DISCUSSION PAPER

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PRODUCTIVITY AND YOUTH ENGAGEMENT IN BRAZIL: ASSESSING SCHOOLING AND LABOR MARKET DECISIONS

Maíra Franca
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Rio de Janeiro, August 2019

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Maíra Franca[2]
Miguel Foguel[3]
Joana Costa[4]
Rita Almeida[5]

1. We would like to thank Truman Packard, Pedro Olinto, Naercio Menezes Filho, Eduardo Rio Neto, and participants at the seminar on Skills and Jobs organized by the World Bank in 2016 for their comments on the first set of results of this paper. We also thank the anonymous referee for the comments and suggestions on this version of the study. All errors are our own.
2. Researcher at Ipea.
3. Researcher at Ipea.
4. Researcher at Ipea.
5. Researcher at the World Bank.

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Discussion paper / Institute for Applied Economic Research.- Brasília : Rio de Janeiro : Ipea, 1990-

ISSN 1415-4765

1. Brazil. 2. Economic Aspects. 3. Social Aspects. I. Institute for Applied Economic Research.

CDD 330.908

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JEL: J24; J29.

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ABSTRACT

One of the main concerns with youths is the *nem-nems*, which correspond to the group of youths that are not investing in their productive skills through the activities of either studying or working. This study analyzes data from National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios – PNAD), 1995-2015, to describe youth condition according to 4 categories: only study, only work, study and work, and *nem-nem*. An age-period-cohort model is considered to capture the influence of these factors on work/study decision trends. The year effects indicated that the decision to only work is pro-cyclical (*i.e.*, tend to co-move with the economy), while that of being *nem-nem* or only studying are anti-cyclical. The results also showed that younger cohorts have higher proclivity to study and lower propensities to work and to be in the *nem-nem* condition.

Keywords: youth; NEET; age-period-cohort decomposition.

1 INTRODUCTION

Brazil is experiencing a period in which the young adult population is at the peak of its share in the total population. According to IBGE (2013), the total number of people aged 15-29 years old reached 52.3 million in 2009 and will remain over 50 million people until 2023, representing over 25% of the total population. This Brazilian "youth wave" is combined with a phenomenon called demographic dividend that is characterized by an increase in the share of the working age population (15 to 64 years old) relatively to the share of the non-working age population (0 to 14 years old and 65 or more years old).[1] This increase in the relative supply of workers improves the potential for economic gains. Nonetheless, to reap the benefits of this favorable demographic condition it is important to invest in the human capital of the working age population, in particular that of young adults, whose capacity to learn and accumulate new knowledge is higher than for older workers.

The need to invest in the youth is intensified by the fact that Brazil's "youth wave" is almost reaching its end. After 2023, the size of the young population will significantly decrease and, by 2040, will reach around 40 million individuals, which will represent less than 20% of the total population. Thus, the current young adults are a crucial generation for the future of Brazil, from a demographic standpoint.

The progression of this youth wave into productive activities will be even more important, given that the labor productivity of the country has increased slowly and is still rather low. The annual GDP per worker in Brazil in 2015 was equivalent to US$ 32.2 thousand (PPP), less than one third of the GDP per American worker (US$ 111.6 thousand) and below the productivity of other Latin American countries like Mexico (US$ 39.2 thousand) and Chile (US$ 48.9 thousand).[2] Many factors act as obstacles to improve labor productivity in Brazil: low level of schooling, low education quality, lack of training on job-relevant skills, high levels of youth unemployment and informality, among others. The time youth spent on school and work is crucial for labor productivity. Therefore, it is important to understand the

1. To understand the demographic transition in Brazil and its implications, see Jorgensen, Rocha and Fruttero (2011) and Camarano (2014).

2. Numbers taken from the World Development Indicators, Retrieved from: <https://databank.worldbank.org/data/reports.aspx?source=2&series=SL.GDP.PCAP.EM.KD&country=BRA>.

youths' decisions regarding school and work, as these will shape youths' employability and productivity and, ultimately, the country's future labor productivity.

This paper analyzes the time use between study and work for youths in the 15-29 age group. Youths can be studying, working, doing both or neither. There is more concern with the *nem-nems*, which correspond to the group of youths that are not in education, employment, or training.[3] This group is not investing in their productive skills and this has negative effects on their future productivity and labor market outcomes. The *nem-nem* status is more problematic among the 15-17 age group, for disengagement at this early phase tends to generate a permanent drop out from school, thus hampering their human capital accumulation and increasing the probability that they end up involved in criminal activity.

This study has two main objectives. The first is to characterize the patterns of time use between work and study amongst youths in Brazil over the 1995-2015 period. Looking at the distribution of youths across the four time-use categories here employed (only study, only work, study and work, and *nem-nem*) allows one to identify not only whether disengagement is increasing or decreasing over time but also the compositional movements between study and work. The second objective is to uncover the relative importance of a set of proximate factors that are behind the patterns of youths' time use in the last two decades. For that, using the method proposed by Deaton and Paxson (1994), we estimate an age-period-cohort model for each of the four time-use categories to capture the contributions of the aging process of youths, their birth-cohorts, and time effects. We believe this is the first time such a model is used to assess the how the time use of youths are influences by these factors.

The database used in the study is the National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios – PNAD), which is conducted on a yearly basis by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística – IBGE) and has national coverage. The study focus on the population aged between 15 and 29 years old since these are the age limits that define the youth group in the Brazilian legislation. All results are obtained separately for males and females and in many instances the results are discussed for

3. In section 2, we define the *nem-nem* group more precisely.

the three most commonly stratified subgroups of youths: *i)* adolescents, between 15 and 17 years old; *ii)* youths between the ages of 18 and 24; and *iii)* young adults between 25 and 29 years old.

The paper is structured as follows. Section 2 describes the concept of *nem-nem* and provides a brief review of the literature on this group. Section 3 describes the data and section 4 presents descriptive evidence on the patterns of time use of youths in the period 1995-2015. Section 5 describes the age-period-cohort model and discusses the results for each time use category. The last section presents the main findings of the paper.

2 *NEM-NEMS*: CONCEPTS, CHARACTERIZATION AND LITERATURE REVIEW

This section discusses the concept of *nem-nem*, a group that has attracted a lot of attention of policy-makers, researchers, and the media. We present the historical context in which the concept emerged, the main characteristics associated with the group, the conceptual divergences in relation to its definition, and a brief literature review.

2.1 Context and characterization

The discussion about young people who are neither working nor in the education system began in the 1990s in the United Kingdom. According to Furlong (2006), concern with this group emerged from the changes that took place in the social security law in that country, which restricted access to unemployment benefits for those under 18 and excluded them from the official records. Because of these institutional changes, the focus on youth unemployment has shifted to a concern on those youths that were not working, studying or training. Istance, Rees and Williamson (1994) created the term *Status Zero* to refer to young people between 16 and 17 years old not engaged in those activities. Due to the negative connotation of having "no status", the term was replaced in policy discussions and in the literature by the abbreviation NEET (neither in employment, nor in education or training).

The report *Bridging the Gap* (SEU, 1999), published by the British government, discussed the issue and the term NEET became widely used in Europe and several other countries. In Spanish-speaking countries, this group is referred to as *NiNi* (*ni trabaja*

ni estudia) and in Brazil as *nem-nem* (*nem trabalha nem estuda*). We will use the term *nem-nem* to refer to the group of youths who are neither working nor studying.

The 2008 financial crisis and the subsequent worsening of the labor market conditions for young people stoked the public debate about the *nem-nems*. The concern with this group stems from their social vulnerability and the likely negative consequences of this status on human capital accumulation.

It is amply recognized in the human capital literature that cognitive and social-emotional skills are developed primarily in the family environment in the first years of life and then from the interaction between the family and the school (Heckman, 2006; Cunha and Heckman, 2007). The school plays a crucial role in the development of skills, especially for children and young people from disadvantaged families. In youth, individuals make the transition from school to the world of labor, where the skills previously acquired should be put into practice, and new skills should be developed. The *nem-nem* condition represents an interruption of this path and this diversion can bring negative effects for adult life, including reduced employability, productivity and earnings.

Bynner and Parsons (2002) conducted one of the first empirical studies analyzing youths out of school and out of work for a cohort of young people born in 1970 in the UK. The authors sought to identify the key characteristics associated with entering in the *nem-nem* condition and the consequences of this status for adult life. They concluded that the major factor influencing the transition to the *nem-nem* condition was poor educational achievement. Regarding the consequences for adult life, they found some differences between the genders. For men, the consequences of being *nem-nem* lie mainly in subsequent poor labor market experience. For the female group, whose vast majority were teenage mothers, negative mental health outcomes were also observed.

The *nem-nems* are not necessarily a homogenous group. In fact, Yates and Payne (2006) consider the concept of *nem-nem* problematic since it consists of various types of youths grouped together under the same label. Using data from UK Connexions, a social program aimed at counseling young people in transition to adulthood, the authors pointed out that the category also included young people in temporary transitional states, such as between school and further education, and young

parents who make a conscious decision to become *nem-nem* for some time to look after their children. More recently, Eurofound (2012) identified five main subgroups of *nem-nems* aged 15 to 24 in European Union countries:[4]

- the conventionally unemployed (short- and long-term unemployed), which represented more than half of the *nem-nems*;
- the disengaged (discouraged workers as well as others who are pursuing dangerous and asocial lifestyles);
- the unavailable (caregivers, such as mothers and others with family responsibilities; people who are sick or disabled);
- the opportunity-seekers (young people who are holding out for opportunities that they see as befitting their skills and status); and
- the voluntary *nem-nem* (travelers and those constructively engaged in other activities such as art, music and self-directed learning).

While it is important to recognize that some subgroups of *nem-nems* are autonomously and/or temporarily in that condition, this does not mean that economic disengagement at some point in youth is not likely to create difficulties for them in the labor market, for instance harming their capacity to obtain good jobs and commanding higher wages in adult life.

