Drop-out, Labor Participation and Leisure Time during two Transfer Programs.*

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April 22, 2013

Abstract

High-school drop-out is one of the main educative problems in middle income countries. We analyze the impact of two Conditional Cash Transfer (CCT) programs on high school students' drop-out ratio in Uruguay for households below the first quintile of income. 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 the hours of work, leisure and home production. Adolescent individuals share their decision with their parents. The final decision depends on the weighted utility function of parents and adolescent individuals. To estimate the model, we use data covering the period of 2004-2011 in Uruguay, where the two CCT programs were introduced. Our novel and large data set includes panel data for households above and below the threshold qualifying for the CCT. This allows us to create a control and treatment group. Finally, our estimated structural model allows us to perform different policy experiments. Our model captures well the share of individuals studying, working and those who neither study nor work. The policy experiments show that if the amount of transfer is reduced, the drop-out rate increases and the individuals work more. If the level of enforcement is higher they change study for leisure. Finally, if the level of eligibility is tighter the effects are bigger than under the other two policies, and the drop-out rate increases even more.

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1 Introduction

1.1 Motivation

In Uruguay the drop-out is one of the main problems of educational system. Considering those students who have at least 50 absences during the academic year and do not continue in the next academic year, the average rate of drop-out in the compulsory high school was around 4.5% yearly in the last decade[1]. Additionally, considering the rate of attendance of those teenagers who are in the first quintile of income there is around 60% in the compulsory education and around only 25% in the non compulsory one (Figure 1). The PANES and AFAM are two programs of Conditional Cash Transfer (CCT) that have among its objectives encourage the human capital accumulation. The first program had being applied between 2005 and 2007 where it was replaced by the AFAM, which is in force since then. This paper analyze how is the dynamic of drop-out in compulsory and non compulsory high-school and how it is affected by the shocks of income and the school attendance enforcement when the household below the first quintile of income have access to one (or both) of the CCT programs.

The nature of the drop-out is essentially dynamic. Poor educational performance, i.e. low Grade Point Average (GPA), in the past increases the probability of drop-out (Alexander et al. (2001); Griffin (2002); Christle et al. (2002)). In this specific process there are two types of incentives which play 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 child's educational performance build parents incentives. Then parents stop to invest in education because of they visualize bad signals emitted by their offspring's outcome (Li and Mumford, 2009). This investment in education could operate either through the time that parent spend with their children in formatives activities such as reading or homework, or commit their children to do it (Boca et al., 2012).

The decision of participate in education system depend on both parents' and children's utilities. When the parents' utility is low because of poor educational performance, they could be compensated by more income if their offspring participate in the labor market. In the case of children, their utility depends on

[1]The drop out in the first three years are around 4% and 7% in the 4th one. Source: http://www.anep.edu.uy/observatorio/

leisure time and the time spends on alternatives activities (school attendance or work). We assume that the utility that extract from attend to school depend not only on the GPA but also in the 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 to know who drops out and whey they do it. They found that those who work contemporaneously with the high school has lower level in their school performance. When they analyze some polices experiments they assess some measures as the work prohibition would have limited success to improve school outcomes. In our paper we deal with a particular group of teenagers who are in the bottom of the income distribution and a relevant share of them neither study nor work, which introduce a particular feature in our model. Stinebrickner and Stinebrickner (2013) estimate a structural dynamic model to understand and quantify the different channels from where the college student drop out. The point out the role of GPA performance in this decision. This paper gave us many insights about the dynamic of the GPA but the nature of the decision is quite different given they consider adult and we are working with teenagers.

The economic and financial crisis suffered by Uruguay in 2002 generated a strong increase of unemployment and poverty. For this reason in 2005 was implemented the PANES[2]. 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 conditionalities was the attendance to school, although there are evidence about the low level of enforcement and compliance of the requirements. In December of 2007 this program was removed, which from the beginning was proposed as transitory, and the families with children under 18 years were integrated into the program AFAM[3]. This last program is also CCT, with similar conditionalities, but with a permanent character. In this case target population is to cover all poor household with children less than 18 years (specifically the law mentions 500,000 children). The cash transfer depends of the number of children and the compliance of conditionalities is really monitored.

The CCTs programs could operate on the probability of drop-outs by two mechanisms. On one hand, in a direct way due to the fact that one of the condition to participate in these programs refers to the school attendance. On

[2]Plan de Asistencia Nacional a la Emergencia Social -Assistance National Plan to the Social Emergency

[3]Asignaciones familiares (Family allowances)

the other hand, indirectly the programs could generate behavioral changes based on variation of incentives, decreasing the investment required to study or the cost of opportunity of study in relation to labor activities.

