Drop-out and enforcement under two Transfer Programs *

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Abstract

High-school drop-out is one of the main educational problems in middle-income countries. We analyze the impact of two Conditional Cash Transfer (CCT) programs on high school students' drop-out ratio and how the level of enforcement of the conditionalities affects it. We develop a structural discrete choice model in which the individuals (12-18 years old) who are above or below the CCT's participation threshold decide whether or not to attend school. They also choose hours of market work, time on home production and leisure. Teenagers share these decisions with their parents in a weighted utility function. To estimate the model, we use data covering the period of 2004-2012 in Uruguay, where the two consecutive CCT programs were introduced with different designs. Our novel and large data set includes administrative records and surveys which allow us to construct a panel data for households above and below the threshold qualifying for the CCT, creating a control and treatment group. Our model captures not only the share of individuals studying effectively, working and those who neither study nor work, but also the extensive and intensive market work and home production and the GPA distribution. The policy experiments show if the level of enforcement is higher, they change study for leisure and work, but this last choice has a limit. Finally if the amount of transfer is reduced, the share of those who only study goes down and individuals work more.

JEL codes: I21, I28, I38, J22 .

Keywords: Drop-out, discrete choice, Conditional Cash Transfer, enforcement.

1 Introduction

The aim of this paper is to analyze the high school drop-out dynamic, specifically we focus on those teenagers[1] in families which are affected by income shocks because they participate in Conditional Cash Transfers (CCT) Programs, and how these behavior changes can be modified by the enforcement level. We develop a structural discrete choice model, where the decisions are jointly taken by the teenagers and their parents. To estimate the model parameters, we use data from two programs designed and carried out in Uruguay in the last decade, the Social Assistance National Plan to the Social Emergency (Plan de Asistencia Nacional a la Emergencia, hereinafter PANES) and the Family Allowances (Asignaciones familiares hereinafter AFAM). These program have requirements for the participants and one of those is school attendance for those individuals under 18. However, the level of enforcement in the programs is different not only because of the program design, but also over time.

In recent years the share of teenagers who drop-out of high-school and do not enter the labor market in Uruguay has been a focal point for policy makers and the academia. According to the ILO (2013), in Uruguay which is in an intermediate level in Latin America, one in five individuals aged between 14 and 19 do not study nor work. In the same report, they disentangle the activities that these individuals do, discriminating those who are engaged in home production, those who are jobseekers, and those engaged in other (inactive) activities . The most worrying feature of this figure in Uruguay and Paraguay is the high proportion, about 50%, of those individuals who answer that they spend their time in other (inactive) activities. Combining both statistics shows that Uruguay is the country in the region where the participation of the individuals between 14 and 24 who neither study nor work is 10% of the total. Additionally, UM/CIEA (2013) indicates the share of age between 15 and 29 in the first quintile of income who neither study nor work, doubled in the last 5 years.

High-school drop-out can be measured with those teenagers who start to attend at the beginning of the academic years and then quit high school. If we consider those students who have at least 50 absences during the academic year and are not enrolled in the educative system in the next academic year, the average rate of drop-out in compulsory high school has been around 5% yearly over the last decade[2]. Note that, this is a lower bound given the threshold is

[1] In this paper we consider as teenagers individuals between 12 and 18 years old

[2] The drop-out in the first three years is around 4% and 7% in the 4th one. Source:

high, considering both 50 absences and the non-enrollment .

Moreover, if we analyze the problem by socio-economic stratus the differences are dramatic. The rate of attendance of those teenagers who are in the fifth quintile of income is around 85% in compulsory and non compulsory education, but in the first quintile it is only 60% for compulsory and around only 25% in non compulsory education (Figure 1). This issue shows first a severe inequality problem, and second the incapacity to jointly improve the relative development with the GDP growth. Twenty years ago, Uruguay was at the top of educational performance in Latin America, but after the severe economic and social crisis in 2002-2003 the country has not being able to back that performance even though the rate of growth in the decade was the highest in its history.

The nature of drop-out is essentially dynamic. Poor educational performance, i.e. low Grade Point Average (GPA), in the past has increased its probability (Alexander et al. (2001); Griffin (2002); Christle et al. (2002)). In this specific process there are two types of incentives which play a determinant role: i) individual incentives, poor performances can generate frustration in the individual (Finn, 1989) and can reduce how enjoyable it is to be in school (Stinebrickner and Stinebrickner, 2013); and ii) household incentive through the aspirations of parents, that is the child's educational performance builds parents' incentives. Because they visualize bad signals emitted by their offspring's outcome, they stop investing in education (Li and Mumford, 2009). This investment in education can operate either through the time that parents spend with their children in formative activities such as reading or homework, or encouraging their children to do it (Boca et al., 2012).

The decision to participate in the education system depends on both parents' and teenager's utilities. When the parents' utility is low because of poor educational performance, they can be compensated by more income if their offspring participates in the labor market. In the case of teenagers, their utility depends on leisure time and the time spent on alternative activities (school attendance or work). We assume that the utility that is extracted from attending school depends not only on the GPA but also on course achievement.

In their seminal paper Eckstein and Wolpin (1999) develop and estimate a structural model of work decision and high school attendance. They exploit the NLSY79[3] to know who drops out and when they do so. They found that those who work contemporaneously while they attend high school have lower levels

http://www.anep.edu.uy/observatorio/

[3]The National Longitudinal Survey of Youth 1979

in their school performance. When they analyze some policy experiments they assess some measures, such as work prohibition which has had some limited success in improving school outcomes. In our paper, we deal with a particular group of teenagers who are at the bottom of the income distribution and a significant share of them neither study nor work, which introduces a particular feature into our model.

Stinebrickner and Stinebrickner (2013) estimate a structural dynamic model to understand and quantify the different channels from which the college student drops out. They point out the role of GPA performance in this decision. This paper gives us many insights into the dynamic of the GPA, but the nature of the decision is quite different given that they studied adults and we are working with teenagers.

The economic and financial crisis in Uruguay in 2002 generated a high increase in unemployment and poverty. For this reason, in 2005 the PANES program was implemented . A fixed cash transfer was directed to the household regardless of the number of members. The target population of this program was the first quintile of the poorest population. Among the required conditions was attendance at school, although there is evidence of the low level of enforcement and compliance of the requirements (Labat, 2012). In December 2007, this program was ended. From the beginning it had been proposed as transitory and the families with children under 18 years were integrated into the AFAM program. This last program is also a CCT, with similar requirements, but it is part of the Social Protection System. In this case, the target population is to cover all poor households with children under 18. The amount of the cash transfer depends on the number of children and if they attend elementary or high school. This latter program include all the PANES beneficiaries with children under 18. The income threshold is higher than in PANES, and the amount of the transfer is similar but in the case of AFAM, it obviously has a bigger dispersion by household than AFAM.

The CCTs programs operate on the probability of drop-outs by two mechanisms. First, in a direct way, due to the fact that one of the conditions to participate in these programs refers to school attendance. Second, the programs indirectly generate behavioral changes based on a variation of incentives, decreasing the investment required to study or the opportunity cost of studying in relation to labor activities.

Todd and Wolpin (2006) analyze the effect of a transfer program PROGRESA in Mexico on child schooling and fertility. They develop a dynamic

behavioral model where the parents first, and then the teenagers decide either to work or attend school and fertility behavior given the existence of a transfer program. Additionally, they perform some contrafactual policy alternatives and propose a different scheme which leads to better school performance. Attanasio et al. (2010) also use a structural model to evaluate the PROGRESA in Mexico. They exploit a randomized experiment to assess where the program is more effective and at which points it could be improved. Our paper goes one step further: we work with two transfer programs and we analyze how enforcement plays a role in school participation. Finally, we also include a grade dynamic in the model.

