A NEETs analysis in Brazil between 2012 and 2020

INTRODUCTION

In recent years, Brazilian social indicators, especially related to the labour market, were deemed unsatisfactory. Unfortunately, the Covid-19 pandemic worsened an already perilous situation, as several workers faced unemployment, wage reductions or haven't had an option but to work in a precarious situation, given that a large share of the Brazilian labour market is composed of workers employed in the informal economy. In this sense, the Covid-19 pandemic drastically affected and thus highlighted the country's long faced inequality and poverty rates.

This scenario places the youth, particularly, in a highly vulnerable position. Thus, and in accordance with FGV Social (2019), youngsters were the share of the total population that was most affected by the Brazilian economic crisis and by the decrease in the labour income since 2014. In the same line, the 2019 ILO Report has shown that youngsters have higher chances of being unemployed than adults, with three times increase in the odds of being in this position. Moreover, and thus aggravating this circumstance, an enormous share of the youth in school age (high school or university) are not studying. The intersection of those issues led to a series of academic studies focusing on youths that are neither in school, nor in the labour market, known as NEET's youth (CAMARANO, KANSO, 2012). According to the 2020 ILO Report, "Global Employment Trends for Youth 2020", among youngsters aged between 15 and 24 years old, one in four individuals are classified as a NEET in thirteen countries in Latin America and the Caribbean, including Brazil. This ratio is even worse for those aged between 18 and 24 years old, given that one in three youngsters are in the NEET position. This is an issue of considerable importance, given that those who are neither in school, nor in the labour market are not contributing to human capital formation, hence affecting productivity. Worse still, the increase in the proportion of NEETs might also cause problems in the short run, considering that it may raise violence and criminality (DE HOYOS, GUTIÉRREZ, VARGAS, 2015). Thus, this issue may impede to fully exploit the "demographic window of opportunities". In addition, the phenomena may cause intergenerational poverty transmission, ultimately leading to the perpetuation of inequality, both also determinants factors of the importance to understand the NEETs youth.

Moreover, it seems very pertinent to analyse these issues beyond the simplistic range of average results, as Brazil is an extremely heterogeneous country, which is exemplified by social groups discrepancies related to colour and gender, and thus regions. Supporting this view, and according to the PNUD Report (2017), the Municipal Human Development Index and its dimensions, education and income, presents meaningful disparities for different social groups. Concerning the Ninis, the 2012 Understanding Children's Work (UCW) Programme Report suggests that, for example, that women present a different probability of being a NEET than men. Furthermore, in the specific analysis of NEETs, it is also important to ponder the position that one holds in the household, once the behaviour can be quite different whether the youngster is the head/partner of the household or if it is an adult son/daughter. Accordingly, this difference leads to distinct results in the probabilities of becoming a NEET. In this line, according to Torre and Baquerin (2017), within the NEETs, the great majority were housewives.

Hence, this paper aims, mostly, to comprehend the NEETs' phenomenon for males and females in the position of head/partner of the household or in the position of adult son/daughter in Brazil and its macro-regions between 2012 and 2020, using the Continuous PNAD. The main contribution of this paper relates to the choice of method. We have displayed that since studying and working (or seeking for employment) are close substitutes for youngsters, the multinomial logistic regression is not the most appropriate model, albeit being the most used method in the literature for this topic. Thereby, the Hausman and McFadden (1984) test for the

condition of “independence of irrelevant alternatives” was taken into consideration and results have shown that, indeed, in the NEETs analysis is more pertinent to employ the bivariate probit model. In the light of those results, an analysis of the individual, domiciliary and macroeconomic factors for NEETs in the position of head/partner of the household and in the condition of adult son/daughter were taken into consideration when applying the bivariate probit, as opposed to the commonly used multinomial logistic regression.

2. NEETs: THEORETICAL AND EMPIRICAL ASPECTS

2.1 - Theoretical aspects about the Ninis youth

There is a growing literature referencing youth that are neither in school, nor in the labour market, given that it represents youth vulnerability, in terms of unemployment, school dropout and disincentive to enter the labour market. Moreover, the United Nations (UN) prompted an agenda for Sustainable Development Goals, in order to achieve a better and more sustainable future for the society, by 2030. According to the Sustainable Development Goals Report (United Nations, 2018), the path leading to sustainable development demands quality education for all children and youth. Accordingly, investment in educational scholarships, school infrastructure and equity are crucial to promote and achieve this goal.

Thus, providing more employment opportunities for the youth, healthier working environment and a decrease in informal employment also constitute one of the development goals - i.e., search for decent work and economic growth. In addition, reducing inequality is also a development goal, given that marginalized population should be included in society and should be assisted. Hence, countries are increasingly concerned by this youth phenomenon and its consequences.

In the international literature, the youth that are neither in school, nor in the labour market are known as “Neet”. In consonance with the International Labour Organization (ILO), the neet rate is “the percentage of the population of a given age group and sex who is not employed and not involved in further education or training” (ILO, 2015). Many studies have tried to understand the vulnerability of the youth both in the labour market and in school ever since.

In Brazil, the youth issue became important in the 1970s, mostly due to the beginning of the demographic transition and the so-called “young wave” (CAMARANO, 2006). As a result, in 2000 there were 47 million youth between 15 and 29 years old in the country and 51.1 million in 2006, representing 27.4% of the population. Besides, the youth population growth also led to a substantial increase in the economically active population. Along with this fact, poverty, low schooling levels and lacking opportunities enhanced the importance of debating the young population situation. For this reason, since 2005, with the implementation of the National Youth Policy (PNJ), public policies started to incorporate many issues, such as education, work, safety, sports, culture, health, human rights and others (ROCHA, DE MACEDO, 2016), demonstrating the importance of this society group.

In order to understand youth time allocation, Behrman et al (2014) developed a model, describing why constraints faced by youths may shape not only their own decision on the human capital accumulation process, but also their families’ decision. To this extent, the youngsters allocate their time amongst four mutually excluding choices: studying, working, studying and working or neither studying, nor working, accompanied by a utility-maximization process. The youth elects between the four allocating choices, bearing in mind the imposed local, micro and macro constraints. Furthermore, a series of immutable endowments, such as socioeconomic aspects, individual, familiar, demographic and cultural factors, will also affect their choice. It is crucial to emphasize that their present decision will also influence future consumption, ascribed to human capital accumulation. Ipso facto, when youth “elect” to be out of the labour market and out of school, the process of human accumulation is ceased.

In order to fully understand the concept of Ninis youth and the life cycle, it is important to also understand concepts of human development, quality of life and wellbeing. To this extent, Amartya Sen's (1992) and Martha Nussbaum's (2011) concepts will be used.

According to Amartya Sen (1992), it is important to define capabilities and functionings. Firstly, functionings can be conceptualized as the accomplishments of an individual. These accomplishments are attributed from happiness to basic needs, like feeding. Following Sen's definition, capability is an aggregation of functionings that reverberate on a person's freedom of making life choices (Sen, 1992). Therefore, furthering the concept of "utility", this approach explains welfare. Both authors believe that capabilities are related to the choice of freedom of an individual and, subsequently, that poverty limits such freedom.

The diversity of capabilities emphasizes that the most important elements in individuals quality of life are plural and qualitatively distinct. Aspects of an individual's life cannot be reduced to a single metric unit without distorting reality (Nussbaum, 2011). Therefore, approaching the youth reality with a multidimensional dynamic seems of utmost importance. In the case of youngsters, especially those that are not studying, nor in the labour market (also not seeking an employment), it is feasible to understand the importance of dimensions such as education, health and employment and how it affects their choice of freedom and opportunities in their life cycle.

Education influences the possibility of an increase in quality of life and in the opportunities of an individual. According to Sen (2010), the lack of access to education constitutes a barrier in engaging into economic activities. Following the same line, Nussbaum (2011) points out that education assists in accomplishing a number of basic functionings in the society, as it increases the capacity of imagining and thinking of a human being. Furthermore, education increases the power of choices of an individual and its possibilities of having a better position in the job market.

Complementing education, health is also to be considered, as it is vital for youngsters to have good physic and psychic conditions in order to develop capabilities and have the freedom to develop different functionings, as described by Nussbaum's basic capability approach, including reproduction. Hence, this dimension is crucial to determine a person's ability of developing other capabilities and it is a solid foundation for expanding into other freedoms.

Working can be associated with the central capability of Nussbaum (2011), control over one's environment and it is defined by the capability of an individual in competing for a position in the workplace with equality. Thus, the work situation can be correlated with income, given that the access that an individual has to a basket of goods is related to monetary earnings and are mostly enabled by the labour income. In that sense, not getting a job corresponds to less freedom to function wellbeing. Following the same line, the same happens when prematurely entering the job market - worst still in a double journey -, as it results in abdicating studying and leading to less freedom to function wellbeing. Furthermore, working influences other capabilities and different functioning developments, whilst also being present in almost every life cycle.

2.2 Empirical Literature

The empirical and theoretical literature highlight the fundamental importance of considering individual, household and macroeconomic aspects as determinant factors of a youngster becoming a Nini (not in school and not working), as well as enlightening the phenomena.

Bacher et al (2014) developed a multi-method approach to understand the NEET's phenomenon in Austria between 2006 and 2011. The results indicated that early school leaving was a major factor imparting the NEET risk. Much in accordance, Ranzani and Rosati (2013) and Siraj et al (2014) also highlighted this importance.

In the same line, Varshavskaia (2017) and Quintini, Martin, and Martin (2007) called attention to low school attainment and its correlation with the NEET phenomena in other parts of the world. Thus, Camarano (2006) has shown that education has an impact in decreasing the probability of a youth becoming a Nini in Brazil. In addition, Menezes-Filho, Cabanas e Komatsu (2013) foregrounded that brazilian youngsters that haven't completed high school have a higher probability of becoming a Nini and a higher probability of being in this position for a greater length of time, when compared to youngsters with a higher educational level.

Siraj et al (2014), Bacher et al (2014), Russel et al (2011) have disclosed a correlation between the probability of becoming a NEET with social class. As an example, Siraj et al (2014) have found that parental unemployment and lower parental qualification increases the chances of entering this group. In agreement, Torre and Baquerin (2017) found that the probability of becoming an argentinian NEET is positively related to those households that presented social and economic vulnerability, hence, those youths living in unsettled environments, as such environments don't encourage the youths to develop their skills.

It is interesting to observe how the results differ upon gender when analysing the NEETs. Ranzani and Rosati (2013) have studied the NEETs in Mexico and the results have shown higher rates amongst women and correspondingly, women with low education and poor background present the highest rate within the NEET group. Following the same line, Camarano (2006) have shown that there is a different trend for the female and male youth. Finally, Torre and Baquerin (2017) have concluded that, in Argentina, being a male and having a higher educational level decreases the chances of becoming a NEET.

The literature has disclosed the importance of considering income levels when analysing youngsters that are neither studying, nor working. In this view, Vieira et al (2016) used the PNAD data between 1992 and 2013 to estimate how different incomes and parents' employment affects the Brazilian youths' decision between work and studying. The outcome indicates that an increase in the mother's income has a higher effect on the proportion of youngsters in school when compared to an increase in the father's income. Also, when both parents are in the labour market, the probability of the youth becoming a Nini decreases. In agreement, Cabanas, Komatsu e Menezes-Filho (2015), Ranzani and Rosati (2013) and Camarano (2006) have found similar results for the significance of household income in the probability of becoming a NEET.