Todd and Wolpin (2006) analyze the effect of a transfer program PROGRESA in Mexico in the child schooling and fertility. They develop a dynamic behavioral model where the parents first and then the teenagers make decide either work or attend school and fertility behavior given the existence of a transfers program. Additionally, they perform some contrafactual policies alternatives and propose an alternative scheme which lead better school performance. Attanasio et al. (2010) use a structural model to evaluate also the PROGRESA in Mexico. They exploit a randomized experiment to assess where the program is more effective and in which point it could be improved. Our paper is going one step ahead, we work with two transfers programs and we analyze how the enforcement plays a role in the school participation. Moreover, we include the grade dynamic in model.

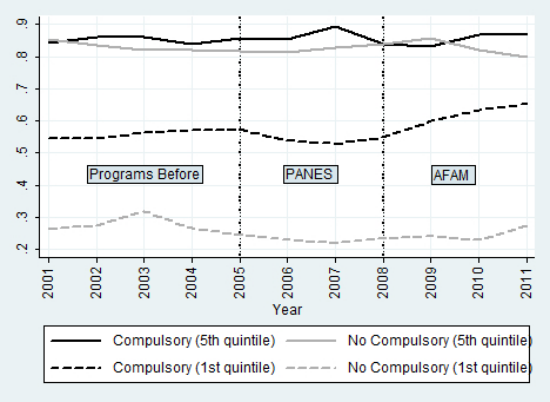

Figure 1: Rate of Attendance of High School in the first and the fifth quintile and year. Source: Continuos Household Survey

1.2 Research question

This paper analyze **how is 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 household 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 to encourage the school participation but the enforcement has been very different.

We will focus in three pointS which are not analyze in the literature: first how is the utility formation from those who neither study nor work; second,how is the role of the time of home production, and finally analyze how the CCT program is designed, particularly how is the function that determine the lost of the transfer and the level of enforcement that the government agency applies.

The rest of the paper is organized as follows. In the section 2 we describe the data bases and the main descriptive statistics. In the 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 the section 7 concludes.

2 The Date and Descriptive Statistics

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

This paper focus in the poorest population which are around the threshold determined to participate in the CCT programs. The information used in this paper comes from administrative records and survey 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 starts in April 2005 and ended in December 2007. The most important component was a lump sum transfer [4] of approximately 60 Euros monthly at the value of April 2005, an amount independent of the number of household members. In addition, households with children received a food card (in-kind transfer) that varied monthly between 10 and 35 Euros per month,

[4]Ingreso ciudadano in Uruguay

depending on the number of children in the household. The target population of this program was the first quintile of poorest households.

The FSP are date collected as part of the evaluation of 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 to 2008. In this follow-up survey it 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 of the vulnerability index. This survey considers only the population that is around the cutoff that identifies the treated and untreated groups.

To complement the FSP data, it is 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 in two cycles, the first three years correspond to the basic cycle (compulsory education) and the last three to the bachelor degree (non compulsory high-school)[5]. Additionally, we estimate the home production time with the Use of Time Survey carried in 2008 by the National Statistics Institute[6].

In the Table 1, we show the mean and standard deviation of main variables. We consider 3090 observations of 12 to 18 years old individuals. Of this population 75% attend to the school system. However only 55% attend to compulsory high-school school (1716 observations) and 44% attend to non compulsory high-school (1362 observations). Of these cases we can only locate 707 students in the SER due to the absence of ID. We do not observe significant changes in the distribution of variables as a consequence of the missing cases. In our sample the 70% of the population are treated, nearly 50% carries out home production and 10% is working. Specific information about educational performance show that 35% fail the course that attends (obtain an F) and only 20% obtained a GPA of A. Finally, only less than 10% attend to 5th and 6th grade of the high-school.

We define four states with the combination of studying and working choices. In the Table 2, we present the distribution of hours worked and home production by age. Further, we show the distribution of the states that are of our interest that is teenagers only studying (sn), those who study and work (sw), those who neither study nor work (nn), and those who only work (nw). In this case we

[5]Ciclo básico y bachillerato diversificado respectivamente

[6]The result of the estimation model is presented in the Table A.1

	FSP			HS attendance (FSP)			FSP and SER		
	Obs.	Mean	S.D	Obs.	Mean	S.D	Obs.	Mean	S.D
Age 12-18									
Attendance (1=Yes)	3090	0.746	0.435						
Age	3093	14.83	2.014	1330	14.60	1.769	707	14.11	1.566
Treatment (1=Yes)	3093	0.701	0.458	1330	0.689	0.463	707	0.680	0.466
Home Production									
0	3079	0.407	0.491	1322	0.436	0.496	703	0.484	0.500
0-5	3079	0.154	0.361	1322	0.151	0.358	703	0.144	0.351
5-10	3079	0.182	0.386	1322	0.240	0.428	703	0.233	0.423
> 10	3079	0.257	0.437	1322	0.149	0.356	703	0.139	0.347
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									
Employee (1=Yes)	2093	0.176	0.381	903	0.095	0.293	423	0.059	0.236
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

