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

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Abstract

We document the stance of labor markets of five Latin American countries at the onset of the COVID-19 pandemic, with special 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. This last observation is unprecedented since informality used to cushion the decline in overall employment in previous recessions. Through the lens of a structural business cycle model with a rich labor market structure, we recover the shocks that rationalize the pandemic recession and find that labor supply shocks and sector-specific productivity shocks to the informal sector are key to account simultaneously for the employment and output loss and for the drop in the informality rate. Finally, we simulate several recovery scenarios under alternative policy responses. Within the context of the model, policies aiming at job creation in the formal sector have the largest impact on employment while mitigating the rebound of the informality rate and its negative impact on labor productivity.

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1. Introduction

The COVID-19 outbreak of early 2020 has triggered a true global crisis with already profound and yet uncertain economic consequences. Policymakers around the world have 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, 2020) may already be characterized as an event that has witnessed a massive job loss, a sudden and unprecedented withdrawal from the labor force, and spells of joblessness of especially uncertain duration.

Needless to say, the so-called pandemic recession 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 dissimilar recoveries across countries. The Latin American region is a case in point. A unique feature that has remained entrenched across the region claims a decisive role across all three themes: informality.

Since informal employment is an enticing option for many to compensate for the loss of earnings, it imposes additional problems of compliance in the management of the pandemic crisis (Loayza, 2020).[1] Also, informal employment, owing to its frictionless nature, could be expected to lead the recovery in labor markets (Leyva and Urrutia, 2020), though potentially slowing down the recovery in output due to its lower productivity. Finally, precisely because informality acts outside the scope of the government, stimulus policies in the form of credits, subsidies, and transfers are expected to miss the targeted beneficiaries. Thus, informality pervades the functioning of labor markets, posing additional challenges for the management of the pandemic and the economy in Latin America.

In the first part of the paper, we exploit our own constructed database of labor market stocks and gross flows for five Latin American countries, comprising Brazil, Chile, Colombia, Mexico, and Peru (LA-5, for short, following IMF, 2020) relying on household and employment surveys publicly available. We start by focusing on the two largest economies in the region, Mexico and Brazil, and documenting the following stylized facts for the pandemic recession, by comparing 2020.Q2 with the same quarter of 2019: (1) an unprecedented decline in employment rates, mirrored by much lower participation rates; (2) slight increase in unemployment rates, coupled with an instant decline in the mean of unemployment duration; (3) falling informality rates; and (4) less job creation from

[1] 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.

inactivity and to the informal sector; and (5) more job destruction to inactivity and from the informal sector. While (4) is more important than (5) in Brazil, the opposite is true for Mexico. The most recent data available for 2020.Q3 show a rapid recovery of employment, accompanied by a rebound in the informality rate and a surge in unemployment.

Comparing these facts to previous recession episodes, the global financial crisis of 2008-9 for Mexico and the 2014-16 recession for Brazil, we observe in the outgoing pandemic recession several differences, mainly the magnitude of the collapse in employment and the response of the informality rate, which in past recessions used to act countercyclically (see Leyva and Urrutia (2020) for the case of Mexico) but in the current episode felt significantly on impact. Although it is still early to confirm, the initial rebound seems to be also quicker and larger than in past recessions. This might be partly explained by two novel margins that we document; the response of temporary layoffs and absent employees. Both witnessed an unprecedented increase in 2020.Q2, rapidly shrinking in the next quarter.[2]

We then extend some of these results to the whole set of LA-5 countries and in general confirm findings (1) to (3), with some minor exceptions. We also decompose the employment and informality rates in each country by sector, gender, and age, noticing how the burden of the pandemic recession has fallen disproportionally on services (in particular, those classified as contact-intensive), women and young workers. However, findings in the aggregate are not just driven by composition effects, as we also observe declines in employment and informality for males and older workers, and in other sectors as well.

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 (2020). The model features many of the important margins discussed above, including an endogenous participation in the labor market decision and an informal sector modeled as self-employment. We calibrate the model using Mexican data for the period 2005-19, preceding the COVID-19 outbreak, and use it to recover the shocks that rationalize the pandemic recession. Following Leyva and Urrutia (2020), we consider aggregate productivity and foreign interest rate shocks as the sources of fluctuations in the calibration period. We add two new

[2] The increase in temporary layoffs, comprising non-employed individuals expecting to be recalled in the near future, at the onset of the pandemic has been emphasized by Kudlyak and Wolcott (2020), Hall and Kudlyak (2020) and Buera et al. (2020) as a signal of rapid employment recovery in the U.S. The second margin, absent employees, includes individuals employed but not currently working; its initial increase may conceal an even greater decline in employment.

disturbances during the pandemic recession, a sector-specific shock affecting the productivity of informal workers and a shock to labor supply through the disutility of work. In the accounting exercise, we find that these two new shocks are key to reproduce simultaneously the initial employment and output loss *and* the drop in the informality rate.[3]

We also simulate the model for the recovery period after 2020.Q3, assuming that shocks revert to their mean. The model predicts a slow recovery led by the more flexible informal sector. This implies a decline in labor productivity for most of the period, dragging the recovery of output.[4]

This grim scenario begs for policy responses. We evaluate first two policy instruments aimed at increasing 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 the recovery of formal employment and output, reducing the informality rate and increasing labor productivity.

Finally, we evaluate two other policies that are part of the current debate, unemployment benefits and subsidies to informal workers. Unemployment benefits only affect the unemployment rate, prompting people out of the labor force and informal workers to search for formal jobs; however, without a strong demand for labor, the impact on employment and output is negligible. An informal income subsidy could potentially increase employment at the cost of a higher informality rate, but its fiscal cost is also too large given that informality pervades labor markets in emerging economies.

Related Literature

There is a vast and growing literature on the economic impact of the pandemic. Our contribution is threefold. On the empirical side, we document for five Latin American countries the evolution of labor market indicators and gross flows, complementing the analysis in Coibion et al. (2020) and Elsby et al. (2010) for the U.S. labor market, with special emphasis on informality. To the best of our knowledge, there is not a comparable data analysis to ours for Latin America,

[3] Our approach is close in spirit to the business cycle accounting methodology introduced by Chari et al. (2007). Instead of modeling the pandemic as a new shock, for which we have very little knowledge, we map its consequences into different well-studied shocks to assess the multiple channels by which it affects the labor market.

[4] It is important to acknowledge the limits of our analysis. The economic shocks that we identify appeared as a consequence of an initial heath shock and the policies aiming at procuring social distancing and the containment of contagions. Consequently, the duration of the partially voluntary quarantine and the speed of the subsequent recovery will be bound by medical possibilities and constraints (including the availability of vaccines).

encompassing so many countries and dimensions.[5]

The use of the model to recover the shocks relevant for the pandemic is another contribution. In that, we relate to Brinca et al. (2020), who also take these disturbances as exogenous and use a different methodology based on vector autoregressive techniques to disentangle labor supply and demand shocks in the U.S. data for the onset of the recession.[6] An alternative approach widely adopted is the use of a SIR epidemiology model, as introduced to the COVID-19 literature by Atkeson et al. (2020) and Eichenbaum et al. (2020), to provide more structure into the pandemic itself, modeled initially as a pure health shock. This alternative approach has some advantages, mainly the possibility of predicting the future path of the pandemic and analyzing the feedback from policies.[7] In that sense, it is a sensible choice to study confinement policies, as in Kaplan et al. (2020), Acemoglu et al. (2020) and Garriga et al. (2020). However, there are some challenges in disciplining the parameters of SIR models, as pointed out in Chang and Velasco (2020). Since our final objective is to evaluate the impact on the recovery of different labor market policies (as opposed to confinement policies), we prefer the simpler and perhaps cleaner approach of taking as given the future path of the shocks, being aware of its limitations.

Finally, we contribute to the literature on the fiscal responses to the COVID-19 crisis, in particular focusing on labor market policies. Birinci et al. (2020) and Faria e Castro (2020) use structural models to analyze the impact of unemployment benefits in the U.S., targeting workers most affected by the pandemic. For Latin American countries as a whole, the recession had a minor effect on unemployment and caused instead a large drop in labor participation, in particular for formerly informal workers (see Alon et al. (2020b) for a discussion of policies aimed broadly at developing — and informal — economies). Therefore, a wider range of policies needs to be considered within a limited budget, as highlighted by Busso et al. (2020). We use our model to evaluate several labor market policy responses, including unemployment benefits, in an economy where labor participation and informality margins matter. Our results complement the analysis in

[5] We complement the data analysis in IMF (2020), focused in the same set of Latin American countries, in several dimensions: working with a broader notion of informal employment, adding gross flows, looking at two non-conventional margins, and comparing the pandemic recession to past episodes. We also add to the IADB's COVID-19 Labor Market Observatory (`https://observatoriolaboral.iadb.org/en/`) by providing national estimates for Peru (not only for Metropolitan Lima) and a broader notion of informality than the one based on access to health-care through social security.

[6] Though these two shocks may interact in complex ways. Guerrieri et al. (2020) show how supply shocks could naturally lead to changes in aggregate demand in economies with multiple sectors and hand-to-mouth consumers.

[7] This approach has also been used by two recent papers, Álvarez et al. (2021) and Hevia and Neumeyer (2021), looking at the impact of the pandemic in emerging economies.

Alfaro et al. (2020), also highlighting the importance of supporting formal jobs based on a model of firm dynamics calibrated for Colombia.[8]

The paper is organized as follows. Section 2 documents the adjustment of the labor market in two countries, Mexico and Brazil, and compares it to past recession episodes. The empirical analysis is extended in Section 3 to a larger set of Latin American countries. In Section 4, we present the model and calibrate it to Mexican data. The accounting exercise for the pandemic episode is performed in Section 5, 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 two experiences. We choose Mexico and Brazil for several reasons. First, these are the largest countries in the LA-5 region, in both population and GDP. Second, household surveys in both countries compare favorably in size, frequency (quarterly), and even the semi-panel structure that allows tracking households in five consecutive quarters. Finally, these are two contrasting cases for the economic outlook in 2020, Mexico expected to decline by 9.0 percent and Brazil by 5.8 percent (IMF, 2020).[9]

2.1. Labor Market Stocks

Based on national representative household surveys we construct the following labor market stocks, based on official definitions: employment over population, inactivity over population, and unemployment over labor force. Key for Latin American labor markets is the measurement of informality, distinguishing between formal and informal employment and focusing on the share of informal workers in overall employment, the so-called informality rate.[10]

In Figure 1, we track the dynamics of these labor market stocks around two recessions. Common to the two countries is the pandemic recession, starting in 2020.Q2.[11] To put this global recession

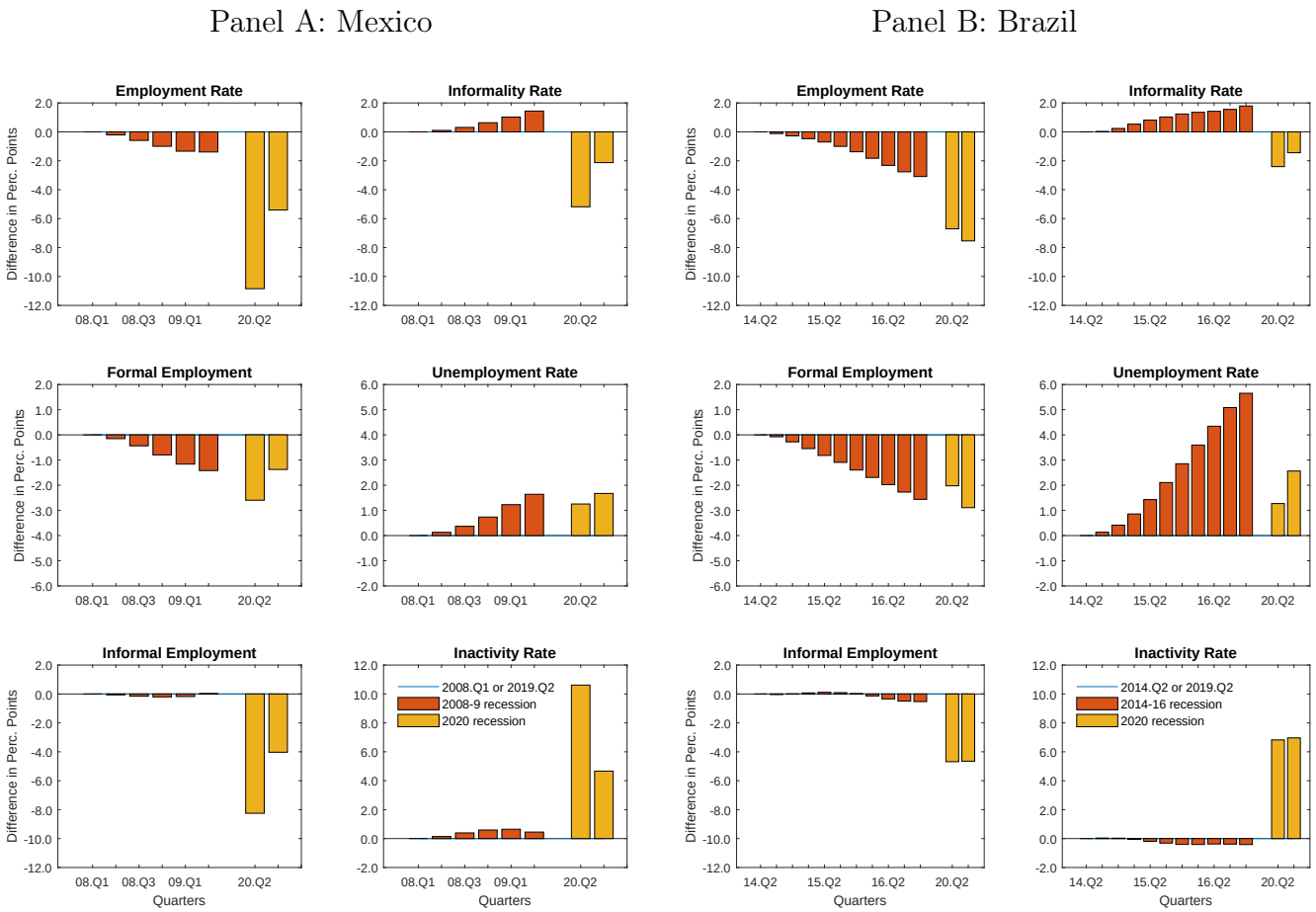
[8] CEPAL (2020) keeps track of the policies undertaken by each country in the region.

[9] The revised IMF estimates by January 2021 are 8.5 and 4.5, respectively (IMF, 2021), p. 4.

[10] Population is the working-age population and informality is a broad definition encompassing both the lack of access to health-care through social security and self-employment either characterized by the size of the establishment or the registration of the business. See the country notes in the appendix.