2.2 Definition

In Brazil, most studies adopt the concept of *nem-nem* to refer to people out of the labor force and out of school, thus removing the unemployed from this group. Training is not usually included in the analysis due to the lack of Brazilian data that systematically measure that activity. There are also differences regarding the age range to delimit the group of youths. People aged 15 to 29 years old are defined as the youth group according to the Brazilian legislation, while in the Organisation for Economic Co-operation and Development (OECD) countries the age range is 15 to 24 years old.

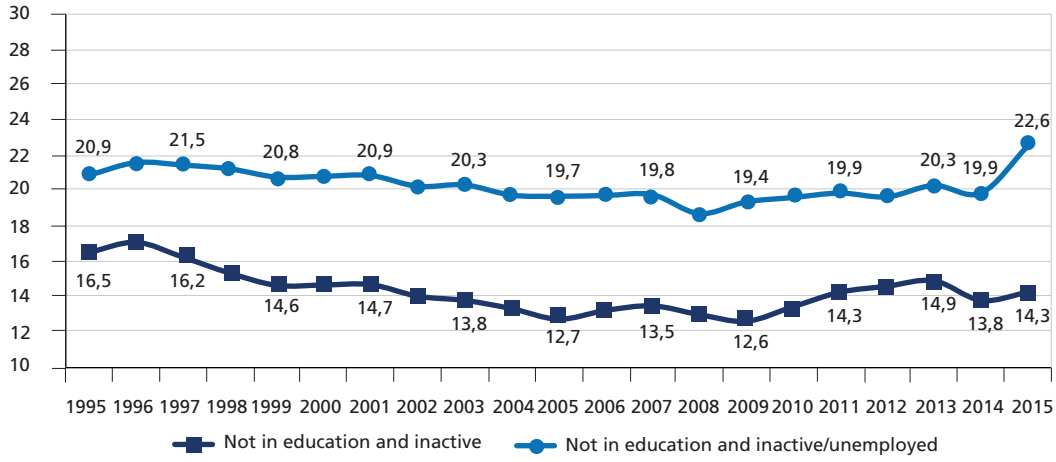
The inclusion of the unemployed in the *nem-nem* category is somewhat controversial since the unemployed are actively looking for work and so may be

4. Eurofound (2012, p. 4).

considered as economically active. Nevertheless, the definition that is widely used in the international literature considers the unemployed as *nem-nem*. In this study, we adopt the international definition, that is, we consider the unemployed as well as the inactive who are not studying as *nem-nem*. By doing this, our results become more comparable with those in the international literature.

In order to see the differences when the unemployed are included or excluded from the *nem-nem* group, figure 1 presents the proportion of Brazilian youths aged 15 to 29 years old that are *nem-nem* using both definitions. The darker line shows the percentage of youths that are out of the labor force (inactive) and not studying while the lighter line adds the percentage unemployed to the *nem-nem* group.

FIGURE 1
Evolution of the percentage of *nem-nems* in Brazil, 15-29 years old
(In %)



Source: PNAD/IBGE.
Elaborated by the authors.
Obs.: The observations for 2000 and 2010 have been interpolated from adjacent years, since PNAD is not conducted in years where the Demographic Census takes place.

Although incorporating the unemployed inflates the *nem-nem* rates, the trajectories for both series are very similar, with a decline in the proportion of *nem-nem* from 1996 to 2008 and a reversal of this trend from 2009 on. The largest difference occurs between 2014 and 2015, due to a sharp increase in the youth unemployment rate that was associated with the beginning of last economic recession in Brazil. Including the unemployed, the *nem-nem* rate reaches its highest value in 2015, 22.6%, an increase of 2.7 percentage points (p.p.) relatively to 2014. In contrast, the

percentage of *nem-nems* from the definition that does not include the unemployed displayed a slight increase of 0.5 p.p. between the same two years. Despite this difference in the last year, figure 1 shows that the two definitions are capable of capturing the same trends in the *nem-nem* rate.

2.3 Literature review

The empirical evidence for Brazil as well as other Latin American countries confirms the strong influence of gender and income on the propensity to be *nem-nem*. Using data for youths aged 15 to 24 years old for 18 Latin American countries[5] from 1980 to 2010, Cárdenas, De Hoyos and Székely (2015) estimated that *per capita* household income is the characteristic that is most strongly associated with the propensity to be *nem-nem*. Besides individual and family factors, the authors also identified a set of community factors and macroeconomic conditions that influence the *nem-nem* proportion. GDP *per capita* growth had the effect of reducing the percentage of *nem-nem* among men. For women, while economic growth was not statistically significant, the fertility rate had a strong positive effect on the probability of being *nem-nem*. The authors concluded that the reduction in the proportion of *nem-nem* in the region was partially explained by the demographic transition that Latin American countries were going through.

Considering the definition of *nem-nem* that excludes the unemployed and using Census data, Camarano and Kanso (2012) shows an increase in the *nem-nem* group between 2000 and 2010. Despite the decline in female *nem-nems*, the authors point to a strong gender component since more than two third of *nem-nems* were women. Using PNAD data for the years 2001 to 2011, Monteiro (2011) shows that the *nem-nem* condition is more prevalent among young people with low schooling and low income, and almost half of the *nem-nems* were women with children.

Vieira *et al*. (2016) analyzed the effects of parental income and occupational status on youths' study and work activities for the period 1992-2014. The results indicate that when both parents work, the odds of being *nem-nem* decrease. Another finding was that the mother's income growth was more important than that of the father to explain the increase in the proportion of young people who are dedicated exclusively to studying.

5. Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, and Venezuela.

Costa and Ulyssea (2014) use the Oaxaca/Blinder decomposition method to analyze changes in the proportion of *nem-nem* between 1992 and 2008 and between 2009 and 2012. They concluded that the reduction in the *nem-nem* rate in the first period can be attributed, in large part, to factors such as increased schooling and reduced fertility. However, in the later period the observed increase in the proportion of *nem-nems* was predominantly explained by unobservable factors.

One limitation of the Brazilian studies is that they do not follow the same individuals over time. To overcome this problem, Menezes Filho, Cabanas and Komatsu (2013) worked with longitudinal data from the PME (Pesquisa Mensal de Emprego), a survey that follows households for up to sixteen months. Considering two different periods, 2003-2004 and 2010-2011, and a youth group aged 17 to 22 years old, the authors found that the increase in the percentage of *nem-nems* in the later period happened due to an increase in the average time they remain in this condition. They also concluded that both the entry rate into *nem-nem* and the average duration in this condition are higher among women.

3 DATA

The data source used in this study is PNAD, which is a nationally representative survey that collects socioeconomic and demographic information about the Brazilian population on a yearly basis. The PNAD was conducted by the IBGE until 2015, the last edition of the survey. We use data from 1995 to 2015, except for the years 2000 and 2010 when the survey was not conducted because the Demographic Census was carried out.

The PNAD survey includes questions about labor market status and school attendance as well as other socioeconomic characteristics, such as gender, age, race, region and income. Our outcomes of interest are defined by the interaction between work and study and consists of four categories: *i) nem-nem*; *ii)* only study; *iii)* only work; and *iv)* study and work.

The study activity in PNAD measures attendance to the regular education system (elementary, high school or university), post-graduation (masters or doctorate), and adult education programs. People attending qualification courses and training programs are not regularly captured by PNAD, so the study activity does not incorporate this group. The concept of work comprises three categories: *i)* paid work; *ii)* unpaid work; and *iii)* subsistence workers. Unemployment is measured according to international

standards and captures individuals who are not working but are actively searching for a job and are readily available to take a job.

Due to PNAD's cross-sectional design, we cannot follow individuals across the years. However, it is possible to follow cohorts of individuals over time, where cohorts are defined by the birth year. We will use this information for the estimation of the age-period-cohort model in section 5.

4 DESCRIPTIVE ANALYSIS

In this section, we describe how the time use patterns of Brazilian youths changed between 1995 and 2015, highlighting how they differ according to age and gender. Before describing these patterns, it is important to note that the decision between studying and working has different meanings and implications according to the age of youths. For instance, there is a wide consensus that youths aged 15 to 17 years old should be at school, and that any work for this age group should not be detrimental to their education. Youngsters at this age range who are not enrolled in formal education comprise a worrisome group. Dropouts or out-of-school youths do not acquire enough human capital to find good quality jobs and, hence, are more vulnerable to unemployment and informality. Moreover, there is evidence that the adverse labor market conditions faced by unskilled youths might have lasting effects to their labor market outcomes (Cruces, Ham and Viollaz, 2012).

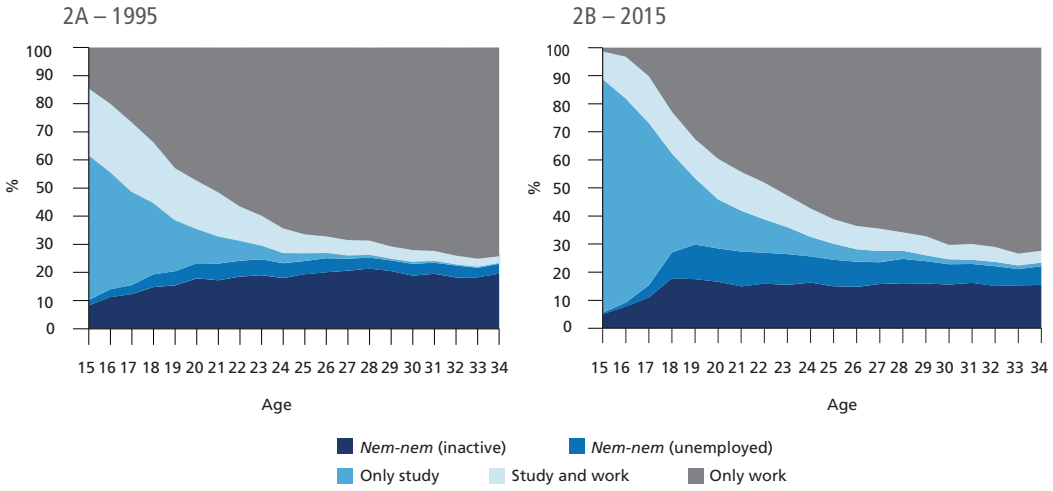
For those aged over 18 years old who completed secondary school, it is not clear whether they should be pursuing more education or labor market experience, but either working or studying are pathways to improve productivity. Nonetheless, those over 18 years old with incomplete secondary school need more schooling/training in order to face better labor market conditions. Therefore, for this group, it is desirable to be both studying and working.