Table 1: Descriptive Statistics. Source: FSP and SER.

observe, children only studying decrease significantly with age, but the trend is increasing for those who neither attend to school nor working. Additionally, those who study and work are always less than 10%. In the case of hours worked we note that as expected increases with age. The increase in hours allocated to home production presents an irregular trend. While the hour allocation increase with age, if we consider the group of ages there are a replacement of hours of study more than being replaced by hours of work.

	State				Hours Worked			Home Production			
	sn	sw	nn	nw	0	0-15	> 15	0	0-5	5-10	> 10
12-13	0.98	-,-	0.02	-,-	-,-	-,-	-,-	0.82	0.18	0.00	0.00
14-15	0.75	0.05	0.16	0.04	0.91	0.05	0.04	0.17	0.10	0.38	0.35
> 16	0.45	0.07	0.31	0.17	0.78	0.08	0.14	0.23	0.17	0.20	0.40

Table 2: Decisions by group of age.Source: FSP and SER.

The distribution of GPA by age and grade is presented in the Table 3. The grade performance is worse when the student attend to higher courses and with her age. About 64% of those older than 16 years old and 72% of those enrolled in 5th and 6th grade fail the course. This differences is due to the fact that student are enrolled in lower courses that would correspond because the repeated fails. The percentage that obtains the best GPA is constant between first and fourth grade (20%), and decrease to only 10% in the last two grades.

Finally, the transition rates between states in consecutive years are shown

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

in Table 4. The state *sn* is more stable than the others, about one thirds of the population is only studying and remain 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 net year 61.5% stop to work and continue studying, this percentage is 25.5% and 39.4% for the case of *nn* and *sw*, respectively.

	sn (t-1)	sw (t-1)	nn (t-1)	nw (t-1)	Total
sn (t)	33.5	2.4	3.9	13.5	53.4
sw (t)	3.2	0.8	0.6	1.8	6.4
nn (t)	7.3	0.3	7.4	10.2	25.2
nw (t)	2.3	0.5	3.5	8.8	15.0
Total	46.3	3.9	15.5	34.3	100.0

State Distribution of t on t-1

	sn (t-1)	sw (t-1)	nn (t-1)	nw (t-1)
sn (t)	72.5	61.5	25.5	39.4
sw (t)	6.9	19.2	3.9	5.3
nn (t)	15.7	7.7	48.0	29.6
nw (t)	4.9	11.6	22.6	25.7
Total	100.0	100.0	100.0	100.0

Table 4: Transitions of states. Source: FSP and SER.

3 Model

We develop a dynamic model of sequential decisions under uncertainty model which is based in the basic model of the seminal paper of Eckstein and Wolpin (1999). The household choose if the teenager attend to school or not, the hours of work and the hours of home production given a weighted utility function of the children's (U_{ch}) and parents' function (U_p). The weight (γ_t) depend on the age of the children, if the children is below of 15 the parent's weight is relatively higher than when he is over 15. The children value the school attendance, the market work and the leisure time (total time minus the hour of market work and home production). The parents value the school attendance, the market work and the home production.

Type	Compulsory			Non-compulsory		
Choices	leisure school home production			leisure school home production work		
Age(t)	12	13	14	15	16	17

Table 5: The individual choices by age

Given the total hours available L_1 (73 hours per week), L_2 (98 hours per week) the rewards in each situation $k = \{sn, sw, nn, nw\}$ which depend on the value of attend to school (b^s), the value of leisure (b^n), the value of being working (ωh^w), and the value of home production ($b^{hp}h^{hp}$). The utility is a weighted function of the children and parents utility function are:

$$U = \gamma_t U_{ch} + (1 - \gamma_t)U_p \tag{1}$$

The value when the individual attends to school and doesn't work (U^{sn}) which include the value of the leisure, the value of studying in the value of both, children and parents; and the value of the home production in the case of the utility of the parents. The value of studying and the working (U^{sw}) includes the rewards of working (ωh^w), which is split between the children and his parents in δ_t and $(1 - \delta_t)$. The value of neither study nor work (U^{nn}) includes only the leisure and the home production. Finally, the value of not study and work includes the home production and the rewards of working (U^{nw}).

