality is an enticing option for many to compensate for the loss of earnings in the formal sector, it imposes challenges in compliance to confinement policies (Loayza, 2020).[2] Moreover, due to its frictionless nature, informal employment, though expected to lead the recovery in labor markets (Leyva and Urrutia, 2020a), could exert a dragging effect on output. Typically, informal employment is recognized to be less productive than formal employment. Finally, precisely because informality acts outside the scope of the government, stimulus policies in the form of credits and transfers are expected to miss the targeted beneficiaries. Informality thus pervades the functioning of labor markets in Latin America, compounding the problem of managing the pandemic and steering the economy.

We start this paper by providing an overview of Latin American labor markets in the aftermath of the COVID-19 pandemic, with emphasis on informal work. We do this by exploiting our own constructed database of labor market stocks for five Latin American countries, comprising Brazil, Chile, Colombia, Mexico, and Peru (LA-5, for short, following IMF (2020)) and gross flows for the two largest economies in the region. For this, we rely on household

[1] For uneven recoveries and its perils, see Gopinath (2021), Rogoff (2021), and Gopinath (2020b). For an emphasis on Latin America, see Werner et al. (2021).

[2] Compliance is, of course, an attribute of a successful confinement policy. We see it now and with the benefit of hindsight, as exemplified by Spinney (2017), ch. 8, in her narrative of the Spanish Flu of 1918.

and employment surveys publicly available. We first focus on Mexico and Brazil to document the following facts for the pandemic recession by comparing 2020.Q2 with the same quarter of 2019: (1) an unprecedented decline in employment rates, mirrored by a fall in participation rates; (2) slight increase in unemployment rates, coupled with an instant decline in the average duration of unemployment; (3) falling informality rates; and (4) less informal job creation from inactivity in Brazil while more informal job destruction to inactivity in Mexico. The most recent available data (2021.Q1) points to a rapid recovery of informal employment, reflected in an informality rate's rebound.

Compared to the Great Recession of 2008-9 for Mexico and the 2014-16 recession for Brazil, we see stark differences in the outgoing pandemic episode, namely the magnitude of the employment collapse and the response of the informality rate. Previously, the latter acted countercyclically (for Mexico, see Leyva and Urrutia (2020a)), but now it felt significantly on impact.

We also contribute to the understanding of the pandemic slump by documenting three novel margins of adjustment: temporary layoffs, absent employees, and telework. We see the first margin absorbing and the second mitigating the loss of employment at the trough of the pandemic recession and both later contributing to a rapid recovery. The evidence for telework is mixed. We identify some gains of working from home in the current pandemic recession but also in previous non-pandemic downturns. What is more, the employment costs of being unable to work from home seem to be more related to employment changes at the sector level than something intrinsically related to telework.

We extend some of these results to all LA-5 countries and, in general, confirm findings (1) through (3), with some minor exceptions. We also decompose the employment and informality rates in each country by economic sector, gender, and age, noticing how the burden of the pandemic recession has fallen disproportionally on services (in particular, those deemed as contact-intensive), women, and young workers. On aggregate, however, the informality rate is not driven by composition effects, as other economic sectors, male and older workers fared similarly.

In the second part of the paper, we assess the COVID-19 pandemic through the lens of a structural model of the business cycle for a small open economy with a rich labor market

structure, based on Leyva and Urrutia (2020a). The model features many of the margins discussed above, including an endogenous participation in the labor market and an informal sector modeled as self-employment. We calibrate the model using Mexican data for 2005-19 and use it to recover the shocks that rationalize the pandemic recession. Building on Leyva and Urrutia (2020a), where we consider aggregate productivity and foreign interest rate shocks as the sources of business cycle fluctuations, we add two new disturbances for the pandemic period, a sector-specific shock affecting the productivity of informal workers and a labor supply shock. In the accounting exercise, we find that these two new shocks are essential to reproduce the initial employment and output loss *and* the drop in the informality rate.[3]

We then use the model to entertain three policy responses. We first evaluate two policy instruments to increase hiring in the formal sector, a payroll tax cut and a direct subsidy to formal vacancy posting. While the two options speed up the recovery and mitigate the rise in the informality rate, the tax cut is more expensive as it also subsidizes jobs created in the past. For a much lower fiscal cost, a subsidy to formal vacancy posting fosters formal employment and output recovery, reducing the informality rate and increasing labor productivity. The third policy, an informal income subsidy, could potentially increase employment at the cost of a higher informality rate. However, its fiscal cost is sizable given the prevalence of informality in the labor market.

There is a growing literature on the economic impact of the pandemic. Our contribution is twofold. On the empirical side, we document the evolution of labor market stocks for LA-5 and of gross flows for the two largest economies, with emphasis on informality, complementing the analysis of Elsby et al. (2010) and Coibion et al. (2020) for the U.S. To the best of our knowledge, there is no comparable analysis to ours, encompassing so many countries and dimensions. In this sense, we complement IMF (2020), for the same set of LA-5 countries, by working with a mixed notion of informal employment, adding gross flows to the analysis, and comparing the pandemic recession to previous downturns. We also add to the IADB's COVID-19 Labor Market Observatory[4] by providing national estimates for Peru (not only for Metropolitan Lima) and adding more dimensions to the measurement of informality.

[3] Our approach is close in spirit to the business cycle accounting methodology introduced by Chari et al. (2007).
[4] Available at https://observatoriolaboral.iadb.org/en/.

The use of the model to recover the shocks relevant for the pandemic is another contribution. We relate to Brinca et al. (2020), who also take these disturbances as exogenous and use vector autoregressive techniques to disentangle labor supply and demand shocks at the onset of the recession in the U.S.[5] An alternative, widely adopted approach is the use of a SIR epidemiology model, as introduced by Atkeson et al. (2020) and Eichenbaum et al. (2020), to predict the future path of the pandemic and analyze the feedback from policies.[6] Though it is a sensible choice to study confinement policies, as in Kaplan et al. (2020), Acemoglu et al. (2021) and Garriga et al. (2020), there are some challenges in disciplining the parameters of such models, as pointed out by Chang and Velasco (2020).[7]

The paper proceeds as follows. Section 2 documents the labor market adjustment in Mexico and Brazil during the pandemic. In section 3, we extend the empirical analysis to all LA-5. In section 4, we describe the model and calibrate it to Mexican data. In section 5, we describe the results from the accounting exercise together with the simulations for the recovery period under different policy options.

2. A Tale of Two Countries and Two Recessions

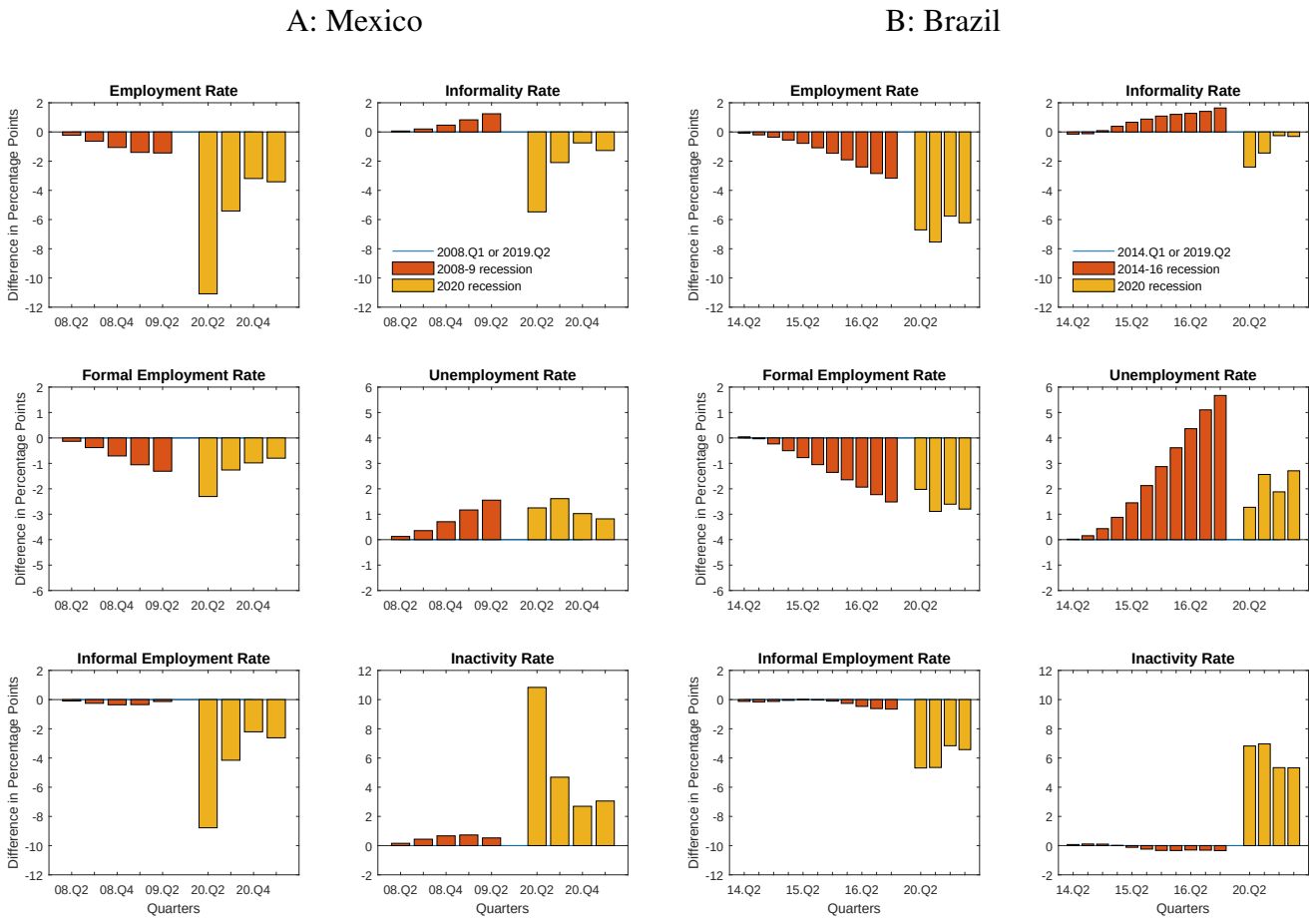
In this section, we concentrate on Mexico and Brazil for several reasons. First, these are the largest countries in the LA-5 region, both in population and GDP. Second, household surveys compare favorably in size, frequency, and even the semi-panel structure that allows tracking households in five consecutive quarters. Finally, Mexico and Brazil are two contrasting cases for the economic performance in 2020, with output drops of 8.3 and 4.1 percent (Gopinath, 2021).

2.1. Labor Market Stocks

Using nationally representative household surveys and relying on official definitions, we add to the traditional portrayal of the labor market by measuring informal employment and focusing on the share of informal workers in overall employment, the so-called informality

[5] Though these two shocks may interact in complex ways as shown by Guerrieri et al. (2020).
[6] This approach has also been used by Álvarez et al. (2021) and Hevia et al. (2021).
[7] Yet another contribution is that we touch upon policies that may speed up the recovery. See Alon et al. (2020) for a discussion of policies aimed broadly at developing and informal economies.

Figure 1: Mexico and Brazil: Evolution of Labor Market Stocks in Two Recessions



Notes: This figure plots the evolution of six labor market stocks in the pandemic recession and in previous downturns for Mexico and Brazil. For each downturn, we display the difference (in percentage points) of each variable relative to a benchmark quarter (shown). Series were smoothing out using centered moving averages, except for the pandemic. Own calculations based on the ENOE/ETOE/ENOE^{N} and the PNAD-C using appropriate survey weights. See country notes in the appendix.

rate.[8]

In Figure 1, we track the labor market dynamics of Mexico and Brazil as seen from six labor market stocks: the employment rate (overall, formal, and informal), the unemployment rate, the inactivity rate, and the informality rate. Common to both countries is the pandemic

[8] The only exception is Brazil, for which we use an alternative definition that is close to Gomes et al. (2020). The official definition has been available since 2015.Q4. For Mexico, the definition of informal employment is mixed, including self-employment and wage-earners with no access to health care through social security. The business registration characterizes the former, which only the official definition in Brazil permits since 2015.Q4. To discriminate between formal and informal workers in Brazil, we follow Gomes et al. (2020) in using a document issued by the Brazilian Ministry of Labor with information on job characteristics, such as compensation, that must be signed by employer and employee. This means that, as in as Gomes et al. (2020), self-employment is entirely classified as informal. See the appendix for further details.

recession, starting in 2020.Q2.[9] We also look at the two labor markets during previous recessions. For Mexico, we choose the global financial crisis, dated from 2008.Q1 to 2009.Q2 (Leyva and Urrutia, 2020a), and for Brazil, we take the 2014.Q1-2016.Q4 period, following CODACE.[10]

In Mexico, the 11-point plunge in employment, relative to 2019.Q2, exceeded by far the cumulative losses registered in 2008-9 (panel A). The division into formal and informal employment offers an even starker contrast. While the instant decline in formal employment was as severe as the 2008-9 recession in its entire length, the pandemic slump took its toll on *unprecedented* informal employment losses. Since the Tequila crisis of 1994-95, the informality rate had risen in every downturn as a result of an immediate fall in formal employment and a rapid recovery of informal employment (Leyva and Urrutia, 2020b).[11] This time, the informality rate fell by 5 points.

The fall in employment in 2020.Q2 in Brazil, half as severe as in Mexico, amounted to losses as high as in the first half of the protracted downturn of 2014-16 (panel B). Again, the composition of employment mattered as informal employment drove the bulk of its decline. As in Mexico, the informality rate turned from being countercyclical to falling along with the pandemic slump.

