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THE EFFECT OF PARENTAL OCCUPATION AND FAMILY ARRANGEMENTS ON OCCUPATIONAL CHOICES AMONG BRAZILIAN YOUTH

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This paper estimates the added worker effect and discouraged worker effect for young people in metropolitan Brazil. Its main contribution is to reveal how the transition to unemployment by the household head impacts labor supply among youth, considering the demographic changes – especially the size and composition of family arrangements – that Brazil has undergone in recent decades. We designed multinomial *probit* models (with and without correction of sample selection bias) covering the main metropolitan regions of the country using data from Brazil's Monthly Employment Survey (PME) for the years 2002 to 2015, which compiles information on monthly transitions in the Brazilian labor market. Our findings point to evidence of a greater transition of young men and women to activation in the labor market, specifically from inactivity to unemployment, in periods when the household head became unemployed. On the other hand, there is no evidence of a statistically significant discouraged worker effect impacting these individuals. Furthermore, the parents' occupational situation seems to have little effect on the transition to activation of young males in low-income families, unlike those belonging to wealthier families.

KEYWORDS: Added worker effect, Labor supply, Youth, Family arrangements.
JEL CLASSIFICATION. J13, J20, D10.

1. INTRODUCTION

According to information from the Continuous National Household Sample Survey (PNADC) for 2019, approximately 39% of Brazilians aged between 14 and 29 years old reported the need to work as their primary reason for dropping out of school. This reason was indicated most often throughout the country – with the highest rates occurring in the South (48.3%) and Midwest (43.1%) regions and the lowest in the Northeast (34.1%). More careful observation shows that the main justifications for young men who have dropped out or never attended school include the need to work (50%) and a lack of interest in studying (33%). For women, the main reasons mentioned are a lack of interest (24.1%), the need to work (23.8%), pregnancy (23.8%), and household chores (11.5%). Notably, only 0.7% of young men claimed household chores as a justification for dropping out of school.

The need to work decisively affects the lives of young people in Brazil. At the same time, an unforeseen period of unemployment for the household head (main income earner), together with the resulting drop in the household budget, can affect future expectations of the likelihood of unemployment. As a consequence, other members of the household, including children, are expected to review their labor supply profiles (Spletzer, 1997). Such decisions reflect the

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complex interaction among household members, the household production function, and the labor market situation (Gonzaga and Reis, 2011).

Often, the decision to join the labor force is based on family circumstances, classifying it as a "joint decision" and not just an individual choice. In this context, our study examines the determinants of the transition to the labor force (either as an employee or unemployed) of young people aged between 15 and 29 years old, focusing on the effect of a change in parental employment status. More specifically, it analyzes the effects of the labor condition of the household head (father or mother) on active employment-seeking among youths within the household. The central hypothesis is that the time allocation and decision-making of young people to join the labor force are based upon the time allocation and income of other household members.

This study aims to stimulate a little-explored discussion in Brazil: more clearly understanding the complexity of the family labor supply. We consider this supply to be determined by economic context, occupational aspects of household earners, and the demographic characteristics of the family, in addition to individual attributes. Consequently, we estimate the added worker effect and discouraged worker effect for young people in metropolitan Brazil.

By definition, the added worker effect refers to the temporary increase in the labor supply of married women due to their husbands' unemployment (Lundberg, 1985; Spletzer, 1997). The term discouraged worker effect was introduced in the economic literature by Long (1953), and it parallels the added worker effect. According to the author, unemployed workers choose to leave the labor force; that is, they stop looking for jobs when the expected salary and the probability of entering the labor market are lower – times of recession and economic crises. Consequently, there is a drop in the participation rate in the labor force, showing that the discouraged worker effect counters the added worker effect.

In previous studies, the main concern addressed has been the entry of wives into the labor market after their husbands have lost their jobs, a focus of both the international literature (Spletzer, 1997; Beylis, 2012; Ayhan, 2018; Bredtmann et al., 2018) and research concerning Brazil (Fernandes and Felício, 2005; Gonzaga and Reis, 2011). Of the few studies that investigated the possible added worker effect of young people on the labor supply, it is worth mentioning Jatobá (1994), Skoufias and Parker (2006), Oliveira et al. (2014), and Da Silva (2016). For example, Skoufias and Parker (2006) detected the existence of added worker effect for sons and daughters (10 to 18 years old) in Mexico City between 1994 and 1995.

Regarding the added worker effect in studies on Brazil, Jatobá (1994) first sought to understand participation decisions regarding the labor force among individuals within a family. The study started from the hypothesis that the family labor supply would increase in correlation with the income reduction of the household head (income effect) and, in this sense, the higher the household head's income, the weaker the income effect. In addition, the family labor supply would increase as the unemployment rate in the family increased (unemployment effect), and such an effect would be subject to decreasing returns. Consequently, this effect would grow more substantial as the income of the primary earner decreased. Corroborating these hypotheses, the results by Jatobá (1994) indicated that both a drop in the main earner's income (income effect) and an increase in unemployment in the family (unemployment effect) lead to an increase in the family labor supply.

In a later study, Oliveira et al. (2014) investigated the added worker effect for the entry of children (aged between 10 and 18 years) into the labor force in metropolitan Brazil from 2002 to 2013. Their results corroborated the existence of the added worker effect for children. In the same vein, Da Silva (2016) evaluated the added worker effect using propensity-score matching (PSM) methods and verified the existence of a statistically significant effect among children and young adults (sons and daughters aged 10 to 24 years old), emphasizing the heterogeneities of that group.

Outside of the above studies, few researchers have analyzed the family labor supply in the Brazilian context. In particular, there is a lack of studies that emphasize how the transition to unemployment by the household head impacts the labor supply of young people, especially considering the demographic changes that Brazil has undergone in recent decades. These transformations have led to a profound change in the size and composition of family arrangements. The added and discouraged worker effects that impact participation in the labor force among young people (i.e., sons and daughters within the family structure) can be detected using data from the Monthly Employment Survey (PME), which compiles information on monthly transitions in the Brazilian labor market. Focusing on the main Brazilian metropolitan regions from 2002 to 2015, we investigate the potential Brazilian additional labor force of young people through the estimation of multinomial *probit* models, considering the possibility of sample selection.

The analysis of the youth labor market is critical from the point of view of labor supply – it enables observations of future trends in the characteristics and composition of the adult labor force. In addition, a better understanding of the age and educational level of young workers illuminates how society and the government have dealt with a country's youth.

Importantly, the possibility of professional success is not evenly distributed among individuals, and in some locations, these opportunities are noticeably more unequal than in others. Individuals enter the labor market with different endowments of human capital, resulting from an intense process of inequalities in educational opportunities. Despite the significant improvement in access to education that Brazil has undergone since the 1990s – for all regions, races, and household situations – it is clear that the level of educational mobility is still lower for the children of less-educated parents (Mahlmeister et al., 2019). In this sense, it is vital to understand the standards in force to disrupt the mechanisms that reproduce this social order.

Furthermore, the low level of intergenerational mobility in Brazil may be enhanced by the global pandemic that started in 2020. Several measures of social isolation have been adopted to contain the deaths caused by the COVID-19 pandemic. Such measures have the potential to affect young people's lives in several ways. First, the ability to absorb knowledge via remote technologies may differ between poor and wealthy households, partly due to the conditions of access, but also resulting from a lack of parental support or an intellectually rich and stimulating environment. Caruso and Posthuma (2020) and Corseuil and Franca (2020) highlighted that the pandemic surfaced when the Brazilian labor market was in the midst of a slow recovery, throwing young people out of the workforce. Thus, this shift has imposed new challenges for youth and changed Brazil's labor supply dynamics. Understanding family labor supply decisions in the period before the pandemic will provide a clearer picture of how this new scenario will impact the entrance of these individuals into the labor market.

This study is divided into seven sections, including this introduction. In the second section, we discuss the demographic changes and reveal some peculiarities regarding the participation of young people in the labor force in Brazil. In the third section, we discuss the theoretical framework. In the fourth section, we present the empirical strategy. The data and variables used are detailed in the fifth section. The sixth section presents the results, and the seventh section concludes.

2. RECENT DEMOGRAPHIC CHANGES IN BRAZIL

As pointed by Lee (2003) and Lee (2015), a demographic transition can be understood as a succession of steps that lead a country (or region) to move from a phase of high mortality and fertility rates to a phase of low levels in both components, resulting in changes in the age structure of the population. In Brazil, this demographic transition started in the 1940s; until

that point, the country was marked by high fertility and mortality rates. From that period on, the mortality rate started to decline due to advances in public health, improvements in basic sanitation, and a decrease in infant mortality. The reduction in mortality has persisted and is reflected in the progressive increase in life expectancy at birth. Thus, Brazil experienced significant population growth between 1940 and 1960, with an average of approximately 3% per year (Rigotti, 2001; Carvalho and Garcia, 2003; Gremaud et al., 2017).