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

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



Notes: Own calculations based on the ENOE/ETOE/ENOE^{N} and the PNAD-C using appropriate survey weights. For details on the baseline turning points of the pandemic recession and previous downturns, see Table C.2 in the appendix. For Brazil, informality follows our baseline definition, close to Gomes et al. (2020). See country notes in the appendix. Series were smoothing out using centered moving averages, except for the pandemic.

in perspective we look at both labor markets through the lens of an alternative recession. For Mexico, this recession is the global financial crisis, dated from 2008.Q1 to 2009.Q2 (Leyva and Urrutia, 2020) and for Brazil, we choose the 2014.Q2-2016.Q4 period, following CODACE.[12]

The sudden collapse in employment is evident for both countries. In Mexico (Figure 1, panel A), the 11 points plunge in overall employment, relative to 2019.Q2, exceeded by far the cumulative employment losses registered during the global financial crisis. The division between formal and informal employment reveals some differences concerning the previous recession. While it is true that the instant decline in formal employment during the pandemic was as severe as the 2008-9

[12]See Bonelli, R. and F. Veloso (Eds.) (2016) for a discussion around the origins of this episode. See also CODACE https://portalibre.fgv.br/en/codace.

recession in its full length, clearly the pandemic recession took its toll in the form of unprecedented *informal* employment losses. We show, as in Leyva and Urrutia (2020), that informal employment did not act as a buffer during 2008-9. Instead, it slipped before giving way to a swift recovery.[13]

This time was indeed different. The contrast could be better appreciated by the dynamics of the informality rate. In past recessions, going back to the Tequila crisis of 1994-95, the informality rate used to move in a countercyclical fashion, reflecting an instant fall in formal employment and a recovery led by informal employment (Leyva and Urrutia, 2020). This time, the informality rate plummeted by 5 points of overall employment.

The global financial crisis witnessed a sort of duality in the Mexican labor market that the pandemic recession appears to have broken. The dynamics of formal and informal employment corresponded almost one-to-one with the dynamics of the unemployment rate and the inactivity rate (scales in Figure 1 are row-wise comparable). By contrast, in 2020.Q2 the burden of the adjustment fell disproportionally over the inactivity rate, as a natural consequence of the lockdown.

In Brazil (Figure 1, panel B), the fall in overall employment in 2020.Q2, half as severe as in Mexico, represented losses aggregated over the first 6 quarters of the protracted downturn of 2014-16. As in Mexico, the composition of employment during the pandemic mattered, with informal employment driving the bulk of the decline in overall employment and the surge in the informality rate (2 points). Also, similar to Mexico, the informality rate went from being countercyclical in 2014-16 to fall along with the pandemic recession.

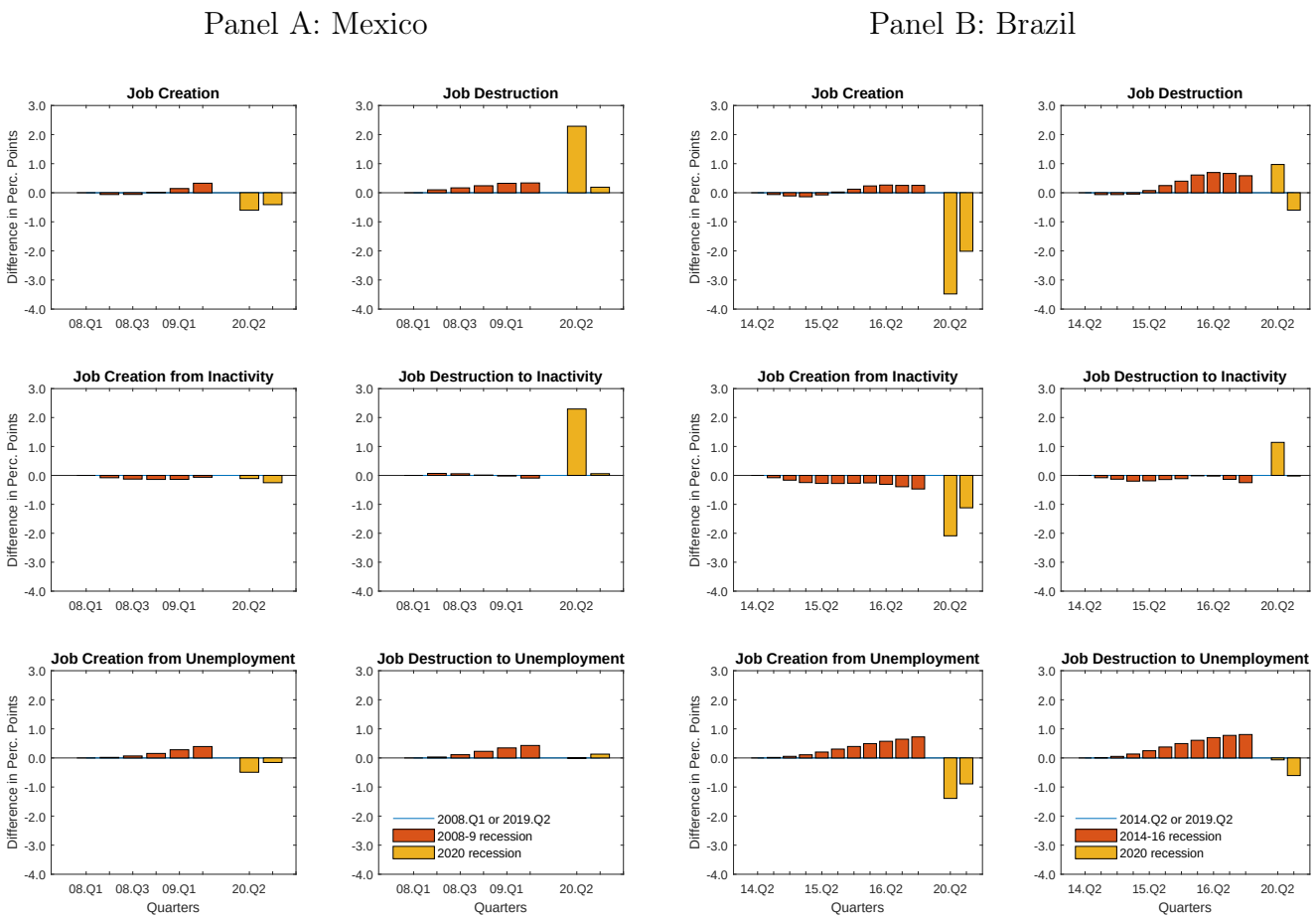
The two non-employment margins tell a different story for Brazil. While in Mexico, the response to the global financial crisis was marked by a continuous withdrawal from the labor force, in Brazil, the incipient increase in the inactivity rate quickly reverted course two quarters later. The flip side of this behavior was the continuous increasing trend observed in unemployment, measured over labor force.[14] More recently, however, as in Mexico, the adjustment seems to have tilted towards inactivity rather than unemployment.

Although the pandemic has triggered a global crisis and the instant response of the economy has been fairly homogeneous across countries (though certainly not in magnitude), the ongoing recovery is already exposing differences in the stance of labor markets. In Brazil, we see a timid

[13] 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 sectoral reallocation hypothesis.

[14] This may in part reflect the prevalence of unemployment insurance in Brazil. For a description of this program, see Gerard and Gonzaga (2018).

Figure 2: Mexico and Brazil: Job Creation and Destruction by Outcomes

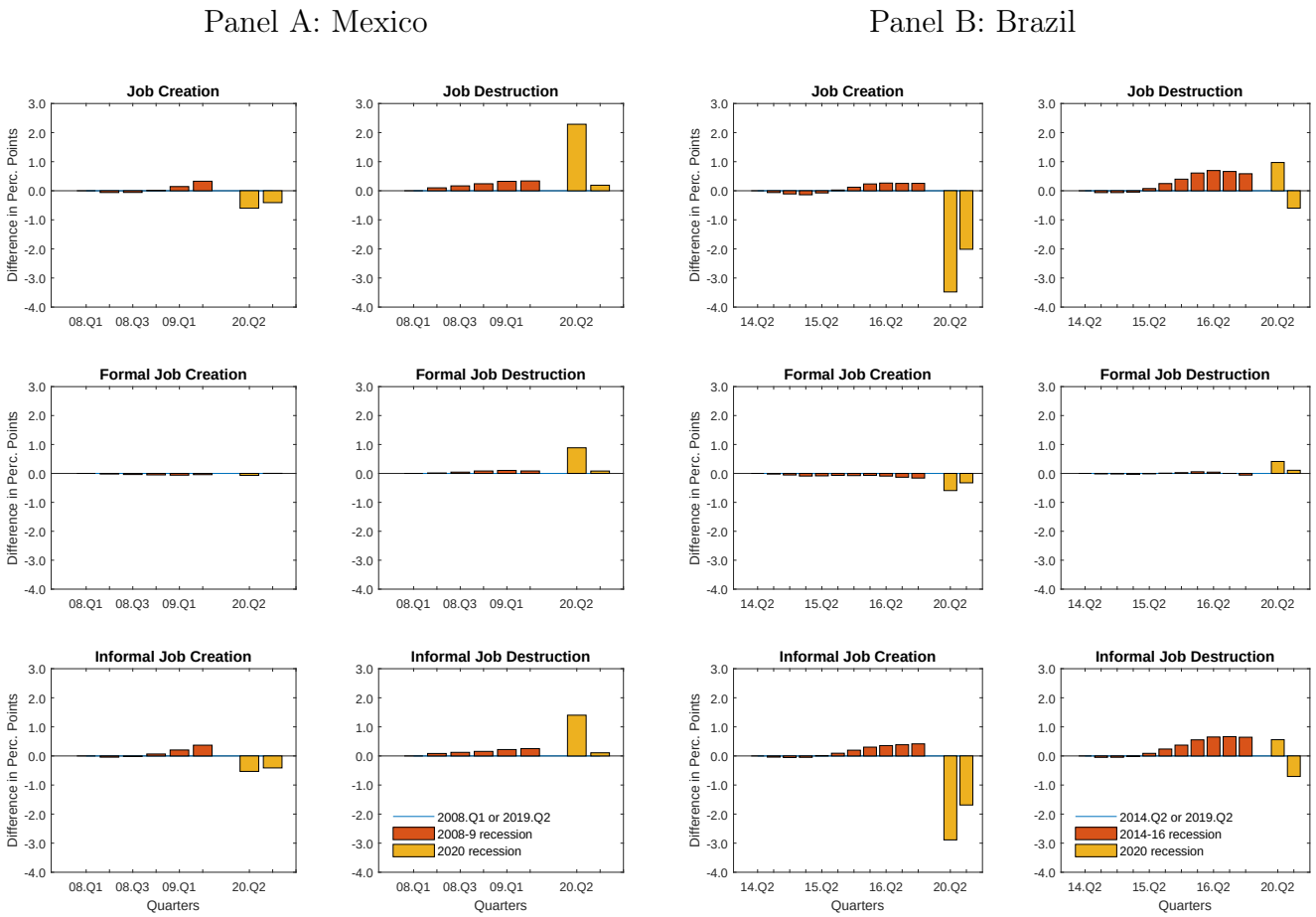


Notes: Own calculations based on the ENOE/ETOE/ENOE^{N} and the PNAD-C using appropriate survey weights. Flows are expressed in percentage of the working-age population. For details on the baseline turning points of the pandemic recession and previous downturns, see Table C.2 in the appendix. For Brazil, informality follows our baseline definition, close to Gomes et al. (2020). See country notes in the appendix. Series were smoothing out using centered moving averages, except for the pandemic. Gross flows for Mexico in 2020.Q2 and 2020.Q3 is the average of monthly flows based on telephone survey responses only. For 2020.Q3 we use the monthly survey weights.

recovery in informal employment and a persistent fall in formal employment, both contributing to a continuing decline in overall employment and a reversal in the informal rate. This latter outcome is shared by Mexico, too; however, the sources are different. We see both informal and formal employment bouncing back (the former at a quicker pace) and accounting for the recovery in overall employment.

Also, notice that the rising unemployment rate in both countries by 2020.Q3 reflects two different phases of the business cycle. In Mexico, the pace of the unemployment rate seems to be accompanying the recovery as confinement policies have been relaxed and people have (re-)entered

Figure 3: Mexico and Brazil: Job Creation and Destruction by Sources



Notes: Own calculations based on the ENOE/ETOE/ENOE^{N} and the PNAD-C using appropriate survey weights. Flows are expressed in percentage of the working-age population. For details on the baseline turning points of the pandemic recession and previous downturns, see Table C.2 in the appendix. For Brazil, informality follows our baseline definition, close to Gomes et al. (2020). See country notes in the appendix. Series were smoothing out using centered moving averages, except for the pandemic. Gross flows for Mexico in 2020.Q2 and 2020.Q3 is the average of monthly flows based on telephone survey responses only. For 2020.Q3 we use the monthly survey weights.

the labor force to search for jobs. By contrast, in Brazil, the rising unemployment rate is now fully a result of the decline in overall employment, with the labor force barely changing.

2.2. Labor Market Gross Flows

We now take advantage of the panel structure of the two household surveys to construct gross flows among the main labor market categories: employment (formal and informal), unemployment, and inactivity.[15] We compare the relative role of job creation and destruction by either of the

[15]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.

following decompositions (normalized to the working-age population):

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

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

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} stands for the gross flow rate from state a to b. We display the first decomposition in Figure 2 and the second in Figure 3. We show that job creation and destruction have played distinctive roles at the start of the pandemic recession and the ongoing recovery in the two countries.

In Mexico, job destruction contributed almost fully to the early drop in employment. Consistent with the subsidiary role played by unemployment, in a highly informal economy lacking a nationwide unemployment benefits system, workers losing their jobs ended up joining the ranks of inactivity (Figure 2, panel A). This is not to understate the role that job creation may play in the recovery, for the longer it takes to engage in active job seeking, the longer the recovery will last. Notice that the lack of job creation in the early pandemic recession, much more significant than in the first two quarters of the 2008-9 recession, rests basically on the lack of job creation from unemployment, though we see this less of a hurdle in 2020.Q3. This is partly compensated by less creation from inactivity, making the lack of overall job creation almost unabated by 2020.Q3.

Figure 3 displays the same flow of workers but now by type of employment, showing that job destruction to inactivity comes from both types though not in equal measure. Informal job destruction is twice as large as job destruction stemming from formal employment. By 2020.Q3, job destruction has receded significantly to levels comparable to those observed in 2008-9. Notice also that unemployment seems to be gaining importance in the dynamics of job destruction.

By contrast, in Brazil, the fall in employment at the onset of the pandemic recession and thereafter seems to be rooted in the lack of job creation (Figure 2, panel B). Interestingly, by disaggregating these flows of workers by type of non-employment (unemployment and inactivity) and employment (formal and informal), the provisional outlook of the Brazilian labor market is still marked by a weak flow of people engaging in the labor market through informal employment (Figure 3).