Unprecedented surges in inactivity have absorbed the bulk of these losses. In the past, while unemployment's response mimicked the decline in formal employment, the dynamics of informal employment mirrored the evolution of the labor force participation. This time, at least at the trough of the pandemic, unemployment failed to absorb losses in formal employment as it did before.[12]

By 2021.Q1, informal employment is leading the labor market's recovery as its initial decline has been almost checked. As formal employment remains depressed (panel B), such

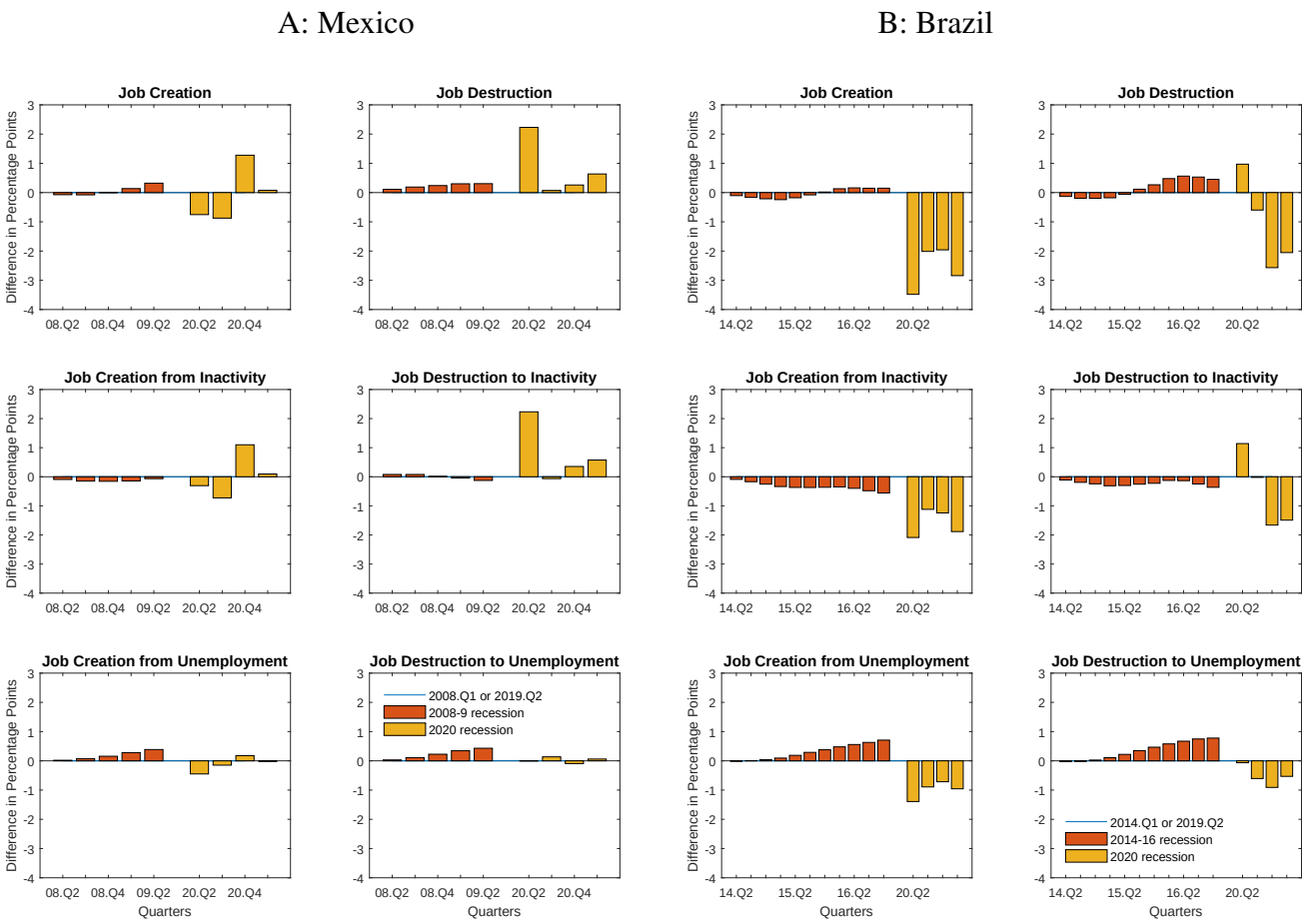
[9] The Brazilian Business Cycle Dating Committee or Comitê de Datação de Ciclos Econômicos (CODACE) dates the beginning of this recent recession in 2020.Q1; see https://portalibre.fgv.br/sites/default/files/2020-06/brazilian-economic-cycle-dating-committee-announcement-on-06_29_2020-1.pdf.

[10] See Bonelli, R. and F. Veloso (Eds.) (2016) for a discussion around the origins of this episode.

[11] This is in contrast to the reallocation hypothesis put forward by Alcaraz et al. (2015), Fernández and Meza (2015), and Alonso-Ortiz and Leal (2017). Bosch and Maloney (2008), as we do, cast doubt on this hypothesis.

[12] In Brazil, unemployment claimed a more prominent role in the labor market dynamics during 2014-16, which may be partly due to unemployment insurance. For a description of this program, see Gerard and Gonzaga (2021).

Figure 2: Mexico and Brazil: Job Creation and Destruction by Type of Non-Employment



Notes: This figure plots the evolution of six labor market gross flows, by type of non-employment, in the pandemic recession and in previous downturns for Mexico and Brazil. For each downturn, we display the difference (in percentage points) of each variable relative to a benchmark quarter (shown). Series were smoothed out using centered moving averages, except for the pandemic. Gross flows for Mexico in 2020.Q2 and 2020.Q3 are the average of monthly flows based on telephone survey responses only.

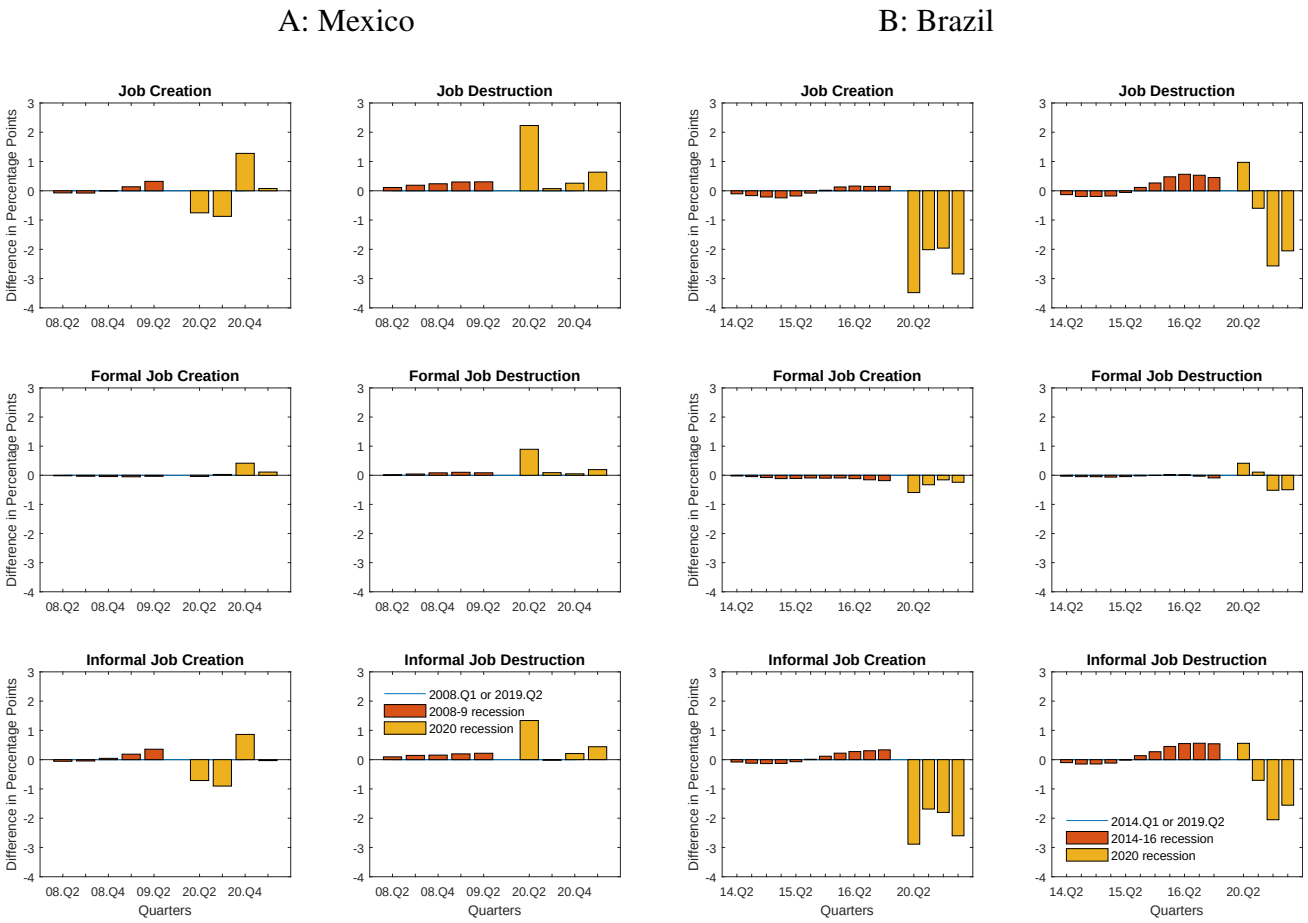
a reversal has even been faster in Brazil than in Mexico.[13]

2.2. Labor Market Gross Flows

We now take advantage of the panel structure of the household surveys to construct gross flows, which we use to assess the relative role of job creation and destruction. Consider the

[13] We have verified that the dynamics of informal self-employment and wage-earners are fairly comparable, except during the recovery. The former shows a slightly faster recovery than the latter.

Figure 3: Mexico and Brazil: Job Creation and Destruction by Type of Employment



Notes: This figure plots the evolution of six labor market gross flows, by type of employment, in the pandemic recession and in previous downturns for Mexico and Brazil. For each downturn, we display the difference (in percentage points) of each variable relative to a benchmark quarter (shown). Series were smoothed out using centered moving averages, except for the pandemic. Gross flows for Mexico in 2020.Q2 and 2020.Q3 are the average of monthly flows based on telephone survey responses only.

following decompositions:

$$\underbrace{Of^{OF}+Of^{OI}}_{\text{creation from } O}+\underbrace{Uf^{UF}+Uf^{UI}}_{\text{creation from } U} \quad \text{vs.} \quad \underbrace{Ff^{FO}+If^{IO}}_{\text{destruction to } O}+\underbrace{Ff^{FU}+If^{IU}}_{\text{destruction to } U} \quad \text{or}$$

$$\underbrace{Uf^{UF}+Of^{OF}}_{\text{creation in } F}+\underbrace{Uf^{UI}+Of^{OI}}_{\text{creation in } I} \quad \text{vs.} \quad \underbrace{Ff^{FU}+Ff^{FO}}_{\text{destruction in } F}+\underbrace{If^{IU}+If^{IO}}_{\text{destruction in } I},$$

where F, I, U, and O stand for the number of formal workers, informal workers, unemployed, and people out of the labor force, all measured over the working-age population, and

f^{ab} for the gross flow rate from state a to b.[14] These decompositions are displayed in Figures 2 and 3.

The role played by job creation and destruction differed in the two countries at the start of the pandemic recession. The decline in employment and the informality rate in Mexico rested in the massive flow of workers leaving informal work and joining inactivity (panel A in Figures 2 and 3). By contrast, in Brazil, they seem to be rooted in the lack of informal job creation from inactivity (panel B), stressing how confinement policies could have also dwarfed job creation.

The same two margins keep setting the course of the labor market in the ongoing recovery. Notice how the setback in job creation and resilience of job destruction are consistent with the employment reversals in both countries by 2021.Q1, possibly reflecting seasonal factors or the imprint of the second coronavirus wave.

Even if the decline in the informality rate is a common phenomenon in Mexico and Brazil, the previous discussion reveals differences in origin that might suggest equally different policies to get their economies back on track.

2.3. The Role of Non-Conventional Margins

Some non-conventional margins of adjustment appear in a different light once we recognize the severity of the pandemic slump. In this section, we discuss three margins. The first margin is temporary layoffs. In the U.S., they include unemployed workers who expect to be called back to their previous job within the next six months. Early evidence for the U.S. shows that the share of these workers spiked at the outset of the pandemic (Kudlyak and Wolcott, 2020 and Hall and Kudlyak, 2020), though this may partly reflect a methodological change.[15] As elusive as the measurement of such a margin is in LA-5, we approximate it for Mexico by aggregating inactive and unemployed respondents with a return date in less than four weeks, more than four weeks, or uncertain return.

The second margin is absent employees, generally comprising employed workers who

[14] We implement the unweighted version of Elsby et al. (2015)'s margin-error correction for possible measurement errors ascribed to survey collection during the pandemic, finding a negligible impact on our conclusions.

[15] Those with an uncertain return date, classified previously as out of the labor force, started to be classified as part of unemployment in March 2020; see https://www.bls.gov/cps/employment-situation-covid19-faq-april-2020.pdf, p. 6.

did not work for at least one hour during the survey reference week. In Mexico, these include workers who either maintain a close labor relationship, perceive earnings, or expect to be back soon to work (or are already back). In Brazil, they include those with a paid job during the reference survey week but temporarily removed. Since agreements to keep the labor relationship, either policy-induced or privately arranged, were introduced in the region in response to the pandemic, absent employment should have carried some specific weight in this period.

To see the contribution of those two margins, we display two counterfactual employment rates in panel A of Table 1. The first counterfactual is constructed by adding temporary layoffs to the baseline employment rate. By including workers with a potential quick return to work, the counterfactual decline in the employment rate looks much more moderate (column 2). Notice how little information is carried by this margin in previous downturns (column 3). The buffer effect of the second margin can be appreciated by substracting absent employees from the measurement of employment (column 2). Again, in previous downturns, this counterfactual is hardly discernible from the baseline employment rate (column 3).[16]

Table 1 also reports some specialization of these margins by type of employment. Part of the adjustment in informal employment occurs by breaking the labor relationship and giving an expected (or uncertain) return date. In contrast, the adjustment seems to have called for a surge in the number of absent employees in formal agreements.

Conforming with the general recovery, the relevance of temporary layoffs and absent employees has started to recede, as shown by the convergence of the two counterfactual rates to the baseline employment rate (column 1) by 2021.Q1.

[16] In Table C.6 in the appendix, we extend this analysis to the rest of LA-5.

Table 1: Three Non-Conventional Margins in the Pandemic Recession and Previous Downturns, Mexico and Brazil

	Mexico			Brazil		
	Recovery	Pandemic Slump	Previous Downturn	Recovery	Pandemic Slump	Previous Downturn
	Difference 2019.Q2 -2021.Q1 in pp.	Difference 2019.Q2 -2020.Q2 in pp.	Difference 2008.Q1 -2009.Q2 in pp.	Difference 2019.Q2 -2021.Q1 in pp.	Difference 2019.Q2 -2020.Q2 in pp.	Difference 2014.Q1 -2016.Q4 in pp.
	1	2	3	1	2	3
A: Temporary layoffs and absent employees						
employment rate:	−3.4	−11.1	−1.3	−6.2	−6.7	−2.7
plus temporary layoffs	−2.9	−4.3	−1.4	-	-	-
minus absent employees	−4.0	−16.7	−1.3	−6.7	−13.4	−2.5
informal employment rate:	−2.6	−8.8	0.3	−3.4	−4.7	−0.3
plus temporary layoffs	−2.1	−2.1	0.1	-	-	-
minus absent employees	−2.6	−10.0	0.2	−3.6	−8.2	−0.1
formal employment rate:	−0.8	−2.3	−1.6	−2.8	−2.0	−2.4
plus temporary layoffs	−0.7	−2.2	−1.6	-	-	-
minus absent employees	−1.4	−6.6	−1.5	−3.1	−5.2	−2.3
B: Ability to telework or work from home						
overall employment:						
non-telework employment rate	−3.4	−10.3	−1.4	−5.9	−6.3	−2.6
non-essential	−11.6	−9.8	−1.2	−8.8	−8.9	−2.2
essential	8.2	−0.5	−0.1	2.9	2.5	−0.4
telework employment rate	0.0	−0.7	0.0	−0.4	−0.4	−0.1
non-essential	−0.5	−0.8	0.0	−0.6	−0.7	0.3
essential	0.5	0.1	0.1	0.3	0.3	−0.4

Notes: Telework follows the definition of Leyva and Mora (2021a). For Mexico, this definition is applied to a harmonized occupation variable available since 2005. Definition of essential and non-essential employment follows Leyva and Mora (2021b). For official decrees/announcements regarding the definition of essential activities and its changes throughout the pandemic period up to 2021.Q1, see Diario Oficial de la Federación (2020b), Tabla 2, and Diario Oficial de la Federación (2020a) for Mexico and Decreto Nº 10.282 (2020) for Brazil. These official definitions are applied to the respective industry classifications at the 4-digit level. Percentage points denoted by pp.