At the end of the 1960s, and especially in subsequent decades, the drop in mortality was followed by substantial drops in the fertility rate, which fell from 6.28 children per woman of childbearing age in 1960 to 1.87 in 2010. The main factors that explain this phenomenon are the entry of women into the labor market and the spread of contraceptive methods. As a result, the Brazilian fertility rate has fallen below the replacement rate, so that each new cohort has been smaller than the previous one. Therefore, although positive, population growth has been decreasing (Gremaud et al., 2017).

Regarding the changes in the Brazilian age structure, while in the 1940s the fall in mortality rates together with high levels of fertility rates resulted in greater population growth and a young age structure, the reduction of the fertility started in the 1960s led to an aging population (Rigotti, 2001; Carvalho and Garcia, 2003). This age increase has led to a rise in the dependency ratio since the increase in the number of older people tends to be greater than the reduction in the number of young people caused by the decrease in fertility.

Another critical factor is the role of demographic dynamics in relation to the population's level of education. As highlighted by Rigotti (2012), the evolution of the relative size of age cohorts is a determining factor in the effort required for full school attendance. The author stated that the demographic transition, followed by increased life expectancy and longevity, affects the accumulation of human capital once people's attitudes change toward valuing education, family formation, retirement, and the status and participation of women in the labor force (Rigotti, 2012).

In this vein, Figure A.1 illustrates the educational transition in Brazil and shows the evolution of years of study by age groups of young people. Regardless of the age group considered, it is evident that the demand for education has increased. In 1987, approximately 20% of young people had only 0 to 3 years of study. In 2014, this rate did not reach 4%. Concomitantly, the rates of young people with 15 years or more of study more than doubled in the same period. The most dramatic growth was observed for the category of 11 to 14 years of study, which encompasses a comprehensive high school education.

Furthermore, Brazil has also undergone substantial changes in family arrangements that have emerged alongside the demographic transition and other socio-cultural transformations. Recent decades have been marked by a decrease in fertility and an aging population, a decrease in the number of marriages, an increase in divorces and the postponement of unions, and a higher level of women's participation in the labor market (Leone et al., 2010). Such transformations have affected the composition of families and increased the frequency of multigenerational relationships, implying a higher prevalence of extended families in Brazilian households (Wajnman, 2012).

The nuclear family has always been the predominant model in Brazil. However, the traditional nuclear form (couple with children) has lost ground to alternatives (single-person households, couples without children, and single-parent families). Among factors that explain the increase in the frequency of "couple without children" and "single-parent" families, those that deserve to be highlighted include increases in consensual unions and divorces. In single-person households, the increase of older adults is responsible for most cases due to the increase in the divorce rate and an aging population (Wajnman, 2012).

Regarding the size and composition of family arrangements, the number of families has increased at a higher rate than that of the population; however, the average family size decreased

– mainly due to the reduced fertility rate (Leone et al., 2010; Wajnman, 2012). Since the 1990s, the "couple with children" family arrangement has diminished the most in terms of family size. Simultaneously, the rate of "single-person" and "couple without children" arrangements increased. Finally, the presence of a greater number of generations in the same household is a significant trend that deserves emphasis, resulting from the longer lives of older individuals, besides being influenced by the current economic context.

In terms of the increase in the frequency of extended families in Brazilian households, Wajnman (2012) has argued that this phenomenon may be associated with an increase in the fertility rate among unmarried individuals since there is a greater probability that single mothers will live with their parents. When analyzing data from household surveys, Wajnman also found that the horizontal extension form prevailed in the period prior to the 2000s, namely, the co-residence of, e.g., brothers, cousins, and brothers-in-law in the same household. At the turn of the century, the vertical extension started to dominate, denoting the increase in the rate of grandchildren living with their grandparents.

Figures A.2 and A.3 show the changes in the arrangements and size of Brazilian families from 1987 to 2014. Although the traditional nuclear family (couple with children) is the predominant form in the country, it has been losing ground to alternative arrangements. The proportion of young people belonging to the "couple with children" family arrangement decreased from almost 70% in 1987 to 58% in 2014, and the percentage of young people in "single-parent" families increased from 17% to 23% in the same period. As previously discussed, the decrease in the number of marriages, the increase in consensual unions and divorces, and the greater participation of women in the labor market – combined with an aging population – explain the increase in alternative family arrangements.

Family size has also changed significantly. In 1987, most young people (48%) were part of families with 4 to 6 members. During this period, the proportion of those who lived in families with 1 to 3 members was approximately 33%, while those in families with 7 members or more represented 19%. Over the years, the average family size has decreased, and the predominant model has become that of 1 to 3 members. In 2014, 51% of young people were already in the smallest family size category, while those in families with 7 members or more made up only 3% of the total.

In summary, the main changes in Brazilian family arrangements in recent decades consist of a decrease in the proportion of households in traditional nuclear arrangements (couple with children), accompanied by a simultaneous increase in alternative arrangements (single-person household, couples without children, and single-parent families). Additionally, according to Wajnman (2012), the incidence of extended families has increased since 1970, mainly through vertical extension relationships. Such changes have likely impacted family labor supply, and one of the objectives of our study is to verify how family types and their occupational situations influence the likelihood of labor market activation among sons and daughters.

3. THEORETICAL FRAMEWORK

For the analysis of the added worker effect, we consider the Neoclassical approach of family labor supply as a basis, specifically the theoretical model developed by Ashenfelter (1980) and applied by, among others, Serneels (2002). In this line, a household maximizes a utility function composed of leisure and consumption of its respective members, subject to a budget constraint, a time constraint and a non-negativity condition. An additional constraint $\overline{H}_i$ is introduced to represent the fact that the desired labor supply cannot exceed a fixed level. If the constraint is respected in equality, the actual working hours (H_i) will be equal to the constraint level $\overline{H}_i$.

Therefore, we have the following optimization problem:

$$\begin{aligned} &\max_{L_i} U = U(L_i, C_i), \qquad i \in \{1, \ldots, n\} \\ &\text{s.t.} \sum_{i=1}^{n} C_i = \sum_{i=1}^{n} w_i H_i + y \\ &\quad L_i = T - H_i \\ &\quad H_i \leq \bar{H}_i \\ &\quad \bar{H}_i \geq 0;\ H_i \geq 0;\ C_i \geq 0, \end{aligned} \tag{1}$$

where L_i is the time allocated to activities outside the paid labor market; C_i is the consumption of individuals; H_i is the individuals' labor supply; w_i represents wages; and y reflects non-work household income. y and w_i are assumed to be exogenous. Each individual chooses the H_i that maximizes U_i.

An individual's labor supply can be written as a function of his salary, the household's income, the labor supply constraint of other family members, and the labor income of other family members:

$$H_i = f\left(w_i, y, \bar{H}_j, w_j H_j\right), \quad i \in \{1, \ldots, n\},\ i \neq j. \tag{2}$$

In the expression above, the variable $u_j = g(\bar{H}_j, w_j H_j)$ is introduced, which is a function of the labor supply constraint of other family members and their work income, for each of the adult household members.

It should also be noted that the supply of family work can also be understood over economic cycles. The secondary participation rate of the labor force (in the present application, the sons and daughters) can present a countercyclical trend, such that this participation increases during periods of recession and decreases in periods of expansion of the level of economic activity. The underlying idea is based on the hypothesis by Mincer (1962) that transient changes in non-work income and wages tend to affect hours worked more significantly compared to permanent changes. This is because, in general, if the change is permanent in these sources of income, the adjustment takes place in consumption. Therefore, if there is a temporary increase in non-work family income, the counterpart is a reduction in hours worked, not an increase in family consumption; the counterpart of a permanent increase in family income would be an increase in family consumption, not a change in the hours worked.

In the family structure, it is possible that, when the provider for the household suffers a temporary loss of income, the other family members (spouses, sons, and daughters) increase their supply of hours worked to maintain consumption levels. However, when this loss of family income is permanent, the adjustment will necessarily take place in consumption.

As it is easier, relatively, to adjust hours worked than consumption patterns, in periods of recession; when the main head of the household is susceptible to losing a job or suffering a salary reduction, secondary workers enter the workforce to maintain the standard of family consumption.