Figure 2 shows the distribution of the young population across the four time-use categories by age for the years 1995 and 2015.[6] There are several points to notice from

6. We separate the proportion that are unemployed in the *nem-nem* category. The figure also extends the age span to 34 years old so as to display the observed patterns beyond the official youth limit age of 29.

the figure. Starting from the features that are common for both years, it is noticeable that the proportion of youths that only study or study and work is much higher among adolescents (15-18) than among young adults. Following the expected path for youths in modern societies, the time allocated to the study activity decreases after adolescence and is progressively substituted for the activity of work. However, in Brazil the "only study" condition falls sharply during adolescence, giving way to the increase in the proportion of *nem-nems* and of youths that are only working or unemployed. After the age of 19/20 years old the proportion of unemployed and inactive *nem-nems* stabilizes. One might expect that the *nem-nem* condition would trend downwards at the end the youth phase, but this does not take place.

FIGURE 2
Youth time use by age



Source: PNAD/IBGE.

The most noticeable change between 1995 and 2015 is the increase in the proportion of young people who only studying. This increase was substantial for the 15-17 age bracket moving up from 42.8% in 1995 to 71.3% in 2015, that is, an increment of 28.5 percentage points (p.p.). On the other hand, there is a reduction in the other three categories for this age group, especially in the category of only work (15 p.p.) and study and work (10 p.p.).

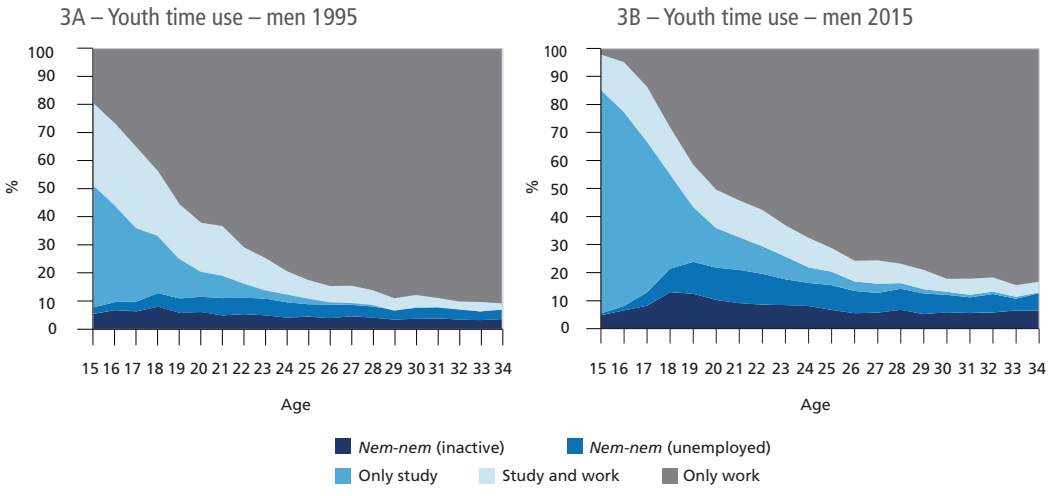
Another clear difference between 1995 and 2015 is the rise in the *nem-nem* rate. This upsurge was more pronounced among young people aged 18 to 24, from 22%

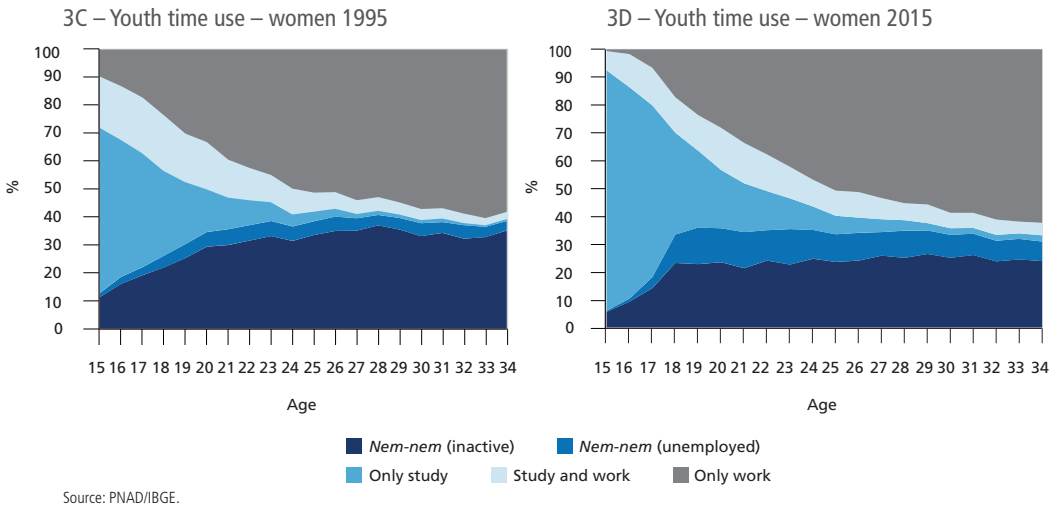
to 27%. Nonetheless, it is important to note that this change was concomitant with a reduction of 8 p.p. in the rate of those that only work and with the increase of unemployed *nem-nems*. As pointed out in the discussion on the *nem-nem* definitions in figure 1, the rise in the *nem-nem* rate in 2015 comes from the increase in the unemployment rate that was largely associated with the recession period that abated the Brazilian economy in that year.

The changes among people aged 25 to 29 were relatively minor, with a decrease of less than 4 p.p. in the rate of those that only work and an increase of 1.8 p.p. and 2.5 p.p. in the rates for those that only study and those that study and work, respectively. As for the younger groups, there was a rise in the *nem-nem* rate, which can also be accounted for by the rise in the unemployment rate.

Figure 3 shows the patterns of time use for males and females in 1995 and 2015. As it can be seen, the patterns are quite different between the sexes. The share of *nem-nems* is much higher for women aged 15 to 29 (29.6% in 2015) than for men (15.6% in the same year). Moreover, this gap is explained by the larger proportion of inactive female youths. At the same time, the only-work rate is much higher for men than for women: in 2015, 49% of the young men were only working, while among women this proportion was around 33%. On the other hand, the only-study rate is higher for young females than for young males.

FIGURE 3
Time use by age and gender





Source: PNAD/IBGE.

Despite the higher *nem-nem* rate for women, the comparison between 1995 and 2015 shows that the proportion of female *nem-nems* diminished 2.1 p.p. (from 31.7% to 29.6%), while the male's rate rose 5.8 p.p. (from 9.8% to 15.6%). Most of this change had to do with the decline in the inactivity rate of females and the increase in the males' one. This is fully in line with the more general phenomenon of increasing attachment of women to the labor market and diminishing labor force participation of men. The rise in unemployed *nem-nems* is observed for both males and females, and, as figure 1 shows, this likely due to the economic crisis that increased unemployment in 2015.

Figure 3 also shows significant differences between males and females across the distinct age subgroups. For teenagers (15-17 years old), the rise in the only study proportion was higher for men, 32.8 p.p., than for women, 24.1 p.p. Nevertheless, men at this age bracket still have a smaller rate for the only study category than women: 67.9% vs 74.9%. Both genders experienced a reduction in the share of the other categories: *nem-nem*, only work, and study and work. The decline in only work was more intense for men, 20 p.p., than for women, 10 p.p., but this is expected since men were more likely to be initially in this situation than women.

For other age subgroups, we see a relative fall in the only work category for males but a small increase for females. For men, this change was partially compensated by a rise in the proportion of youths who only study or study and work. An increase in the relative importance of these two categories was also observed for females. An important difference

between males and females is the *nem-nem* share. Although there was a drop for females and a rise for males, the proportion of women in that status is much higher and stable than that of men across the age span. Most of this difference comes from labor force inactivity, which decreased for females but it is still high. The lower labor market attachment of females begins at early ages of youth. This can be explained by many factors, such as cultural attitudes related to the role of women in society, teenage pregnancy, and labor market discrimination. The fact that women have a much lower labor market attachment at older ages suggests that the effects of these factors are strong and long-lasting.

5 AGE-PERIOD-COHORT: MODEL SPECIFICATION AND RESULTS

5.1 Model

The age-period-cohort (APC) model is typically used in economics, demography, and other areas for analyzing time varying phenomena when longitudinal data are not available. The main purpose of the APC model is to capture the effects on an outcome of interest that stem from the aging of individuals, their birth-cohorts (generations), and the time effects. Letting A be a matrix of age dummies, C a matrix of birth-cohort dummies, and P a matrix of year dummies, the model for an outcome of interest can be written as:

$$Y = \alpha + A\beta + C\delta + P\gamma + U, \quad (1)$$

where α, β, δ, γ are parameters to be estimated and U is an error term.

The main difficulty with the APC model is how to deal with the identification problem associated with the fact that any of the variables can be written as a linear combination of the others: period = cohort + age. Deaton and Paxson (1994) proposed a method widely used in economics to circumvent this identification problem. The basic idea of the their approach is to impose a restriction that the time effect dummies are orthogonal to a time trend and sum to zero when considering the entire sample period. The method consists in normalizing the period effects, so that they capture only cyclical fluctuations, thus attributing any temporal trend to the age and cohort components. Formally, their proposal imposes the normalization

$$S'P = 0, \quad (2)$$

where S is a vector with the sequence {0,1,2,...} that is conformable to P, and the use of $T-2$ transformed period dummies, P_t^*, that are defined as:

$$P_t^* = P_t - [(t-1)\,P_2 - (t-2)\,P_1], \tag{3}$$

where P_t is the original period dummy for year. This transformation ensures that the normalization in equation (2) is respected and that the sum of all year dummies is zero. The coefficients associated with P_1 and P_2 can be recovered from equation (2) and the zero sum restriction on the year dummies.