The last margin is the ability to telework or work from home, which has received considerable attention in the aftermath of the COVID-19 pandemic. There have been many efforts to measure the extent of teleworking ex-ante at the country level, most notably Dingel and Neiman (2020) and Gottlieb et al. (2021). Dingel and Neiman (2020) extend their telework measure for the U.S (henceforth DN), based on O*NET questionnaires, to a large set of developed and developing countries, including Brazil, Chile, and Mexico. Gottlieb et al. (2021)'s measure (henceforth GGPS) is a major downward revision of the former for a selected group of developing countries, including Colombia, using the STEP survey. In the same vein, Leyva and Mora (2021a), using a more granular classification of occupations, calculate a telework measure for Mexico (henceforth LM) that is half the share reported by Dingel and Neiman (2020). Table C.2, in the appendix, summarizes these shares as replicated by Leyva and Mora (2021b) for all LA-5.[17,18]

We start by dividing up employment according to the ability to work from home. Panel B of Table 1 reports the non-telework and telework employment as shares of the working-age population. Our reading of the evidence is mixed. We see differences in the decline of non-telework and telework employment (column 2) that showcase the virtues of working from home. However, previous non-pandemic downturns (column 3) showed similar acute differential effects when none were expected.

It might be argued that the real test is assessing how telework determined employment outcomes in activities deliberately shut down early in the pandemic. The ability to work from home might have made a difference in workers engaged in non-essential activities, in opposition to those employed in essential activities. We borrow from Leyva and Mora (2021b), who distinguish between non-essential and essential employment relying on governments' official

[17] Alfaro et al. (2020a), following DN's classification but applied to GEIH data, the Colombian household survey, calculate that the telework share was 14.7 percent of employment in 2019. Two predecessors of Gottlieb et al. (2021) are Saltiel (2020) and Gottlieb et al. (2020). Gottlieb et al. (2020) display in their Figure 4 telework shares of urban employment for Brazil, Colombia, Mexico, and Peru similar to those reported by Dingel and Neiman (2020). Saltiel (2020) focuses on a set of heterogeneous developing countries, including Colombia, also reporting low working-from-home shares. For additional telework measures, we refer the reader to Dingel and Neiman (2020) and Gottlieb et al. (2021).

[18] The crosswalk between DN and LM at the 2-digit level used in Leyva and Mora (2021a) for Mexico is pivotal not only for extending DN to the other countries. Leyva and Mora (2021a) also use it to calculate GGPS measures, also available at the 2-digit level, for all LA-5 (Gottlieb et al., 2021, p. 13, Table A3). Unlike Dingel and Neiman (2020), the Mexican telework classification is taken as the starting point, with the benefit of using Mexican instead of U.S. employment weights when mapping all telework classifications to the rest of LA-5.

decrees as a guide. In panel B of Table 1, non-telework and telework employment is further divided into non-essential and essential employment.

As expected, jobs unable to be carried out at home and considered essential proved more resilient than employment in non-essential activities. Surprisingly, previous downturns show a similar advantage of being employed in essential activities, suggesting specific sectors driving those differential results. Sectors that are typically sensitive to the business cycle may be precisely those shut down during the pandemic. Manufacturing, construction, and commerce jobs, roughly considered non-telework employment, are typically sensitive to the business cycle, especially in Mexico and Brazil. Coincidentally, all same activities were deemed non-essential at the onset of the pandemic in both countries.

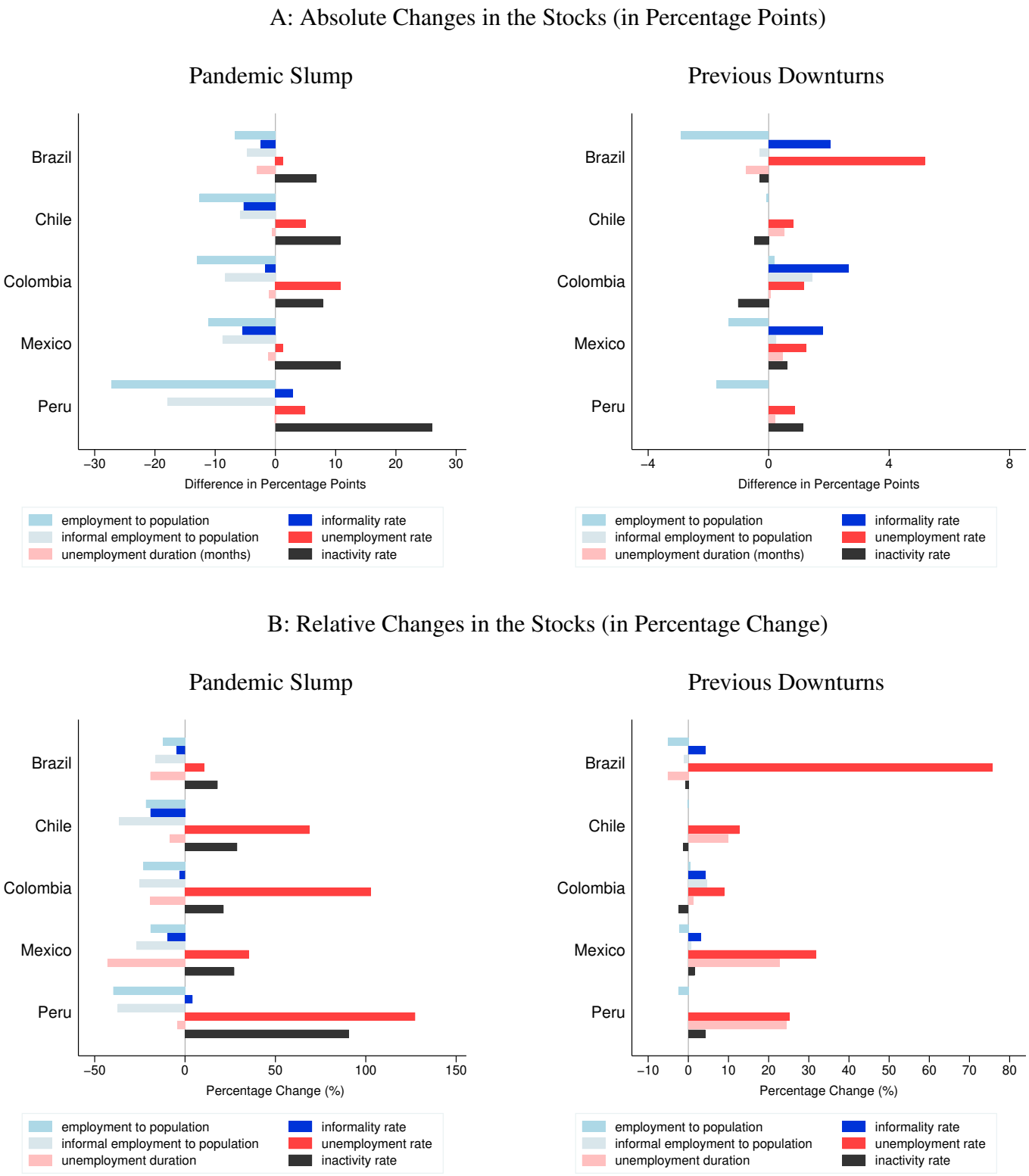
3. An Overview of LA-5 Labor Markets

In this section, we exploit our dataset of labor market stocks from each LA-5 country's household or employment survey (Table C.1 in the appendix displays their main characteristics). The contribution of this dataset is twofold. Foremost is the definition of informal employment. Informality is certainly a multifaceted concept, ranging from activities falling outside the government's scope to precarious labor contracts. We use a mixed definition of informality, including aspects like the size of the establishment, the registration of the business, and access to health care through social security, relying on official definitions from each statistical agency. This choice may render the comparison across countries problematic though at the benefit of using the definition that suits better the idiosyncrasies of each labor market. The second advantage of this dataset is the length of the time series, allowing us to gain perspective on the pandemic recession by examining the evolution of LA-5's labor markets in previous downturns, though not necessarily the same across countries (see Table C.3 in the appendix).

3.1. Aggregate Outcomes

We extend our labor market overview of all LA-5 and add the average duration of unemployment (in months) to our set of labor market stocks. The unprecedented destruction of jobs should have manifested in the composition of the unemployment pool and its early

Figure 4: Labor Market Stocks in LA-5: Pandemic Slump vs. Previous Downturns



Notes: Own calculations based on LA-5's household and employment surveys, using appropriate survey weights. The characteristics of each survey are summarized in Table C.1. For the construction of these labor markets, see the country notes in the appendix. Panel A shows the change in the labor market stocks in percentage points and panel B shows their relative change. In Colombia, informal employment is our baseline measure based on the size of the establishment only. The slight increase in the employment rate during the global financial crisis conforms with the discussion in Arango et al. (2015), Cuadro 6, p. 12. In Mexico, the rise in informal employment (over population) during the Great Recession reflects its much faster recovery relative to the aggregate economy; see Figure 1 and Leyva and Urrutia (2020a). We are using the baseline turning points for these previous downturns; see Table C.3.

dynamics.

We assess the impact of the pandemic slump by comparing 2020.Q2 with the same quarter of 2019. As shown in panel A of Figure 4, overall employment underwent a free-fall across the region.[19] In Mexico, for instance, the recent fall in the employment rate has exceeded its drop in the aftermath of the global financial crisis by a factor of eight to one. This is because informal employment, in contrast to 2008-9, has failed to cushion the overall decline in employment. For the rest of the countries, we also see sharp, immediate responses of informal employment in the same direction, as confirmed by the declining informality rates.[20] In previous downturns, the informality rate behaved rather countercyclically.

These huge losses in employment have engrossed the ranks of inactivity and unemployment with different intensities across countries (Colombia vis-à-vis the rest of LA-5 is an example). What is perhaps specific to the pandemic recession is the sudden and massive withdrawal from the labor force. Also revealing is the massive job loss, which could be appreciated from the *drop* in the average duration of unemployment, only explained by a higher proportion of new layoffs.[21]

Given the institutional differences that characterize their labor markets, it is not easy to draw sharp conclusions from all LA-5 countries. Minimum wages, unemployment benefits, firing costs, and payroll taxes could account for heterogeneous labor markets before the pandemic. What is more, confinement and policy responses could have also shaped the instant outlook of the labor market. Still, it is possible to draw some conclusions by looking at relative changes in the stocks.

Consistent with its general economic performance, Peru exhibited by far the worst labor market performance in the LA-5 region (panel B). The employed population was shockingly slashed by 40 percent, with unemployment and inactivity increasing almost twofold. Brazil and Mexico seem to be the least affected countries, both known for their more lenient confinement policies.

[19] These are raw changes; detrended and alternative measures are reported in Tables C.4-C.5 in the appendix.

[20] The Peruvian official statistical bulletin agrees with the rising informality rate; see https://www.inei.gob.pe/media/MenuRecursivo/boletines/03-informe-tecnico-n03_empleo-nacional-abr-may-jun-2020.pdf. Notice that the shrink of the informal sector at the onset of the pandemic was not evident, pending the laxity (stringency) and timing of the foreseeable lockdown policies.

[21] The U.S. labor market registered a similar response; see https://fred.stlouisfed.org/series/UEMPMEAN.

3.2. The Unequal Hallmark of the Pandemic Slump

As pervasive as the pandemic slump was, its burden has been unevenly distributed, affecting particularly women and young people. To see this burden through the lens of the labor market's adjustment, consider two alternative ways of decomposing overall employment:

$$\begin{aligned} \frac{\text{overall employment}}{\text{population}} &= \frac{\text{labor force}}{\text{population}}\left(1-\frac{\text{unemployment}}{\text{labor force}}\right) \text{ and} \\ \frac{\text{informal employment}}{\text{population}} &= \frac{\text{overall employment}}{\text{population}} \times \frac{\text{informal employment}}{\text{overall employment}}, \end{aligned}$$

which combined yields:

$$\frac{\text{informal employment}}{\text{population}} = \frac{\text{labor force}}{\text{population}}\left(1-\frac{\text{unemployment}}{\text{labor force}}\right)\left(\frac{\text{informal employment}}{\text{overall employment}}\right),$$

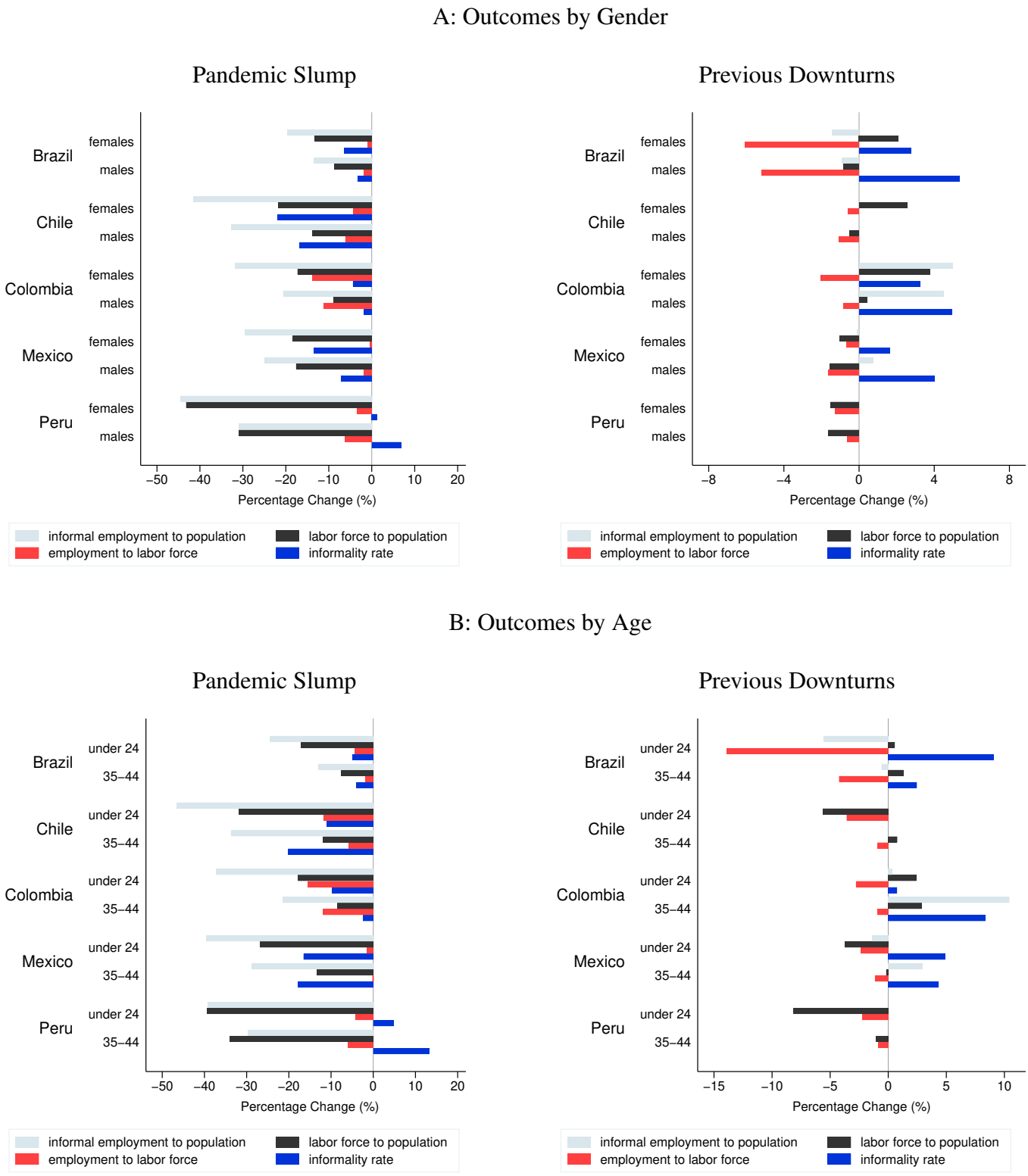
thus linking informal job losses with entry and exit from the labor market, higher unemployment, or changes in employment composition.