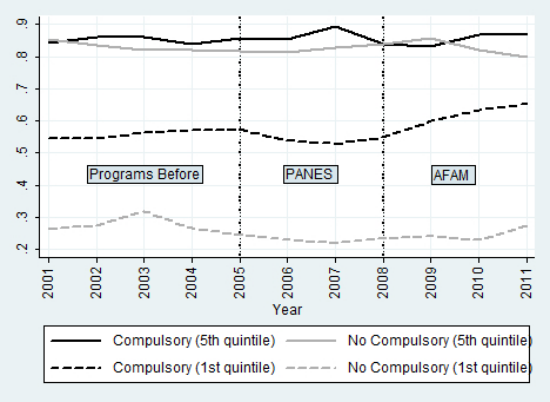

Figure 1: Rate of High School Attendance in the first and the fifth quintile and year. Source: Continuos Household Survey

Enforcement is a concept that has been gaining a crucial role in public economic literature. It involves not only the resources that the government invests to carry out the programs, but also the individual perception about the quality and its efficiency. The individual enforcement perception and their externalities are introduced by Alm et al. (2009) in a paper about tax compliance in a lab experiment, and they were studied by Rincke and Traxler (2011) in an empirical paper about TV licenses in Austria. They identified enforcement spillovers where the activity of inspectors leads on average to an unsolicited registration for every three effectively enforced registrations.

Kaufmann et al. (2012) assess the enforcement relevance in CCT programs focused on income requirement with data from the *Bolsa familia* Program in Brazil. These authors found that people learn about the program enforcement

not only with their own experience, but also with their peer experience. They found that the changes in behavior depend on public and private signals about the enforcement quality, and this feature is a key point in the program's effectiveness.

On comparing both programs, there are some similarities and many differences as is shown in Table 1. Both programs target the beneficiaries through a Critical Gap Index (Índice de Carencias Críticas, ICC in spanish) and the formal income per capita of the household. The ICC identifies the probability that the household is vulnerable, then the households above a threshold are eligible for the program. Both PANES and AFAM have the household as an objective, but the AFAM has a wider coverage. Both programs use different thresholds with PANES targeting the first quintile of the poorest population and AFAM putting the emphasis on all the children, targeting the 500,000 poorest ones.

The main differences are the amount of the transfer and the enforcement mechanism. The transfer in PANES is the same amount for all the households, a lump sum one. Conversely, the AFAM transfer is linked with the number of household members and the educative achievement. The first child of the household receives an amount, which is multiplied by 0.6 for the other younger child. If the children attend high-school they receive 30% more as a bonus.

The enforcement in both programs is different but neither is efficient in regulating the requirements (specifically education and health), given they are not a main concern for the policy maker. The enforcement is based on the individual perception that if they not hold the requirement they will lose the transfer. In terms of perception, PANES enforcement is higher than that of AFAM, because the probability of losing the entire transfer depends on any single children. Conversely, In AFAM if one of the children drops out of the education system, the household will lose only the part of the transfer that corresponds to that child.

However, the enforcement perception can be understood as higher in the AFAM case, because when the children start high-school the family has to present the enrollment certificate in order to receive the 30% bonus. In 2013, the government checked in April if the children were enrolled in the educative system, and in September checked again the number of days that they effectively attend school. This change led to the suspension of some individuals from the program and could spillover to other families through the enforcement perception.

Table 1: Program design

	PANES	AFAM
Targeting mechanism	Critical Gap Index & Formal income per capita	Critical Gap Index & Formal income per capita
Population	First quintile of poor households	Poor households with children
Transfer	Lump sum per household	Per children but decresing with the number of children in the household and an extra to be in high-school.
Enforcement	Weak regulation. Perception based. The household loses the transfer if one member does not meet the requirements.	Weak regulation. Perception based. The household loses the part of the transfer of the member that does not meet the requirements. Regulation when the children enter high school. In 2013 strong monitoring.

In 2013, due to the fact the authorities increased the regulation, in April they cancelled 26,000 households (6% of the total) because the children were not enrolled in the school system, and in November they cancelled 10,500 more because the children did not attend enough days during the year. Among these transfer cancellations 40% were for children who should have attended high-school[4].

The income requirement has been monitored in both PANES and AFAM programs, but only the formal income which is registered through the labor records. All those incomes that the families have from informal jobs cannot be monitored by the government. Around 5% of the PANES and AFAM beneficiaries exit from the programs because they are above the formal income threshold. The enforcement of this requirement is widely known and enters into the decision function of the individual[5].

Our paper analyzes **the dynamic of drop-out in compulsory and non compulsory education and, how it is affected by the shocks of income and the attendance enforcement when the households have access to one (or both) of the CCT programs.** We analyze individuals who go through the high school when there are two different programs, PANES and AFAM, which have the same objective of encouraging school participation but the enforcement perception is different.

[4]In 2014, the enforcement agency continues with this policy

[5]Similar features are identified by the World-Bank (2010) for Colombia

We will focus on three points which are not analyzed in the literature: first, how is the utility formation for those who neither study nor work; second, what is the role of the time of home production, and finally we analyze how the CCT program is designed, particularly how is the function that determines the loss of the transfer and the level of enforcement that the government agency applies.

The rest of the paper is organized as follows. In section 2 we describe the data bases and the main descriptive statistics. In section 3 the model is developed. In section 4 the estimation strategy is presented. In section 5 we present the results and in section 6 we perform some policy experiments. Finally section 7 concludes.

2 The Data and Descriptive Statistics

Educational performance is a heterogeneous phenomenon, richer teenagers attend more classes than poorer ones, and even in compulsory education the difference is quite significant (see Figure 1). Around 85% of the richer teenagers attend compulsory and non-compulsory high-school, and around 60% of poorer teenagers attend compulsory and 25% non-compulsory high-school. The effect of the crisis can be seen in the decrease in attendance in the poorest ones; although this process did not stop in 2007 even though the PANES had been implemented. In 2011, when the AFAM was in progress, the attendance increased significantly, even when demand for labor was the highest in the history of this country.

This paper focused on the poorest population which is around the threshold determined to participate in the CCT programs. The information used in this paper comes from administrative records and surveys that can be combined using the national ID number of the person. They are: the follow-up survey of PANES (FSP) and the high-school education record (SER). The PANES is a transient program that started in April 2005 and ended in December 2007. The most important component was a lump sum transfer [6] which is independent of the number of household members[7]. The target population of this program was the first quintile of the poorest households.

The FSP consists of data collected as part of the evaluation of the PANES program. We have two waves of this survey. The first wave is primarily from 2006, although part of it corresponds to 2007, and the second one corresponds

[6] Ingreso ciudadano in Uruguay

[7] In addition, households with children received a food card (in-kind transfer) where amount depended on the number of children in the household

to 2008. In this follow-up survey, it is possible to identify the beneficiaries of the program (treatment group) and those who applied but were not selected (control group). The beneficiary selection criterion arises from the critical gap index. This survey considers only the population that is around the cutoff that identifies the treated and untreated groups.

The AFAM transfer depends on the number of children in the household and the educative level. The amount for children depends on whether they are in high-school (30% bonus) and for the younger members of the household to the transfers a factor of 0.6 is applied.

In the same fashion as FSP, the Follow-up survey for AFAM (FSA) is an instrument used to evaluate the AFAM program. In this case, we have only one wave in 2011. The criteria allow us to identify the treated and control population in a similar way to the FSP, through the critical gap index and formal per capita income threshold.

To complement the FSP and FSA data, they are combined with information from SER, which contains data on the educational performance of students in secondary education, the Grade Point Average (GPA). This cycle starts at 12 years of age, after 6 years of primary education. This education stage is divided into two cycles, the first three years correspond to the basic cycle (compulsory education) and the last three to the advanced cycle (non compulsory high-school)[8]. Additionally, we estimate the home production time with the Use of Time Survey carried out in 2008 by the National Statistics Institute[9].

In Table 2, we show the mean and standard deviation of the main variables during the period of both CCT programs. In the first panel, the data about PANES can be observed. We consider 3090 observations of 12 to 18 year old individuals. Of this population 75% attended the school system. However only 55% attended compulsory high-school school (1716 observations) and 44% attended non-compulsory high-school (1362 observations). Of these cases we can only locate 707 students in the SER due to the absence of an ID. We do not observe significant changes in the distribution of variables as a consequence of the missing cases. In our sample 70% of the population were treated, nearly 65% carried out home production and 6% were working. Specific information about educational performance shows that 35% fail the course that they attend (obtain an F) and only 20% obtained a GPA of A. Finally, less than 9% attended 5th and 6th grade of high-school.

[8] Ciclo básico y bachillerato diversificado respectively

[9] The result of the estimation model is presented in the Table A.4

In the second panel we show data about the AFAM period. There, 82% attended formal education (7 points more than in the PANES). We consider 2796 individuals between 12 and 18 years old, and we have high-school records for 952 of them. The age and the treated population is similar to PANES. The estimation of home production is also quite similar. However, the AFAM population work less than the PANES one, 3 points less.