We estimated the model separately for each of the four time use categories: *i) nem-nem*; *ii)* only study; *iii)* only work; and *iv)* study and work. The year span is from 1995 to 2015 and, dropping the first dummies for the age and cohort components (due to the presence of the intercept), the age effects are separately estimated for the ages 16 to 29 and the cohort effects for those born in each year from 1966 to 1999. All coefficients were estimated separately for males and females. We also include some socioeconomic characteristics as control variables, namely: a dummy for white color, years of schooling, *per capita* household income, and dummies for the geographic region and for whether the area of residence was rural. In addition, for women we included a dummy variable for those who have children. The estimated coefficients and their standard errors are presented in the appendix.

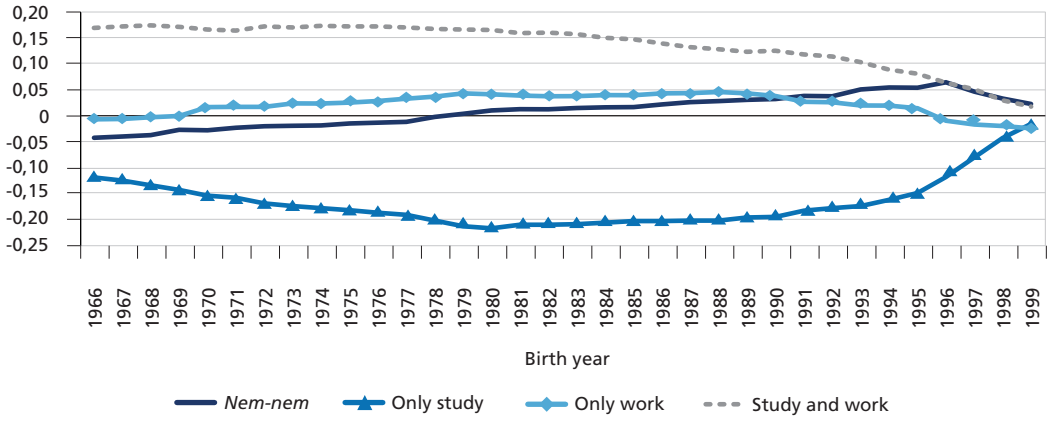
5.2 Results

5.2.1 Cohort effects

Figures 4 and 5 present the cohort effects for our four time use categories (*nem-nem*, only study, only work, and study and work) for males and females, respectively. The cohort effects for males show a steady growth in the proclivity to become *nem-nem* for cohorts born up to the mid-1990s, but this trend has reversed for more recent cohorts. Older cohorts of males were marginally less prone to be only studying but this pattern changed for the cohorts born from the beginning of the 1990s, especially the youngest cohorts. The cohort effects for the only work group display the opposite pattern from the only study group, with older cohorts presenting an increasing propensity to be only working and the younger cohorts (especially the youngest ones) a declining proclivity to be in this group. The cohort effects in the study and work category of males decline in a smooth fashion for the older cohorts but this trend is intensified for the younger

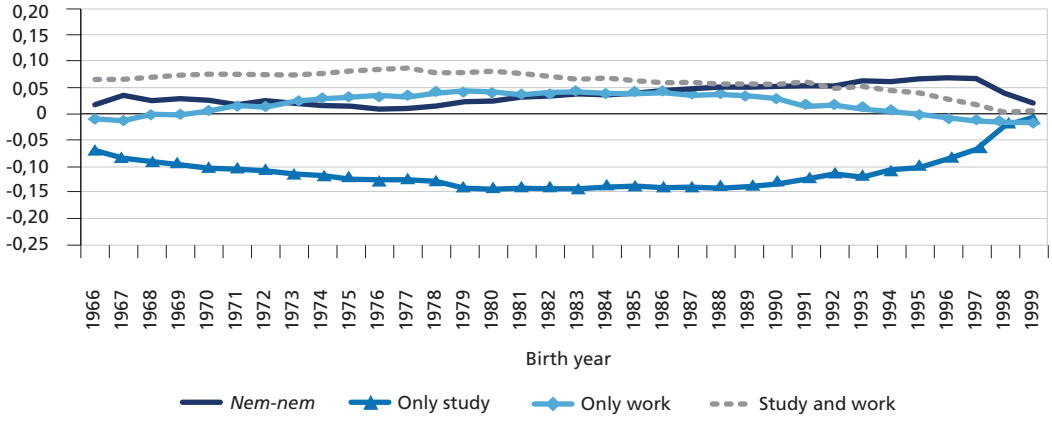
cohorts. As can be seen from figure 5, except of the propensity to be *nem-nem* for the older cohorts of females – which is slightly declining – the patterns of the cohort effects for females across all time use categories are very similar to those estimated for males.

FIGURE 4
Cohort effects across all time use groups – males



Source: PNAD/IBGE, 1995 and 2015.
Elaborated by the authors.
Obs.: All points correspond to the regression coefficients estimated from equation (1) for the *nem-nem*, only-study, only-work, and study and work groups.

FIGURE 5
Cohort effects across all time use groups – females



Source: PNAD/IBGE, 1995 and 2015.
Elaborated by the authors.
Obs.: All points correspond to the regression coefficients estimated from equation (1) for the *nem-nem*, only-study, only-work, and study and work groups.

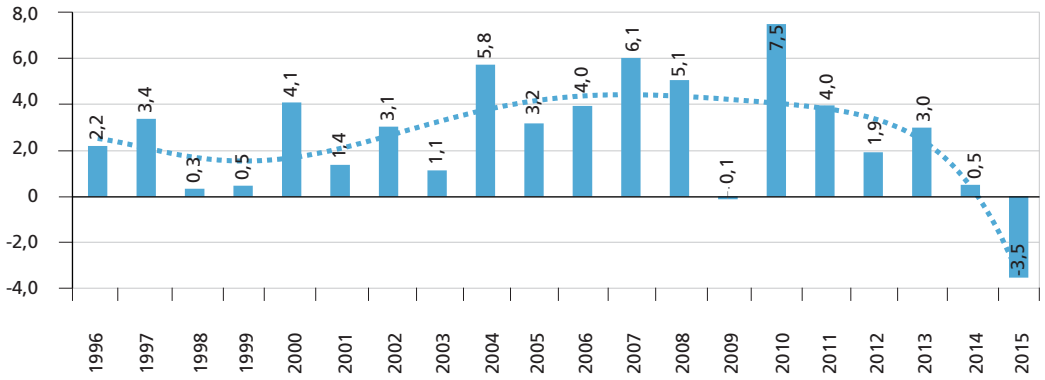
As in studies of consumption/savings (Deaton and Paxson, 1994; Deaton, 1997), earnings (Deaton, 1997; Firpo, Gonzaga and Narita, 2003), and labor force participation (Aaronson *et al.*, 2006; Aaronson *et al.*, 2014), it is also difficult to pin down the contributions of underlying factors that are behind the cohort effects in our analysis

of time use. In our setting, the patterns are affected by a variety of elements such as cultural attitudes, changes in the size and structure of the family, transformations in the structure of the labor market, trends in the quality of the school system, and the increase in the scale of the social protection system. Probably, these and other factors played some role to explain the observed changes in the patterns of the cohort effects between the older and younger cohorts. Nonetheless, regardless of the nature and importance of these factors, the movement towards investing more time at school and being less prone to be *nem-nem* for the youngest cohorts is clear-cut in our results. This seems auspicious, as the higher engagement of the recent cohorts should help increasing not only their own productivity in the future but also the productivity of the country as a whole.

5.2.2 Year effects

In the APC model here employed, the period effects only capture the cyclical movements in the response variable. Thus, if the year effects of the time use categories are responsive to variations in the performance of the economy, we can contrast them with the changes in the GDP to uncover whether they follow a pro- or anti-cyclical path. Figure 6 presents the annual GDP growth rate for our period of analysis. It shows that the Brazilian economy experienced a period of slow growth in the second half of the 1990s, which was followed by a moderate to high period of growth up to the beginning of the 2010s. From that point on, the economy started losing impetus, which culminated in a 3.5% fall in GDP in 2015.

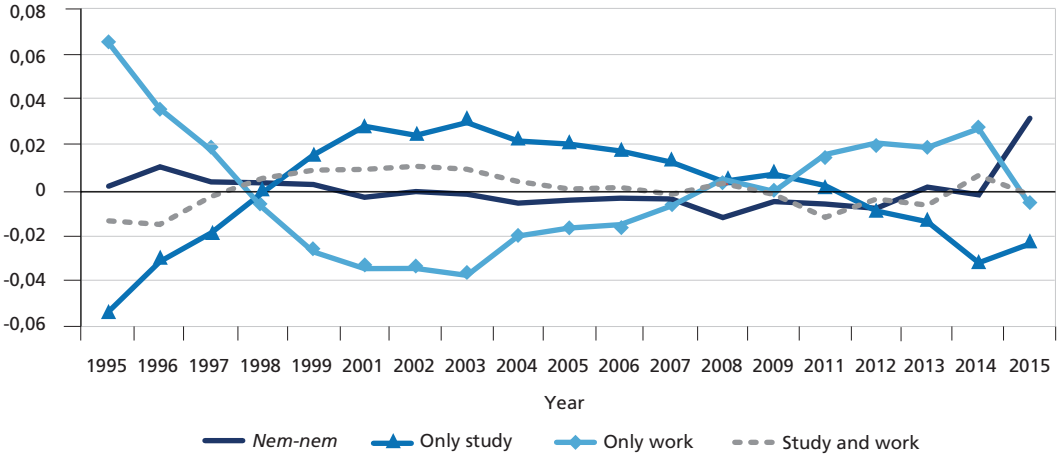
FIGURE 6
Brazilian GDP growth rates
(In %)



Source: Ipeadata.
Obs.: The dotted line represents a polynomial fit of the growth rates.

