Transition rates and recent developments in the labor market

The unemployment rate, estimated by the Continuous National Household Sample Survey (PNAD Contínua – IBGE), after recording successive increases between the second quarter of 2014 and the first quarter of 2017, when it reached 13.2 percent, declined in the two subsequent quarters and stood at 12.6 percent in the third quarter of 2017, considering seasonally adjusted[1] data.

The objective of this box is to quantify the potential impact that current labor market conditions – reflected in the transition rates – can exert on the path of the unemployment rate. The concept of transition rate, used here, can be understood as the probability of an individual of population category "i" to migrate to population category "j" within a 3-month horizon. The analysis utilizes the PNAD Contínua[2] micro-data pairing technique and a model with transition rates among the various population categories in the labor market. The categories of population considered here were:

1 – Non Working Age Population (NWAG)[3];
2 – Population Not in Labor Force (PNLF);
3 – Unemployed Population (UP);
4 to 9 – Occupied Population (OP):
- 4 – Formal Jobs at Private Sector (FJ);
- 5 – Non-registered Private Sector Workers (N-reg.);
- 6 – Domestic/Family (Others);
- 7 – Public Sector workers (Public);
- 8 – Employers (Employers);
- 9 – Self-employed workers (SE).

Of note, the decline mentioned in the unemployment rate, from the first to the third quarters of 2017, reflected a 3.5 percent decline in the unemployed population and a 1.8 percent growth in the employed population. The main contributions to the growth of employed population came from increases in the contingent of self-employed, non-registered

1/ Unless otherwise stated, seasonally adjusted data were used in this box. The seasonal adjustment was carried out by Banco Central do Brasil.
2/ For more details on pairing technique, see box "Labor market flows in the Brazilian labor market," published in the September 2016 Inflation Report.
3/ People under 14 years old at the survey cutoff date.

Table 1 – Recent evolution of population data

%

	2017 Q3 1/	Change Q/Q-1 2/	Change Q/Q-2 2/	Q/Q-2 (contribution in p.p.)
Unemployment rate (p.p.)	12.6	-0.3	-0.6	---
Working age population	168.8	0.4	.8	---
Workforce	104.3	0.8	1.1	---
Unoccupied	13.1	-1.3	-3.5	---
Occupied	91.2	1.1	1.8	1.8
Formal jobs	33.3	-0.1	-0.8	-0.3
Non-registered works	10.8	1.4	3.6	0.4
Self-employed	23.1	2.6	4.3	1.1
Employer	4.2	-0.7	0.8	0.0
Public sector	11.3	0.6	2.1	0.3
Other	8.5	3.3	3.4	0.3

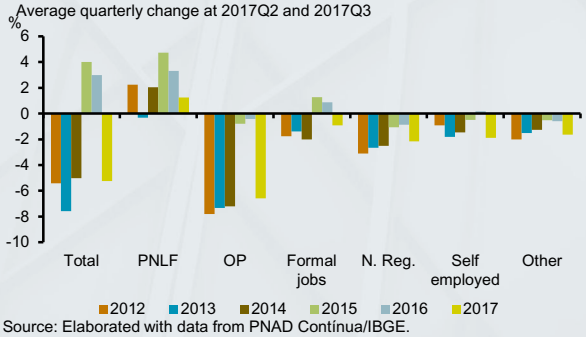
Source: PNAD Contínua/IBGE

1/ Seasonally adjusted data. Population data in million and unemployment in pencentage.

2/ Changes in percentage points for unemployment rate and percentage for other variables.

Figure 1 – Net contribution to unoccupied population change

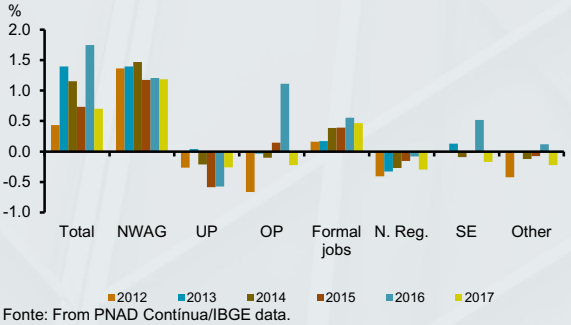
Average quarterly change at 2017Q2 and 2017Q3



Source: Elaborated with data from PNAD Contínua/IBGE.
Not seasonally adjusted data

Figure 2 – Net contribution in the changes of number of workers and workers not in labor force

Average quarterly Vchange in 2017Q2 and 2017Q3



Fonte: From PNAD Contínua/IBGE data.
Non seasonally adjusted data.

and public sector workers (Table 1). The number of formal jobs continued to decline during the period under analysis, but at lower rates than previously observed[4].