We show this decomposition by gender (panel A) and age (panel B) in Figure 5. The employment loss in the informal sector, tilted towards females, mirrored the decline in participation (panel A), except for Colombia, where the adjustment also took place as higher unemployment. Only in Mexico do we see a similar decline in the participation of females and males. In Chile, the decline in informal employment has been accompanied by large changes in employment composition.

Young people (under 24) were also particularly exposed to the crisis, relative to workers aged 35 to 44 (panel B of Figure 5). Between these groups, there are no relevant differences in the role played by inactivity and unemployment. Again, for Colombia, we see that unemployment claimed a more prominent role in absorbing the employment loss. The ability of the informality rate to absorb these losses is notorious in Chile and Peru.

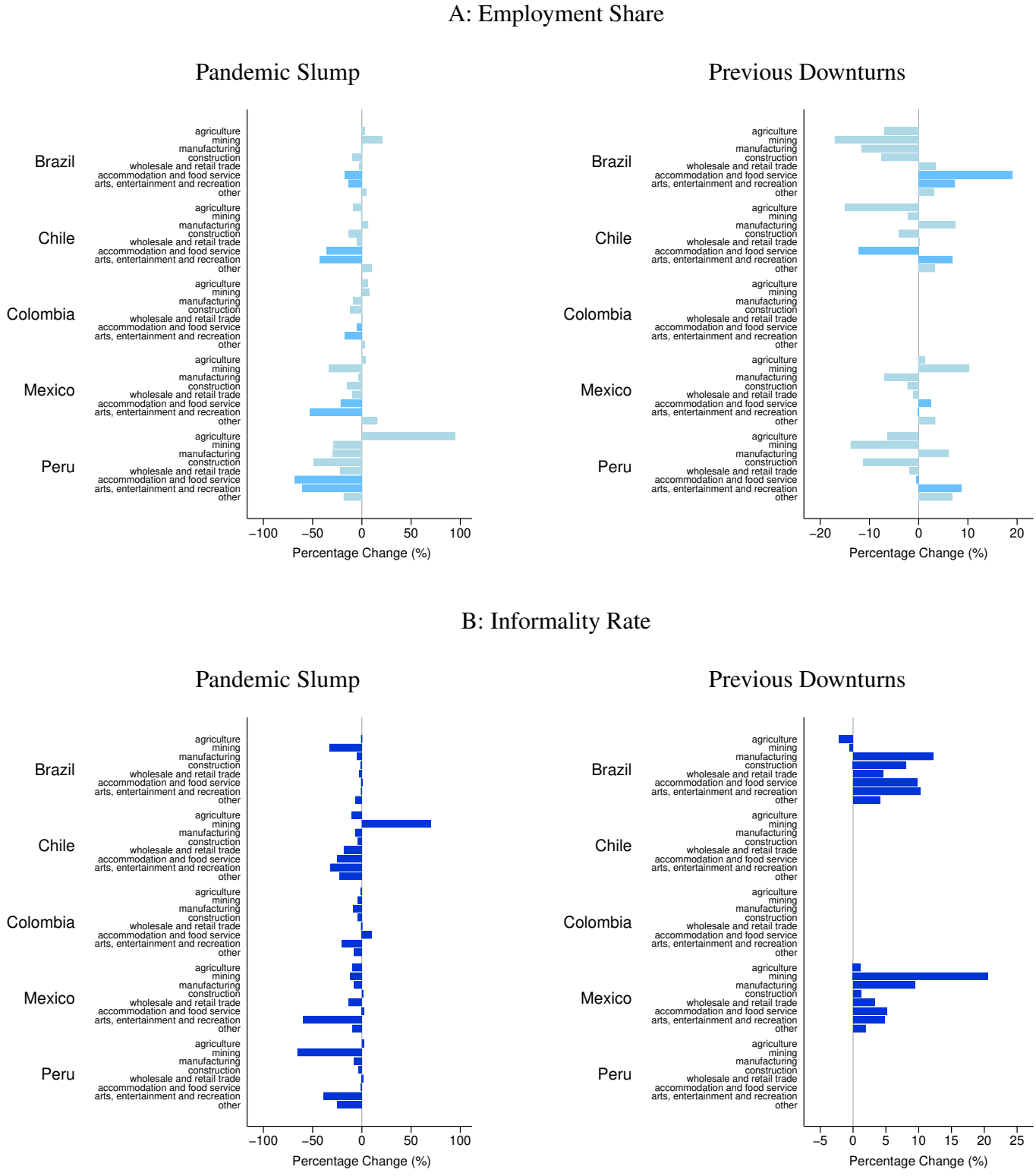
Seen through the lens of past downturns, the pandemic slump has been unique in the response of labor markets in LA-5, even for specific groups. Of course, the magnitude of the changes in the stocks is symptomatic of confinement and lockdown policies never implemented before. However, the specific margins at play are also peculiar to this crisis across gender and age, namely, the decline in participation coupled with employment losses in the

Figure 5: Unequal Labor Market Outcomes in LA-5: Pandemic Slump vs. Previous Downturns



Notes: Own calculations based on LA-5's household and employment surveys, using appropriate survey weights. The characteristics of each survey are summarized in Table C.1. For the construction of these labor markets, see the country notes in the appendix.

Figure 6: Employment Share and Informality Rate by Sector in LA-5: Pandemic Slump vs. Previous Downturns



Notes: Own calculations based on LA-5's household and employment surveys, using appropriate survey weights. The characteristics of each survey are summarized in Table C.1. For the construction of these labor markets, see the country notes in the appendix. Panels A and B show the relative change in the employment share and the informality rate, respectively. Highlighted bars in panel A denote changes in the employment share in "accommodation and food service" and "arts, entertainment and recreation".

informal sector, in turn driving the informality rate downwards. Though we witnessed rising informality rates across groups and countries in the past, we do not necessarily see informal employment and labor market participation going in tandem.

Another dimension that shaped the aftermath of the pandemic recession is the employment composition by economic sectors. As expected, the most systematically affected sectors across countries were those associated with accommodation and food service and arts, entertainment, and recreation, as these activities were ruled out from the list of essential activities at the onset of the pandemic (Figure 6, panel A). This is not to say that specific sectors drove the behavior of the informality rate. They did not, neither during past downturns nor at the onset of the pandemic recession, as shown by panel B of Figure 6.

4. A Model with Search Frictions, Labor Participation, and Informality

In this section, we introduce an aggregate dynamic general equilibrium model of a small open economy with a rich labor market structure. The model is based on Leyva and Urrutia (2020a), including as endogenous adjustment margins: (1) a participation decision, modeled as a standard labor-leisure choice; (2) frictional formal employment, with search and matching frictions leading to equilibrium unemployment; and (3) an informal employment option, modeled as self-employment or home production. Employment in the informal sector is assumed to be more flexible than formal employment, avoiding search frictions in hiring and the burden of labor regulation. However, informal workers in the model are also less productive.

Adding aggregate productivity and interest rate shocks, we calibrate the model to be consistent with several business cycle facts, using Mexico as an example of an emerging and fairly open economy. We use this calibrated model in the next section to account for the behavior of macroeconomic variables and labor market variables during the COVID-19 pandemic recession.

4.1. The Model Economy

We now present the main features of the model and refer to Leyva and Urrutia (2020a) for a complete description of the environment and a formal definition of equilibrium.

Technology: A representative firm produces a final good using capital and intermediate goods:

$$Y_t = A_t \left(K_t\right)^{\alpha} \left(M_t\right)^{1-\alpha},$$

where A_t is an aggregate productivity shock. The intermediate good is itself a composite of inputs produced in the formal sector and by informal workers:

$$M_t = \left\{ \left(M_t^f\right)^{\frac{\epsilon-1}{\epsilon}} + \left(M_t^s\right)^{\frac{\epsilon-1}{\epsilon}} \right\}^{\frac{\epsilon}{\epsilon-1}},$$

using linear technologies in labor with productivities Ω and $\varkappa$, respectively.[22] This simple specification allows us to construct an aggregate production function for the economy:

$$\underbrace{Y_t}_{\text{GDP}} = \underbrace{\left[A_t \left\{ \left(\Omega\left(1-l_t^s\right)\right)^{\frac{\epsilon-1}{\epsilon}} + \left(\varkappa l_t^s\right)^{\frac{\epsilon-1}{\epsilon}} \right\}^{\frac{\epsilon(1-\alpha)}{\epsilon-1}} \right]}_{\text{TFP}} \left(K_t\right)^{\alpha} \left(L_t\right)^{1-\alpha},$$

in which TFP is endogenously determined by the informality rate $l_t^s \equiv \frac{L_t^s}{L_t} = \frac{L_t^s}{L_t^f + L_t^s}$, i.e., the share of informal workers in total employment.

Formal Employment: While unemployed workers search for jobs, firms in the formal sector post vacancies. A matching function determines the vacancy filling probability: $q_t = \left(U_t/V_t\right)^{\phi}$. Formal employment is a long-run decision. Once a worker and a firm are matched, they remain operating until the match is destroyed, which occurs with an exogenous probability (or separation rate) s. The law of motion for formal employment is then:

$$L_t^f = \left(1-s\right) L_{t-1}^f + q_t V_t.$$

In this setup, we can define the value of a formal match for an entrepreneur recursively:

$$J_t = \left(p_t^{M,f} \Omega - \left(1+\tau\right) w_t \right) U_{c,t} + \beta E_t \left[\left(1-s\right) J_{t+1} - s\kappa U_{c,t+1} \right],$$

[22] We use throughout this presentation a superscript f to denote variables for the formal sector and s for the corresponding variables in the informal (or self-employment) sector.

where $p_t^{M,f}$ is the relative price of formal intermediate goods (with respect to the final good, which is the numeraire) and $U_{c,t}$ is the marginal utility of consumption, to be defined later. This definition includes two labor regulation instruments, for now fixed: a payroll tax τ, rebated to households as a lump-sum transfer, and a firing cost κ, modeled as a severance payment to the worker. The wage rate w_t in the formal sector is determined by Nash-Bargaining. In equilibrium, a zero-profit condition for vacancy posting holds, $q_t J_t = \eta U_{c,t}$, where η is the cost of posting a vacancy.

Representative Household's Problem: There is a representative household in the economy, with a time endowment normalized to one. This endowment can be used to work in one of the two sectors, to search for formal jobs, and to avoid the work disutility outside of the labor force (O_t):

$$\underbrace{L_t^f + L_t^s}_{\text{employed}} + \underbrace{U_t + O_t}_{\text{non-employed}} = 1.$$

The preferences of the household are described by the intertemporal utility function:

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{\left[C_t - \varphi \frac{L_t^{1+\nu}}{1+\nu} - \frac{\varsigma}{2} U_t^2\right]^{1-\sigma}}{1-\sigma},$$

where φ governs the disutility of work, assumed to be symmetric for formal and informal employment. Notice that unemployment appears as part of the quadratic search cost. The representative household maximizes utility subject to a budget constraint:

$$C_t + I_t + (1 + r_t^*) B_t = \underbrace{w_t L_t^f + p_t^{M,s} \varkappa L_t^s}_{\text{labor income}} + r_t K_t + \underbrace{\kappa s L_{t-1}^f}_{\text{severance}} + B_{t+1} + \underbrace{\Pi_t}_{\text{transfers}},$$

where B_t is foreign debt carrying a stochastic interest rate r_t^*, and a law of motion for capital:

$$K_{t+1} = (1 - \delta) K_t + I_t - \frac{\vartheta}{2} \left(\frac{I_t}{K_t} - \delta \right)^2 K_t.$$

Two Limitations of the Model

Before moving forward, it is worth highlighting two limitations of this framework that can be relevant for the analysis of the COVID-19 pandemic. First, the model endogenizes hiring decisions and job creation in the formal sector. However, formal job destruction is assumed to be exogenous, so we cannot say much about this margin of adjustment in the pandemic and how it would respond to the different policy options.[23] By contrast, notice that there is no meaningful way to distinguish job creation from job destruction in the informal sector, as the self-employment decision is static.

Another limitation of the model comes from the aggregation of workers into one representative household. This implicitly assumes perfect insurance within the household. Our model is then silent about the distributional consequences of the pandemic.

4.2. Calibration

Following Leyva and Urrutia (2020a) again, we calibrate the model to aggregate data for Mexico, including labor market variables as the ones described in section 2. We extend the sample to 2005.Q2-2019.Q4, three more years than the original calibration exercise, without including observations affected by the COVID-19 pandemic. One period in the model is a quarter.

The model is solved using a first-order log-linearization around the steady-state, implemented in Dynare. For the quantitative model, we assume the following autoregressive processes for the exogenous aggregate productivity parameter A_t and foreign interest rate shocks:

$$\begin{aligned} \log(A_t) &= \rho_A \log(A_{t-1}) + \varepsilon_t^A \quad \text{and} \\ \log(1+i_t^*) &= \rho_i \log\left(1+i_{t-1}^*\right) + (1-\rho_i)\log(1+i^*) + \varepsilon_t^i, \end{aligned}$$

where $1+r_t^* = (1+i_t^*)\,\Theta(B_t)$ includes an endogenous risk premium depending positively on the level of debt, as in Schmitt-Grohé and Uribe (2003).

Table 2 presents the results of the calibration exercise. A first group of parameters is chosen outside the model, based on direct observation or the literature. We assume a standard

[23] See Lama et al. (2021) for a model with endogenous separations and labor market policies.

Table 2: Parameters of the Model Economy

	Symbol	Value		Symbol	Value
From outside the model			*Calibrated to steady-state targets*		
Risk Aversion Coefficient	σ	2	Disutility of Labor	φ	3.15
Discount Factor	β	0.99	Productivity Informal Sector	$\varkappa$	0.47
Depreciation Rate	δ	1.25%	Search Cost	ς	95.3
Elasticity of Matching Function	ϕ	0.40	Productivity Formal Sector	Ω	0.76
Payroll Tax	τ	0.25	Workers' Bargaining Power	γ	0.66
Separation Rate	s	8.57%	Capital Share in Production Function	α	0.23
Persistence AR(1) Aggregate Productivity	ρ_A	0.90	Firing Cost	κ	1.43
Persistence AR(1) Foreign Real Interest Rate	ρ_i	0.89			
Calibrated to business cycle targets					
S.D. Innovations AR(1) Aggregate Productivity	σ_A	0.71%	S.D. Innovations AR(1) Foreign Real Interest Rate	σ_i	0.50%
Elasticity of Substitution between Formal and Informal Inputs	ϵ	2.30	Frisch Elasticity of Labor Supply	$1/\nu$	0.61
Adjustment Cost of Capital	ϑ	54.8	Cost of Posting a Vacancy	η	0.16

risk aversion coefficient of 2. The discount factor β implies an annual real interest rate of 4 percent and the depreciation rate δ is set to 5 percent per year. We choose an elasticity ϕ of 0.4, consistent with the work of Blanchard and Diamond (1990). The exogenous separation rate s corresponds to a quarterly exit rate from the formal sector of 8.6 percent. We also set the payroll tax τ to 0.25, consistent with the estimates in Leal (2014) and Alonso-Ortiz and Leal (2017). Finally, we set the persistence parameters ρ_A and ρ_i equal to the observed persistence of GDP and the foreign real interest rate, constructed as in Leyva and Urrutia (2020a), adding the Global EMBI spread for Mexico to the 90-day Treasury Bill rate and subtracting the U.S. GDP annual inflation.