$$\begin{aligned}
U_t^{sn} &= \gamma_t\Big(b_t^n\big(L_1 - h_t^{hp}\big) + b_{1t}^s\Big) + \big(1 - \gamma_t\big)\Big(b_{2t}^s + b^{hp}h_t^{hp}\Big) \\
U_t^{sw} &= \gamma_t\Big(b_t^n\big(L_1 - h_t^w - h_t^{hp}\big) + b_{1t}^s + \delta_t\omega_t h_t^w\Big) + \big(1 - \gamma_t\big)\Big(b_{2t}^s + b^{hp}h_t^{hp} + (1 - \delta_t)\omega_t h_t^w\Big) \\
U_t^{nn} &= \gamma_t\Big(b_t^n\big(L_2 - h_t^{hp}\big)\Big) + \big(1 - \gamma_t\big)\Big(b^{hp}h_t^{hp}\Big) \\
U_t^{nw} &= \gamma_t\Big(b_t^n\big(L_2 - h_t^w - h_t^{hp}\big) + \delta_t\omega_t h_t^w\Big) + \big(1 - \gamma_t\big)\Big(b^{hp}h_t^{hp} + (1 - \delta_t)\omega_t h_t^w\Big)
\end{aligned} \tag{2}$$

The value of the leisure depend on the age and the education achieved (E_{t-1}) and a shock.

$$b_t^n = \overline{b_t^n}(E_{t-1}) + \epsilon_t^n \tag{3}$$

The reward in the school depend on the $\overline{b}^s(gpa_{t-1}, E_{t-1}, h_t^{hp})$ which depend on the grades in the last period and the level of education achieved, and the

shock of the grades that the student receive this year (ϵ_t^s) both for children and parents. Parents could also receive a conditional cash transfer from the government (T_t) if the children attend to the high school.

$$b_{1t}^s = \overline{b_1^s}(b_1, gpa_{t-1}, E_{t-1}, h_t^{hp}) + \epsilon_t^s \tag{4}$$

$$b_{2t}^s = \overline{b_2^s}(b_2, gpa_{t-1}, E_{t-1}, h_t^{hp}) + T_t + \epsilon_t^s \tag{5}$$

The grades follow to a ordered logit process which depend 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.

$$\begin{aligned} gpa^* &= X\beta + e \qquad e/X \sim N(0,1) \\ gpa_t &= F \quad \text{if} \quad gpa^* < \mu_1 \\ gpa_t &= B \quad \text{if} \quad \mu_1 < gpa^* < \mu_2 \\ gpa_t &= A \quad \text{if} \quad gpa^* > \mu_2 \end{aligned}$$

The CCT can be received by a household where the children attend to the school in the first period. Then, in the following periods the household can continue receiving the CCT which depend on the school attendance, an income shock and the government enforcement. The probability of lose the income of CCT programs is p_1 if the student is not working, and p_2 for those who is working ($p_2 > p_1$).

$$\begin{aligned} P(CCT = 0/CCT = 1, nw) = p_1 \\ P(CCT = 0/CCT = 1, w) = p_2 \end{aligned} \tag{6}$$

The reward of the home production depend on $\overline{b_t^{hp}}$ which is the reward by age (t) and a shock.

$$b_t^{hp} = \overline{b_t^{hp}} + \epsilon_t^{hp} \tag{7}$$

The wage in each moment is determined by the experience (H_{t-1}), the school attendance,the level of education achieved (CS_{t-1}, B_{t-1}), the time of home production and if the household receive the transfer:

$$\ln \omega_t = \beta_0 + \beta_1 H_{t-1} + \beta_2 At_t + \beta_3 CS_{t-1} + \beta_4 B_{t-1} + \beta_5 hp_t + \beta_6 CCT + \epsilon_t^w \tag{8}$$

$$\left(\epsilon_t^n, \epsilon_t^s, \epsilon_t^w, \epsilon_t^{hp}\right) \sim N(c_j, \sigma_j) \quad j = \{n, s, w, hp\} \tag{9}$$

Bellman Equations in each choice and given the state S_t which is defined C_t the accumulated course, H_t work hours, home production hours, gpa, age, CCT and shocks:

$$\begin{aligned} V_t(S_t) &= \max \mathbb{E}\left[\sum_{\tau=t}^{T} \beta^{\tau-t} \sum_k U_t^k d_t^k / S_t\right] \qquad k = \{sn, sw, nn, nw\} \\ S_t &= \left\{C_t, H_t, h^w, h^{hp}, gpa, t, T, \epsilon_t' s\right\} \end{aligned} \tag{10}$$

$$V_t(S_t) = U_t^k + \beta \mathbb{E}\Big[V_{t+1}(S_{t+1}) | S_t d_t\Big] \tag{11}$$

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

$$V_t(S_t) = \max\left[V_t^{sn}(S_t), V_t^{sw}(S_t), V_t^{nn}(S_t), V_t^{nw}(S_t)\right] \tag{12}$$

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

$$V_{18}(S_{18}) = \frac{\alpha_1}{-\alpha_2 CS_{18} - \alpha_3 B_{18}} \tag{13}$$

4 Estimation

The estimation strategy has two steps. The first one we estimate the wage function, the GPA function and transition out of the model. 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.2 - A.4. In the wage equation (Table A.2) we observe wages and education are negative correlated, because of the wages are determined by the specific experience and those who has more education lack this experience. Home production has a positive correlation with wage because of there a complementarity between the intensity in labor market and the amount of tasks that the teenager does at home.

