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Labour market transitions in the time of Covid-19 in Brazil: a panel data analysis

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Abstract

The Covid-19 pandemic caused the most recessive shock the Brazilian labour market has ever experienced in its history. In the second quarter of 2020, more than 11 million jobs had been lost compared to the pre-pandemic period. Paradoxically, informal employment has paid the heaviest price for the crisis with two thirds of jobs destroyed. While unemployment has increased significantly, the main mode of adjustment has been an unprecedented withdrawal from the labour market which results in an explosion of inactivity. Since then, there has been a progressive recovery. At the end of 2021, the shock seems to be absorbed, the main labour market indicators returning to their pre-pandemic levels. However, this macro picture based on net labour flows only partially reflects the micro dynamics at work. What happened to the workers who lost their jobs? Who are they? Has the pandemic changed the nature of professional mobility, or has it only accentuated previous structural transitions? This study aims at answering these questions by mobilizing data from the PNAD-Continua panel. After correcting the selective attrition in the samples due to the changes in survey collection modes during the pandemic, re-weighted transition matrices are elaborated by distinguishing five main employment statuses: occupied workers (formal and informal), unemployed, discouraged workers, other inactive. Econometric models are then estimated to draw profiles and to identify the main socio-demographic factors associated with these transitions. Estimates are carried out for the three sub-periods (pre-pandemic, shock and recovery), in order to disentangle what is specific to the Covid-19 crisis. The results highlight labour flows that are much more massive and complex than the macro approach suggests. Paradoxically, the overall rate of sectoral mobility remained constant during the shock, despite its magnitude. It even collapsed in the recovery phase. The increase in exits from the informal sector into inactivity has been offset by greater immobility of the unemployed, without disrupting either the structure of the transitions between statuses or their determinants. The exclusion from the labour market that has affected the most vulnerable underlines the importance of the category of discouraged workers, a neglected phenomenon which deserves special attention. Finally, we find that the pandemic has exacerbated the inequality dynamics, particularly those related to gender, already at work before the crisis.

Keywords: Brazil, Covid-19; labour market; transition; panel data; inequalities.

JEL Classification: J21, J46, J60, 017, 054

Résumé

La pandémie de Covid-19 a provoqué le plus grand choc récessif sur le marché du travail jamais enregistré par le Brésil. Au 2ème trimestre 2020, plus de 11 millions d'emplois avaient été détruits par rapport à la période pré-crise. Paradoxalement, les travailleurs informels ont payé le plus lourd tribut à la crise avec deux tiers des emplois perdus. Si le chômage a cru significativement, le principal mode d'ajustement a consisté en un retrait massif du marché du travail, avec en

particulier une explosion du nombre d'inactifs. Depuis lors, on assiste à une récupération progressive. Fin 2021, le choc semblait absorbé, les principaux indicateurs du marché du travail retrouvant leur niveau pré-pandémique. Cependant, ce macro panorama, basé sur l'analyse des flux nets, reflète mal les dynamiques micro à l'œuvre. Qui sont les travailleurs qui ont perdu leur emploi et que sont-ils devenus ? La pandémie a-t-elle bouleversé la nature de la mobilité professionnelle ou simplement accentué des phénomènes structurels en cours ? Cette étude se propose de répondre à ces questions en mobilisant les données de panel de la PNAD-Continua. Après avoir corrigé l'attrition sélective causée par le changement du mode de collecte durant la pandémie, des matrices de transition ont été élaborées en distinguant cinq statuts vis-à-vis du marché du travail : occupés (formels et informels), chômeurs, travailleurs découragés et autres inactifs. Dans un second temps, des modèles économétriques ont été estimés afin d'établir les profils et d'identifier les principaux facteurs socio-démographiques associés à ces transitions. Trois sous-périodes sont distinguées (pré-pandémie, choc et récupération) afin de faire la part de ce qui est spécifique à la crise de la Covid-19. Les résultats mettent en lumière des flux de main-d'œuvre beaucoup plus massifs et complexes que ne le donne à voir l'approche macro. Paradoxalement, le taux global de mobilité sectorielle est resté constant durant le choc, en dépit de son ampleur. Il s'est même effondré dans la phase de récupération. L'accroissement des sorties de l'informel vers l'inactivité a été compensé par une plus grande immobilité des sans-emploi, sans pour autant bouleverser ni la structure des transitions entre statuts, ni leurs déterminants. L'exclusion du marché du travail qui a touché les plus fragiles souligne l'importance de la catégorie des travailleurs découragés, un phénomène négligé et sur lequel l'attention doit être portée. Finalement, il apparait que la pandémie a exacerbé la dynamique des inégalités, notamment de genre, déjà à l'œuvre avant la crise.

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I. INTRODUCTION

Due to the Covid-19, economies around the world have suffered a massive and unprecedented shock. In the context of Brazil, this shock occurred whereas the country was already in a fragile situation after a period of crisis (2014-2016) and an economic stagnation since 2017. Globally, the job destruction was on a large scale and contrary to what might have been expected, informal jobs was more affected than formal ones. Informality is usually presented as a refuge of last resort for laid-off workers and new entrants. Then, its role as an anti-cyclical "safety cushion" is stressed, in particular in Latin America (Loayza & Rigolini, 2011; David, Lambert & Toscani, 2021; David, Pienknagura & Roldos; 2020). But this mechanism did not function during the Covid-19 crisis. Informal employment has not evolved in a counter-cyclical manner to play its role as a cushion (Razafindrakoto, Roubaud & Saludjian, 2022).

This paper aims at investigating in detail the impact of the pandemic on the Brazilian economy, through the prism of the labour market. First, we examine the gross flows of individuals' transitions between 5 labour market statuses: formal worker, informal worker, unemployed, discouraged worker and other inactive. Macro-level analyses focus only on net flows. The advantage of micro-level transitions is that they better reflect movements in the labour market by identifying more precisely the origins, destinations and volume of gross flows. We will then be able to identify for example what happened to the millions of people who lost their jobs? Where the millions of people who became inactive during the shock came from? Then we try to determine which factors are significantly associated with each type of transition, bearing in mind that the aim is also to compare the crisis period with a reference period.

Our analysis is based on an important methodological construction work of panel databases for different periods of interest: the pre-crisis period, the shock period, and the recovery on the labour market. Using these tools, we conduct a three-step analysis for each period. First, we compute transition matrices that map individual transitions between different labour market statuses, thus allowing measuring the extent of the disruption caused by the new crisis. Second, we use descriptive statistics to profile the individuals in each transition category and monitor their evolution. Finally, in order to give more depth to the analysis, we perform multinomial logistic regressions to identify individual characteristics significantly associated with transitions when controlling for other variables. To our knowledge, no other work offers such a comprehensive analysis, whether in terms of the tools used, the comparison of periods, transitions considered, or the individual characteristics taken into account. This is particularly the case in Brazil, where the microdynamics in the context of the Covid-19 crisis have been little investigated so far.

Through this analysis, we pursue a double objective. First, we question the validity of the model that usually highlights the role of the informal economy as an adjustment variable, particularly in

times of crisis. Our study invalidates for Brazil the idea that in times of difficulty, informalisation is the rule. The underlying reasoning that the absence of binding legislation means that there are no barriers to access to informal jobs does not hold. The results show that the adjustment to a negative shock also involves an exclusion mechanism: a significant part of the population leaves the labour market. The examination of the profiles of the latter shows that most of them do not leave the market by deliberate choice. On the contrary, they are individuals at the bottom of the income scale who are excluded and are forced to drop out despite their wish to work. Thus, models analysing the dynamics of the labour market must not neglect the transition to inactivity and in particular the growing weight of discouraged workers. Secondly, our objective is also to explore the consequences of these adjustment mechanisms on the different categories of the population. The main questions are: has the pandemic completely reshaped the transitions' patterns? Or has it essentially amplified the structural movements already at work? The results tend to confirm this second hypothesis in spite of the magnitude of the shock. The Brazilian labour market thus seems to be characterised by a persistence of the mechanisms at work. They seem to be structurally anchored. This is also the case with regard to the effect of the pandemic on inequalities which persist, and even worsen, particularly against women and the already vulnerable groups.

This paper is structured as follows. Section II presents the economic context of the country. Section III reviews the literature at the macro and micro levels. Section IV presents the data, the methodological issues and the empirical strategy. Section V is devoted to the analysis of the results. Finally, section VI concludes with elements of discussion and future research prospects.

II. CONTEXT

Brazil is the sixth largest country in population, and the largest economy in South America. One of the most striking features of the Brazilian society is its structural heterogeneity, which shapes its socioeconomic development, and its labour market (Azzoni & Haddad, 2018; Dweck *et al.*, 2022). Over the 20th century, this country underwent deep transformations in its development model. Brazil was a primary exporter until the early 1930s, and then it industrialized partially, through a strategy of substitution for importations until the 1970s, before liberalizing its economy in the 1980s and 1990s. Since the late 1980s, the imports' share has increased sharply. Like other South American countries, Brazil was strongly affected by the debt crisis during the 1980s and early 1990s, called the "lost decade". However, the Brazilian economy experienced a boom period at the beginning of the millennium, due to a confluence of factors, such as the international conjuncture favourable to raw materials, but also, from the domestic point of view, neo-developmentalist policies characterized by the positive induction of the economy by the State – driven by President Lula and the Workers' Party (PT), accompanied by distributive social policies, which have increased the purchasing power of the Brazilian population. But the extractive model, boosted so far by the rise in raw materials prices, reached its limits and led to a serious crisis from 2014 onwards (Salama, 2019; Gaulard & Salama, 2020).

A major reversal in the public policy line started over the 2015-2017 period, with the brutal deregulation of the labour market (Krein, 2018; Carvalho, 2017). The government of the current President Bolsonaro, elected in 2018, pursued an austerity policy following neoliberal principles

(Dweck *et al.*, 2021) and maintaining the country in a situation of economic stagnation. Thus, it is in a sluggish economy context that Brazil has been hit by the current Covid-19 crisis. The management of the pandemic by the Bolsonaro's government was catastrophic in terms of Covid mortality rate and infection rate. However, while Bolsonaro and his economic team declare themselves to be against redistributive policies, the government has set up in 2020 an emergency cash transfer (*Auxilio Emergencial*) for the poorest categories of workers (especially informal), which has represented about 9% of GDP, devoted to mitigating the effects of Covid-19 (Roubaud & Razafindrakoto, 2021). At the micro level, this measure compensated for the drop in income resulting from job losses. In addition, the program produced prominent redistributive effects that reduced inequalities, as the poorest benefited proportionally more. At the macro level, it helped to support aggregate demand, preventing the fall into a deeper recession. Finally, the transfer also had a direct positive effect on people's exposure to the virus by allowing informal workers to stay at home, instead of going out in search of livelihoods (Razafindrakoto *et al.*, 2021).

As regards the labour market, the shock occurred while the country was still stagnating due to the 2014 crisis. Between the fourth quarter of 2019 (2019q4) and the second quarter of 2020 (2020q2), 11 million jobs were destroyed in Brazil, two-thirds of which were informal jobs[1] (Table 1). This crisis is atypical regarding the role of informality, which could be explained by two phenomena. On the one hand, informal employees in the formal sector are the easiest to dismiss. On the other hand, normally, in the absence of a pandemic, all laid-off employees (from the informal and formal sectors) who do not find a new job are led to create their own survival job *ex nihilo* to avoid unemployment or inactivity. However, this "usual" strategy has been limited due to the health measures (social isolation), hampering the anti-cyclical "safety cushion" role. Thus the workers who lost their job in March and April 2020 were forced to withdraw from the labour market and join the ranks of the inactive or "discouraged" workers, i.e., those who would like to work but have given up looking for work.

Table 1
Macro labour market dynamics 2019-2021: main indicators

	Benchmark	***Crisis***	***Recovery 1***	***Recovery 2***	***Recovery 3***
Indicators (%)	2019q4	2020q2	2020q4	2021q2	2021q4
Employment rate	56,5	49,5	51,1	52,1	55,5
Activity rate	63,6	57,3	59,5	60,8	62,6
Informality rate	41,4	37,9	40,0	40,7	41,8
Unemployment rate	11,1	13,6	14,2	14,2	11,2

Source: quarterly PNAD-C 2019-2021, IBGE; authors' calculations.