A second group of parameters are jointly calibrated to reproduce the following targets for Mexico in steady-state: (1) an employment rate of 57.3 percent; (2) an informality rate of 58.2 percent; (3) an unemployment rate of 4.26 percent; (4) a normalized aggregate TFP of one; (5) a formal wage premium of 13 percent; (6) a labor share of two-thirds, within the range found by Gollin (2002); and (7) a firing cost equivalent to 13 weeks of the average

Table 3: Business Cycle Statistics: Data and Model

Relative Volatility	Data 1	Model 2	Correlation with Output	Data 3	Model 4
$\sigma(Y)$	1.35	1.35	-	-	-
$\sigma(C)/\sigma(Y)$	0.93	1.01	$Corr(C,Y)$	0.97	0.85
$\sigma(I)/\sigma(Y)$	2.33	2.33	$Corr(I,Y)$	0.87	0.75
$\sigma(L)/\sigma(Y)$	0.40	0.40	$Corr(L,Y)$	0.67	0.99
$\sigma(l^s)/\sigma(Y)$	0.49	0.49	$Corr(l^s,Y)$	-0.56	-0.30
$\sigma(1+i^*)$	0.49	0.49	$Corr(1+i^*,Y)$	-0.23	-0.23

Notes: Columns 1 and 3 correspond to Mexican quarterly data from 2005.Q2 to 2019.Q4, obtained from National Accounts and calculated from the ENOE survey. The foreign real interest rate is constructed as the sum of the Global EMBI spread for Mexico and the 90-day Treasury Bill rate minus the U.S. GDP annual inflation. Series were smoothed out using centered moving averages and HP-filtered with parameter 1600. Columns 2 and 4 report the theoretical (HP-filtered) moments from the model, computed by Dynare.

formal wage. The first three targets are our calculation from the ENOE survey, while the formal wage premium (relative to informal workers) is taken from Alcaraz et al. (2011) and the size of firing costs is obtained from Heckman and Pagés (2000).

Finally, a third group of parameters is chosen to minimize the distance between some second moments from the data and the model. These moments include the volatilities of output and the foreign real interest rate, the relative volatilities (with respect to output) of investment, the employment rate, and the informality rate, and the correlation between output and the foreign real interest rate. Table 3 provides a glimpse of the model fit. It also shows that the model is consistent with the procyclicality of consumption, investment, and employment, as well as with a countercyclical informality rate. These were not explicit calibration targets.

5. Accounting for the Pandemic Recession: Policy Options for the Recovery

In this final section, we use the calibrated model described above to analyze the COVID-19 pandemic. First, we perform an accounting exercise with an extended version of the model to recover the shocks that better explain the recent evolution of the Mexican economy and labor market. We compare the role of these shocks during two recessions: the pandemic, in particular the slump of 2020.Q2, and the Great Recession of 2008-09. This allow us to

identify the disturbances specific to the pandemic episode. Finally, we evaluate some policy options and compare their cost effectiveness in speeding up the recovery.

5.1. Accounting for the Pandemic Recession

Two defining features of the pandemic recession are the dramatic drop in employment and the unprecedented decline in the informality rate. The model described in the previous section is unable to account for these features without including additional shocks. We consider two new sources of fluctuations in an extended version of the model, under the assumption that these shocks were not present before and were driven by the pandemic itself. One is a negative shock to labor supply, *increasing* the work disutility parameter φ; the other is a negative shock to the informal sector productivity parameter $\varkappa$ relative to the one of the formal sector Ω.[24]

We assume that these two shocks follow similar first-order autoregressive processes, with very small variances indicating that they are low-probability events and a common persistence parameter ρ_{new}. The value of this parameter, key for our analysis, affects the expectations about the duration of the pandemic recession. We tie its value to $\rho_{\text{new}} = 0.825$ so that the model reproduces the response of consumption in the data in 2020.Q2 (see footnote 28 below).

Several features of the pandemic episode can be mapped in a reduced form into one or more of the shocks included in the analysis. For instance, the shutdown of some non-essential activities (as restaurants) acts as negative aggregate productivity shock in the context of the model. The stronger impact of these shutdowns on informal employment, more pervasive in contact-intensive sectors or in activities less amenable to teleworking,[25] can be captured as

[24] The second shock implies a decrease in the productivity of the informal sector $\varkappa$ coupled with a proportional increase in formal productivity Ω so as to keep aggregate TFP constant. This allows us to isolate disturbances affecting aggregate productivity (via its exogenous component A_t) from changes to the *relative* productivity of one sector with respect to the other. Alternatively, the same shock could be seen as a change in the weight ω of informal inputs in the production of the composite intermediate good:

$$M_t = \left\{ (1-\omega) \left(M_t^f \right)^{\frac{\epsilon-1}{\epsilon}} + \omega \left(M_t^s \right)^{\frac{\epsilon-1}{\epsilon}} \right\}^{\frac{\epsilon}{\epsilon-1}} = \left\{ (1-\omega) \left(\Omega L_t^f \right)^{\frac{\epsilon-1}{\epsilon}} + \omega \left(\varkappa L_t^s \right)^{\frac{\epsilon-1}{\epsilon}} \right\}^{\frac{\epsilon}{\epsilon-1}}.$$

[25] The empirical analysis for Latin American countries in IMF (2020) reveals that "informal workers ... are more likely to be employed in high contact intensity and low teleworkability jobs.... [T]he share of informal workers employed in contact intensive occupations is between 5 and 10 percentage points higher than for formal workers.... [and] [t]he share of informal workers with high teleworkability jobs is between 20 and 40 percentage points lower than for formal workers" (p. 5). Alfaro et al. (2020b) find similar results for workers

a negative (relative) informal productivity shock, consistent with the larger job destruction of informal jobs documented in section 2. Finally, confinement policies (mandatory and voluntary) and lack of childcare due to school closures increase the cost of participating in the labor market, acting in the model as a negative labor supply shock.

Using the extended model, we invert the (linear) decision rules to recover the sequences for the innovations to the four shocks that account for the behavior of GDP, the foreign interest rate, the employment rate, and the informality rate in Mexico, for the period 2019.Q2 (initial steady-state) to 2021.Q1. Panel A of Figure 7 reports the results of the accounting exercise and reveals that large negative labor supply and informality shocks are required to account for the observed decline in employment and in the informality rate in 2020.Q2. The two shocks revert quickly in the next three quarters, as the economy partially recovers.[26]

Panel B of Figure 7 plots the behavior of additional variables in the data for Mexico and in the model. By construction, the model with the shocks recovered reproduces almost exactly the evolution of labor productivity. It is important that the model is also consistent with the decline in employment mirrored by a decline in the participation rate (an increase in inactivity), with a very minor role for unemployment, which increases slightly (both in the model and in the data) by the end of 2020.Q3.[27]

The accounting exercise with the model also captures well the procyclical behavior of consumption and investment.[28] However, it is unable to reproduce the current account reversal during the pandemic, reflected in the rise in net exports.[29]

in small firms. Leyva and Mora (2021a) find similar gaps for Mexico using an alternative classification of telework jobs than the one used by IMF (2020). For formal workers, they estimate that the share of telework jobs is 19.4 percent, while for informal wage-earners and the self-employed this share shrinks to 4.6 and 1.4, respectively.

[26] The rapid reversion of these shocks may also capture, in reduced-form, the dissipation of the two non-conventional margins (temporary layoffs and absent employees) discussed in section 2. For a model of the pandemic recession that embeds one of these margins, see Buera et al. (2021).

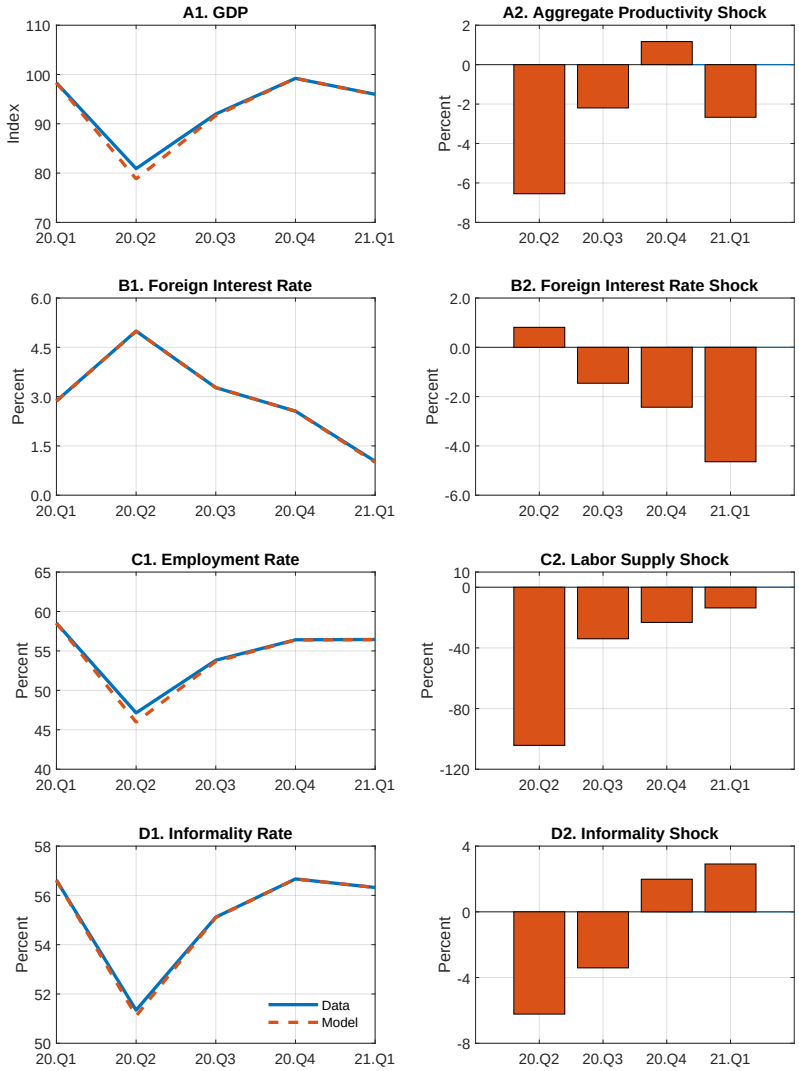
[27] However, the model predicts a procyclical fall in the unemployment rate in 2020.Q2, clearly at odds with the data. This is a limitation of the original model discussed in Leyva and Urrutia (2020a). Because of the coexistence of a participation decision with job search, unemployment in the model (capturing the intensity of the search effort) declines in recessions.

[28] The exercise reproduces by construction the drop in consumption in 2020.Q2 by choosing the parameter of persistence ρ_{new} for the shocks to labor supply and informality. A higher (lower) value of ρ_{new} would imply less (more) consumption smoothing, as the shocks would be perceived as more permanent.

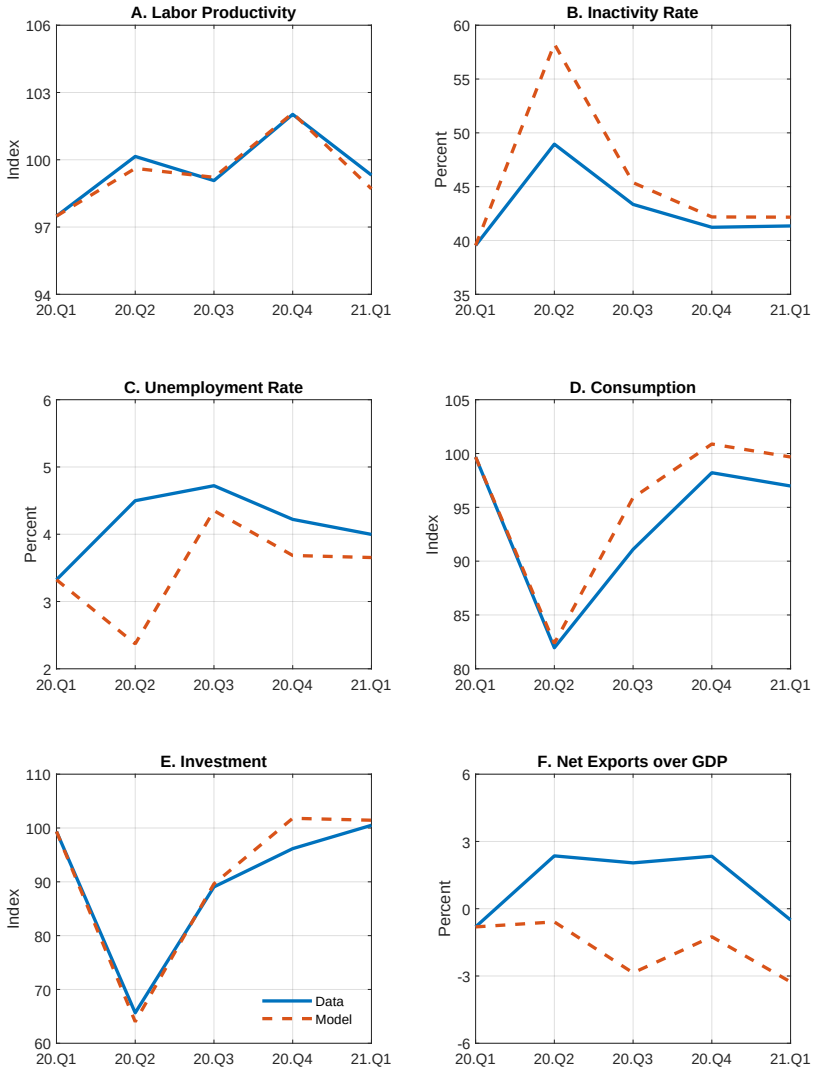
[29] To make the model and the data consistent, we calculate net exports as the residual between GDP and the sum of consumption and investment. Thus, it includes minor categories as change in inventories and statistical discrepancies.

Figure 7: Accounting for the Pandemic Recession

Panel A: Shocks Recovered



Panel B: Other Variables Fit



Notes: All series in the data, except for net exports, are first detrended using the HP-filter with smoothing parameter 1600. The match between model and data for labor productivity (panel B) does not conform to the match shown for GDP and employment rate in panel A because the former depicts HP-filtered series for the ratio between GDP and employment instead of the ratio of the HP-filtered series for GDP and employment. In the model, the initial steady-state corresponds to 2019.Q2.

5.2. Comparing Two Recessions in Mexico

We repeat the same accounting exercise for the Great Recession episode of 2008-9 in Mexico, recovering the four innovations that account for the observed behavior of output, the foreign interest rate, the employment rate, and the informality rate. The resulting shocks are reported in panel A of Figure 8 and compared to the ones obtained for the pandemic (appearing originally in Figure 7). The contribution of each of the four shocks are reported in panel B of Figure 8, both for the Great Recession (averaged across 2008.Q2-2009.Q2) and the slump of 2020.Q2.[30]

The comparison between the two episodes highlights that shocks to labor supply and informality are indeed very specific to the pandemic episode and play a negligible role in previous downturns, epitomized by the Great Recession. In both episodes, negative (aggregate) productivity shocks and interest rate hikes are present and contribute to the drop in output, pushing employment down and informality up.[31] However, only in the pandemic recession do negative labor supply shocks play a prime role in the output and employment contraction and in the fall in the informality rate, the latter effect reinforced by the negative informality shock. In contrast, we do not find a significant contribution of labor supply nor informality shocks in the 2008-9 downturn.

The whole accounting exercise is of course model dependent, and as such the shocks recovered can only be interpreted as wedges between the model's predictions and the data. How informative these wedges are depends on their empirical validation. Although there is more work to be done in this direction, the comparison with past recessions is reassuring in the sense that the "new" shocks do not seem to be capturing just regular business cycle disturbances.