On the other hand, a second effect that can arise over economic cycles is the effect on unemployed individuals. In times of recession, it is more difficult to find a job. In this situation, the discouraged worker effect leads to a strong exit of individuals from the workforce, which configures an effect with a pro-cyclical tendency.

It is extremely important to highlight that, although this theoretical model is used as a background to understand the rationale behind the process of activation in the work force of sons and daughters due to the unemployment of the main head of the family, there is an imminent

negligence in it in terms of weighting demographic changes and the diversity of family types, especially in the investigation of locations with large socio-economic structural differences. In this sense, Nerlove (1974) and Griliches (1974) criticize this model, in which a family with different individuals acts as a single decision-making unit, due to its lack of ability to explain changes in family composition. Standing (1983) also emphasizes the structural problem of unemployment associated with a broader set of factors, such as mismatch in workers' qualifications, new demographic dynamics, greater female participation in the workforce, among other aspects.

By the traditional approach described, family decisions are equivalent to the results of constrained individual utility maximization, so that family decisions are not examined as complex results but are reduced to individual decisions (McElroy and Horney, 1981). Vermeulen (2002) essentially points out two main problems in this model. First, because it does not follow methodological individualism, according to which social theories should deal with the behavior of individuals, the traditional model assumes that family preferences coincide with those of a specific member of the household. Second, in the traditional model, it is assumed that marginal changes in the salary of individuals in the household have exactly the same effect on each one's labor supply.

The collective rationality approach to family labor supply (Chiappori, 1988; 1992) is considered an alternative to the traditional model, as it assumes individual preferences for different family members, as well as the existence of an intra-family bargaining process among those members (Vermeulen, 2002). In these models, a family is analyzed from a pair of individual utility functions, with a particular decision rule defined through axioms.

Chiappori et al. (2002) generalized the traditional models of collective rationality, which made it possible, as pointed out by Fernandes and Scorzafave (2009), to empirically test the results of the collective approach without the need to impose specific properties on individual preferences, as had been done by Chiappori (1992). The central idea of this new approach was to consider variables capable of affecting the intra-household decision process via impact on the bargaining power of family members, but without influencing individual preferences or the set of family consumption. Such variables are called distribution factors, with the sex ratio and divorce laws as examples.

In view of this discussion, it is evident that a more comprehensive understanding of the process of activation in the workforce by sons and daughters is essential for modeling Brazilian data, especially given the current context of changes in family structures and the structural context of high inequality. It is necessary to consider that this potential additional workforce can carry with it several aspects of vulnerability. For example, according to Hirata (2002), the recent evolution of women's work is related to a trend towards the development of polarized professions in terms of gender, class and race relations. Therefore, this empirical analysis seeks to conduct a more comprehensive examination of the complexity of family labor supply, based on the theoretical models discussed in this section.

4. EMPIRICAL STRATEGY

To understand the influence of the added worker effect on the likelihood of participation in the labor force, we use regression models to determine the benefit obtained from the inactivity-to-activation transition (transition to the labor force as employed or unemployed) for sons and daughters. Thus, the starting point consisted of modeling the transition to activation, $H_{i(t)t}$, as dependent on the value of a latent variable, $H^*_{i(t)t}$, which is a linear function of a vector containing individual characteristics, characteristics of the family, and the geographical context: $H^*_{i(t)t} = x_i\beta + u_{i(t)t}$. Here, $H^*_{i(t)t}$ represents the expected benefit associated with the transition from

inactivity to activation in the labor force. In summary, the estimated model can be expressed as

$$H_{i(t)t} = \alpha_0 + \alpha_1 TA_{i(t)} + \alpha_2(w_t - \bar{w}) + \gamma_1 X_{i(t)} + \gamma_2 Ch_{i(t)} + \gamma_3 D_{i(t)} + \phi P_i + u_{i(t)t}, \quad (3)$$

where the dependent variable, $H_{i(t)t}$, consists of the following categories: remain inactive (1), transition to unemployment (2), and transition to an occupation (3). Therefore, we have $J = 1,2,3$ situations and $i = 1,2,\ldots,N$ individuals. The variable $TA_{i(t)}$ is equal to 1 if the individual is in the treatment group (household head has lost their job) and is equal to 0 for individuals in the control group (household head has not lost their job).

The job loss of the individual who claims to be the family earner may significantly decrease household income. Under these circumstances, the added worker effect may contribute to increasing the likelihood of participation in the labor force by the other family members in the treatment group compared to those in the control group.

The term $X_{i(t)}$ represents the set of individual characteristics of i. The set of characteristics of the job of the household head is represented by $Ch_{i(t)}$ (specifically, the labor income in the first month of the interview and if the household head had a Work and Social Security Card in that job). The set of variables $D_{i(t)}$ represents the household characteristics related to the living environment of individual i.

We also include year fixed effects in the regressions to control the temporary shocks that occurred between 2002 and 2015 (P_i). Unobserved factors that affect the dependent variable are represented by $u_{i(t)t}$. As $TA_{i(t)}$ is time-invariant, unlike $H_{i(t)t}$, α_1 is the average added entry rate into the labor force in the three household interviews subsequent to the job loss of the household head for individuals in the treatment group.

As previously described, the concept underlying the discouraged worker effect is that unemployed workers lose their hopes and motivations for finding a job in times of recession and, therefore, prefer to move temporarily to inactivity instead of dealing with job search costs. It is perfectly possible for the added worker and discouraged worker effects to coexist since their effects are reflected among different groups of people. To evaluate the discouraged worker effect, we consider that $(w_t - \overline{w})$ is the difference between the logarithm of average labor income in period t and the logarithm of average labor income in all periods for sons and daughters in the treatment and control groups (Gonzaga and Reis, 2011). Thus, α_2 is the coefficient used to capture the discouraged worker effect. Supposing that only the discouraged worker effect existed, for example, it would be possible to observe a participation rate with a pro-cyclical character – increased participation during periods of expansion but decreasing during recessions.

Consequently, we estimate multinomial *probit* models with and without sample selection bias to examine the impact of variables of interest on the probabilities of specific transitions to unemployment and work. Generally speaking, if the two result alternatives are $j \neq k$, the probability of the j alternative being "selected" by individual i is

$$\Pr(H_i = j) = P_{ij} = \Pr\{u_{ik} - u_{ij} \leq (z_{1ij} - z_{1ik})'\beta + z_{1i}'(\beta_j - \beta_k)\}, \text{ for all } k, \quad (4)$$

where the linear predictor for individual i is given by $z_{1i}\beta_j$, such that in the multinomial *probit* approach, we model the probability that individual i will "select" situation j, assuming that the error terms of the model – in this case, $u = (u_{i1},u_{i2},u_{i3})$ – are jointly normally distributed ($u \sim N(0,\sum)$). Thus, $\Pr(H_i = j)$ can be obtained using the properties of the normal distribution.

In equation (4), z_{1i} is the set of exogenous factors attributed to individual i. Using as a base category the permanence in inactivity ($j = 1$), we ensure identification, such that β_1 is normalized to zero, and the coefficients are always interpreted in relation to that category. The

multinomial *probit* model does not allow the estimation of the parameters of interest per se, but only the estimation of differences $(\beta_2 - \beta_1)$ and $(\beta_3 - \beta_1)$ for $j = 2,3$.

In addition, we apply the procedure of Heckman (1976) and Van de Ven and Van Praag (1981) in the multinomial analysis to correct the possible sample selection bias resulting from the initial constraint (sample of families in the first interview period where the household head is working and the child is inactive).

Heckman (1976) model of correction for sample selection addresses the problem of selection bias through the interaction of two equations: the first considers the mechanisms that determine the outcome variable of interest; the second, a selection equation, considers the sample where the result of interest is observed and the determining mechanisms of this selection process (Gao et al., 2014). The exclusion restriction – that is, the presence of at least one variable that determines the initial constraint (being inactive in a family with a working head of household) but not the decision of children to enter the labor market – must be imposed to improve model identification.

The first equation is a multinomial *probit* model to check for the probability of activation, specifically for unemployment and employment, vis-à-vis remaining inactive. Thus, given $u = (u_{i1}, u_{i2}, u_{i3})$ and checking only for differences in parameters for $j = 2,3$ (transitions to unemployment and occupation, respectively), the selection equation can be written as

$$y_{2i} = (z_{2i}\omega + u_{2i} > 0),$$

where

$$\begin{aligned} &u_{1j} \sim N(0,1) \\ &u_2 \sim N(0,1) \\ &\text{corr}(u_{12}, u_2) = \rho_2 \text{ for } j = 2 \\ &\text{corr}(u_{13}, u_2) = \rho_3 \text{ for } j = 3 \end{aligned} \tag{5}$$

Thus, we use Heckman (1976) approach in the sample of $y_{2i} > 0$ for the appropriate estimation of the multinomial *probit* models with selection bias correction (Glewwe, 1993; Roodman, 2011). The estimation of the multinomial model by such a method (designed to correct selection bias) is based on the use of an instrumental variable that affects the probability of being inactive in a family whose household head works, but which does not affect the "choice" between remaining inactive, entering into unemployment, or entering in the labor force.