The current crisis and its exclusion mechanisms have been investigated on the intensive margins (i.e., the quality of jobs, working hours and wages) as well (Razafindrakoto, Roubaud & Saludjian, 2022). Changes in the number of hours worked and wages are another channel through which

[1] In this paper informal employment is defined as "all workers not benefiting from social protection". This definition corresponds to the ILO international recommendation, and adopted by the National Statistical Office of Brazil (ILO, 2013).

the labour market has adapted to new conditions. If 13% of jobs were destroyed between 2019q4 and 2020q3, the total volume of hours worked was reduced by 17%. This decline in the overall hourly volume for the labour market as a whole is a combination of job losses and a reduction in the number of actual working hours of employed persons. On average, the working week was reduced by about 5%. As a result, the real wage bill fell by -16%, but real hourly earnings remained quite stable. This movement in earnings may indicate that job losers were those in the lowest earnings bands. According to the IBGE, 9.7 million workers were not even paid in May (11.5% of the occupied population).

The fall in employment (as well as of hours worked) has primarily affected informal jobs, which has fallen by 18% in absolute terms (compared with 9% for formal employment). While the prolongation of the crisis also has weakened the position of better-off workers, the latter has more opportunity to negotiate hours worked, wages, contracts, etc. Thus, the most precarious segments have been hit first and hardest and faced closed doors even for survival strategies.
The shock was followed by a gradual process of recovery, an impressive performance given the magnitude of the shock. In just over a year, the main aggregate labour market indicators have returned to their pre-pandemic level, as shown in Table 1. At the end of 2021, the unemployment rate was 11.2% (compared to 11.1% at the end of 2019) and the informality rate of 41.8% (vs. 41.4%). Although the process of return to the labour market does not seem to be integrally completed, the deviations are minimal. The activity rate and the employment rate remain 1 percentage point lower than before the crisis, after having fallen by more than 6 points at the time of the shock.

III. LITERATURE REVIEW

1. The Covid-19 impact on the different labour market statuses: macrodynamic approach

Our study focuses on labour market adjustment and factors involved in the case of the Covid-19 crisis. The question which arises in particular is about the role of the informal economy. As in many developing countries, informality is a dominant feature of labour markets. Informal employment represents 40% of total employment in Brazil. According to the literature regarding the informal economy, three dominant schools of thought can be considered (the dualist, the structuralist and the legalist) to predict the labour market reactions (Roubaud, 1994; Bacchetta *et al.,* 2009). The dualist school has its roots in the work of Lewis (1954) and Harris and Todaro (1970). The informal sector is seen as the lower, residual segment of a dual labour market with no direct link to the formal economy. Its existence is due to the fact that the formal sector cannot provide jobs for all workers. During economic crises, the informal economy is expected to act as a safety cushion for people losing their formal job and then to grow. Structuralists (Moser, 1978; Portes *et al.*, 1989) see the informal economy as composed of informal jobs in the formal sector and above all, of small, unregistered enterprises, subordinate to large capitalist enterprises and providing them with cheap products and workers, thus improving their competitiveness in international trade. This approach highlights interdependence between the sectors. As a result, growth is unlikely to eliminate informal production relations, intrinsically associated with capitalist development. Finally, the legalist approach supported by Hernando de

Soto (1989), analyses the informal sector as being composed of micro-entrepreneurs who prefer to operate informally to avoid the costs associated with registration (public regulations, taxes, etc.). Informality is therefore a voluntary choice, and as long as the costs of registration and other procedures outweigh the benefits of formality, micro-entrepreneurs will choose to operate informally.

A more recent literature, focusing on Latin America before the Covid-19 crisis, takes up and combines the dualist and legalist approaches (Loayza & Rigolini, 2011; David, Lambert & Toscani, 2021; David, Pienknagura & Roldos; 2020). In line with these lines of research, this literature stresses, on the one hand, the role of the informal economy as a shock absorber. On the other hand, it insists on the fact that it is the rigidities created by overly strict regulations in the formal economy that limit the formalisation of jobs. Finally, the labour market is modelled by considering essentially three labour market statuses: formal employment, informal employment and unemployment. The results of the first analyses (see below) show that these stylized facts or theoretical models are not relevant for understanding the impact of Covid-19.

At the global level, the ILO quickly produced several briefs to assess the impact of the pandemic on workers, particularly in the informal economy. The Covid-19 crisis is unique for Brazil and for the rest of the world, whether in terms of origin, intensity, or policy responses. For the first time ever, most countries are imposing social isolation measures. In developing countries, people who have no alternative but to work to support themselves and their family faced a dilemma: starve to death or contract the virus (ILO, 2020a). Informal workers are often concentrated in economic sectors strongly affected by lockdown measures as they involve a high infection risk (ILO, 2020b). In January 2021, 8.8% of working hours were lost globally in 2020 (compared to the fourth quarter of 2019), i.e., 255 million full-time jobs (assuming a 48-hour working week). This decline can be associated with both a reduction in hours worked for employees and job losses. The counterpart of these job losses was mainly a decrease in the participation rate, rather than an increase in the unemployment rate. Thus, the participation rate felt by 2.2 percentage points in 2020 (reaching 58.7%) and the unemployment rate increased by 1.1 percentage points (reaching 6.5%).

To summarise the different mechanisms, the impact of the pandemic was primarily the result of lockdowns and social distancing measures. Many workplaces were closed, with restrictions varying from one geographical area to another and from one sector to another. These measures caused a combined drop in both demand (consumption and investment) and supply of goods and services. The first sectors to be hit hardest were those requiring face-to-face contact with customers and which were not classified as essential. Through forward and backward linkages, companies that act as suppliers or customers to these sectors were also affected, with spillover effects. The shock to demand was amplified by job losses or reductions in household income, which forced households to reduce their consumption. In addition, the climate of uncertainty created by the pandemic also had a negative impact on investment and consumption decisions (Verick *et al.*, 2022). These authors, like many studies, insist on the specificity of this health crisis compared to other global crises, given the origin of the shock, the transmission mechanisms and the types of sectors directly affected. Thus, based on the analysis of a large sample of countries (low income, middle-income and high income countries), they highlight three results. First, the

crisis has also strongly affected low and middle income countries, whereas this was less the case for the global financial crisis. Second, while the informal economy played a role as a shock absorber by absorbing some of the workers laid off from the formal sector during the previous crisis, regarding the impact of Covid-19, informal jobs were not spared, quite the contrary, due to lockdowns and other containment measures.

The highly regressive nature of the sanitary shock is now acknowledged since the most vulnerable categories experienced stronger negative impact (Bundervoet *et al.*, 2022). However, the exact mechanisms that took place and the way in which the different categories of workers were affected remain to be clarified. For example, according to these authors, self-employed (informal) workers have seen their income fall sharply, but they have suffered fewer job losses than wage-workers (which is not borne out by micro approaches to transitions, see below).

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2. Micro-dynamics approaches using panel data

To gain a better understanding of the mechanisms at work, studies have mobilised longitudinal data to investigate micro dynamics during crises and beyond. The approaches consist in analysing factors associated with individuals' transitions between different labour market statuses. Funkhouser (1996), with his work on employment patterns and earnings structure in the formal and informal sectors for 5 countries of Central America, is among the pioneers in the study of individual labour market transitions. Funkhouser (1997) uses transition rates matrices between sectors and multinomial logit regressions (MNL) to shed light on determinants of sectoral choice and transitions between them in the Salvadorian urban labour market. Maloney (1999) followed this approach and questioned the dualist theory. He attempted to assess the segmentation of urban labour markets in Mexico. He used summary statistics to profile each category of transitors between 4 states of occupation, studied the earnings differentials, mobility patterns using transition matrices, and ran MNL models. One of the conclusions is that income differentials, as well as mobility patterns of workers, do not allow to identify segmented sectors and thus provides an empirical validation of the dualist theory. However, Bosch and Maloney (2010) mitigate these results with data for Mexico, Argentina, and Brazil. They mobilized continuous time Markov transition matrices to study patterns of sectorial transition between 5 statuses: out of the labour force, unemployed, informal self-employed, informal and formal salaried. They noticed that some transitions to informality appear to be voluntary, particularly those to self-employment. On the other hand, informal employees fit better with the idea of queuing while waiting for a formal job, especially for young workers.

Cuesta and Bohórquez (2014) investigated the magnitude, direction and composition of transitions between 2008 and 2009 in Colombia, employing logit function and MNL to predict transitions according to personal and professional characteristics, between inactivity, unemployment, informality and formality. They noticed large and asymmetric transitions, which are disproportionally more likely to occur from formal to informal occupations than vice versa. A self-employed informal worker may more likely move into non-occupation. Tansel and Ozdemir (2019) analysed individual transitions in Egypt with discrete time Markov transition matrices for the whole sample and disaggregated by gender, and then MNL to identify individual, household and job characteristics associated with a wide range of possible transitions. Fabrizi and Mussida

(2009) used similar methods for Italy over the periods 1993-1994 and 2002-2003. Karamessini *et al.* (2016) included a time analysis to take into account the 2008 crisis in Europe. They analysed the influence of the economic crisis on the early job insecurity, especially among young people. Taking advantage of the availability of more than two points in time panel data, Gong *et al.* (2004) used random effects with the MNL to control for time-invariant unobserved characteristics in the case of Mexico and found that unobserved heterogeneity is important and explains more than half of the unsystematic variation in the mobility patterns. In the same vein, Watson (2013) ran gender separated MNL with random intercepts, applied to labour market transitions in Australia.

Finally, some papers have applied these approaches to the case of Brazil. Sedlacek *et al.* (1990) investigated the labour market segmentation and transitions for workers with and without *carteira de trabalho* (assigned working card). Using panel data over the period 1984-1987 for the city of São Paulo, they computed transition matrices, mobility indexes and income differentials. With the surveys, Curi and Menezes-Filho (2006) examined the sectorial segmentation and the determinants of transitions with transition matrices and logistic regressions for six metropolitan regions over 1984-2001. Aguas *et al.* (2014) considered a four-state Markov model for transition in order to shed light on the characteristics of the discouraged workers, whom they call the "marginally attached to the labour market". They analyse the transition probabilities between the four labour market statuses (employed, unemployed, marginally attached, non-participating or inactive) between 2003 and 2008. They show that the group of the marginally attached could be considered an intermediate status between the unemployed and the non-participating in the labour force, although closer to the unemployed.

Amorim and Corseuil (2016) used the panel dimension of the PNAD Contínua (PNAD-C) to assess labour market adjustments during the 2014 crisis, at the economic activities level. Costa *et al.* (2019) studied the transitions of female domestic workers over the period 2012-2018. Júnior *et al.* (2019) mobilized socio-demographic descriptive statistics to analyse transitions of a panel of individuals between the 2017 and 2018 releases of the PNAD-C and consider the issue of longitudinal weights.

Turning now to the impact of the Covid-19 pandemic, several studies are focused on micro-transitions. Adams-Prassl *et al.* (2020) used data on work history for UK, US and Germany to identify job and earnings loss probability through two OLS regression using respectively job and individual characteristics. They noticed highly unequal impacts, exacerbating existing inequalities, with particular concerns for women and less educated workers. Some papers focused on the gendered impact of Covid-19 on labour market and shed light on the precarious situation of women during the current crisis. For example, Abraham *et al.* (2021) noticed that in India, compared to men, women were much more likely to lose work during the lockdown, and even more likely to not return to work.

Soares and Berg (2021) examined transitions between the first 2 quarters of 2020 in 7 countries including Brazil. They found that the pandemic exacerbated labour market inequalities. Carvalho and Nogueira (2020) used data from the PNAD-C (2020q1) and the PNAD Covid-19 (May, June and July 2020) to examine the gross workers flows between the different states by type of occupation. The crisis has affected the most fragile segments, with more intensity for workers

without a *carteira de trabalho* and for the self-employed. Barbosa *et al.* (2020) identified which workers suffered a greater impact in terms of job loss, according to the characteristics of the individuals who lost their jobs and then to the characteristics of the lost jobs. They contrast these pieces of information with panels for the similar period in previous years (2018-2019 and 2017-2018) to distinguish what is specific to the crisis. The groups pinpointed as the most likely to lose their jobs are women and young people. They also noticed significant differences related to skin colour and education. Corseuil and Franca (2020) focused on labour market integration of young people in times of crisis over the period 2013-2020, characterized by two episodes of economic recession: 2014-2016 (massive flow to unemployment) and 2020 (massive flow to inactivity). Finally, Silva and Vaz (2020) explored more deeply the characteristics of young people in the context of the pandemic, particularly the "nem-nem" ("neither-nor"): those who are neither working nor studying. They found predominance of women, Afro-descendants, north-easterners, and of the poorest and least educated people.

Beccaria *et al.* (2022) studied also transition matrices for Latin American countries and provided useful insights by making the distinction between the self-employed and the wage-workers and by highlighting the extent of transition to inactivity. They show that self-employed suffered from the contraction of the economy as many of them had to stop their activity at the height of the crisis like the wage-workers. The study confirms the importance of exits into inactivity which is not only the result of lockdown and social distancing but also of negative labour market forecasts that reduced the job-search incentives for the jobless.