Table 1: Two Non-Conventional Margins in the Pandemic Recession, in Percentage Change

Country	Recession	Overall Employment Rate			Informal Employment Rate			Formal Employment Rate		
		1	2	3	1	2	3	1	2	3
	2008.Q1/2009.Q2	−2.3	−2.2	−2.4	1.4	1.4	0.9	−6.8	−6.7	−6.6
Mexico	2019.Q2/2020.Q2	−29.7	−19.0	−6.7	−31.3	−26.7	−4.6	−27.4	−10.0	−9.4
	2019.Q2/2020.Q3	−12.0	−9.5	−5.5	−13.3	−13.0	−5.9	−10.4	−5.3	−4.9
Relative to column 2:										
	2008.Q1/2009.Q2	1.0	1.0	1.1	1.0	1.0	0.7	1.0	1.0	1.0
Mexico	2019.Q2/2020.Q2	1.6	1.0	0.4	1.2	1.0	0.2	2.8	1.0	0.9
	2019.Q2/2020.Q3	1.3	1.0	0.6	1.0	1.0	0.5	2.0	1.0	0.9
	2014.Q2/2016.Q4	−5.7	−5.1	-	−1.2	−1.1	-	−9.9	−8.8	-
Brazil	2019.Q2/2020.Q2	−25.0	−12.3	-	−28.9	−16.3	-	−20.5	−7.8	-
	2019.Q2/2020.Q3	−15.7	−13.8	-	−17.6	−16.2	-	−13.6	−11.2	-
Relative to column 2:										
	2014.Q2/2016.Q4	1.1	1.0	-	1.2	1.0	-	1.1	1.0	-
Brazil	2019.Q2/2020.Q2	2.0	1.0	-	1.8	1.0	-	2.6	1.0	-
	2019.Q2/2020.Q3	1.1	1.0	-	1.0	1.0	-	1.2	1.0	-

Notes: Column 2 is the baseline employment rate. Column 1 subtracts the number of absent employees over population from the baseline while column 3 adds the number of temporary layoffs over population to the baseline. We split temporary layoffs in inactive and unemployed and add them to the calculation of informal and formal employment in column 3, respectively. Absent employees and temporary layoffs are our own construction based on the survey questionnaires (see country notes in the appendix for details). It was not possible to construct the second counterfactual for Brazil. For Brazil, informality follows our baseline definition, close to Gomes et al. (2020) and, for Mexico, we follow Leyva and Urrutia (2020). The rise in informal employment (over population) during the Great Recession in Mexico (first line in this table) reflects its much faster recovery relative to the aggregate economy; see Figure 1 and Leyva and Urrutia (2020).

2.3. The Role of Two Non-Conventional Margins

By acknowledging the severity of the pandemic recession, some hidden adjustment margins appear in a different light. The first margin, relevant as ever for the U.S. labor market, is temporary layoffs. The U.S. Bureau of Labor Statistics typically classifies as unemployed people on temporary layoff those workers who expect to be called back to the previous job within the next 6 months. It has been argued that the share of these workers spiked at the outset of the pandemic, hinting at a not so sluggish recovery (Kudlyak and Wolcott, 2020, Hall and Kudlyak, 2020 and Buera et al., 2020).[16]

The second margin is made up of the so-called absent employees. These are employed workers

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

who, having not worked for at least one hour during the survey reference week, either maintain a close labor relationship, perceive earnings, or expect to be back soon to work. It is expected that the share of absent employees would have increased as a result of the implementation of confinement and social distancing policies. While the first margin would suggest a moderate recovery, the second may conceal a greater employment decline.

Table 1 shows the results of an effort to measure these margins for Mexico and Brazil, as the availability of the appropriate information permits. (In Table C.5 in the appendix we extend this analysis to the rest of LA-5.) In column 2 we present the percentage change in the baseline employment to population ratio (overall, formal, and informal). For each country, we calculate this change in two recessions, the pandemic recession (we compare 2020.Q2 with the same quarter of 2019) for both countries, and the Great Recession for Mexico and the idiosyncratic recession of 2014-16 for Brazil. We also keep track of the ongoing recovery by comparing 2020.Q3 with 2019.Q2.

At the left of the baseline (column 1), we report the (larger) counterfactual drop in the employment rate we would observe in the pandemic recession had the measure of absent employees been excluded from the measurement of employment. Notice how little informative this margin is for both countries during the alternative downturn.

The second counterfactual, displayed at the right of the baseline (column 3), is constructed by adding the share of temporary layoffs in the population to the baseline employment rate. By including workers that may relatively quickly get back to work, the counterfactual decline in the employment rate is much moderate, in line with the discussion around the recovery of the U.S. labor market during the pandemic. Again, during the alternative downturn, this counterfactual is hardly discernible from the baseline.

All in all, the decline in the observed employment rate in the pandemic recession represents a fairly balanced compromise between two counterfactual scenarios, the first downplaying the employment loss and the other exaggerating it.

Now, it is possible to extend this analysis to see which margin is relatively more important for which type of employment. We conjecture that part of the adjustment in informal employment could have taken place in the form of breaking the labor relationship and giving an expected (or uncertain) return date, while in formal arrangements the need of keeping the match and avoiding search frictions and separation costs would have called for an adjustment in the number of absent

employees. To show that this is precisely the case, we also report in Table 1 the ratio of the numbers reported in columns 1 and 3 to the baseline changes. The farther the ratio from unity, the more relevant the margin (numbers underlined).

Going forward, it appears that the relevance of these two non-conventional margins has receded by 2020.Q3 in both Mexico and Brazil. Again, notice how the ratios in columns 1 and 3 are closer to unity in 2020.Q3/2019.Q2 than in 2020.Q2/2019.Q2.

3. An Overview to LA-5 Labor Markets

We build a comprehensive dataset of labor market stocks from each country's household or employment survey. Table C.1 in the appendix displays the main characteristics of these surveys. 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 of the scope of the government to precarious labor contracts. We use the broadest 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.[17] 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 put the pandemic recession in perspective by examining the evolution of LA-5's labor markets in previous downturns (not necessarily the same for all countries; see Table C.2 in the appendix).

3.1. Aggregate Outcomes

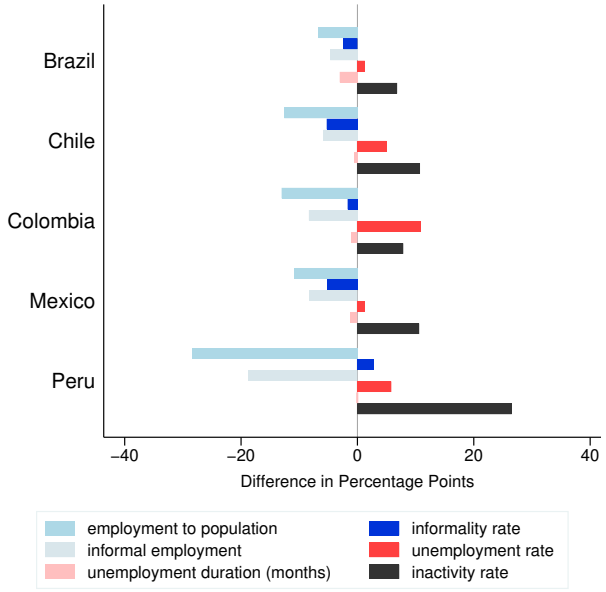
We now extend our labor market overview to all LA-5 and add the average duration of unemployment (in months) to our set of labor market stocks. The unrecorded destruction of jobs should manifest in the composition of the pool of unemployed, raising the share of short-term unemployment and therefore shaping the early dynamics of the unemployment rate.

We assess the instant impact of the ongoing pandemic recession by comparing 2020.Q2 with the same quarter of 2019. As shown in panel A of Figure 4, the pandemic recession witnessed a free-fall

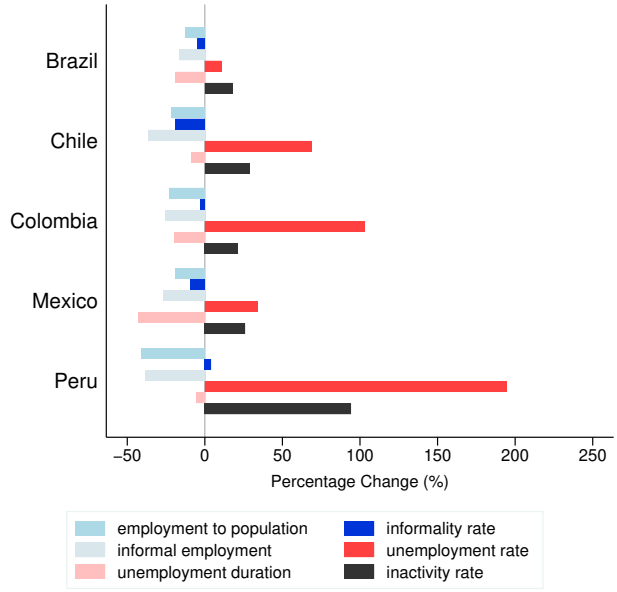
[17] For Brazil, we use an alternative definition owing to the length of the time series; see country notes in the appendix.

Figure 4: LA-5: The Pandemic Recession in Perspective

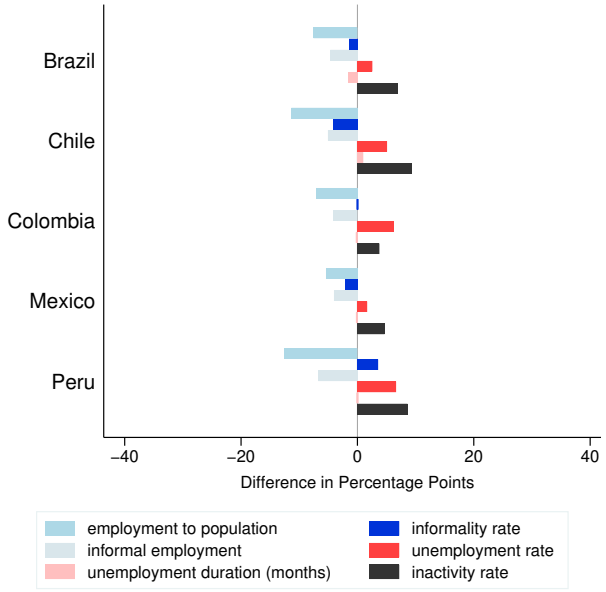
Panel A: Absolute Changes 2019.Q2/2020.Q2



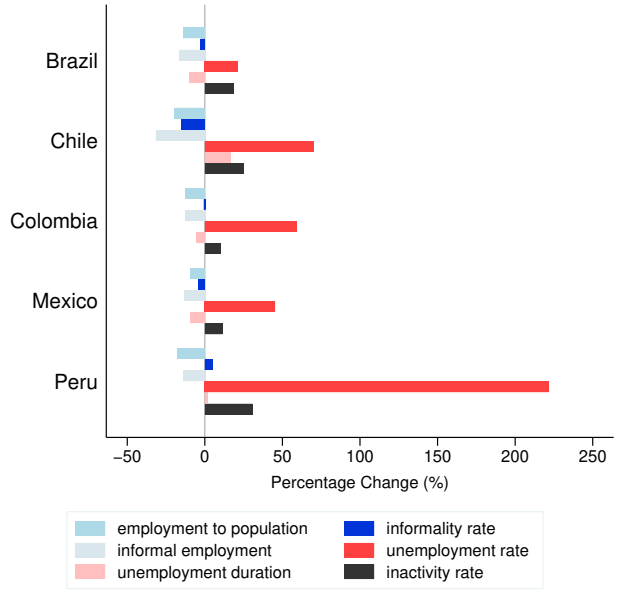
Panel B: Relative Changes 2019.Q2/2020.Q2



Panel C: Absolute Changes 2019.Q2/2020.Q3



Panel D: Relative Changes 2019.Q2/2020.Q3



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 C show the change in the labor market stocks in percentage points and panels B and D in percentage change. In Colombia, informal employment is our baseline measure based on the size of the establishment only; see the country notes.

in employment across the region.[18] In Mexico, for instance, the recent fall in the employment rate has exceeded its drop in the aftermath of the global financial crisis in a factor of six to one. This is because now 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 shown by declining informality rates.[19]

Panel C of Figure 4 suggests that the flexibility of informal employment (immune to labor regulation) is behind the partial recovery in informality rates by 2020.Q3 (and the still increasing rate in Peru). Though this may augur overall employment rates bouncing back quickly, it may at the same delay output recoveries across the region, through the effect of the share of informal workers in labor productivity. This is precisely the outcome delivered by the model discussed later.

These huge losses in employment have engrossed the ranks of inactivity and unemployment with different intensities across countries. What is perhaps specific to the pandemic recession is the sudden and massive withdrawal from the labor force. Also revealing is the huge job loss, which could be appreciated from the *drop* in the mean unemployment duration, only explained by a higher proportion of newly layoffs.[20]

It is difficult to draw sharp conclusions from all LA-5 countries given the institutional differences that characterize their labor markets. Minimum wages, unemployment benefits, firing costs, payroll taxes could all account for heterogeneous labor markets before the pandemic recession. The instant outlook of the labor market in response to the pandemic could also be shaped by different confinement and stimulus policy responses to the crisis. Still, it is possible to draw some conclusions by looking at relative changes in the stocks.

The overview changes dramatically (Figure 4, panel B). Peru, which is the country expected to fare badly in 2020 according to some projections (IMF, 2020), consistently shows by far the worst labor market outlook in the LA-5 region.[21] As a consequence of the pandemic, the workforce was

[18] These are raw changes. In Tables C.3-C.4 in the appendix, we use alternative measures dealing with trends prevalent before the pandemic.

[19] Peru is the exception. The official statistical bulletin, though differing from us in the presentation of the data, agrees with the rising informality rate at the onset of the COVID-19 pandemic; see https://www.inei.gob.pe/media/MenuRecursivo/boletines/03-informe-tecnico-n03_empleo-nacional-abr-may-jun-2020.pdf. For the evolution of LA-5's labor markets in previous downturns, see Figure C.1 in the appendix. The fact that informal employment (over population) in Mexico increased between 2008.Q1 and 2009.Q2 is an artifact of the comparison. Unlike formal employment, informal employment recovered quickly and ever surpassed their pre-recession level by 2019.Q2; see Leyva and Urrutia (2020). In the appendix, we show that the decline in the informality rate in all LA-5 has been witnessed across all sectors, with some minor exceptions; see Figure C.3.

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

[21] The relative outlook for Peru has not changed much since June 2020; see Werner (2020).

shockingly slashed by 40 percent, with unemployment and inactivity rates increasing threefold and twofold, respectively. The least affected countries seem to be Brazil and Mexico, two cases well known for their more lenient confinement policies.[22]

As we move to the second quarter of the pandemic, we see a general reversal in the fall in inactivity rates. In all cases, this more active engagement in the labor market is reflecting itself in higher unemployment rates, except for Colombia (Figure 4, panel D).