We assume that family size is a determinant of sample selection, although not directly affecting the likelihood of the transition to specific categories (work, unemployment, and inactivity). Thus, a selection equation will be imposed by using family size only in the vector z_{2i}. The larger the average family size, the greater the chances of a family arrangement in which at least one adult individual works (Cools et al., 2017).

5. DATA AND VARIABLES

In order to achieve the proposed objectives, we explored the possibilities of longitudinal information using microdata from the PME of the Brazilian Institute of Geography and Statistics (IBGE), focusing on the metropolitan regions of Rio de Janeiro, São Paulo, Belo Horizonte, Porto Alegre, Recife, and Salvador. The PME has a rotating panel design in which each household is interviewed eight times over a 16-month period (the household is surveyed for four consecutive months, out for eight, and then returns for another four months of interviews).

TABLE I

CONSTRUCTION SCHEME OF TREATMENT AND CONTROL GROUPS FOR ANALYSIS OF THE ADDED WORKER EFFECT

	(t)	$(t+1; t+2; t+3)$
Control group (Situation 1)	Household head (employed)	Remained employed at $t+1$, $t+2$, and $t+3$
	Daughters/Sons (outside the labor force)	Transition to activity at $t+1$, $t+2$ or $t+3$
Treatment group (Situation 2)	Household head (employed)	Transition to unemployment at $t+1$
	Daughters / Sons (outside the labor force)	Transition to activity at $t+1$, $t+2$ or $t+3$

To be able to identify the same individual in different periods, we used some basic code variables that appear in the research. When any of these variables were inconsistent between periods, the individual was left out of the sample. Despite this limitation, the PME is one of the best databases in Brazil to investigate the monthly transitions observed in the labor force.

It is worth mentioning that the PME panel structure is essential in estimating the added worker effect. It allows monthly transitions in occupation to be observed – from inactivity in one period to active participation later and from employment to unemployment. PME data reveal labor market trends regarding employment and unemployment based on cyclical information.

To measure the added worker effect, sons and daughters were considered, with analyses conducted separately for each group. This approach follows the idea that visible demographic changes, especially those associated with changes in family households, are related to changes in traditional gender roles and are relevant for examining youth activation and the added worker effect.

Regarding the sample, we used data referring to the years 2002 to 2015. The individuals monitored were those in the 15–29-year-old age group who declared themselves inactive in the first interview and whose household head claimed to be employed at the time of the first interview. The youth's decision to study or work was directly related to factors such as the financial stability of the household, the labor market prospects for young job market entrants in that year, and the existing incentives for studying. Empirical studies have shown that the opportunity costs for a young person to enter the labor market earlier have changed over the years, and this change is related to changes in the income of the adults in the household (Cabanas et al., 2014).

Thus, following Gonzaga and Reis (2011) and Oliveira et al. (2014), the treatment group consisted of sons and daughters who transitioned to activity between the second and fourth interviews and whose income earners moved from employed to unemployed between the first and second interviews. The control group consisted of sons and daughters who transitioned to activity between the second and the fourth interviews but whose income earners remained employed throughout the time interval.

It is essential to clarify that the initial constraint (when income earners work in period t and daughters and sons are inactive in period t) does not impose any constraints on the gender of the household head (considering nuclear families and single-parent families), nor on the spouse's occupational status. As we already have a powerful initial constraint, we have sought to minimize the negative effects that more impositions on the final sample could cause to the results. Table I shows a schematic representation of the hypothesis of the added worker effect and the constructions of the treatment and control groups.

Regarding the factors possibly related to the dependent variable (that is, activation of the youth labor force), we used a transition dummy of the household head (from employment to unemployment) to capture the added worker effect. Thus, if the coefficient sign associated with

this variable was positive and significant, an added worker effect was operating in the period of analysis. The discouraged worker effect was captured by the impact on activation due to changes in economic cycles, which, in turn, were represented by deviations of the logarithm of returns in each period compared to the logarithm of the average returns for all periods. Therefore, the dummy for the discouraged worker effect is a variable repeated for all individuals observed in the same month (Gonzaga and Reis, 2011). The discouraged worker effect is captured by a positive sign of the referred variable that represents it, reflecting the pro-cyclical characteristic of participation in the labor force (see Table A.I).

In summary, the most substantial evidence in the literature on individual variables of control is that the age and years of education among individuals positively affect their participation in the labor force (Gonzaga and Reis, 2011; Giannakopoulos, 2015; Beylis, 2012). Regarding the characteristics of the household head, research has shown an inverse relationship between the variables that indicate the effect of education and labor income on the participation in the labor force of those who are not the household head (Gonzaga and Reis, 2011; Beylis, 2012; Giannakopoulos, 2015; Bredtmann et al., 2018).

Finally, we opted for the usual classification of family and non-family households (Wajnman, 2012). We excluded from the sample those individuals belonging to non-family households, that is, one or more people living in a private dwelling who are not "related" persons. We used two family units: i) couple with children, and ii) father or mother with children (single parents). In addition, this family typology was considered in the light of the parents' occupational situation in the labor market, where couple families meet the classifications of dual-earner and single-earner couples. We examined the variables identifying the type of family and eldest child as possible determinants of the likelihood of activation of youths in the labor force. We also included a dummy to capture the effect of extended families, structures that incorporate other relatives in addition to parents and children. Table II shows the descriptive statistics of the sample for young men and women separately.

Source: Own elaboration with PME data from March 2002 to December 2015.

6. RESULTS AND ANALYSIS

6.1. *Exploratory analysis*

As previously explained, our study used PME data from March 2002 to December 2015, with analyses conducted separately for sons and daughters. Thus, the graphs in Figure A.4a depict the trajectories of participation rates in the paid labor market in situations 1 and 2 (see Table I), together with the evolution of the average real income of the job.

The behavior of the participation rate (employed and unemployed) followed the evolution of average income. Both variables have decreased since 2014, which marked the beginning of an economic crisis in Brazil. These results indicate that the participation rate was sensitive to fluctuations in economic cycles. Another important fact is that the trajectory of average real income was, in several years, lower for the treatment group compared to the group where the head of the family remained employed (control group). The decrease in the average real income of the job held by the head of the household is evident from 2014.

Curiously, the decreased participation of sons and daughters in the labor market seems to precede the crisis (beginning in 2014), especially in the control group. Instead, such participation started to decrease in 2011 (with fluctuations between 2011 and 2015 for those in the treatment group). In addition, the participation rate and monthly income of men surpassed those observed for women. Structural and cyclical effects affected men and women differently.

TABLE II
DESCRIPTIVE STATISTICS

	Men				Women			
	Mean	StdD	Min.	Max.	Mean	StdD	Min.	Max.
log(Average income –month)	–0.01	0.13	–0.24	0.34	–0.02	0.13	–0.24	0.34
Skin color								
Black	0.10	0.30	1.00	1.00	0.10	0.30	1.00	1.00
Brown	0.43	0.49	1.00	1.00	0.43	0.49	1.00	1.00
White	0.47	0.50	1.00	1.00	0.47	0.50	1.00	1.00
Age group								
15-17 years old	0.58	0.49	1.00	1.00	0.57	0.49	1.00	1.00
18-20 years old	0.25	0.43	1.00	1.00	0.25	0.43	1.00	1.00
21-23 years old	0.10	0.30	1.00	1.00	0.11	0.31	1.00	1.00
24-26 years old	0.05	0.21	1.00	1.00	0.05	0.22	1.00	1.00
De 27-29 years old	0.02	0.15	1.00	1.00	0.03	0.16	1.00	1.00
Education								
No education or less than 1 year of study	0.02	0.15	1.00	1.00	0.02	0.13	1.00	1.00
From 1.00 to 3 years of study	0.03	0.16	1.00	1.00	0.02	0.13	1.00	1.00
From 4 to 7 years of study	0.27	0.44	1.00	1.00	0.19	0.39	1.00	1.00
From 8 to 10 years of study	0.47	0.50	1.00	1.00	0.50	0.50	1.00	1.00
From 11 to 14 years of study	0.21	0.41	1.00	1.00	0.27	0.44	1.00	1.00
15 or more years of study	0.01	0.09	1.00	1.00	0.02	0.12	1.00	1.00
Number of elderly (over 65 years old)	0.03	0.19	1.00	3.00	0.03	0.18	1.00	3.00
Type of family								
Dual-earner couple with children	0.38	0.49	1.00	1.00	0.38	0.49	1.00	1.00
Single-earner couple with children	0.30	0.46	1.00	1.00	0.29	0.45	1.00	1.00
Single-parent and single-earner family	0.32	0.47	1.00	1.00	0.33	0.47	1.00	1.00
Extended family (yes)	0.08	0.28	1.00	1.00	0.11	0.31	1.00	1.00
Eldest child (yes)	0.63	0.48	1.00	1.00	0.63	0.48	1.00	1.00
Student (yes)	0.79	0.41	1.00	1.00	0.78	0.42	1.00	1.00
log(main earner's income in the first month)	7.32	0.94	0.57	12.07	7.29	0.93	0.18	11.78
Household head with a Work and Social Security Card (no)	0.33	0.47	1.00	1.00	0.34	0.47	1.00	1.00
N	82,647				87,158			