The increase in the employed population concomitant with the retreat in the number of unemployed suggests that there has been a net flow of people from the second to the first category. In addition, the greater growth of the labor force compared to the growth of the working age population indicates that there has been an increase in the net flow of people from outside the labor force to the labor force, particularly to the employed population.

The pairing technique shows that the decline in the unemployment rate was in fact a result of the positive net flow of individuals from the unemployed to the employed category during the second and third quarters of 2017, reversing the stability trend observed in the same periods of 2015 and 2016 (Figure 1, OP category). In the same sense, there was a reduction in the net flow of people from outside the labor force to unemployment (Figure 1, NWLF category). These two movements were the main determinants for the first decline in the number of unemployed people since the corresponding period of 2014 (Figure 1, Total). The analysis shows, in a complementary way, positive net flow for employed people coming directly from the category of individuals who were out of the labor market, reversing the pattern observed in the last two years (Figure 2, OP category).

Changes in the flows of individuals reflect shifts in the transition rates between different population categories. In order to quantify the effect of the recent evolution of each transition rate on the unemployment rate, a model was used to calculate the number of individuals in each population category in the quarter T + 1, from the quantities in quarter T and from the transition rates across categories. The description of the model and the categories in which the total population were divided are shown below[5]:

4/ Declines of 0.8 percent in the six-month period ended in Sep/17; of 1.6 percent in the six-month period ended in Mar/17; and of 1.9 percent in the six-month period ended in Sep/16.

5/ For more details on the model used, see box "Transition rates and evolution of unemployment", published in the December 2016 Inflation Report.

$$POP_j(t+\Delta t) = POP_j(t) + \Delta t \cdot \left[\sum_{\substack{i=1 \\ i \neq j}}^{9} f_{i,j} \cdot POP_i - \sum_{\substack{i=1 \\ i \neq j}}^{9} f_{j,i} \cdot POP_j \right]$$

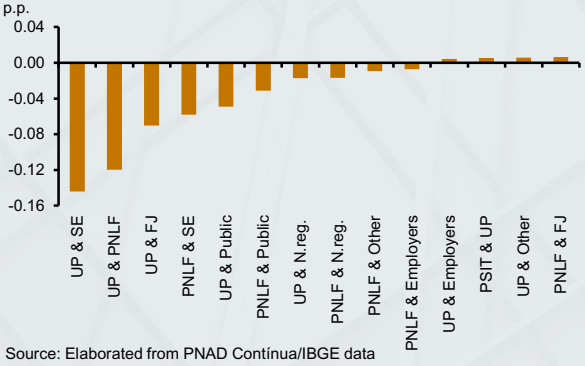
where:

fi,j is the transition rate from category i to category j;

POPj it is the amount of people at category j, where j = 1 to 9, as aforementioned.

The model described was used to calculate the evolution of the number of people in the different population categories and, as a consequence, the unemployment rate. In this exercise, we first calculated the unemployment rate variation between the first and third quarters of 2017 with all transition rates set at the level of the first quarter of 2017. Subsequently, alternative variations for the unemployment rate were calculated, with all transition rates at the level of the first quarter of 2017, except for one category, which varied between that period and the third quarter of the same year, as obtained with the use of the PNAD Contínua microdata. The difference between the changes in the initially calculated unemployment rate and the unemployment rates calculated according to the new criterion quantifies the impact of the evolution of each category's transition rate to the change in the unemployment rate over the last two quarters[6]. (Figure 3)

Figure 3 – Effect on transition rate changes on unemployment rate



Source: Elaborated from PNAD Contínua/IBGE data

Table 2 – Evolution of the transition rate and contribution to changes in the unemployment rate

%

	2017Q1	Average 2017Q2-2017Q3	Unempl. change rate (p.p.)
UD - SE	8.38	8.60	-0.14
SE - UD	4.26	3.90	
UD - PNLF	24.81	24.55	-0.12
PNLF - UD	5.61	5.40	
UD - Formal jobs	7.50	7.54	-0.07
Formal jobs - UD	2.91	2.74	
PNLF - SE	3.34	3.55	-0.06
SE - PNLF	10.22	9.64	

Souce: From PNAD Contínua/IBGE data.