				PANES					
		FSP		HS attendance (FSP)			FSP and SER		
	Obs.	Mean	S.D	Obs.	Mean	S.D	Obs.	Mean	S.D
Age 12-18									
Attendance	3090	0.746	0.435						
Age	3093	14.83	2.014	1330	14.60	1.769	707	14.11	1.566
Treatment	3093	0.701	0.458	1330	0.689	0.463	707	0.680	0.466
Home Production									
0	3079	0.333	0.471	1322	0.332	0.471	703	0.354	0.478
0-10	3079	0.315	0.464	1322	0.378	0.485	703	0.404	0.491
> 10	3079	0.351	0.477	1322	0.290	0.453	703	0.242	0.428
GPA									
F							707	0.349	0.477
B							707	0.444	0.497
A							707	0.206	0.405
Grade									
1-2							707	0.584	0.493
3-4							707	0.328	0.470
5-6							707	0.088	0.283
Age 14-18									
Hours									
0	2093	0.823	0.381	903	0.905	0.294	423	0.941	0.236
0-15	2093	0.062	0.241	903	0.041	0.198	423	0.031	0.173
> 15	2093	0.097	0.296	903	0.043	0.203	423	0.021	0.144
				AFAM					
		FSA		HS attendance (FSA)			FSA and SER		
	Obs.	Mean	S.D	Obs.	Mean	S.D	Obs.	Mean	S.D
Age 12-18									
Attendance	2796	0.821	0.382						
Age	2936	14.93	1.0	1555	14.82	1.72	952	14.43	1.47
Treatment	2936	0.731	0,443	1555	0.692	0.462	952	0.721	0.448
Home Production									
0	2641	0.141	0.348	1484	0.127	0.333	917	0.154	0.361
0-10	2641	0.541	0.498	1484	0.582	0.493	917	0.581	0.493
> 10	2641	0.318	0.466	1484	0.291	0.454	917	0.265	0.441
Grade									
1-2							952	0.574	0.494
3-4							952	0.425	0.494
Age 14-18									
Hours									
0	1901	0.868	0.338	1116	0.945	0.227	644	0.973	0.160
0-15	1901	0.03	0.18 0	1116	0.02	0.142	644	0.01	0.103
> 15	1901	0.10	0.297	1116	0.04	0.181	644	0.016	0.123

Table 2: Descriptive Statistics. Source: FSP, FSA and SER.

We define four states with the combination of studying and working choices. In Table 3, we present the distribution of hours worked and home production by age. Furthermore, we show the distribution of the states that are of our interest, which are teenagers who only study (sn), those who study and work (sw), those who neither study nor work (nn), and those who only work (nw). In this case

we observe the number of teenagers who only study decreases significantly with age, but the trend is increasing for those who neither attend school nor work. Additionally, the percentage of those who study and work is always less than 10%. In the case of hours worked we note that it increases with age as expected. The increase in hours allocated to home production presents an irregular trend.

Comparing both programs, during AFAM there are more teenagers studying and not working and this is because of the decrease in those who neither study nor work.

PANES										
	State				Hours Worked			Home Production		
	sn	*sw*	*nn*	*nw*	0	0-15	> 15	0	0-10	> 10
12-13	0.82	-.-	0.18	-.-	-.-	-.-	-.-	0.44	0.49	0.08
14-15	0.77	0.05	0.16	0.03	0.93	0.04	0.03	0.02	0.60	0.38
> 16	0.51	0.06	0.28	0.15	0.80	0.08	0.12	0.12	0.48	0.40
AFAM										
	State				Hours Worked			Home Production		
	sn	*sw*	*nn*	*nw*	0	0-15	> 15	0	0-10	> 10
12-13	0.96	-.-	0.04	-.-	-.-	-.-	-.-	0.40	0.52	0.08
14-15	0.86	0.02	0.10	0.03	0.95	0.02	0.03	0.08	0.58	0.34
> 16	0.61	0.07	0.20	0.12	0.81	0.04	0.15	0.00	0.52	0.48

Table 3: Decisions by group of age. Source: FSP, FSA and SER.

The distribution of GPA by age and grade is presented in Table 4. The grade performance is worse when students attend higher level courses and with their age. About 64% of those older than 16 years old and 72% of those enrolled in 5th and 6th grade fail the course. This difference is due to the fact that students are enrolled in lower courses that would correspond to their age because of repeated fails. The percentage that obtains the best GPA is constant between first and fourth grade (20%), and decreases to only 10% in the last two grades.

GPA	Age			Grade		
	12-13	14-15	> 16	1-2	3-4	5-6
F	0.22	0.40	0.64	0.34	0.33	0.72
B	0.50	0.43	0.26	0.44	0.46	0.18
A	0.28	0.17	0.10	0.22	0.21	0.10
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 4: The grades distribution by age group. Source: FSP and SER.

Finally, the transition rates between states in consecutive years are shown in Table 5. The state *sn* is more stable than the others, about one third of the population is only studying and remains there the next year. In any other case the proportion of the population in the same state exceeds 10%. The largest movements occur to study exclusively from all the other states. Of those *sw* in $t-1$, the next year about 60% stop working and continue studying, this

percentage is 28% and 43% for the case of nn and sw, respectively.

	sn_{t-1}	sw_{t-1}	nn_{t-1}	nw_{t-1}	Total
sn_t	54.6	3.1	2.3	5.0	65.0
sw_t	4.4	0.6	0.4	0.6	5.9
nn_t	10.7	0.9	4.2	3.2	19.1
nw_t	4.9	0.7	1.5	2.8	10.0
Total	74.6	5.2	8.5	11.7	100.0

State Distribution of t on t-1

	sn_{t-1}	sw_{t-1}	nn_{t-1}	nw_{t-1}
sn_t	73.2	58.4	27.8	42.9
sw_t	5.9	10.9	4.3	5.4
nn_t	14.3	16.8	50.0	27.7
nw_t	6.6	13.9	17.9	24.1
Total	100.0	100.0	100.0	100.0

Table 5: Transitions of states. Source: FSP, FSA and SER.

3 Model

We develop a dynamic model of sequential decisions under uncertainty which is based on the basic model of the seminal paper of Eckstein and Wolpin (1999). Household utility depends on the time allocation of the teenager, whether he attends school, produces at home, works in the market or enjoys leisure. Additionally, that allocation determines if the household receives (or continues receiving) the CCT. Here we consider the utility that the teenager brings to the household weighting the utility that the teenager directly enjoys (U_{ch}), and the utility that the parents (U_p) enjoy through the teenager's time allocation.

The weight (γ_t) depends on the age of the teenager, if the age is below 14 the parent's weight is relatively higher than when they are over 14. The teenager values school attendance, market work and leisure time (total time minus the hours of market work and home production). The parents value school attendance, market work and home production.

$$U_t = \gamma_t U_{ch,t} + (1 - \gamma_t) U_{p,t} \tag{1}$$

This utility function could be thought of as the result of a bargaining process between teenager and parents about the teenager's time allocation where the bargaining power changes with the teenager's age. In the literature of family economics this formalization is used in the decision making of couples (Browning et al., 2014), not of teenagers.

Figure 2 shows the choices that the household can take. The decision is how to split the time between school attendance, home production, leisure and market work, when they are legally able to work.

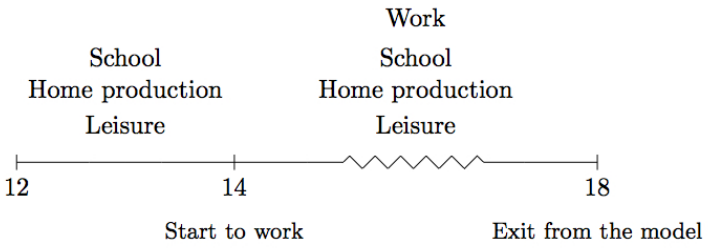

Figure 2: Timeline of the individual in the model by age (t)

Given the total hours available L_1 (73 hours per week[10]) for those who attend school, L_2 (98 hours per week[11]) for those who do not attend the rewards in each situation $k = \{sn, sw, nn, nw\}$ depend on the value of attending school (b^s), the value of leisure (b^n), the value of working in the market (ωh^w), and the value of home production ($b^{hp}h^{hp}$). The utility is a weighted function of the teenager and parents' utility function.

