



International
Labour
Organization



European
Commission

Background paper n°18

November 2023

► Examining persistent labour force transitions during the COVID-19 pandemic

Evidence from four developing countries

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Background Paper Series of the Joint EU-ILO Project
"Building Partnerships on the Future of Work"

- ▶ Examining persistent labour force transitions during the COVID-19 pandemic

► Abstract

This paper examines the labour market transitions during the two years of COVID-19 pandemic in four developing countries: Argentina, Mexico, South Africa, and Viet Nam. Before the pandemic, these countries presented a variety of labour market characteristics and, during the pandemic, distinct measures to contain the spread of virus. To estimate the transitions, we present a pseudo-panel approach using repeated cross-sectional data. Our findings show that by the second half of 2022, labour force participation was still 2 to 5 percentage points below the pre-pandemic level. This persistent loss is found even in Viet Nam, a country that applied more effective measures to contain the virus. In all countries, a common factor preventing workers from returning to the labour force was age. Workers under 35 and over 50 years old were more likely to stay inactive than other workers, unless they move to the informal sector. Although informal employment recovered faster than formal employment, we also observe net transitions of formal workers to informal employment. Results per education and gender groups vary across countries.

Keywords: labour market transitions, COVID-19, labour force participation, informality, pseudo-panel analysis.

JEL: C23, C81, J21, J69

The author thanks Guillaume Delautre for providing comments and suggestions and helping with the collection of additional data.

The views expressed in this background paper are those of the authors and do not necessarily represent the views of the organizations where the researchers are based.

1. Introduction

The COVID-19 pandemic had immediate and unprecedented effects on employment and labour force participation (LFP) in developed and developing countries (Couch, Fairlie, and Xu, 2020; Adams-Prassl et al., 2020b; Galasso and Foucault, 2020; Egger et al., 2021). Khamis et al. (2021) and Bundervoet, Dávalos and Garcia (2022) estimate that in the second quarter of 2020, more than 30 percent of workers in developing economies stopped working, and more than 60 percent reported income loss in their household.¹ Although sectors that rely on personal interaction were hit the hardest, job losses tended to propagate across other sectors given the reduced demand (Guerrieri et al., 2022). Empirical evidence points to a mechanism in which high-income individuals reduce spending sharply, decreasing the revenue of small businesses and causing widespread job losses (Chetty et al., 2020; Aum, Lee, and Shin, 2021a, 2021b). According to Coibion, Gorodnichenko, and Weber (2020) and the ILO (2021), though, the wave of job losses early in the pandemic did not necessarily increase unemployment rates. Instead, a large proportion of workers left the labour force, increasing inactivity.

After the first wave of infections, in the third quarter of 2020, employment levels presented significant recovery in many economies (e.g., Chetty et al., 2020; Hoehn-Velasco, Silverio-Murillo, and Miyar, 2021; Deshpande, 2022). However, many factors, such as increasing infection rates, continuous lockdowns, closure of schools and childcare centres, and transfer schemes, prevented a faster recovery in labour markets. Moreover, the recovery was quite heterogeneous across countries and demographic groups (e.g., Dang, Nguyen, and Carletto, 2023; Acevedo et al., 2021; Aldan, Çıraklı, and Torun, 2021).

In this paper, we examine how employment and LFP changed throughout the pandemic in four developing countries: Argentina, Mexico, South Africa, and Viet Nam. The purpose is to assess the persistent changes in LFP and working status of different types of workers, even after great part of the population had been vaccinated against the COVID-19 virus. This study covers the period between the second quarter of 2020 and the third quarter of 2022, using data starting in 2016 to capture pre-pandemic trends and differences across population groups. After estimating a difference-in-differences (DID) model for each country separately, we calculate net transition rates for different groups, such as men and women, young and old workers, more and less educated workers, and formal and informal workers.

The four selected countries present a wide range of pre-pandemic characteristics and public responses to the health crisis.² Argentina used to be classified as a high-income country by the World Bank until 2019. However, after a decade of frequent recessions, its gross domestic product (GDP) had grown only 1.4 per cent a year, on average, and the country is now classified as an upper-middle-income country. Still, it has the highest GDP per capita in our sample. About 80 per cent of its workers are employed in services, while the 20 per cent remaining is almost entirely employed in the industrial sector. Before the pandemic, the unemployment rate was almost 10 per cent, nearly 50 per cent of the employed workers were in the informal sector, and LFP was about 60 per cent, with a gender gap of 21 percentage points (p.p.).

Mexico has the second highest GDP per capita in our sample and is also classified as an upper-middle-income country. From 2010 to 2019, its GDP grew on an average of 2.7 per cent a year, which is the second highest growth rate in our sample. About 8 per cent of its workers are still employed in agriculture, 29 per cent are employed in the industrial sector, and 63 per cent are employed in services. Before the pandemic, the unemployment rate was 3.5 per cent, 58 per cent of the employed workers were in the informal sector, and LFP was 60 per cent, with a gender gap of 32 p.p.

South Africa is also an upper-middle-income country, but its GDP per capita is lower than Argentina's and Mexico's. From 2010 to 2019, its GDP grew on an average of 1.7 per cent a year, which is higher than Argentina's growth rate but lower than Mexico's. Compared to Mexico, South Africa has a lower share of workers employed in the agricultural and industrial sectors — 6 per cent in agriculture and 22 per cent in industry — and a higher share in services, about 72 per cent. Before the pandemic, its unemployment rate, at 28.5 per cent, was the highest in our sample, but the share of informal employment, 40.5 per cent, was the lowest. South Africa also had the lowest LFP rate in the sample, around 55 per cent, and the second lowest gender gap in LFP, close to 14 per cent.

Viet Nam is a lower-middle-income country, but for the last two decades, its economy has grown over 6 per cent a year, on average. Still, almost 35 per cent of workers are employed in agriculture and 30 per cent in the industrial sector. Thus, it has the smallest service sector participation in our sample. Before the pandemic, Viet Nam had the lowest

¹ See Brouder et al. (2021) and Miguel and Mobarak (2022) for a review of broader short-term impacts of the pandemic in developed and developing countries, respectively.

² See Table A1 of the Appendix.

unemployment rate, at 1.7 per cent, and the highest LFP rate, almost 76 per cent, with the lowest gender gap in LFP, around 10 p.p. However, it also had the highest informality, with almost 70 per cent of workers informally employed.

During the pandemic, the spread of the virus and the number of resulting deaths also vary considerably among those four countries. Argentina had the largest rates of confirmed COVID-19 cases and deaths. By the second quarter of 2022, Argentina accumulated nearly 200 thousand confirmed cases and 3,000 deaths per million people, caused by three waves of infection: from May to December 2020, from January to October 2021, and from December 2021 to March 2022. In Mexico, the number of cases started to grow earlier than in the other countries, resulting in the second largest rate of confirmed deaths, over 2,500 deaths per million people by April 2022. This country faced four waves of infection: from April to September 2020, from October 2020 to May 2021, from June to November 2021, and from January to April 2022. South Africa also had four waves of infection: from May to October 2020, from November 2020 to March 2021, from May to October 2021, and from December 2021 to March 2023. By April 2023, the COVID-19 mortality rate in South Africa was close to 1,700 deaths per million people. In Argentina, Mexico, and South Africa, the second wave of infection was the deadliest.

Unlike the other countries, Viet Nam was able to contain the spread of the virus for more than a year. This early success was due to a combination of measures, such as early lockdowns, travel restrictions, mask-wearing mandates, and guidelines for contact tracing, testing, and isolation (Huynh, 2020; Van Tan, 2021; Hoang, 2022). However, the country did not suppress the virus forever. The first wave of infections started in June 2021, lasting until October 2021, while the second wave went from November 2021 to April 2022. Despite the quick spread of COVID-19 late in 2021, the mortality rate stayed close 400 deaths per million people, which is one-fourth the rate in South Africa and one-seventh the rate in Argentina.

Figure 1 – Daily new confirmed COVID-19 deaths per million people



Source: WHO COVID-19 Dashboard. Available at <https://ourworldindata.org>.

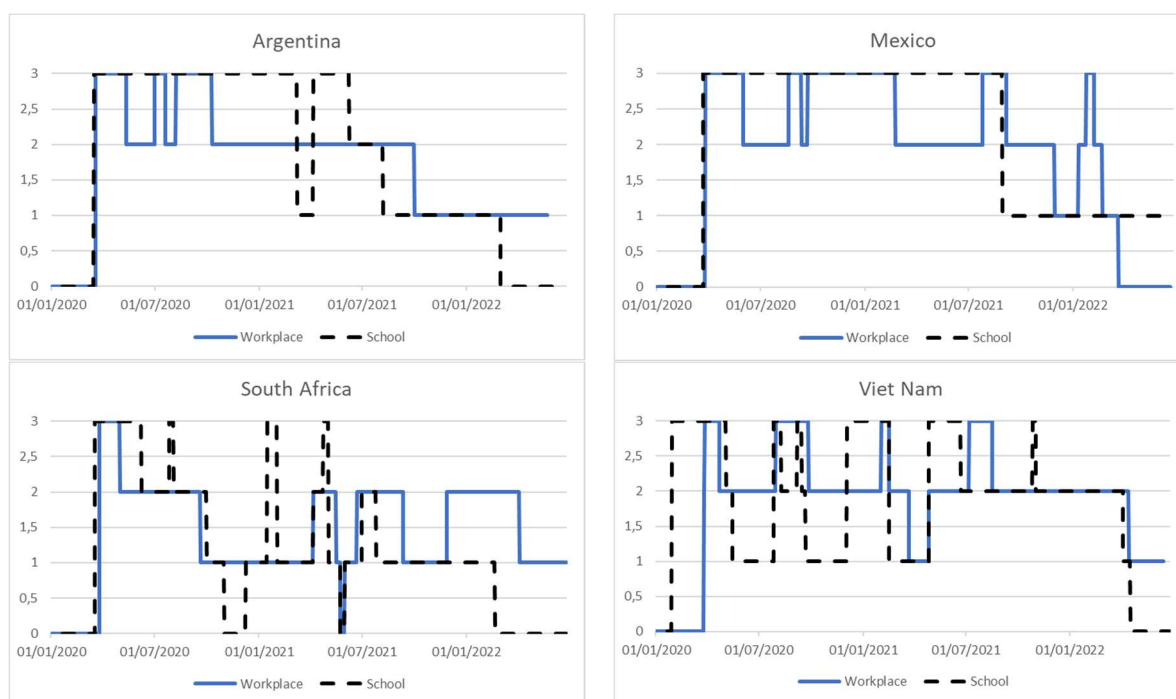
Note: Number of daily deaths estimated using 7-day rolling average. Due to varying protocols, the number of confirmed deaths may not accurately represent the true number of deaths caused by COVID-19.