The result indicates that about 70 percent of the change in the unemployment rate between the first and the third quarter of 2017 was due to shifts in the transition rates that occurred during this period. Of this total, a share of about 75 percent reflected in the transition rates between UP and SE, UP and PNLF, UP and FJ, and PNLF and SE[7] (Figure 3). The changes in migration probabilities between these categories – reflected in the transition rates themselves – show the improvement in labor market conditions in the period.

The increase of the transition rate from UP to SE combined with the reduction of the transition rate from SE to UP was responsible for 0.14 p.p. of the decrease in the unemployment rate between the first and third quarters of 2017 (Table 2). Similarly,

6/ In order to purge seasonal effects, we used seasonally adjusted population data and transition rates.

7/ In order to simplify data presentation, transition rate variations effects were presented in pairs. That is, by grouping the effects of variations in the transition rates from "i" to "j" and from "j" to "i".

changes in the transition rates between UP and FJ contributed to the unemployment rate decline in the period, since the decrease in the number of employees with formal job was lower than would have occurred had the transition rates remained at the level observed in the first quarter of 2017.

The recent improvement in population flows resulted in a decline in the unemployment rate. The average transition rates for the second and third quarters of 2017 are, however, worse than those for longer periods, especially from the beginning of the PNAD Contínua (2012) until the first quarter of 2014. In fact, according to Table 3, the average of the transition rate of unemployed persons that were employed in the second and third quarters of 2017 is lower than in other periods, while the transition rate from employed to unemployed is on a higher level. Additionally, the transition rates from out of the workforce to the unemployed and from out of the workforce to employed are respectively higher and lower than those observed in longer periods.

Table 3 – Transition and unemployment rates
Averages for the period

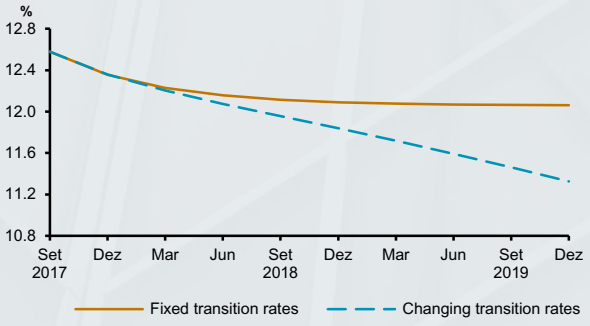
(%)

	UP-OP	OP-UP	UP-PNLF	PNLF-UP	PNLF-OP	OP-PNLF	Unempl.
2012Q1-2017Q3	33.1	2.8	27.9	4.2	9.8	7.1	8.9
2012Q1-2014Q1	35.7	2.4	29.3	3.4	10.5	7.3	7.2
2017Q2-2017Q3	29.3	3.6	24.5	5.4	9.1	6.4	12.7

Souce: From PNAD Contínua/IBGE data.

Prospectively, two scenarios were considered for the transition rates, in order to infer their impact on the evolution of the unemployment rate. In the first scenario, current labor market conditions were kept unchanged, considering the maintenance of the transition rates over the next quarters[8]. In this case, the unemployment rate would continue to decline until the beginning of 2019, stabilizing around 12.1 percent. Alternatively, in a scenario in which the transition rates evolve according to the variations observed between Sep/16 and Sep/17 – therefore, assuming that labor market conditions will continue to improve at a pace similar to what was observed in the last year. In this case, the unemployment rate would fall to 11.8 percent at the end of 2018 (s.a.) and 11.3 percent at the end of 2019 (Figure 4). In both cases, the unemployment rate would decline from the current level, but would remain above the historical average and the values observed at the beginning of the PNAD Contínua series.

Figure 4 – Unemployment rate
Prospective outlooks



Source: Elaborate from PNAD Contínua/IBGE data

8/ For this exercise, the average of the 2Q2017 and 3Q2017 transition rates were used.

These exercises do not constitute forecasts for the evolution of the unemployment rate. They only highlight the contribution of changes in transition rates to this process.

In summary, the recent improvement in transition rates has favored reductions in the unemployment rate after a prolonged period of successive increases and should further contribute in the same direction over the coming quarters. A sharper decline in the unemployment rate requires sharper improvements in transition rates. The consolidation of the process of economic activity recovery, as well as advances seeking macroeconomic rebalancing, partially achieved throughout this year, are factors that will contribute to this goal.