6.2. *The transition of young people to the labor force by type of activation (2002–2015)*

The empirical analysis consisted of estimating the impact of the discouraged and added worker effects on activation – the participation in the labor force among sons and daughters. It should be highlighted that the focus was exclusively on the replacement process and not on the complementarity of this secondary worker. We analyzed the entry of young people into the labor force conditioned by the transition of the household head from employment to unemployment. Therefore, we had a restricted and more homogeneous analysis group. We did not analyze, for example, those related to the household head as complementing the family income, such that they entered the labor force as a result of a drop in income and not due to the primary earner's unemployment.

This section focuses on analyzing the transition to unemployment and occupation through estimations of multinomial *probit* models, with and without correcting for sample selection bias. In Table III, we report the main statistical tests to examine the possibility of selectivity with the estimation of model coefficients. However, we present and discuss results through the marginal effects of the main equation, as shown in Table IV.

Instrument selection is not an easy task. Therefore, given the possibilities that the data allowed us, we opted to try to correct sample selection bias and, whenever convenient, present the results with and without those corrections. Family size was the variable used here as an

TABLE III

TRANSITION OF SONS AND DAUGHTERS TO OCCUPATION AND UNEMPLOYMENT – MULTINOMIAL PROBIT MODEL COEFFICIENTS, WITHOUT AND WITH SAMPLE SELECTION BIAS CORRECTION

	Model III.A			Model III.B		
Base result: Inactive-inactive (I – I)	I – E	I – U	Select. eq.	I – E	I – U	Select. eq.
Transition of the household head to unemployment (sit. 2)						
Yes	0.26**	0.43***		0.22*	0.46***	
log(Average income – month)	0.16	0.20		0.03	0.07	
Color (black omitted)						
Brown	0.05	0.04	0.026	0.04	–0.03	0.03
White	–0.04	–0.10**	0.004	0.01	–0.10**	0.01
Age group (15-17 years old omitted)						
18-20 years old	0.69***	0.78***	–0.476***	0.61***	0.64***	–0.42***
21-23 years old	1.09***	0.99***	–0.829***	0.91***	0.80***	–0.73***
24-26 years old	1.15***	1.03***	–1.089***	1.00***	0.75***	–0.99***
27-29 years old	1.15***	1.06***	–1.259***	1.12***	0.78***	–1.18***
Education (no education or less than 1 year of study omitted)						
From 1 to 3 years of study	1.24***	0.94***	–0.650***	1.07***	0.90***	–0.43***
From 4 to 7 years of study	1.24***	1.16***	–0.706***	0.85***	1.21***	–0.54***
From 8 to 10 years of study	1.33***	1.53***	–0.754***	1.13***	1.54***	–0.65***
From 11 to 14 years of study	1.33***	1.62***	–0.848***	1.48***	1.87***	–0.85***
15 or more years of study	1.53***	1.79***	–0.971***	1.70***	2.30***	–1.01***
Number of elderly (over 65 years old)	–0.15**	–0.17**	0.048*	–0.06	–0.12*	–0.10***
Family type (dual-earner couple with children omitted)						
Single-earner couple with children	–0.05*	0.05*	0.001	–0.04	0.11***	0.01
Single-parent and single-earner	–0.03	0.10***	0.572***	0.04	0.12***	0.50***
Extended family (not omitted)						
Yes	0.04	0.02	0.010	–0.01	0.02	0.14***
Eldest child (not omitted)						
Yes	–0.02	0.05**	0.510***	0.01	0.08***	0.46***
Student (not omitted)						
Yes	–0.40***	–0.54***	0.236***	–0.19***	–0.47***	0.21***
Household head var.						
log(earner's income in the first month)	–0.18***	–0.27***		–0.16***	–0.26***	
Social Security Card (Yes omitted)						
No	0.07***	–0.07***		0.08***	–0.04	
Family size (two people omitted)						
3 people			0.769***			0.67***
4 people			1.456***			1.28***
5 people			1.938***			1.72***
6 people			2.323***			2.02***
7 people or more			2.584***			2.32***
Intercept	–1.71***	–1.34***	0.795***	–2.33***	–1.66***	1.02***
/athrho	–0.25***	–0.09*		–0.35***	–0.25***	
rho [Wald test of indep. eqns. (rho=0)]	–0.24***	–0.09*		–0.34***	–0.25***	
N		182,414			163,797	

Note. Model III.A: Multinomial probit with selection bias correction for sons. Model III.B: Multinomial probit with selection bias correction for daughters. Robust standard errors are available from the authors upon request. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. I - E is "inactivity –employment" and I - U is "inactivity – unemployment". All models include MR dummies (Recife ommited) and Year dummies (2002 ommited).

instrument to identify the selection equation. In multinomial estimates with bias correction, the effects estimated in the selection models indicate whether respondents with a specific profile and living in a particular type of family are more likely (positive effects) or less likely (negative effects) to be inactive in a household in which the household head is employed. The instrumental variables show an expected positive sign and are statistically significant for all groups analyzed (see Table III).

When $\rho \neq 0$, the standard estimates are biased. For sons and daughters (see Table III), the athrho coefficient and the Wald test of independent equations indicate the rejection of the null hypothesis that there was no correlation between the error terms in the main and selection equations in all models. In other words, any estimate of the determinants of the likelihood of activation of sons and daughters without controlling sample selection bias would provide biased results.

Therefore, by examining the results (marginal effects reported in Table IV) and considering that the tests suggested that the appropriate models are those with correction of sample selection bias, we find that the unemployment of the household head positively affected the likelihood of transition to unemployment, although not affecting the likelihood of transition to occupation, vis-à-vis remaining inactive. On the other hand, youth participation in the labor force seems independent of a discouraged worker effect. That is, there is no evidence of a statistically significant discouraged worker effect.

In general, many results for sons and daughters are analogous. However, the main differences are noted below. The marginal effects for the added worker effect variable indicate that the likelihood of moving from inactivity to unemployment (activation) is on average 5.59 percentage points (p.p.) higher for young men in families where the household head has lost a job compared to those where the household head remained employed. For daughters, the likelihood of transition is 6.36 p.p. higher in families where the household head has lost a job, vis-à-vis remaining inactive.

Regarding individual variables, educational level and age are determinants for the labor supply among sons and daughters. First, the likelihood of the transition to occupation and unemployment is clearly higher among older age groups. For both men and women, the older the individual, the greater the chances of participation in the labor force. Furthermore, those who declared themselves students are, on average, less likely to transition to activation when compared to non-students.

Young males identified as the oldest child are, on average, 0.6 p.p. more likely to transition from inactivity to unemployment than those who are not older children, vis-à-vis remaining inactive. For daughters, this difference is 0.9 percentage points. Older sons or daughters are expected to be more involved in the financial dilemmas of the family and are more affected by their father's or mother's unemployment, leading them to take more responsibility for the financial burdens of that family.

The likelihood of activation of young people decreases with the increasing household head's income in the first month of the interview, which is consistent with a higher reservation wage in families of households that had received higher wages. Interestingly, young people are less likely to transition to unemployment and more likely to transition to occupation in households where the household head was an informal worker, compared to remaining inactive. It is possible that the condition of informality facilitates the transition of young people to an occupation in the same category.