Figures 7 and 8 display the period effects across our four time-use categories for males and females, respectively. For all time use groups, the patterns for both sexes are similar over the years. As expected, the propensity to be in the only work group is pro-cyclical, *i.e.* it tends to increase when the economy expands and to decrease when the economy is stagnant. The propensity to be in the only study group, however, tends to follow an anti-cyclical movement, evincing that Brazilian youths tend to stay or go back to school when the labor market is slack and vice-versa. The tendency to be in the *nem-nem* group follows a anti-cyclical movement, indicating that youth disengagement tends to fall when the state of economy improves and to rise in worse times. Studying and working also displays an anti-cyclical pattern, though in a more attenuated way.[7]

FIGURE 7
Period effects across all time use groups – males

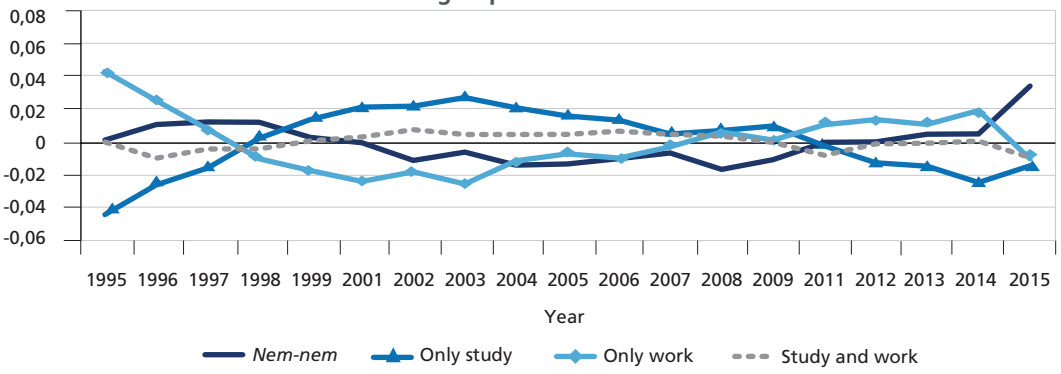


Source: PNAD/IBGE, 1995 and 2015.
Elaborated by the authors.
Obs.: All points correspond to the regression coefficients estimated from equation (1) for the nem-nem, only-study, only-work, and study and work groups.

Another point to notice is that the magnitudes of the estimated period effects for males and females are much smaller (in absolute value) than their corresponding cohort and age effects (see next subsection). This implies that time use decisions are much less influenced by the performance of the economy than by the other two components.

7. Calculating the contemporaneous correlation between the specific effects for both males and females and the GDP growth rates across different years intervals (specifically, for the 1995-2005 through the 1995-2015 intervals), the average correlations were 0,28 for the only-work group, -0,12 for the only-study group, -0,50 for the *nem-nems*, and -0,08 the study and work group.

FIGURE 8
Period effects across all time use groups – females

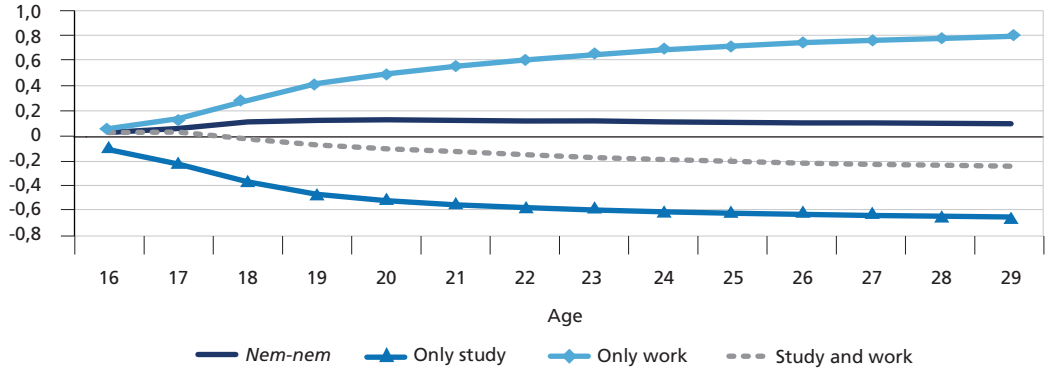


Source: PNAD/IBGE, 1995 and 2015.
Elaborated by the authors.
Obs.: All points correspond to the regression coefficients estimated from equation (1) for the *nem-nem*, only-study, only-work, and Study and Work groups.

5.2.3 Age effects

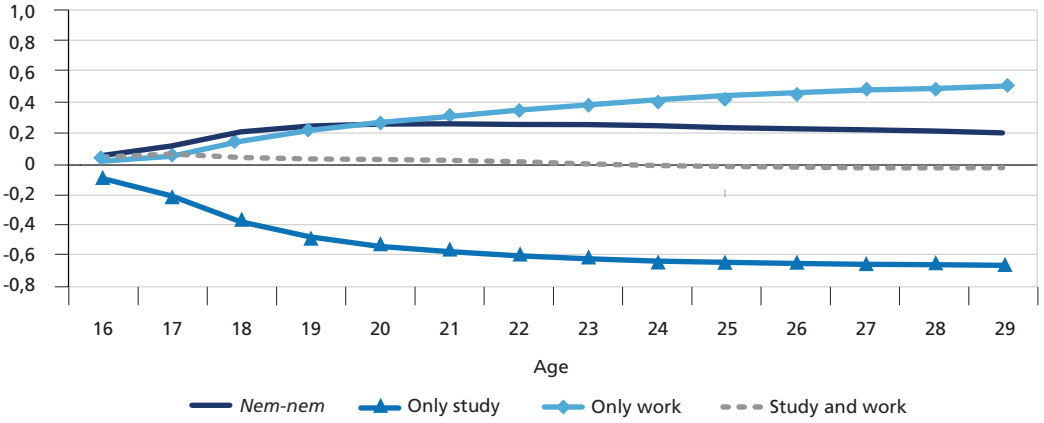
Age effects are presented in figures 9 and 10 respectively for males and females. As expected, the propensity to be only studying decreases as youths grow old, while the propensity to only work increases as they mature. Males become less prone to be in the study and work group as they age but the decision of combining the two activities is not affected by the aging of female youths. The propensity to be *nem-nem* increases for males between the ages of 15 and 20 and then starts declining smoothly from that point on. For females, this proclivity increases up to age 21 and then starts declining from that age on in a smooth fashion. Overall, these age effects are quite in line with the age profile from raw data presented in figure 3.

FIGURE 9
Age effects across all time use groups – males



Source: PNAD/IBGE, 1995 and 2015.
Elaborated by the authors.
Obs.: All points correspond to the regression coefficients estimated from equation (1) for the *nem-nem*, only-study, only-work, and study and work groups.

FIGURE 10
Age effects across all time use groups – females



Source: PNAD/IBGE, 1995 and 2015.
Elaborated by the authors.
Obs.: All points correspond to the regression coefficients estimated from equation (1) for the *nem-nem*, only-Study, only-work, and study and work groups.

The magnitudes of the estimated age effects tend to be much higher (in absolute value) than the corresponding cohort and period effects for each sex. This is particularly so for being in the only study and only work groups. This result indicates that the age component plays a prominent role in setting the patterns of the decisions between studying and working along the transition from youth to adulthood. The age effects are also more important than the other two effects to determine the probability to be in the *nem-nem* group for youths older than 20 years old. Though this is observed with lower intensity as compared to the cases of only work and only study, it indicates that the age factor has a high and stable effect on the economic disengagement of youths in Brazil.

6 MAIN FINDINGS

Understanding youths' employability and productivity is an important issue for the development strategy of all countries. It is particularly critical for developing countries like Brazil, whose current youth cohort is the largest in history, but whose demographic dividend is reaching an end. A crucial element for increasing the productivity not only of the current generation of youths but of the country as a whole is how youths are investing their time in accumulating human capital. Being engaged in study and/or work during youth forms the basis of human capital accumulation, so observing a high proportion of youths that are not engaged in neither of these activities is not a desirable outcome.

This study had two objectives. The first was to analyze the patterns of time use between work and study amongst youths in Brazil in the last two decades, with a particular focus on the group of disengaged youths, the so-called *nem-nems*. The second objective was to go deeper in this analysis to uncover the importance of a set of proximate factors behind the observed patterns of youths' time use during this period. The estimation of an age-period-cohort model for being in each of the four time-use categories (only study, only work, study and work, and *nem-nem*) allowed us to capture the role played by the aging process of youths, the contribution of their distinct birth-cohorts as well as the importance of (cyclical) time effects. All results were based on PNAD data for the period 1995-2015 and were obtained separately for males and females.

The 1995-2015 period witnessed relevant changes in the time use patterns of Brazilian youths. During this period, there was a significant increase in the percentage of youths only studying, with a concomitant decline in the share of those only working. This change was particularly pronounced for youths aged 15 to 17 years old, a group for which there is wide consensus that the main activity should be to attend school.

Another important change was the increase in the share of youths that were in the *nem-nem* group. However, this change occurred only for males, since females experienced a decline in the *nem-nem* rate. Yet, despite the drop in the proportion of female *nem-nems*, they still have much higher rates than males for all age subgroups.

The results from age-period-cohort model show that the age component plays the most prominent role in explaining the patterns of time allocation amongst the youths. The year effects indicated that the decision to only work is pro-cyclical (*i.e.*, tends to co-move with the economy), while the decisions of being *nem-nem* or only studying are anti-cyclical. The results also showed that younger cohorts have higher proclivity to study and lower propensities to work and to be in the *nem-nem* condition. While this result is auspicious for increasing the productivity of these recent cohorts, it is still early to know whether this trend will persist for future generations.