Therefore, in spite of the growing the literature on labour market transitions which investigate the impact of the pandemic, our study makes a specific contribution along two dimensions. On the one hand, in order to better understand the pandemic impact, we compare three periods: a pre-crisis period which serves as a benchmark, the crisis and the recovery. To our knowledge, it is the first to investigate and contrast these three economic phases, correcting the data for selective attrition due to the pandemic (see below). On the other hand, we consider five labour market statuses: formal, informal, unemployed, discouraged and other inactive. We show that that the usually neglected discouraged worker category is key to understand the dynamics at stake.

IV. DATA AND EMPIRICAL STRATEGY

1. Data

The data used come from the quarterly PNAD-C (*Pesquisa Nacional por Amostra de Domicílios Contínua* - National continuous Labour Force Survey), conducted by the IBGE (*Instituto Brasileiro de Geografia e Estatística* - Brazilian Institute of Geography and Statistics) since 2012 (IBGE, 2014). It generates quarterly the information for the study of Brazil's socio-economic development at the national, federal states, metropolitan regions, and capital cities levels.

211,000 households are surveyed each quarter. The survey follows a rotating 1-2(5) scheme: within a quarter, each household is interviewed in one month and get temporarily removed from the sample for 2 months before being interviewed again. This is repeated 5 times before the household is removed from the sample permanently. Thus, from one quarter to the next, 80% of

the sample should overlap. This makes possible to constitute a panel, necessary to study people's transitions on the labour market, including up to 5 successive points in time (quarters). As we want to capture rapid status changes during the shock, which occurred between the last quarter of 2019 and the second quarter of 2020, we considered 4 panels with 2 quarters per panel (Table 2). Although this specification excludes the estimation of fixed effect models, it is more accurate given our objective. A first panel is made up of the last quarter spared by the crisis, i.e., the last of 2019 (2019q4), and the quarter associated with the peak of the shock, the second quarter of 2020 (2020q2). To calibrate the results, this period of analysis is compared to a pre-pandemic benchmark period, one year earlier (2018q4-2019q2), to control for seasonality effects.[2] The two following sub-periods (2020q2-2020q4 and 2020q4-2021q2) were also included in the analysis as the recovery phase.

Table 2
Panels of individuals (14 years old and more)

Sample size:	**2018q4**	**2019q2**	**2019q4**	**2020q2**	**2020q2**	**2020q4**	**2020q4**	**2021q2**
Cross-sections	447,859	445,904	439,670	302,022	302,022	276,228	276,228	293,867
	(100%)	(99.6%)	(98.2%)	(67.4%)	(67.4%)	(61.6%)	(61.6%)	(65.6%)
Theoret. Panels		271,432	266,482		162,105		127,329	
		(100%)	(98.2%)		(59.7%)		(46.9%)	
Effective panels		233,725	190,654		135,167		108,387	
		(100%)	(81.6%)		(57.8%)		(46.4%)	
Attrition		37,707	75,828		26,938		18,942	
Attrition rate		13.9%	28.5%		16.6%		14.9%	

Source: quarterly PNAD-C 2018-2021, IBGE; authors' calculations.
Note: theoretical panel = interviews 1, 2, 3 in 2018q4; 1, 2, 3 in 2019q4; 1, 2, 3 in 2020q2 and 1, 2, 3 in 2020q4.

Before the pandemic, the sample size was constant over each quarter for households and varied slightly for individuals. With the pandemic, the sample size has begun to decrease from 2020q1. From around 440,000 individuals in 2019q4, the number of interviewees falls to 396,000 individuals (a 10% drop) in 2020q1. During the following quarters, the phenomenon intensified continuously. In 2021q1, only 264,000 individuals have been interviewed, corresponding to a huge 40% drop in the sample size over one year. This is mainly due to the change in collection mode during the pandemic. The interviews were conducted by phone since mid-March 2020, instead of face-to-face (IBGE, 2020). An important part of the lost observations is therefore linked to the fact that IBGE did not manage to find the phone numbers of the new households entering the sample (whereas for those who had already been interviewed, the interviewers were able to take their numbers). But other reasons may be at stake. For instance, with the pandemic, the interviewees may be more reluctant to answer the survey or part of them may have temporarily moved to other places to live in a safer environment. This interpretation is plausible as the evolution of the sample loss seems to follow the dynamics of the pandemic. Therefore, we examined potential selective attritions and new post-stratification weights were considered to reduce the significant selection biases not taken into account in the official data.[3]

[2] We considered also other periods for the benchmark. The results are robust (available from the authors upon request).
[3] The detailed methodological procedure is presented in the appendix.

2. *Empirical strategy*

For each period, our objective is twofold. First, we analyse the gross flows, to know how many individuals changed their status during the period studied: for example, where did the new inactive people come from. Second, the panel component also makes it possible to identify the characteristics associated with the transitions on the labour market. Presented in another way, macro-dynamics provide information at a given point in time on the characteristics of groups according to their employment status. Comparisons between two periods can give an idea of the characteristics of those who have moved from one status to another. But only panel data analysis allows to know precisely what dynamics have taken place: who managed to remain in their position and who did not? And what are their specificities?

2.1. Transition matrices

The transition matrices used are discrete-time stochastic matrices based on panel data containing 2 time points (2019q4-2020q2 for the crisis; 2018q4-2019q2 for the benchmark; 2020q2-2020q4 and 2020q4-2021q2 for the recovery). Razafindrakoto, Roubaud and Saludjian (2022) shows that it is no longer relevant to focus solely on formal/informal or formal/informal/unemployment transitions in the context of developing countries. They stress the importance of considering labour market entries and exits as well. In addition, the data from the PNAD-C allows the distinction between "discouraged" inactive and other inactive. Thus, 5 statuses were retained: formal active, informal active, unemployed, discouraged and other inactive.

The matrices present the conditional probability P_{ij} (in %) of finding an individual in status *j* in endline, given that this individual was in status *i* in baseline (2). The total of each row is equal to 100%, as the sum of transition probability from a status to other statuses must be 1 (3).

(2) $P(X_{t+1} = j \mid X_t = i)$ (3) $\sum_{j=1}^{j=5} P_{i,j} = 1$

2.2. Descriptive statistics: transition profiles

The second step of this empirical analysis is the comparison of the transitors' profiles. To avoid complicating the analysis, 20 profiles (out of 25) are studied: individuals who were formal workers, informal workers, unemployed and discouraged at baseline. Each group is compared to the stayers for socio-demographic and economic variables that may influence the labour market status and transitions. The socio-demographic variables selected are the age, gender, race, location and education. The economic variables include actual income from the main job, as well as per capita income at the household level.[4] .Group means are computed with the baseline data, i.e., the first time point of each panel. This descriptive approach includes statistical tests to check if the differences in means between the groups are significant.

[4] Unfortunately, the quarterly data from the PNAD-C do not provide information on other sources of income.

2.3. Multinomial logistic regressions (MNL)

The last component of the empirical work consists of an econometric investigation. We use multinomial logistic regression (MNL) specifications to estimate the correlations of different variables holding the effect of the other variables constant. 12 MNL have been estimated to model transitions as a function of individual characteristics. The first model concerns the transitions of formal workers over the period 2019q4-2020q2. The dependent variable is a qualitative variable with 5 modalities, corresponding to the 5 types of transitions: stayers, formal-informal, formal-unemployed, formal-discouraged, formal-other inactive.

The explanatory variables are similar to those used in the previous step: a qualitative variable to indicate age (1 = 14-25 years, 2 = 26-45 years, 3 = 46-65 years and 4 = 66 years & +), an indicator variable for gender (female = 1), an indicator variable for skin colour (white = 1), an indicator variable for household location (rural = 1), a categorical variable for region (1 = Norte, 2 = Nordeste, 3 = Sudeste, 4 = Sul, 5 = Centro-Oeste), a qualitative variable for the education level (1 = no education/less than 1 year, 2 = 1-4 years of education, 3 = 5-8 years of education, 4 = 9-11 years of education, 5 = 12-15 years of education, and 6 = 16+ years of education), and a qualitative variable for quintile of income per capita (calculated at the household level).

The multinomial logit regression equations can be written:

$$P_{ij}(Y_i = j|X_i) = G(X_i\beta_j) = \frac{e^{\beta_{n,j}X_{n,i}}}{1 + \sum_{j=2}^{5} e^{\beta_{n,j}X_{n,i}}} \quad (4)$$

P_{ij} is the probability that individual *i* is in transition into status *j*, $X_{n,i}$ is the nth explanatory variables associated with individual *i*, the $\beta_{n,j}$ is the coefficient associated with the nth explanatory variable and the jth outcome. Thus, the same variable has a differentiated correlation depending on the type of labour market transition.

Then we consider a pre-crisis period (a benchmark) 2018q4-2019q2 and the first recovery period 2020q2-2020q4 respectively.[5] The same model was estimated for the informal workers at baseline, then the unemployed and finally, the discouraged workers. For each model, the stayer category has been set as the reference group. Thus, the risk ratio of each transition is computed relatively to the stayers' category.

[5] A stressed above, it should be noted that the periodisation adopted in this paper does not permit to estimate fixed or random effect models, which would have allowed the control of time-invariant unobserved characteristics. Our choice is justified by the fact that to capture the full shock impact. The second quarter of 2020 should be compared to the last pre-pandemic quarter (see Table 1), that is to say the last quarter of 2019, the first quarter of 2020 being partially affected by the Covid-19 (from mid-February).

V. RESULTS

1. Transition matrices

The net flows analysis led to the identification of a major drop in the stock of economically active population, mainly to the detriment of informal workers. Transition matrices allow to investigate these dynamics. Table 3 compares net and gross flows, in and out of employment. Table 4 presents the global mobility rate and the repartition of the gross flows according to their origin or destination. Table 5 presents the transition of individuals in detail between 5 labour market statuses: formal employment, informal employment, unemployment, discouragement inactivity, and other inactivity.[6] The diagonal represents the quantity of stayers, and the total column corresponds to the share of individuals in each status at the end of the 4 periods of interest respectively.[7]

The first point to stress is that the macro picture based on net flows hugely minimizes the true movements on the labour market, which appears much more dynamic. The cross-section analysis shows that the net loss in employment was about 11.3 million between 2019q4 and 2020q2, with 3.5 million among formal jobs and 7.7 million among informal jobs. But the analysis of gross flows (Table 3) reveal during the same period that 19%, or 10.5 million individuals, left their formal employment (representing an increase of 1.3 million compared to the pre-crisis period).[8] The movers from informal employment are much more numerous since 31%, or more than 12 million informal workers lost their job (i.e. an increase of 4.9 million compared to the previous period). Furthermore, even at the peak of the crisis 4.9 million informal workers found a formal job. This is a surprising result as they represent 12.4% of informal employment, a proportion just slightly inferior compared to 15.9% in the pre-pandemic period. First, a structural result can be stressed: the intensity of actual gross flows (the actual flows) compared to net flows between employment statuses is highlighted whatever the period. The second finding is the scale of gross job losses compared to the pre-crisis period (the benchmark), with the informal standing out for the importance of outflows**.** Some would say that the loss of employment on the informal side is not surprising given the precariousness of their conditions and the application of containment measures. However, this result was not necessarily predictable. On the one hand, the strict confinement did not last three months, so a more limited effect could have been expected. On the other hand, one might have thought that, forced to find an income to survive, some of the informal workers bypassed the confinement measures and continued to work. Given the scale of the phenomenon, a significant proportion of workers with informal employment has suffered the full impact of the pandemic and lost their jobs.

[6] Transition matrices by gender are presented in the Appendix.

[7] For ease of reading, only the first 3 periods are included in the following sections. We have indeed verified that the fourth period does not change the conclusions (as it essentially confirms the findings of the third period). Results are available from the authors upon request.

[8] The job separation rate is even greater, as transitions are measured between statuses, and not at the individual job level. For instance, people who separated from their formal job but found another formal one within the same quarter are not identified here.