One important aspect that many authors have tried to understand is how long youngsters remain on the NEET or the Nini position. In that sense, Menezes-Filho, Cabanas e Komatsu (2013) used transition matrices to emphasize the length of time in which youngsters remained a Nini. The research suggests that the average time of being a Nini is relatively short, given that after a year the proportion of Ninis' youth in Brazil that remained in this same position is smaller, compared to the ones who are working or studying or working and studying. Conversely, Ranzani and Rosati (2013) have demonstrated, using transition matrices and duration analysis, that being a NEET in Mexico is a trapped condition for the youth. Furthermore, being a NEET in the present time in Mexico increases the probability of pertaining to this very same group in the future.

Lastly, within the NEET scenario, structural aspects such as environment and age are significant to be considered, as each will affect youngsters differently. As an example, Ranzani and Rosati (2013) have shown that the NEET rate is higher in rural areas in Mexico. Furthermore, Varshavskaia (2017) demonstrated that the NEET rate differs between age groups in Russia, increasing significantly between youngsters aged between 20 and 24 years old.

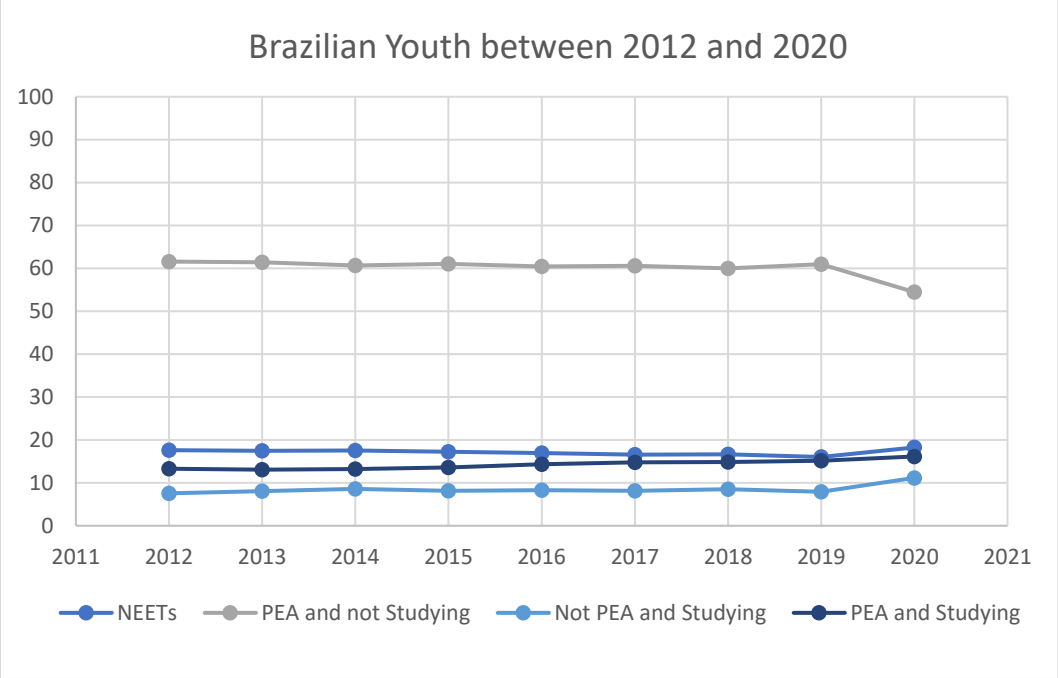
DESCRIPTIVE ANALYSIS AND METHODS

The Continuous PNAD will be applied for the period between 2012 and 2020 and constituted by youth, aged between 18 and 29 years old. This survey, carried by IBGE (Brazilian Institute of Geography and Statistics), provides continuous information concerning demographic and educational features along with labour market

information. Furthermore, according to IBGE, the survey frequency is monthly and quarterly for workforce indicators; annual for the remaining survey topics and complementary workforce indicators; and variable for other topics included in the research. Thus, geographically it covers Brazil and its macro-regions, federal units and metropolitan areas.

Firstly, a descriptive analysis of the Brazilian youth will be taken into consideration. Thus, graph 1 shows the percentage of youngsters that pertain to the economically active population or are inactive, that are going to school or not in Brazil between 2012 and 2020, using the Continuous PNAD. As shown, throughout the years, a substantial proportion of the youngsters, around 60%, pertain to the economically active population (PEA, in the graph). It is noticeable that there is an ongoing problem with the youth that do not work (and do not seek employment) and do not study at the same time. For the analysed period of time, the percentage of the youth known as NEETs, remained around 17%. In addition, it is perceptible that, as an immediate result of the Covid-19 Pandemic, there was not only a decrease in the proportion of youngsters that were working (or seeking employment) and studying, but also an increase amongst the share of NEETs (an increase of 2% between 2019 and 2020).

Graph 1: Brazilian Youth between 2012 and 2020



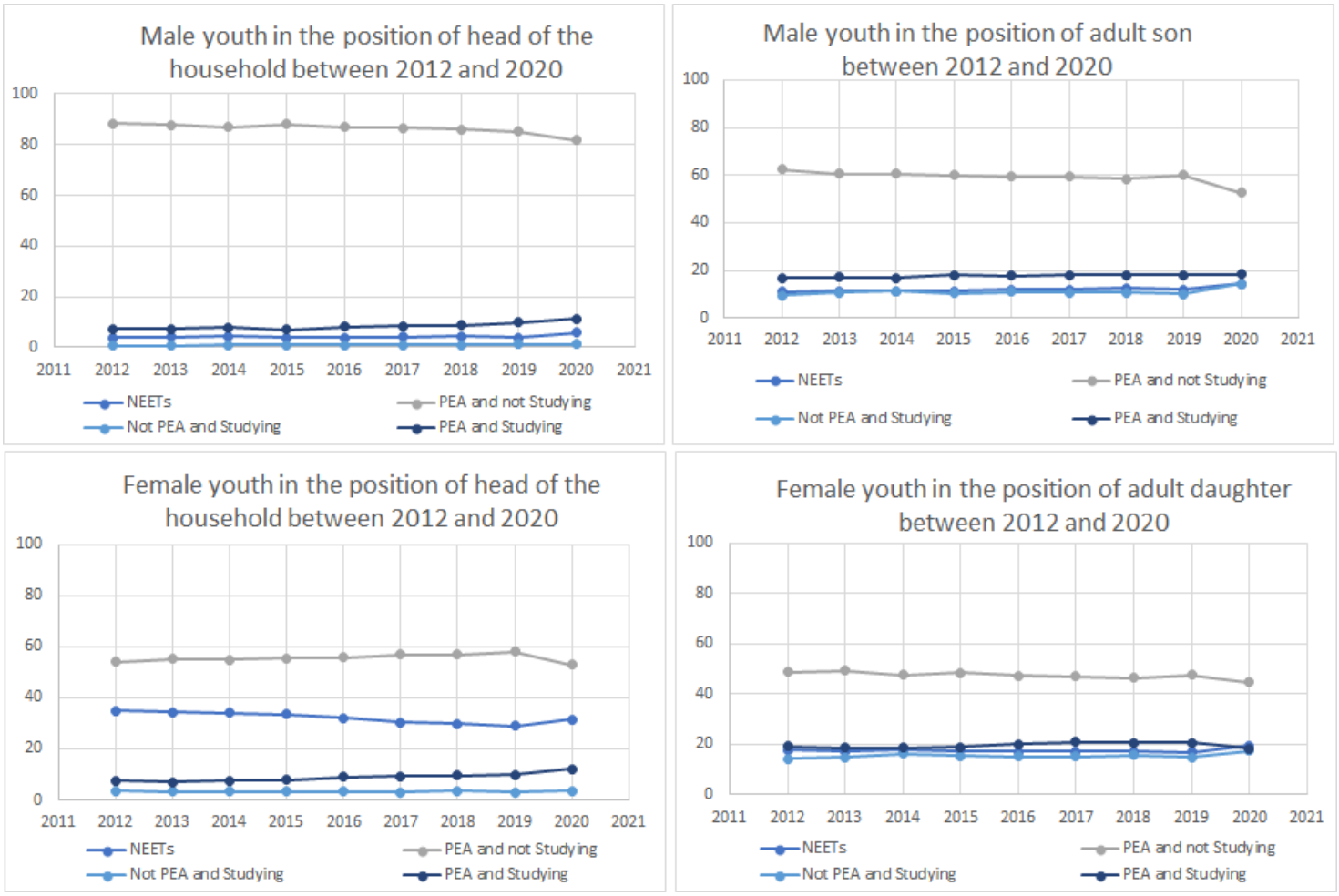
Source: Own elaboration based on the Continuous PNAD

As the main goal of this paper is to show that the decision of time allocation of youngsters between studying and working (or seeking for employment) changes according to the position that one has in the household, the following figure presents the Brazilian youth according to its position in the household. It is perceptible that, approximately, 85% of male youth in the position of head/partner of the household were working (or seeking for employment). In comparison, around 60% of the female youth in the position of head/partner of the household were working (or seeking employment).

It is important to highlight that over the studied period, the percentage of Ninis has grown between 2019 and 2020, independently of the position in the household, and in consonance with the Covid-19 pandemic crisis. Furthermore, it is noticeable the substantial difference between male and female youngsters and thus, within groups (position in the household). The highest rates of Ninis pertain to female youth in the position of

head/partner of the household, followed by adult daughters. In this sense, female youth tend to be more vulnerable than male youngsters.

Figure 1: Brazilian youth according to position in the household



Source: Own elaboration based on the Continuous PNAD

METHODS

In this section we have taken into consideration two models amongst those for discrete choice, that is, the multinomial logit model (widely used in the literature) and the bivariate probit, in order to see which one is a better fit for the comprehension of how youth (given their position in the household) allocate their time in Brazil, especially those known as NEETs. In this manner, firstly, we will present the multinomial logistic regression, its limitations and results of this method for youngsters. Afterwards, the bivariate probit model will be taken into account.

MULTINOMIAL LOGIT MODEL

In accordance with Greene (2010) and Cameron e Trivedi (2005) the Multinomial Logit Model takes part in a variety of models known as qualitative response models, in which the dependent variable represents a discrete choice. As an example, the decision of a youngster on whether deciding to work (or seek employment) or whether not is a qualitative decision, which in order to be modelled should be transformed into a binary code. In this sense, multinomial models are an extension of models for binary choice, considering that these models are used when there are several possible outcomes. The general approach, in consonance with Greene (2010) is:

$$Prob(event\ j\ occurs) = Prob(Y = j) = F[relevant\ effects, parameters]$$

Accordingly, given that youth time allocation is represented by more than two outcomes, a multinomial logit model, based on Wooldridge (2007), Heij et al (2004) and Greene (2010), could be employed. For the purpose of this paper, time allocation of the youth is represented by a categorical variable (j). Within this variable, youth can choose amongst four options (j) that have no natural ordering and are mutually exclusive:

1) Studying and pertaining to the economically active population (PEA)
2) Not studying and pertaining to the economically active population (PEA)
3) Studying and not pertaining to the economically active population (not PEA)
4) Neither pertaining to the economically active population (not PEA), nor studying

Cameron e Trivedi (2005) have highlighted that if one jth alternative is observed, then it will be equal to one, meanwhile the remaining options will be equal to zero. In this sense, "the multinomial density for one observation can then be conveniently written as" (CAMERON AND TRIVEDI, page 496, 2005):

$$f(y) = p_1^{y1} \times \ldots \times p_m^{ym} = \prod_{j=1}^{m} p_j^{yj}$$

In light of the theoretical literature, the explanatory variables will be divided into three categories: individual, household and macroeconomic factors. The individual factors are related to gender, race, age, education, metropolitan area and urban area. On the other hand, the household factors are related to having children/teenagers and elderly in the household. Thus, temporal dummies, between 2012 and 2020, were used in order to indirectly capture the macroeconomic behaviour of the period.