In terms of enforced workplace closures, all the four countries adopted the highest level of stringency³ (level 3 – closing all but essential workplaces) early in the pandemic. However, the phasing out of restrictive workplace measures varied significantly. In 2020 and 2021, the most stringent workplace restrictions were enforced in Mexico. In the first 12 months,

³ Following the Oxford COVID-19 Government Response Tracker, workplace closures stringency is measured as categorized as follows: Level 0 - No measures, level 1 - Recommend closing (or work from home), level 2 - Require closing (or work from home) for some sectors or categories of workers, level 3 - Require closing (or work from home) for all but essential workplaces (e.g., grocery stores, doctors).

the Mexican government often kept the restrictions at level 3. Afterwards, it moved the restrictions to level 2 (required for certain sectors and occupations), with a short period at level 3 in September 2021. In December 2021, it moved to level 1 (only recommended), with a short period at levels 2 and 3. In Argentina, the workplace restrictions were the second most stringent in 2020. Through October 2020, it kept restrictions at level 3, with two short periods at level 2. After that, it lowered the restriction to level 2 for 12 months, and then to level 1. In Viet Nam, workplace restrictions quickly dropped to level 2 early in the pandemic, but the government had to raise the level of restrictions in three occasions again: October 2020, February 2021, and July 2021. There was also a short period, in May 2021, when the restriction level dropped to 1. It was only after March 2022 when restrictions permanently dropped to level 1. In South Africa, workplace restrictions also quickly dropped to level 2 early in the pandemic. However, unlike Viet Nam, restrictions later fluctuated between levels 2 and 1.

Figure 2 – Degree of workplace and school closure in response to the COVID-19 pandemic



Source: Oxford COVID-19 Government Response Tracker.

The present study shows that, by containing the virus, Viet Nam suffered a much lower reduction in LFP early in the pandemic. Its LFP decreased by only 5 p.p., whereas in the other three countries, LFP decreased by more than 10 p.p.⁴ After the initial shock, though, two other results emerge. First, all countries but Viet Nam presented a sudden but partial workforce recovery in the second half of 2020. This pattern indicates that great part of the initial decline in LFP was caused by fear and uncertainty.⁵ Although the pandemic worsened, the workforce loss was not as large as in the first months. Second, by the third quarter of 2022, LFP remained between 2 and 5 p.p. below the pre-pandemic level. This persistent loss is observed in all countries, including Viet Nam, and does not seem related to more stringent workplace restriction. For instance, South Africa, the country with the most lenient measures, had the largest loss in LFP in 2022. On the other hand, Mexico, the country with the most stringent workplace restrictions, had the quickest recovery. These findings reinforce the evidence that employment losses were mostly caused by the fear of infection rather than business closures and lockdowns (see Aum, Lee, and Shin, 2021a, 2021b).⁶

⁴ According to Dang, Nguyen, and Carletto (2023), though, the pandemic significantly increased the proportion of workers earning below-minimum wages in Viet Nam, rising wage inequality.

⁵ See Yu, Xiao, and Li (2020) for evidence on the relationship between LFP and uncertainty during an epidemic.

⁶ See also Angelucci et al. (2020), Forsythe et al. (2020), Goolsbee and Syverson (2021), Casarico and Lattanzio (2022).

In countries where the virus spread faster, informal employment declined more than formal employment early in the pandemic. At first glance, this finding is in line with the prediction that informal workers would suffer the biggest shocks (Acevedo et al., 2021; Alfaro, Becerra, and Eslava, 2020).⁷ However, only in Argentina the informal workers were more likely to leave the workforce than the formal ones. In Mexico and South Africa, the net transitions reveal that formal workers were more prone to move out of the workforce than informal workers. The reason informal employment declined in these countries is because informal workers showed a net transition to formal employment, occupying the space of formal workers who left the labour force. In Viet Nam, the country with the most effective measures against COVID-19, formal workers presented a net transition to the informal sector, while informal workers were more likely to leave the workforce.

In all four countries, informal employment recovered faster than formal employment by the second half of 2022, with more significant differences in Mexico and Viet Nam. But the transition patterns during recovery vary. In Mexico and Argentina, we observe a net transition of informal workers to formal employment and of formal workers to informal employment. In both countries, those unemployed before the pandemic were more likely to stay out of the workforce. In South Africa, formal and informal workers were more likely to stay out of the workforce or transition to unemployment, while the unemployed transitioned to the formal and informal sectors. In Viet Nam, formal workers were the most likely to return, but mostly to the informal sector. In summary, the composition of workers in the formal and informal sectors changed considerably after two years of the global pandemic.

In terms of population groups, we find that young workers, under 35 years old, were highly affected early in the pandemic.⁸ Moreover, by the second half of 2022, this group was still more likely to stay out of the workforce than those between 36 and 50 years. In the four countries, the difference between these age groups seems related to the fact that younger workers exhibited a slower return to the formal sector. Although workers over 50 were not initially affected as much as younger workers in Argentina, Mexico, and South Africa, they were even less likely to return to the workforce in 2022 than those under 35.⁹ In Viet Nam, older workers were rather more likely to return but mostly to the informal sector. Based on our results, age appears to be a common factor preventing individuals from returning to the workforce, mostly due to the low formal employment of younger and older cohorts.

In the first quarter of the pandemic, women were 1 p.p. more likely to leave the workforce than men in Argentina and Viet Nam. But in Mexico, men were 4 p.p. more likely to leave the workforce than women, while in South Africa, no difference is found. Through the first half of 2022, the higher effect on women only persisted in Argentina. This persistency was related to a slower return of female workers to the informal sector. In Viet Nam, the country with the lowest gender gap in LFP, men were more likely to stay out of the workforce in 2022. This gender difference was related to a faster return of women to the informal sector. Overall, these findings seem not to corroborate the hypothesis that the effects on LFP were gender-biased (Alon et al., 2020, 2021, 2022; Dang and Viet Nguyen, 2021).¹⁰

Some studies predicted that the health crisis would have larger effects on less educated workers (e.g., Hoynes, Miller, and Schaller, 2012; Casarico and Lattanzio, 2022). Our results partially confirm this prediction, but the evidence varies across countries. In all countries but Viet Nam, workers with secondary education or less were more prone to leave the workforce in the first quarter of the pandemic. In Viet Nam, the reduction in LFP was the highest among those with tertiary education, who mostly left the formal sector, followed by those with primary education or less, mostly leaving the informal sector. The comparison of Viet Nam with other countries indicates the initial spread of virus had higher impacts on less educated workers.¹¹

Later in the pandemic, less educated workers were still more likely to stay out of the workforce in Mexico and South Africa. In Argentina and Viet Nam, no significant difference across education levels is observed in 2022. In these countries, however, workers re-entered the labour force in different ways based on their education. In Argentina, less educated workers were more likely to find an informal job, while highly educated workers were less likely to have an informal job.

⁷ See also Crossley, Fisher, and Low (2021) and Cueva, Del Carpio, and Winkler (2021).

⁸ This finding is consistent with the evidence in developed countries (e.g., Montenegro et al., 2022; Lee, Park, and Shin, 2021).

⁹ Similar evidence is found in the United States (see Bui, Button, and Picciotti, 2020; Cortes and Forsythe, 2023; Davis et al., 2023) and in Turkey (Aldan, Çıraklı, and Torun, 2021). Our findings are in line with Hoehn-Velasco, Silverio-Murillo, and Miyar (2021), who study the impact of COVID-19 on formal employment in Mexico.

¹⁰ See also Cueva, Del Carpio, and Winkler (2021) for evidence on gender-specific effects in Peru, Aldan, Çıraklı, and Torun (2021) for Turkey, Cateia, Savard, and de Oliveria Almeida (2022) for Brazil, and Deshpande (2022) for India.

¹¹ This finding is consistent with the evidence presented by Dang, Nguyen, and Carletto (2023) for Viet Nam.

In Viet Nam, though, better education was correlated with higher informal employment, higher unemployment, and lower formal employment.

Overall, this paper contributes to a better understating of labour market recoveries during health crises (Albanesi and Kim, 2021; Cortes and Forsythe, 2023; Alon et al., 2022). It shows that not every prediction presented by other studies consistently happened in developing countries. The pre-pandemic characteristics of the labour market, the public responses to the pandemic, and the spread of virus might explain the differences across countries. In terms of LFP, the only groups who were consistently impacted two years after the pandemic started were workers under 35 and over 50.

Another contribution is the proposed method to estimate net transition in the labour market. Accordingly, by only using repeated cross-sectional data, one can verify the flow of workers in and out of formal employment, informal employment, unemployment, and workforce. Indeed, our results confirm that conclusions based on aggregate participation rates may diverge from the conclusions based on net transitions.