Table 3

Net and gross flows on the labour market 2018-2021

MACRO APPROACH					
	Benchmark	**Crisis**	**Recovery 1**	**Recovery 2**	**Recovery 3**
Net flows *(in millions)*	2018q4 ➔2019q2	**2019q4 ➔2020q2**	2020q2 ➔2020q4	2020q4 ➔2021q2	2021q2 ➔2021q4
Employment	*+0.2*	**-11.3**	+1.4	+0.5	+4.3
Formal	*+0.1*	**-3.5**	-0.4	+1.2	+2.1
Informal	*+0.1*	**-7.7**	+1.8	-0.6	+2.3
MICRO APPROACH					
Gross flows *(in millions)*	**Benchmark**	**Crisis**	**Recovery 1**	**Recovery 2**	**Recovery 3**
Employment					
Stayers	*82.4*	**77.3**	75.2	79.1	83.1
Outflows ➔	*11.1*	**18.2**	8.8	8.1	6.3
➔ Inflows	*11.2*	**6.9**	10.2	8.7	10.6
Mobility rate (outflows)	*12%*	**19%**	11%	9%	7%
Formal					
Stayers	*45.9*	**45.5**	46.6	47.9	49.0
Outflows ➔	*9.2*	**10.5**	5.5	4.4	4.1
➔ Inflows	*9.3*	**6.9**	5.1	5.5	6.1
Mobility rate (outflows)	*17%*	**19%**	11%	8%	8%
Informal					
Stayers	*24.9*	**22.3**	24.5	26.8	29.1
Outflows ➔	*13.4*	**17.2**	7.3	8.1	7.3
➔ Inflows	*13.5*	**9.4**	9.1	7.5	9.6
Mobility rate (outflow)	*35%*	**43%**	23%	23%	20%
Others (unemployed, discouraged & other inactive)					
Stayers	*62.4*	**66.5**	75.6	74.8	71.5
Outflows ➔	*11.2*	**6.9**	10.2	8.7	10.6
➔ Inflows	*11.1*	**18.2**	8.8	8.1	6.3
Mobility rate (outflow)	*15%*	**9%**	12%	10%	13%

Source: quarterly PNAD-C 2019-2021, IBGE; authors' calculations.
Note: by definition, the panel approach does not take into account the new entrants in the labour market for each period. Therefore, inflows include only persons who are already in the working age population at the beginning of the considered period.

During the crisis, the striking result is about the overall mobility rate: it displays a surprising stability (around 30% as for the benchmark period) for both men and women, while the shock was of exceptional magnitude as shown by the volume of job losses (Table 4). But these aggregate figures hide very different dynamics. In fact, we do have greater movements of workers initially employed in the formal or informal sector. But the stability of the overall mobility rate despite the crisis is explained by much more limited movements of the discouraged and other inactive, stuck in their positions.

Thus, the deterioration of the situation is the result of a combination of several phenomena at the time of the shock. While a larger number of employed persons lose their jobs, the reverse

flow of persons who enter employment is more limited compared to the reference period. At the same time, discouraged or other inactive people leaving their status are not only far fewer, but besides, half of the movers are joining these two groups. They represent 42% of the working age population at 2020q2 (by comparison, they were 'only' 37% before the crisis).

According to the movers' origins and destinations in the reference period, the informal workers are the most mobile (they represent 28% of gross outflows). But this status also hosts the highest percentage of movers (28% of gross inflows). During the crisis, the informal workers are still those who move the most and change status (they represent 34% of the movers), but informal employment is no longer the first option for the movers. The latter become largely discouraged (26.5%) or inactive (24.5%). That said, taking into account the weight of each status in the total working age population, in relative terms, the unemployed and the discouraged are the status with the highest gross inflow and outflow. For example, the discouraged represent barely around 7% of the total, but this status host 26.5% of the movers during the crisis.

Table 4
Mobility rates, origin and destination of the movers

(%)	% Working Age Population	Benchmark 18q4-19q2	Crisis 19q4-20q2	Recovery 1 20q2-20q4	Recovery 2 20q4-21q2
Mobility Rate Women		29.8	30.5	20.6	18.6
Mobility Rate men		28.5	29.0	19.8	17.5
Global Mobility Rate		29.2	30.1	20.2	18.1
Destination of the movers (%)					
To formal	*33*	19.0	13.7	14.9	18.0
To informal	*23*	27.7	18.6	26.5	24.0
To unemployed	*7*	16.2	16.8	20.3	22.0
To discouraged	*7*	16.0	26.5	19.8	18.0
To inactivity	*30*	21.1	24.5	18.5	18.0
Total	*100*	100	100	100	100
Origin of the movers (%)					
From formal	*33*	18.6	20.4	16.2	14.3
From informal	*23*	27.5	33.7	21.6	26.3
From unemployed	*7*	15.0	14.0	15.7	18.4
From discouraged	*7*	15.7	13.5	25.2	20.0
From inactivity	*30*	23.2	18.4	21.3	21.0
Total	100	100	100	100	100

Source: quarterly PNAD-C 2018-2021, IBGE; authors' calculations.

The detailed analysis of the transition matrices shows a lower mobility of a major part of the formal workers as well as the other inactive (excluding the discouraged). Movers come mainly from the informal, the unemployed and the discouraged (Table 5). Indeed, compared to the benchmark, the probability of informal workers to stay informal decreased by 8.5 p.p., and their probability to become formal by 3.5 p.p. Symmetrically, the risk of falling into the discouraged status increased by 6.8 p.p. Then, 12% of the informal workers, or 4.5 million, fell among the

discouraged due to the shock (whereas 11% went among the other inactive). However, these overall negative trends did not prevent 12% of informal workers to find a formal job. As regards unemployment, opportunities of formal jobs have been reduced (-4 p.p.), and even more for informal jobs (-9 p.p.). Therefore, it is clear that the informal economy is not playing a cushion role in this crisis. Transition patterns out of informality are similar between dependent and independent informal workers, confirming that the aggregation of these two categories is not a central concern for our analysis. Furthermore, this means that the former were not the first to be dismissed (Beccaria *et al.*, 2022), at odds with the expectations based on net flows analysis. The drop in informal employment is twice higher for wage workers than for the independent workers (-27% vs. -15%). In fact, the main part of the informal wage employment reduction is due to lower recruitment flows in this status.

For the unemployed, the probability to become discouraged increased by almost 11 p.p. Thus, another striking fact deserves to be highlighted: the weight of the discouraged and the role they played in the adjustment of the labour market. This finding is in line with Aguas *et al.* (2014) who have already highlighted the specificity of discouraged workers that they called the **'**marginally attached' to the labour market.

The recovery phase. If we now turn to the recovery period, it is characterised by a much lower mobility rate. This reduction in flows persists as it is observed in the third and fourth quarter of 2020 following the peak of the crisis (with a 20% mobility rate) and is confirmed in the following quarters from 2020q4 and 2021q2 (with an even lower level, 18%). Table 3 shows that the decrease in flows during the recovery period concerns all employment status. It is as if those who already have a job are holding on to their status while the rest of the potential workforce (the unemployed and the discouraged) have few opportunities to access a job. The percentage of stayers increases for all, but the increase is very marked in particular for informal workers (+20 p.p.), for the unemployed (+20 p.p.) and for the discouraged (+14 p.p.). Thus, the situation on the labour market is improving mainly because a larger share of individuals is keeping their jobs. The number of those who enter or re-enter employment is increasing, but to a limited extent. Transitions from employed (formal and informal) to discouraged status have declined relatively to the shock but are still higher than before the crisis. Here again, the importance of this exit option from the labour market, as a discouraged person, even if only temporarily, is confirmed.

Employed individuals may hold their position due to lack of external opportunity, and the recovery seems to be yet not strong enough to provide employment for all the unemployed/inactive. The informal workers are twice less likely to find a formal job during the recovery than during the shock. This result may seem paradoxical but it is probably the effect of the climate of uncertainty that still prevails at that time: therefore, investment is still limited, enterprises prefer to avoid hiring new workers and a large majority of the occupied prefer to keep their jobs. The unemployed and the discouraged are respectively 2 and almost 3 times more likely to find a job in the informal sector than in the formal. Thus, although there is a growth of the activity rate from the fourth quarter of 2020 onwards, this is above all driven by the informal employment and unemployment.

Table 5
Matrices of individual transitions on the labour market (%)

BASELINE STATUS \ ENDLINE STATUS	FORMAL	INFORMAL	UNEMPLOYED	DISCOURAGED	OTHER INACTIVE
FORMAL	**83.3**	9.9	3.1	1.1	2.6
	81.3	8.1	3.6	3.5	3.5
	89.4	3.7	2.5	1.8	2.7
	91.7	3.4	2.4	1.1	1.5
INFORMAL	15.9	**65.0**	6.4	4.8	7.9
	12.4	**56.5**	8.7	11.6	10.8
	6.5	**77.0**	5.1	5.8	5.5
	7.4	**76.8**	6.2	4.5	5.1
UNEMPLOYED	13.2	22.4	**39.7**	9.9	14.7
	8.9	13.7	**38.9**	21.2	17.2
	9.5	18.1	**58.4**	8.5	5.6
	10.1	16.2	**60.1**	7.1	6.5
DISCOURAGED	3.7	16.1	13.3	30.1	**36.8**
	2.2	10.2	12.1	36.7	**38.8**
	5.7	15.4	13.7	**51.4**	13.8
	4.4	9.7	13.1	**59.0**	13.8
OTHER INACTIVE	2.2	7.0	4.5	8.3	**78.0**
	1.5	4.2	3.6	8.7	**82.0**
	1.3	3.7	3.0	5.3	**86.7**
	1.6	3.5	2.6	4.6	**87.8**
TOTAL	33.0	23.0	7.7	6.6	**29.7**
	31.0	18.8	7.8	10.3	**32.0**
	30.5	19.8	8.7	9.4	**31.7**
	31.8	20.1	9.0	8.5	**30.6**

Source: quarterly PNAD-C (2018, 2019, 2020), IBGE; authors' calculations.
Note: yellow lines = 2018q4-2019q2 (pre-crisis period), blue lines = 2019q4-2020q2 (shock period); green lines = 2020q2-2020q4 (partial recovery period) and orange lines = 2020q4-2021q2.
Note: darker shades emphasize the proportion of stayers, while the bold type underlines the largest flows.

Gender perspective. During the pre-pandemic period, employed women were already more likely than men to move into inactivity, especially women in informal employment (16.5% for women vs. 10% for men).[9] These differences became wider during the shock, as the absolute variation in the probability of transition for women was greater than for men. Thus, while the probability of a male informal worker to join inactivity increased by 8 p.p., it increased by 12 p.p. for female informal workers.

Access to employment is structurally even more unequal than the exit mechanism from the labour market or from the active occupied population. Again, inequality is even more pronounced regarding access to informal employment. For example, among the unemployed in 2018q4, 18% of women find an informal job in 2019q2 compared to 27% of men. During the crisis, the drop is greater for women in their chances of getting a job. During the last recovery period, women have apparently more difficulty to recover compared to men, although they suffered more during the crisis. This result will be discussed further in the following sections.

[9] Transition matrices disaggregated by gender are available in Appendix.

2. Transition profiles

Globally the Covid-19 crisis did not change the structural pattern of the transition profiles. As underlined before, the Brazilian labour market was already in a sluggish situation, and the pandemic greatly amplified the dynamics at work. Thus, movers as well as stayers remained with quite similar profiles before and after the crisis. While the shock was exceptional, the results do not fundamentally change. It was essentially the magnitude of the gross outflows that have increased significantly. So we will not comment in detail the different profiles, the objective here is to highlight new features or results revealed by the crisis.

First, the profiles highlight the mechanisms that maintain or amplify inequalities. Indeed, as expected, those who manage to keep a job have very specific profile. For example, formal stayers are on average significantly more educated and wealthier than movers. Informal stayers are also relatively wealthier than movers (with the exception of those who formalise who are better off in terms of education and income). In fact, people who are already considered vulnerable in normal times are the most likely to see their situation deteriorate during the pandemic. These vulnerable groups are in particular, the young, the women, the non-white, the rural, the less educated, and the poorest people. By way of illustration, formal workers transiting to unemployment are much younger than the stayers (6 years difference for the benchmark period).

As a consequence, we find that gender inequalities are worsening. Access to employment appears to be relatively even more difficult for women during the recovery phase. This difficulty for women seems even more marked for accessing or maintaining an informal job (Tables 6 and 7). But the most striking result concerns exclusion from the labour market, which affects women more strongly. Whatever the starting status of individuals, women are systematically more numerous among those who fall into inactivity (more than 55%, whereas they are only about 40% of those who remain in employment). They are also relatively over-represented in the transition to discouraged (e.g., 60% or more of the unemployed who become or remain discouraged are women). This over-representation of women among those leaving the labour market is a structural fact (observed before the crisis) which is confirmed during the crisis and can also be noticed during the recovery period. However and surprisingly, its magnitude did not change over time.

The same observation can also be made about racial inequalities. There are systematically fewer Whites in the most affected groups: those who were formally or informally employed and who switch to the discouraged. For example, Whites represent less than a third of the informal workers who become discouraged, whereas they represent around half of the informal and formal workers who retain their status.