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APPENDIX

TABLE A.1
Age period and cohort effects on the probability of being *nem-nem* or only study

	Nem-nem			Only study		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Male	Female	All	Male	Female
Age						
16	0.0412***	0.0268***	0.0488***	-0.1099***	-0.1108***	-0.1004***
	(0.0016)	(0.0018)	(0.0024)	(0.0013)	(0.0018)	(0.0019)
17	0.0924***	0.0587***	0.1109***	-0.2299***	-0.2258***	-0.2144***
	(0.0016)	(0.0018)	(0.0024)	(0.0014)	(0.0018)	(0.0020)
18	0.1720***	0.1113***	0.2044***	-0.3895***	-0.3683***	-0.3830***
	(0.0016)	(0.0018)	(0.0025)	(0.0014)	(0.0019)	(0.0020)
19	0.2039***	0.1228***	0.2415***	-0.4926***	-0.4676***	-0.4817***
	(0.0016)	(0.0019)	(0.0025)	(0.0014)	(0.0019)	(0.0021)
20	0.2213***	0.1283***	0.2553***	-0.5533***	-0.5188***	-0.5442***
	(0.0017)	(0.0019)	(0.0026)	(0.0014)	(0.0019)	(0.0021)
21	0.2257***	0.1232***	0.2565***	-0.5902***	-0.5521***	-0.5777***
	(0.0017)	(0.0019)	(0.0026)	(0.0014)	(0.0019)	(0.0021)
22	0.2270***	0.1185***	0.2524***	-0.6184***	-0.5736***	-0.6061***
	(0.0017)	(0.0019)	(0.0026)	(0.0014)	(0.0019)	(0.0022)
23	0.2318***	0.1189***	0.2512***	-0.6399***	-0.5926***	-0.6246***
	(0.0017)	(0.0019)	(0.0027)	(0.0015)	(0.0020)	(0.0022)
24	0.2309***	0.1111***	0.2441***	-0.6585***	-0.6081***	-0.6413***
	(0.0017)	(0.0020)	(0.0027)	(0.0015)	(0.0020)	(0.0022)
25	0.2275***	0.1068***	0.2307***	-0.6701***	-0.6191***	-0.6493***
	(0.0017)	(0.0020)	(0.0027)	(0.0015)	(0.0020)	(0.0022)
26	0.2271***	0.1026***	0.2239***	-0.6802***	-0.6281***	-0.6561***
	(0.0018)	(0.0020)	(0.0028)	(0.0015)	(0.0020)	(0.0023)
27	0.2263***	0.1028***	0.2169***	-0.6894***	-0.6367***	-0.6620***
	(0.0018)	(0.0020)	(0.0028)	(0.0015)	(0.0021)	(0.0023)
28	0.2257***	0.1002***	0.2090***	-0.6951***	-0.6428***	-0.6642***
	(0.0018)	(0.0020)	(0.0029)	(0.0015)	(0.0021)	(0.0023)
29	0.2216***	0.0964***	0.1968***	-0.7017***	-0.6492***	-0.6680***
	(0.0018)	(0.0021)	(0.0029)	(0.0016)	(0.0021)	(0.0024)
PNAD's year						
1997	0.0075***	0.0038***	0.0122***	-0.0167***	-0.0188***	-0.0157***
	(0.0013)	(0.0014)	(0.0019)	(0.0011)	(0.0015)	(0.0016)
1998	0.0081***	0.0033**	0.0120***	0.0005	-0.0011	0.0023
	(0.0013)	(0.0014)	(0.0019)	(0.0011)	(0.0015)	(0.0016)
1999	0.0031**	0.0026*	0.0028	0.0145***	0.0156***	0.0137***
	(0.0013)	(0.0014)	(0.0019)	(0.0011)	(0.0015)	(0.0016)
2001	0.0006	-0.0030**	-0.0004	0.0244***	0.0283***	0.0212***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
2002	-0.0048***	-0.0005	-0.0112***	0.0229***	0.0243***	0.0218***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)

(Continues)

(Continuation)

	Nem-nem			Only study		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Male	Female	All	Male	Female
PNAD's year						
2003	-0.0036***	-0.0016	-0.0061***	0.0279***	0.0299***	0.0270***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
2004	-0.0089***	-0.0056***	-0.0140***	(0.0011)	(0.0014)	(0.0015)
	(0.0012)	(0.0014)	(0.0019)	0.0208***	0.0218***	0.0208***
2005	-0.0084***	-0.0043***	-0.0133***	0.0177***	0.0204***	0.0158***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0015)	(0.0015)
2006	-0.0055***	-0.0035**	-0.0101***	0.0149***	0.0174***	0.0133***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
2007	-0.0050***	-0.0038***	-0.0066***	0.0082***	0.0124***	0.0049***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
2008	-0.0145***	-0.0120***	-0.0166***	0.0050***	0.0040***	0.0070***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
2009	-0.0076***	-0.0049***	-0.0107***	0.0085***	0.0071***	0.0097***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
2011	-0.0036***	-0.0060***	-0.0002	0.0003	0.0021	-0.0023
	(0.0012)	(0.0014)	(0.0018)	(0.0010)	(0.0014)	(0.0015)
2012	-0.0037***	-0.0080***	0.0001	-0.0108***	-0.0091***	-0.0126***
	(0.0012)	(0.0014)	(0.0018)	(0.0010)	(0.0014)	(0.0015)
2013	0.0036***	0.0015	0.0047***	-0.0141***	-0.0138***	-0.0147***
	(0.0012)	(0.0014)	(0.0018)	(0.0010)	(0.0014)	(0.0015)
2014	0.0016	-0.0020	0.0049***	-0.0279***	-0.0319***	-0.0246***
	(0.0012)	(0.0014)	(0.0018)	(0.0010)	(0.0014)	(0.0015)
2015	0.0299***	0.0318***	0.0340***	-0.0183***	-0.0236***	-0.0144***
	(0.0012)	(0.0014)	(0.0019)	(0.0011)	(0.0014)	(0.0015)
Birth cohort						
1999	0.0204***	0.0226***	0.0197**	-0.0115**	-0.0159**	-0.0073
	(0.0058)	(0.0066)	(0.0089)	(0.0050)	(0.0067)	(0.0073)
1998	0.0343***	0.0331***	0.0383***	-0.0327***	-0.0429***	-0.0237***
	(0.0056)	(0.0063)	(0.0085)	(0.0048)	(0.0064)	(0.0070)
1997	0.0540***	0.0464***	0.0661***	-0.0732***	-0.0804***	-0.0684***
	(0.0054)	(0.0061)	(0.0083)	(0.0046)	(0.0062)	(0.0068)
1996	0.0626***	0.0644***	0.0676***	-0.1008***	-0.1183***	-0.0863***
	(0.0053)	(0.0060)	(0.0082)	(0.0046)	(0.0062)	(0.0067)
1995	0.0549***	0.0539***	0.0656***	-0.1245***	-0.1490***	-0.1029***
	(0.0054)	(0.0061)	(0.0083)	(0.0046)	(0.0062)	(0.0068)
1994	0.0522***	0.0543***	0.0602***	-0.1331***	-0.1625***	-0.1069***
	(0.0053)	(0.0060)	(0.0081)	(0.0045)	(0.0061)	(0.0067)
1993	0.0510***	0.0505***	0.0617***	-0.1453***	-0.1736***	-0.1209***
	(0.0053)	(0.0059)	(0.0081)	(0.0045)	(0.0061)	(0.0066)
1992	0.0403***	0.0374***	0.0520***	-0.1439***	-0.1777***	-0.1148***
	(0.0052)	(0.0059)	(0.0080)	(0.0045)	(0.0060)	(0.0066)
1991	0.0408***	0.0382***	0.0523***	-0.1515***	-0.1826***	-0.1254***
	(0.0052)	(0.0059)	(0.0080)	(0.0045)	(0.0060)	(0.0065)

(Continues)

(Continuation)

	Nem-nem			Only study		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Male	Female	All	Male	Female
Birth cohort						
1990	0.0371***	0.0322***	0.0514***	-0.1619***	-0.1951***	-0.1344***
	(0.0052)	(0.0058)	(0.0079)	(0.0044)	(0.0060)	(0.0065)
1989	0.0358***	0.0306***	0.0499***	-0.1647***	-0.1964***	-0.1392***
	(0.0052)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0065)
1988	0.0349***	0.0281***	0.0501***	-0.1686***	-0.2016***	-0.1418***
	(0.0051)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0065)
1987	0.0320***	0.0261***	0.0467***	-0.1676***	-0.2017***	-0.1398***
	(0.0051)	(0.0058)	(0.0078)	(0.0044)	(0.0059)	(0.0064)
1986	0.0282***	0.0217***	0.0436***	-0.1683***	-0.2031***	-0.1413***
	(0.0051)	(0.0058)	(0.0078)	(0.0044)	(0.0059)	(0.0064)
1985	0.0235***	0.0166***	0.0383***	-0.1663***	-0.2026***	-0.1377***
	(0.0052)	(0.0058)	(0.0079)	(0.0044)	(0.0060)	(0.0065)
1984	0.0220***	0.0162***	0.0352***	-0.1688***	-0.2056***	-0.1403***
	(0.0052)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0065)
1983	0.0222***	0.0148**	0.0371***	-0.1712***	-0.2093***	-0.1426***
	(0.0051)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0065)
1982	0.0196***	0.0124**	0.0330***	-0.1719***	-0.2102***	-0.1432***
	(0.0051)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0064)
1981	0.0196***	0.0125**	0.0309***	-0.1708***	-0.2099***	-0.1420***
	(0.0051)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0064)
1980	0.0160***	0.0101*	0.0235***	-0.1751***	-0.2166***	-0.1443***
	(0.0051)	(0.0058)	(0.0078)	(0.0044)	(0.0059)	(0.0064)
1979	0.0121**	0.0036	0.0221***	-0.1719***	-0.2130***	-0.1422***
	(0.0052)	(0.0058)	(0.0079)	(0.0044)	(0.0059)	(0.0065)
1978	0.0061	-0.0024	0.0138*	-0.1594***	-0.2015***	-0.1289***
	(0.0052)	(0.0058)	(0.0079)	(0.0044)	(0.0060)	(0.0065)
1977	-0.0008	-0.0118**	0.0094	-0.1527***	-0.1913***	-0.1263***
	(0.0052)	(0.0059)	(0.0080)	(0.0045)	(0.0060)	(0.0065)
1976	-0.0015	-0.0135**	0.0081	-0.1496***	-0.1865***	-0.1258***
	(0.0052)	(0.0059)	(0.0080)	(0.0045)	(0.0060)	(0.0066)
1975	0.0032	-0.0149**	0.0136*	-0.1463***	-0.1823***	-0.1247***
	(0.0053)	(0.0059)	(0.0081)	(0.0045)	(0.0061)	(0.0066)
1974	0.0004	-0.0188***	0.0149*	-0.1409***	-0.1782***	-0.1182***
	(0.0053)	(0.0060)	(0.0081)	(0.0046)	(0.0062)	(0.0067)
1973	0.0037	-0.0194***	0.0192**	-0.1370***	-0.1742***	-0.1148***
	(0.0054)	(0.0061)	(0.0082)	(0.0046)	(0.0062)	(0.0067)
1972	0.0079	-0.0204***	0.0241***	-0.1313***	-0.1685***	-0.1093***
	(0.0055)	(0.0062)	(0.0083)	(0.0047)	(0.0063)	(0.0068)
1971	0.0017	-0.0231***	0.0164*	-0.1239***	-0.1578***	-0.1060***
	(0.0056)	(0.0063)	(0.0085)	(0.0048)	(0.0065)	(0.0070)
1970	0.0049	-0.0281***	0.0249***	-0.1207***	-0.1545***	-0.1038***
	(0.0056)	(0.0063)	(0.0085)	(0.0048)	(0.0064)	(0.0070)
1968	0.0063	-0.0374***	0.0243***	-0.1047***	-0.1340***	-0.0913***
	(0.0060)	(0.0068)	(0.0091)	(0.0051)	(0.0070)	(0.0074)