2. Data

The microdata used in this study come from quarterly household and labour force surveys. Namely the Permanent Household Survey for Argentina (EPH), the National Occupation and Employment Survey for Mexico (ENOE), and the National Labour Force Surveys of South Africa and Viet Nam (LFS). These surveys cover the period between the first quarter of 2016 and the third quarter of 2022, except for Argentinian EPH, which stops in the second quarter of 2022.

These data are obtained from the ILOSTAT microdata repository. Since 2016, the ILO Department of Statistics has systematically processed microdata from household and labour force surveys to increase the coverage and improve the international comparability of statistics published on ILOSTAT. This repository provides up to 100 comparable variables that follow international concepts and definitions to the greatest extent possible (ILO, 2018). Given the different methodologies, these variables are not available for all countries.

From the variables that are available and comparable in the four surveys, we collect four outcomes of interest: LFP, unemployment, formal employment, and informal employment. For each subject in the sample, LFP equals one if they have worked in the last seven days, including those temporarily absence from a job, looked for work in the last 30 days, or are available to take up employment within 14 days, and zero otherwise. Unemployment equals one if they have looked for work in the last 30 days or are currently available to take up employment and have not worked in the last seven days. Formal employment equals one if they have worked in the last seven days and their employment relationship is subject to social protection or entitlement to employment benefits (e.g., paid holidays and sick leave). This category also includes independent workers working in a formal sector enterprise (i.e., a firm registered with the national competent authority). Informal employment equals one if they have worked in the last seven days and their employment relationship is not subject to social protection or entitlement to employment benefits. This category also includes independent workers working in an informal sector enterprise and contributing family workers.

It is worth noting that this categorization is not equivalent to aggregate rates of unemployment and formal/informal employment, whose sum equals one. Instead, for each individual, the sum of unemployment, formal employment, and informal employment must equal their LFP. Accordingly, we can estimate workers' transitions into and out of the labour force, as described below.

Furthermore, the terms formal/informal employment and formal/informal sector are interchangeably used throughout the paper. For the ILO, formal/informal sector refers to the nature of the economic unit (or firm), while formal/informal employment refers to the nature of job. Following these definitions, an informal worker can be employed in the formal sector and a formal worker can be employed in the informal sector. To facilitate the narrative and avoid any confusion, this paper refers to formal/informal sector as the nature of job.

For the covariates in our model, we also collect information on individuals' education, year of birth, gender (biological sex), and location. Following the International Standard Classification of Education (ISCE), we classify education into four categories: primary or no formal education, lower secondary education, upper secondary education, and tertiary education or higher. From the South African LFS, we also collect race, split into three categories: white, Black, and other (including Asians and Coloured people). Based on the year of birth, we restrict the sample to individuals born between 1960 and 1995, who were between 25 and 60 years old in 2020.

Given the available information and sample size, the definition of location varies across surveys. For South Africa and Viet Nam, we define location as the province of residency, distinguishing urban and rural areas. In Argentina, the sample only includes individuals living in urban areas, and the location is split into six major regions (Greater Buenos Aires, Cuyo,

Northeast, Northwest, Pampeana, and Patagonic). Within these regions, the sample is also split into metropolitan and non-metropolitan areas. Mexico is the only country for which we define location as the province of birth. Ideally, we should use area of birth for all countries in our pseudo-panel analysis because it is a characteristic that individuals cannot change. However, this variable is collected only in Mexico.

3. Empirical method

3.1. Event study

The average impact of the COVID-19 pandemic is estimated using an event study approach, as follows:

$$y_{iqt} = \lambda \cdot D_t + \kappa \cdot t + \mu_q + \epsilon_{iqt}, \quad (1)$$

where y_{iqt} is the outcome of interest (i.e., LFP, unemployment, and formal and informal employment), i represents the individual, q is the quarter of the year, and t represents time, measured in quarters. A dummy variable, D_t , indicates the period of exposure to the shock, and ϵ_{iqt} is a zero-mean random term. In this equation, coefficient κ describes the linear trend in y_{it} before the pandemic, μ_q is the quarter-specific effect, and λ represents the deviation from the trend during the pandemic. To facilitate the interpretation of coefficients, variable t is set to be zero in 2020Q1, negative before 2020Q1, and positive after.

Since the impact on labour markets varies throughout the pandemic, D_t is rather a set of dummies indicating five periods: **first shock**, which comprises the first quarter of the pandemic (2020Q2); **first, second, and final thirds**, which considers the last two quarters of 2020 (2020Q3-4), the first two quarters of 2021 (2021Q1-2), and the last two quarters of 2021 (2021Q3-4), respectively; and **recovery**, which considers the first three quarters of 2022 (2022Q1-3). We call this last period recovery because by 2022Q2 most of the restrictions to schools and workplaces had been relaxed.

3.2. Difference-in-differences

To investigate the impact of the pandemic on distinct demographic groups, we also estimate the following DID model:

$$y_{iqt} = \gamma'(X_i \cdot D_t) + \theta'(\hat{Z}_{i0} \cdot D_t) + \beta'_0 X_i + \beta'_1 (X_i \cdot t) + \alpha'_0 \hat{Z}_{i0} + \alpha'_1 (\hat{Z}_{i0} \cdot t) + \mu_{qt} + \epsilon_{iqt} \quad (2)$$

where X_i represents time-invariant cohort characteristics, $\hat{Z}_{i0}$ represents cohort conditions when the pandemic started ($t = 0$), μ_{qt} is a set of period-specific effects (i.e., a dummy for each quarter-year), and ϵ_{iqt} is a zero-mean random term. While vector X_i includes gender, year of birth, and education, vector $\hat{Z}_{i0}$ includes the pre-pandemic probabilities of being unemployed and formally working conditional on being in the labour force. The effects of $\hat{Z}_{i0}$ are compared to the situation of being employed in the informal sector (omitted condition).

In the DID model, period-specific effects, μ_{qt} , capture how labour force outcomes have changed on average for all demographic groups. If the purpose is to compare different groups, this term controls for everything else affecting these groups' outcomes that is unrelated to their characteristics. Similarly, terms $\beta'_0 X_i$ and $\alpha'_0 \hat{Z}_{i0}$ control for pre-pandemic differences across groups so that the post-pandemic differences result from the shock.

In addition to the pre-pandemic differences, it is also important to control for pre-pandemic trends in different groups. For instance, suppose that LFP has grown faster among women in recent years. Without controlling for this trend, one may infer that the gender gap in LFP declined following the pandemic. Accordingly, terms $\beta'_1 (X_i \cdot t)$ and $\alpha'_1 (\hat{Z}_{i0} \cdot t)$ control for (linear) pre-pandemic trends in labour force outcomes that are related to cohort characteristics.

As we control for common time-varying factors and baseline differences and trends, the interaction between cohort characteristics and the pandemic period, $(X_i \cdot D_t)$ and $(\hat{Z}_{i0} \cdot D_t)$, are used to infer how differences across groups changed during the pandemic. That is, coefficients γ and θ represent the distinctive effect the pandemic had on specific groups compared to others. For example, if X_i is equal to one for females and zero for males, γ tells how much the women's rate changed in the pandemic in comparison to men's.

In terms of cohort characteristics, there is a distinction between invariant individual attributes (X_i), such as birth year, gender, and education, and pre-pandemic characteristics ($\hat{Z}_{i0}$), such as unemployment and formal employment. While

individual attributes vary very little over time, some characteristics are quite volatile. For example, we can certainly assume that the vast majority of women born in 1975 who have a college degree before the pandemic still belonged to this group after the pandemic. Hence, based on those attributes, we can compare the same group of individuals over time. On the other hand, we cannot assume that those who had been formally employed before the pandemic were still in the same condition after. That is, the population of formal workers is not the same. Thus, the best we can do is to control for the status before the pandemic started.

The problem is that the data do not come from true panels. Hence, for individuals observed during the pandemic, we do not know their labour force status before the pandemic. The solution is to estimate their pre-pandemic status (i.e., unemployed and formally employed), Z_{i0} , based on their attributes, W_i (Deaton, 1985, Moffitt, 1993). To do so, we use the sample of individuals observed in 2016-2019 to estimate the following model:

$$Z_{it} = \delta' W_i + \pi_{qt} + v_{it} \quad \text{with } t \leq 2019Q4,$$

where W_i is the combination of time-invariant characteristics in X_i (i.e., gender, year of birth, education), location and an exhausted set of two-way and three-way interactions between these variables, π_{qt} is a set of period-specific effects (i.e., a dummy for each quarter-year), and v_{it} is a zero-mean random term. Then, for each subject whose W_i is observed in any period, the estimated pre-pandemic conditions are given by:

$$\hat{Z}_{i0} = \hat{\delta}' W_i + \hat{\pi}_{2019Q4},$$

where $\hat{\delta}$ and $\hat{\pi}_{2019Q4}$ are ordinary least squares (OLS) estimators.

In principle, the DID model could be estimated using W_i instead of $\hat{Z}_{i0}$. However, W_i is a high-dimensional vector and the interpretation of the resulting DID coefficients would be cumbersome. Instead, in addition to cohort attributes, X_i , pre-pandemic working conditions, $\hat{Z}_{i0}$, are assumed to be the mediator through which interactions between cohort attributes and location affect the main outcome, y_{it} .

Below, we present results based on two separate models. To investigate how labour force status changed with respect to cohort attributes, X_i , we estimate a DID model without including $\hat{Z}_{i0}$. That is, we focus on the unconditional relationship between attributes (gender, year of birth, and education) and changes in y_{it} because the conditional relationship would be hard to interpret. However, to examine the relationship between changes in labour force status, y_{it} , and initial conditions, $\hat{Z}_{i0}$, we control for cohort attributes, X_i . That is, conditional on gender, year of birth, and education, we can understand how initial unemployment and formal employment influenced workers' status during the pandemic.