Table 6
Profiles of formal workers to the different labour market status

	FORMAL TO FORMAL	FORMAL TO INFORMAL	FORMAL TO UNEMPLOYED	FORMAL TO DISCOURAGED	FORMAL TO OTHER INACTIVE
AGE (years)	***39.2***	40.6*	33.1*	37.7	43.9*
	39.2	40.6*	34.4*	38.0*	43.2*
	39.6	40.1	35.5*	41.0	46.7*
SHARE OF WOMEN (%)	***42.9***	38.3*	41.9	48.8	57.0*
	43.0	38.0*	40.5	49.3*	55.2*
	41.6	39.3	47.0	52.5*	54.9*
SHARE OF « WHITE » PEOPLE (%)	***50.6***	47.5*	45.6*	42.0*	48.3
	50.5	46.3*	41.8*	41.1*	44.3*
	52.0	44.7*	49.3	45.6	48.5
SHARE OF RURAL PEOPLE (%)	***6.7***	10.5*	4.7*	11.5*	9.4*
	6.5	10.2*	4.9*	6.8	7.2
	7.4	9.5	2.7*	6.0	6.5
SCHOOLING (years)	***12.0***	10.9*	11.3*	10.3*	10.6*
	12.1	11.3*	11.3*	10.9*	10.9*
	12.3	11.4*	11.6*	11.4*	11.2*
EFFECTIVE EARNINGS (nominal R$)	***2,966***	2,475*	1,680*	1,608*	2,013*
	3,144	2,699*	1,835*	1,710*	2,122*
	2,954	2,100*	1,627*	1,456*	2,521
HOUSEHOLD PER CAPITA EARNINGS (R$)	***1,911***	1,645*	1,189*	1,119*	1,491*
	2,061	1,919	1,277*	1,241*	1,493*
	1,844	1,442*	1,046*	1,025*	1,618

Source: quarterly PNAD-C, IBGE; authors' calculations.
Note: white lines = 2018q4-2019q2; light grey lines = 2019q4-2020q2; dark grey lines = 2020q2-2020q4.
The stars denote a significant difference at 5% between the stayers (reference category) and the movers.

Table 7
Profiles of informal workers to the different labour market status

	INFORMAL TO FORMAL	***INFORMAL TO INFORMAL***	INFORMAL TO UNEMPLOYED	INFORMAL TO DISCOURAGED	INFORMAL TO OTHER INACTIVE
AGE (years)	38.7*	***40.1***	33.7*	37.7	44.3*
	39.2*	***40.2***	34.1*	38.0*	44.9*
	38.6*	***40.5***	36.0*	40.9	48.3*
SHARE OF WOMEN (%)	41.4	***41.9***	43.3	51.8*	60.1*
	38.3*	***41.5***	42.5	53.2*	60.6*
	35.5	***37.4***	46.5*	54.7*	60.9*
SHARE OF « WHITE » PEOPLE (%)	47.3*	***35.6***	30.4*	27.1*	36.9*
	48.6*	***36.7***	30.1*	28.5*	34.3
	44.6*	***37.6***	31.8	33.1	39.4
SHARE OF RURAL PEOPLE (%)	10.4*	***20.0***	13.1	32.0*	22.3*
	10.6*	***19.3***	12.2*	20.5	18.9
	10.4*	***17.0***	11.1*	20.7	17.3
SCHOOLING (years)	11.1*	***9.2***	9.7*	8.1*	8.2*
	11.3*	***9.5***	10.0*	9.2*	8.6*
	11.4*	***10.0***	9.8	9.5*	8.9*
EFFECTIVE EARNINGS (nominal R$)	1,986*	***1,297***	755*	562*	830*
	2,235*	***1,494***	899*	797*	880*
	1,983*	***1,404***	642*	494*	754*
HOUSEHOLD PER CAPITA EARNINGS (R$)	1,493*	***929***	635*	534*	801*
	1,578*	***1,067***	740*	657*	802*
	1,443*	***1,001***	528*	536*	713*

Source: quarterly PNAD-C, IBGE; authors' calculations.
Note: white lines = 2018q4-2019q2; light grey lines = 2019q4-2020q2; dark grey lines = 2020q2-2020q4.
The stars denote a significant difference at 5% between the stayers (reference category) and the movers.

Table 8
Profiles of unemployed to the different labour market status

	UNEMPLOYED TO FORMAL[1]	UNEMPLOYED TO INFORMAL	***UNEMPLOYED TO UNEMPLOYED***	UNEMPLOYED TO DISCOURAGED	UNEMPLOYED TO OTHER INACTIVE
AGE (years)	31.9*	32.1*	***30.3***	31.5	31.1
	31.9*	33.1*	***30.5***	31.0	30.9
	31.4	33.6	***31.3***	32.3	36.4*
SHARE OF WOMEN (%)	47.8*	40.9*	***51.0***	56.7*	64.2*
	43.1*	43.6*	***52.7***	58.8*	63.4*
	41.8	37.2*	***49.5***	59.6*	65.3*
SHARE OF « WHITE » PEOPLE (%)[1]	42.9*	30.9	***34.5***	29.6	35.6
	36.2	31.1	***35.2***	31.7	34.5
	40.0	32.7*	***35.3***	32.0	33.8
SHARE OF RURAL PEOPLE (%)	5.1*	13.1*	***7.1***	19.0*	9.4
	5.4	12.4*	***7.5***	12.1*	8.1
	3.3*	13.3	***7.3***	18.7*	4.2*
ILLITERACY RATE (%)	0.7*	4.2*	***1.5***	4.5*	3.5*
	0.9*	2.9*	***1.3***	3.2*	2.5*
	0.2*	2.9*	***1.4***	3.8*	4.9*
SCHOOLING (years)	11.4*	9.9*	***10.9***	9.8*	10.0*
	11.6*	10.0*	***11.1***	10.3*	10.3*
	11.9*	10.2*	***10.9***	10.6	10.0*
HOUSEHOLD PER CAPITA EARNINGS (R$)	597*	391	***450***	364*	568*
	687*	380*	***523***	440*	525
	551*	323*	***376***	394	499

Source: quarterly PNAD-C, IBGE; authors' calculations.
Note: white lines = 2018q4-2019q2; light grey lines = 2019q4-2020q2; dark grey lines = 2020q2-2020q4.
The stars denote a significant difference at 5% between the stayers (reference category and the movers.
Note: [1]Using a different stratum because of an insufficient number of observations on original stratum on this transition (about the recovery period – last line)

Table 9
Profiles of discouraged to the different labour market status

	DISCOURAGED TO FORMAL	DISCOURAGED TO INFORMAL	DISCOURAGED TO UNEMPLOYED	**DISCOURAGED TO DISCOURAGED**	DISCOURAGED TO OTHER INACTIVE
AGE (years)	35.5*	35.0	29.5*	***34.9***	39.7*
	35.1	35.4	30.1*	***35.0***	40.9*
	34.71	35.9	31.7*	***35.7***	41.6*
SHARE OF WOMEN (%)	53.5*	52.7*	57.6*	***65.3***	67.5
	49.1*	48.9*	54.6*	***65.6***	68.6
	49.6*	48.2*	53.7*	***63.9***	68.3
SHARE OF « WHITE » PEOPLE (%)	42.8*	26.6	31.8*	***26.8***	32.5*
	38.7*	25.2	27.5	***26.4***	32.5*
	37.2	27.4	33.3	***30.7***	38.3*
SHARE OF RURAL PEOPLE (%)	13.9*	33.9	16.1*	***36.6***	23.1*
	13.9*	37.5	17.1*	***32.2***	23.4*
	5.7*	20.4	9.5*	***25.1***	14.6*
ILLITERACY RATE (%)	4.4*	9.5	3.8*	***9.9***	11.2
	3.8*	10.1	3.5*	***7.6***	9.9*
	0.9*	5.2	2.0*	***4.9***	6.7
SCHOOLING (years)	10.2*	8.4	9.9*	***8.1***	7.9
	10.3*	8.3	9.9*	***8.6***	8.1*
	11.4*	9.6	10.9*	***9.5***	9.2
HOUSEHOLD PER CAPITA EARNINGS (R$)	610*	313	430	***306***	430*
	575*	320	432	***342***	477
	563*	297	325	***317***	382

Source: quarterly PNAD-C, IBGE; authors' calculations.
Note: white lines = 2018q4-2019q2; light grey lines = 2019q4-2020q2; dark grey lines = 2020q2-2020q4.
Note: the stars denote a significant difference at 5% between the stayers (reference category) and the movers.

Second, the group of discouraged people deserves special attention. We have seen above that this labour market status has a specific place in labour market adjustment. The transition profiles confirm this specificity. Indeed, the discouraged are clearly different from the other inactive, the latter being older and relatively wealthier. One might have thought that the discouraged leave the labour market because they can afford it. One might have assumed that they benefit from relatively higher incomes thanks to other members of their household or they have benefited from higher incomes in the past. But these assumptions are invalidated. Those who become discouraged systematically have the lowest incomes (effective earnings at the individual level for those who worked, or household per capita income).

In brief, if we try to rank the different statuses, those who become discouraged seem to be the most precarious. Thus, for example, formal workers who become informal are relatively richer than those who become discouraged (Table 6). It should be noted that informal workers who remain informal are richer than those who become inactive or unemployed (Table 7). Among the unemployed and discouraged (Tables 8 and 9), those who manage to move to formal status are those who initially have the highest per capita incomes, followed by those who become (or remain) unemployed. Finally, those who are the poorest become informal or move to the discouraged as a last resort.

3. *Labour earnings dynamics by type of transition*

If we restrict the analysis to the groups of those who remain in employment, Table 10 confirms and shows how earnings level is correlated with transitions. Individuals with a higher income are also those who are best protected. Systematically, formal stayers are the richest, and informal stayers are the poorest. Over the 2018q4-2019q2 period, stayers' earnings are quite stable. Those transiting from informal to formal are always those winning the most or mitigating the best the effects of the crisis. It is also the initially richer workers who manage to move from informal to formal employment during the crisis. The period of early recovery (2020q2-2020q4) is associated with an increase in income for most categories, except for those who move from formal to informal activities. For the latter, the effects of the crisis apparently continue to prevail. Thus, the drop in their income concomitant with their informalisation shows deterioration in their situation.

Table 10
Earnings dynamics by type of transition

	2018q4	2019q2	Δ (%)	2019q4	2020q2	Δ (%)	2020q2	2020q4	Δ (%)
F → F	3,535	3,418	- 3,3	3,641	3,274	- 10,1	3,364	3,555	+ 5.7
F → I	2,952	2,507	- 15,1	3,126	2,473	- 20,9	2,394	2,340	- 2.2
I → F	2,304	2,575	+ 11,8	2,524	2,361	- 6,5	2,170	2,789	+ 28.6
I → I	1,463	1,446	- 1,2	1,638	1,298	- 20,8	1,501	1,684	+ 12.2

Source: quarterly PNAD-C, IBGE; authors' calculations.
Note: F = formal and I = informal.
Note: Deflated earnings at Q4 2021 prices.

One important consequence of the previous analyses, based on transition matrices (Table 5), the different socioeconomic profiles by status and by transition type (Tables 6 to 9) and earnings dynamic for formal and informal workers (Table 10), is to establish a clear hierarchy between

labour market statuses. Formal workers are at the top: they earn more, come from richer households, transit less to less rewarding sectors, and have a more favourable socioeconomic profile. Then, follow the informal workers, who are better off than the unemployed. The other inactive are better off than the discouraged and are in par with the unemployed. The main systematic difference between the two groups is related to age structure: the other inactive are the oldest while the unemployed are the youngest. In particular, we provide new elements, beyond job quality (earnings and protection), to support the dualist view of formal/informal divide, over the legalist interpretation. Formal jobs are in average superior to informal jobs, at least on the Brazilian labour market. At the end of the ladder we find the discouraged, systematically disadvantaged compared to all other four statuses, whatever the indicator.

4. Econometric models

The descriptive statistics outlined a relative stability in the individual features of each type of movers during the shock, and few changes during the recovery period. Resorting to econometrics provides more analytical depth. It aims at understanding the consequences of the pandemic on the Brazilian labour market by analysing the relationship between individual characteristics and each type of transition (other things being equal), and by comparing them over time. We do not pretend to detect causal effect on the transition probabilities. But the use of econometric models allows for the control of observable confounding factors. The odds ratios represent the probability associated to an explanatory variable to leave a given labour market status, relative to the likelihood of remaining in the initial labour market status. The tables with the detailed results of the different MNL are presented in the appendix. The following Tables (11 and 12) are intended to provide a selected overview that summarises the main results, focused at formal and informal workers.

First, econometric estimations confirm findings already obtained from descriptive statistics. Globally, in the pre-crisis period, at the height of the crisis or during the recovery, the conditional correlations with the socio-demographic factors are in the same direction and about the same order of magnitude. The few changes we can notice over time are mainly limited to coefficients that are no longer significant during the recovery. The worsening of gender inequalities already mentioned before is confirmed by the higher probabilities of exit from the labour market for women, a phenomenon that is even more pronounced during the recovery phase. Regarding the racial inequalities observed before and during the crisis, it no longer seems to operate in the post-crisis phase.