The value when the teenager attends school and does not work (U^{sn}) includes the value of leisure, the value of studying for both, teenagers and parents; and the value of home production in the case of the utility of the parents. The value of studying and working (U^{sw}) includes the rewards of working (ωh^w), which is split between the teenager and their parents. The value of neither studying nor working (U^{nn}) includes only leisure and home production. The value of not studying and working includes home production and rewards of working (U^{nw}). Finally, the value of the CCT is included in the parents utility function, and it is multiplied by the enforcement function $q(\eta, t)$ if the teenagers are not attending formal education. This function depends on a quality parameter, which summarizes the enforcement spillover of the program. The transfer depends on the program and whether the family is above the formal income, insofar that income enforcement is perfect.

Teenager utility comes from leisure, school attendance and work in the

[10]This computation is the result of considering that they have 14 hours available per day (after considering sleep, food and clean time) minus 25 weekly hours to attend school and study

[11]This computation is the result of considering that they have14 hours available per day

market:

$$\begin{aligned} U^{sn}_{ch,t} &= B^{n}_{1,t}\Big(L_1 - h^{hp}_t\Big) + B^{s}_{1,t} \\ U^{sw}_{ch,t} &= B^{n}_{1,t}\Big(L_1 - h^{w}_t - h^{hp}_t\Big) + B^{s}_{1,t} + \omega_t h^{w}_t \\ U^{nn}_{ch,t} &= B^{n}_{1,t}\Big(L_2 - h^{hp}_t\Big) \\ U^{nw}_{ch,t} &= B^{n}_{1,t}\Big(L_2 - h^{w}_t - h^{hp}_t\Big) + \omega_t h^{w}_t \end{aligned} \tag{2}$$

Parent utility comes from school attendance, time allocated in home production, time working in the market and the CCT:

$$\begin{aligned} U^{sn}_{p,t} &= B^{s}_{2,t} + B^{hp}(h^{hp}_t) + T_t \\ U^{sw}_{p,t} &= B^{s}_{2,t} + B^{hp}(h^{hp}_t) + \omega_t h^{w}_t + T_t \\ U^{nn}_{p,t} &= B^{hp}(h^{hp}_t) + \big(1 - q(\eta, t)\big)T_t \\ U^{nw}_{p,t} &= B^{hp}(h^{hp}_t) + \omega_t h^{w}_t + \big(1 - q(\eta, t)\big)T_t \end{aligned} \tag{3}$$

The value of the leisure for the teenager depends positively on the age, and it is convex in the hours that they do not spend working in the market, on home production, or in formal education.

$$B^{n}_{1t}(h) = b^{n}_{1t}(h^{n})^{b^{n}_{2}} + b^{n}_{11} \tag{4}$$

The reward in school depends on the grades in the last period and the level of education achieved, the hours spent working in the market and on home production and two parameters, one for the teenager and other for the parents.

$$B^{s}_{1t} = b^{s}_{1}\left(gpa_{t-1}, E_{t-1}, h^{hp}, h^{hw}\right) + \epsilon^{s}_{t} \tag{5}$$

$$B^{s}_{2t} = b^{s}_{2}\left(gpa_{t-1}, E_{t-1}\right) + \epsilon^{s}_{t} \tag{6}$$

The enforcement quality function depends on a parameter which is different for the two CCT programs and also the lapse of time that the program is carried on. We work with the hypothesis that over time the credibility of the

enforcement is decreasing with the age of the program.

$$q(\eta,t) \in [0,1] \quad \text{if} \quad q(\eta,t) = \begin{cases} 0 & \text{if enforcement does not exist} \\ 1 & \text{if full enforcement} \end{cases}$$

The grades follow an ordered logit process which depends on the age, the lag of grades, the work hours, the home production hours and the CCT. The grades can take three values (A, B and F) the lower one means that the student fails the course.

$$\begin{aligned} gpa^* &= X\beta + e \qquad e/X \sim N(0,1) \\ gpa_t &= F \quad \text{if} \quad gpa^* < \nu_1 \\ gpa_t &= B \quad \text{if} \quad \nu_1 < gpa^* < \nu_2 \\ gpa_t &= A \quad \text{if} \quad gpa^* > \nu_2 \end{aligned}$$

The CCT can be received by a household where the teenager attends school in the first period. Then, in the following periods the household can continue receiving the CCT which depends on school attendance, an income shock and the government enforcement. The probability of losing the income of CCT programs is p_1 if the student is not working, and p_2 for those who are working. This percentage is estimated in two groups, one for those who are between 12 and 14, and another for those between 15 and 17 years old.

$$\begin{aligned} P(CCT = 0/CCT = 1, nw) &= p_1(t) \\ P(CCT = 0/CCT = 1, w) &= p_2(t) \end{aligned} \tag{7}$$

The reward of the home production depends on parameters b_t^{hp}, the age (t) and the hours on home production(h^{hp}):

$$B_t^{hp}(h) = b_{1t}^{hp} * t * (h^{hp})^{b_2^{hp}} \tag{8}$$

The wage in each moment is determined by the experience (t), the school attendance (At_t), the level of education achieved (CS_{t-1}[12], B_{t-1}[13]), the time

[12]Compulsory high school (Ciclo básico in spanish)
[13]Non compulsory high school (Bachillerato in spanish)

spent on home production and whether the household receives the CCT transfer:

$$\ln \omega_t = \beta_0 + \beta_1(t) + \beta_2 At_t + \beta_3 CS_{t-1} + \beta_4 B_{t-1} + \beta_5 h_t^{hp} + \beta_6 CCT + \beta_7 Mills + \epsilon_t^w \tag{9}$$

$$\left(\epsilon_t^s, \epsilon_t^w\right) \sim N(\mu, \Sigma) \quad \mu = (\mu_s, \mu_w) \quad \Sigma = \begin{pmatrix} \sigma_s & 0 \\ 0 & \sigma_w \end{pmatrix} \tag{10}$$

The Bellman Equations are shown in Equation 11 for each choice and depend on the vectoe of states S_t, which are C_t the accumulated course, the work hours h^w, the home production hours h^{hp}, the gpa, the age, the CCT (control or treatment) and the shocks (ϵ^s and ϵ^w):

$$\begin{aligned} V_t(S_t) &= \max \mathbb{E}\left[\sum_{\tau=t}^{T} \beta^{\tau-t} \sum_k U_t^k d_t^k / S_t\right] \qquad k = \{sn, sw, nn, nw\} \\ S_t &= \left\{C_t, h^w, h^{hp}, gpa, t, T, \epsilon_t' s\right\} \end{aligned} \tag{11}$$

$$V_t(S_t) = U_t^k + \beta \mathbb{E}\left[V_{t+1}(S_{t+1}) | S_t d_t\right] \tag{12}$$

The value function $t < 18$ of the different choices are:

$$V_t(S_t) = \max\left[V_t^{sn}(S_t), V_t^{sw}(S_t), V_t^{nn}(S_t), V_t^{nw}(S_t)\right] \tag{13}$$

As in Attanasio et al. (2010), the value function at $t = 18$ is $V_{18}(S_{18})$ which depends on the educational achievement, given that CS is the completed compulsory school and B is the completed non compulsory school. The parameters are estimated in the model.

$$V_{18}(S_{18}) = \frac{\alpha_1}{1 + e^{-\alpha_2 CS_{18} - \alpha_3 B_{18} - \alpha_4 E_{t-1}}} \tag{14}$$

4 Estimation

The individuals used to estimate the model can enter in two moments, at the beginning of PANES (then they are in that program for 2 years, and then receive AFAM for a maximum of 4 years) or at the beginning of AFAM (and they are in that program for a maximum of 6 years). They can enter at any age, but the exit is always at 18 years-old. At the entrance the age distribution, the educational level and treated and control status by program are shown in

Tables A.1, A.2 and A.3, and these characteristics are the initial heterogeneity in the model.

Comparing the background of the teenagers when they enter in the programs, there are some slight differences. The control teenagers have a slightly better educational background than the treated ones. Moreover, the AFAM individuals have a better background than the PANES ones, note that the AFAM program is more extensive than the PANES and, consequently, the AFAM teenagers have a better socioeconomic situation and a better educational background. We can observe in Tables A.2 and A.3, that those teenagers who have not completed primary school are at least 10 points lower when we consider the AFAM population in comparison with the PANES population.