3.2. The Unequal Hallmark of the Pandemic Recession

So far, we have focused on the general consequences of the pandemic recession. Aggregate outcomes, however, tend to conceal the unequal distribution of the burden of the recession.[23]

Social norms and the role within the household typically put women at a disadvantage, a strain that has been compounded by the need to spent much more time on child care because of the pandemic (Alon et al., 2020a). Latin America, a region well known for its disparities in income and opportunities (engagement in the labor market, for instance), has seen itself as turning the clock back years, if not decades, compromising the progress made so far.

To explore how badly women have fared so far, we plot in Figure 5 the results of a decomposition of job loss into higher inactivity rates and unemployment rates:

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

We perform this decomposition (shown percentage changes) for females and males in panels A and C of Figure 5. Across countries, we see that the loss in employment was essentially mirrored by a fall in labor force participation at the onset of the pandemic (panel A), except for Colombia, where the adjustment also took the form of a higher unemployment rate. Between groups, the participation margin has played a bigger role for females, except for Mexico. By 2020.Q3 (see panel C) recoveries in participation rates have been faster for males than for females (look how the dark blue bars for the gap have widened out in all LA-5), increasing the gender gap at the risk of leaving women in a worse position than before the pandemic.

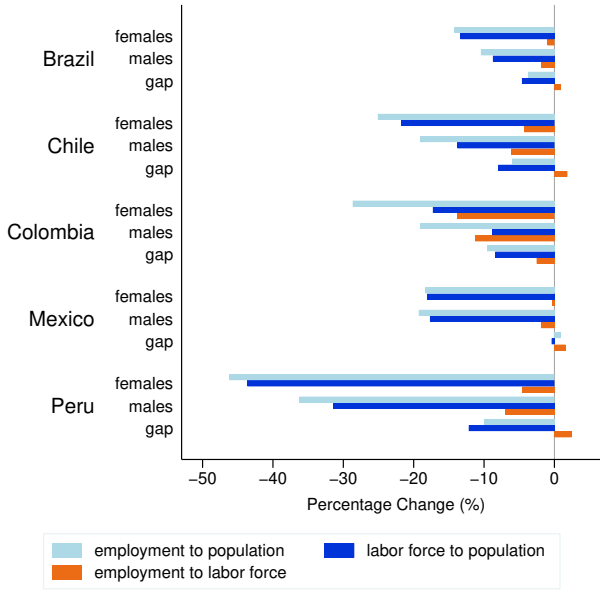
Young people have been also particularly exposed to the crisis. In panel B of Figure 5, we

[22] These changes differ markedly from those observed in previous downturns; see Table C.2 and Figure C.1 in the appendix.

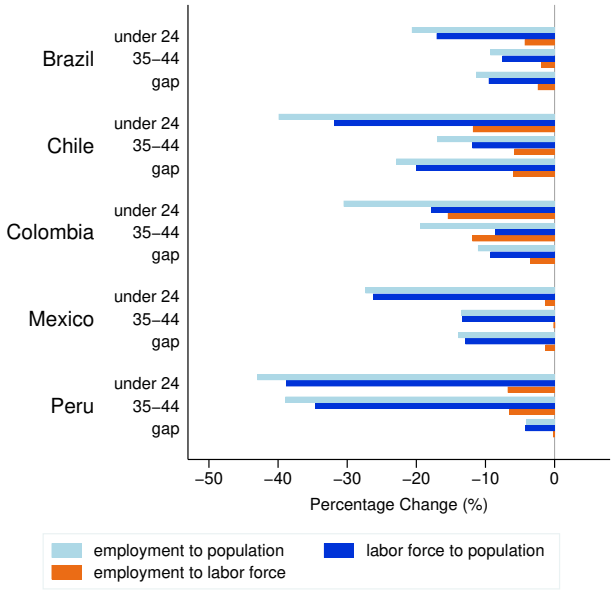
[23] As expected the most affected sectors were those associated with accommodation and food service and arts, entertainment, and recreation; see Figure C.4 in the appendix.

Figure 5: Unequal Labor Market Outcomes in LA-5

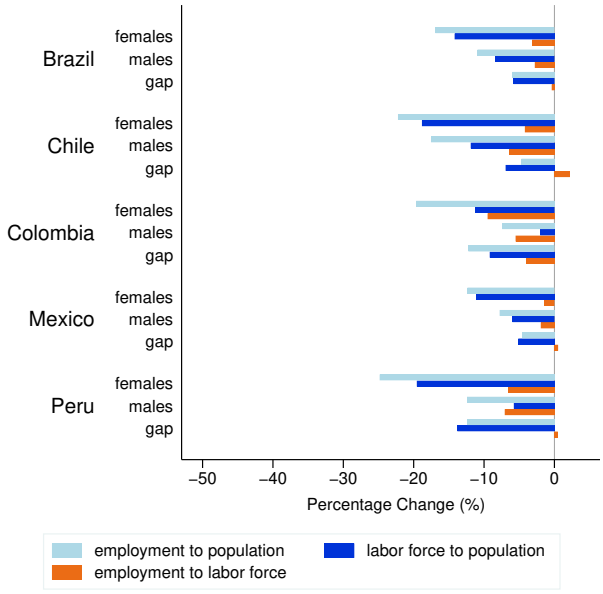
Panel A: By Gender, 2019.Q2/2020.Q2



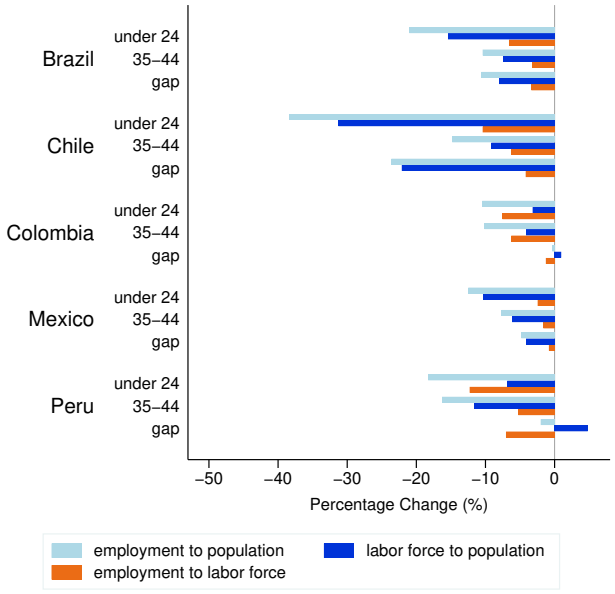
Panel B: By Age, 2019.Q2/2020.Q2



Panel C: By Gender, 2019.Q2/2020.Q3



Panel D: By Age, 2019.Q2/2020.Q3



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.

perform the same decomposition by age. In general, young workers (under 24) have carried the weight of the crisis relative to older workers (35-44). Between age groups, there are no relevant differences in the role played by inactivity and unemployment. Again, for Colombia, we see that unemployment has claimed a bigger role in absorbing the employment loss. The participation gap between these two age-groups has shrunk in all countries by 2020.Q3 (panel D). For the gap between unemployment rates, we see a similar pattern, except for Brazil and Peru.

As we documented before, informal employment has been particularly hard hit at the onset of the pandemic recession. We now decompose this employment rate as follows:

$$\frac{\text{informal employment}}{\text{population}} = \frac{\text{overall employment}}{\text{population}} \times \frac{\text{informal employment}}{\text{overall employment}},$$

acknowledging that losses in informal employment could be seen as a combination of aggregate outcomes (first term) and sector-specific shocks (second term), a distinction that is also captured by the model discussed in the next section. We present an extended version of the decomposition presented before:

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

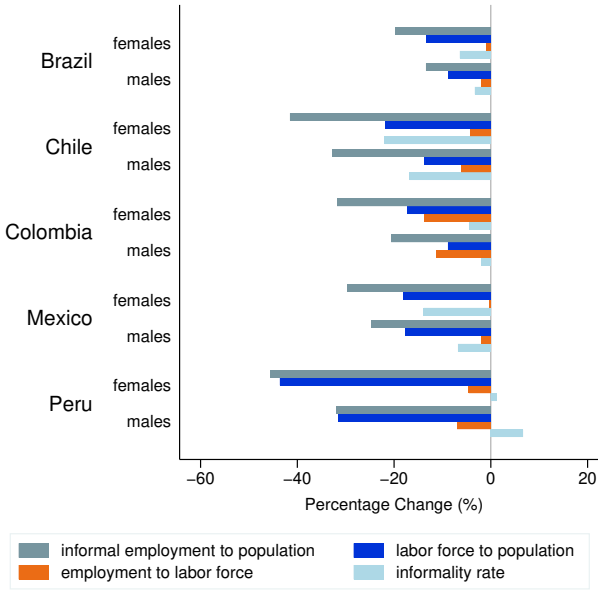
In panel A of Figure 6, we depict this decomposition at the onset of the pandemic. Between groups, job loss for females is tilted towards informal employment. Notice the excess in the informality rate in females relative to males. This relative result also applies to Peru though in the two groups the informality rate declines, consistent with the aggregate behavior shown in Figure 4. The more recent behavior in LA-5's labor markets shows that the progress in informality rates has been uneven across gender (panel C).

Informal employment declined the most for younger workers, in all countries (panel B). Between groups, the evidence of the relative role play by informality is mixed. In Brazil and Chile, the relative job loss of young workers is tilted towards formal employment, while the opposite is the case for Colombia, Mexico, and Peru. The incipient recovery seems to be accompanied by increases in informality rates across age-groups and for all countries (panel D). In Colombia, the informality rate has even surpassed its level in 2019.Q2 while in Peru, it has started to recede from its level in 2020.Q2.

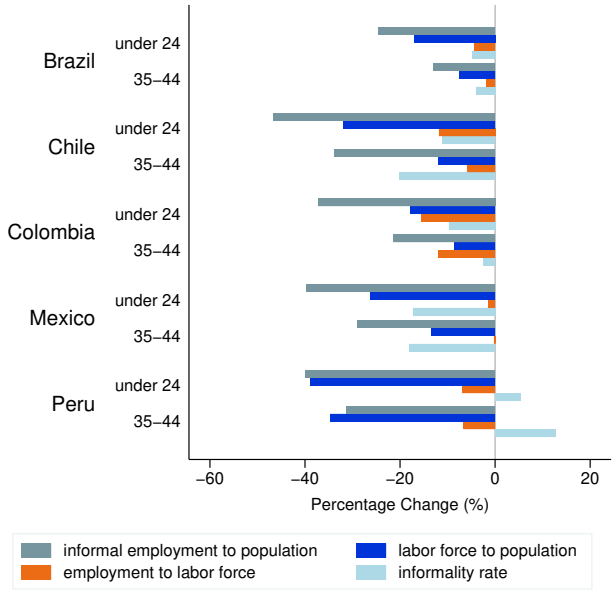
The aggregate labor market outcomes in LA-5 thus paint a gloomy picture that applies with

Figure 6: Unequal Labor Market Outcomes in LA-5: The Role of Informality, 2019.Q2/2020.Q2

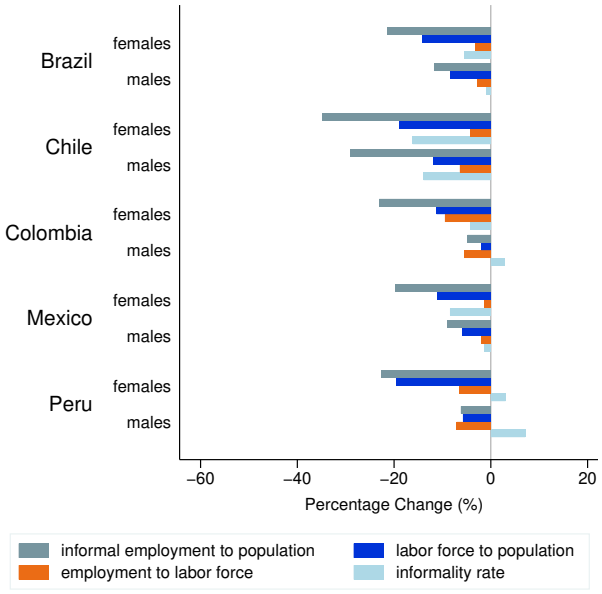
Panel A: By Gender, 2019.Q2/2020.Q2



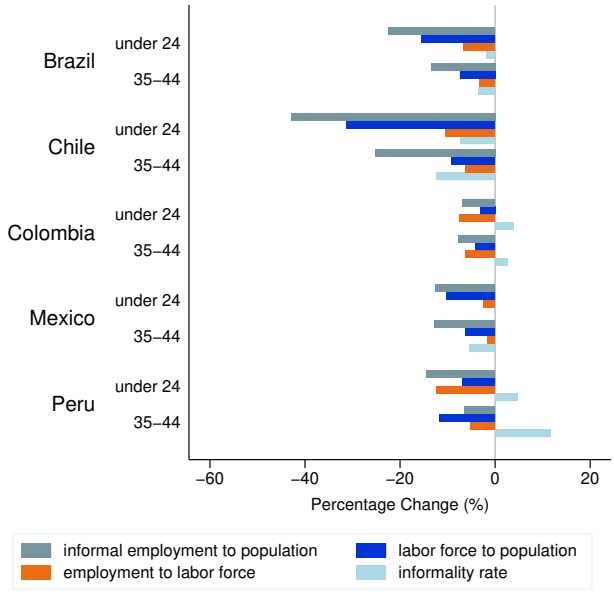
Panel B: By Age, 2019.Q2/2020.Q2



Panel C: By Gender, 2019.Q2/2020.Q3



Panel D: By Age, 2019.Q2/2020.Q3



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.

different intensity to specific population groups at the onset of the pandemic. Given the all-encompassing nature of the pandemic recession, these labor market outcomes, however, do not seem to be driven by compositional changes.

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 (2020), 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 indicators during the COVID-19 pandemic recession.

4.1. The Model Economy

We present now the main features of the model and refer to Leyva and Urrutia (2020) 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 technology 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.[24] 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:

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

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

[24] 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.

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.[25] 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, so all members consume the same and share the value of leisure. Our model is then silent about the distributional consequences of the pandemic and the role of credit market imperfections such as borrowing limits.

[25] See Lama and Urrutia (2020) for a model with endogenous separations and labor market policies.

4.2. Calibration

Following again Leyva and Urrutia (2020), 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 aggregate productivity 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 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 (2020), 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 55.9 percent; (2) an informality rate of 55.7 percent; (3) an unemployment rate of 4.5 percent; (4) a normalized aggregate TFP of one; (5) a formal wage premium of 13 percent; (6) a labor share of two-thirds; and (7) a firing cost equivalent to 13 weeks of the average 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. (2015) and the size of firing costs is obtained from Heckman and Pagés (2000).