To this extent, it is assumed that the chosen utility (u^j_i), time allocation of the youngster, is the maximal by the individual "i" when deciding on "j"; and that x' are the explanatory variables. In this sense, $u^j_i = x'^i$. Therefore, the multinomial model for time allocation of youth is given, in agreement with Greene (2010), by:

$$Pr(Y_i = j) = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^{j} e^{\beta_k x_i}} \quad \text{if j=0,1,2,3,...,J.}$$

In order to withdraw an indeterminacy in the model, still in accordance with Greene (2010), it was taken into consideration, that given that the probabilities sum to one, $\beta_0 = 0$. Furthermore, considering that all error terms, are independent and identically distributed, and for the reference category[1], the multinomial logit becomes:

$$Pr(x_i = j|x_i) = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^{j} e^{\beta_k x_i}} \quad \text{if j=0,1,2,3,...,J, } \beta_0 = 0$$

Given the dependent variable and its "j" categories, the main goal is to compare categories simultaneously. In this specific case, for instance, the comparison will happen between j=4, which is those that are neither

[1] In this case, the reference category is given by youngsters that are studying and pertaining to the economically active population.

pertaining to the economically active population (not PEA), nor studying, and the reference category, that is j=1, studying and pertaining to the economically active population (PEA).

The estimation of the parameters is given by maximum likelihood. Hence, the log-likelihood of the multinomial model is a generalization of the logit model according to Greene (2010). The author defines that if, in one hand, an individual i chooses the alternative j, $d_{ij} = 1$ and on the other hand, $d_{ij} = 0$ if one does not choose alternative j. This will follow for all the J-1 possible outcomes. Thus, the log-likelihood is given by:

$$ln\,L = \sum_{i=1}^{n}\sum_{j=0}^{J} d_{ij}\, ln\, Prob\,(Y_i = j)$$

Moreover, in this model, "all the parameters together determine the marginal effect of x_i on the probability to choose the *j*th alternative" (HEIJ ET AL, page 495, 2004). In addition, it is also possible to compute the log-odds ratios of the model, which will provide the odds ratio for each category (that is, it is independent of the other choices in the model).

Some limitations of the Multinomial Logit Model should be taken into consideration. For the matters of this paper, the main focus will be the assumption that disturbances are independent and homoscedastic in the model. Albeit being a suitable assumption for estimation, it is not a very appealing restriction when considering youth's time allocation. The independence of irrelevant alternatives (IIA) is the "property that the relative odds between two alternative outcomes depend exclusively on characteristics pertaining to the two outcomes and are therefore independent of the number and the nature of all other outcomes that are simultaneously considered" (MCFADDEN, page 245, 1984).

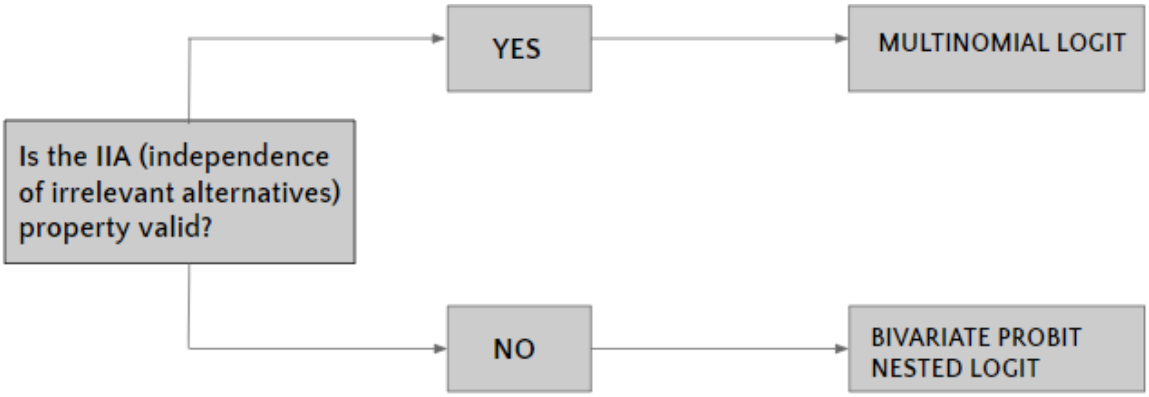
For instance, in the specific case of how youth allocate time, study and working (or seeking for employment) can be viewed as close substitutes and, in this sense, the property of the independence of irrelevant alternatives would not be valid. The issue of this property in the multinomial logit arises from the fact that the relative probability of choosing two existing alternatives cannot be affected by the presence of additional alternatives. Hausman and McFadden (1984) have proposed a test to examine if the IIA property is valid or not; the null hypothesis is that the difference between the estimated models (restricted and unrestricted) is zero. In this test, firstly one estimates a model with all choices (unrestricted model, represented by $\widehat{\beta u}$) and then estimates omitting a subset of choices (restricted model, represented by $\widehat{\beta r}$). Therefore, the test statistic (q) takes the following form:

$$q = [\widehat{\beta u} - \widehat{\beta r}]\,[Vr - Vu]^{-1}\,[\widehat{\beta u} - \widehat{\beta r}]$$

in which $Vr\ and\ Vu$ are the respective estimates of the asymptotic covariance matrices. Furthermore, the test follows a chi-squared distribution (degrees of freedom are the difference in the number of parameters).

If the independence of irrelevant alternatives (IIA) property does not hold, that is, if the null hypothesis is rejected, other models should be considered. The following diagram represents the possibilities, given the Hausman-McFadden test.

Diagram 1: Possibilities given the Hausman-McFadden test



Source: Own Elaboration

BIVARIATE PROBIT

In accordance with Cameron and Trivedi (2005) the bivariate probit model is an extension of the probit model with two equations with correlated disturbances. The unobserved latent variables would be:

$$y_1^* = x'_1\beta_1 + \varepsilon_1$$

$$y_2^* = x'_2\beta_2 + \varepsilon_2$$

where, $E[\varepsilon_1|x_1, x_2] = E[\varepsilon_2|x_1, x_2] = 0$ the correlation is ρ (if correlation is zero it is better to estimate two separate probit models) and variances one. Furthermore, in the specific case of this paper, youth would allocate their time between y_1^*, pertaining to the economically active population (PEA), and y_2^* , studying. In this sense, still in agreement with Cameron and Trivedi (2005), the observed outcomes:

$$y_1 = 1 \; if \; y_1^* > 0, 0 \; otherwise$$

$$y_2 = 1 \; if \; y_2^* > 0, 0 \; otherwise$$

The log-likelihood estimation for the bivariate probit, according to Greene (2000), is given by:

$$log\ L\ = \sum_{i=1}^{n} ln\ \phi_2(w_{i1}, w_{i2}, \rho_{i^*})$$

where, ϕ_2 is the cumulative density function. Thus, taking the first order conditions, one obtains the maximum likelihood.

The bivariate probit should be interpreted with marginal effects and predicted values. Therefore, it is possible to verify, using the bivariate probit, the differences between the explanatory variables and response variables in a much more interesting way than it would be in multinomial logit.

As well as in the multinomial logistic regression, in the bivariate probit, the explanatory variables were gender, race, age, education, metropolitan area, urban area, presence of children/teenagers in the household and presence of elderly in the household. In addition, temporal dummies were used to indirectly capture the macroeconomic behaviour of the period.

RESULTS

In light of the literature, we have, firstly, estimated the multinomial logit model[2] with all possible set of choices and then we have estimated the multinomial logit model with a restricted choice set in order to do a Hausman-McFadden test and analyse if the IIA property was valid. In this sense, table 1 just below shows the unrestricted and restricted models, considering the set of choices given to youth when allocating time.

Table 1: Possible choices for the restricted and unrestricted model

	Unrestricted Model	Restricted Model
SET OF POSSIBLE CHOICES	Studying and pertaining to the economically active population	Studying and pertaining to the economically active population
	Not studying and pertaining to the economically active population	Not studying and pertaining to the economically active population
	Studying and not pertaining to the economically active population	Studying and not pertaining to the economically active population
	Neither pertaining to the economically active population, nor studying	-

Source: Own Elaboration.

Furthermore, it is important to emphasize that this empirical exercise also took into account each position in the household that the youngsters can have and, therefore, the Hausman McFadden test was executed four times (four different models). In this sense, the results of this test, which are shown in Table 2, indicate if the IIA is valid or not and this stipulates which model would be the most appropriate for the NEETs' analysis, given its position in the household.

Table 2: Hausman-McFadden test for the IIA Assumption

HAUSMAN-MCFADDEN TEST FOR THE IIA ASSUMPTION	
MODEL	Ho: difference in coefficients not systematic chi2(64)= (b-B)'[(V_b-V_B)^(-1)](b-B)
Male in the condition of head/partner of the household	chi2(64)= -113.04
Male youth in the position of adult son (offspring)	chi2(64)= 3190.72
Female in the condition of head/partner of the household	chi2(64)= -116.34
Female youth in the position of adult daughter (offspring)	chi2(64)= -517.57

Source: Own Elaboration based on the Hausman-McFadden Test

The null hypothesis of the Hausman-McFadden test asserts that the parameters from the restricted and unrestricted models are equal. As Table 2 indicates, we reject the null hypothesis that the parameters are equal and, therefore, the IIA (independence of irrelevant alternatives) property is not valid for all the models and, furthermore, the correlation between the latent error terms are significant (studying and working, or seeking for employment, are close substitutes for youngsters). As stated by McFadden (1984), the assumption that error terms are independent across choices in the multinomial logit model is an important limitation of the

[2] In the multinomial logistic regression, the group set as the reference for the analysis of the results was the youth that pertain to the economically active population and study, in relation to those who are not studying, nor pertaining to the economically active population; not pertaining to the economically active population and studying; or pertaining to the economically active population and not studying. The results for the multinomial logistic regression for the Brazilian youth, given the position in the household between 2012 and 2020 are presented in the appendix by Table 1, by the coefficient that demonstrates either higher or smaller probability of observing the concerned event.

model that may lead to a misinterpretation of the studied object. By that means, we have employed the bivariate probit model[3] in order to comprehend the NEETs, given its the position in the household, in Brazil.

Thereby, Table 3 presents the predicted probabilities of becoming a NEET, given its position in the household. The model's estimated results, by individual traits, demonstrate the importance of attentive analysis for women, especially those in the position of head/partner of the household, when compared to the other studied groups.

Given that Brazil's historical structure is marked by racial inequality, it is important to analyse discrepancies of colour for the youth. The probability of a black youth becoming a NEET is higher than a white youth becoming a NEET for all positions in the household that one might have. Furthermore, taking into consideration that differences amongst youngsters tend to increase over time with age (BECKER, 1993), it is relevant to analyse how this single aspect affects the probability of becoming a NEET. Thus, and according to Varshavskaia (2017), the NEET rate differs between age groups. As an example, the highest probability of becoming a NEETs, age regarded, is for those who are 19 years old, regardless of the position in the household.

Furthermore, when analysing household factors, the probability of a youngster, living in a household with children between 6 and 14 years old that don't attend school, becoming a NEET is higher than a youngster living in a household with teenagers between 15 and 17 years old that don't attend school, becoming a NEET. Thus, this probability is higher for women than for men.

Table 3: Marginal effects for the joint probabilities of becoming a NEET.