The estimation strategy has two steps. In the first one we estimate out of the model the wage function, the GPA function and transition. The second step is the estimation of a group of parameters within the model through the Simulated Method of Moments (SMM).

The parameters estimated out of the model are shown in Tables A.5 - A.7. In the wage equation (Table A.5) we observe that wages and education are negatively correlated, because the wages are determined by specific experience and those who have more education lack this experience. Home production has a positive correlation with wage because there is a complementarity between the intensity in the labor market and the amount of tasks that the teenager does at home.

The GPA dynamics are shown in Table A.6. Performance in $t-1$ has a positive impact on t. The probability of increasing GPA in t is similar for age, but people over 14 years do not change their probability in t when obtaining F or B in $t-1$. Neither home production time nor the market work time coefficients are significant.

Finally, we perform a multinomial logit to estimate the transition between states in the model. As is expected, not only is there some stability of states between t and $t-1$, but also there are significant movements between nn and nw (on both sides). The probability of losing the CCT is estimated using the administrative records and setting in p_1 as 5.08% and 3.97% and p_2 as 4.69% and 5.88% at the ages of 12-14 and 15-17 respectively.

The second step of the estimation is through the SMM. To construct the list of moments we take into consideration the treated and control group. The first one is defined as those who receive the CCT in the year of entrance in the model, and the latter one the others. We construct the mean for the four

states sn, sw, nn, and nw by age and for both programs (PANES and AFAM). Additionally, we consider as moments the time spent on home production, the time working in the market and the grades by age, program and for control and treated populations. These parameters are presented in Tables 7 and 8.

Total Hours	
L_1 (Study)	3536
L_2 (Non Study)	5096
Home production hours	
HP_1	312
HP_2	624
Market Work hours	
W_1	520
W_2	1040

Table 6: Calibration: Hours per year (L_2 means 14 hours per day), (L_1 is equal to L_2 minus 25 hours to attend school)

The total number of hours that the teenagers have to spend is 98 hours per week. If they attend school, they spend 25 hours in that activity. Then they can choose to do some home production 0, 6 or 12 hours per week and work in the market 0, 10 or 20 hours per week. The values per year are shown in Table 6.

	12 -13	14 -15	16-17
γ_t	0.3082	0.5808	0.7613
	(0.000344)	*(0.00235)*	*(0.00255)*
b^n_{1t}	5.42	90.68	90.68
	(0.112)	*(31.76)*	*(31.76)*
b^n_2	8.99	8.99	8.99
	(0.343)	*(0.343)*	*(0.343)*
b^{hp}_{1t}	262.95	121.69	198.03
	(37.15)	*(6.25)*	*(10.34)*
b^{hp}_2	6.89	6.89	6.89
	(0.228)	*(0.228)*	*(0.228)*

Table 7: Estimation: Parameters estimated by SMM

The parameter estimation shows that the leisure values increase with age and obviously with the number of hours that the teenagers have available after the school decision, as is shown in Figure A.1. The value of home production does not show a monotone behavior with age (Figure A.2). In Figure A.3 there is the value of studying which increases in the GPA and in the grade achievement.

The value that the individuals have at the age of 18 depends on equation 14

Parameter	Value	Std Deviation
β	0.9152	*(0.0061)*
School utility		
b_1	16382.4	*(895.57)*
b_2	10450.0	*(369.15)*
Enforcement parameters		
η_{PANES}	0.057	*(0.0012)*
η_{AFAM}	0.1109	*(0.0092)*
Shocks : means and standard deviation		
μ_s	0	Calibrated
μ_w	-0.838	*(0.0021)*
σ_s	411.26	*(640.38)*
σ_w	0.5514	*(0.0015)*
Final utility function values		
α_1	23024	*(2059.66)*
α_2	0.5315	*(0.0012)*
α_3	0.5555	*(0.00092)*
α_4	0.5355	*(0.00083)*

Table 8: Estimation: Parameters estimated by SMM

and the set of parameters in Table 8, where α_1 is the parameter of Compulsory High school achievement[14], α_2 the Non compulsory achievement[15] and α_3 the parameter of each grade achievement. The values are shown in Figure A.4

5 Results

In this section, we present how well the model fits with the main moments from the data. In the set of Tables 9 - 12 we show how well the model fits with the states (*sn*, *sw*, *nn* and *nw*) in both programs for treated and control populations. The model fits well with the only exception being for control populations (at the age of 16 and 17) where there is an underestimation of *sn* and an overestimation of *nn*. As we analyze the initial heterogeneity, these teenagers have better conditions than the treated ones. In the model, using the same parametrization could induce these mismatches. These mismatches are observed in depth in the case of AFAM.

In Tables 9 - 12 we can also observe also that the working condition is a bit overestimated, in particular the teenagers in the model have a lot of incentives to only work, and at the same time the state study and working cannot match the data at that age. In sum, the model can capture well the decision to work

[14]Ciclo básico
[15]Bachillerato

	sn		*sw*		*nn*		*nw*	
	Data	Model	Data	Model	Data	Model	Data	Model
12	1	0.9819	-.-	-.-	0	0.0181	-.-	-.-
13	0.965	0.9930	-.-	-.-	0.035	0.0070	-.-	-.-
14	0.759	0.7216	0.0560	0.0067	0.167	0.1998	0.018	0.0719
15	0.764	0.7703	0.0430	0.0071	0.134	0.0990	0.059	0.1237
16	0.627	0.5929	0.0630	0.0007	0.233	0.2340	0.077	0.1724
17	0.521	0.5470	0.0660	0.0000	0.266	0.2140	0.147	0.2391

Table 9: Model: PANES Treated

or not, but it has more problems to disentangle those who work and study, from those who do not.

	sn		*sw*		*nn*		*nw*	
	Data	Model	Data	Model	Data	Model	Data	Model
12	0.951	0.9978	-.-	-.-	0.049	0.0022	-.-	-.-
13	0.946	0.9601	-.-	-.-	0.054	0.0399	-.-	-.-
14	0.861	0.7271	0.031	0.0077	0.108	0.1967	0	0.0685
15	0.748	0.6994	0.038	0.0202	0.206	0.1233	0.008	0.1571
16	0.630	0.5090	0.076	0.0022	0.219	0.2698	0.075	0.2189
17	0.524	0.5154	0.04	0.0000	0.301	0.2125	0.135	0.2721

Table 10: Model fit: PANES Control

In the comparison of treated and control teenagers, the model captures a slightly higher attendance rate for the treated ones. The construction of the paths depends on the initial heterogeneity, which is better for the control ones. The rewards are also a little higher than the control ones because in the data there is a selection process and those teenagers that attend are the better ones.

	sn		*sw*		*nn*		*nw*	
	Data	Model	Data	Model	Data	Model	Data	Model
12	0.985	0.9917	-.-	-.-	0.015	0.0083	-.-	-.-
13	0.924	0.9936	-.-	-.-	0.076	0.0064	-.-	-.-
14	0.880	0.7742	0.006	0.0058	0.092	0.1565	0.020	0.0635
15	0.805	0.8282	0.025	0.0048	0.131	0.0722	0.039	0.0948
16	0.716	0.6617	0.043	0.0005	0.167	0.1751	0.074	0.1626
17	0.608	0.6114	0.057	0.0000	0.223	0.1553	0.112	0.2333

Table 11: Model fit: AFAM treated

The model also properly fits the home production, the work behavior and the grade achievement as is shown in Tables A.8-A.10. In the case of the home production the model can disentangle the teenagers that do less and more than

10 hours per week. The model is able to replicate the trend by age in the two time brackets, in the first one there is no clear trend and in the second one it is clearly increasing by age. In the case of work hours, the model has more problems to fit the market work hours properly, because as we mentioned before the model overestimates the more intensive workers, and underestimates the less intensive ones.

	sn		*sw*		*nn*		*nw*	
	Data	Model	Data	Model	Data	Model	Data	Model
12	1	0.9930	-.-	-.-	0	0.0070	-.-	-.-
13	1	0.9717	-.-	-.-	0	0.0283	-.-	-.-
14	0.908	0.7903	0.042	0.0078	0.050	0.1695	0	0.0325
15	0.871	0.7858	0.008	0.0291	0.081	0.1091	0.040	0.0761
16	0.807	0.6252	0.038	0.0031	0.115	0.2604	0.038	0.1113
17	0.767	0.6674	0.048	0.0000	0.146	0.1784	0.039	0.1542

Table 12: Model fit: AFAM control

The model captures well the GPA behavior along the ages of the teenagers as is shown in Table A.10. Not only is the trend well captured where A and B are decreasing, and F is increasing, but also the level. Note that, at the age of 12 the percentages are 14.2%, 54.0% and 31.8% for the GPA, F, B and A respectively and those grades at the age of 17 are 57.0%, 31.6% and 11.3%.