The GPA dynamics is shown in the Table A.3. Performance in $t-1$ has a positive impact in t. The probability of increase GPA in t is similar for

age, but people over 14 years do not change your probability in t with obtain F or B in $t-1$. Neither home production time nor the market work time coefficients are significative. Finally, we perform a multinomial logit to estimate the transition between states in the model. As is expected, not only there are somewhat stability of states between t and $t-1$, but also there are a significative movements between nn and nw (in both sides). The probability to lose the CCT is estimated using the administrative records and fixing in p_1 is 6% and p_2 is 8%.

The second step of the estimation is through the SMM. We use as moments the mean of sn, sw, nn, and nw by age, the time spend in home production by age and the time working by age. These parameters are presented in the Tables 6 and 7. The leisure values is increasing with age as the home production productivity. The value of the utility of studying is coming form the equations 4 and 5, and the parameters of final value is given by the equation 13.

	12	13	14	15	16	17
γ_t	0.301	0.3012	0.301	0.479	0.479	0.652
δ_t	0	0	0	0.204	0.504	0.804
$\overline{b_t^n}$	-4.020	-4.020	-4.494	0.903	0.903	0.903
$\overline{b_t^{hp}}$	0	0	0	1.007	1.052	1.052

Table 6: Estimation: Parameters estimated by SMM

β	0.957
School utility	
b_1	703.62
b_2	601.10
Shocks : means and standard deviation	
c_s	2.017
c_{hp}	0.504
c_w	-0.500
c_n	0.100
σ_s	0.502
σ_{hp}	0.248
σ_w	0.401
σ_n	0.050
Final utility function values	
α_1	602.38
α_2	3.013
α_3	3.011

Table 7: Estimation: Parameters estimated by SMM

5 Results

In this section, we present how well the model fits with the main moments form the data. In the set of panels of the Figure 2 we observe the shares of teenagers

in each state they can choose. In the first Panel, there are the share sn, the model capture that the great majority of the teens choose it when they are under 15, but the performance is no so good for the over 14, specially when they are 15 and is the for year when they can work. However, if we observe the Panel 2, the proportion of teen studying is well estimated, but is not well distributed among who work and who do not. The model estimate well who neither study nor work for the over 14, but overestimate those who only work.

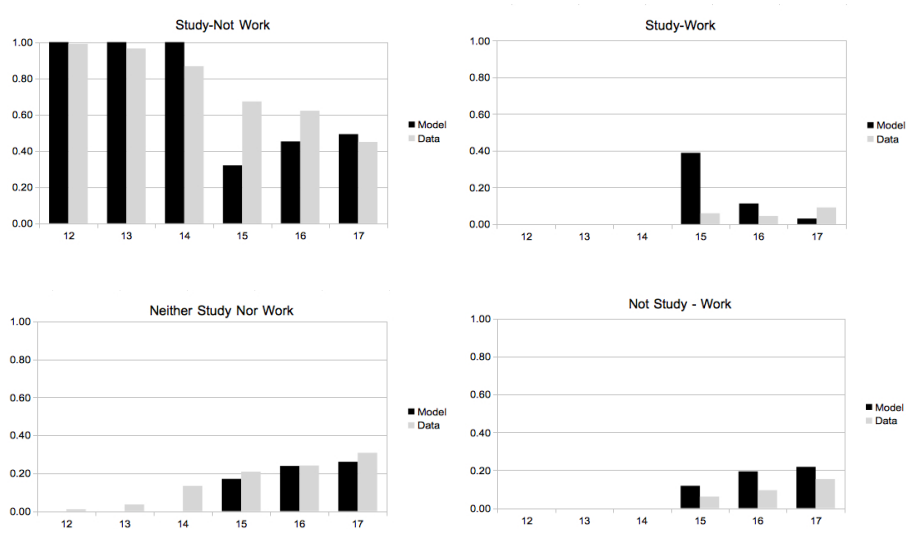

Figure 2: States fits: Model and Data

In the set of Figures 3, we observe the model fit of the GPA results by age regardless the course that the individuals attends. The model fit also quit well these moments, with the exception of the A grades at thirteen years old and the grade B in the fourteen and fifthteen which are overestimated.