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	3.10
Discount Factor	β	0.99	Productivity Informal Sector	$\varkappa$	0.44
Depreciation Rate	δ	1.25%	Search Cost	ς	89.2
Elasticity of Matching Function	ϕ	0.40	Productivity Formal Sector	Ω	0.78
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	1.39
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	$1/\nu$	0.63
Adjustment Cost of Capital	ϑ	55.2	Cost of Posting a Vacancy	η	0.14

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. Second, we use the model to simulate recovery scenarios on a two-year horizon. Finally,

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	1.02	$Corr(C,Y)$	0.97	0.85
$\sigma(I)/\sigma(Y)$	2.33	2.33	$Corr(I,Y)$	0.87	0.75
$\sigma(L)/\sigma(Y)$	0.41	0.41	$Corr(L,Y)$	0.68	0.99
$\sigma(l^s)/\sigma(Y)$	0.53	0.53	$Corr(l^s,Y)$	-0.57	-0.31
$\sigma(1+i^*)$	0.49	0.49	$Corr(1+i^*,Y)$	-0.24	-0.24

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 are smoothing 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.

we evaluate some policy options and compare their cost-effectiveness in speeding up the recovery.

5.1. Accounting for the Pandemic Recession

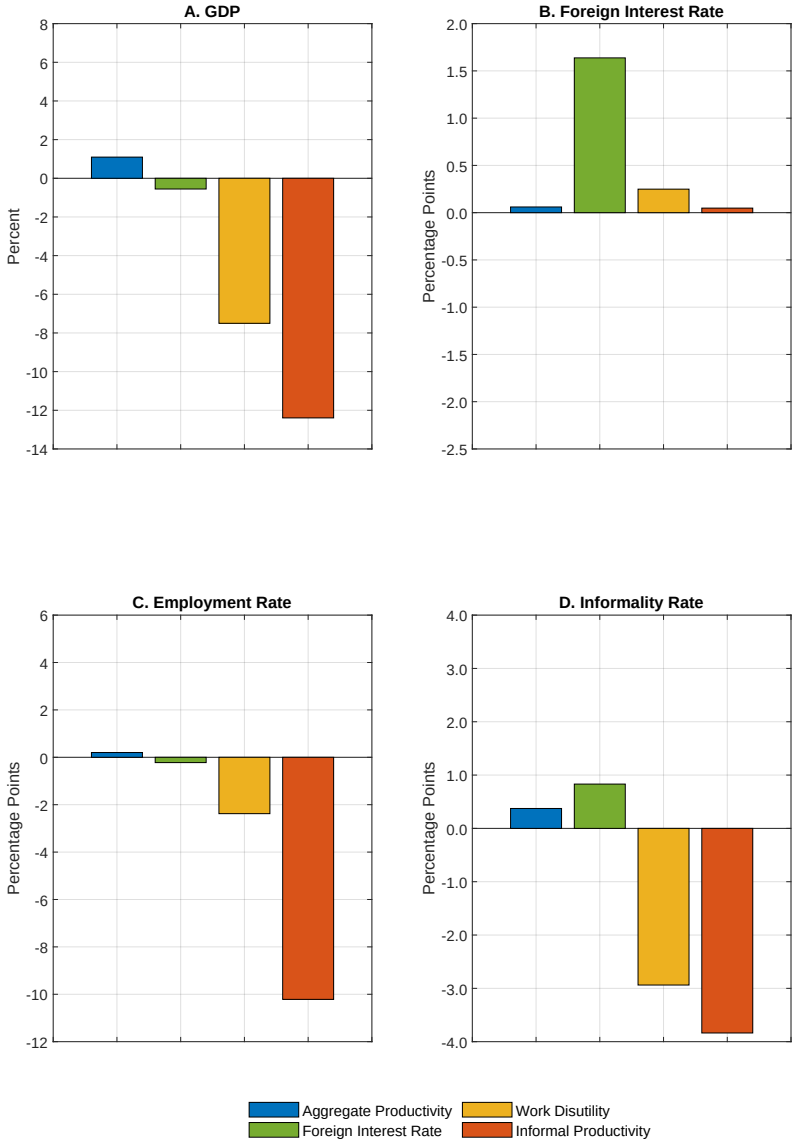
As highlighted before, two of the defining features of the pandemic recession of 2020.Q2 are the dramatic drop in employment and the unprecedented decline in the informality rate. The model described in the previous section is unable to account for these features without including additional shocks. 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 shock to the work disutility parameter φ, the other is a technology shock specific to the informal sector productivity parameter $\varkappa$. The former captures confinement policies (mandatory and voluntary) affecting the labor supply in general. The latter could represent the shutdown of some activities, more contact-intensive or less amenable to teleworking, in which informality is more pervasive.[26] This shutdown is consistent with the large job destruction of informal jobs documented in Section 2.

[26]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. (2020) find similar results for workers in small firms. Leyva and Mora (2021) 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.

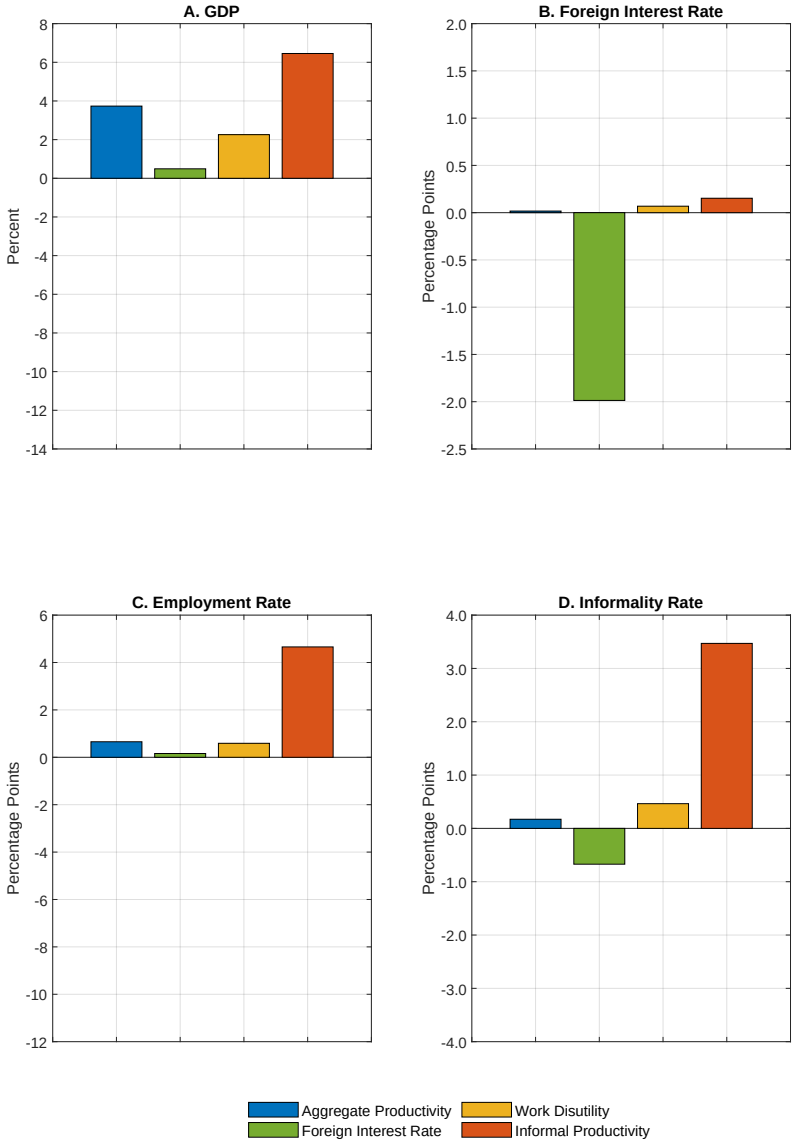
Figure 7: Accounting for the Pandemic Recession: Shocks Recovered

Figure 8: Decomposition of Shocks for the Pandemic Recession

Panel A: 2020.Q2 Relative to 2020.Q1



Panel B: 2020.Q3 Relative to 2020.Q2



We assume that the two new 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 $\rho_{\text{new}} = 0.83$ so that the model reproduces the response of consumption in the data in 2020.Q2 (see footnote 30 below).

Using the extended model, we invert the (linear) decision rules to recover the sequences for the innovations to the four shocks that account exactly (up to a degree of tolerance) for the behavior of GDP, the foreign interest rate, the employment rate and the informality rate in Mexico, for the period 2019.Q2 to 2020.Q3.[27] Figure 7 reports the results of the accounting exercise and reveals that a large positive work disutility shock (reducing overall labor supply) and a large negative informal productivity shock (reducing labor demand in the informal sector) are required to account for the observed decline in employment and increase in the informality rate in 2020.Q2. These shocks revert quickly in 2020.Q3, as the economy partially recovers.[28]

The contribution of each of the four shocks to the changes in the four selected variables between 2020.Q1 and 2020.Q2, corresponding to the onset of the pandemic recession, is reported in panel A of Figure 8. Perhaps surprisingly, the informal productivity shock accounts for most of the drop in output and employment, considerably more than the aggregate productivity shock, as well as for most of the decline in the informality rate. The work disutility and the aggregate productivity shocks are also important in explaining the fall in output and employment but have opposite effects on the informality rate. The dominant role of the informal productivity shock is maintained in 2020.Q3, as shown in panel B of Figure 8, where it accounts for most of the partial recovery in GDP, employment, and the informality rate. In contrast, the interest rate shock plays a very minor role in this episode except for the fluctuations in the foreign real interest rate for Mexico in these two quarters.

Finally, Figure 9 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

[27] These four series are first detrended using the HP-filter with smoothing parameter 1600.

[28] 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. (2020).

the end of 2020.Q3.[29] The accounting exercise with the model also captures well the procyclical behavior of consumption and investment.[30] However, it is unable to reproduce the current account reversal during the pandemic, reflected in the rise in net exports.[31]

5.2. Simulating the Recovery

Once the economy is hit by the four shocks in 2020.Q2, we assume that there are no further innovations to their stochastic processes, so they revert to their mean value at a speed driven by their persistence parameter. We refer to the period in which the shocks revert to their mean as the recovery. We choose a two-year horizon for the simulation of all the endogenous variables (from 2020.Q4 to 2022.Q3). The exercise reflects as researchers our lack of information on the future evolution of the pandemic itself, yet providing a useful benchmark for comparing the impact of alternative policies on the recovery.

Still, we can think of different recovery scenarios by choosing alternative values of the persistence parameter ρ_{new} for the work disutility and informal productivity shocks. A smaller persistence parameter would suggest a more transitory impact of the pandemic, hence a quicker recovery. The opposite would be implied by a bigger value for ρ_{new}. Figure 10 plots the recovery under the baseline parameter $\rho_{\text{new}} = 0.83$ (labeled "Neutral") and two alternative values: an "Optimistic" scenario with $\rho_{\text{new}} = 0.5$ and a "Pessimistic" one with $\rho_{\text{new}} = 0.9$. The shaded area between the two provides a graphical representation of the uncertainty in the exercise.

The baseline scenario suggests a slow recovery from the pandemic. Not even in the optimistic scenario employment or output fully come back to trend after two years. The convergence is still slower in the pessimistic case. In all cases, the informality rate rebounds as informal employment leads the recovery. This last insight is important to understand the consequences of the pandemic on the composition of the labor market and its implications for labor productivity. Since the recovery is led by informal employment, facing less frictions and labor regulation but also lower

[29] 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 (2020). 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.

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

[31] To make the model and the data consistent, we compute 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 discrepancy.

Figure 9: Accounting for the Pandemic Recession: Other Variables Fit

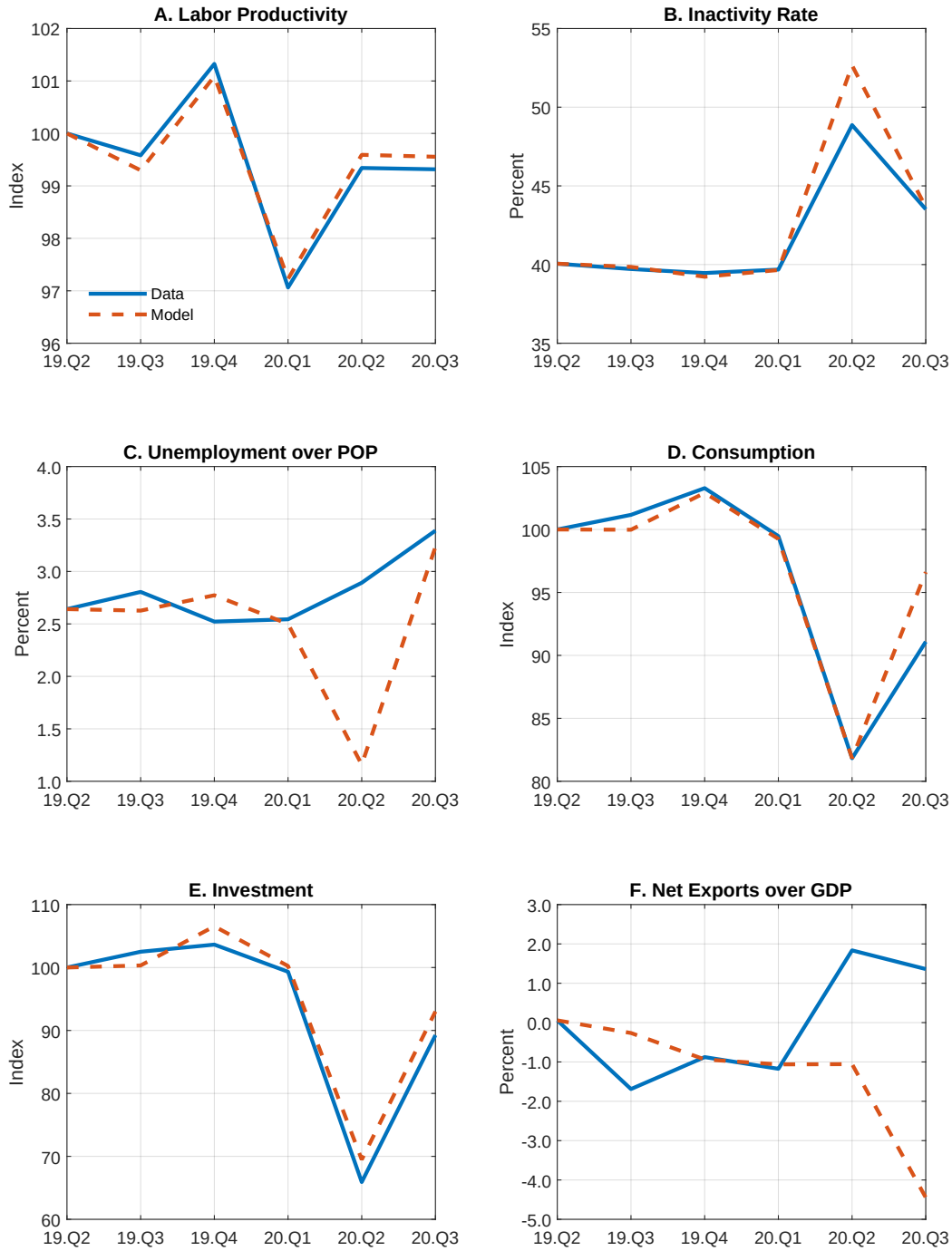
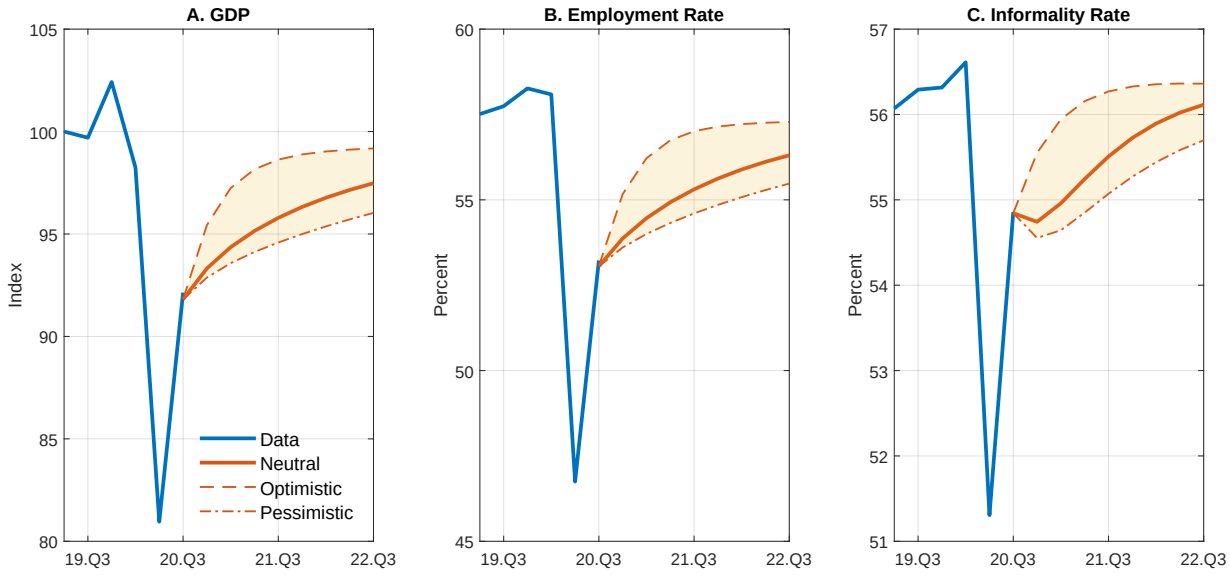