6 Policy experiments

In the section we perform policy experiments with the enforcement parameters, firstly we set the enforcement parameters 50 points higher, and secondly we set the enforcement parameter at the maximum. Finally, we perform an experiment reducing the amount of the transfers.

Firstly, we set the enforcement parameters η_{PANES} at 0.557 instead at 0.057, and η_{AFAM} at 0.611 instead at 0.111. In Table 13 we observe the effect of the policy experiment in both programs , observing the difference-difference between treated and control, and between policy and benchmark. There is a rise in the teenagers that only study and those who study and work and a fall those who do not study or work and those who do not study and work. These rises are higher in PANES than AFAM for the younger ones, due to the fact that the teenagers in the first program have a better background than in the second one.

Secondly, we set the enforcement parameters at the maximum (η_{PANES} and η_{AFAM}) at 1. In Table 14 the effect of the states is shown. The effect is quite

PANES: η_{PANES}: 0.557				
	sn	*sw*	*nn*	*nw*
14	0.0890	0.0018	-0.0345	-0.0562
15	0.0467	0.0015	-0.0520	0.0038
16	0.0480	0.0021	-0.0213	-0.0288
17	0.0338	0.0000	-0.0413	-0.0075
AFAM: η_{AFAM}: 0.611				
	sn	*sw*	*nn*	*nw*
14	0.0671	-0.0048	-0.0280	-0.0438
15	0.0394	0.0123	-0.0363	-0.0154
16	0.0533	0.0029	-0.0297	-0.0265
17	0.0517	0.000	-0.0464	-0.0053

Table 13: Policy experiment: Differences between treated and control and policy of increasing the enforcement rate

big, in the early ages the effect is slightly bigger than in the latter ones. Those teenagers that study more, mainly come from those who neither study nor work in contrast to the last case. Here again the effect is higher in PANES than in AFAM, although in this case it is for ages.

PANES: η_{PANES}: 1.00				
	sn	*sw*	*nn*	*nw*
14	0.1611	0.0143	-0.166	-0.031
15	0.0987	0.0136	-0.100	-0.033
16	0.0986	-0.0001	-0.120	-0.025
17	0.0969	0.000	-0.144	0.007
AFAM: η_{AFAM}: 1.00				
	sn	*sw*	*nn*	*nw*
14	0.1218	0.0169	-0.0994	-0.0393
15	0.0716	0.0152	-0.0368	-0.0499
16	0.0912	0.000	-0.0670	-0.0243
17	0.0878	0.000	-0.0687	-0.0191

Table 14: Policy experiment: Differences between treated and control and policy of increasing the enforcement rate at 1

The difference of the policy experiment in home production and work hours[16] can be observed in the first panel of Table 15. The most important change is the decrease of home production in the younger ages (12-13 years old). In those ages there are no significant changes among states, because more than 90% of those teenagers attend school anyway, although there are changes in the use of their time. For those over 14, there is an effect of reducing the number of hours

[16]Similar result are found in the case that η is at 0.557 and 0.6111

in home production, with a fall of those who do 12 hours per week, and a slight increment for the less intensive ones.

In the second panel of Table 15, we show the effect over the market work hours, there is a fall in the share of teenagers that work more (more than 15 hours), and an slight increase of less intensive workers. As we analyzed before, the effect over those who study and work contemporaneously is little, but positive.

	PANES		AFAM	
	0-10 hours	>10 hours	0-10 hours	>10 hours
12-13	-0.1500	0.0003	-0.0922	0.0134
14-15	0.0098	-0.0281	0.0403	-0.0121
16-17	0.0157	-0.0048	0.0074	-0.0063
	PANES		AFAM	
	0-15 hours	>15 hours	0-15 hours	>15 hours
14-15	0.0096	-0.0158	0.0108	-0.0186
16-17	0.0061	-0.0199	0.0091	-0.0273

Table 15: Policy experiment: Differences between treated and control and policy of increasing the enforcement rate at 1

Regarding, the difference in GPA for the effect of the policy, there are less individuals that fail the course and there is an increment of both A and B for all ages. This positive impact in the GPA is generated by the fact that in the ordered probit that generate the grades, being treated has a positive effect on the positive grades (A and B).

	GPA		
	F	B	A
12	0.0074	-0.0057	-0.0017
13	-0.0182	0.0258	-0.0076
14	-0.0893	0.0652	0.0241
15	-0.0674	0.0417	0.0257
16	-0.0463	0.0271	0.0192
17	-0.0496	0.0369	0.0127

Table 16: Policy experiment: Differences between treated and control and policy of increasing the enforcement rate at 1

Finally, we perform a policy experiment that decreases the amount of transfer by 50%, The difference between treated and control because of this policy is the decrease of those teenagers that only study in both programs, and there is a split between those who study and work, those who neither study nor work and those who only work. In all these states there is an increment of

participation. Then, when the transfers is reduced the teenagers go to the other states, but do not necessary drop-out from formal education.

	PANES			
	sn	*sw*	*nn*	*nw*
14	-0.0344	0.0051	0.0252	0.0041
15	-0.0746	0.0136	0.0218	0.0392
16	-0.0321	0.011	0.0104	0.0205
17	-0.0161	0.000	0.0262	-0.0101
	AFAM			
	sn	*sw*	*nn*	*nw*
14	-0.0503	0.0084	0.0371	0.0047
15	-0.0468	0.0209	0.0141	0.0119
16	-0.0174	0.0026	0.0052	0.0097
17	-0.0055	0.000	0.0073	-0.0018

Table 17: Policy experiment: Differences between treated and control and policy of decreasing the transfer by 50 points

7 Concluding remarks

In this paper we develop a dynamic model of the teenagers' use of time, when they are elegible to receive a CCT program. We model not only school attendance, but also the work and the home production behavior. Moreover, we model the enforcement of the CCT program, pointing out the estimation of a parameter that shows how the beneficiaries perceive the enforcement level. We exploit a wide, rich and novel data set combining administrative records and survey data for Uruguay for two CCT programs, in which one of the conditions was school attendance.

In the model, the decision is taken by the teenagers and their parents, given the utility that each decision brings to the household, but the weight of the teenagers in the decision changes over time. This model captures well the state distribution of the individuals not only among the school attendance and market working conditions, but also the time that they spend on home production. One of the features that we exploit is the large percentage of teenagers that neither study nor work, and this is a challenge at the moment to model.

We perform three policy experiments to assess the role of the enforcement parameter and the amount of the transfer in the household decision. When the enforcement is higher the treated teenagers attend formal education more, especially in the middle ages (14-17), before there is no room to improve given

the higher rates. Those teenagers in the early ages cannot attend more but they change their use of time, spending fewer hours on home production. Those teenagers who are legally able to work do it less and with less intensity.

Finally, we perform a third policy, reducing the amount of the transfer by 50%. In this case, the effect in PANES treated is higher than in AFAM and there is only a decrease in those who only study, and an increase in the share of all the other states.