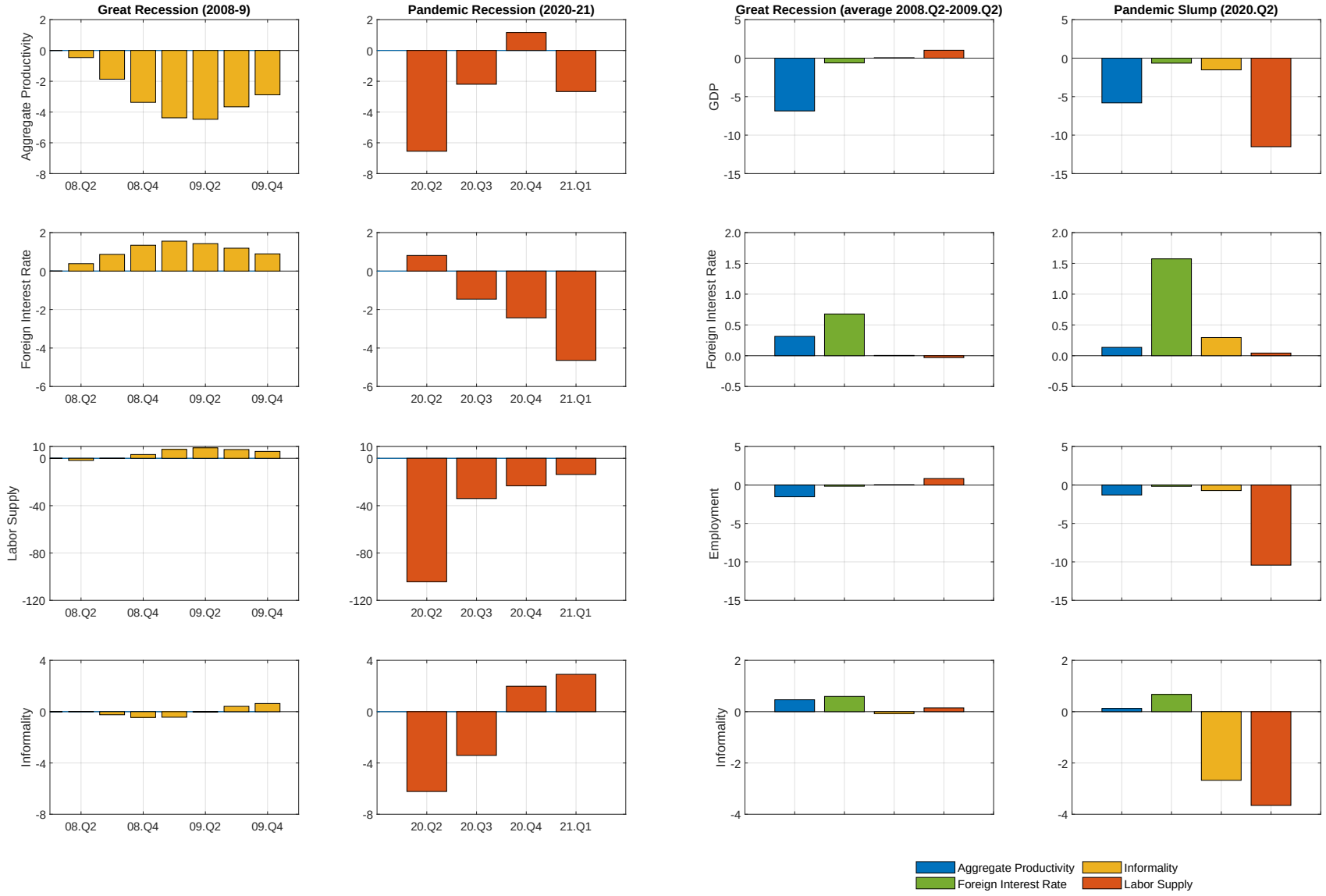
[30] The contribution of a shock (as aggregate productivity) to an endogenous variable (for instance, GDP) is measured as the counterfactual change in the endogenous variable shutting down all the other shocks in the model.

[31] In Leyva and Urrutia (2020a), we discuss how interest rate hikes act as negative shocks to formal employment, which has a long-term component in relation to the more flexible informal alternative. High interest rates reduce the present value of a formal job, disincentivizing hiring in that sector and pushing up the informality rate.

Figure 8: Comparing Shocks Recovered for the Pandemic Recession and the Great Recession of 2008-9

Panel A: Shocks Recovered

Panel B: Contribution of Shocks



5.3. Labor Market Policies for the Recovery

The model also allows us to discuss several policy options to promote a faster recovery, acting on different margins of adjustment in the labor market. We discuss two policies promoting job creation in the formal sector: a reduction in the payroll tax τ and a direct subsidy to hirings s_h, reducing the effective cost $(1-s_h)\eta$ that formal firms pay to post vacancies. We also discuss as a third option an income support for informal workers.[32] The three policies are assumed to last for two years and then revert to their original values, and their fiscal cost is covered by lump-sum taxes. Also, the policies are scaled so that the economy fully closes in one year the gap in employment relative to its pre-pandemic level in 2020.Q1.

Figure 9 compares the recoveries under these three policies to the model with no policy intervention, letting all four shocks identified in Figure 7 to revert to their mean from 2021.Q2 to 2022.Q1 according to their own persistence. Table 4 summarizes the results. Payroll tax cuts and (formal) hiring subsidies have similar qualitative effects, as they operate on the same margin of adjustment. Both policies speed up the recovery of employment and output while at the same time dampening the increase in the informality rate and hence the decline in labor productivity. By the end of the year, they achieve the same full recovery of employment.[33]

However, there are large differences in the size of these policies and hence in their fiscal cost. The tax cut would imply reducing the payroll tax from 25 percent to a bit more than 5 percent, a huge cut entailing a fiscal cost of almost 7.5 percent of GDP each quarter. A hiring subsidy is a significantly more cost-effective policy to achieve the same goals. Even though the required subsidy is half of the vacancy cost, its fiscal cost is only 0.23 percent of GDP (see Table 4). The hiring subsidy directly targets job creation in the formal sector, while the payroll tax also subsidizes currently operating matches, wasting fiscal resources.[34]

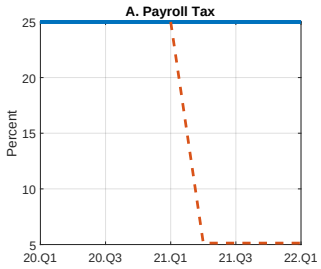
[32] Another policy which has been part of the current debate is the use and extension of unemployment insurance. Our model is not suitable for analyzing this particular policy, since the model does not track the histories of employment (formal or informal) and unemployment spells. Therefore, we cannot condition unemployment benefits to past formal employment.

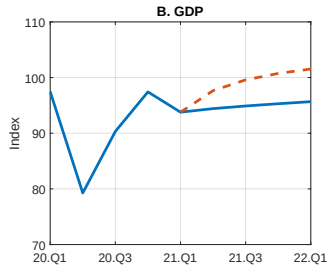
[33] Notice that unemployment, as an intermediate step required for entering into formal employment, also increases with these policies. As formal employment becomes more attractive workers increase their search effort to obtain a formal job. This effect is more pronounced on impact.

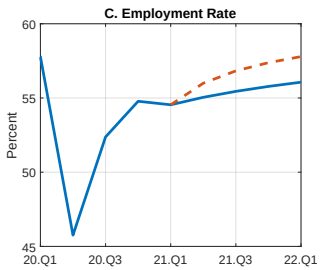
[34] As we mentioned in the presentation of the model, one limitation of the analysis is that formal job destruction is exogenous. Hence, a payroll tax cut does not have an impact on reducing separations. Adding this margin would increase the effectiveness of this policy. An endogenous separation margin would, for instance, be key to contribute to the discussion of either letting ailing firms shut down or helping them in the creation of jobs. For a discussion along these lines, see Blanchard et al. (2020).

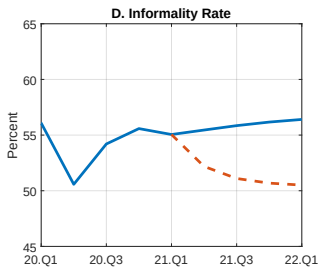
Figure 9: Counterfactual Recovery under Different Labor Market Policies

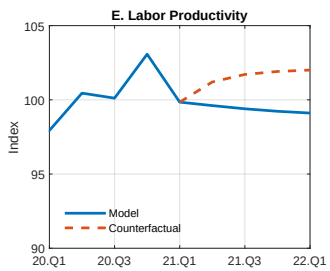
Panel A: Reducing Payroll Taxes



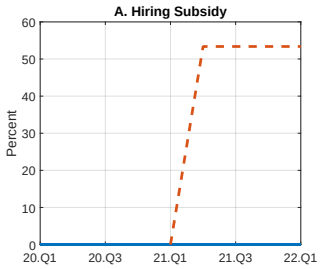


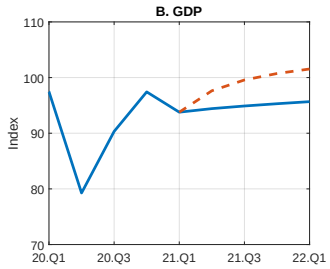


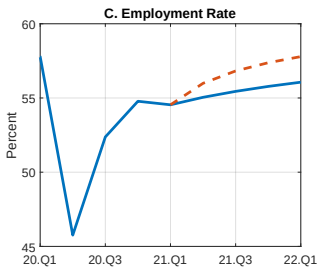


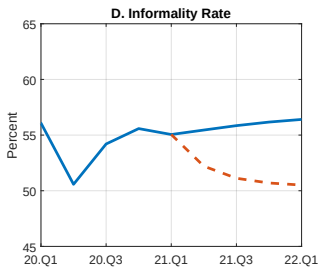


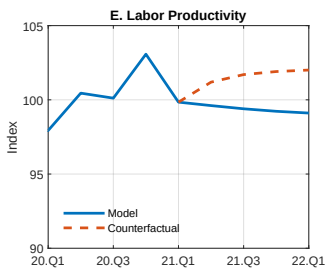
Panel B: Subsidizing Hiring Costs

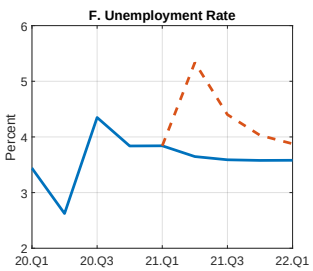




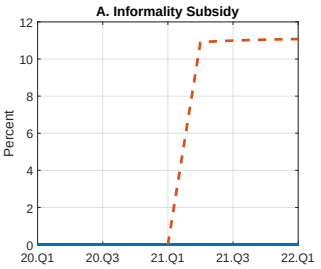


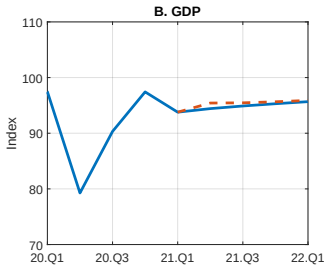


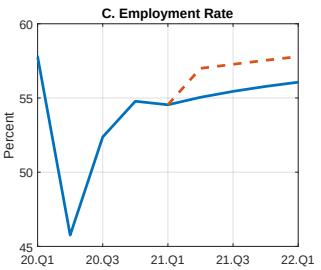


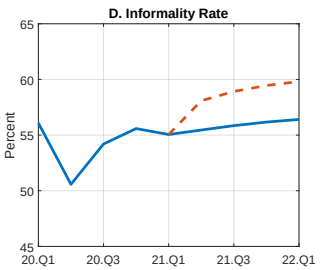


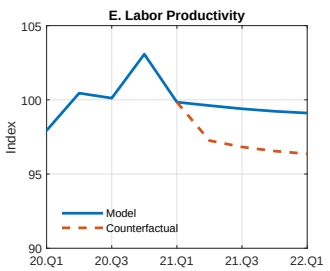
Panel C: Subsidizing Informality











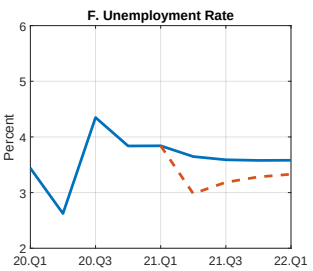


Table 4: Labor Market Policies: Summary Results after One Year

Policy Instrument	Employment Rate	Informality Rate	Unemployment Rate	GDP	Fiscal Cost % GDP	Policy Size
	1	2	3	4	5	6
No Policy Intervention	−1.72	0.33	0.14	−1.84	–	–
Payroll Tax Cut	0.00	−5.57	0.55	4.18	7.49	19.9
Hiring Subsidy	0.00	−5.57	0.44	4.18	0.23	53.4
Informal Income Subsidy	0.00	3.73	−0.10	−1.61	4.13	11.0

Notes: Columns 1, 2, and 3 report for each policy the gap between the final (2022.Q1) labor market rate and the initial rate (2020.Q1) before the start of the pandemic, in percentage points differences. Column 4 reports the resulting GDP growth from 2020.Q1 to 2022.Q1. Column 5 reports the quarterly fiscal cost of each policy, as a percent of GDP. Finally, column 6 reports the size of each policy intervention, corresponding to the the payroll tax cut (in percentage points), the hiring subsidy (as a percent of the vacancy cost), or the informal income subsidy (as a percent of the informal wage).

An informal income support for informal workers, on the other hand, promotes informal employment. It might promote participation in the labor market and boost total employment, but at the cost of a higher informality rate and lower labor productivity. Closing the employment gap requires an informal subsidy of 11 percent (relative to the informal wage). However, given the incidence of informality in emerging economies, the cost of this policy is also quite large, more than 4 percent of GDP.

Some Important Caveats

It is worth recalling that we evaluate all these policies within the context of a highly stylized and aggregated model. The implicit assumption of perfect insurance between all workers (formal, informal, unemployed, and inactive) does not allow us to assess the distributional consequences of the pandemic and the different policy responses. For instance, income support to informal workers could mitigate the negative impact on consumption of the recession for the most vulnerable, hand-to-mouth households. Also, a payroll tax cut can generate further income inequality between formal and informal workers.

These considerations are, of course, of first-order importance in the current debate, but would require a different model, with heterogeneous households and imperfect capital markets.[35] Nevertheless, we believe that in its limited scope our analysis contributes to the dis-

[35] Gregory et al. (2020) use a search and matching model with heterogeneous agents to forecast the shape of the U.S. recovery (either L or V), abstracting from the informality and participation margins. These margins are key for an emerging economy and their role outweighs the importance of unemployment.

cussion by pointing out several margins of adjustment of the labor market with important macroeconomic consequences.

Our analysis also abstracts from issues related to the implementation of each of these policies. While hiring subsidies are the most cost-effective policy in our exercise, we recognize the difficulties in targeting with precision only new jobs. In that sense, broad payroll tax cuts can be easier to implement and monitor. Similarly, even if desirable, subsidizing informal income would represent a formidable administrative challenge for governments in emerging economies.

6. Conclusions

The presence of a large informal sector is an important feature of Latin American labor markets. In contrast to previous recessions, informal employment has been particularly hit at the onset of the pandemic recession. However, the most recent data is already showing a quick rebound of informality, dragging the recovery itself at the same time. The nature of the pandemic and the attendant confinement policies have also highlighted the importance of the participation margin in emerging economies. In the region, in general, we have witnessed an instant outburst in inactivity along with a more stable unemployment rate.