Figure 10: Alternative Scenarios for the Recovery from the Pandemic Recession



productivity, a decline in labor productivity during the transition should be expected (notice in Figure 10 how total employment recovers faster than output). Mitigating this productivity decline by fostering employment in the formal sector would be an important policy goal, which we discuss next.

5.3. Labor Market Policies for the Recovery

The model allows us to discuss several policy options to promote a faster recovery, acting on different margins of adjustment of the labor market. Based on the discussion above, we first 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. The two 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 two policies are scaled so that the economy closes completely the gap in employment by 2020.Q3, relative to its pre-pandemic level in 2020.Q1.

Payroll Tax Cuts vs. Hiring Subsidies

Figure 11: Policies Targeting Formal Labor Demand during Recovery

Panel A: Reducing Payroll Taxes

Panel B: Subsidizing Hiring Costs

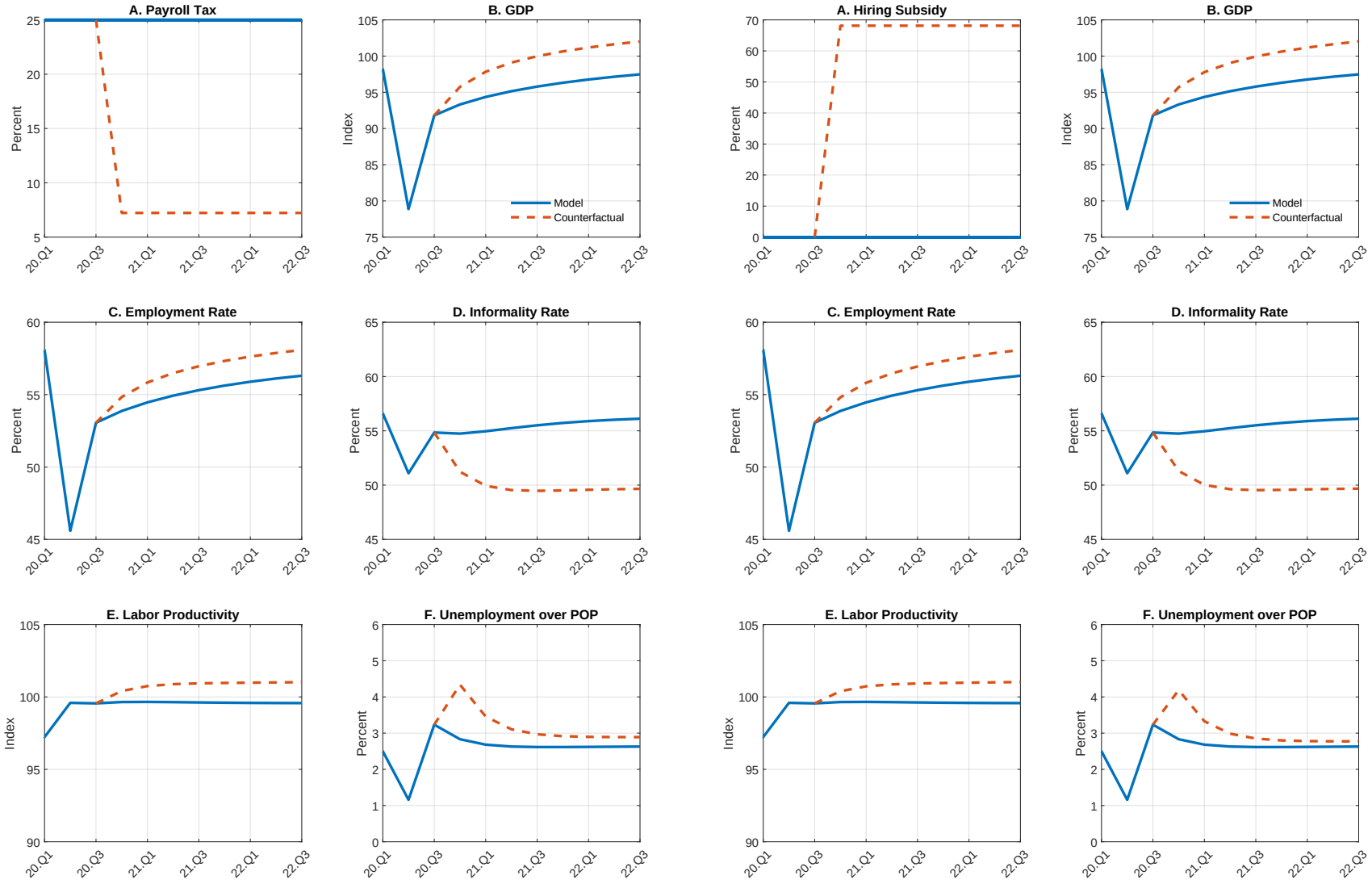


Table 4: Labor Market Policies: Summary Results after Two Years

Policy Instrument	Employment Rate	Informality Rate	Unemployment over POP	GDP	Fiscal Cost % GDP	Size
	1	2	3	4	5	6
No Policy Intervention	−1.78	−0.49	0.13	−0.76	–	–
Payroll Tax Cut	0.00	−6.95	0.39	3.86	6.96	17.8
Hiring Subsidy	0.00	−6.93	0.27	3.87	0.26	68.1
Unemployment Benefits	−1.63	−1.11	0.90	−0.40	4.60	100.0
Informal Income Subsidy	0.00	3.46	0.04	0.36	3.56	9.2

Notes: Columns 1, 2, and 3 report for each policy the gap between the final (2022.Q3) 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.Q3. 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), the replacement rate for unemployment benefits (as a percent of the formal wage), or the informal income subsidy (as a percent of the informal wage). Notice that the replacement rate for unemployment benefits reached its maximum value of 100 without reducing significantly the employment gap.

Figure 11 compares the recoveries under these two policies to the model with no policy intervention (corresponding to the neutral scenario of Figure 10). The first three rows in Table 4 summarize the results. Both policies have similar qualitative effects, as they operate on the same margin of adjustment. Payroll tax cuts and hiring subsidies 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 two years, both policies achieve the same full recovery of employment.[32]

However, there are big 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 less than 8 percent, a huge cut entailing a fiscal cost of almost 7 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 almost 70 percent of the vacancy cost, its fiscal cost is only 0.26 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.[33]

[32] 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.

[33] 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

Alternative Policies: Unemployment Benefits and Informal Income Support

We also evaluate two alternative policies that have been part of the discussion at the onset of the pandemic. One is unemployment benefits, the other is income support for informal workers. As before, the two policies are implemented for two years and financed through lump-sum taxes. We also scaled them to fully close the employment gap by 2020.Q3, constrained to the implied unemployment benefits replacement rate and/or the informal income subsidy rate laying between 0 and 100 percent. The recoveries induced by these two policies are depicted in Figure 12 and summarized in the last two rows of Table 4.

Unemployment benefits have almost no impact on the recovery except for the rise in the unemployment rate itself. The benefits are ripped by some inactive or informally employed workers to search for formal jobs. However, without a strong demand for labor in the formal sector, this translates into a lower job-finding probability without a significant impact on formal employment. This is why even with a full replacement rate of 100 percent of the formal wage the policy can only deliver a modest reduction in the employment gap, at a very high cost amounting to 4.6 percent of GDP each quarter.

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 about 9.2 percent (relative to the informal wage). However, given the incidence of informality in emerging economies, the cost of this policy is also quite large, about 3.6 percent of GDP.

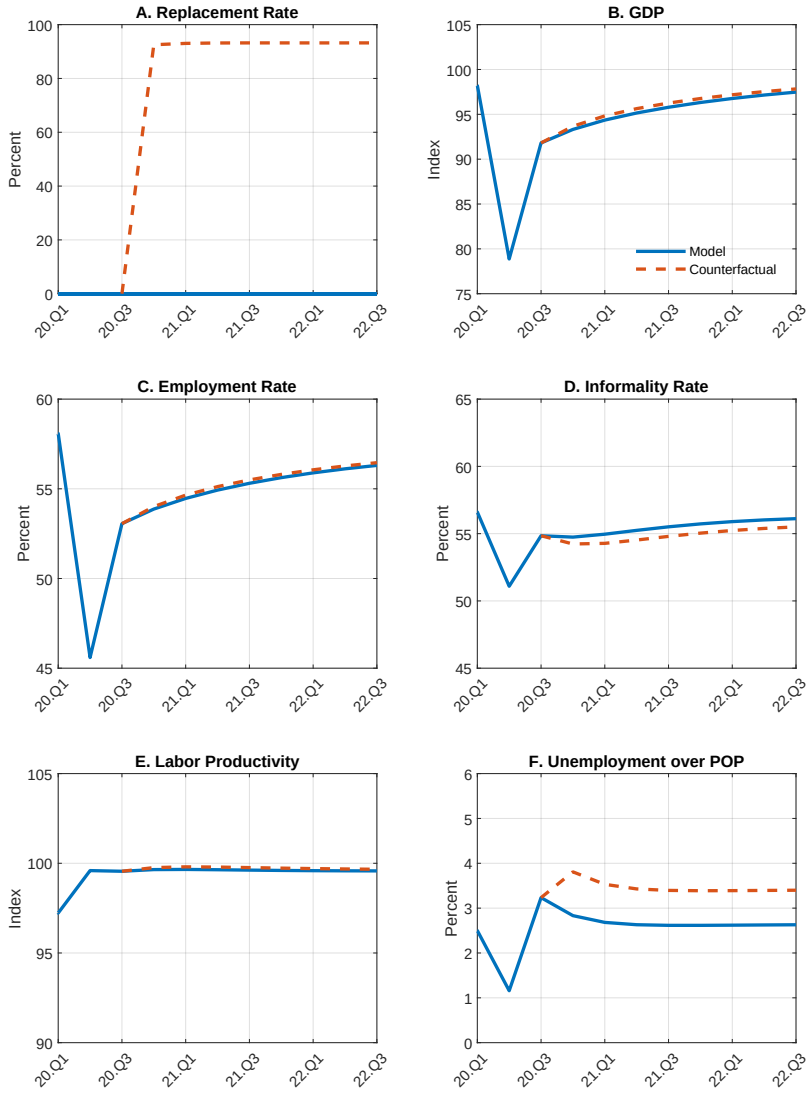
Some Important Caveats

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, unemployment benefits or 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.

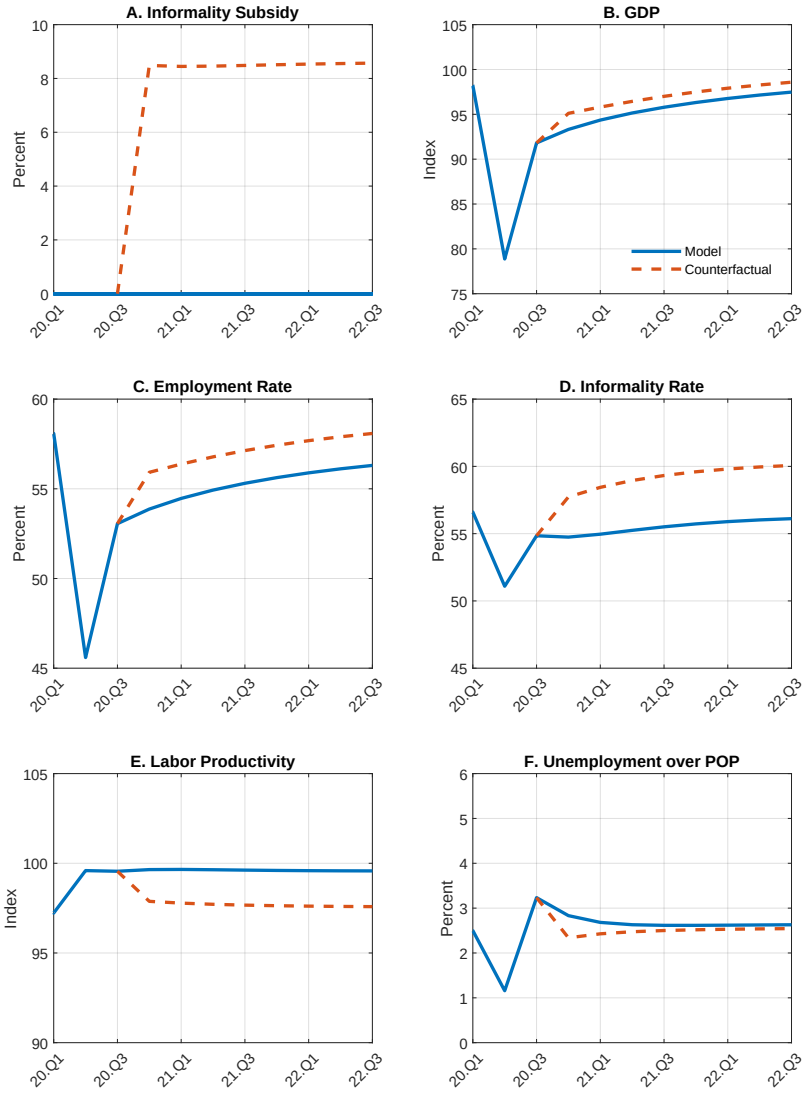
discussion along these lines, see Blanchard et al. (2020).