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8 Appendix

	PANES			AFAM		
Age	Total	Treat	Control	Total	Treat	Control
12	17.4	11.9	5.5	17.0	12.9	4.1
13	16.6	12.6	4.1	15.2	11.9	3.3
14	17.1	11.2	5.9	18.3	13.4	4.9
15	16.1	11.2	4.9	16.6	11.7	4.9
16	17.6	13.6	3.9	16.6	12.3	4.3
17	15.2	11.1	4.2	16.3	12.0	4.3

Table A.1: Age and treatment distribution at the entrance moment

Age	Primary		High-school					
	Incompleted	Completed	1	2	3	4	5	6
			Total					
12	76.6	23.4						
13	49.8	28.1	22.1					
14	34.5	20.9	26.3	18.3				
15	31.7	14.5	21.0	19.9	12.9			
16	31.1	9.7	18.3	16.6	16.0	8.3		
17	33.6	6.7	15.7	15.3	14.3	9.4	5.0	
			Treat					
12	79.4	20.6						
13	54.3	26.3	19.4					
14	39.0	20.9	24.3	15.8				
15	36.8	14.8	20.5	17.5	10.4			
16	35.8	10.0	18.5	15.7	13.6	6.4		
17	38.2	6.6	16.0	14.5	12.9	8.0	3.8	
			Control					
12	69.0	31.0						
13	38.1	32.8	29.1					
14	23.9	20.8	30.8	24.5				
15	19.7	13.9	22.2	25.4	18.8			
16	20.4	9.0	17.8	18.5	21.4	12.9		
17	23.8	6.9	15.2	16.8	17.2	12.5	7.6	

Table A.2: Education background at the moment of entering in PANES

Age	Primary		High-school					
	Incompleted	Completed	1	2	3	4	5	6
			Total					
12	67.3	32.7						
13	34.2	21.4	44.4					
14	24.8	9.5	30.1	35.6				
15	18.9	10.5	27.4	22.1	21.1			
16	18.0	9.5	33.3	23.5	13.9	1.8		
17	19.7	4.0	24.0	32.1	17.2	1.8	1.2	
			Treat					
12	69.8	30.2						
13	37.1	18.8	44.1					
14	28.0	10.6	29.6	31.8				
15	19.6	9.6	28.8	19.9	22.1			
16	20.1	9.8	31.7	23.6	13.0	1.8		
17	23.4	4.7	23.4	30.4	16.4	1.3	0.4	
			Control					
12	59.4	40.6						
13	24.2	30.3	45.5					
14	15.8	6.3	31.6	46.3				
15	17.3	12.6	24.4	26.8	18.9			
16	12.5	8.6	37.5	23.1	16.4	1.9		
17	8.2	2.1	25.8	37.1	19.6	3.1	4.1	

Table A.3: Education background at the moment of entering in AFAM

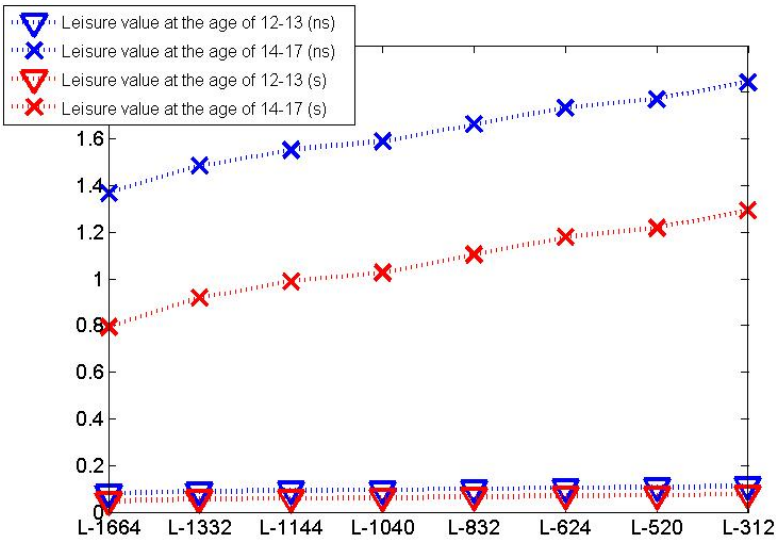

Figure A.1: Leisure value by hours of leisure

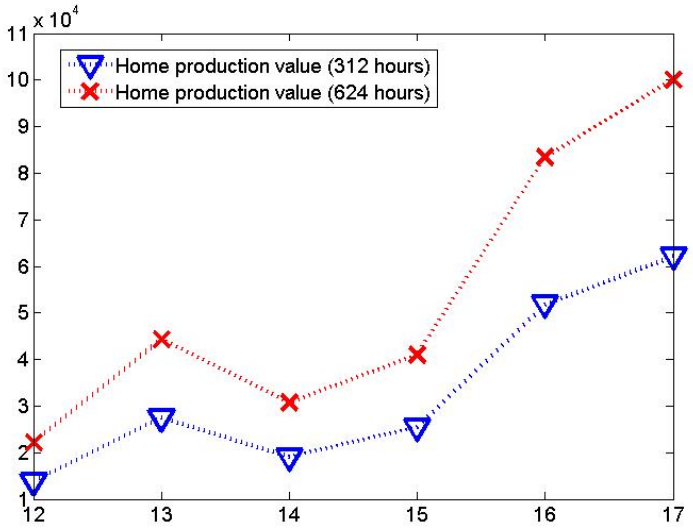

Figure A.2: Home production value by age

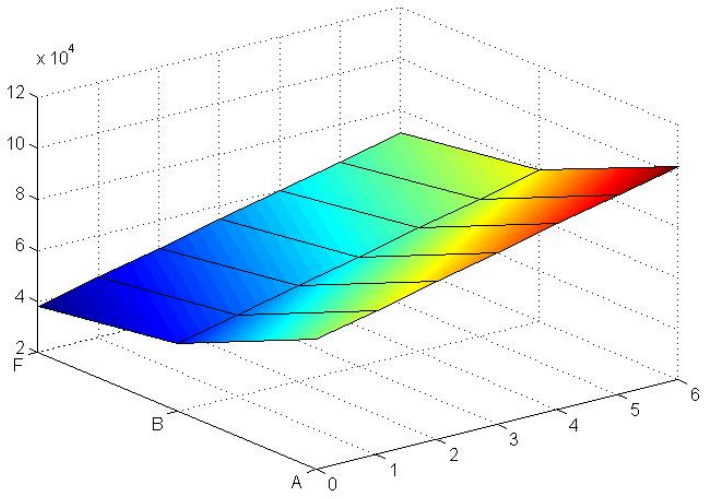

Figure A.3: School attendance value by GPA and grade achievement

	All	Under-19	Under-19 (CCT)*
Age (reference:12-13)			
14-15	10.308***	9.148***	6.814***
	[1.690]	[0.900]	[2.445]
16-17	10.032***	9.013***	9.584***
	[1.716]	[0.938]	[2.533]
18-19	15.080***	10.804***	14.615***
	[1.828]	[1.081]	[3.290]
20 or more	19.031***		
	[1.531]		
Sex (1=Male)	-21.199***	-5.332***	-6.896***
	[0.503]	[0.637]	[1.817]
Region (1=Montevideo)	-1.300**	1.399*	3952
	[0.525]	[0.781]	[2.696]
Employee (1=Yes)	-5.613***	-2.572**	-6.432*
	[0.540]	[1.066]	[3.560]
Attendance (1=Yes. 0=No)	-5.550***	-3.634***	-5.395**
	[0.962]	[0.876]	[2.708]
Offspring (1=Yes)	12.995***	45.903***	36.838***
	[0.634]	[1.910]	[5.805]
Household Income/100	-0.001	-0.001	0.007
	[0.002]	[0.003]	[0.043]
Constant	16.145***	6.276***	8.971**
	[1.521]	[1.136]	[3.691]
N	9387	1481	196
R-square	0.3061	0.4541	0.4465

* Those who applied to the CCT programs (treated and control)

Table A.4: Home production: OLS

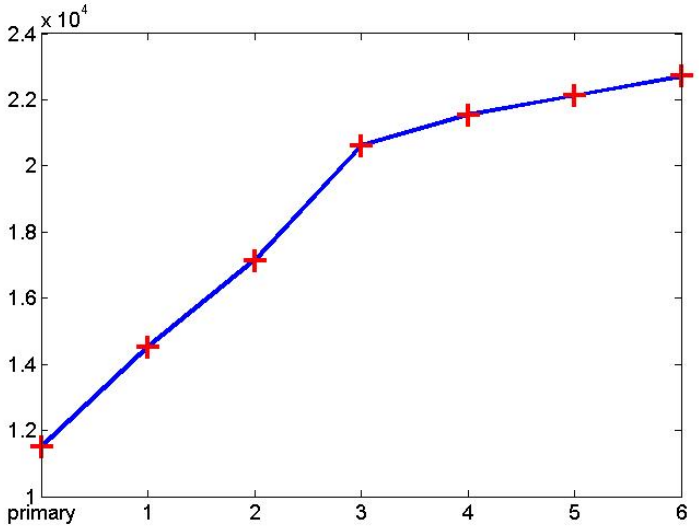

Figure A.4: Value at the age 18

Dependent variable: wage (15-18 years)	OLS	Heckman	Selection eq. Pr(ocup=1)
	(1)	(2)	(3)
Age	0.063	0.155	0.224***
	[0.105]	[0.195]	[0.038]
Attendance (1=Yes)	-0.030	-0.339	-0.719***
	[0.262]	[0.612]	[0.092]
Education (Ref: Primary)			
High School (compulsory)	-0.460*	-0.448*	0.022
	[0.245]	[0.245]	[0.099]
High School (not compulsory)	-0.856**	-0.918**	-0.153
	[0.378]	[0.392]	[0.136]
Home Production (Ref: HP=0)			
0-10	0.742**	0.719*	-0.062
	[0.379]	[0.379]	[0.133]
> 10	0.813**	0.740**	-0.122
	[0.336]	[0.358]	[0.120]
Treat (1=Yes)	0.272	0.271	0.013
	[0.220]	[0.219]	[0.082]
2nd Wave (1=Yes)	0.337	0.336	-0.012
	[0.207]	[0.206]	[0.077]
Offspring (1=Yes)			-0.713***
			[0.181]
Constant	1.465	-0.640	-4.094***
	[1.720]	[4.149]	[0.636]
Mills			0.553
			[0.992]
N	302		1568
R-sq	0.064		