Marginal Effects for the joint probabilities P(y1=0, y2=0)

	Male head of the household/Partner	Adult son (Offspring)	Female head of the household/Partner	Adult daughter (offspring)
White	0,039	0,105	0,290	0,181
Black	0,056	0,136	0,397	0,264
19 years old	0,072	0,139	0,398	0,245
20 years old	0,071	0,133	0,392	0,228
21 years old	0,057	0,123	0,374	0,210
22 years old	0,047	0,119	0,366	0,215
23 years old	0,045	0,110	0,360	0,222
24 years old	0,043	0,108	0,356	0,219
25 years old	0,047	0,110	0,356	0,228
26 years old	0,040	0,108	0,342	0,222
27 years old	0,042	0,110	0,338	0,227
28 years old	0,040	0,101	0,337	0,220
29 years old	0,043	0,128	0,317	0,238
8 to 10 years of study	0,055	0,103	0,425	0,202
11 or more years of study	0,037	0,037	0,257	0,155
North	0,047	0,135	0,401	0,286
Northeast	0,073	0,165	0,445	0,303
Southeast	0,036	0,097	0,299	0,174
South	0,032	0,080	0,241	0,147
MidWest	0,028	0,098	0,310	0,186
Urban Area	0,040	0,111	0,295	0,182
Metropolitan Area	0,045	0,112	0,267	0,171
Households w/ 6 to 14	0,087	0,186	0,551	0,432

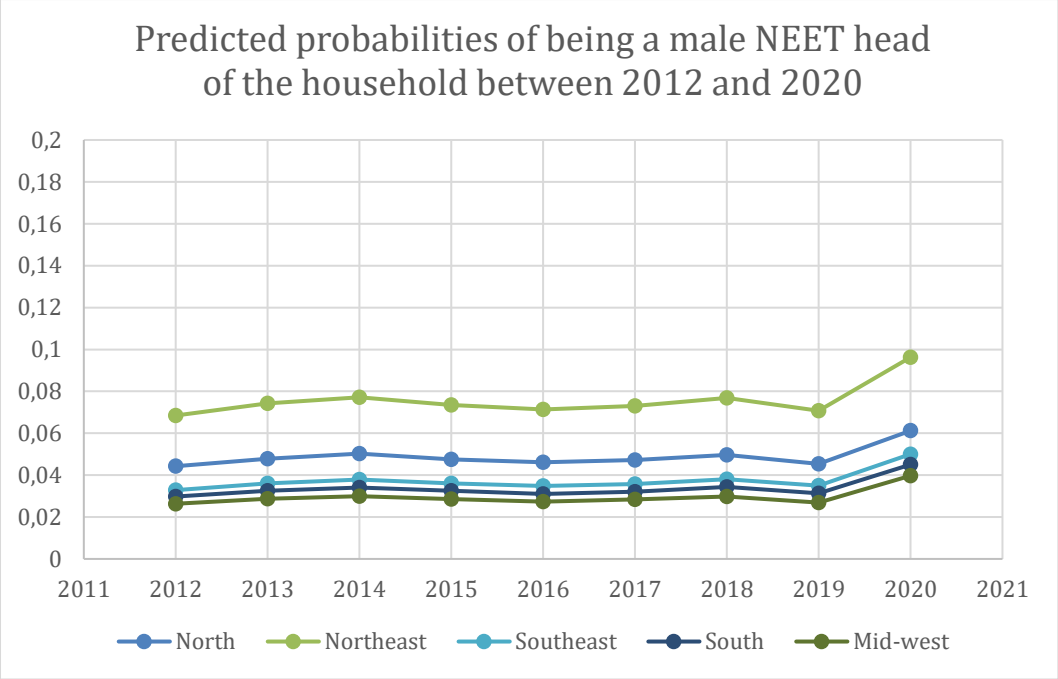
[3] The complete estimations for the bivariate probit models are in the appendix.

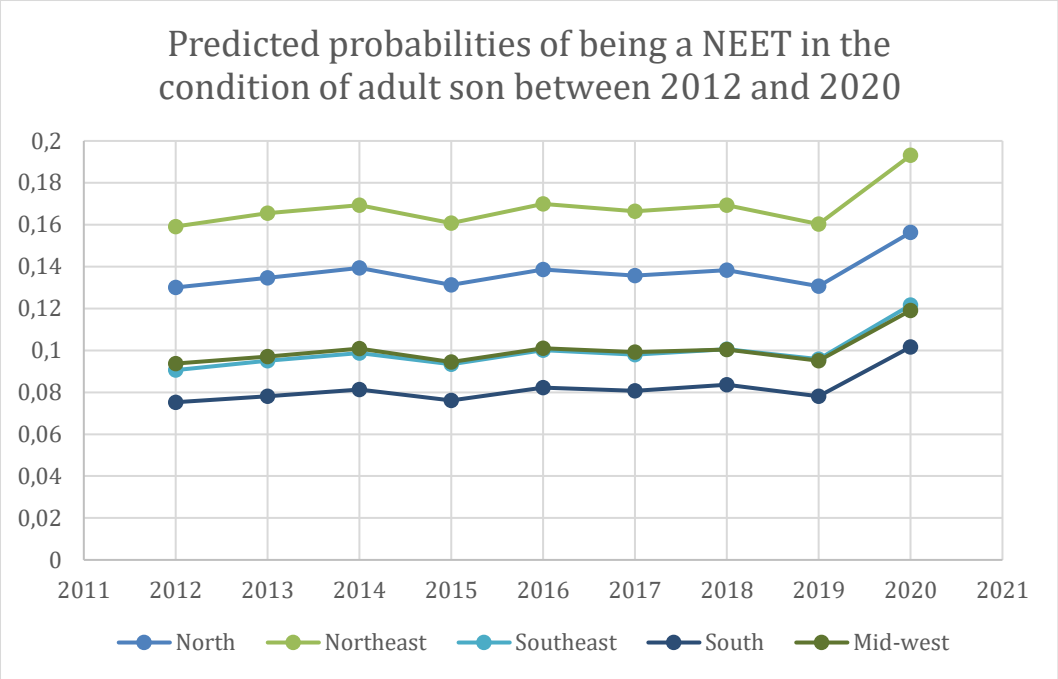
Households w/ 15 to 17	0,062	0,166	0,426	0,335
Elderly	0,072	0,142	0,384	0,262
2013	0,050	0,123	0,377	0,239
2014	0,052	0,127	0,377	0,245
2015	0,050	0,120	0,369	0,239
2016	0,048	0,127	0,354	0,230
2017	0,049	0,125	0,334	0,223
2018	0,052	0,128	0,336	0,224
2019	0,048	0,120	0,321	0,215
2020	0,066	0,148	0,334	0,243

Source: Own Elaboration based on the Continuous PNAD

The temporal dummies allow an analysis for the predicted probabilities of being a NEET in the Brazilian regions throughout time. Hence, this also captures, indirectly, how the macroeconomic scenario affects youngsters. The predicted probabilities of being a male NEET, either in the position of head/partner of the household or in the position of adult son are shown in Figure 2. The predicted probabilities of being a NEET for both positions in the household remained roughly the same for each region, with a substantial increase in 2020 that can be related to the Covid-19 Pandemic Crisis and the precarious situation that the country's been facing. Furthermore, it is noticeable the substantial difference within Brazilian regions, highlighting regional inequalities throughout the country. The highest rates of NEETs are located in the Northern and North-eastern region for all these years.

Figure 2: Predicted probabilities of being a male NEET between 2012 and 2020 in the Brazilian regions

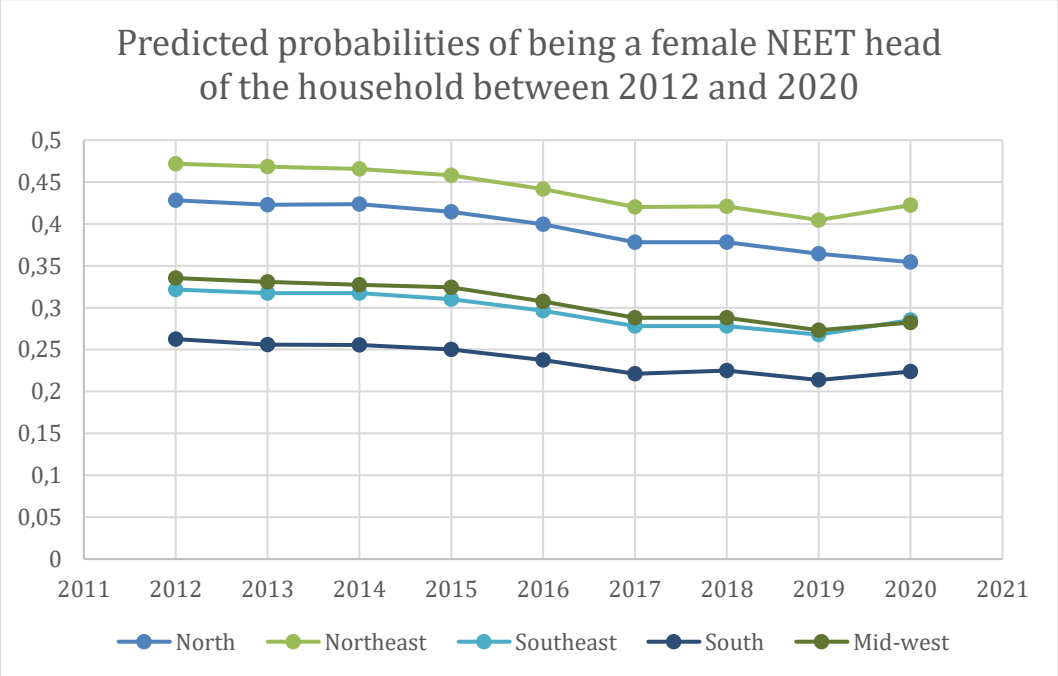




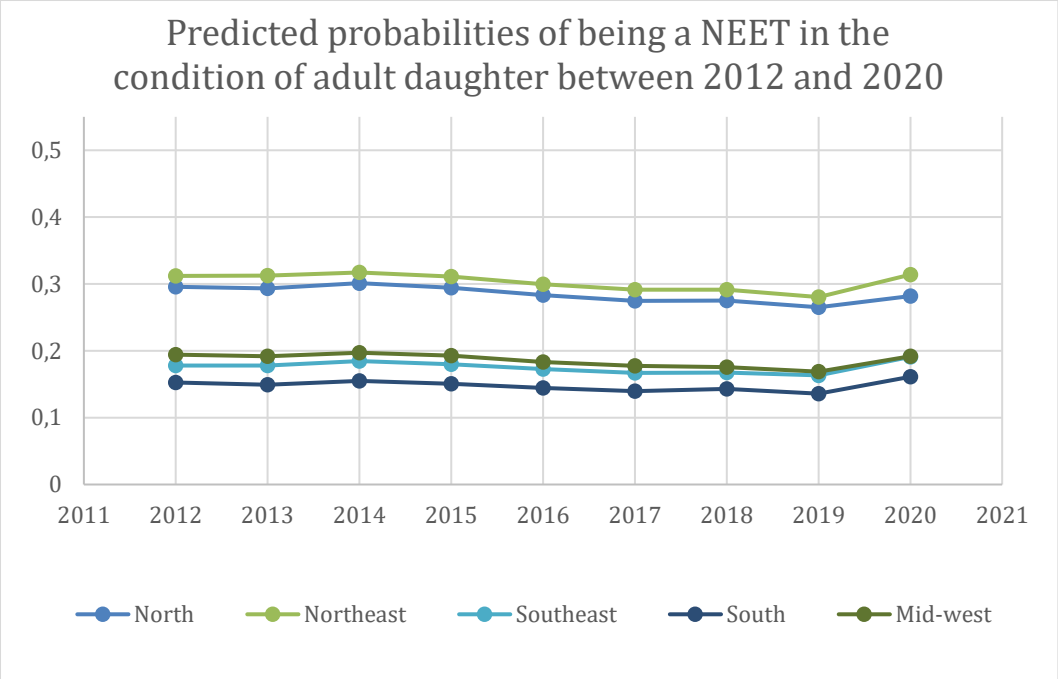
Source: Own Elaboration based on the Continuous PNAD.