Out of family variables, two specific points stand out. First, the greater the number of elderly residents (over 65 years old) in the household, the lower the chances of daughters and sons moving to unemployment, vis-à-vis remaining inactive. The presence of older adults in the household can be interpreted as a factor that hinders the activation of the possible additional

TABLE IV

TRANSITION OF SONS AND DAUGHTERS TO OCCUPATION AND UNEMPLOYMENT – MARGINAL EFFECTS OF MULTINOMIAL PROBIT MODEL COEFFICIENTS

	Model IV.A		Model IV.B		Model IV.C		Model IV.D	
Base result: Inactive-inactive (I – I)	I – E	I – U	I – E	I – U	I – E	I – U	I – E	I – U
Transition of the household head to unemployment (sit. 2)								
Yes	0.016	0.036***	0.022	0.056***	0.010	0.042***	0.012	0.064***
log(Average income – month)	0.010	0.013	0.015	0.021	0.001	0.005	0.001	0.008
Color (Black omitted)								
Brown	0.003	0.002	0.005	0.004	0.002	–0.002	0.004	–0.004
White	–0.003	–0.007**	–0.003	–0.011**	0.001	–0.008***	0.003	–0.013**
Age group (15-17 years old omitted)								
18-20 years old	0.039***	0.052***	0.052***	0.070***	0.026***	0.043***	0.037***	0.062***
21-23 years old	0.077***	0.069***	0.105***	0.089***	0.045***	0.052***	0.069***	0.078***
24-26 years old	0.079***	0.071***	0.115***	0.093***	0.049***	0.041***	0.082***	0.068***
27-29 years old	0.072***	0.075***	0.113***	0.099***	0.056***	0.039***	0.100***	0.068***
Education (no education or less than 1 year of study omitted)								
From 1 to 3 years of study	0.042***	0.017***	0.076***	0.032***	0.027***	0.014***	0.045***	0.023***
From 4 to 7 years of study	0.039***	0.027***	0.072***	0.048***	0.015***	0.026***	0.027***	0.044***
From 8 to 10 years of study	0.042***	0.050***	0.076***	0.086***	0.025***	0.044***	0.043***	0.071***
From 11 to 14 years of study	0.039***	0.058***	0.074***	0.099***	0.041***	0.067***	0.071***	0.106***
15 or more years of study	0.050***	0.071***	0.096***	0.118***	0.048***	0.109***	0.085***	0.171***
Number of elderly (over 65 years old)	–0.011**	–0.011**	–0.015*	–0.018**	–0.004	–0.010**	–0.004	–0.013*
Family type (dual-earner couple with children omitted)								
Single-earner couple with children	–0.004**	0.004**	–0.008**	0.007**	–0.003*	0.008***	–0.006**	0.014***
Single-earner and single-parent family	–0.004**	0.007***	–0.005	0.013***	–0.000	0.007***	–0.001	0.013***
Extended family (not omitted)								
Yes	0.003	0.001	0.004	0.002	0.000	0.002	–0.001	0.002
Eldest child (not omitted)								
Yes	–0.002	0.004**	–0.004	0.007**	–0.000	0.006***	–0.001	0.010***
Student (not omitted)								
Yes	–0.024***	–0.041***	–0.036***	–0.059***	–0.006***	–0.037***	–0.010***	–0.056***
Household head var.								
log(earner's income in the first month)	–0.011***	–0.018***	–0.016***	–0.030***	–0.007***	–0.018***	–0.010***	–0.029***
Social Security Card (Yes omitted)								
No	0.006***	–0.006***	0.011***	–0.011***	0.004***	–0.003**	0.008***	–0.006**
Selection equation (family size)			Yes	Yes			Yes	Yes
N	82,647		182,414		87,158		163,797	

Note. Model IV.A: Multinomial probit for sons. Model IV.B: Multinomial probit with selection bias correction for sons. Model IV.C: Multinomial probit for daughters. Model IV.D: Multinomial probit with selection bias correction for daughters. Robust standard errors are available from the authors upon request. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. I - E is "inactivity –employment" and I - U is "inactivity – unemployment". All models include an intercept, MR dummies (Recife ommited), and Year dummies (2002 ommited).

labor force. Many older adults may serve as potential generators of additional income for the household through retirement remunerations. In addition, the time allocated to care activities for these older adults would be more extensive.[1]

The second intriguing family aspect is how being in a single-parent family increases the chances of sons and daughters moving to unemployment compared to those who live with two

[1]The more time allocated to care for the elderly in households can be translated into higher expenses. However, such expenses are expected to be lower than retirement earnings in most Brazilian families (which are middle-class or low-income families).

economically active parents. The results indicate that sons and daughters in single-earner families face a greater likelihood of transition to unemployment. For young women, this effect is relatively equal between single-earner couples and single-parent families. However, for men, the likelihood of transition to unemployment is almost double in single-parent households (1.2 p.p.) compared to those in single-earner couples' households (0.7 p.p.). Unfortunately, the incidence of single-parent families in Brazil is strongly correlated to issues of vulnerability and poverty. Therefore, the more significant young labor supply in such families is probably more strongly associated with necessity than a desire to enter the workforce.

The considerable differences between the labor supply of sons and daughters by type of family are notable. Households without both parents – usually with the presence of only the mother – demand a greater young labor supply, and, naturally, the transition of this relatively less experienced labor force should first encounter unemployment. According to Vieira et al. (2016), for example, the presence of both parents in the household may indicate a higher level of financial stability, increasing the chances of young people remaining in school, classifying them as inactive.

6.3. *The transition of young people to the labor force by income group (2002–2015)*

For more detailed results, we separately estimated models for individuals belonging to families in which the household head's income in the first interview was lower (higher) than the median (see Table V). This type of analysis allowed us to verify whether the added worker effect is more significant among higher-income families.

Differences in estimates by income groups are mainly related to family characteristics. Thus, within the lowest income group, being in a single-earner couple or a single-parent family increases the likelihood of activation of daughters for unemployment by 1.34 p.p. and 2.53 p.p., respectively, compared to families with dual-earner couples. In the group with the highest income, young people in single-earner couple families are less likely to transition to an occupation and more likely to enter unemployment. Similar results are detected for men and women. Young men are more likely to transition to an occupation and unemployment in single-parent families in the highest income group, vis-à-vis remaining inactive. This finding reveals that single-parent families at the extremes of income are probably very different in several characteristics and significantly different in the occupational respects of the household head. Again, there is no evidence of a statistically significant discouraged worker effect.

It seems reasonable to consider that the parents' occupational situation has a minimal effect on the transition of young people to activation for low-income families. On the other hand, aspects such as education, age, and the job characteristics of the household head are more relevant.

The number of elderly dependents (over 65 years old) in the household does not affect the likelihood of activation of children in low-income families. However, this has reduced the likelihood of activation for unemployment in higher-income families, but only for men. This result may be due to the fact that these older people act as complementary income earners within such family arrangements.

It is also clear that the likelihood of transitioning to an occupation or unemployment is higher in more educated groups. For both men and women, the higher the education, the greater the probability of labor force participation. However, in general, these effects are noticeably more substantial for young people in low-income families.

The main difference between men and women is revealed in the added worker effect. In lower-income families, the likelihood of young members moving from inactivity to unemployment (activation) is almost 4 p.p. higher in families where the household head has lost a job

TABLE V

TRANSITION OF SONS AND DAUGHTERS TO OCCUPATION AND UNEMPLOYMENT BY INCOME GROUPS – MARGINAL EFFECTS OF MULTINOMIAL PROBIT MODEL