Table A.5: Wage equation

Dependent variable: GPA	Age					
	12-18		12-14		15-18	
	(1)	(2)	(3)	(4)	(5)	(6)
GPA t-1 (ref: F)						
B	0.645***	0.631***	0.883***	0.866***	0.069	0.058
	[0.101]	[0.102]	[0.122]	[0.124]	[0.201]	[0.203]
A	1.720***	1.685***	1.892***	1.863***	1.784***	1.738***
	[0.183]	[0.184]	[0.209]	[0.209]	[0.497]	[0.497]
Grade (ref:1-2)						
3-4	0.192	0.212	0.362**	0.385**	0.018	0.019
	[0.138]	[0.139]	[0.184]	[0.185]	[0.222]	[0.225]
5-6	-0.384	-0.373			-1.063***	-1.045***
	[0.3220]	[0.321]			[0.357]	[0.359]
Sex (1=Male)		-0.219		-0.192		-0.140
		[0.134]		[0.186]		[0.206]
Age	-0.127**	-0.128**	-0.257***	-0.259***	0.169	0.149
	[0.056]	[0.057]	[0.091]	[0.094]	[0.114]	[0.114]
Home Production (Ref: HP=0)						
0-10	0.097	-0.047	0.121	-0.008	0.032	-0.029
	[0.102]	[0.143]	[0.114]	[0.187]	[0.313]	[0.321]
> 10	0.077	-0.009	0.084	-0.119	0.166	0.104
	[0.162]	[0.185]	[0.328]	[0.386]	[0.276]	[0.286]
Region (1=Montevideo)		-0.197		-0.296		-0.013
		[0.149]		[0.207]		[0.201]
Treat (1=Yes)	0.119	0.130	0.194	0.206	0.046	0.051
	[0.107]	[0.107]	[0.127]	[0.128]	[0.199]	[0.204]
2nd Wave (1=Yes)		-0.156*		-0.187*		-0.114
		[0.095]		[0.128]		[0.184]
Hours Worked (Ref: HW=0)						
0-15					0.464	0.527
					[0.673]	[0.684]
> 15					-0.208	-0.133
					[0.347]	[0.384]
ν_1	-1.827	-2.117	-4.015	-3.682	2.508	2.021
	[0.736]	[0.744]	[1.273]	[1.208]	[1.866]	[1.870]
ν_2	-0.203	-0.479	-2.21	-1.868	3.866	3.384
	[0.732]	[0.741]	[1.266]	[1.204]	[1.873]	[1.878]
N	623	623	454	454	169	169
Pseudo R-sq	0.147	0.153	0.166	0.174	0.091	0.094

Table A.6: GPA: ordered probit

Multinomial Logit. 15-18 years old.

	sn base outcome								
		sw			nn			nw	
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)	(3a)	(3b)	(3c)
State									
sw	0.190**	1.217**	1.116**	-0.552	-0.405	-0.488	1.016	1.166	0.870
	[0.561]	[0.556]	[0.564]	[0.767]	[0.721]	[0.718]	[0.683]	[0.786]	[0.851]
nn	0.482	0.593	0.624	2.160***	2.341***	2.385***	2.567***	2.670***	2.658***
	[0.584]	[0.593]	[0.595]	[0.290]	[0.336]	[0.345]	[0.391]	[0.439]	[0.459]
nw	0.350	0.438	0.456	1.243***	1.202***	1.160***	2.261***	2.176***	1.930***
	[0.383]	[0.391]	[0.394]	[0.227]	[0.242]	[0.245]	[0.267]	[0.337]	[0.348]
Sex (1=Male)			0.321			0.670***			2.251***
			[0.345]			[0.251]			[0.366]
Age		0.153	0.137		0.505***	0.551***		0.878***	1.010***
		[0.164]	[0.169]		[0.097]	[0.103]		[0.143]	[0.153]
Home Production (HP=0)									
0-10		0.611	0.781		-0.328	-0.216		-1.444**	-1.407**
		[0.510]	[0.561]		[0.426]	[0.438]		[0.571]	[0.653]
> 10		0.286	0.496		1.326***	1.639***		0.449	1.260***
		[0.506]	[0.548]		[0.340]	[0.347]		[0.408]	[0.410]
Region (1=Montevideo)			-0.503			-0.117			-0.483***
			[0.524]			[0.282]			[0.373]
Treat (1=Yes)		0.099	-0.043		-0.038	-0.150		-0.081	-0.214
		[0.370]	[0.363]		[0.225]	[0.231]		[0.276]	[0.300]
Constant	-2.353***	-5.337**	-5.286*	-1.526***	-10.676***	-11.875***	-2.690***	-17.300***	-21.192***
	[0.228]	[2.720]	[2.743]	[0.159]	[1.588]	[1.732]	[0.267]	[2.329]	[2.587]
N	659	653	653	659	653	653	659	653	653
Pseudo R-sq	0.089	0.175	0.211	0.089	0.175	0.211	0.089	0.175	0.211

Table A.7: Transitions: Multinomial logit 15-18 years old

	PANES treated				PANES control			
	0-10 hours		>10 hours		0-10 hours		>10 hours	
	Data	Model	Data	Model	Data	Model	Data	Model
12-13	0.510	0.402	0.054	0.172	0.431	0.362	0.137	0.189
14-15	0.620	0.334	0.358	0.327	0.568	0.347	0.417	0.332
16-17	0.481	0.299	0.390	0.410	0.489	0.326	0.420	0.450
	AFAM treated				AFAM control			
	0-10 hours		>10 hours		0-10 hours		>10 hours	
	Data	Model	Data	Model	Data	Model	Data	Model
12-13	0.507	0.412	0.075	0.156	0.581	0.401	0.071	0.165
14-15	0.599	0.354	0.316	0.311	0.539	0.365	0.395	0.333
16-17	0.531	0.312	0.466	0.408	0.495	0.334	0.505	0.458

Table A.8: Model fit: home production

	PANES treated				PANES control			
	0-15 hours		>15 hours		0-15 hours		>15 hours	
	Data	Model	Data	Model	Data	Model	Data	Model
14-15	0.051	0.096	0.036	0.062	0.015	0.086	0.020	0.042
16-17	0.076	0.032	0.116	0.225	0.070	0.025	0.134	0.152
	AFAM treated				AFAM control			
	0-15 hours		>15 hours		0-15 hours		>15 hours	
	Data	Model	Data	Model	Data	Model	Data	Model
14-15	0.021	0.078	0.021	0.054	0.017	0.078	0.029	0.028
16-17	0.045	0.018	0.149	0.218	0.042	0.018	0.151	0.132

Table A.9: Model fit: Work hours

	F		B		A	
	Data	Model	Data	Model	Data	Model
12	0.15	0.145	0.44	0.513	0.41	0.342
13	0.25	0.229	0.52	0.499	0.23	0.272
14	0.31	0.418	0.48	0.399	0.21	0.184
15	0.39	0.393	0.40	0.419	0.21	0.188
16	0.55	0.546	0.34	0.342	0.11	0.112
17	0.57	0.587	0.30	0.306	0.13	0.106

Table A.10: Model fit: Grades by age