Also in regards to Figure 2, it is interesting to highlight that men in the position of adult son have higher predicted probabilities than men in the position of head/partner of the household. Moreover, as it can be seen in Figure 3[4], women have higher predicted probabilities than men of being a NEET. Mainly, the highest predicted probabilities between women are for those in the position of head/partner of the household.

Figure 3: Predicted probabilities of being a female NEET between 2012 and 2020 in the Brazilian regions



[4] It is important to emphasize that the graph axis has a different size between Figure 2 and Figure 3, given that the predicted probabilities for men are much lower than for women and it would be very difficult to see the differences between regions if it had the same size as figure 3.



Source: Own Elaboration based on the Continuous PNAD

In accordance with figure 3, the occurrence of the highest predicted probabilities of being a NEET are located in the Northeast and in the North regions amongst women. Conversely, the lowest predicted probabilities of being a NEET are located in the Southern and in the South-eastern regions. There is, therefore, a huge interregional NEET discrepancy for both male and female youngsters.

Finally, it is important to understand how educational levels affect the predicted probabilities of being a NEET throughout the years. In accordance with Sen (2010), the lack of access to education constitutes a barrier in engaging economic activities. Thus, Camarano (2006) has shown that education has an impact in decreasing the probability of a youth becoming a NEET. In accordance, Siraj et al. (2014) have presented that low education also influenced the chance of becoming a NEET, as it is an obstacle to attain higher levels of education, or getting a job.

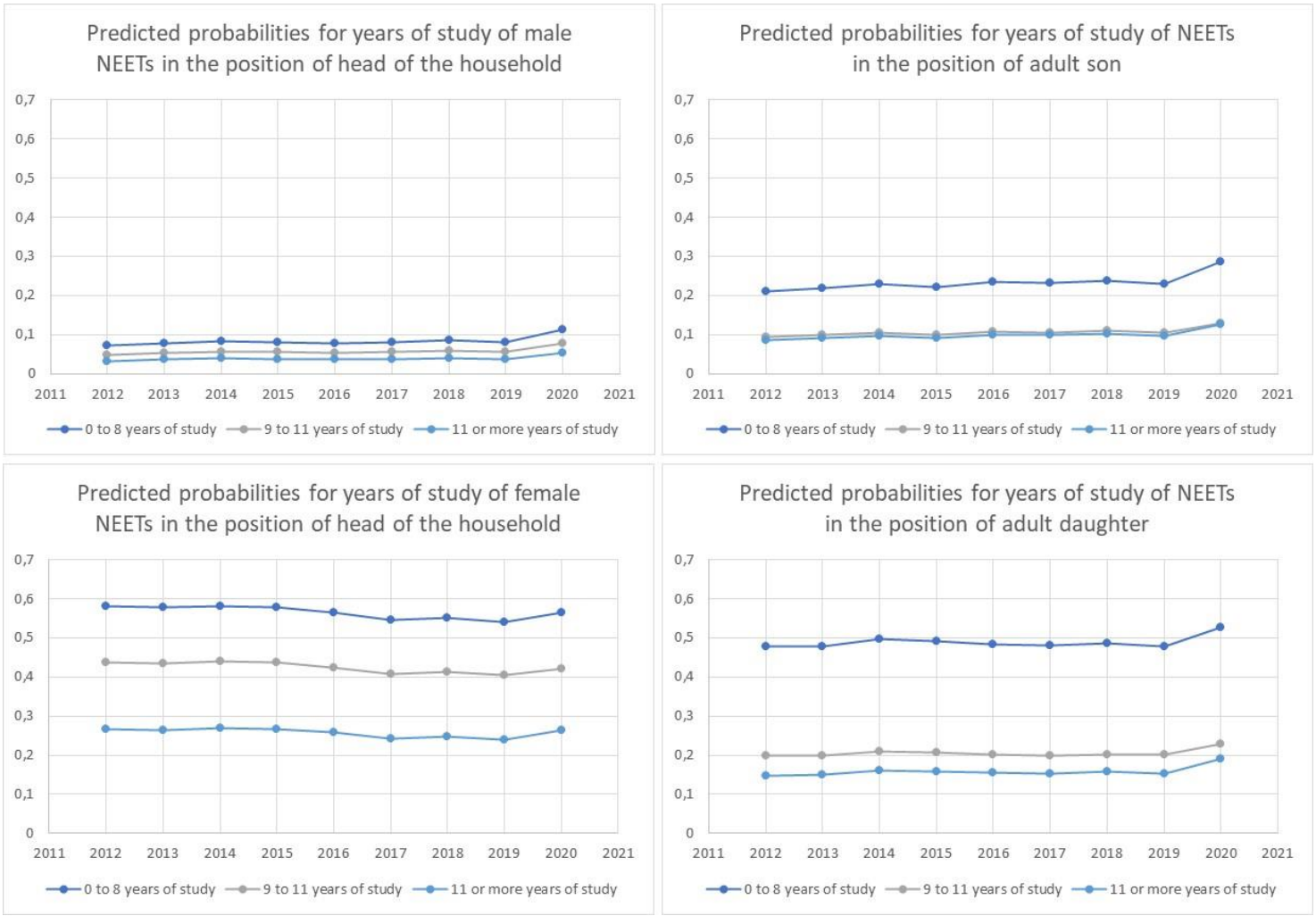
In an attempt to demonstrate how different schooling levels affect individuals in the labour market, Camargo and Reis (2005) divide the workers into three groups, according to their educational levels. There are the non-qualified workers, the semi-qualified workers and the highly-qualified workers. These groups present different behaviours in regards to productivity and handle with different information asymmetry in the labour market. Furthermore, the authors highlight that there is an immense information asymmetry amongst youth, reverberating higher levels of unemployment. The employers have difficulties in presuming the productivity of the youth, given that youngsters have little (or none) experience in the labour market. Therefore, it is hard to discriminate against the workers, elevating the uncertainty level and the information asymmetry (CAMARGO AND REIS, 2005). Pursuantly, Becker (1993) highlighted the importance of educational levels and training for accumulating human capital and achieving good results in the labour market.

The same reasoning applies to semi-qualified workers. The employers also have difficulties in presuming the productivity of this group, based on the educational levels that the individuals present. Therefore, it is hard to discriminate the hard worker from the lazy worker, elevating the uncertainty level and the information asymmetry. Differently, highly-qualified workers (11 or more years of study) present little information asymmetry in the labour market. This is associated with the fact that the higher the degree one individual has, the easier it is to find good information about this qualification, and lower is the uncertainty about the worker.

The information asymmetry is remarkably low for non-qualified workers. This happens because this group is quite homogenous and there is little difference between their abilities. In fact, as this group is quite homogenous and there is little difference between their abilities, the employers know that this type of worker presents low levels of productivity (CAMARGO AND REIS, 2005), resulting in low information asymmetry for this group. Usually, youngsters with this educational level turn to the informal labour market and present the highest levels of unemployment, despite low information asymmetry.

Figure 4, below, shows the predicted probabilities of being a NEET, given the schooling levels for the different positions that the youngster holds in the household between 2012 and 2020. The predicted probabilities of being a NEET were higher between those with 0 to 8 years of study, regardless of its position in the household. Moreover, it is pertinent to highlight that, as before, women are more vulnerable, presenting higher predicted probabilities than men. In the same line, the predicted probabilities of being a NEET increased, for all schooling levels, in 2020, demonstrating the initial consequences of the Covid-19 pandemic crisis.

Figure 4: Predicted probabilities of being a NEET for years of study between 2012 and 2020



Source: Own elaboration based on the Continuous PNAD.

It is also interesting to ponder that the predicted probabilities of being a NEET for those with 9 to 11 years of study and in the position of adult son are roughly the same as those with 9 to 11 years of study in the position of adult son. Finally, the predicted probabilities of becoming a NEET were the lowest for the youth that had 11 or more years of study, regardless of its position in the household. This can be associated with the fact that these are the individuals that have the highest educational levels and low information asymmetry on the labour market.

CONCLUSION

The main goal and contribution of this work was to comprehend the NEETs' phenomenon in Brazil given its household position, between 2012 and 2020, regarding models of discrete choice. As it was shown, pursuant to the Hausman and McFadden (1984) test for the IIA condition and the fact that studying and working (or seeking for employment) are close substitutes for youth, the bivariate probit model was employed for the analysis.

Furthermore, the bibliographic review about the topic allowed perceiving the importance of considering individual and macroeconomic factors in the analysis, and, thus, consider the phenomena throughout time. It is important to highlight that the widespread presence of youths that are neither in school, nor in the labor market in Brazil remained a persistent and a structural phenomenon during the studied time. Thus, and aggravating the problem, there are substantial differences within male and female, especially those in the position of head/partner of the household.

This scenario requires attention, having Camarano and Kanso (2012) noted that youngsters in this position are not accumulating human capital in a crucial stage of the life cycle, and this might negatively affect the future productive capacity. Within this scenario, it is of utmost relevance and importance to apply social public policies in order to diminish the NEETs' youth issue in Brazil. Given the regional disparities, and thus differences on individuals traits, such as gender and colour, it is also important that social policies are regionally based, when focusing on the youth. In accordance with the Sustainable Development Goals Report (United Nations, 2018), it is important to have quality education for the youth. In light of that, and based on Iceland´s successful social policies focused on youth, the "Youth in Iceland" and "Planet of youth: Programme", it seems feasible to suggest that Brazilian research institutes, such as IPEA and IBGE, should promote, on a regular basis, questionnaires based on the perception of the youth towards relevant topics, such as education, health, work, social activities and others. In conclusion, based on the youth's perspective of what needs improvement, social policies would be applied on a local scale, respecting the differing needs of each region. This would enable improving not only youth's life quality and social indicators, but also would promote economic growth.

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APPENDIX

Table 1 – Coefficients estimated by multinomial logistic regression. for the Brazilian youth. given the position in the household between 2012 and 2020.