Through the lens of a structural model, we map the consequences of the pandemic into well-understood labor supply and sector-specific productivity shocks. More work needs to be done, though, to shed light on the transmission of the pandemic into these shocks. Our framework suggests that policies targeting directly job creation in the formal sector could be cost-effective options to speed up the recovery in employment and output, mitigating the rebound in the informality rate. Yet the implementation of such policies might be difficult, compared to simpler tax instruments, and its overall cost should be weighed against the fiscal stance of each country. Moreover, inequality concerns might require other stimulus policies targeting the income of the workers most affected by the pandemic.

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Appendix

A. Data Sources for Mexico

Labor market stocks and gross flows: Own calculations based on the ENOE (2005.Q1-2020.Q1), the ETOE (2020.Q2), and the ENOE^{N} (Nueva Edición) thereafter. Gross flows are based on Shimer (2012) and Leyva and Urrutia (2020a). We match respondents in two consecutive quarters following Shimer (2012)'s methodology, using the number of the interview and complementary information on residence, date of birth, and gender. For Mexico, gross flows data in 2020.Q2-Q3 is monthly. Our attempt to transform these flows to a quarterly basis (see Norris, 1997, ch. 2) delivered counterfactual flows in light of the observed labor market stocks. For the ETOE, face-to-face interviews were conducted in June only while for the ENOE (Nueva Edición), these interviews were conducted throughout the quarter. In 2020.Q2-2020.Q3, we restrict the sample to be matched to those who were interviewed by telephone while in 2020.Q3-2020.Q4, we use the sample with face-to-face interviews only. The panel structure used in the calculation of gross flows is depicted in Figure C.1 in this appendix.

Foreign real interest rate: Sum of the Global EMBI for Mexico and the 90-day Treasury Bill rate minus the U.S. GDP annual inflation (2012=100). EMBI is from Banco Central de Reserva del Perú, accessed 12 May 2017 and 7 June 2021, and the other two are from FRED database, accessed 27 July 2021.

Macroeconomic variables: GDP, Consumption (public and private), and Investment (public and private fixed capital formation) taken directly from INEGI. All in 2013 Mexican pesos and accessed 26 July 2021. Net exports is calculated as the difference between GDP and the sum of consumption and investment.

B. Country Notes

Brazil

1. For the calculation of labor market stocks, we have used as a reference and validation the "Indicadores IBGE" quarterly files, various years; see https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=72421 "and Summary Tables," various years; see https://www.ibge.gov.br/en/statistics/social/labor/16809-quarterly-dissemination-pnad2.html?edicao=27711&t=quadro-sintetico.

2. For the calculation of the average unemployment duration, we use 0.5 for all respondents whose duration of unemployment is censored at 1 month (variable labeled V4076 in the data dictionary).

3. Our baseline definition of informal employment is close to Gomes et al. (2020), p. 3. which does not consider the registration of the business (variable labeled V4019 in the data dictionary, available since 2015.Q4). Their definition is conditional to having a Carteira de Trabalho e Previdência Social (CTPS, variable coded V4029 in the data dictionary), which is a document issued by the Brazilian Ministry of

Labor with information on job characteristics, such as compensation, that must be signed by employer and employee (Gomes et al., 2020, p. 3). All public employees and armed forces are classified as formal workers. Employers are excluded from their analysis. We follow Gomes et al. (2020) in using the CTPS to differentiate between formal and informal private workers. As part of informal employment, we also include public employees without CTPS (we identify positive records, 2.5 percent of overall employment in 2012.Q1-2021.Q1), all domestic workers (including auxiliary family workers), and all employers. The CTPS applies to all workers except own-account workers, employers, and auxiliary family workers. Our baseline definition thus considers all own-account workers and employers as informal workers (our interpretation is that Gomes et al., 2020 does the same for own-account workers). The official definition is finer yet shorter than the one used here, including private-sector employees without CTPS, domestic workers without CTPS, employers and own-account workers (both in business not registered in the Cadastro Nacional da Pessoas Jurídicas), and auxiliary family workers. Though the levels are different, both measures of informal employment are comparable in their annual rates of variation after 2015.Q4. In this period, we find that own-account workers in non-registered businesses represents, on average, 79.6 percent of all own-account workers, while the corresponding ratio for employers is 18.5 percent. Own-account workers and employers represent 24.6 and 4.4 percent of overall employment in 2012.Q1-2021.Q1.

4. For the calculation of gross flows, we use as a key the following variables: V1016 (number of interview), UPA, V1008, V1014, V2007, V2008, V20081, V20082, and V2009. PNAD-C follows the scheme 1-(2)5 to track households in consecutive quarters.

5. Absent employees are those with paid job during the reference survey week but temporarily removed (variable labeled V4005 in the data dictionary)

Chile

1. For the calculation of labor market stocks, we have used as a reference and validation the INE's bulletin entitled "Boletín Estadístico: Empleo Trimestral," various years; see `https://www.ine.cl/estadisticas/sociales/mercado-laboral/ocupacion-y-desocupacion` [BOLETINES/PAÍS]. In addition, we have consulted Banco Central de Chile (2018) as a validation for our construction of (mean) unemployment duration.

2. The measurement of informality has been released since the moving quarter of July-August-September 2017.

3. Absent employees are those employed who did not work at least one hour during the reference survey week and either maintain a labor relationship, perceive earnings, or expect to return in four weeks or less (variable labeled a8). There was a methodological change introduced by INE, consistent with the uncertainty of the return date in times of pandemic. This change became effective for the May subsample,

starting with the moving quarter March-April-May 2020. For more details, see INE's Technical Note No. 3 (29 May 2020).

Colombia

1. Microdata files are arranged separately in Areas (13 main cities and metropolitan areas), Cabeceras (urban areas), and Resto (rural areas). National estimates are constructed by combining Cabeceras and Resto files.
2. The employment size of the establishment was not inquired and is therefore not available for Areas and Cabeceras files in March and April 2020. It was inquired for Resto; the rate of variation in informal employment for this sample serves then as a basis for filling the gaps in the series at the national level. We proceed similarly for the series of the average unemployment duration.
3. Informal employment by gender, age, and sector of economic activity in March and April 2020 is calculated based on the rates of variation at the national level, in turn, based on Resto.
4. For the calculation of labor market stocks other than informal employment we have used as a reference and validation DANE's bulletin entitled "Principales indicadores del mercado laboral," various years and their accompanying Excel files (Annexes); see https://www.dane.gov.co/index.php/estadisticas-por-tema/mercado-laboral/empleo-y-desempleo. Also, we have consulted Arango and Ríos (2015) as a validation for our construction of (mean) unemployment duration.
5. Our baseline informality definition is related to the size of the establishment, following DANE and our validation from the accompanying Excel files (Annexes) of the Technical Bulletin entitled "Medición de la economía informal y seguridad social"; see https://www.dane.gov.co/index.php/estadisticas-por-tema/mercado-laboral/empleo-informal-y-seguridad-social. This definition includes private-sector employees and blue-collar workers, family non-remunerated workers, non-remunerated workers in other-family business, domestic workers, day laborers and agricultural/manual laborers, own-account workers, and employers. In all these cases the employed population is restricted to those working in establishments and businesses with less than or equal to five workers. Public-sector employees are excluded. The alternative definition includes those who have no access to health care through social security and do not make pension contributions.
6. Absent employees are those employed (either subordinated or in their own business) who did not work at least one hour during the reference survey week (variable labeled p6260).

Mexico

1. Wage-eaners here differ from wage-earners in Leyva and Urrutia (2020a) in that workers with non-salary perceptions are excluded. Self-employment here differs from self-employment in Leyva and Urrutia (2020a) in that employers are excluded.

2. Temporary layoffs are non-employed (either unemployed or inactive) with a return date in less than four weeks, more than four weeks, or uncertain return. Absent employees are those employed who did not work at least one hour during the reference survey week and either maintain a labor relationship, perceive earnings, or expect to return during the reference week (or are already back). The construction of these two margins is ours. The latter is further inspired by INE's definition of absent employees. We use combinations of variables CLASE2, CLASE3, P1B, P1D, and P1E.

3. INEGI explicitly acknowledges that ETOE is not necessarily comparable to ENOE; see https://www.inegi.org.mx/contenidos/investigacion/etoe/doc/etoe_nota_tecnica_abril_2020.pdf.

4. For the calculation of gross flows, we use N_ENT (number of interview), CD_A, ENT, CON, V_SEL, N_HOG, H_MUD, N_REN, the gender of the respondent, her age, birth and place of date.

Peru

1. The measurement of informality is available in the quarterly files since 2017.

2. For the calculation of labor market stocks, we have used as a reference and validation the INEI's bulletin entitled "Empleo a Nivel Nacional," various years; see https://www.inei.gob.pe/biblioteca-virtual/boletines/empleo-a-nivel-nacional-9721/1/. Our numbers and those displayed in the Annex of these bulletins may not coincide because the latter are subject to revision by the Advisory Commission on Poverty. We have verified that the preliminary numbers (not revised) from these bulletins coincide with ours. We have also validated our labor market stocks by consulting INEI (2018).

3. Absent employees are those employed (either subordinated or in their own business) who did not work during the reference survey week (a combination of variables labeled p501, p502, and p503).

LA-5

1. For Peru, activities were classified using the International Standard Industrial Classification (ISIC), Rev.4. For Chile, activities were classified using the Clasificador de Actividades Económicas Nacional para Encuestas Sociodemográficas (CAENES), an adaptation from the ISIC, Rev.4 (branch of economic activity of the company where the employed person works as opposed to the branch of economic activity of the company that pays the employee). For Colombia, in the period 2015-19, we use the correlation of ISIC, Rev.4 and the ISIC Rev.3, both adapted to Colombia, available at http://microdatos.dane.gov.co/index.php/catalog/661/get_microdata. For Brazil, activities were classified using the Classificação Nacional de Atividades Econômicas Domiciliar Versão 2.0 (CNAE-Dom 2.0), derived from the ISIC, Rev.4. For Mexico, activities were classified using the 2007 North American Industry Classification System (INEGI's household version).

2. Ocupations were classified using adaptations of the International Standard Classification of Occupations (ISCO) or this classification itself. For details, see Leyva and Mora (2021b).

3. The least working-age is as follows: Brazil (14), Chile (15), Colombia (10), Mexico (15), and Peru (14).

4. The definition of informality is fairly homogeneous for Chile, Mexico, and Peru, combining and distinguishing the concepts of informal sector and informal employment (outside the informal sector). Brazil's baseline estimate is close to Gomes et al. (2020), available since 2012.Q1. Brazil's alternative estimate is our construction trying to match the official definition, available since 2015.Q4; see for instance https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/26741-desemprego-cai-para-11-9-na-media-de-2019-informalidade-e-a-maior-em-4-anos. For Peru, our definition follows INEI and differs from alternative measures available elsewhere; see for instance Céspedes and Ramírez-Rondán (2020), where informal workers are identified as those who do not have access to health care and earn less than the minimum wage, using the Encuesta Permanente de Empleo (covering Metropolitan Lima only).

5. The "other" activity category groups utilities and services (including those provided by the government) other than "accommodation and food service" and "arts, entertainment and recreation". In some countries, it may also include a very small number of non-responses.

6. For the calculation of labor market stocks by sector of economic activity, the sample period may vary because of the availability of a consistent classification of activities throughout the baseline sample period. The beginning of the reduced sample period is as follows: Chile (2013.M1 or as part of the January-February-March 2013 moving quarter) and Colombia (2015.M1).

7. In the early pandemic and even by 2021.Q1, surveys in some countries were conducted solely or complementarily by telephone. For methodological changes introduced during the pandemic, we refer the reader to the links provided below to consult the relevant documentation.

8. LA-5: public microdata files are available at the following sites:

    - IBGE (2012-2021): https://www.ibge.gov.br/en/statistics/social/labor/18083-annual-dissemination-pnadc3.html?=&t=downloads [TRIMESTRAL/MICRODADOS]
    - INE (2010-2021): https://www.ine.cl/estadisticas/sociales/mercado-laboral/ocupacion-y-desocupacion [BASES DE DATOS/FORMATO STATA]
    - DANE (2007-2021): http://microdatos.dane.gov.co/index.php/catalog/659/get_microdata (for the YEAR of your interest search for DANE GEIH YEAR on the Internet)
    - INEGI (2005-2021): https://www.inegi.org.mx/programas/enoe/15ymas/#Microdatos (ENOE for 2020.Q1 and before, ETOE for 2020.Q2 and ENOE^{N} (Nueva Edición) thereafter)

- INEI (2011-2021) and INEI (2004-2020): http://iinei.inei.gob.pe/microdatos/index.htm [CONSULTA POR ENCUESTAS/ENAHO METODOLOGÍA ACTUALIZADA/CONDICIONES DE VIDA Y POBREZA-ENAHO/TRIMESTRE FILES] or [CONSULTA POR ENCUESTAS/ENAHO METODOLOGÍA ACTUALIZADA/CONDICIONES DE VIDA Y POBREZA-ENAHO/ANUAL - (ENE-DIC) FILES

C. Additional Tables and Figures

Table C.1: LA-5 Household and Employment Surveys

	Brazil	Chile	Colombia	Mexico	Peru
Survey	PNAD-C	ENE	GEIH	ENOE	ENAHO
Start	2012.Q1	2010.M1	2007.M1	2005.Q1	2011.Q1
End	2021.Q1	2021.M3	2021.M3	2021.Q1	2021.Q1
Length	37 quarters	45 quarters	57 quarters	65 quarters	41 quarters

Notes: PNAD-C is Pesquisa Nacional por Amostra de Domicílios Contínua, ENE is Encuesta Nacional de Empleo, GEIH is Gran Encuesta Integrada de Hogares, ENOE is Encuesta Nacional de Ocupación y Empleo, and ENAHO is Encuesta Nacional de Hogares. ENE data is released as moving quarters. For Mexico, ENOE is for 2020.Q1 and before, ETOE (Encuesta Telefónica de Ocupación y Empleo) for 2020.Q2, and ENOE^{N} (Nueva Edición) thereafter.

Table C.2: Labor Market Stocks in LA-5, 2019.Q2

	Brazil	Chile	Colombia	Mexico	Peru
Employment Rate	54.6	58.1	56.4	58.1	68.6
Informal Employment Rate					
Baseline	28.8	16.1	33.0	32.7	48.0
Alternative	22.5	-	34.7	-	-
Informality Rate					
Baseline	52.7	27.6	58.4	56.3	70.0
Alternative	41.2	-	61.5	-	-
Non-Telework Employment Rate					
DN	43.7	41.9	44.7	45.5	57.2
GGPS	51.5	52.8	52.5	53.8	65.5
LM	47.2	49.6	51.6	52.1	61.5
Telework Share					
DN	20.1	27.9	20.8	21.7	16.5
GGPS	5.7	9.2	6.9	7.3	4.5
LM	13.6	14.7	8.5	10.2	10.3
Unemployment Rate	12.0	7.3	10.5	3.5	3.9
Unemployment Duration (in months)	15.9	6.2	5.3	2.8	1.1
Inactivity Rate	37.9	37.3	36.9	39.8	28.7

Notes: DN stands for Dingel and Neiman (2020), GGPS for Gottlieb et al. (2021), and LM for Leyva and Mora (2021a). For Mexico, LM means Leyva and Mora (2021a) applied to a harmonized occupation variable available since 2005. For Colombia, 2019.Q2 stands for 2019.M5.