3.3. Calculating net transitions

After estimating the event study model and the DID model, we use their parameters to calculate the transition of workers across labour force statuses between the first quarter of 2020 and the post-pandemic periods. Since we work with repeated cross-sectional data, we are not able to estimate individual probabilities of changing working conditions (i.e., gross transitions). Instead, we focus on the net changes across cohorts, identified through X_i and $\hat{Z}_{i0}$. That is, we examine how the proportion of individuals in each condition changes per cohort and ignore that, within cohorts, individuals switch conditions with each other (Ribas, 2023).

For a certain outcome (i.e., LFP, unemployment, or formal/informal employment), the estimated λ in the event study gives the average change from 2020Q1 to some post-pandemic period (e.g., first shock and recovery). Since for each individual the sum of unemployment and formal and informal employment must be equal to LFP, the sum of effects across these outcomes must be zero. Namely, on average, individuals must transition from one category to another.

To estimate the net transition per cohort attribute, we combine the event study coefficient, λ , with the DID coefficient, γ . For instance, let γ^f capture the difference between female and male workers after the pandemic. Then the net transition for female workers is:

$$\tau^f = \lambda + (1 - \bar{x}^f) \gamma^f,$$

and the net transition for male workers is:

$$\tau^m = \lambda - \bar{x}^f \gamma^f,$$

where $\bar{x}^f$ is the estimated proportion of women in the population. Notice that the original DID coefficient is the difference between women's and men's transition rates:

$$\gamma^f = \tau^f - \tau^m.$$

Below we present the transition rates for gender, education, and age groups.

We also calculate the transition rates with respect to the initial working status, using the DID coefficient θ . Let θ^u capture the effect of unemployment and θ^{fp} capture the effect of formal employment — both are compared to the effect of informal employment, conditional on being in the labour force. The reason we consider only individuals in the labour force is because we are not interested in the transition of those who were already inactive before the pandemic. Then the transition from unemployment to any status (represented by y_{iqt}) is given by:

$$\tau^u = \lambda + (1 - \bar{z}^u)\theta^u - \bar{z}^{fp}\theta^{fp},$$

the transition from formal employment is given by

$$\tau^u = \lambda + (1 - \bar{z}^{fp})\theta^{fp} - \bar{z}^u\theta^u,$$

and the transition from informal employment is given by

$$\tau^{ip} = \lambda - \bar{z}^u\theta^u - \bar{z}^{fp}\theta^{fp},$$

where $\bar{z}^u$ is the proportion of unemployed workers in the labour force before the pandemic and $\bar{z}^{fp}$ is the proportion of formal workers in the labour force before the pandemic.

4. Results

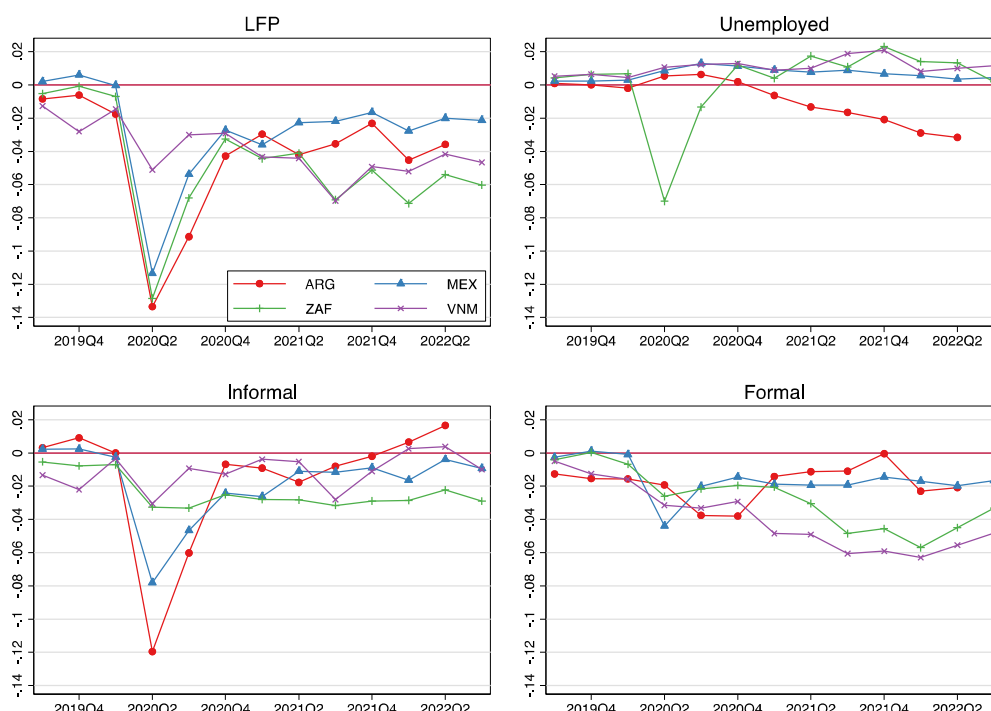
In this section, we first briefly present the evolution of the main labour force outcomes (LFP, unemployment, informal employment, and formal employment) since the end 2019 and throughout the pandemic. The main finding of this part is that by the third quarter of 2023, we continue to observe a persistent loss in LFP of at least 2 p.p. Then, we examine this persistent gap by analysing the net transitions derived from the DID model. The idea is to get a better understanding of who are the missing people in the labour force through the use of different variables (i.e., gender, age, education, and working status prior to the pandemic).

4.1. Descriptive event study

Figure 3 shows the different paths taken by the four countries since the outburst of the crisis in early 2020. In the first months of the pandemic, Argentina, Mexico and South Africa were particularly impacted with a reduction of more than 10 p.p. in LFP. In Viet Nam, the impact was much lower, around 5 p.p. Later in 2020, all countries presented a strong recovery, with the LFP loss dropping below 5 p.p. However, in the second half of 2021, while LFP kept rising in Argentina and Mexico, it dropped even further in South Africa and Viet Nam. By the third quarter of 2022, these countries still showed a persistent loss in LFP of at least 2 p.p. The gap was the smallest in Mexico, at 2 p.p., and the largest in South Africa, at 6 p.p. Even Viet Nam, which was less affected than the others initially, presented a persistent loss of more than 4 p.p. in the third quarter of 2022.

The initial shock in Argentina and Mexico was mostly followed by a reduction in informal employment. In South Africa, which had the lowest informality and the highest unemployment rate before the pandemic, the largest outflow was among unemployed workers. In Viet Nam, both formal and informal employment presented similar reduction early in the pandemic. Throughout the pandemic, though, the informal sector showed a faster recovery overall. In Argentina, the level of informal employment was even higher in 2022 than prior to the crisis. Argentina was also the only country where the number of unemployed workers declined during the pandemic. For the countries, unemployment has been slightly higher than before the pandemic.

Figure 3 – Event study of changes in labour force outcomes during the COVID-19 pandemic



Notes: This figure shows the estimated λ coefficients of equation (1). Regressions control for linear trend and quarter effects.

4.2. Estimated transition per demographic group

In the following tables (Tables 1 to 3), we separate the results for the labour force transitions into two periods: the initial shock (2020Q2) and the latest period (2022Q1-Q3). In both cases, the baseline period is 2020Q1. Each table presents the net transitions based on cohort characteristics — i.e., gender, age, and education. This allows us to identify the populations who were more affected initially by the crisis and those who continued to be affected two years after the start of the pandemic.

4.2.1 By gender

Table 1 presents the net transitions across labour force statuses for each gender. Early in the pandemic (left-hand panel), women were more likely to leave the workforce than men in Argentina and Viet Nam. In Argentina, the effect was higher on women because men were more prone to stay unemployed instead of inactive. In Viet Nam, the difference in the effect on LFP was because men were less likely to leave the informal sector. In Mexico, like in Argentina, we also observe an increasing unemployment among men. However, women were less likely to leave the formal sector in Mexico than men, causing women's LFP to be significantly less affected. In South Africa, formal female workers were also less likely to leave the workforce. But female workers in the informal sector presented greater outflow, offsetting the net effect on LFP.

Two years later, the picture is different — see right-hand panel of Table 1. In Argentina, women were still more likely to be inactive, but because male workers had grown their participation in the informal sector. In Viet Nam, on the other hand, women were more likely to return to the workforce through an increasing participation in the informal sector, while reducing their participation in the formal sector. In Mexico and South Africa, we do not observe gender differences in the LFP changes. However, in both countries, women were more likely to leave the informal sector and less likely to leave the formal sector than men.