Regarding age-related structural inequalities, the youngest but also the oldest are those who see their situation deteriorate the most over time. Compared to stayers, formal individuals in the 14-25 age group are 54 percent more likely than those in the 26-45 group (and 72 percent more likely than those in the 46-65 group) to transit into unemployment. Besides, they have 46 percent more risk than the 26-45 to fall into the discouraged groups. The order of magnitude is roughly similar for informal workers. But contrary to what several papers stress, the situation has not worsened for young people due to the Covid-19 shock: coefficients remained relatively stable during the shock. In contrast, the group that experiences major changes in transition probabilities

relatively to the 14-25 age group are people over 66. Their probability of becoming inactive has exploded during the recovery period.

Table 11
MLN: transitions of formal workers

	FORMAL → INFORMAL			FORMAL → DISCOURAGED			FORMAL → OTHER INACTIVE		
	Benchmark	Crisis	Recovery	Benchmark	Crisis	Recovery	Benchmark	Crisis	Recovery
Age									
14-25	*Base category*			*Base category*			*Base category*		
26-45	-	-	-	-	-	-	-	-	-
46-65			-	-	-	-			
66 & +	+	+	+		-		+	+	+
Woman	-	-		+	+	+	+	+	+
White	+				-			-	
Rural	+	+	+		-			-	-
Region									
Norte	*Base category*			*Base category*			*Base category*		
Nordeste	-	-		+	+		-		
Sudeste	-	-		-	+	-	-		
Sul	-	-	-	-	-	-	-		
Centro-Oeste	-	-		-			-		+
Education									
< 1 year	*Base category*			*Base category*			*Base category*		
1 to 4 years	-			-					-
5 to 8 years	-			-	-		-	-	-
9 to 11 years	-	-		-	-		-	-	-
12 to 15 years	-	-	-	-	-	-	-	-	-
> 16 years	-	-	-	-	-	-	-	-	-
Earnings quintile									
1st	*Base category*			*Base category*			*Base category*		
2nd	-	-		-	-		-	-	
3rd	-	-	-	-	-	-	-	-	
4th	-	-	-	-	-	-	-	-	
5th	-	-	-	-	-	-	-	-	

Source: quarterly PNAD-C, IBGE, authors' calculations
Note: Stayers are used as reference category. Coloured cells are those with significant coefficient: green means odd-ratio<1; brown means odd-ratio>= 1.

Finally, econometrics makes it possible to identify important relationships that were not straightforward in the previous section. The North and Nordeste regions appear to be more vulnerable to the shock: both the formal and the informal workers of these regions have higher probabilities to move to the discouraged category during the crisis. In contrast, rural population seems to be better protected than the urban population against inactivity since the shock. Furthermore, we note the important role of education. Even if the coefficients are no longer significant during the recovery period, the most educated informal workers have a higher

probability of getting a formal job. Symmetrically, more years of education is associated with a lower risk of moving to a more precarious status.

We are aware that the inclusion of the earnings quintiles implies some endogeneity issue. However, it is interesting to observe that, not surprisingly, being in the top quintiles provides protection from precarious transitions and helps to move to better statuses. While the probability gaps narrow during the shock, many odds ratios gain in importance during the recovery period.

Table 12
MLN: transitions of informal workers

	INFORMAL → FORMAL			INFORMAL → DISCOURAGED			INFORMAL → OTHER INACTIVE		
	Benchmark	Crisis	Recovery	Benchmark	Crisis	Recovery	Benchmark	Crisis	Recovery
Age									
14-25	*Base category*			*Base category*			*Base category*		
26-45	+	+		-	-	-	-	-	-
46-65	+	+	-	-	-	-	-	-	
66 & +	-	-	-	-	-	-	+	+	+
Woman	-	-	-	+	+	+	+	+	+
White	+	+	-	-	-			-	
Rural	-	-	-	+	-			-	-
Region									
Norte	*Base category*			*Base category*			*Base category*		
Nordeste			+	+	+	+	-		
Sudeste	+	+	+	-	+		-	-	
Sul	+	+	+	-	-	-			
Centro-Oeste	+	+	+	-	-		-	-	
Education									
< 1 year	*Base category*			*Base category*			*Base category*		
1 to 4 years							-	-	-
5 to 8 years	+	+		-			-	-	-
9 to 11 years	+	+		-			-	-	-
12 to 15 years	+	+	+	-			-	-	-
> 16 years	+	+	+	-	-		-	-	-
Earnings quintile									
1st	*Base category*			*Base category*			*Base category*		
2nd	+	+		-	-	-	-	-	-
3rd	+	+		-	-	-	-	-	-
4th	+	+	+	-	-	-	-	-	-
5th	+	+		-	-	-	-	-	-

Source: quarterly PNAD-C, IBGE, authors' calculations
Note: Stayers are used as reference category. Coloured cells are those with significant coefficient: green means odd-ratio<1; brown means odd-ratio>= 1.

VI. Discussion and conclusion

In this paper, we examined individual transitions on the labour market related to the Covid-19 pandemic. On the one hand, we measured their magnitude, and on the other hand, we studied the individual characteristics associated with the transition probabilities, as well as the evolution of these probabilities over time. We distinguish three periods: pre-pandemic, shock and recuperation, in order to disentangle what is specific to the Covid-19 crisis.

First, we confirm that labour market flows are much more massive and complex than the macro approach suggests. The analysis of gross flows (panel microdynamics) provides a more accurate picture of the movements on the labour market than the more usual approach based on net flows (cross section macrodynamics). While at the aggregate level, in six months Brazil lost 11 million jobs, 18 million workers lost their jobs and 7 million new jobs were created. This process of job creation and destruction is structural. Before the crisis, the negligible increase in the number of jobs (0.2%) is associated with a loss of 11 million jobs compensated by the creation of the same amount of jobs. Moreover, 50 million people change statuses, as in pre-pandemic times, a conservative estimate of the true individual mobility (since we cannot estimate the number of individuals who lost and regained a job within the same quarter). Paradoxically, the overall rate of sectoral mobility (30%) remained constant during the shock, despite its huge magnitude. It even collapsed in the recovery phase. Thus the macro picture is at best partial, and in some instances misleading of the real and much more fluid labour market dynamics. However, its assessment is much more demanding as it requires panel data.

Second, our analysis shows that the loss has mainly been concentrated in informal jobs. The latter did not play its cushion role during the shock contrary to what might have been expected from the literature. Containment or social distancing measures can only partly explain the fact that informal workers could not keep their jobs and that informality did not play their usual role as a refuge or fallback for formal workers who lost their jobs. On the one hand, if they are looking for sources of income, the concerned population could have been forced to work anyway and face the risk of being infected or dying from the disease. On the other hand, the strict confinement had a limited duration compared to the quarterly studied period. In fact, in addition to the supply side effect, informal workers also experienced a demand side effect: consumption decreased overall. Thus, we highlight a weakness of existing models that consider the informal economy as the main adjustment variable in the labour market, in addition to unemployment. We note, however, that even if informal jobs are not regulated by any legislation, access to them is not open: informal economy has also barriers to entry.

Third, our analysis highlights the particular role played by the discouraged category: a status that must be taken into account to explain adjustments which occur in the labour market. Looking at the profile of the discouraged, this status is clearly different from the other inactive: it includes the most precarious workers (with the lowest per capita income) who leave the labour market. More globally, using the overall results, if we establish a hierarchy, the discouraged workers appear to be the most disadvantaged compared to all other labour market statuses. This third finding argues for the systematic identification and consideration of this specific status in the analysis of the labour market functioning.

The fourth finding that emerges from our analysis is on inequalities. Globally, the different transition profiles remained quite similar before and after the crisis in spite of the magnitude of the shock. We could have expected upheavals, but the pandemic has mainly amplified dynamics already at work since the Brazilian labour market was already in a tight situation before the sanitary crisis. Therefore, the usual vulnerable groups (the youngest, the non-white people, the less educated, the poorest and the women) were more affected. The impact of the pandemic was even more pronounced during the recovery period for certain categories. In particular, women faced an even higher risk of exiting the labour market (by moving into the discouraged or other inactive groups) after the crisis. This result may stem from the fact that in most households, women are the one who most of the time decide to give up their work to take care of the children and the sick people in the family.

To go further, this work offers many avenues of research. It deserves to be pursued in several directions. First, the massive dip in activity rates appeared to be the main adjustment variable to the shock, and not unemployment and even less the informal sector, as expected. In particular, the explosion in the number of discouraged workers encourages a more serious investigation on this key but neglected category. More broadly, the survival mechanisms of the poorest deprived of their jobs need to be better understood. Different hypotheses can be put forward, like debt contracting or benefiting from other sources of revenues, beginning with the *Auxilio emergencial*. It should be tested whether it disincentives the return to work. It is currently not possible to address this issue due to lack of data. Second, while the aggregate indicators point to a return to the initial situation after two years of the pandemic, the micro-dynamics show that this is not the case. The resulting question concerns the nature of the crisis: is it just a transitory shock quickly absorbed or, on the contrary, will it leave a lasting imprint on the functioning of local labour markets. Third, the determinants of transitions constitute another desirable extension of our study. Our econometric models remain essentially descriptive. In particular, the causal impact of household income on transitions, and conversely of transitions on the earnings dynamics should be explored further. Finally, conducting the analysis on previous crises or in other countries, in a comparative perspective, would allow to assess to what extent the results are specific to Brazil in a Covid-19 context, or have a broader scope.

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APPENDIX

1. Methodology to construct the panel and strategy to reduce attrition biases

The IBGE provides a key to identify households from one quarter to the next. It is composed of the "primary sampling unit" variable, which is the census tract, the "household selection number" assigned to the household for the 5 quarters of presence in the sample, and the "sample group". However, no code is provided to identify individuals longitudinally.[10] The Brazilian literature has developed matching methods to identify them.

The first method, which will be called "basic matching", was used in the work of Lopes (2002) with the PME (Monthly Employment Survey). The individual identification key consists of the household identification one plus the variable indicating gender, day of birth, month of birth and year of birth. However, this selection is very strict. A potential problem is that individuals may be lost during the matching due to measurement errors. Ribas and Soares (2008) attempted to address this problem for the PME (which is partly the basis of the PNAD-C). They developed an algorithm allowing for some variation, leading to what will be called the "augmented matching". Therefore, using the Stata package made available by the *PUC do Rio de Janeiro* which adapted this methodology to the PNAD-C. For the 2019q4-2020q2 period, the augmented method saves 9,213 individuals (a little less than 5% of the augmented panel). We manage to avoid a problem of selective attrition: in the basic matching, individuals ignoring their birthdate cannot be identified. However, individuals who do not know their birthdate are also more likely to be precarious individuals. Beyond this "artificial attrition" related to the panel construction, other attrition concerns have been identified. Actual attrition may be generated by geographical mobility or refusal to be re-interviewed, and it was more problematic during the pandemic period.

Apart from the massive loss in the cross-section sample sizes, the main concern is about the potential selective attrition during the pandemic. This is all the more problematic that the evolution of the theoretical panel seems to follow a different pattern of attrition. Attrition could be selective as the IBGE can only survey individuals who have a telephone. However, those who do not have a telephone are probably the most precarious. To assess the issue of selective attrition, we compared several socio-demographic, labour market and economic characteristics of the individuals in the cross-section with those of the individuals in the theoretical panel (in our case, in interviews 1, 2 and 3 at baseline). The latter is by construction representative of the cross-section. Our computations confirm there is no significant difference in mean between the cross-section and the theoretical panel for each period. Nevertheless, by definition, the theoretical panel is composed of a proportion of effective panel (the individuals effectively matched in the database) and a proportion of attritors:

$$(1) \qquad (X_{panel(theo)} = a\, X_{panel(eff)} + 1 - a\, X_{attritors})$$

[10] The 'sequence number' can be used to create an individual identifier in the cross-section database, but it varies from one quarter to the next and must not be used to match individuals.