The model have more problems estimating the home production and the working time. In the case of the home production (Figure 4), the model have problems to capture non only extension but also the intensity of the home production. This feature is difficult to capture for three reasons; first the home production in the model enters in the utility that the parents extract form the children, second the intensity of home production decrease the school satisfaction of the children and third, there are a positive relation between wages and home production (see Table A.2).

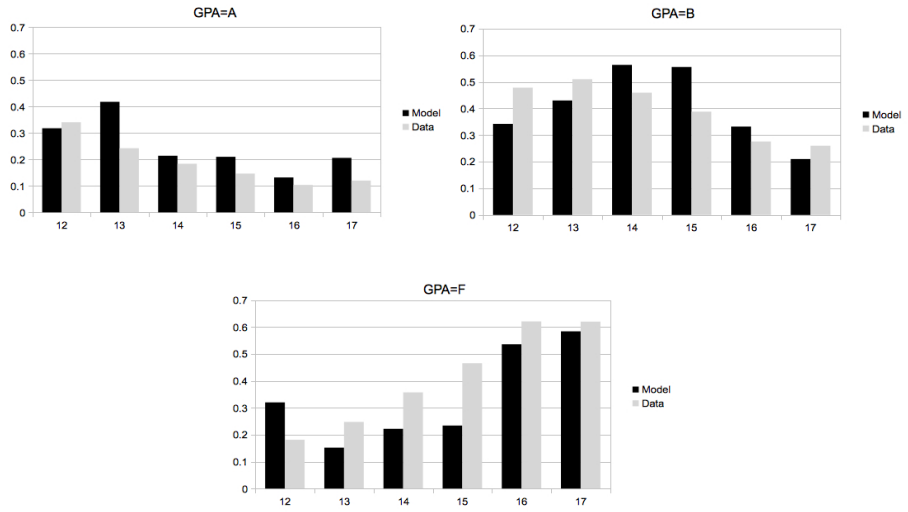

Figure 3: GPA fits: Model and Data

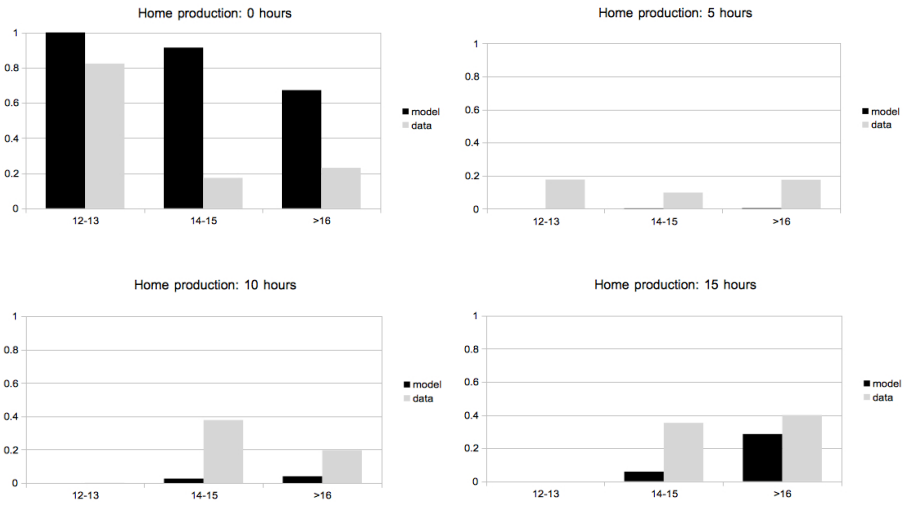

Figure 4: States fits: home production

In the case of the market work, the model capture the share of individuals who are working but is not able to disentangle how many hours they work. all the individuals in our model work the maximum of hours which are available.