	Male head/partner of the household	Adult Son (Offspring)	Female head/partner of the household	Adult daughter (Offspring)
Reference Group: PEA and Studying				
PEA and not studying				
White	-0.241*	-0.331*	-0.189*	-0.292*
	(0.03)	(0.02)	(0.03)	(0.02)
19 years old	-0.924*	-0.004	-0.636*	-0.272*
	(0.10)	(0.03)	(0.07)	(0.04)
20 years old	-0.864*	0.174*	-0.594*	-0.308*
	(0.09)	(0.03)	(0.07)	(0.04)
21 years old	-0.535*	0.256*	-0.531*	-0.322*
	(0.09)	(0.04)	(0.07)	(0.04)
22 years old	-0.408*	0.396*	-0.345*	-0.110**
	(0.08)	(0.04)	(0.06)	(0.04)
23 years old	-0.298*	0.524*	-0.309*	0.189*
	(0.07)	(0.04)	(0.06)	(0.04)
24 years old	-0.211*	0.708*	-0.199*	0.332*
	(0.07)	(0.04)	(0.06)	(0.04)
25 years old	-0.053	0.781*	-0.027	0.521*
	(0.07)	(0.04)	(0.05)	(0.05)
26 years old	0.091	1.007*	-0.118**	0.721*
	(0.07)	(0.05)	(0.06)	(0.05)
27 years old	0.022	1.106*	0.084	0.811*
	(0.07)	(0.05)	(0.06)	(0.05)
28 years old	0.137**	1.253*	0.176*	0.934*
	(0.07)	(0.05)	(0.05)	(0.06)
29 years old	0.008*	0.055*	0.009*	0.039*
	(0.00)	(0.00)	(0.00)	(0.00)
8 to 10 years of study	-0.799*	-1.146*	-0.753*	-1.109*
	(0.06)	(0.03)	(0.05)	(0.06)
11 or more years of study	-1.321*	-0.702*	-0.761*	-0.379*
	(0.05)	(0.03)	(0.04)	(0.05)
North	-0.172*	-0.125*	-0.242*	-0.102*
	(0.05)	(0.03)	(0.04)	(0.03)
Southeast	0.244*	0.209*	0.383*	0.176*
	(0.04)	(0.02)	(0.04)	(0.03)
South	-0.071	0.054**	0.068***	-0.172*
	(0.05)	(0.03)	(0.04)	(0.03)
MidWest	-0.015	-0.031	0.021	-0.139*
	(0.06)	(0.03)	(0.04)	(0.03)
Urban Area	-0.716*	-0.447*	-0.410*	-0.341*
	(0.05)	(0.02)	(0.03)	(0.03)
Metropolitan Area	-0.370*	-0.324*	-0.224*	-0.218*
	(0.04)	(0.02)	(0.03)	(0.02)
Household w/ 6 to 14	1.139*	0.278*	0.431**	0.719*
	(0.20)	(0.09)	(0.17)	(0.12)
Household w/ 15 to 17	0.587*	0.656*	0.292**	0.397*
	(0.10)	(0.05)	(0.13)	(0.06)
Elderly	-0.179**	0.119*	0.001	0.060***

	(0.09)	(0.03)	(0.08)	(0.03)
2013	0.017	-0.049	0.078	0.031
	(0.06)	(0.03)	(0.05)	(0.04)
2014	-0.076	-0.023	0.017	0.005
	(0.06)	(0.03)	(0.05)	(0.04)
2015	0.071	-0.108*	0.015	0.004
	(0.06)	(0.04)	(0.05)	(0.04)
2016	-0.090	-0.095*	-0.111**	-0.086**
	(0.06)	(0.04)	(0.05)	(0.04)
2017	-0.098	-0.108*	-0.150*	-0.148*
	(0.06)	(0.03)	(0.05)	(0.04)
2018	-0.134**	-0.125*	-0.164*	-0.158*
	(0.06)	(0.04)	(0.05)	(0.04)
2019	-0.243*	-0.095*	-0.179*	-0.129*
	(0.06)	(0.04)	(0.05)	(0.04)
2020	-0.362***	-0.286*	-0.477*	-0.076
	(0.19)	(0.10)	(0.16)	(0.11)
Intercept	4.311*	2.070*	3.091*	1.710*
	(0.08)	(0.05)	(0.07)	(0.07)
Not PEA and studying				
White	0.339*	0.177*	0.124*	0.214*
	(0.09)	(0.03)	(0.05)	(0.03)
19 years old	0.975*	-0.268*	0.545*	-0.178*
	(0.19)	(0.04)	(0.10)	(0.04)
20 years old	0.979*	-0.391*	0.287*	-0.398*
	(0.18)	(0.04)	(0.09)	(0.04)
21 years old	0.590*	-0.559*	0.112	-0.573*
	(0.17)	(0.05)	(0.10)	(0.04)
22 years old	0.456*	-0.674*	0.108	-0.697*
	(0.17)	(0.06)	(0.09)	(0.05)
23 years old	0.240	-0.798*	-0.077	-0.769*
	(0.18)	(0.06)	(0.09)	(0.05)
24 years old	-0.258	-0.909*	-0.140	-0.901*
	(0.18)	(0.06)	(0.09)	(0.06)
25 years old	-0.279***	-1.109*	-0.090	-0.952*
	(0.17)	(0.07)	(0.09)	(0.07)
26 years old	-0.236	-1.182*	-0.176***	-1.076*
	(0.18)	(0.07)	(0.09)	(0.07)
27 years old	-0.540*	-1.206*	-0.288*	-1.274*
	(0.20)	(0.09)	(0.09)	(0.08)
28 years old	-0.838*	-1.484*	-0.191**	-1.443*
	(0.18)	(0.10)	(0.09)	(0.09)
29 years old	-0.036*	-0.046*	-0.011*	-0.051*
	(0.01)	(0.00)	(0.00)	(0.00)
8 to 10 years of study	0.049	-0.233*	-0.271*	-0.504*
	(0.16)	(0.04)	(0.07)	(0.06)
11 or more years of study	0.436*	-0.394*	-0.927*	-1.044*
	(0.14)	(0.04)	(0.06)	(0.06)
North	-0.053	-0.148*	0.256*	0.063***
	(0.12)	(0.04)	(0.05)	(0.04)
Southeast	-0.354*	-0.440*	-0.492*	-0.457*
	(0.11)	(0.03)	(0.06)	(0.03)
South	-0.177	-0.816*	-0.822*	-0.720*
	(0.11)	(0.04)	(0.06)	(0.04)

MidWest	-0.177	-0.394*	-0.248*	-0.283*
	(0.13)	(0.04)	(0.06)	(0.04)
Urban Area	-0.099	-0.061**	-0.452*	-0.415*
	(0.13)	(0.03)	(0.05)	(0.03)
Metropolitan Area	0.567*	0.126*	0.076	0.077*
	(0.09)	(0.03)	(0.05)	(0.03)
Household w/ 6 to 14	0.252	-0.009	0.292	0.415*
	(0.58)	(0.13)	(0.23)	(0.13)
Household w/ 15 to 17	-0.751**	-0.134***	0.067	-0.188*
	(0.31)	(0.07)	(0.18)	(0.07)
Elderly	0.291	0.085**	0.206***	0.046
	(0.20)	(0.04)	(0.12)	(0.04)
2013	0.295	0.105**	0.033	0.067
	(0.19)	(0.05)	(0.08)	(0.05)
2014	0.334***	0.168*	-0.027	0.174*
	(0.18)	(0.05)	(0.08)	(0.05)
2015	0.556*	0.033	-0.063	0.137*
	(0.18)	(0.05)	(0.08)	(0.05)
2016	0.339***	0.134*	-0.183**	0.046
	(0.17)	(0.05)	(0.08)	(0.05)
2017	0.212	0.077	-0.316*	0.015
	(0.17)	(0.05)	(0.08)	(0.05)
2018	0.369**	0.080	-0.154***	0.066
	(0.18)	(0.05)	(0.08)	(0.05)
2019	0.295***	0.036	-0.342*	0.011
	(0.18)	(0.05)	(0.08)	(0.05)
2020	0.075	0.398*	-0.406***	0.336*
	(0.36)	(0.14)	(0.23)	(0.12)
Intercept	-2.898*	0.464*	0.502*	1.587*
	(0.26)	(0.06)	(0.10)	(0.08)
NEETs				
White	-0.381*	-0.279*	-0.300*	-0.338*
	(0.07)	(0.03)	(0.03)	(0.03)
19 years old	-0.559*	-0.081***	-0.185**	-0.146*
	(0.15)	(0.04)	(0.07)	(0.05)
20 years old	-0.589*	-0.077***	-0.141**	-0.322*
	(0.13)	(0.05)	(0.07)	(0.05)
21 years old	-0.383*	-0.101***	-0.163**	-0.467*
	(0.13)	(0.05)	(0.07)	(0.05)
22 years old	-0.513*	-0.028	-0.072	-0.354*
	(0.12)	(0.05)	(0.06)	(0.05)
23 years old	-0.410*	-0.057	-0.074	-0.203*
	(0.11)	(0.05)	(0.07)	(0.05)
24 years old	-0.264**	0.078	-0.003	-0.128**
	(0.11)	(0.05)	(0.06)	(0.06)
25 years old	-0.005	0.217*	0.114**	0.042
	(0.10)	(0.06)	(0.06)	(0.06)
26 years old	-0.088	0.363*	-0.032	0.128**
	(0.10)	(0.06)	(0.06)	(0.06)
27 years old	-0.045	0.470*	0.107***	0.257*
	(0.10)	(0.07)	(0.06)	(0.07)
28 years old	0.022	0.504*	0.153*	0.275*
	(0.10)	(0.07)	(0.06)	(0.07)
29 years old	0.007***	0.036*	0.003***	0.017*
	(0.00)	(0.00)	(0.00)	(0.00)

8 to 10 years of study	-1.044*	-1.891*	-1.068*	-2.006*
	(0.08)	(0.04)	(0.05)	(0.06)
11 or more years of study	-1.960*	-1.573*	-1.757*	-1.908*
	(0.07)	(0.04)	(0.05)	(0.05)
North	-0.662*	-0.311*	-0.234*	0.044
	(0.07)	(0.04)	(0.04)	(0.04)
Southeast	-0.358*	-0.355*	-0.044	-0.396*
	(0.07)	(0.03)	(0.04)	(0.03)
South	-0.803*	-0.594*	-0.643*	-0.782*
	(0.08)	(0.04)	(0.04)	(0.04)
MidWest	-1.024*	-0.555*	-0.276*	-0.471*
	(0.09)	(0.04)	(0.04)	(0.04)
Urban Area	-1.058*	-0.464*	-0.998*	-0.928*
	(0.06)	(0.03)	(0.04)	(0.03)
Metropolitan Area	-0.256*	-0.175*	-0.448*	-0.302*
	(0.08)	(0.03)	(0.03)	(0.03)
Household w/ 6 to 14	1.474*	0.409*	0.809*	0.978*
	(0.24)	(0.11)	(0.17)	(0.12)
Household w/ 15 to 17	0.552*	0.618*	0.109	0.420*
	(0.13)	(0.06)	(0.13)	(0.06)
Elderly	0.303**	0.246*	0.137	0.253*
	(0.13)	(0.04)	(0.08)	(0.04)
2013	0.073	0.004	0.028	-0.012
	(0.09)	(0.05)	(0.05)	(0.05)
2014	0.046	0.075	-0.001	0.061
	(0.10)	(0.05)	(0.05)	(0.05)
2015	0.083	-0.000	-0.021	0.051
	(0.10)	(0.05)	(0.05)	(0.05)
2016	-0.043	0.101**	-0.178*	-0.019
	(0.10)	(0.05)	(0.05)	(0.05)
2017	0.023	0.108**	-0.300*	-0.066
	(0.09)	(0.05)	(0.05)	(0.05)
2018	0.049	0.149*	-0.300*	-0.055
	(0.09)	(0.05)	(0.05)	(0.05)
2019	-0.138	0.124**	-0.351*	-0.060
	(0.10)	(0.05)	(0.05)	(0.05)
2020	0.255	0.310**	-0.447*	0.261***
	(0.42)	(0.14)	(0.16)	(0.14)
Intercept	2.227*	1.589*	3.994*	3.020*
	(0.11)	(0.06)	(0.07)	(0.07)
Pseudo - R2	0.0603	0.0683	0.0657	0.0786
Number of obs.	123316	194990	176298	148868
Chi2	4312.90	15141.50	13769.98	15818.88
Prob>Chi2	0.00	0.00	0.00	0.00

*** p<0.10. ** p<0.05. * p<0.01

Source: Own Elaboration based on the Continuous PNAD.