	Household head's income in t is below the median				Household head's income in t is above the median			
	Sons		Daughters		Sons		Daughters	
Base result: Inactive-inactive (I – I)	I – E	I – U	I – E	I – U	I – E	I – U	I – E	I – U
Transition of the household head to unemployment (sit. 2)								
Yes	0.037	0.040*	0.003	0.077***	–0.014	0.119**	0.042	0.057
log(Average income – month)	–0.027	0.036	–0.001	0.036	0.043	0.008	0.004	–0.010
Color (Black omitted)								
Brown	0.010*	–0.004	0.007	–0.010	–0.002	0.013*	–0.005	0.002
White	0.010	–0.017**	0.006	–0.008	–0.015*	–0.000	–0.005	–0.013*
Age group (15-17 years old omitted)								
18-20 years old	0.058***	0.082***	0.037***	0.077***	0.049***	0.063***	0.039***	0.052***
21-23 years old	0.113***	0.095***	0.055***	0.082***	0.099***	0.091***	0.085***	0.078***
24-26 years old	0.112***	0.097***	0.053***	0.062***	0.119***	0.096***	0.119***	0.079***
27-29 years old	0.106***	0.120***	0.059***	0.040***	0.121***	0.091***	0.152***	0.098***
Education (no education or less than 1 year of study omitted)								
From 1 to 3 years of study	0.086***	0.036***	0.037***	0.028***	0.077***	0.049***	0.076***	0.027*
From 4 to 7 years of study	0.084***	0.065***	0.027***	0.060***	0.060***	0.033***	0.029***	0.030***
From 8 to 10 years of study	0.086***	0.109***	0.040***	0.090***	0.069***	0.066***	0.045***	0.054***
From 11 to 14 years of study	0.084***	0.124***	0.068***	0.137***	0.064***	0.076***	0.074***	0.086***
15 or more years of study	0.107***	0.126***	0.103***	0.223***	0.079***	0.090***	0.077***	0.134***
Number of elderly (over 65 years old)	–0.013	–0.019	–0.009	–0.011	–0.014	–0.021*	–0.002	–0.016
Family type (dual-earner couple with children omitted)								
Single-earner couple with children	–0.002	–0.001	–0.004	0.013***	–0.012***	0.012***	–0.009**	0.012***
Single-earner and single-parent family	0.004	0.005	0.005	0.025***	0.012***	0.023***	–0.004	0.004
Extended family (not omitted)								
Yes	0.005	–0.008	–0.001	0.002	0.005	0.016*	0.001	0.005
Eldest child (not omitted)								
Yes	–0.003	–0.008*	–0.002	0.014***	–0.005	0.005	–0.001	0.005
Student (not omitted)								
Yes	–0.042***	–0.047***	–0.004	–0.055***	–0.031***	–0.071***	–0.017***	–0.052***
Household head var.								
ln (Earner income in the first month)	–0.008*	–0.017*	–0.002	–0.010**	–0.020***	–0.036***	–0.016***	–0.038***
Social Security Card (Yes omitted)								
No	0.010**	–0.008**	0.009***	–0.005	0.014***	–0.009***	0.010**	–0.002
/athrho	–0.323***	–0.085	–0.151*	–0.215***	–0.183**	–0.111	–0.518***	–0.301***
rho [Wald test of indep. eqns. (rho=0)]	–0.312***	–0.085	–0.150*	–0.212***	–0.181**	–0.111	–0.476***	–0.293***
N	90,973		81,664		91,441		82,133	

Note. Robust standard errors are available from the authors upon request. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. I - E is "inactivity –employment" and I - U is "inactivity – unemployment". All models include an intercept, MR dummies (Recife ommited), Year dummies (2002 ommited), and a Selection equation (family size).

than where parents have remained employed. For youths in higher-income families, this likelihood is 11.86 percentage points. Daughters are more likely to move toward activation (to unemployment, specifically) when they belong to lower-income families in which the father or mother (household head) has lost a job. It is not possible to detect an added worker effect for daughters belonging to higher-income families. This finding implies that, above the median family income, the activation process of daughters does not depend on the labor situation of the household head, which does not apply to daughters belonging to lower-income families. This result may be because the activation process for the latter group may be more associated with

a matter of necessity. In summary, the likelihood of activation in the labor force of sons and daughters seems to be different between income groups.

7. CONCLUSION

Most unemployed people are individuals who have lost their jobs, although a relevant portion corresponds to those who are affected by the dismissal of a family member. In a highly simplified explanation, if a parent loses a job, their children may be forced to start looking for work. The very instability of a crisis period also generates unemployment, as the fear of being unemployed encourages other non-earning members of families to start looking for work, even before the primary earner becomes unemployed.

In situations of crisis and uncertainty, various problems affect different social sectors, and issues related to the sectors of education, health, social security, and employment must be considered carefully by public actors. Thus, a better understanding of how the added and discouraged worker effects operate within a given country is essential to develop public policies to minimize the effects of adverse shocks on the labor market.

Given the above, our study sought to analyze the decision of activation in the labor force by young Brazilians, approaching this process by considering family circumstances and the context of the demographic changes that the country has been undergoing. Our results point to evidence of a more significant transition of young men and women to activation, specifically from inactivity to unemployment, for those families in which the household head lost a job. It is expected that young people first move from inactivity to unemployment accompanied by a continuous search for work, given their age and labor experience. Therefore, the results indicate the existence of added worker effect for young Brazilians between 2002 and 2015.

Furthermore, the importance of educational and age characteristics as determinants for the labor supply of young people was revealed in the transition to employment or unemployment. In summary, the higher the age or education, the greater the probability of labor force participation for men and women. Looking at families above and below the median income, we found that such age and education effects are stronger for young people in lower-income families.

Despite variations in the different family results, we identified two general trends. Firstly, young people in single-earner families, whether a family of single-earner couples or single parents, seem to be more likely to transition to unemployment, that is, have greater chances of activation than remaining inactive. Secondly, there are some indications that the parents' occupational situation seems to have little effect on the transition to activation of young males belonging to low-income families, unlike what was found for those in wealthier families.

In the current Brazilian economic context, the analysis of the added worker effect and investigation to expand knowledge on the process of activation of young people in the labor force are essential to understand how the population has reacted to the economic scenario. It is vital to examine and draw lessons from the recent past to identify the main obstacles to overcome in order to guarantee equal access to the labor market. Since 2020 and the COVID-19 health crisis, which has affected occupational conditions and family incomes, the greater transition of young people to activation was an expected phenomenon. However, the results for the years between 2002 and 2015 indicated that, regardless of the income class of these young people's families, the accumulation of individual human capital will be essential for their transition from inactivity to an occupation.

APPENDIX A: ADDITIONAL FIGURES AND TABLES

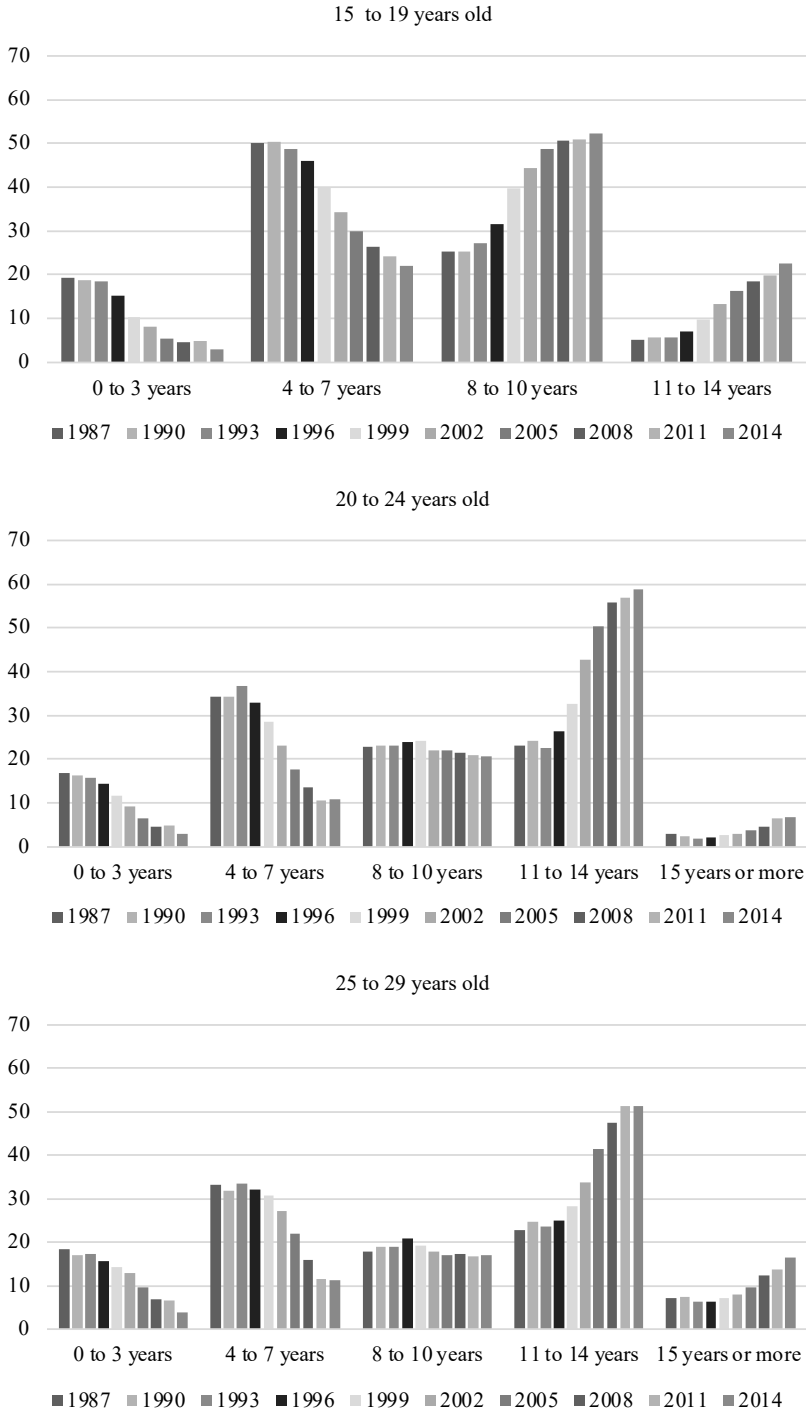


FIGURE A.1.—Evolution of the composition of young people by groups of years of study and by age group between 1987 and 2014 in Brazil (% by age groups). Source: Own elaboration using PNAD microdata.