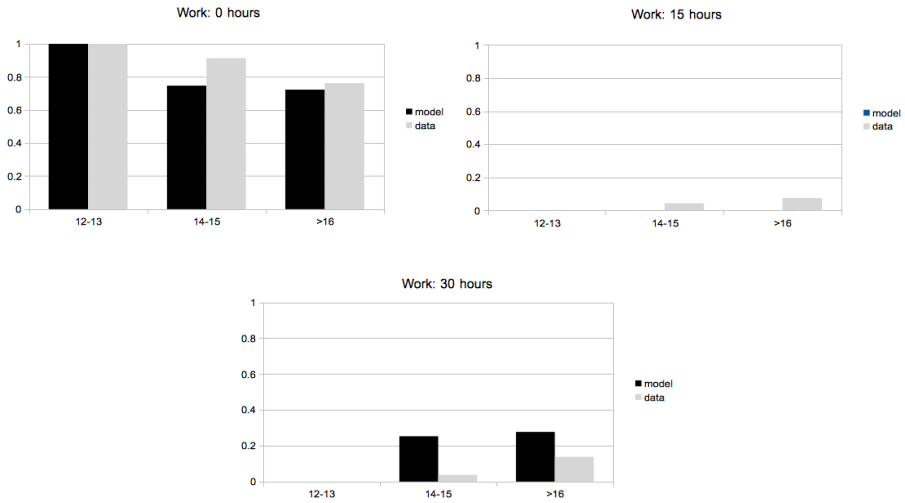

Figure 5: States fits: home production

6 Policy experiments

In the section we perform three policy experiments. In the first one we reduce the CCT transfer in 25%. There are no practically effect in those nn. The main effect is the increment in drop out from sw in the early ages and from those sn in the over 15. These individuals leave the high school to work.

	sn		sw		nn		nw	
Age	Benchmark	Policy	Benchmark	Policy	Benchmark	Policy	Benchmark	Policy
12	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
13	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
14	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
15	0.320	0.320	0.388	0.366	0.170	0.162	0.118	0.152
16	0.452	0.434	0.112	0.112	0.238	0.226	0.194	0.228
17	0.492	0.448	0.030	0.036	0.260	0.264	0.218	0.252

Table 8: Reduction of 25% of the transfer

The second policy experiments in the tightness of the policy enforcement. In this case the probability to lose the CCT rise to 10% for those who only study

and 15% for those who study and work. The main effect is the increment in the drop out. The individuals who have 15 years old leave the high school to work and those over 15 leave the high school to neither study nor work.

	sn		sw		nn		nw	
Age	Benchmark	Policy	Benchmark	Policy	Benchmark	Policy	Benchmark	Policy
12	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
13	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
14	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
15	0.320	0.312	0.388	0.350	0.170	0.170	0.118	0.168
16	0.452	0.396	0.112	0.116	0.238	0.270	0.194	0.218
17	0.492	0.424	0.030	0.038	0.260	0.308	0.218	0.230

Table 9: Increase probability to lose 6% to 10% and 8% to 15%

Finally, the third policy experiment is the eligibility rate, in our sample this rate was 70% and now we decrease it to 50%. This policy has a great impact in the drop out, the younger individuals change the high school to work and the weight of those who choose neither work nor study is bigger in the older ages.

	sn		sw		nn		nw	
Age	Benchmark	Policy	Benchmark	Policy	Benchmark	Policy	Benchmark	Policy
12	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
13	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
14	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
15	0.320	0.238	0.388	0.352	0.170	0.198	0.118	0.210
16	0.452	0.310	0.112	0.084	0.238	0.298	0.194	0.308
17	0.492	0.348	0.030	0.026	0.260	0.330	0.218	0.296

Table 10: Eligibility rate: 50% instead of 70%

7 Concluding remarks

In this paper we develop a dynamic model of drop out and we estimate it for one CCT program in Uruguay. Our model captures well the size of teenagers who study and those who work, but presents some difficulties to estimate the working and home production hours.

The main results of the policy experiment are the increment in the drop out when the CCT programs gives less money to the household and when the level of enforcement is higher. In future version of this paper we will include the data of a second CCT (AFAM) which present a higher level of enforcement in order to increase the quality of the estimation and analyze deeply the role of the enforcement.

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8 Appendix

	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.1: Home production: OLS

Dependent variable: wage (15-18 years)	OLS	Heckman	Selection eq. Pr(ocup=1)
	(1)	(2)	(3)
Age	0.048	0.135	0.228***
	[0.107]	[0.214]	[0.039]
Attendance (1=Yes)	0.040	-0.268	-0.781***
	[0.281]	[0.714]	[0.097]
Education (Ref: Primary)			
High School (not compulsory)	-0.457*	-0.446*	0.022
	[0.245]	[0.244]	[0.099]
High School (compulsory)	-0.876**	-0.931**	-0.153
	[0.381]	[0.396]	[0.137]
Home Production (Ref: HP=0)			
0-5	0.654	0.649	-0.021
	[0.441]	[0.436]	[0.148]
5-10	0.733**	0.802**	0.187
	[0.365]	[0.391]	[0.129]
> 10	0.895**	0.822**	-0.132
	[0.356]	[0.386]	[0.126]
Treat (1=Yes)	0.274	0.274	0.014
	[0.220]	[0.219]	[0.083]
2nd Wave (1=Yes)	0.340	0.340*	-0.004
	[0.207]	[0.206]	[0.077]
Offspring (1=Yes)			-0.655***
			[0.183]
Constant	1.683	-0.314	-4.203***
	[1.745]	[4.594]	[0.642]
Mills			0.505
			[1.076]
N	302		1570
Pseudo R-sq	0.065		