Table A1
Comparison between the effective panel and attritors, pre-reweighting

	2018q4-2019q2			2019q4-2020q2			2020q2-2020q4		
	Eff. panel	Attritors	Diff.	Eff. Panel	Attritors	Diff.	Eff. panel	Attritors	Diff.
Age *(year)*	41.5	35.8	**5.7** *	41.7	38.7	**3.0** *	41.9	39.0	**2.9** *
Women share *(% or p.p.)*	51.8	49.3	**2.5** *	52.3	49.7	**2.6** *	51.8	50.9	**0.8**
White share *(% or p.p.)*	43.4	39.0	**4.5** *	44.5	35.0	**9.4** *	44.9	39.9	**4.9** *
Rural share *(% or p.p.)*	14.3	11.2	**3.1** *	11.8	17.0	**-5.2** *	13.0	13.6	**-0.6**
Education *(year)*	9.7	10.0	**-0.3** *	10.0	9.2	**0.8** *	10.1	9.8	**0.3** *
Illiteracy rate *(% or p.p.)*	6.3	4.5	**1.8** *	5.2	8.2	**-3.0** *	5.0	5.6	**-0.6** *
Eff. earnings *(R$)*	2,239	2,123	**116**	2,436	1,918	**519** *	2,335	2,025	**310** *
HH PC earnings *(R$)*	1,067	1,070	**-3**	1,198	892	**306** *	978	857	**121** *
Activity rate *(% or p.p.)*	62.7	68.2	**-5.5** *	64.0	63.4	**0.6**	56.7	57.9	**-1.2**
Unemployment rate *(% or p.p.)*	11.1	14.0	**-2.9** *	10.3	13.3	**-3.0** *	13.0	15.6	**-2.6** *
Informality rate *(% or p.p.)*	41.0	43.0	**-2.0** *	39.9	46.5	**-6.6** *	37.5	41.8	**-4.3** *

Source: PNAD-C, IBGE; authors' calculations.
Note: The stars represent a statistically significant difference at a 5%-level.

Table A2
Comparison between the theoretical panel and effective panel, post-reweighting

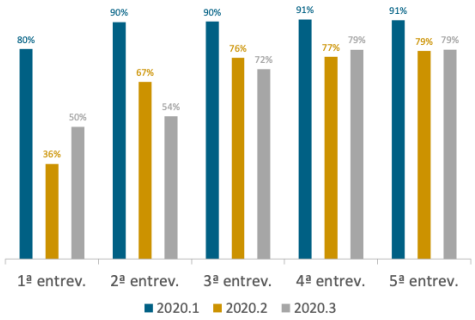
	2018q4-2019q2			2019q4-2020q2			2020q2-2020q4		
	Theoret. panel	Eff. panel	Diff.	Theoret. Panel	Eff. panel	Diff.	Theoret. panel	Eff. panel	Diff.
Age *(year)*	40.7	41.4	**-0.7** *	41.0	41.7	**-0.7** *	40.5	41.8	**-1.2** *
Women share *(% or p.p.)*	51.4	51.7	**-0.3**	51.6	52.3	**-0.6** *	51.3	51.6	**-0.2**
White share *(% or p.p.)*	42.8	42.8	**0.0**	*42.0*	*42.1*	***-0.1***	43.5	43.5	**0**
Rural share *(% or p.p.)*	13.8	13.9	**-0.1**	*13.2*	*13.4*	***-0.2***	13.3	13.3	**0**
Education *(year)*	9.7	9.7	**0.0**	9.8	9.9	**-0.1**	10.0	10.1	**-0.1**
Illiteracy rate *(% or p.p.)*	6.1	6.3	**-0.2**	6.0	5.6	**0.4** *	5.3	5.1	**0.2**
Eff. earnings *(R$)*	2,222	2,231	**-9**	2,305	2,343	**-38**	2,254	2,292	**-39**
HH PC earnings *(R$)*	1,067	1,060	**7**	1,118	1,127	**-9**	958	954	**3.8**
Activity rate *(% or p.p.)*	63.4	63.3	**0.1**	*63.8*	*63.6*	***0.3***	57.3	57.3	**0**
Unemployment rate *(% or p.p.)*	11.5	11.7	**-0.2**	*11.1*	*11.1*	***0.0***	13.6	13.6	**0**
Informality rate *(% or p.p.)*	41.3	41.1	**0.2**	*41.5*	*41.4*	***0.2***	37.9	37.9	**0**

Source: PNAD-C, IBGE; authors' calculations.
Note: The stars represent a statistically significant difference at a 5%-level.

Table A1 presents the characteristics of the effective panel compared with the attritors over the 2 first periods. It shows that the structure of the effective panel differs statistically from the theoretical panel one. The individuals in the effective panel are slightly more female, white, and urban. They are a little more educated. Finally, regarding their position on the labour market, they are more formal, and less unemployed. As a result, on average individuals in the effective panel are more advantaged socially and enjoy a better situation on the labour market. However, if most of the differences are significant, they are small. By definition, the gap is maximized when comparing the effective panel to the attritors. To avoid spurious analyses, these groups must be representative of the cross-section, with no selection bias linked to the pandemic.

Considering the most relevant criteria, the reweighting of the effective panel and attritors has been done using the cross-section structures. Table A2 shows the comparison of the theoretical panel and the effective panel once reweighted. The new post-stratification weights allow to reduce the biases without eliminating them totally. However, the fact that the structure of the attritors is not perfectly identical to the cross-section one should not be a major problem. First, they represent a relatively small group of the theoretical panel. Second, the differences between the theoretical and effective panels are insignificant or of quite low in magnitude. Moreover, the 2019q4 – 2020q2 period is not the most affected by the significant reduction in the number of interviews. Figure 1, taken from Corseuil and Russo (2021), illustrates the decrease in the sample for each quarter of 2020 compared to the same quarter of 2019, for each group of individuals defined by the visit number. The loss of interviews is mostly concentrated on visits 1 and 2 in 2020q2, while the individuals constituting the panel of interest are those with visits 3, 4 or 5.

Figure 1
Sample size in 2020 relative to 2019, by number of interview (%)



Source: Corseuil and Russo (2021), with microdata from PNAD Contínua/IBGE.

We should stress that, aware of the selective attrition issue, the IBGE reweighted the PNAD-C data. However, the post-stratification data only take into account gender and age ranges, and not the income levels.[11] In consequence, the selection biases in the official data underestimating the weight of the poorest strata of the population persist.

[11] IBGE (2021), Pesquisa Nacional por Amostra de Domicílios Contínua – PNAD Contínua. Sobre o processo de ponderação da PNAD Contínua. Nota técnica 02/2021, IBGE, Rio de Janeiro.

Table A3
Matrices of individual transitions on the labour market (%) – column movements by gender

Table A3a
Matrix of individual (men) transitions on the labour market over the periods 2018q4 – 2019q2, 2019q4 – 2020q2, 2020q2 – 2020q4, %

BASELINE \ ENDLINE	FORMAL	INFORMAL	UNEMPLOYED	DISCOURAGED	OTHER INACTIVE
FORMAL	**83.2**	10.7	3.1	0.9	2.0
	81.5	8.9	3.7	3.1	2.8
	90.3	3.9	2.2	1.5	2.1
	92.1	3.5	2.5	0.9	1.0
INFORMAL	16.6	**67.2**	6.5	4.1	5.6
	13.8	**59.7**	9.0	9.8	7.7
	7.0	**80.4**	4.7	4.4	3.5
	8.2	**79.9**	5.2	3.4	3.2
UNEMPLOYED	14.0	27.0	**39.6**	8.7	10.7
	11.0	16.7	**39.8**	18.9	13.6
	10.6	22.0	**57.0**	6.6	3.7
	12.0	20.1	**57.6**	6.3	4.0
DISCOURAGED	4.6	20.3	15.1	27.9	**32.0**
	3.1	14.2	1.5	**34.5**	33.3
	7.2	19.9	15.8	**46.2**	10.9
	6.5	12.6	15.8	53.6	11.5
OTHER INACTIVE	2.5	7.9	5.1	7.9	**76.7**
	1.9	4.9	3.7	8.5	**81.0**
	1.8	5.0	3.3	5.0	**84.9**
	1.9	4.3	2.4	4.2	**87.2**
TOTAL	38.7	26.9	7.8	5.2	21.3
	37.2	22.6	7.5	8.7	23.3
	36.7	24.4	8.8	7.3	22.8
	38.5	24.5	8.6	6.3	22.2

Source: quarterly PNAD-Contínua (2018, 2019, 2020), IBGE; authors' calculations.

Note: yellow lines = 2018q4-2019q2 (pre-crisis period), blue lines = 2019q4-2020q2 (shock period); green lines = 2020q2-2020q4 (partial recovery period) and orange lines = 2020q4-2021q2.

Note: weights recomputed by the authors.

Note: darker shades emphasize the proportion of stayers, while the bold type underlines the largest flows.

Table A3b
Matrix of individual (women) transitions on the labour market over the periods 2018q4 – 2019q2, 2019q4 – 2020q2, 2020q2 – 2020q4, %

BASELINE \ ENDLINE	FORMAL	INFORMAL	UNEMPLOYED	DISCOURAGED	OTHER INACTIVE
FORMAL	**83.4**	8.9	3.0	1.2	3.5
	81.0	7.2	3.3	4.0	4.5
	88.1	3.4	2.7	2.2	3.5
	91.1	3.2	2.3	1.3	2.1
INFORMAL	15.0	**62.1**	6.4	5.7	10.8
	10.7	**52.6**	8.3	13.8	14.7
	5.8	**72.2**	5.8	7.8	8.4
	6.3	**72.7**	7.5	5.9	7.7
UNEMPLOYED	12.4	18.1	**39.8**	11.1	18.6
	7.2	11.2	**38.2**	23.2	20.3
	8.3	13.9	**59.8**	10.4	7.5
	8.4	12.6	**62.4**	7.8	8.8
DISCOURAGED	3.2	13.5	12.3	31.4	**39.7**
	1.7	7.8	10.4	38.0	**42.0**
	4.7	12.4	12.3	**54.8**	15.8
	3.3	8.1	11.6	**62.0**	15.1
OTHER INACTIVE	2.1	6.5	4.3	8.5	**78.7**
	1.3	3.9	3.5	8.8	**82.5**
	1.1	3.1	2.8	5.4	**87.7**
	1.4	3.1	2.6	4.7	**88.2**
TOTAL	27.7	19.4	7.6	7.9	37.5
	25.4	15.3	7.4	11.8	40.0
	24.6	15.4	8.6	11.4	40.0
	25.7	16.1	9.3	10.5	38.3

Source: quarterly PNAD-Contínua (2018, 2019, 2020), IBGE; authors' calculations.

Note: yellow lines = 2018q4-2019q2 (pre-crisis period), blue lines = 2019q4-2020q2 (shock period); green lines = 2020q2-2020q4 (partial recovery period) and orange lines = 2020q4-2021q2.

Note: weights recomputed by the authors.

Note: darker shades emphasize the proportion of stayers, while the bold type underlines the largest flows.

Table A4
MLN: transitions of formal workers

	Formal → Informal			Formal → Unemployed			Formal → Discouraged			Formal → Other inactive		
	18q4 – 19q2	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**
Constant	1.10	0.68**	0.14***	0.27***	0.31***	0.53	0.60*	0.50***	0.11***	0.29***	0.36***	0.04***
Age												
14-25		*Base category*			*Base category*			*Base category*			*Base category*	
26-45	0.84***	0.87***	0.80**	0.42***	0.46***	0.40***	0.52***	0.54***	0.58***	0.47***	0.51***	0.51***
46-65	0.94	0.94	0.73***	0.24***	0.28***	0.23***	0.46***	0.52***	0.65**	1.05	0.97	1.20
66 & +	2.12***	2.08***	1.73***	0.15***	0.18***	0.07***	0.62	0.70*	0.74	4.95***	4.59***	4.36***
Woman	0.93**	0.92**	0.94	1.03	0.98	1.00	1.39***	1.39***	1.71***	2.10***	1.96***	1.93***
White	1.09***	1.04	1.10	1.00	0.84***	1.04	0.90	0.87**	0.85	1.00	0.91*	1.00
Rural	1.19***	1.17***	1.22**	0.54***	0.51***	0.55***	1.13	0.66***	0.94	0.94	0.80***	0.70**
Region												
Norte		*Base category*			*Base category*			*Base category*			*Base category*	
Nordeste	0.84***	0.83***	1.03	1.06	1.15	1.70***	1.38**	1.72***	1.22	0.75***	1.15	1.06
Sudeste	0.55***	0.66***	0.87	1.03	1.33***	1.71***	0.66***	1.23**	0.73*	0.45***	0.87	1.11
Sul	0.49***	0.57***	0.59***	0.76***	0.89	0.85	0.64***	0.74***	0.68*	0.73***	1.02	1.24
Centro-Oeste	0.69***	0.77***	1.20	0.80**	1.12	1.52**	0.64***	1.02	0.73	0.55***	1.00	1.74***
Education												
< 1 year		*Base category*			*Base category*			*Base category*			*Base category*	
1 to 4 years	0.75***	0.96	1.13	0.91	0.89	0.42**	0.59**	0.75	0.90	0.91	0.79	0.54*
5 to 8 years	0.71***	0.82	0.82	0.76	0.70	0.43***	0.30***	0.53***	0.52	0.67**	0.59***	0.49**
9 to 11 years	0.63***	0.76**	0.74	0.84	0.74	0.38***	0.27***	0.52***	0.53	0.62***	0.55***	0.50**
12 to 15 years	0.45***	0.59***	0.59**	0.63**	0.55**	0.31***	0.20***	0.38***	0.44**	0.42***	0.43***	0.39***
> 16 years	0.41***	0.53***	0.51***	0.40***	0.32***	0.22***	0.13***	0.22***	0.31***	0.30***	0.28***	0.33***
Earnings quintile												
1st		*Base category*			*Base category*			*Base category*			*Base category*	
2nd	0.48***	0.51***	0.96	0.86	0.86	0.37***	0.30***	0.50***	0.68	0.41***	0.40***	1.59
3rd	0.39***	0.42***	0.60**	0.61**	0.67	0.35***	0.20***	0.37***	0.42**	0.41***	0.34***	0.96
4th	0.37***	0.35***	0.63*	0.46***	0.55**	0.25***	0.17***	0.30***	0.40**	0.38***	0.30***	0.88
5th	0.37***	0.34***	0.55**	0.35***	0.42***	0.18***	0.12***	0.20***	0.28***	0.34***	0.25***	0.76

Source: quarterly PNAD-C, IBGE.