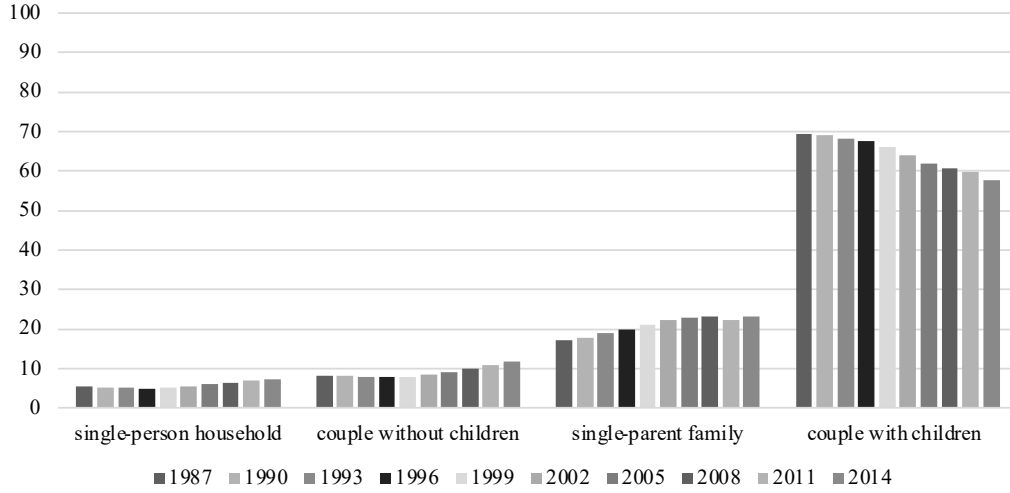


FIGURE A.2.—Evolution of the percentage of young people in each type of family, between 1987 and 2014 in Brazil (% of young people aged 15 to 29). Source: Own elaboration using PNAD microdata.

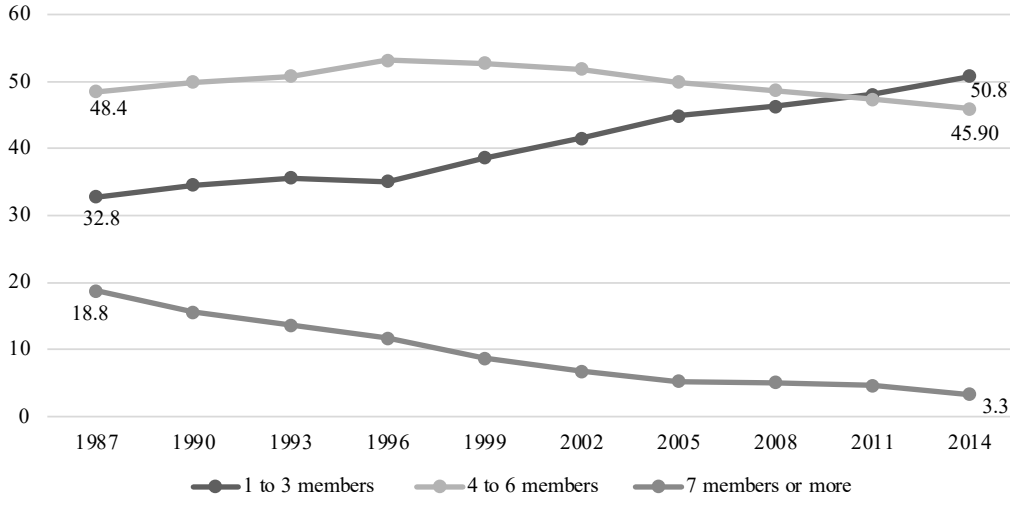


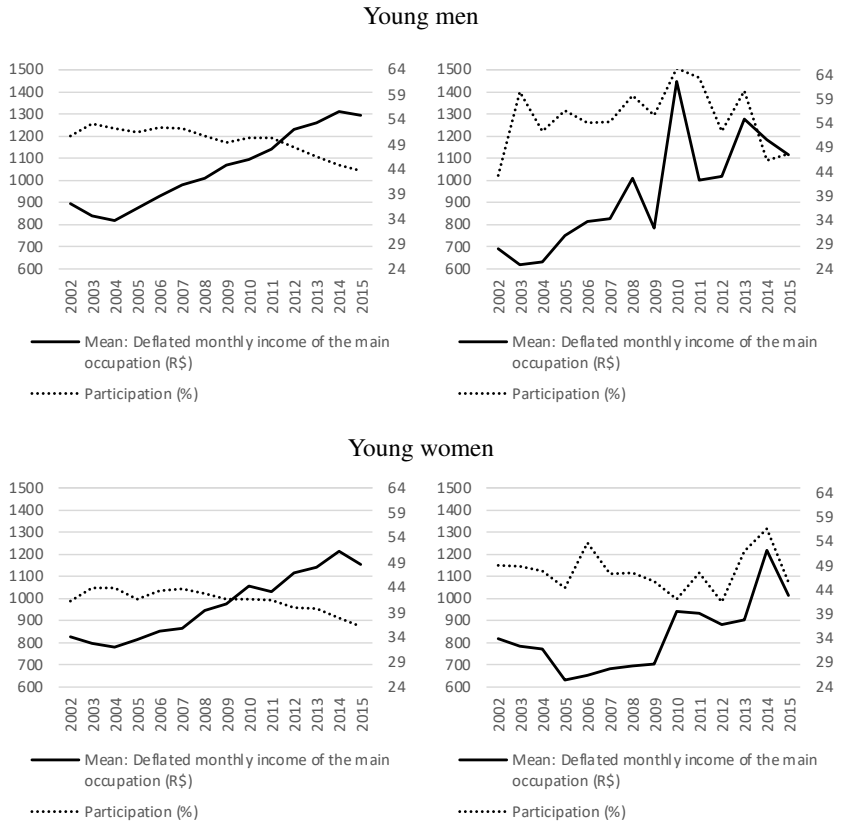
FIGURE A.3.—Evolution of the percentage of young people in each family size typology, considering the number of family members, between 1987 and 2014 in Brazil. Source: Own elaboration using PNAD microdata.

TABLE A.I

VARIABLES RELATED TO THE DEPENDENT VARIABLE: PARTICIPATION IN THE LABOR FORCE

Characteristics	Independent variables
Added worker effect	Dummy of transition of the household head from employment to unemployment
Discouraged worker effect	Difference between the logarithm of average occupation income in period t and the logarithm of average occupation income in all periods for those in the treatment group (whose household head has lost the job) and control group (whose household head has not lost the job)
Individual	Age (triennial age groups) Race (1 = black, 2 = brown, 3 = white) Education (1 = no education or less than 1 year of study, 2 = 1 to 3 years of study, 3 = 4 to 7 years of study, 4 = 8 to 10 years of study, 5 = 11 to 14 years of study, 6 = 15 or more years of study) Metropolitan region of residence (1 = Recife, 2 = Salvador, 3 = Belo Horizonte, 4 = Rio de Janeiro, 5 = São Paulo, 6 = Curitiba, 7 = Porto Alegre) Student (1 = yes, 0 = no)
Earner and his/her job	Labor income in the first month of interview Had a Work and Social Security Card (1 = yes, 0 = no)
Family members	Number of persons over 65 years old in the household Extended family Family type (1 = dual-earner couple, 2 = single-earner couple, 3 = single-parent family) [(a)] Eldest child (1 = yes, 0 = no) Family size (1 = 2 people, 2 = 3 people, 3 = 4 people, 4 = 5 people, 5 = 6 people, 6 = 7 people or more) [(b)]

Note. (a) Households with only one resident were excluded from the sample. (b) Family size was not directly associated with participation in the labor force, but it was used in the selection equation to model the initial constraint, that is, the constraint that uses the sample of families whose head was employed, and the daughter was inactive in the first month of interview. Source: Own elaboration.



(a) Trajectories of occupation rates in situations 1 and 2 and evolution of the average income from the main job for sons and daughters. Source: Own elaboration, with PME data from March 2002 to December 2015.

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