TABLE 2: Bivariate Probit for Male in the position of head/partner of the household

MALE IN THE POSITION OF HEAD/PARTNER OF THE HOUSEHOLD

	Coef.	Robust Std. Error	z	P>|z|	[95% Conf.	Interval]
WORKING						
White	.0096294	.0224459	0.43	0.668	-.0343638	.0536225
19 years old	-.3284637	.0501186	-6.55	0.000	-.4266943	-.2302331
20 years old	-.3151984	.0454289	-6.94	0.000	-.4042373	-.2261594
21 years old	-.1618398	.0421598	-3.84	0.000	-.2444714	-.0792081
22 years old	-.0416575	.0388125	-1.07	0.283	-.1177287	.0344137
23 years old	-.0048794	.0380431	-0.13	0.898	-.0794425	.0696838
24 years old	.0297815	.0350067	0.85	0.395	-.0388303	.0983932
25 years old	-.0028574	.0336828	-0.08	0.932	-.0688746	.0631597
26 years old	.0899983	.034229	2.63	0.009	.0229107	.1570859
27 years old	.0628739	.0333086	1.89	0.059	-.0024097	.1281575
28 years old	.0970847	.0355754	2.73	0.006	.0273583	.1668112
29 years old	.0026542	.0012807	2.07	0.038	.0001441	.0051643
8 to 10 years of study	.1181004	.025246	4.68	0.000	.0686193	.1675816
11 or more years of study	.1981853	.021269	9.32	0.000	.1564988	.2398718
North	.1920336	.021898	8.77	0.000	.1491142	.234953
Southeast	.2786016	.0234904	11.86	0.000	.2325614	.3246419
South	.2855851	.0257204	11.10	0.000	.2351741	.3359961
MidWest	.3792267	.0271734	13.96	0.000	.3259678	.4324857
Urban Area	.145569	.017074	8.53	0.000	.1121045	.1790334
Metropolitan Area	-.1344889	.0265096	-5.07	0.000	-.1864469	-.082531
Households w/ 6 to 14	-.1375104	.0716953	-1.92	0.055	-.2780307	.0030099
Households w/ 15 to 17	.0747415	.0417663	1.79	0.074	-.0071189	.1566018
Elderly	-.2241628	.0453187	-4.95	0.000	-.3129859	-.1353397
2013	-.0426618	.0315914	-1.35	0.177	-.1045798	.0192562
2014	-.0763777	.0347464	-2.20	0.028	-.1444794	-.0082761
2015	-.0460133	.0335642	-1.37	0.170	-.1117979	.0197713
2016	-.0446748	.032387	-1.38	0.168	-.1081522	.0188026
2017	-.0613533	.0321193	-1.91	0.056	-.1243059	.0015994
2018	-.098544	.0307508	-3.20	0.001	-.1588145	-.0382736
2019	-.0706927	.0327993	-2.16	0.031	-.1349781	-.0064073
2020	7.463.759	3.001.903	2.49	0.013	1.580.138	1.334.738
Constant	1.295.754	.0349601	37.06	0.000	1.227.233	1.364.274
STUDYING						
White	.1333643	.016771	7.95	0.000	.1004936	.1662349
19 years old	.5442081	.0477606	11.39	0.000	.450599	.6378171
20 years old	.513881	.0419833	12.24	0.000	.4315951	.5961668
21 years old	.2973997	.0408378	7.28	0.000	.217359	.3774403
22 years old	.2263214	.0367973	6.15	0.000	.1542	.2984429
23 years old	.1536738	.0351022	4.38	0.000	.0848748	.2224729
24 years old	.0881538	.0345789	2.55	0.011	.0203805	.1559271
25 years old	.0078193	.0325542	0.24	0.810	-.0559858	.0716244
26 years old	-.0626272	.032746	-1.91	0.056	-.1268081	.0015537
27 years old	-.0422187	.0336699	-1.25	0.210	-.1082105	.0237731
28 years old	-.1016628	.0317863	-3.20	0.001	-.1639628	-.0393627
29 years old	-.0054629	.0010923	-5.00	0.000	-.0076037	-.003322
8 to 10 years of study	.3634025	.0246449	14.75	0.000	.3150994	.4117057

11 or more years of study	.6539171	.0211717	30.89	0.000	.6124212	.6954129
North	.1018935	.0219184	4.65	0.000	.0589342	.1448529
Southeast	-.1346721	.0207462	-6.49	0.000	-.1753338	-.0940103
South	.0345368	.0217383	1.59	0.112	-.0080694	.077143
MidWest	.011845	.0269111	0.44	0.660	-.0408998	.0645898
Urban Area	.3294139	.0198631	16.58	0.000	.290483	.3683448
Metropolitan Area	.212973	.0175022	12.17	0.000	.1786693	.2472768
Households w/ 6 to 14	-.5084174	.081172	-6.26	0.000	-.6675117	-.3493231
Households w/ 15 to 17	-.3115439	.0453139	-6.88	0.000	-.4003575	-.2227303
Elderly	.0986825	.0419684	2.35	0.019	.0164259	.1809391
2013	.0002051	.0279407	0.01	0.994	-.0545577	.0549679
2014	.0420922	.0286676	1.47	0.142	-.0140953	.0982797
2015	-.0185616	.0309658	-0.60	0.549	-.0792535	.0421303
2016	.0465497	.0292418	1.59	0.111	-.0107631	.1038625
2017	.0439532	.0288106	1.53	0.127	-.0125146	.100421
2018	.0728583	.0293053	2.49	0.013	.015421	.1302955
2019	.1228474	.0298872	4.11	0.000	.0642696	.1814252
2020	-3.777.649	2.664.715	-1.42	0.156	-9.000.394	1.445.096
Constant	-2.259.065	.0369145	-61.20	0.000	-2.331.416	-2.186.714
athrho	-.2484095	.0131439	-18.90	0.000	-.274171	-.222648
rho	-.243423	.012365			-.2675017	-.2190405
Wald Test	chi2(1) = 357.183				Prob > chi2 = 0.0000	

Source: Own Elaboration based on the Continuous PNAD.

TABLE 3: Bivariate Probit for Male in the position of adult son in the household

ADULT SON (OFFSPRING)

	Coef.	Robust Std. Error	z	P>|z|	[95% Conf.	Interval]
WORKING						
White	-.1094789	.0104229	-10.50	0.000	-.1299075	-.0890503
19 years old	.1127033	.0160491	7.02	0.000	.0812477	.1441589
20 years old	.2269919	.0165852	13.69	0.000	.1944855	.2594983
21 years old	.3195853	.019045	16.78	0.000	.2822578	.3569127
22 years old	.3902981	.0193226	20.20	0.000	.3524265	.4281697
23 years old	.4865193	.0192329	25.30	0.000	.4488235	.5242151
24 years old	.5498285	.0193668	28.39	0.000	.5118702	.5877868
25 years old	.5699193	.0205924	27.68	0.000	.529559	.6102796
26 years old	.6293096	.021963	28.65	0.000	.586263	.6723562
27 years old	.6365073	.0229825	27.70	0.000	.5914624	.6815521
28 years old	.7235887	.0229646	31.51	0.000	.6785789	.7685986
29 years old	.0212076	.0009456	22.43	0.000	.0193543	.023061
8 to 10 years of study	.2135867	.0133208	16.03	0.000	.1874783	.2396951
11 or more years of study	.3591511	.0122125	29.41	0.000	.335215	.3830871
North	.0851814	.0126863	6.71	0.000	.0603166	.1100461
Southeast	.3253124	.0115253	28.23	0.000	.3027232	.3479017
South	.4275124	.0140528	30.42	0.000	.3999695	.4550554
MidWest	.2648601	.0146081	18.13	0.000	.2362287	.2934915
Urban Area	-.0330607	.0098548	-3.35	0.001	-.0523758	-.0137455
Metropolitan Area	-.1247101	.0114263	-10.91	0.000	-.1471053	-.1023149
Households w/ 6 to 14	-.0242794	.0378721	-0.64	0.521	-.0985073	.0499485

Households w/ 15 to 17	.1118026	.0194817	5.74	0.000	.0736191	.1499861
Elderly	-.0553359	.0142301	-3.89	0.000	-.0832264	-.0274454
2013	-.0503365	.0172624	-2.92	0.004	-.0841703	-.0165028
2014	-.0784587	.017488	-4.49	0.000	-.1127345	-.0441828
2015	-.0575512	.017752	-3.24	0.001	-.0923445	-.022758
2016	-.1087494	.0178763	-6.08	0.000	-.1437863	-.0737126
2017	-.1002397	.0172734	-5.80	0.000	-.1340949	-.0663845
2018	-.1223679	.0174514	-7.01	0.000	-.156572	-.0881638
2019	-.0884619	.0176352	-5.02	0.000	-.1230263	-.0538974
2020	1045.43	1.626.778	6.43	0.000	7.265.876	1.364.273
Constant	.1390178	.0186793	7.44	0.000	.1024071	.1756284
STUDYING						
White	.2259691	.0099102	22.80	0.000	.2065455	.2453928
19 years old	-.0667408	.0158618	-4.21	0.000	-.0978294	-.0356522
20 years old	-.1890413	.0162539	-11.63	0.000	-.2208983	-.1571843
21 years old	-.266457	.017275	-15.42	0.000	-.3003155	-.2325986
22 years old	-.3659269	.0180039	-20.32	0.000	-.4012139	-.3306399
23 years old	-.4521465	.0188897	-23.94	0.000	-.4891696	-.4151234
24 years old	-.5743106	.019318	-29.73	0.000	-.6121733	-.5364479
25 years old	-.6471835	.0210068	-30.81	0.000	-.6883561	-.6060109
26 years old	-.776886	.0221749	-35.03	0.000	-.8203481	-.733424
27 years old	-.8355255	.0250787	-33.32	0.000	-.8846789	-.7863721
28 years old	-.9312871	.0250484	-37.18	0.000	-.9803811	-.8821932
29 years old	-.0377694	.0010202	-37.02	0.000	-.0397691	-.0357698
8 to 10 years of study	.6973667	.013866	50.29	0.000	.6701898	.7245437
11 or more years of study	.408955	.0128711	31.77	0.000	.383728	.4341819
North	.058611	.0128499	4.56	0.000	.0334256	.0837964
Southeast	-.1659393	.0112658	-14.73	0.000	-.1880198	-.1438587
South	-.1341349	.0131183	-10.23	0.000	-.1598462	-.1084236
MidWest	-.0183032	.0145767	-1.26	0.209	-.046873	.0102665
Urban Area	.2479694	.0099702	24.87	0.000	.2284282	.2675106
Metropolitan Area	.2062841	.0109129	18.90	0.000	.1848951	.227673
Households w/ 6 to 14	-.1733835	.0411703	-4.21	0.000	-.2540758	-.0926911
Households w/ 15 to 17	-.3989667	.0217292	-18.36	0.000	-.4415551	-.3563782
Elderly	-.0604975	.0133683	-4.53	0.000	-.086699	-.0342961
2013	.0463501	.0169773	2.73	0.006	.0130752	.0796251
2014	.0387356	.0169323	2.29	0.022	.0055489	.0719223
2015	.0599674	.0174595	3.43	0.001	.0257474	.0941874
2016	.0641203	.0171871	3.73	0.000	.0304342	.0978064
2017	.0593464	.0171019	3.47	0.001	.0258274	.0928655
2018	.0638916	.0173026	3.69	0.000	.0299792	.097804
2019	.0456527	.0177053	2.58	0.010	.0109509	.0803545
2020	-6.712.713	1.575.593	-4.26	0.000	-9.800.819	-3.624.607

Constant	-.9348679	.0197735	-47.28	0.000	-.9736231	-.8961126
athrho	-.3918888	.0063777	-61.45	0.000	-.4043889	-.3793888
rho	-.3729874	.0054904			-.383698	-.3621765
Wald Test	chi2(1) = 3775.7			Prob > chi2 = 0.0000		

Source: Own Elaboration based on the Continuous PNAD.