Table 1 – Initial and persistent net transitions during the COVID-19 pandemic by gender

		Initial shock (2020Q2)				Persistence (2022Q1-Q3)			
				employed				employed	
		LFP	unemployed	informal	formal	LFP	unemployed	informal	formal
ARG	average	-0.1230*** (0.004)	0.0055*** (0.002)	-0.1258*** (0.003)	-0.0026 (0.002)	-0.0302*** (0.007)	-0.0311*** (0.002)	0.0038 (0.005)	-0.0028 (0.004)
	(1) male	-0.1173	0.0182	-0.1316	-0.0039	-0.0235	-0.0321	0.0122	-0.0036
	(2) female	-0.1283	-0.0064	-0.1205	-0.0015	-0.0364	-0.0301	-0.0041	-0.0022
	diff. (2) – (1)	-0.0110*** (0.003)	-0.0246*** (0.003)	0.0111* (0.005)	0.0025 (0.005)	-0.0128** (0.006)	0.0020 (0.005)	-0.0162* (0.009)	0.0014 (0.008)
MEX	average	-0.1134*** (0.002)	0.0072*** (0.001)	-0.0832*** (0.002)	-0.0375*** (0.001)	-0.0238*** (0.003)	0.0019 (0.001)	-0.0099*** (0.003)	-0.0159*** (0.001)
	(1) male	-0.1353	0.0158	-0.0864	-0.0647	-0.0209	0.0031	-0.0031	-0.0209
	(2) female	-0.0940	-0.0004	-0.0803	-0.0133	-0.0264	0.0010	-0.0159	-0.0115
	diff. (2) – (1)	0.0413*** (0.004)	-0.0162*** (0.001)	0.0062* (0.003)	0.0514*** (0.002)	-0.0055 (0.006)	-0.0021 (0.002)	-0.0128** (0.006)	0.0094** (0.004)
ZAF	average	-0.1283*** (0.003)	-0.0767*** (0.002)	-0.0305*** (0.002)	-0.0210*** (0.002)	-0.0498*** (0.005)	0.0023 (0.004)	-0.0234*** (0.003)	-0.0287*** (0.004)
	(1) male	-0.1284	-0.0765	-0.0283	-0.0237	-0.0481	0.0010	-0.0157	-0.0335
	(2) female	-0.1282	-0.0770	-0.0328	-0.0184	-0.0515	0.0035	-0.0311	-0.0239
	diff. (2) – (1)	0.0002 (0.003)	-0.0005 (0.002)	-0.0045* (0.002)	0.0052*** (0.002)	-0.0034 (0.005)	0.0024 (0.003)	-0.0154*** (0.005)	0.0096* (0.005)
VNM	average	-0.0491*** (0.004)	0.0077*** (0.001)	-0.0207*** (0.003)	-0.0361*** (0.005)	-0.0319*** (0.008)	0.0047** (0.002)	0.0083 (0.006)	-0.0449*** (0.009)
	(1) male	-0.0444	0.0078	-0.0165	-0.0356	-0.0381	0.0068	-0.0047	-0.0402
	(2) female	-0.0538	0.0077	-0.0248	-0.0367	-0.0257	0.0027	0.0212	-0.0496
	diff. (2) – (1)	-0.0094** (0.004)	-0.0001 (0.001)	-0.0083** (0.004)	-0.0010 (0.002)	0.0124* (0.007)	-0.0041** (0.002)	0.0259*** (0.006)	-0.0094** (0.004)

Notes: this table shows the net transitions in labour force statuses between 2020Q1 and 2020Q2 (left-hand panel) and between 2020Q1 and 2022Q1-Q3 (right-hand panel) based on gender. Transition rates are calculated using estimates for equations (1) and (2), as explained in Section 3.3. Robust standard errors clustered by quarter-year are in parentheses. ***, **, * represent statistical significance at the 1, 5, and 10 per cent levels, respectively.

4.2.2 By age groups

Table 2 presents the net transitions for different age groups. These groups are defined according to their age when the pandemic started. In the left-hand panel, we observe that the first impact of the pandemic on LFP was larger on younger cohorts in South Africa, Mexico and Argentina. While in South Africa the difference between the youngest and the oldest birth cohorts was over 5 p.p., in Mexico and Argentina it was around 1.5 p.p. The largest difference in South Africa is explained by an outflow of young unemployed workers. In Mexico and Argentina, though, unemployment in younger cohorts had increased. The greater outflow of younger cohorts from the workforce in Mexico is mostly explained by a larger reduction in informal sector participation. In Argentina, it is explained by a slightly larger reduction in formal and informal employment. A similar pattern observed in Mexico and South Africa is that workers over 51 years old were more likely to leave the formal sector.

Unlike in other countries, in Viet Nam workers over 51 years old were more likely to leave the workforce early in the pandemic than younger workers. Most of this difference is explained by a larger reduction in informal employment. In Viet Nam, workers under 35 were more prone to leave the formal sector and slightly more likely to become unemployed than older workers. After two years of pandemic (right-hand panel of Table 2), the differences across birth cohorts changed in Viet Nam. Workers who were over 51 when the pandemic started were more likely to return to the labour force. Those who were under 35 were more likely to stay out. These differences in LFP occurred because younger cohorts were less likely to be formally employed.

In South Africa, Mexico, and Argentina, workers over 51 were less likely to return to the labour force, followed by workers under 35. The outflow of older workers is explained by a reduction in formal and informal employment. In South Africa and Argentina, this age group also showed a larger reduction in unemployment. Similar to Viet Nam, the outflow of younger workers in those countries reflects a lower participation in the formal sector.

Table 2 – Initial and persistent net transitions during the COVID-19 pandemic by age group

		Initial shock (2020Q2)				Persistence (2022Q1-Q3)			
		LFP	unemployed	employed		LFP	unemployed	employed	
				informal	formal			informal	formal
ARG	average	-0.1230*** (0.004)	0.0055*** (0.002)	-0.1258*** (0.003)	-0.0026 (0.002)	-0.0302*** (0.007)	-0.0311*** (0.002)	0.0038 (0.005)	-0.0028 (0.004)
	(1) 24-35	-0.1299	0.0049	-0.1269	-0.0080	-0.0370	-0.0388	0.0138	-0.0119
	(2) 36-50	-0.1209	0.0108	-0.1292	-0.0025	-0.0133	-0.0281	0.0036	0.0112
	(3) 51+	-0.1162	-0.0036	-0.1179	0.0054	-0.0515	-0.0248	-0.0114	-0.0154
	diff. (1) – (3)	-0.0138* (0.007)	0.0085** (0.004)	-0.0089 (0.010)	-0.0134 (0.008)	0.0146 (0.014)	-0.0140** (0.007)	0.0251 (0.016)	0.0034 (0.013)
	(2) – (3)	-0.0047 (0.004)	0.0144*** (0.004)	-0.0112 (0.008)	-0.0079 (0.005)	0.0382*** (0.010)	-0.0033 (0.007)	0.0149 (0.014)	0.0266*** (0.009)
MEX	average	-0.1134*** (0.002)	0.0072*** (0.001)	-0.0832*** (0.002)	-0.0375*** (0.001)	-0.0238*** (0.003)	0.0019 (0.001)	-0.0099*** (0.003)	-0.0159*** (0.001)
	(1) 24-35	-0.1275	0.0097	-0.0906	-0.0467	-0.0281	0.0023	-0.0046	-0.0259
	(2) 36-50	-0.1044	0.0082	-0.0882	-0.0243	-0.0132	0.0014	-0.0088	-0.0057
	(3) 51+	-0.1090	0.0015	-0.0622	-0.0483	-0.0374	0.0024	-0.0199	-0.0199
	diff. (1) – (3)	-0.0185*** (0.006)	0.0082*** (0.001)	-0.0283*** (0.004)	0.0016 (0.003)	0.0093 (0.011)	0.0000 (0.001)	0.0153** (0.007)	-0.0059 (0.005)
	(2) – (3)	0.0046 (0.004)	0.0066*** (0.001)	-0.0260*** (0.003)	0.0240*** (0.002)	0.0243*** (0.008)	-0.0010 (0.002)	0.0111** (0.005)	0.0142*** (0.004)
ZAF	average	-0.1283*** (0.003)	-0.0767*** (0.002)	-0.0305*** (0.002)	-0.0210*** (0.002)	-0.0498*** (0.005)	0.0023 (0.004)	-0.0234*** (0.003)	-0.0287*** (0.004)
	(1) 24-35	-0.1526	-0.1100	-0.0252	-0.0174	-0.0565	-0.0048	-0.0197	-0.0320
	(2) 36-50	-0.1181	-0.0627	-0.0388	-0.0166	-0.0271	0.0157	-0.0253	-0.0175
	(3) 51+	-0.0963	-0.0333	-0.0230	-0.0400	-0.0895	-0.0138	-0.0278	-0.0479
	diff. (1) – (3)	-0.0564*** (0.007)	-0.0767*** (0.004)	-0.0022 (0.003)	0.0225*** (0.004)	0.0331** (0.013)	0.0091 (0.007)	0.0081 (0.009)	0.0159** (0.007)
	(2) – (3)	-0.0219*** (0.005)	-0.0295*** (0.002)	-0.0157*** (0.003)	0.0233*** (0.005)	0.0624*** (0.010)	0.0295*** (0.005)	0.0025 (0.007)	0.0304*** (0.009)
VNM	average	-0.0491*** (0.004)	0.0077*** (0.001)	-0.0207*** (0.003)	-0.0361*** (0.005)	-0.0319*** (0.008)	0.0047** (0.002)	0.0083 (0.006)	-0.0449*** (0.009)
	(1) 24-35	-0.0522	0.0096	-0.0148	-0.0471	-0.0541	0.0119	0.0136	-0.0795
	(2) 36-50	-0.0345	0.0078	-0.0120	-0.0303	-0.0258	0.0015	0.0054	-0.0327
	(3) 51+	-0.0710	0.0051	-0.0442	-0.0319	-0.0130	0.0007	0.0062	-0.0199
	diff. (1) – (3)	0.0188*** (0.006)	0.0046** (0.002)	0.0294*** (0.004)	-0.0151*** (0.004)	-0.0411*** (0.011)	0.0112*** (0.004)	0.0073 (0.007)	-0.0596*** (0.007)
	(2) – (3)	0.0365*** (0.006)	0.0027*** (0.001)	0.0322*** (0.006)	0.0016 (0.001)	-0.0128 (0.010)	0.0008 (0.001)	-0.0008 (0.010)	-0.0128*** (0.003)

Notes: this table shows the net transitions in labour force statuses between 2020Q1 and 2020Q2 (left-hand panel) and between 2020Q1 and 2022Q1-Q3 (right-hand panel) based on age in 2020. Transition rates are calculated using estimates for equations (1) and (2), as explained in Section 3.3. Robust standard errors clustered by quarter-year are in parentheses. ***, **, * represent statistical significance at the 1, 5, and 10 per cent levels, respectively.