Figure 12: Policies Targeting Labor Supply during Recovery

Panel A: Implementing Unemployment Insurance



Panel B: Subsidizing Informal Income



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.[34] Nevertheless, we believe that in its limited scope our analysis contributes to the discussion 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 countries. Moreover, inequality concerns might require other stimulus policies targeting the income of the workers most affected by the pandemic.

[34] 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.

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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, (2020.Q3). We exclude non-earner workers as in Leyva and Urrutia (2020). Gross flows based on Shimer (2012) and Leyva and Urrutia (2020). 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.
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 and the other two are from FRED database. All accessed 15 November 2020.
Macroeconomic variables: GDP, Consumption (public and private), Investment (public and private fixed capital formation), and Net Exports taken directly from INEGI. All in 2013 Mexican pesos and accessed 27 January 2021.

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 mean 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 informality is close to Gomes et al. (2020), p 3, who do not consider the registration of the business (variable labeled V4019 in the data dictionary, available since 2015.Q4), but include all public sector employees (with and without the Carteira de Trabalho e Previdência Social, CTPS) and exclude employers. Our alternative definition is more comprehensive, yet shorter than the baseline, including private-sector employees without CTPS, domestic workers without CTPS, employers and own-account workers (in business not registered in the Cadastro Nacional da Pessoas Jurídicas), and auxiliary family workers. The CTPS 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.). Though the levels are different, both measures are comparable in their annual rates of variation.

4. For the calculation of gross flows we use as a key the following variables: 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. It was inquired for Resto; the rate of variation in informal employment for this sample serves 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 April and March 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 5 workers. Public-sector employees are excluded. The alternative

definition includes those that 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. Our sample excludes non-earner workers, about 10 percent of the workforce, as in Leyva and Urrutia (2020).

2. Temporary layoffs are non-employed (either unemployed or inactive) with a return date in less than 4 weeks, more than 4 weeks, and uncertain. 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 already back). The construction of these two margins is ours. The latter is further inspired by INE's definition of absent employees.

Peru

1. For the measurement of informal employment before 2020 we use the information contained in the annual ENAHO public microdata files, using the inbuilt key to merge quarterly and annual files. We drop the cases where we find disagreements in labor force status, informality condition of employment, gender, and age.

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 all countries, activities were classified using the International Standard Industrial Classification (ISIC), Rev.4. For Colombia, 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.

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

3. In the early pandemic, surveys in some countries were conducted solely or complementarily by telephone.

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) who use the Encuesta Permanente de Empleo (only Metropolitan Lima), to define informal workers as those who do not have access to health care and earn less than the minimum wage.

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. LA-5: public microdata files are available at:

   - IBGE (2012-2020): https://www.ibge.gov.br/en/statistics/social/labor/18083-annual-dissemination-pnadc3.html?=&t=downloads [TRIMESTRAL/MICRODADOS]
   - INE (2010-2020): https://www.ine.cl/estadisticas/sociales/mercado-laboral/ocupacion-y-desocupacion [BASES DE DATOS/FORMATO STATA]
   - DANE (2007-2020): 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 (2005-2020): 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 (2011-2020) 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]

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	2020.Q3	2020.M9	2020.M9	2020.Q3	2020.Q3
Length	35 quarters	129 months	165 months	63 quarters	39 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: Dating of the Pandemic Recession and of Previous Downturns for LA-5

	Brazil	Chile	Colombia	Mexico	Peru
Pandemic Recession					
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.Q2	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.Q2	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 alternative downturns is as follows: for Brazil, we use 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 (2020), 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.3: Change in Labor Market Stocks during the Pandemic Recession in LA-5 (Percentage Points 2019.Q2/2020.Q2)

	year-to-year absolute change raw	year-to-year absolute change detrended	year-to-year absolute change HP detrended	absolute value of the difference raw	absolute value of the difference detrended	absolute value of the difference HP detrended
Brazil (National)						
employment to population ratio	−6.7	−5.4	−5.6	−6.5	−5.9	−5.2
informality rate	−2.4	−3.3	−2.8	−2.5	−2.9	−1.9
informal employment	−4.7	−4.5	−4.4	−4.7	−4.6	−3.7
unemployment rate	1.3	0.6	0.7	1.7	1.3	2.0
unemployment duration (months)	−3.0	−3.6	−3.1	−2.2	−2.5	−1.6
inactivity rate	6.8	5.9	5.9	6.4	5.9	4.6
Chile (National)						
employment to population ratio	−12.6	−10.8	−8.5	−12.7	−11.8	−8.9
informality rate	−5.3	−2.7	−3.7	−6.0	−4.4	−4.5
informal employment	−5.9	−2.6	−3.9	−6.3	−4.4	−4.7
unemployment rate	5.0	3.8	3.2	4.8	4.2	3.4
unemployment duration (months)	−0.5	−1.0	−0.8	−1.6	−1.9	−1.4
inactivity rate	10.8	9.6	7.4	11.0	10.4	7.7
Colombia (National)						
employment to population ratio	−13.0	−11.2	−8.9	−12.3	−11.3	−7.6
informality rate	−1.7	−1.2	−1.8	0.7	1.0	0.3
informal employment	−8.3	−7.0	−5.9	−7.0	−6.3	−4.4
unemployment rate	10.8	9.9	7.6	9.4	8.9	6.0
unemployment duration (months)	−1.0	−1.1	−1.0	−1.3	−1.3	−1.1
inactivity rate	7.9	6.5	5.3	7.9	7.2	4.8
Mexico (National)						
employment to population ratio	−10.8	−10.7	−9.9	−10.9	−10.8	−7.5
informality rate	−5.2	−4.5	−4.4	−5.1	−4.8	−3.2
informal employment	−8.3	−7.8	−7.4	−8.2	−8.0	−5.5
unemployment rate	1.3	1.7	1.2	1.3	1.5	0.8
unemployment duration (months)	−1.2	−1.1	−1.2	−0.7	−0.7	−0.4
inactivity rate	10.6	10.2	9.7	10.7	10.4	7.3
Peru (National)						
employment to population ratio	−28.4	−25.7	−25.4	−27.9	−26.5	−18.2
informality rate	2.8	2.1	2.4	1.4	1.0	0.6
informal employment	−18.7	−17.3	−16.8	−19.3	−18.6	−12.8
unemployment rate	5.8	4.9	4.9	4.9	4.4	3.5
unemployment duration (months)	−0.1	−0.1	−0.1	0.0	0.0	0.0
inactivity rate	26.5	24.3	23.9	26.7	25.5	17.2

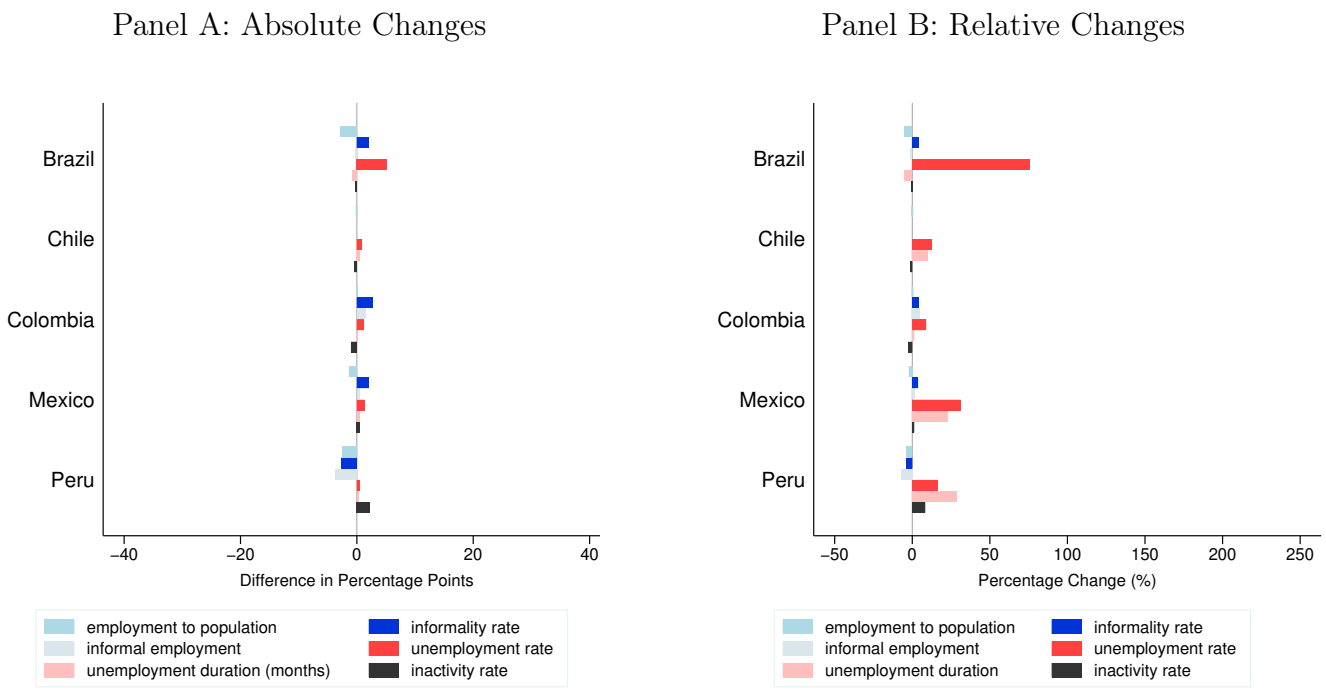
Notes: Year-to-year is the change of in the pandemic recession (baseline turning points). The first column corresponds to the numbers reported in Figure 4, panel A. Difference to average ratio is the ratio of the difference between trough and peak (alternative turning points) to the average of these 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. See this appendix for the definition of the turning points. Trends are calculated with data up to 2020.Q3.

Table C.4: Change in Labor Market Stocks during the Pandemic Recession in LA-5 (Percentage Change 2019.Q2/2020.Q2)

	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 (National)						
employment to population ratio	−12.3	−9.6	−10.7	−12.8	−10.8	−9.9
informality rate	−4.6	−6.4	−5.4	−4.9	−6.0	−3.7
informal employment	−16.3	−15.6	−16.0	−17.6	−17.1	−13.4
unemployment rate	10.6	5.9	5.4	13.2	13.9	15.3
unemployment duration	−19.2	−22.3	−21.3	−15.9	−18.3	−10.8
inactivity rate	18.0	15.8	14.7	15.3	14.7	11.4
Chile (National)						
employment to population ratio	−21.6	−18.1	−16.0	−24.4	−21.5	−16.7
informality rate	−19.1	−9.8	−14.4	−23.6	−16.7	−17.2
informal employment	−36.6	−16.7	−28.7	−47.3	−29.2	−33.4
unemployment rate	68.9	63.6	34.3	49.0	54.3	37.1
unemployment duration	−8.4	−18.4	−11.1	−24.8	−34.0	−21.2
inactivity rate	28.8	26.3	17.8	25.8	25.4	18.8
Colombia (National)						
employment to population ratio	−23.1	−19.5	−17.2	−24.6	−21.7	−14.5
informality rate	−2.9	−1.9	−3.0	1.2	1.6	0.5
informal employment	−25.3	−20.0	−19.4	−23.5	−19.2	−14.1
unemployment rate	102.9	103.9	53.2	60.4	64.4	43.8
unemployment duration	−19.4	−19.7	−20.5	−26.2	−26.4	−21.4
inactivity rate	21.3	17.8	13.3	19.3	18.2	12.2
Mexico (National)						
employment to population ratio	−19.0	−18.6	−18.2	−21.1	−20.8	−13.7
informality rate	−9.5	−8.0	−8.3	−9.9	−8.9	−6.1
informal employment	−26.7	−24.3	−25.4	−30.8	−28.4	−19.1
unemployment rate	34.0	37.4	29.5	29.5	27.5	20.6
unemployment duration	−42.9	−41.5	−51.7	−35.7	−34.1	−15.8
inactivity rate	26.0	25.4	22.4	23.1	23.2	16.9
Peru (National)						
employment to population ratio	−40.7	−34.9	−40.2	−50.4	−43.3	−28.8
informality rate	4.0	3.0	3.4	1.9	1.4	0.9
informal employment	−38.3	−33.1	−37.3	−48.6	−42.0	−28.4
unemployment rate	194.4	243.5	93.4	77.2	94.4	65.9
unemployment duration	−5.2	−8.3	−6.4	−1.4	−2.9	3.0
inactivity rate	94.2	98.3	71.5	64.5	70.4	51.7

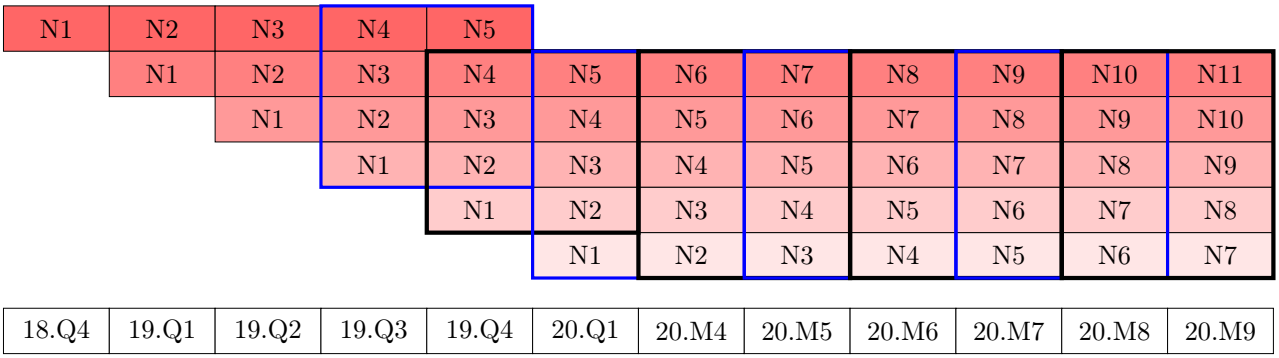
Notes: Year-to-year is the change of in the pandemic recession (baseline turning points). The first column corresponds to the numbers reported in Figure 4, panel B. Difference to average ratio is the ratio of the difference between trough and peak (alternative turning points) to the average of these 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. See this appendix for the definition of the turning points. Trends are calculated with data up to 2020.Q3.