TABLE 4: Bivariate Probit for Female in the position of head/partner of the household

FEMALE IN THE POSITION OF HEAD/PARTNER OF THE HOUSEHOLD

	Coef.	Robust Std. Error	z	P>|z|	[95% Conf.	Interval]
WORKING						
White	.0547906	.010363	5.29	0.000	.0344794	.0751018
19 years old	-.2811385	.0256679	-10.95	0.000	-.3314467	-.2308303
20 years old	-.253407	.0249017	-10.18	0.000	-.3022134	-.2046006
21 years old	-.1952246	.0228257	-8.55	0.000	-.2399622	-.1504871
22 years old	-.1496996	.0206794	-7.24	0.000	-.1902305	-.1091687
23 years old	-.1159397	.0204506	-5.67	0.000	-.1560223	-.0758572
24 years old	-.0930493	.019787	-4.70	0.000	-.1318311	-.0542675
25 years old	-.0704336	.0193676	-3.64	0.000	-.1083933	-.0324739
26 years old	-.0345081	.018871	-1.83	0.067	-.0714945	.0024783
27 years old	.0021314	.0187738	0.11	0.910	-.0346646	.0389275
28 years old	.0197435	.0187597	1.05	0.293	-.0170248	.0565119
29 years old	.0036422	.0005779	6.30	0.000	.0025094	.0047749
8 to 10 years of study	.2060294	.0125669	16.39	0.000	.1813988	.23066
11 or more years of study	.619155	.0111359	55.60	0.000	.597329	.6409811
North	-.020355	.0125532	-1.62	0.105	-.0449588	.0042487
Southeast	.2560522	.0118128	21.68	0.000	.2328996	.2792048
South	.433911	.0132087	32.85	0.000	.4080225	.4597995
MidWest	.1772924	.0134751	13.16	0.000	.1508817	.2037032
Urban Area	.3631717	.009313	39.00	0.000	.3449185	.3814249
Metropolitan Area	.1132967	.0117515	9.64	0.000	.0902642	.1363293
Households w/ 6 to 14	-.2320518	.0385877	-6.01	0.000	-.3076824	-.1564213
Households w/ 15 to 17	.0931988	.039583	2.35	0.019	.0156175	.17078
Elderly	-.0871764	.0275663	-3.16	0.002	-.1412054	-.0331473
2013	.02396	.0161095	1.49	0.137	-.0076141	.0555341
2014	.0106082	.0170806	0.62	0.535	-.0228693	.0440856
2015	.0232864	.0177316	1.31	0.189	-.0114668	.0580397
2016	.051555	.0171262	3.01	0.003	.0179882	.0851217
2017	.1038618	.0171601	6.05	0.000	.0702286	.137495
2018	.0864722	.0173696	4.98	0.000	.0524283	.1205161
2019	.1197408	.0178144	6.72	0.000	.0848251	.1546564
2020	-6.054.593	1.536.943	-3.94	0.000	-9.066.947	-3.042.239
Constant	-.5482573	.0188182	-29.13	0.000	-.5851403	-.5113744
STUDYING						
White	.1352121	.0128747	10.50	0.000	.1099781	.160446
19 years old	.3609162	.0293242	12.31	0.000	.3034418	.4183905

20 years old	.2764778	.0285774	9.67	0.000	.2204672	.3324884
21 years old	.227252	.0295894	7.68	0.000	.1692578	.2852462
22 years old	.1449685	.025529	5.68	0.000	.0949326	.1950045
23 years old	.1049015	.02765	3.79	0.000	.0507085	.1590944
24 years old	.0443987	.0241978	1.83	0.067	-.0030282	.0918256
25 years old	-.0292092	.0233971	-1.25	0.212	-.0750667	.0166483
26 years old	.018117	.0242521	0.75	0.455	-.0294162	.0656502
27 years old	-.0887161	.0242456	-3.66	0.000	-.1362367	-.0411955
28 years old	-.1176414	.0227245	-5.18	0.000	-.1621807	-.0731021
29 years old	-.0053962	.0007384	-7.31	0.000	-.0068434	-.003949
8 to 10 years of study	.399001	.0181034	22.04	0.000	.3635189	.434483
11 or more years of study	.4290085	.0160248	26.77	0.000	.3976005	.4604164
North	.1868808	.0156943	11.91	0.000	.1561205	.217641
Southeast	-.1985218	.0155951	-12.73	0.000	-.2290877	-.1679559
South	-.0308659	.016314	-1.89	0.058	-.0628407	.0011089
MidWest	.0068939	.0169309	0.41	0.684	-.0262901	.0400778
Urban Area	.2633516	.0133545	19.72	0.000	.2371774	.2895259
Metropolitan Area	.1680276	.0136546	12.31	0.000	.1412651	.1947901
Households w/ 6 to 14	-.2345099	.0592002	-3.96	0.000	-.3505403	-.1184796
Households w/ 15 to 17	-.0885608	.0509544	-1.74	0.082	-.1884295	.011308
Elderly	.0074266	.0343753	0.22	0.829	-.0599478	.074801
2013	-.0289556	.0203755	-1.42	0.155	-.0688909	.0109797
2014	-.0146428	.0209253	-0.70	0.484	-.0556555	.0263699
2015	-.015404	.0220446	-0.70	0.485	-.0586107	.0278026
2016	.0340938	.0223551	1.53	0.127	-.0097215	.077909
2017	.0532463	.0216181	2.46	0.014	.0108757	.0956169
2018	.0794353	.0220963	3.59	0.000	.0361273	.1227433
2019	.0697271	.022355	3.12	0.002	.025912	.1135422
2020	-2.175.213	1.953.319	-1.11	0.265	-6.003.647	1.653.222
Constant	-1.851.653	.0261664	-70.76	0.000	-1.902.939	-1.800.368
athrho	.0944011	.0073963	12.76	0.000	.0799046	.1088976
rho	.0941217	.0073308			.079735	.1084692
Wald Test	chi2(1) = 162.902			Prob > chi2 = 0.0000		

Source: Own Elaboration based on the Continuous PNAD.

TABLE 5: Bivariate Probit for Female in the position of adult daughter in the household

ADULT DAUGHTER (OFFSPRING)

	Coef.	Robust Std. Error	z	P>|z|	[95% Conf.	Interval]
WORKING						
White	-.0712209	.0108232	-6.58	0.000	-.092434	-.0500078
19 years old	-.0037168	.0177197	-0.21	0.834	-.0384469	.0310132
20 years old	.1041876	.0182349	5.71	0.000	.0684479	.1399273
21 years old	.196193	.0190066	10.32	0.000	.1589407	.2334453
22 years old	.2809046	.0197646	14.21	0.000	.2421667	.3196426
23 years old	.376322	.0210001	17.92	0.000	.3351626	.4174814
24 years old	.4441557	.0246802	18.00	0.000	.3957834	.492528
25 years old	.4745799	.0236725	20.05	0.000	.4281826	.5209773

26 years old	.5575828	.023427	23.80	0.000	.5116666	.6034989
27 years old	.5726232	.025373	22.57	0.000	.5228931	.6223533
28 years old	.6431225	.0254081	25.31	0.000	.5933235	.6929215
29 years old	.0214479	.0008593	24.96	0.000	.0197637	.0231321
8 to 10 years of study	.3987433	.0195492	20.40	0.000	.3604275	.4370591
11 or more years of study	.8277955	.0172739	47.92	0.000	.7939392	.8616517
North	-.0726773	.014153	-5.14	0.000	-.1004167	-.0449379
Southeast	.330586	.0121121	27.29	0.000	.3068467	.3543254
South	.3828495	.0151527	25.27	0.000	.3531508	.4125482
MidWest	.1731936	.0159069	10.89	0.000	.1420167	.2043704
Urban Area	.2967802	.0118703	25.00	0.000	.2735147	.3200456
Metropolitan Area	-.0189502	.0113501	-1.67	0.095	-.041196	.0032957
Households w/ 6 to 14	-.1425589	.0431722	-3.30	0.001	-.227175	-.0579429
Households w/ 15 to 17	.0663667	.0226632	2.93	0.003	.0219476	.1107858
Elderly	-.0783206	.0155392	-5.04	0.000	-.1087768	-.0478644
2013	-.000513	.01808	-0.03	0.977	-.0359491	.0349232
2014	-.0646952	.0182005	-3.55	0.000	-.1003675	-.029023
2015	-.0523233	.0184084	-2.84	0.004	-.088403	-.0162435
2016	-.0412876	.0192413	-2.15	0.032	-.0789999	-.0035753
2017	-.0436607	.0184485	-2.37	0.018	-.079819	-.0075023
2018	-.0640596	.0186143	-3.44	0.001	-.1005429	-.0275762
2019	-.0343195	.0191593	-1.79	0.073	-.0718709	.003232
2020	5.382.015	1.689.789	3.19	0.001	2.070.089	869.394
Constant	-.8627787	.0241601	-35.71	0.000	-.9101317	-.8154257
STUDYING						
White	.2319371	.0107561	21.56	0.000	.2108555	.2530187
19 years old	.0785739	.0172588	4.55	0.000	.0447473	.1124005
20 years old	.0632046	.0178289	3.55	0.000	.0282606	.0981487
21 years old	.0489071	.0186194	2.63	0.009	.0124138	.0854004
22 years old	-.0941751	.0203354	-4.63	0.000	-.1340317	-.0543185
23 years old	-.2705059	.0209211	-12.93	0.000	-.3115105	-.2295012
24 years old	-.372086	.0222017	-16.76	0.000	-.4156005	-.3285714
25 years old	-.4894432	.0237949	-20.57	0.000	-.5360804	-.4428061
26 years old	-.6145909	.0242009	-25.40	0.000	-.6620239	-.567158
27 years old	-.6988986	.0257375	-27.15	0.000	-.7493432	-.6484539
28 years old	-.7785306	.026645	-29.22	0.000	-.8307538	-.7263075
29 years old	-.0304124	.0009963	-30.52	0.000	-.0323652	-.0284596
8 to 10 years of study	.7503322	.0205166	36.57	0.000	.7101204	.790544
11 or more years of study	.2704097	.0186141	14.53	0.000	.2339267	.3068927
North	.0466668	.014364	3.25	0.001	.0185139	.0748197
Southeast	-.1306462	.0120455	-10.85	0.000	-.1542551	-.1070374
South	.0293855	.0146436	2.01	0.045	.0006846	.0580864
MidWest	.067054	.015795	4.25	0.000	.0360963	.0980116
Urban Area	.2161238	.0121382	17.81	0.000	.1923334	.2399142
Metropolitan Area	.1624625	.0112902	14.39	0.000	.1403342	.1845908
Households w/ 6 to 14	-.340736	.0455842	-7.47	0.000	-.4300794	-.2513926

Households w/ 15 to 17	-.2887253	.0244047	-11.83	0.000	-.3365576	-.2408929
Elderly	-.0552238	.0146208	-3.78	0.000	-.08388	-.0265676
2013	.0052254	.0179107	0.29	0.770	-.0298789	.0403297
2014	.0324678	.0182598	1.78	0.075	-.0033207	.0682563
2015	.0256178	.018631	1.38	0.169	-.0108982	.0621339
2016	.0528635	.0196999	2.68	0.007	.0142523	.0914747
2017	.0830074	.018566	4.47	0.000	.0466187	.1193961
2018	.0959749	.0185901	5.16	0.000	.059539	.1324109
2019	.0712168	.0189329	3.76	0.000	.034109	.1083246
2020	-5.961.384	1.678.568	-3.55	0.000	-9.251.317	-2.671.451
Constant	-.8451345	.0249844	-33.83	0.000	-.8941031	-.7961659
athrho	-.2574532	.0064987	-39.62	0.000	-.2701903	-.244716
rho	-.2519119	.0060863			-.2638019	-.2399452
Wald Test	chi2(1) = 1569.45				Prob > chi2 = 0.0000	

Source: Own Elaboration based on the Continuous PNAD.