4.2.3 By education level

Table 3 exhibits the net transitions by education level. The left-hand panel shows that In Argentina, Mexico, and South Africa, the first shock on LFP was weaker among workers with tertiary education than among less educated workers. Part of this difference is explained by a general pattern in which highly educated workers were less likely to transition out of the informal sector. In Mexico and Argentina, the difference is also explained by the lower transition of highly educated workers out of the formal sector. Moreover, in both countries, the larger outflow of less educated workers is followed by a slight increase in unemployment.

In the first quarter of the pandemic, South Africa was the only country where we observe unemployment decreasing faster among less educated workers, suggesting a discouragement effect. On the other hand, highly educated workers were

more likely to leave the formal sector than less educated workers. The same difference in formal employment is observed in Viet Nam. However, in Viet Nam, highly educated workers were overall more likely to leave the workforce.

Table 3 – Initial and persistent net transitions during the COVID-19 pandemic by education

		Initial shock (2020Q2)				Persistence (2022Q1-Q3)			
				employed				employed	
		LFP	unemployed	informal	formal	LFP	unemployed	informal	formal
ARG	average	-0.1230*** (0.004)	0.0055*** (0.002)	-0.1258*** (0.003)	-0.0026 (0.002)	-0.0302*** (0.007)	-0.0311*** (0.002)	0.0038 (0.005)	-0.0028 (0.004)
	(1) prim. or less	-0.1736	0.0169	-0.1908	0.0002	-0.0239	-0.0425	0.0223	-0.0036
	(2) lower sec.	-0.1573	0.0055	-0.1583	-0.0046	-0.0264	-0.0469	0.0202	0.0003
	(3) upper sec.	-0.1196	0.0009	-0.1098	-0.0108	-0.0335	-0.0317	0.0077	-0.0095
	(4) tertiary	-0.0615	0.0047	-0.0783	0.0122	-0.0318	-0.0087	-0.0315	0.0084
	diff. (1) – (4)	-0.1122*** (0.006)	0.0123*** (0.004)	-0.1125*** (0.008)	-0.0120* (0.007)	0.0079 (0.012)	-0.0338*** (0.009)	0.0538*** (0.015)	-0.0121 (0.015)
	(2) – (4)	-0.0959*** (0.006)	0.0008 (0.004)	-0.0800*** (0.012)	-0.0168 (0.011)	0.0054 (0.011)	-0.0382*** (0.007)	0.0517** (0.021)	-0.0081 (0.021)
	(3) – (4)	-0.0582*** (0.005)	-0.0037* (0.002)	-0.0315*** (0.006)	-0.0230*** (0.007)	-0.0017 (0.009)	-0.0230*** (0.007)	0.0392*** (0.011)	-0.0179 (0.012)
MEX	average	-0.1134*** (0.002)	0.0072*** (0.001)	-0.0832*** (0.002)	-0.0375*** (0.001)	-0.0238*** (0.003)	0.0019 (0.001)	-0.0099*** (0.003)	-0.0159*** (0.001)
	(1) prim. or less	-0.1206	0.0156	-0.1014	-0.0349	-0.0246	0.0013	-0.0138	-0.0121
	(2) lower sec.	-0.1226	0.0138	-0.1029	-0.0335	-0.0148	0.0019	-0.0019	-0.0148
	(3) upper sec.	-0.1250	-0.0007	-0.0630	-0.0613	-0.0460	0.0033	-0.0146	-0.0347
	(4) tertiary	-0.0726	-0.0060	-0.0492	-0.0173	-0.0095	0.0012	-0.0116	0.0009
	diff. (1) – (4)	-0.0480*** (0.002)	0.0217*** (0.001)	-0.0522*** (0.002)	-0.0175*** (0.002)	-0.0151*** (0.004)	0.0001 (0.002)	-0.0021 (0.007)	-0.0131*** (0.005)
	(2) – (4)	-0.0500*** (0.002)	0.0198*** (0.001)	-0.0537*** (0.002)	-0.0162*** (0.002)	-0.0053 (0.005)	0.0007 (0.002)	0.0097 (0.006)	-0.0157*** (0.004)
	(3) – (4)	-0.0524*** (0.003)	0.0054*** (0.001)	-0.0139*** (0.003)	-0.0439*** (0.001)	-0.0365*** (0.005)	0.0021 (0.002)	-0.0030 (0.007)	-0.0356*** (0.004)
ZAF	average	-0.1283*** (0.003)	-0.0767*** (0.002)	-0.0305*** (0.002)	-0.0210*** (0.002)	-0.0498*** (0.005)	0.0023 (0.004)	-0.0234*** (0.003)	-0.0287*** (0.004)
	(1) prim. or less	-0.0909	-0.0704	-0.0252	0.0047	-0.0718	0.0082	-0.0479	-0.0321
	(2) lower sec.	-0.1472	-0.0935	-0.0441	-0.0097	-0.0565	-0.0028	-0.0353	-0.0185
	(3) upper sec.	-0.1391	-0.0710	-0.0236	-0.0445	-0.0435	0.0044	-0.0018	-0.0462
	(4) tertiary	-0.1052	-0.0547	-0.0182	-0.0322	-0.0181	0.0028	-0.0087	-0.0122
	diff. (1) – (4)	0.0143*** (0.004)	-0.0156*** (0.004)	-0.0070* (0.004)	0.0369*** (0.004)	-0.0538*** (0.010)	0.0054 (0.012)	-0.0392*** (0.007)	-0.0200** (0.007)
	(2) – (4)	-0.0420*** (0.002)	-0.0387*** (0.003)	-0.0259*** (0.004)	0.0226*** (0.005)	-0.0385*** (0.008)	-0.0055 (0.009)	-0.0266*** (0.008)	-0.0063 (0.011)
	(3) – (4)	-0.0340*** (0.002)	-0.0163*** (0.003)	-0.0054 (0.004)	-0.0123*** (0.003)	-0.0254*** (0.007)	0.0016 (0.006)	0.0069 (0.007)	-0.0340*** (0.008)
VNM	average	-0.0491*** (0.004)	0.0077*** (0.001)	-0.0207*** (0.003)	-0.0361*** (0.005)	-0.0319*** (0.008)	0.0047** (0.002)	0.0083 (0.006)	-0.0449*** (0.009)
	(1) prim. or less	-0.0522	0.0069	-0.0461	-0.0130	-0.0351	0.0021	-0.0133	-0.0238
	(2) lower sec.	-0.0368	0.0060	-0.0210	-0.0218	-0.0180	0.0023	0.0188	-0.0391
	(3) upper sec.	-0.0495	0.0086	-0.0005	-0.0576	-0.0381	0.0012	0.0209	-0.0602
	(4) tertiary	-0.0660	0.0118	0.0058	-0.0836	-0.0423	0.0216	0.0166	-0.0805
	diff. (1) – (4)	0.0138 (0.009)	-0.0049 (0.003)	-0.0519*** (0.008)	0.0706*** (0.016)	0.0073 (0.014)	-0.0195*** (0.006)	-0.0299** (0.014)	0.0567** (0.026)
	(2) – (4)	0.0292*** (0.010)	-0.0058 (0.004)	-0.0268*** (0.005)	0.0618*** (0.016)	0.0244 (0.016)	-0.0193*** (0.006)	0.0023 (0.009)	0.0414 (0.026)
	(3) – (4)	0.0165* (0.009)	-0.0032 (0.003)	-0.0063 (0.004)	0.0260*** (0.008)	0.0042 (0.015)	-0.0204*** (0.006)	0.0043 (0.008)	0.0204 (0.015)

Notes: this table shows the net transitions in labour force statuses between 2020Q1 and 2020Q2 (left-hand panel) and between 2020Q1 and 2022Q1-Q3 (right-hand panel) based on education. Transition rates are calculated using estimates for equations (1) and (2), as explained in Section 3.3. Robust standard errors clustered by quarter-year are in parentheses. ***, **, * represent statistical significance at the 1, 5, and 10 per cent levels, respectively.

Two years later (right-hand panel of Table 3), less educated individuals were less likely to return to the labour force in Mexico and South Africa. In Mexico, the faster return of highly educated is explained by an increasing participation in the formal sector. In South Africa, it is explained by their faster recovery in both sectors, formal and informal. In Argentina and Viet Nam, the persistent effect on LFP is statistically similar across education levels. However, in Argentina, less educated workers were more likely to transition from unemployment to the informal sector. In Viet Nam, highly educated workers were more likely to transition from formal employment to unemployment.

4.3 Initial working status

Table 4 presents the net transitions from the working status before the pandemic to the labour force status during the pandemic. In Argentina, Mexico, and South Africa, the initial shock on LFP was higher on unemployed workers — see the first column of the left-hand panel —, suggesting a discouragement effect. The shock also made these workers less likely to find an informal job than other workers. Surprisingly, with the general outflow of formal workers from the formal sector, unemployment workers in Mexico, South Africa, and Viet Nam were more likely to find opportunities in the formal sector.

In Argentina and Viet Nam, informal workers were more prone to leave the workforce than formal workers. In Mexico and South Africa, formal workers were more prone to leave. However, In Mexico, we also observe some of these workers transitioning to the informal sector and unemployment.

Later during the pandemic (right-hand panel of Table 4), the initial status did not appear to play a significant role in LFP. Except for Mexico, where unemployed workers were still less likely to return to the workforce. In Argentina and Viet Nam, we observe unemployed workers entering the informal sector, while in South Africa they were more likely to enter the formal sector.

In all countries, formal workers were less likely to have a formal job later in the pandemic. In Argentina and Viet Nam, we observe that most of these workers moved to the informal sector. In Mexico, they showed increasing unemployment and informal employment, and in South Africa they were more likely to become unemployed. The room left by former formal workers in the formal sector was filled by others who were initially unemployed or in the informal sector.