Figure C.1: LA-5: Alternative Downturns in Perspective



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 in percentage change. In Colombia, informal employment is our baseline measure based on the size of the establishment only; see the country notes. We are using the baseline turning points for these alternative downturns; see Table C.2. In Colombia, the slight increase in the employment rate conforms with the discussion in Arango et al. (2015), Cuadro 6, p. 12.

Figure C.2: Panel Structure in the ENOE, ETOE, and ENOE^{N}



Notes: Each row represents a sample of households entering the survey for the first time (first interview, N1) in the period 2018.Q4-2020.Q3. In principle, the sample used in the calculation of the gross flows in two consecutive quarters amounts to 80% of the total sample in a given quarter. For example, to calculate the flows of individuals 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 (N1); see black square. This rotation panel has been part of the ENOE design since 2005.Q1 up to 2020.Q1 based on face-to-face interviews. In 2020.Q2, INEGI conducted the survey by telephone with the exception of part of the June sample, which was conducted in a face-to-face basis. The design of the ETOE (telephone version of the ENOE) allows tracking households in two consecutive months. We are using all ETOE sample except the sample of households whose first (face-to-face) interview N1 took place in June (not shown). The ENOE^{N} conducted in 2020.Q3 is a combination of face-to-face and telephone surveys. We are using interviews by telephone only, allowing tracking households in a monthly basis as well.

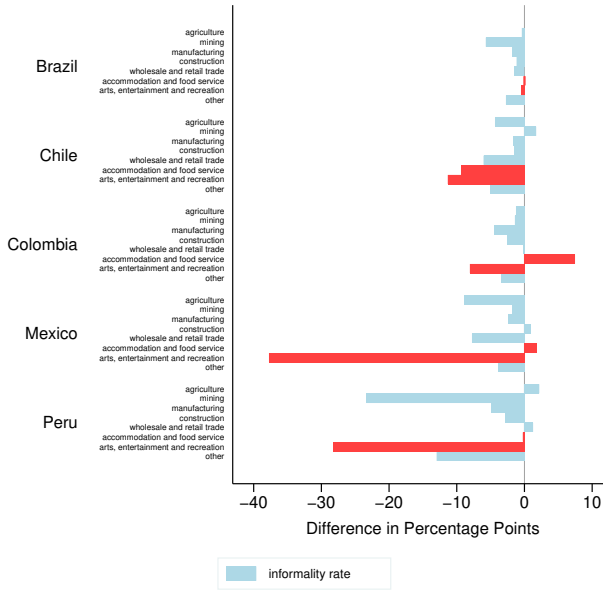
Table C.5: Two Non-Conventional Margins in the Pandemic Recession in LA-5, in Percentage Change

Country	Recession/ Downturn	Overall Employment Rate			Informal Employment Rate			Formal Employment Rate		
		1	2	3	1	2	3	1	2	3
Brazil	2014.Q2/2016.Q4	−5.7	−5.1	-	−1.2	−1.1	-	−9.9	−8.8	-
	2019.Q2/2020.Q2	−25.0	−12.3	-	−28.9	−16.3	-	−20.5	−7.8	-
	2019.Q2/2020.Q3	−15.7	−13.8	-	−17.6	−16.2	-	−13.6	−11.2	-
Chile	2016.Q1/2017.Q2	7.8	−0.1	-	-	-	-	-	-	-
	2019.Q2/2020.Q2	−32.1	−21.6	-	−43.3	−36.6	-	−27.8	−15.9	-
	2019.Q2/2020.Q3	−27.7	−19.5	-	−35.9	−31.6	-	−24.5	−14.9	-
Colombia	2008.M1/2009.M1	0.1	0.4	-	5.5	4.7	-	−8.8	−6.6	-
	2019.M5/2020.M5	−35.5	−23.1	-	−39.2	−25.3	-	−30.2	−20.0	-
	2019.M5/2020.M8	−14.5	−12.5	-	−14.6	−12.5	-	−14.4	−12.6	-
Mexico	2008.Q1/2009.Q2	−2.3	−2.2	−2.4	1.4	1.4	0.9	−6.8	−6.7	−6.6
	2019.Q2/2020.Q2	−29.7	−19.0	−6.7	−31.3	−26.7	−4.6	−27.4	−10.0	−9.4
	2019.Q2/2020.Q3	−12.0	−9.5	−5.5	−13.3	−13.0	−5.9	−10.4	−5.3	−4.9
Peru	2013.Q2/2017.Q2	−3.3	−3.6	-	−7.0	−7.1	-	7.0	6.1	-
	2019.Q2/2020.Q2	−44.2	−40.7	-	−40.2	−38.3	-	−54.1	−46.3	-
	2019.Q2/2020.Q3	−19.3	−18.0	-	−14.1	−13.8	-	−31.7	−27.8	-

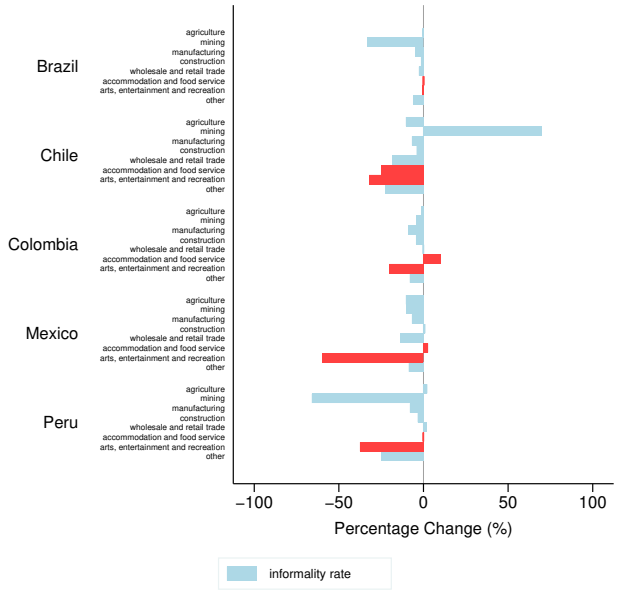
Notes: For Chile, the increase in the counterfactual of column 1 during the previous downturn is due to seasonality in the number of absent employees. The relevance of the same margin during the pandemic recession could be associated with the Employment Protection Law, enacted in April 2020.

Figure C.3: LA-5: Informality Rates By Sector in the Pandemic Recession

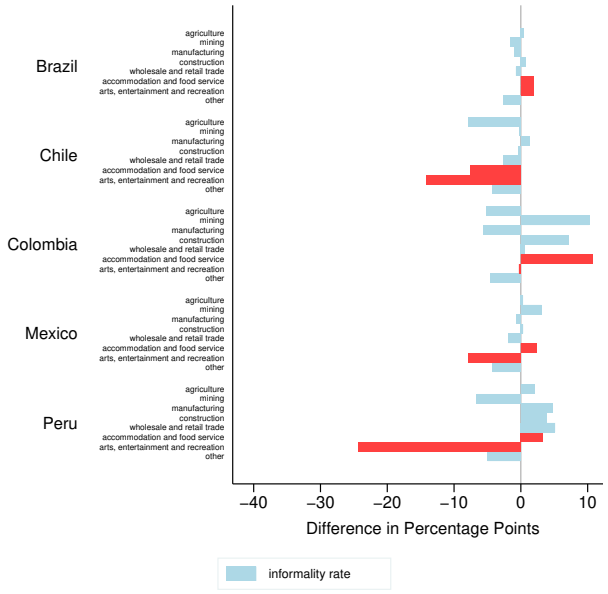
Panel A: Absolute Changes 2019.Q2/2020.Q2



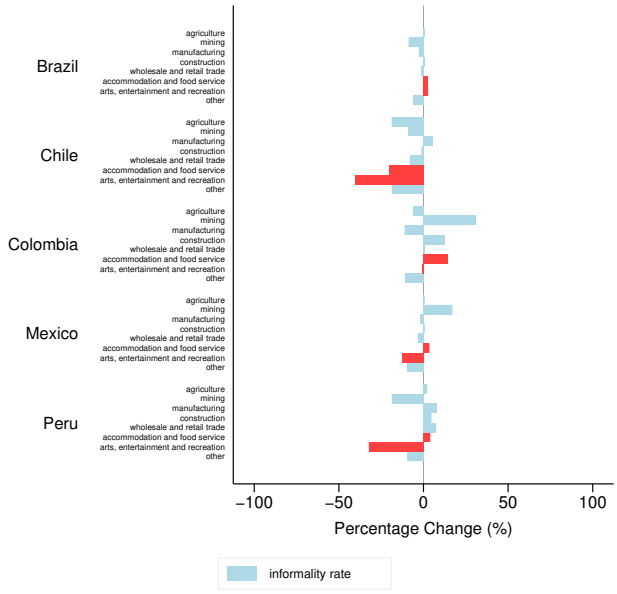
Panel B: Relative Changes 2019.Q2/2020.Q2



Panel C: Absolute Changes 2019.Q2/2020.Q3



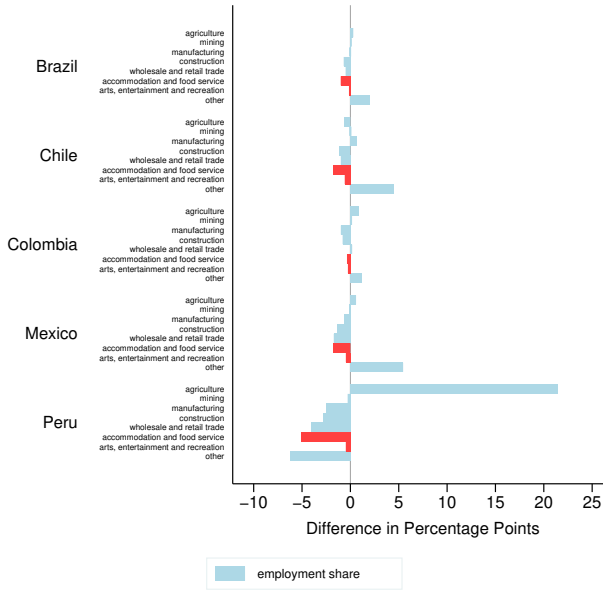
Panel D: Relative Changes 2019.Q2/2020.Q3



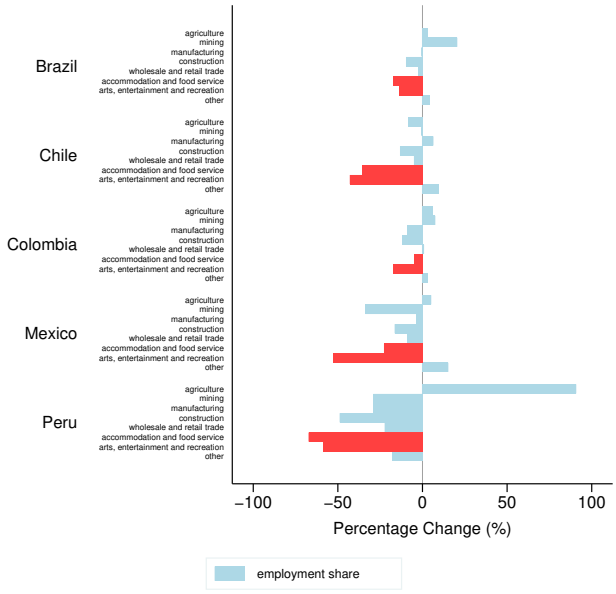
Notes: Own calculations based on LA-5's household and employment surveys, using appropriate survey weights. The characteristics of each survey are summarized in Table C.1. For the construction of these labor markets, see the country notes in the appendix. Panels A and C show the change in the informality rate in percentage points and panels B and D in percentage change. In Colombia, informal employment is our baseline measure based on the size of the establishment only; see the country notes. Bars in red highlight changes in the informality rate in two contact-intensive sectors: "accommodation and food service" and "arts, entertainment and recreation".

Figure C.4: LA-5: The Pandemic Recession by Sector

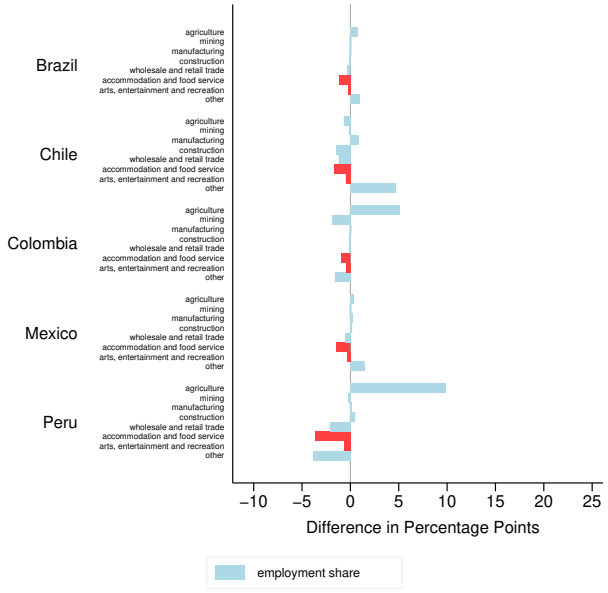
Panel A: Absolute Changes 2019.Q2/2020.Q2



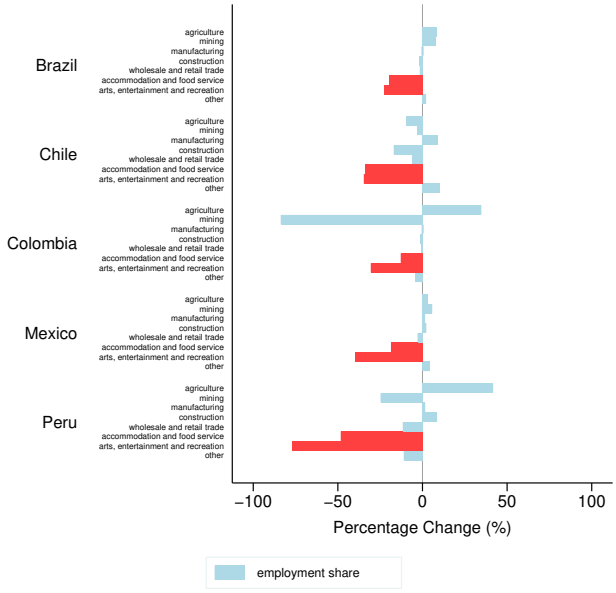
Panel B: Relative Changes 2019.Q2/2020.Q2



Panel C: Absolute Changes 2019.Q2/2020.Q3



Panel D: Relative Changes 2019.Q2/2020.Q3



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 C show the change in the employment share in percentage points and panels B and D in percentage change. Bars in red highlight changes in the employment share in two contact-intensive sectors: "accommodation and food service" and "arts, entertainment and recreation".