Table A.2: Wage equation

Dependent variable: GPA	Age					
	12-18		12-14		15-18	
	(1)	(2)	(3)	(4)	(5)	(6)
GPA t-1 (ref: F)						
B	0.656***	0.640***	0.887***	0.871***	0.064	0.045
	[0.101]	[0.102]	[0.123]	[0.124]	[0.203]	[0.205]
A	1.722***	1.683***	1.889***	1.858***	1.743***	1.698***
	[0.183]	[0.184]	[0.209]	[0.209]	[0.497]	[0.501]
Grade (ref:1-2)						
3-4	0.203	0.213	0.273	0.313	0.014	0.023
	[0.143]	[0.143]	[0.199]	[0.199]	[0.221]	[0.224]
5-6	-0.339	-0.348			-1.049***	-1.045***
	[0.322]	[0.322]			[0.352]	[0.354]
Sex (1=Male)		-0.227**		-0.199		0.00003
		[0.111]		[0.144]		[0.245]
Age	-0.131**	-0.126**	-0.301***	-0.284***	0.167	0.162
	[0.053]	[0.055]	[0.098]	[0.101]	[0.115]	[0.118]
Home Production (Ref: HP=0)						
0-5	-0.107	-0.176	-0.114	-0.182	-0.056	-0.032
	[0.138]	[0.158]	[0.157]	[0.187]	[0.332]	[0.340]
5-10	0.022	-0.053	0.286	0.149	-0.068	-0.081
	[0.138]	[0.150]	[0.205]	[0.239]	[0.254]	[0.261]
> 10	0.060	-0.023	-0.235	-0.172	0.215	0.240
	[0.191]	[0.214]	[0.460]	[0.484]	[0.243]	[0.280]
Region (1=Montevideo)		-0.154		-0.188		-0.090
		[0.159]		[0.212]		[0.232]
Treat (1=Yes)	0.117	0.129	0.183	0.197	0.043	0.060
	[0.107]	[0.107]	[0.128]	[0.128]	[0.199]	[0.206]
2nd Wave (1=Yes)		-0.159*		-0.190*		-0.122
		[0.096]		[0.114]		[0.184]
Hours Worked (Ref: HW=0)						
0-15					0.539	0.558
					[0.649]	[0.663]
> 15					-1.137	-0.123
					[0.357]	[0.387]
μ_1	-1.935	-2.109	-4.015	-4.039	2.431	2.283
	[0.707]	[0.727]	[1.273]	[1.305]	[1.864]	[1.932]
μ_2	-0.31	-0.468	-2.21	-2.217	3.796	3.651
	[0.704]	[0.725]	[1.266]	[1.301]	[1.875]	[1.940]
N	623	623	454	454	169	169
Pseudo R-sq	0.147	0.154	0.169	0.176	0.095	0.097

Table A.3: GPA: ordered probit

	sn base outcome					
	sw		nn		nw	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
State						
sw	0.190**	1.164	-0.552	-0.654	1.016	0.602
	[0.561]	[0.558]	[0.767]	[0.719]	[0.683]	[0.920]
nn	0.482	0.589	2.160***	2.374***	2.567***	2.697***
	[0.584]	[0.597]	[0.290]	[0.338]	[0.391]	[0.451]
nw	0.35	0.445	1.243***	1.171***	2.261***	1.978***
	[0.383]	[0.395]	[0.227]	[0.249]	[0.267]	[0.357]
Sex (1=Male)		0.236		1.100***		2.745***
		[0.391]		[0.270]		[0.388]
Age		0.159		0.421***		0.755***
		[0.200]		[0.096]		[0.132]
Home Production (Ref: HP=0)						
0-5		1.387**		0.532		-0.626
		[0.562]		[0.453]		[0.727]
5-10		0.670		0.511		-0.162
		[0.549]		[0.390]		[0.463]
> 10		0.449		2.465***		2.363***
		[0.632]		[0.357]		[0.437]
Region (1=Montevideo)		-0.651		-0.586*		-1.089***
		[0.549]		[0.308]		[0.405]
Treat (1=Yes)		-0.028		-0.270		-0.338
		[0.377]		[0.234]		[0.307]
Constant	-2.353***	-5.687*	-1.526***	-10.135***	-2.690***	-17.544***
	[0.228]	[3.267]	[0.159]	[1.593]	[0.267]	[2.248]
N	659	653	659	653	659	653
Pseudo R-sq	0.089	0.228	0.089	0.228	0.089	0.228

Table A.4: Transitions: Multinomial logit 15-18 years old