Table 4 – Initial and persistent net transitions during the COVID-19 pandemic by initial status

		Initial shock (2020Q2)				Persistence (2022Q1-Q3)			
				employed				employed	
		LFP	unemployed	informal	formal	LFP	unemployed	informal	formal
ARG	average	-0.1230*** (0.004)	0.0055*** (0.002)	-0.1258*** (0.003)	-0.0026 (0.002)	-0.0302*** (0.007)	-0.0311*** (0.002)	0.0038 (0.005)	-0.0028 (0.004)
	(1) unemployed	-0.6085	-0.1219	-0.4829	-0.0036	-0.1663	-0.2946	0.2598	-0.1314
	(2) informal	-0.1731	-0.0155	-0.1817	0.0240	-0.0271	-0.0135	-0.1027	0.0892
	(3) formal	0.0048	0.0465	-0.0138	-0.0279	-0.0107	-0.0044	0.0631	-0.0693
	diff. (1) – (2)	-0.4353*** (0.075)	-0.1064 (0.068)	-0.3012*** (0.076)	-0.0276 (0.056)	-0.1392 (0.121)	-0.2811** (0.111)	0.3625*** (0.128)	-0.2206** (0.104)
	(3) – (2)	0.1779*** (0.021)	0.0619*** (0.010)	0.1679*** (0.029)	-0.0519 (0.035)	0.0164 (0.040)	0.0091 (0.017)	0.1658*** (0.053)	-0.1585** (0.061)
MEX	average	-0.1134*** (0.002)	0.0072*** (0.001)	-0.0832*** (0.002)	-0.0375*** (0.001)	-0.0238*** (0.003)	0.0019 (0.001)	-0.0099*** (0.003)	-0.0159*** (0.001)
	(1) unemployed	-0.5620	-0.2037	-0.5689	0.2107	-0.2370	-0.2630	0.0047	0.0213
	(2) informal	-0.0823	-0.0010	-0.1561	0.0749	-0.0139	0.0051	-0.0396	0.0206
	(3) formal	-0.1226	0.0312	0.0392	-0.1931	-0.0221	0.0154	0.0261	-0.0635
	diff. (1) – (2)	-0.4797*** (0.026)	-0.2027** (0.078)	-0.4128*** (0.048)	0.1358*** (0.047)	-0.2231*** (0.051)	-0.2681** (0.129)	0.0443 (0.089)	0.0007 (0.092)
	(3) – (2)	-0.0404*** (0.010)	0.0322*** (0.003)	0.1953*** (0.018)	-0.2680*** (0.018)	-0.0082 (0.018)	0.0102* (0.005)	0.0656** (0.030)	-0.0841** (0.031)
ZAF	average	-0.1283*** (0.003)	-0.0767*** (0.002)	-0.0305*** (0.002)	-0.0210*** (0.002)	-0.0498*** (0.005)	0.0023 (0.004)	-0.0234*** (0.003)	-0.0287*** (0.004)
	(1) unemployed	-0.2152	-0.2696	-0.0620	0.1164	-0.0075	-0.1758	0.0328	0.1355
	(2) informal	-0.0311	-0.0241	-0.0371	0.0301	-0.0522	0.0455	-0.1119	0.0141
	(3) formal	-0.1468	-0.0057	-0.0086	-0.1325	-0.0717	0.0715	0.0061	-0.1493
	diff. (1) – (2)	-0.1841*** (0.012)	-0.2455*** (0.043)	-0.0248 (0.023)	0.0863*** (0.017)	0.0447 (0.029)	-0.2213*** (0.077)	0.1447*** (0.038)	0.1214*** (0.040)
	(3) – (2)	-0.1157*** (0.016)	0.0183 (0.013)	0.0286 (0.024)	-0.1626*** (0.035)	-0.0195 (0.031)	0.0260 (0.021)	0.1180*** (0.041)	-0.1635*** (0.058)
VNM	average	-0.0491*** (0.004)	0.0077*** (0.001)	-0.0207*** (0.003)	-0.0361*** (0.005)	-0.0319*** (0.008)	0.0047** (0.002)	0.0083 (0.006)	-0.0449*** (0.009)
	(1) unemployed	-0.0186	-0.1283	0.0457	0.0639	-0.0503	-0.2103	0.1407	0.0193
	(2) informal	-0.0912	0.0027	-0.0825	-0.0114	-0.0442	0.0079	-0.0599	0.0078
	(3) formal	0.0355	0.0231	0.1026	-0.0902	-0.0063	0.0064	0.1420	-0.1546
	diff. (1) – (2)	0.0725 (0.051)	-0.1310 (0.132)	0.1282** (0.062)	0.0754 (0.090)	-0.0061 (0.086)	-0.2182 (0.215)	0.2006* (0.107)	0.0115 (0.151)
	(3) – (2)	0.1266*** (0.041)	0.0203*** (0.002)	0.1851*** (0.045)	-0.0788*** (0.017)	0.0379 (0.068)	-0.0015 (0.004)	0.2018** (0.076)	-0.1624*** (0.032)

Notes: this table shows the net transitions in labour force statuses between 2020Q1 and 2020Q2 (left-hand panel) and between 2020Q1 and 2022Q1-Q3 (right-hand panel) based on the working status in 2019Q4. Transition rates are calculated using estimates for equations (1) and (2), as explained in Section 3.3. Robust standard errors clustered by quarter-year are in parentheses. ***, **, * represent statistical significance at the 1, 5, and 10 per cent levels, respectively.

5. Discussion

The COVID-19 pandemic had unprecedented effects on workforce participation. In the first quarter of 2020, LFP declined by more than 10 p.p. in countries like Argentina, Mexico, and South Africa. In Viet Nam, a country that contained the early spread of the virus, the impact was much lower but still significant, reducing LFP by 5 p.p. Yet the great reduction in LFP in those countries only persisted for a short period. By the end of 2020, the impact in more affected countries dropped by half, regardless of their differences in workplace restrictions.

More intriguing is that even after COVID-19 cases and deaths declined, along with less stringent workplace restrictions and high vaccination rates, LFP remained between 2 and 5 p.p. below the pre-pandemic level in those four countries, including Viet Nam. The higher persistency does not seem related to more stringent workplace restriction. Indeed, the country with the most lenient measures, South Africa, was also the one with the most persistent negative effect on LFP. Mexico, the country with the most stringent workplace restrictions in 2020 and 2021, was the one showing the fastest

recovery in LFP in 2022. Although Mexico and South Africa exhibited similar death rates throughout the pandemic, their vaccination roll-out was quite different.¹² While in Mexico it started earlier and was quicker, in South Africa it happened later and was much slower. Nevertheless, the vaccination roll-out does not explain the slower LFP recovery in Argentina and Viet Nam.

By using a pseudo-panel model to estimate net transitions, we also examine the population groups that were more likely to leave the workforce early in the pandemic and more likely to stay out later. The results show that the groups more affected early in the pandemic do not necessarily coincide with the ones more affected in 2022. Moreover, we observe substantial heterogeneity across countries.

As regards gender, for instance, we find that in the first quarter of the pandemic, women were 1 p.p. more likely to leave the workforce than men in Argentina and Viet Nam, two countries with quite distinct labour markets. But in Mexico, men were 4 p.p. more likely to leave the workforce than women. In the first half of 2022, the higher effect on women only persisted in Argentina, the most developed country but with a relatively high gender gap in LFP. This persistency was related to a slower return of female workers to the informal sector. In Viet Nam, the least developed country with the lowest gender gap in LFP, men were more likely to stay out of the workforce in 2022. This gender difference was related to a faster return of women to the informal sector. Overall, these findings seem not to corroborate the hypothesis that the effects of the pandemic in developing countries were gender-biased.

The only group consistently more affected early in the pandemic in all four countries was workers under 35. Two years later, this group was still more likely to stay out of the workforce than those between 36 and 50 years old. In the four countries, the difference between these two age groups seems related to the fact that younger workers exhibited a slower return to the formal sector.

Although workers over 50 were not initially affected as much as younger workers in Argentina, Mexico, and South Africa, they were even less likely to return to the workforce in 2022 than those under 35. In Viet Nam, older workers were rather more likely to return but mostly to the informal sector. Therefore, age appeared to be a common factor preventing individuals from returning to the labour force, especially due to the lower formal employment of younger and older cohorts.

On the other hand, education was a factor playing different roles across countries. In Viet Nam, the initial outflow from the labour force was higher among those with tertiary education, leaving the formal sector, followed by those with primary education or less, mostly leaving the informal sector. In the other countries, those with secondary education or less were more prone to leave the workforce in the first quarter of 2020. By comparing Viet Nam with other countries, one may conclude that the initial spread of virus had higher impacts on less educated workers.

In 2022, less educated workers were still more likely to stay out of the workforce in Mexico and South Africa, the countries with the two lowest vaccination rates. In countries with higher vaccination rates, Argentina and Viet Nam, no significant difference across education levels is observed later in the pandemic. In these countries, however, workers re-entered the labour force in different ways based on their education. In Argentina, less educated workers were more likely to find an informal job, while highly educated workers were less likely to have an informal job. In Viet Nam, better education was correlated with higher informal employment, higher unemployment, and lower formal employment.

The initial spread of the virus also seemed associated with the decision of unemployed workers to leave the labour force. In all countries except Viet Nam, the unemployed were significantly more likely to leave the workforce when the pandemic started. In Viet Nam, most of the initial negative effect on LFP was rather driven by informal workers. Instead of leaving the Vietnamese workforce, formal workers were more likely to transition to the informal sector, whereas the unemployed transitioned to formal and informal employment. These transitions explain why formal employment in that country declined more than informal employment. In other words, with a low spread of the virus, formal jobs disappeared faster, but informal workers were pushed out of the workforce.