Note: Stayers are used as reference category. * notices a 10% significance level, ** notices a 5% significance level and *** notices a 1% significance level.

Table A5
MLN: transitions of informal workers

	Informal → Formal			Informal → Unemployed			Informal → Discouraged			Informal → Other inactive		
	18q4 – 19q2	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**
Constant	0.05***	0.04***	0.03***	0.25***	0.25***	0.14***	0.26***	0.41***	0.12***	0.37***	0.48***	0.11***
Age												
14-25		*Base category*			*Base category*			*Base category*			*Base category*	
26-45	1.17***	1.22***	0.96	0.53***	0.57***	0.53***	0.51***	0.61***	0.58***	0.38***	0.48***	0.51***
46-65	1.16***	1.24***	0.81**	0.36***	0.37***	0.33***	0.50***	0.59***	0.66***	0.78***	0.90**	1.09
66 & +	0.71***	0.75***	0.40***	0.04***	0.07***	0.05***	0.42***	0.47***	0.59***	2.32***	2.41***	3.27***
Woman	0.76***	0.72***	0.70***	0.98	0.97	1.43***	1.71***	1.65***	1.74***	2.56***	2.51***	2.80***
White	1.12***	1.13***	0.89*	0.77***	0.75***	0.84**	0.87***	0.84***	0.89	1.02	0.91**	1.03
Rural	0.74***	0.85***	0.68***	0.49***	0.50***	0.49***	1.21***	0.82***	0.93	1.02	0.83***	0.81***
Region												
Norte		*Base category*			*Base category*			*Base category*			*Base category*	
Nordeste	0.95	1.01	1.29***	1.31***	1.38***	1.46***	1.46***	1.75***	1.74***	0.80***	1.03	1.09
Sudeste	1.21***	1.23***	2.10***	1.42***	1.79***	1.36	0.70***	1.11*	0.93	0.59***	0.72***	0.96
Sul	2.12***	2.17***	2.87***	1.38***	1.54***	1.10***	0.80**	0.72***	0.68**	0.95	1.03	1.13
Centro-Oeste	1.45***	1.49***	1.81***	1.32***	1.68***	1.49***	0.81**	0.83**	0.80	0.79***	0.86**	0.97
Education												
< 1 year		*Base category*			*Base category*			*Base category*			*Base category*	
1 to 4 years	1.18*	1.16	1.19	0.99	1.20	1.27	1.00	0.97	0.78	0.82***	0.73***	0.70**
5 to 8 years	1.41***	1.35**	1.32	1.11	1.38**	1.14	0.87*	0.93	0.90	0.75***	0.71***	0.75**
9 to 11 years	1.72***	1.70***	1.38	1.21	1.46***	1.30	0.76***	1.06	1.07	0.72***	0.66***	0.71**
12 to 15 years	2.36***	2.20***	2.14***	1.33**	1.55***	1.31	0.71***	0.91	0.90	0.53***	0.53***	0.48***
> 16 years	3.18***	3.09***	2.54***	1.37**	1.29*	1.29	0.55***	0.67***	0.83	0.50***	0.45***	0.32***
Earnings quintile												
1st		*Base category*			*Base category*			*Base category*			*Base category*	
2nd	1.27***	1.49***	1.01	0.65***	0.72***	0.72**	0.57***	0.64***	0.75**	0.64***	0.67***	0.77**
3rd	2.03***	2.30***	1.33	0.52***	0.60***	0.62***	0.36***	0.51***	0.50***	0.56***	0.64***	0.53***
4th	2.26***	2.63***	1.55**	0.42***	0.49***	0.56***	0.30***	0.46***	0.43***	0.50***	0.54***	0.55***
5th	2.48***	3.09***	1.34	0.26***	0.33***	0.31***	0.28***	0.36***	0.33***	0.53***	0.53***	0.59***

Source: quarterly PNAD-C, IBGE.

Note: Stayers are used as reference category. * notices a 10% significance level, ** notices a 5% significance level and *** notices a 1% significance level.

Table A6
MLN: transitions of unemployed

	Unemployed → Formal			Unemployed → Informal			Unemployed → Discouraged			Unemployed → Other inactive		
	18q4 – 19q2	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**
Constant	0.11***	0.05***	0.03***	1.34	0.46***	0.48***	0.48***	0.66*	0.21***	0.82	0.88	0.03***
Age												
14-25		*Base category*			*Base category*			*Base category*			*Base category*	
26-45	1.58***	1.59***	1.30***	1.45***	1.49***	1.34***	0.95	0.90*	0.78**	0.73***	0.71***	0.93
46-65	1.37***	1.56***	0.93	1.52***	1.51***	1.50***	1.25**	1.07	0.86	1.23**	1.16*	1.82***
66 & +	0.83	0.43	0.00	1.05	1.09	1.60	5.02***	3.69***	2.56*	8.29***	5.72***	14.58***
Woman	0.67***	0.59***	0.60***	0.70***	0.69***	0.64***	1.37***	1.41***	1.22**	1.85***	1.70***	1.74***
White	0.99	0.87*	1.10	0.99	1.03	0.90	1.11	1.07	1.22**	1.14**	1.10	1.34**
Rural	0.92	1.01	0.89	1.48***	1.45***	1.58***	2.11***	1.38***	1.71***	1.28***	1.02	1.68***
Region												
Norte		*Base category*			*Base category*			*Base category*			*Base category*	
Nordeste	1.01	0.79	1.65***	0.79***	0.79**	0.97	1.13	1.06	1.31**	0.67***	0.52***	0.94
Sudeste	1.46***	1.12	2.75***	0.54***	0.49***	0.84*	0.38***	0.46***	0.70***	0.45***	0.40***	0.79
Sul	3.34***	2.30***	4.48***	0.67***	0.63***	1.05	0.51***	0.45***	0.64**	0.80**	0.53***	1.04
Centro-Oeste	1.86***	1.42**	3.17***	0.68***	0.81*	1.28*	0.50***	0.41***	0.74	0.58***	0.57***	1.52**
Education												
< 1 year		*Base category*			*Base category*			*Base category*			*Base category*	
1 to 4 years	1.36	1.64	1.02	1.01	2.15***	0.56**	1.06	1.72**	0.47**	0.84	1.22	1.55
5 to 8 years	1.13	2.23*	0.82	0.81	1.86***	0.80	0.96	1.46*	0.80	0.69*	1.32	1.71
9 to 11 years	1.50	2.09	1.78	0.66**	1.36	0.64*	0.81	1.17	0.63	0.57***	1.00	1.53
12 to 15 years	1.79*	3.30**	2.18	0.54***	1.05	0.64*	0.58***	0.93	0.51**	0.37***	0.62**	1.27
> 16 years	1.77*	3.47***	2.32	0.46***	0.89	0.63*	0.45***	0.81	0.49**	0.27***	0.55***	1.08
Earnings quintile												
1st		*Base category*			*Base category*			*Base category*			*Base category*	
2nd	1.12	1.20**	1.03	0.97	0.87*	0.84**	0.84**	1.01	1.25**	1.24***	1.12	1.30*
3rd	1.24**	1.33**	1.35**	0.92	0.96	0.75***	0.77***	0.99	1.28**	1.29***	1.15*	1.36**
4th	1.55***	1.66***	1.35**	0.88	0.73***	0.67***	0.88	0.97	1.22	1.69***	1.26**	1.66***
5th	1.54***	1.50**	1.26	1.10	0.79	0.94	1.33*	1.23	1.45	2.17***	1.59***	2.60***

Source: quarterly PNAD-C, IBGE.

Note: Stayers are used as reference category. * notices a 10% significance level, ** notices a 5% significance level and *** notices a 1% significance level.

Table A7
MLN: transitions of discouraged

	Discouraged → Formal			Discouraged → Informal			Discouraged → Unemployed			Discouraged → Other inactive		
	18q4 – 19q2	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**	**18q4 – 19q2**	**19q4 – 20q2**	**20q2 – 20q4**
Constant	0.07***	0.04***	0.03***	0.83	0.63***	0.30***	0.60***	0.39***	0.14***	1.59***	1.22*	0.17***
Age												
14-25		*Base category*			*Base category*			*Base category*			*Base category*	
26-45	1.77***	1.78***	1.45**	1.55***	1.42***	1.36***	0.86**	0.87**	0.87*	0.80***	0.82***	0.78***
46-65	1.90***	1.62***	1.30	1.46***	1.22**	1.11	0.58***	0.53***	0.53***	1.45***	1.45***	1.55***
66 & +	0.29***	0.20**	0.33**	0.81	0.55***	0.32***	0.14***	0.11***	0.10***	3.10***	3.66***	4.00***
Woman	0.37***	0.35***	0.47***	0.50***	0.44***	0.49***	0.62***	0.59***	0.66***	1.22***	1.33***	1.15**
White	1.16	1.01	0.94	0.95	0.97	1.07	0.97	0.85**	0.89	1.10**	1.07	1.17**
Rural	0.50***	0.78	0.47***	0.89**	1.17**	1.12	0.39***	0.52***	0.48***	0.67***	0.78***	0.81***
Region												
Norte		*Base category*			*Base category*			*Base category*			*Base category*	
Nordeste	0.60***	0.46***	0.64**	0.61***	0.62***	0.81**	0.75***	0.98	1.30**	0.58***	0.68***	1.07
Sudeste	1.37*	1.38	1.67***	0.67***	0.76**	0.98	1.12	1.53***	2.07***	0.68***	0.73***	1.39***
Sul	3.51***	3.62***	2.90***	1.00	0.89	0.78	1.39**	2.02***	1.40*	1.00	1.15	1.52***
Centro-Oeste	1.98***	2.28***	2.28***	0.89	1.14	1.19	1.41***	2.15***	2.02***	0.92	1.26**	1.96***
Education												
< 1 year		*Base category*			*Base category*			*Base category*			*Base category*	
1 to 4 years	1.17	1.11	0.97	1.19*	0.89	0.78	1.07	0.98	1.28	0.97	0.90	0.80
5 to 8 years	0.99	0.84	1.24	0.99	0.67***	0.78	1.01	1.04	1.18	0.90	0.79**	0.69***
9 to 11 years	1.40	0.85	2.13	1.13	0.70**	0.77	1.60***	1.22	1.65*	0.82**	0.66***	0.65***
12 to 15 years	2.35***	1.79	3.18**	1.17	0.66***	0.90	2.12***	1.45*	2.13***	0.67***	0.57***	0.51***
> 16 years	4.17***	3.19***	5.88***	1.60***	0.90	1.24	3.59***	2.07***	2.33***	0.83	0.66***	0.49***
Earnings quintile												
1st		*Base category*			*Base category*			*Base category*			*Base category*	
2nd	1.57***	2.01***	0.78	1.06	1.16**	1.08	0.98	1.04	1.00	1.24***	1.25***	1.33***
3rd	1.86***	2.38***	1.28	1.16*	1.16	0.86	1.13	1.19*	0.97	1.38***	1.52***	1.26**
4th	1.58***	2.00***	1.01	0.96	1.13	0.95	0.88	1.21	1.04	1.40***	1.78***	2.07***
5th	1.28	2.27***	0.94	1.11	1.21	0.55***	0.79	0.86	0.76	1.93***	2.18***	2.02***

Source: quarterly PNAD-C, IBGE.

Note: Stayers are used as reference category. * notices a 10% significance level, ** notices a 5% significance level and *** notices a 1% significance level.