(Continues)

(Continuation)

	Nem-nem			Only study		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Male	Female	All	Male	Female
Birth cohort						
1967	0.0093 (0.0065)	-0.0401*** (0.0074)	0.0342*** (0.0098)	-0.0969*** (0.0056)	-0.1251*** (0.0076)	-0.0852*** (0.0081)
1966	0.0039 (0.0077)	-0.0426*** (0.0089)	0.0164 (0.0115)	-0.0858*** (0.0066)	-0.1190*** (0.0091)	-0.0703*** (0.0094)
Socioeconomic characteristics						
White color	-0.0012* (0.0006)	-0.0045*** (0.0007)	-0.0021** (0.0010)	0.0175*** (0.0006)	0.0186*** (0.0008)	0.0144*** (0.0008)
Years of education	-0.0156*** (0.0001)	-0.0091*** (0.0001)	-0.0220*** (0.0002)	0.0100*** (0.0001)	0.0094*** (0.0001)	0.0046*** (0.0001)
Per capita household income	-0.0033*** (0.0000)	-0.0018*** (0.0000)	-0.0028*** (0.0000)	0.0015*** (0.0000)	0.0015*** (0.0000)	0.0013*** (0.0000)
Rural area	-0.0709*** (0.0009)	-0.0842*** (0.0010)	-0.0508*** (0.0013)	-0.0741*** (0.0007)	-0.0956*** (0.0010)	-0.0513*** (0.0011)
West central region	-0.0097*** (0.0016)	-0.0057*** (0.0018)	-0.0069*** (0.0023)	-0.0476*** (0.0013)	-0.0411*** (0.0018)	-0.0534*** (0.0019)
Northeast region	0.0018 (0.0013)	0.0166*** (0.0015)	0.0037* (0.0019)	-0.0062*** (0.0011)	-0.0014 (0.0015)	-0.0183*** (0.0016)
Southeast region	0.0003 (0.0012)	0.0178*** (0.0014)	0.0056*** (0.0019)	-0.0490*** (0.0011)	-0.0349*** (0.0015)	-0.0668*** (0.0015)
South region	-0.0298*** (0.0014)	-0.0045*** (0.0016)	-0.0380*** (0.0021)	-0.0843*** (0.0012)	-0.0711*** (0.0017)	-0.0982*** (0.0018)
Women with children			0.2057*** (0.0011)			-0.0963*** (0.0009)
Constant	0.1722*** (0.0049)	0.0985*** (0.0056)	0.2081*** (0.0076)	0.8118*** (0.0042)	0.7864*** (0.0057)	0.8915*** (0.0062)
Observations	1,798,580	893,101	905,479	1,798,580	893,101	905,479
R-squared	0.0567	0.0329	0.1472	0.3239	0.3176	0.3438

Elaborated by the authors.
Obs:. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE A.2
Age period and cohort effects on the probability of study and work or only work

	Study and work			Only work		
	(7)	(8)	(9)	(10)	(11)	(12)
	All	Male	Female	All	Male	Female
Age						
16	0.0304*** (0.0014)	0.0267*** (0.0020)	0.0392*** (0.0018)	0.0383*** (0.0018)	0.0574*** (0.0023)	0.0124*** (0.0024)
17	0.0395*** (0.0014)	0.0298*** (0.0020)	0.0593*** (0.0019)	0.0980*** (0.0018)	0.1373*** (0.0024)	0.0443*** (0.0025)
18	-0.0036*** (0.0014)	-0.0252*** (0.0021)	0.0367*** (0.0019)	0.2212*** (0.0018)	0.2822*** (0.0024)	0.1418*** (0.0025)
19	-0.0368*** (0.0014)	-0.0733*** (0.0021)	0.0268*** (0.0019)	0.3255*** (0.0018)	0.4181*** (0.0025)	0.2133*** (0.0026)
20	-0.0573*** (0.0014)	-0.1040*** (0.0021)	0.0238*** (0.0020)	0.3893*** (0.0019)	0.4945*** (0.0025)	0.2652*** (0.0026)
21	-0.0740*** (0.0015)	-0.1257*** (0.0021)	0.0181*** (0.0020)	0.4385*** (0.0019)	0.5546*** (0.0025)	0.3031*** (0.0027)
22	-0.0941*** (0.0015)	-0.1508*** (0.0022)	0.0089*** (0.0020)	0.4855*** (0.0019)	0.6059*** (0.0025)	0.3448*** (0.0027)
23	-0.1154*** (0.0015)	-0.1740*** (0.0022)	-0.0057*** (0.0020)	0.5234*** (0.0019)	0.6478*** (0.0026)	0.3791*** (0.0028)
24	-0.1311*** (0.0015)	-0.1900*** (0.0022)	-0.0161*** (0.0021)	0.5586*** (0.0019)	0.6870*** (0.0026)	0.4133*** (0.0028)
25	-0.1436*** (0.0015)	-0.2044*** (0.0022)	-0.0227*** (0.0021)	0.5863*** (0.0019)	0.7166*** (0.0026)	0.4412*** (0.0028)
26	-0.1548*** (0.0015)	-0.2190*** (0.0023)	-0.0263*** (0.0021)	0.6079*** (0.0020)	0.7446*** (0.0026)	0.4585*** (0.0029)
27	-0.1640*** (0.0015)	-0.2288*** (0.0023)	-0.0318*** (0.0022)	0.6271*** (0.0020)	0.7627*** (0.0027)	0.4769*** (0.0029)
28	-0.1688*** (0.0016)	-0.2353*** (0.0023)	-0.0317*** (0.0022)	0.6382*** (0.0020)	0.7778*** (0.0027)	0.4869*** (0.0029)
29	-0.1733*** (0.0016)	-0.2425*** (0.0024)	-0.0308*** (0.0022)	0.6534*** (0.0021)	0.7953*** (0.0028)	0.5020*** (0.0030)
PNAD's year						
1997	-0.0034*** (0.0011)	-0.0027* (0.0016)	-0.0042*** (0.0015)	0.0126*** (0.0014)	0.0178*** (0.0019)	0.0078*** (0.0020)
1998	0.0003 (0.0011)	0.0053*** (0.0016)	-0.0041*** (0.0015)	-0.0090*** (0.0014)	-0.0075*** (0.0019)	-0.0102*** (0.0020)
1999	0.0046*** (0.0011)	0.0090*** (0.0016)	0.0007 (0.0015)	-0.0222*** (0.0014)	-0.0271*** (0.0019)	-0.0173*** (0.0020)
2001	0.0053*** (0.0011)	0.0093*** (0.0016)	0.0031** (0.0014)	-0.0303*** (0.0014)	-0.0345*** (0.0019)	-0.0239*** (0.0019)
2002	0.0087*** (0.0011)	0.0106*** (0.0016)	0.0075*** (0.0014)	-0.0268*** (0.0014)	-0.0344*** (0.0019)	-0.0181*** (0.0019)
2003	0.0068*** (0.0011)	0.0093*** (0.0016)	0.0046*** (0.0014)	-0.0312*** (0.0014)	-0.0375*** (0.0019)	-0.0255*** (0.0019)

(Continues)

(Continuation)