In countries where the virus spread faster, informal employment declined more than formal employment. In Argentina, formal workers did not reduce their LFP, but they rather showed increasing unemployment. In Mexico and South Africa, despite the reduction in informal employment, formal workers were more likely to move out of the workforce than informal workers. Along with the unemployed, informal workers in these countries showed a net transition to the formal sector, occupying the space of formal workers who left the labour force. Therefore, in countries with a high spread of the virus, informal jobs disappeared faster than the formal ones, but formal workers, who have a better safety net, were more

¹² See Figure A1 of the Appendix.

prone to leave employment. This adds to fact that the unemployed were the most discouraged to stay in the workforce early in the pandemic.

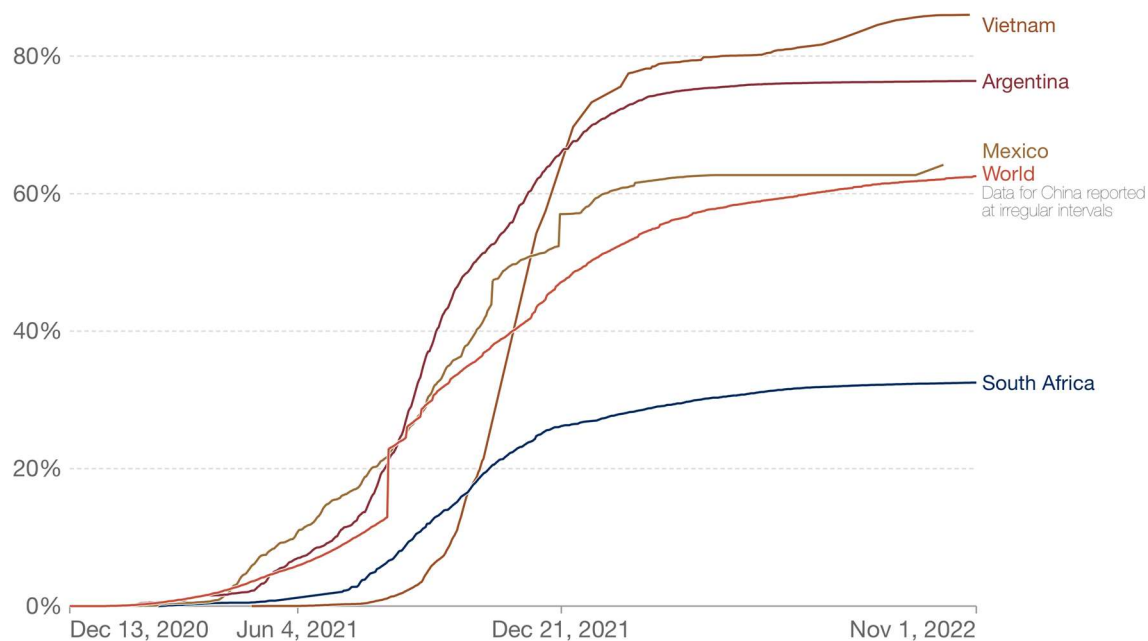
Two years later, those unemployed before the pandemic were still the least likely to return to the labour force in Argentina and Mexico, but not in South Africa. In South Africa, which had the lowest informality and the highest unemployment before the pandemic, the recovery was faster among the unemployed, who moved mostly to the formal sector. Those who were formally or informally employed before the pandemic were more likely to stay out of the workforce or unemployed.

Mexico and Viet Nam, the two countries with the highest informality rates, presented a faster recovery through the informal sector. However, the growth of the informal sector in both countries happened by increasingly employing workers who were formally employed before the pandemic. In Argentina, the recovery was also faster among those who were initially in the formal sector and moved to the informal sector. Furthermore, in the formal sector of Argentina and Mexico, the formal workers who moved to the informal sector were replaced by those who were informally employed before the pandemic. In summary, the composition of workers in the formal and informal sectors changed considerably in the aftermath of the pandemic.

Since only four developing countries are investigated in this paper, we cannot estimate any correlation between the countries' characteristics and the impacts on the labour force. Thus, the conclusions above should be taken with a grain of salt. Still, one could make use of the pseudo-panel model proposed in this paper to investigate workforce transitions in other specific countries or even build a larger sample of countries. Future research could explore some of the insights and issues raised here using such a larger sample.

Appendix

Figure A1 – Share of people who completed the initial COVID-19 vaccination protocol



Source: Our World in Data. Available at <https://ourworldindata.org>.

Note: Alternative definitions of a full vaccination — e.g., having been infected with SARS-CoV-2 and having 1 dose of a 2-dose protocol — are ignored.

Table A1 – Key labour market indicators in 2019

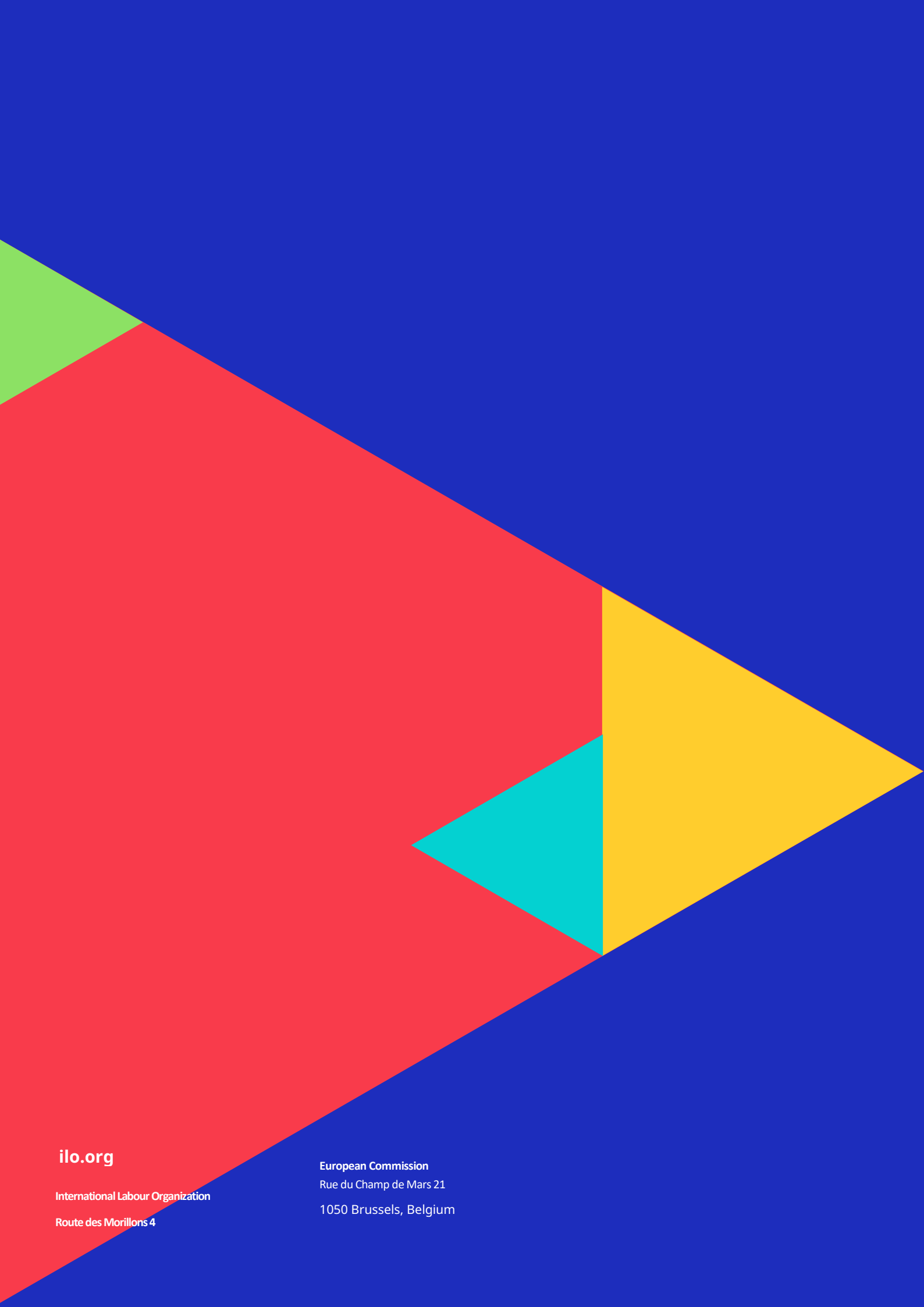
	Argentina			Mexico			South Africa			Viet Nam		
	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women
Labour force participation rate (%)	60.3	71.2	50.2	60.1	76.9	44.5	55.3	62.4	48.5	75.6	81.0	70.5
Unemployment rate (%)	9.8	9.2	10.7	3.5	3.5	3.5	28.5	26.8	30.5	1.7	1.8	1.6
Informal employment over total employment (%)	49.7	49.7	49.6	57.6	57.5	57.8	40.5	38.4	43.1	69.7	71.9	67.2
Employment by sector (%)												
Agriculture	0.1	0.1	0.0	8.1	11.8	2.3	5.6	6.9	4.0	34.5	33.3	35.9
Industry	19.7	30.1	7.1	28.5	35.0	18.2	22.3	31.0	11.9	29.6	33.3	25.5
Services	80.0	69.5	92.7	62.3	52.3	78.3	72.1	62.1	84.1	35.9	33.3	38.7
Not classified	0.2	0.3	0.2	1.0	0.9	1.2	0.0	0.0	0.0			
GDP growth (%)												
2000-2009 (avg.)	2.6			1.5			3.6			6.9		
2010-2019 (avg.)	1.4			2.7			1.7			6.5		

Source: ILOSTAT.

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