Table C.3: Dating of the Pandemic Slump and of Previous Downturns for LA-5

	Brazil	Chile	Colombia	Mexico	Peru
Pandemic Slump					
Baseline Turning Points:					
Peak	2019.Q2	2019.M4-2019.M6	2019.M5	2019.Q2	2019.Q2
Trough	2020.Q2	2020.M4-2020.M6	2020.M5	2020.Q2	2020.Q2
Alternative Turning Points:					
Peak	2019.Q3-2020.Q1	2019.M7-2020.M3	2019.M7-2020.M3	2019.Q3-2020.Q1	2019.Q3-2020.Q1
Trough	2020.Q2	2020.M4-2020.M6	2020.M4-2020.M6	2020.Q2	2020.Q2
Previous Downturns					
Baseline Turning Points:					
Peak	2014.Q1	2016.M1-2016.M3	2008.M1	2008.Q1	2013.Q2
Trough	2016.Q4	2017.M4-2017.M6	2009.M1	2009.Q2	2017.Q2
Alternative Turning Points:					
Peak	2013.Q4-2014.Q1	2015.M7-2016.M3	2007.M5-2008.M1	2009.Q3-2008.Q1	2012.Q4-2013.Q2
Trough	2016.Q4	2017.M4-2017.M6	2008.M12-2009.M2	2009.Q2	2017.Q2

Notes: Our dating of the previous downturns follows, for Brazil, https://portalibre.fgv.br/sites/default/files/2020-06/brazilian-economic-cycle-dating-committee-announcement-on-06_29_2020-1.pdf, for Chile, Banco Central de Chile (2020), p. 47, Gráfico V.4, for Colombia, Alfonso et al. (2013) and Arango et al. (2015), for Mexico, Leyva and Urrutia (2020a), and, for Peru, Banco Central de Reserva del Perú (2020), p. 68, Gráfico 49. Quarters and months are denoted by Q and M.

Table C.4: Change in Labor Market Stocks during the Pandemic Slump in LA-5 (in Percentage Points)

	year-to-year value of change raw	year-to-year value of change detrended	year-to-year value of change HP detrended	value of the absolute difference raw	value of the absolute difference detrended	value of the absolute difference HP detrended
Brazil						
employment to population ratio	−6.7	−5.2	−5.3	−6.5	−5.8	−5.5
informality rate	−2.4	−3.1	−2.8	−2.5	−2.9	−2.0
informal employment	−4.7	−4.3	−4.2	−4.7	−4.5	−3.9
unemployment rate	1.3	0.5	0.6	1.7	1.3	2.1
unemployment duration (months)	−3.0	−3.6	−3.3	−2.2	−2.5	−1.4
inactivity rate	6.8	5.6	5.6	6.4	5.7	4.9
Chile						
employment to population ratio	−12.6	−10.7	−8.9	−12.7	−11.7	−8.8
informality rate	−5.3	−4.3	−4.3	−6.0	−5.4	−4.3
informal employment	−5.9	−4.2	−4.3	−6.3	−5.4	−4.5
unemployment rate	5.0	3.8	3.4	4.8	4.2	3.4
unemployment duration (months)	−0.5	−1.1	−1.0	−1.6	−1.9	−1.3
inactivity rate	10.8	9.4	7.8	11.0	10.3	7.6
Colombia						
employment to population ratio	−13.0	−11.3	−9.8	−12.3	−11.3	−7.3
informality rate	−1.7	−1.3	−1.9	0.7	0.9	0.4
informal employment	−8.3	−7.0	−6.6	−7.0	−6.3	−4.1
unemployment rate	10.8	9.8	8.2	9.4	8.9	5.8
unemployment duration (months)	−1.0	−1.1	−1.2	−1.3	−1.3	−1.0
inactivity rate	7.9	6.6	6.1	7.9	7.3	4.5
Mexico						
employment to population ratio	−11.1	−10.8	−10.1	−11.1	−11.0	−7.6
informality rate	−5.5	−4.7	−4.8	−5.4	−5.0	−3.3
informal employment	−8.8	−8.2	−7.9	−8.8	−8.5	−5.8
unemployment rate	1.2	1.6	1.1	1.3	1.4	0.9
unemployment duration (months)	−1.2	−1.2	−1.3	−0.7	−0.7	−0.2
inactivity rate	10.8	10.3	9.9	10.9	10.6	7.4
Peru						
employment to population ratio	−27.2	−25.2	−24.9	−27.5	−26.4	−17.2
informality rate	2.9	1.3	1.9	1.4	0.5	1.3
informal employment	−17.9	−15.9	−16.4	−19.1	−18.0	−11.9
unemployment rate	4.9	4.0	4.1	4.6	4.2	3.6
unemployment duration (months)	0.0	−0.1	−0.1	0.0	0.0	0.0
inactivity rate	26.0	24.5	24.2	26.5	25.7	16.1

Notes: Year-to-year is the yearly change in the stocks during the pandemic recession, using the baseline turning points (Table C.3). The first column corresponds to the numbers reported in Figure 4, panel A. Absolute difference is the difference between trough and peak (alternative turning points) to the average of these two periods. Detrended means controlling for a quadratic polynomial. HP means Hodrick-Prescott-filtered, with the appropriate smoothing parameters according to the frequency of the data. Trends are calculated with data up to 2021.Q1.

Table C.5: Change in Labor Market Stocks during the Pandemic Slump in LA-5 (in Percentage Change)

	year-to-year relative change raw	year-to-year relative change detrended	year-to-year relative change HP detrended	ratio of difference to average raw	ratio of difference to average detrended	ratio of difference to average HP detrended
Brazil						
employment to population ratio	−12.3	−9.1	−10.2	−12.8	−10.6	−10.7
informality rate	−4.6	−6.1	−5.4	−4.9	−5.8	−3.8
informal employment	−16.3	−14.7	−15.5	−17.6	−16.4	−14.4
unemployment rate	10.6	5.1	4.7	13.2	13.4	16.0
unemployment duration	−19.2	−22.5	−22.0	−15.9	−18.5	−9.4
inactivity rate	18.0	15.1	13.9	15.3	14.4	12.1
Chile						
employment to population ratio	−21.6	−17.9	−16.7	−24.4	−21.3	−16.3
informality rate	−19.1	−15.6	−16.2	−23.6	−21.0	−16.2
informal employment	−36.6	−27.0	−30.9	−47.3	−38.3	−31.8
unemployment rate	68.9	62.2	37.1	49.0	53.3	36.9
unemployment duration	−8.4	−19.5	−13.9	−24.8	−34.9	−19.2
inactivity rate	28.8	25.9	18.9	25.8	25.3	18.7
Colombia						
employment to population ratio	−23.1	−19.6	−18.7	−24.6	−21.8	−13.7
informality rate	−2.9	−2.1	−3.2	1.2	1.5	0.6
informal employment	−25.3	−20.4	−21.0	−23.5	−19.6	−13.2
unemployment rate	102.9	103.9	59.3	60.4	64.7	43.6
unemployment duration	−19.4	−21.2	−23.0	−26.2	−27.8	−20.0
inactivity rate	21.3	18.0	15.5	19.3	18.2	11.7
Mexico						
employment to population ratio	−19.1	−18.3	−18.3	−21.2	−20.4	−13.7
informality rate	−9.7	−8.1	−8.6	−10.1	−9.0	−5.9
informal employment	−26.8	−23.9	−25.6	−31.0	−27.9	−18.8
unemployment rate	35.3	38.9	27.4	30.5	29.4	23.1
unemployment duration	−42.9	−45.0	−52.4	−35.7	−38.2	−8.5
inactivity rate	27.2	26.7	23.5	24.0	24.3	17.5
Peru						
employment to population ratio	−39.7	−35.3	−39.1	−49.9	−44.5	−26.9
informality rate	4.1	1.8	2.7	2.0	0.7	1.8
informal employment	−37.2	−33.3	−35.7	−48.0	−44.0	−25.8
unemployment rate	127.3	140.3	69.3	71.3	86.2	61.9
unemployment duration	−4.2	−6.7	−5.6	−0.8	−1.9	3.4
inactivity rate	90.7	93.0	75.0	64.0	67.8	50.1

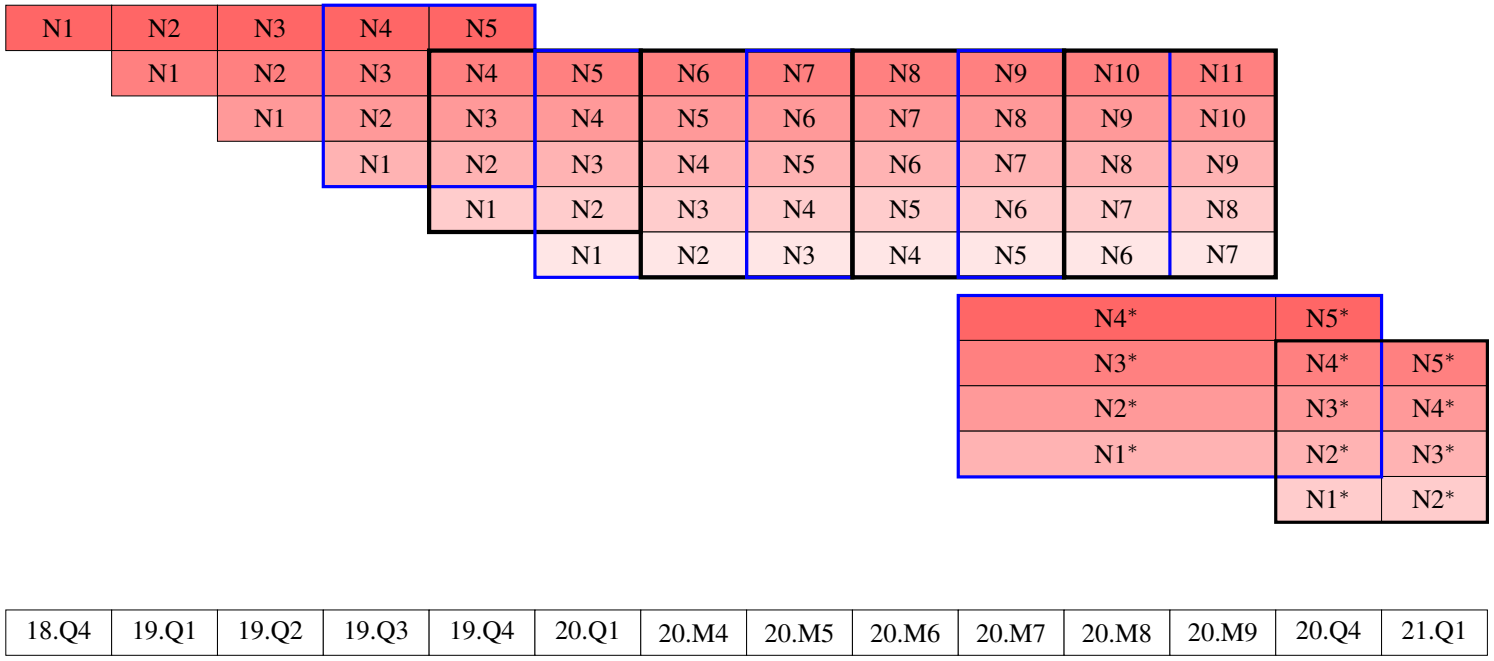
Notes: Year-to-year is the yearly change in the stocks during the pandemic recession, using the baseline turning points (Table C.3). The first column corresponds to the numbers reported in Figure 4, panel B. Difference to average ratio is the ratio of the difference between trough and peak (alternative turning points) to the average of these two periods. Detrended means controlling for a quadratic polynomial. HP means Hodrick-Prescott-filtered, with the appropriate smoothing parameters according to the frequency of the data. Trends are calculated with data up to 2021.Q4.

Table C.6: Two Non-Conventional Margins in the Pandemic Recession in LA-5, in Percentage Points

Country	Downturn/ Recession	Overall Employment Rate			Informal Employment Rate			Formal Employment Rate		
		1	2	3	1	2	3	1	2	3
Brazil	2014.Q1/2016.Q4	−2.7	-	−2.5	−0.3	-	−0.1	−2.4	-	−2.3
	2019.Q2/2020.Q2	−6.7	-	−13.4	−4.7	-	−8.2	−2.0	-	−5.2
	2019.Q2/2021.Q1	−6.2	-	−6.7	−3.4	-	−3.6	−2.8	-	−3.1
Chile	2016.Q1/2017.Q2	−0.1	-	4.0	-	-	-	-	-	-
	2019.Q2/2020.Q2	−12.6	-	−17.6	−5.9	-	−6.6	−6.7	-	−11.1
	2019.Q2/2021.Q1	−6.7	-	−10.3	−2.3	-	−2.5	−4.4	-	−7.8
Colombia	2008.M1/2009.M1	0.2	-	0.0	1.5	-	1.6	−1.3	-	−1.6
	2019.M5/2020.M5	−13.0	-	−19.5	−8.3		−12.6	−4.7	-	−6.9
	2019.M5/2021.M2	−4.6	-	−4.4	−2.0	-	−2.0	−2.6	-	−2.4
Mexico	2008.Q1/2009.Q2	−1.3	−1.4	−1.3	0.3	0.1	0.2	−1.6	−1.6	−1.5
	2019.Q2/2020.Q2	−11.1	−4.3	−16.7	−8.8	−2.1	−10.0	−2.3	−2.2	−6.6
	2019.Q2/2021.Q1	−3.4	−2.9	−4.0	−2.6	−2.1	−2.6	−0.8	−0.7	−1.4
Peru	2013.Q2/2017.Q2	−1.7	-	−1.5	-	-	-	-	-	-
	2019.Q2/2020.Q2	−27.2	-	−29.3	−17.9	-	−18.6	−9.4	-	−10.6
	2019.Q2/2021.Q1	−3.8	-	−5.0	1.1	-	1.0	−5.0	-	−5.9

Notes: Number of columns follow the order of rows in panel A of Table 1. For Chile, the rise of the margin in column 3 during the pandemic recession could be associated with the Employment Protection Law, enacted in April 2020. Its surge during the previous downturn responds to seasonal factors in the number of absent employees. A program providing financial help to formal workers was enacted in Colombia in June 2020 (Decree 770), targeting workers on unpaid leave or under "licencia no remunerada" at any time during April-June 2020.

Figure C.1: Panel Structure in ENOE, ETOE, and ENOE^{N}



Notes: Each row represents a sample of households entering the survey for the first time (first interview, N1) in 2018.Q4-2021.Q1. The sample used to calculate gross flows in two consecutive quarters amounts in principle to 80% of the sample in a given quarter. For example, to calculate gross flows from 2019.Q4 to 2020.Q1, the sample comprises all individuals surveyed in 2019.Q4 except those who are in their fifth interview (N5) plus all individuals surveyed in 2020.Q1 except those who are entering the survey for the first time (see black square). This design has been part of the ENOE survey since 2005.Q1 up to 2020.Q1 based exclusively on face-to-face interviews. In 2020.Q2, the ENOE was conducted by telephone (relabeled as ETOE) except for part of the June sample conducted face-to-face. The design of the ETOE (telephone version of the ENOE) allows tracking households in two consecutive months. We use all ETOE samples except households whose first (face-to-face) interview N1 was in June (not shown). The ENOE^{N} (Nueva Edición) conducted since 2020.Q3 is a combination of face-to-face (denoted by an asterisk symbol in the figure) and telephone interviews. We use the latter only for monthly flows calculated from 2020.M6 through 2020.M9. By contrast, from 2020.Q3 through 2021.Q1, we use face-to-face interviews only.