	Study and work			Only work		
	(7)	(8)	(9)	(10)	(11)	(12)
	All	Male	Female	All	Male	Female
PNAD's year						
2004	0.0040***	0.0039**	0.0046***	-0.0159***	-0.0201***	-0.0114***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0019)	(0.0019)
2006	0.0034***	0.0013	0.0066***	-0.0128***	-0.0151***	-0.0098***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0019)	(0.0019)
2007	0.0015	-0.0017	0.0047***	-0.0047***	-0.0068***	-0.0029
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0019)	(0.0019)
2008	0.0034***	0.0031*	0.0035**	0.0061***	0.0049***	0.0061***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0018)	(0.0019)
2009	-0.0010	-0.0018	-0.0002	0.0001	-0.0005	0.0012
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0018)	(0.0019)
2011	-0.0098***	-0.0119***	-0.0080***	0.0131***	0.0158***	0.0105***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0018)	(0.0019)
2012	-0.0026**	-0.0039**	-0.0011	0.0171***	0.0209***	0.0136***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0018)	(0.0019)
2013	-0.0036***	-0.0065***	-0.0008	0.0141***	0.0189***	0.0107***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0018)	(0.0019)
2014	0.0037***	0.0066***	0.0006	0.0226***	0.0272***	0.0191***
	(0.0010)	(0.0015)	(0.0014)	(0.0013)	(0.0018)	(0.0019)
2015	-0.0049***	-0.0019	-0.0094***	-0.0067***	-0.0064***	-0.0102***
	(0.0011)	(0.0016)	(0.0014)	(0.0014)	(0.0018)	(0.0019)
Birth cohort						
1999	0.0111**	0.0175**	0.0049	-0.0201***	-0.0243***	-0.0174*
	(0.0051)	(0.0074)	(0.0068)	(0.0065)	(0.0087)	(0.0092)
1998	0.0157***	0.0296***	0.0022	-0.0173***	-0.0199**	-0.0168*
	(0.0049)	(0.0071)	(0.0065)	(0.0062)	(0.0083)	(0.0088)
1997	0.0332***	0.0509***	0.0166***	-0.0140**	-0.0169**	-0.0143*
	(0.0047)	(0.0069)	(0.0064)	(0.0061)	(0.0081)	(0.0086)
1996	0.0458***	0.0635***	0.0271***	-0.0076	-0.0096	-0.0083
	(0.0047)	(0.0068)	(0.0063)	(0.0060)	(0.0080)	(0.0084)
1995	0.0608***	0.0808***	0.0388***	0.0087	0.0143*	-0.0015
	(0.0047)	(0.0069)	(0.0063)	(0.0061)	(0.0080)	(0.0085)
1994	0.0673***	0.0887***	0.0434***	0.0137**	0.0195**	0.0033
	(0.0046)	(0.0068)	(0.0062)	(0.0060)	(0.0079)	(0.0084)
1993	0.0786***	0.1034***	0.0511***	0.0157***	0.0197**	0.0081
	(0.0046)	(0.0067)	(0.0062)	(0.0059)	(0.0078)	(0.0083)
1992	0.0821***	0.1145***	0.0473***	0.0215***	0.0258***	0.0156*
	(0.0046)	(0.0067)	(0.0061)	(0.0059)	(0.0078)	(0.0083)
1991	0.0901***	0.1176***	0.0600***	0.0206***	0.0268***	0.0131
	(0.0046)	(0.0067)	(0.0061)	(0.0059)	(0.0078)	(0.0082)
1990	0.0914***	0.1250***	0.0551***	0.0335***	0.0379***	0.0279***
	(0.0045)	(0.0066)	(0.0061)	(0.0058)	(0.0077)	(0.0082)
1989	0.0905***	0.1228***	0.0560***	0.0383***	0.0430***	0.0332***
	(0.0045)	(0.0066)	(0.0061)	(0.0058)	(0.0077)	(0.0081)

(Continues)

(Continuation)

	Study and work			Only work		
	(7)	(8)	(9)	(10)	(11)	(12)
	All	Male	Female	All	Male	Female
Birth cohort						
1988	0.0932*** (0.0045)	0.1278*** (0.0066)	0.0556*** (0.0060)	0.0406*** (0.0058)	0.0457*** (0.0077)	0.0360*** (0.0081)
1987	0.0968*** (0.0045)	0.1322*** (0.0065)	0.0589*** (0.0060)	0.0388*** (0.0058)	0.0434*** (0.0076)	0.0343*** (0.0081)
1986	0.1001*** (0.0045)	0.1385*** (0.0065)	0.0583*** (0.0060)	0.0401*** (0.0057)	0.0429*** (0.0076)	0.0393*** (0.0081)
1985	0.1060*** (0.0045)	0.1465*** (0.0066)	0.0623*** (0.0061)	0.0367*** (0.0058)	0.0394*** (0.0077)	0.0372*** (0.0082)
1984	0.1099*** (0.0045)	0.1498*** (0.0066)	0.0671*** (0.0061)	0.0369*** (0.0058)	0.0396*** (0.0077)	0.0380*** (0.0081)
1983	0.1125*** (0.0045)	0.1568*** (0.0066)	0.0646*** (0.0060)	0.0366*** (0.0058)	0.0376*** (0.0077)	0.0408*** (0.0081)
1982	0.1169*** (0.0045)	0.1603*** (0.0066)	0.0703*** (0.0060)	0.0354*** (0.0058)	0.0375*** (0.0077)	0.0399*** (0.0081)
1981	0.1185*** (0.0045)	0.1586*** (0.0066)	0.0758*** (0.0060)	0.0328*** (0.0058)	0.0388*** (0.0077)	0.0353*** (0.0081)
1980	0.1240*** (0.0045)	0.1652*** (0.0065)	0.0800*** (0.0060)	0.0352*** (0.0057)	0.0413*** (0.0076)	0.0407*** (0.0081)
1979	0.1230*** (0.0045)	0.1664*** (0.0066)	0.0774*** (0.0061)	0.0368*** (0.0058)	0.0430*** (0.0077)	0.0427*** (0.0081)
1978	0.1232*** (0.0045)	0.1672*** (0.0066)	0.0770*** (0.0061)	0.0302*** (0.0058)	0.0367*** (0.0077)	0.0382*** (0.0082)
1977	0.1292*** (0.0046)	0.1703*** (0.0067)	0.0861*** (0.0061)	0.0243*** (0.0059)	0.0328*** (0.0078)	0.0309*** (0.0082)
1976	0.1285*** (0.0046)	0.1718*** (0.0067)	0.0834*** (0.0061)	0.0226*** (0.0059)	0.0283*** (0.0078)	0.0343*** (0.0083)
1975	0.1268*** (0.0046)	0.1718*** (0.0068)	0.0804*** (0.0062)	0.0162*** (0.0059)	0.0253*** (0.0079)	0.0306*** (0.0083)
1974	0.1252*** (0.0047)	0.1734*** (0.0068)	0.0757*** (0.0062)	0.0153** (0.0060)	0.0235*** (0.0080)	0.0277*** (0.0084)
1973	0.1220*** (0.0047)	0.1699*** (0.0069)	0.0729*** (0.0063)	0.0113* (0.0061)	0.0237*** (0.0081)	0.0226*** (0.0085)
1972	0.1230*** (0.0048)	0.1720*** (0.0070)	0.0735*** (0.0064)	0.0003 (0.0061)	0.0170** (0.0082)	0.0117 (0.0086)
1971	0.1193*** (0.0049)	0.1637*** (0.0072)	0.0742*** (0.0065)	0.0029 (0.0063)	0.0171** (0.0084)	0.0153* (0.0088)
1970	0.1209*** (0.0049)	0.1660*** (0.0071)	0.0745*** (0.0065)	-0.0051 (0.0063)	0.0165** (0.0083)	0.0044 (0.0087)
1969	0.1217*** (0.0050)	0.1709*** (0.0074)	0.0725*** (0.0067)	-0.0159** (0.0065)	-0.0005 (0.0086)	-0.0028 (0.0090)
1968	0.1211*** (0.0052)	0.1744*** (0.0077)	0.0686*** (0.0070)	-0.0227*** (0.0067)	-0.0030 (0.0090)	-0.0016 (0.0094)
1967	0.1178*** (0.0057)	0.1716*** (0.0084)	0.0648*** (0.0075)	-0.0301*** (0.0073)	-0.0064 (0.0099)	-0.0138 (0.0101)

(Continues)

(Continuation)

	Study and work			Only work		
	(7)	(8)	(9)	(10)	(11)	(12)
	All	Male	Female	All	Male	Female
Birth cohort						
1966	0.1167*** (0.0067)	0.1686*** (0.0101)	0.0644*** (0.0088)	-0.0348*** (0.0087)	-0.0071 (0.0118)	-0.0105 (0.0119)
Socioeconomic characteristics						
White color	0.0032*** (0.0006)	0.0025*** (0.0008)	0.0043*** (0.0007)	-0.0195*** (0.0007)	-0.0166*** (0.0010)	-0.0166*** (0.0010)
Years of education	0.0124*** (0.0001)	0.0141*** (0.0001)	0.0086*** (0.0001)	-0.0068*** (0.0001)	-0.0145*** (0.0001)	0.0088*** (0.0002)
Per capita household income	0.0012*** (0.0000)	0.0012*** (0.0000)	0.0006*** (0.0000)	0.0006*** (0.0000)	-0.0008*** (0.0000)	0.0008*** (0.0000)
Rural area	0.0437*** (0.0008)	0.0671*** (0.0011)	0.0166*** (0.0010)	0.1013*** (0.0010)	0.1127*** (0.0013)	0.0855*** (0.0014)
West central region	0.0005 (0.0014)	-0.0075*** (0.0020)	0.0070*** (0.0018)	0.0567*** (0.0018)	0.0543*** (0.0024)	0.0533*** (0.0024)
Northeast region	0.0023** (0.0011)	0.0051*** (0.0017)	-0.0068*** (0.0015)	0.0021 (0.0014)	-0.0203*** (0.0019)	0.0214*** (0.0020)
Southeast region	-0.0218*** (0.0011)	-0.0310*** (0.0016)	-0.0208*** (0.0014)	0.0704*** (0.0014)	0.0480*** (0.0019)	0.0820*** (0.0019)
South region	0.0060*** (0.0012)	-0.0095*** (0.0019)	0.0158*** (0.0016)	0.1081*** (0.0016)	0.0851*** (0.0022)	0.1204*** (0.0022)
Women with children			-0.0939*** (0.0009)			-0.0154*** (0.0012)
Constant	0.0067 (0.0043)	0.0234*** (0.0063)	0.0179*** (0.0058)	0.0093* (0.0056)	0.0917*** (0.0074)	-0.1176*** (0.0078)
Observations	1,798,580	893,101	905,479	1,798,580	893,101	905,479
R-squared	0.0450	0.0622	0.0489	0.2075	0.2984	0.1605

Elaborated by the authors.
Obs.: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Ipea – Institute for Applied Economic Research

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Supervision
Carlos Henrique Santos Vianna

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The manuscripts in languages other than Portuguese published herein have not been proofread.

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SBS – Quadra 1 – Bloco J – Ed. BNDES, Térreo
70076-900 – Brasília – DF – Brazil
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Composed in Adobe Garamond Pro 12/16 (text)
Frutiger 67 bold condensed (headings, graphs and tables)
Rio de Janeiro-RJ

Logotipo/slogan de governo removido em observancia ao disposto no art. 40 da Lei n 9.504/1997

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MINISTRY OF ECONOMY

ISSN 1415-4765