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Transfer Program Enforcement and Children's Time
Allocation

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Abstract

We estimate the enforcement level of conditionalities of two transfer programs and how they affect teenagers' time use, in particular, their school attendance, labor supply, and home production. We develop a structural discrete choice model in which young individuals and their parents decide how to allocate their time, including the decision of whether to attend school. They also choose how many hours to work in the market, time in home production, and leisure. To estimate the model, we use household panel data which combines administrative records and surveys covering the period of 2005-2012 in Uruguay, during which two consecutive CCT programs were introduced with different designs. Our model captures not only the share of individuals who are in fact in studies, working and those who neither study nor work, but also the share and the number of hours in market work and home production, and the GPA distribution. The policy experiments performed indicate that school attendance can be increased by raising the level of enforcement and by changing who in the household receives the cash transfer from the parents to the teenagers.

Palabras clave: Time Use; Enforcement; Discrete Choice Models; Conditional Cash Transfer
Código JEL: D15, H53, I38, J22

Resumen

En este trabajo estimamos el nivel de *enforcement* de las condicionalidades de dos programas de transferencias y como afectan el uso del tiempo de los adolescentes, en particular, la asistencia a centros educativos, la oferta laboral, y las actividades domésticas. Desarrollamos un modelo estructural de elección discreta en la cual los adolescentes y sus padres eligen como asignar su tiempo, incluyendo la decisión de asistir a un centro educativo. También eligen las horas que dedican a trabajar, al ocio, y a las actividades domésticas. Para estimar el modelo usamos datos de un panel de hogares, el cual es combinado con registros administrativos y encuestas, que cubren el período 2005-2012 en Uruguay, cuando fueron introducidos dos programas CCT con diferente diseño. El modelo captura no solo la proporción de individuos que trabajan, estudian, o no hacen ninguna de las dos cosas, sino también las horas que dedican al trabajo y a las actividades domésticas, y la distribución del GPA. Los experimentos de política realizados indican que la asistencia a centros educativos podría incrementarse si el nivel de *enforcement* fuese mayor y si cambiara quien recibe la transferencia de ingreso, los padres o los adolescentes.

Palabras clave: uso del tiempo; enforcement; modelos de elección discreta; Transferencias condicionadas de ingresos
Código JEL: D15, H53, I38, J22

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1 Introduction

Research on public economics has traditionally examined the effects of social welfare programs on incentives in labor supply, school attendance and home production, with emphasis on financial constraints that affect individual behavior and the role of the conditionalities in the decision process. Over the last decade, there has been an increasing number of papers that analyze how enforcement impacts these decisions. This paper aims to estimate the level of enforcement relating to middle and high school attendance for two conditional cash transfers (CCT) programs and analyze how this variable affects time use of teenagers in treated families. We develop a structural discrete choice model, where the teenagers and their parents jointly make the decisions about teenagers' time use. To estimate the model parameters, and especially the enforcement levels, we use data from two programs that were designed and carried out (the second replaced the first one) in Uruguay over about ten years.

Government enforcement has a crucial role in the public economics literature. Traditionally, the decision of its level was set through a cost-benefit problem, such as in the seminal papers of Becker (1968) and the extension of Allingham and Sandmo (1972) for the particular case of tax evasion. Since Alm et al. (2009) introduced enforcement on tax compliance in a lab experiment, a significant body of research has been exploring which enforcement strategies work better and how these strategies generate spillovers on the whole economy, with a focus on taxes (Almeida and Carneiro, 2009; Rincke and Traxler, 2011; Almeida and Carneiro, 2012; Drago et al., 2015; Ulyssea and Ponczek, 2018; Slemrod, 2018) and on social programs (Brollo et al., 2017). Following this literature and also in line with those of social norms, enforcement level involves not only the resources that the government invests to carry out the programs but also individual perceptions about program quality and efficiency, and so related estimation has been an issue in economics literature (Posner, 1997; Benabou and Tirole, 2011; Besley et al., 2015; Acemoglu and Jackson, 2017). The enforcement level estimation is the first and main contribution in this paper, insofar as we are able to do it using a structural model which also allows us explore a series of counterfactual situations.

In this paper, we also contribute theoretically and empirically to the literature in three other respects. The second contribution is how the inclusion of time use in utility formation introduces the decision made by parents and teenagers into the model, and the positive utility for those who neither study nor work, especially from leisure. We propose a dynamic model of sequential decisions under uncertainty, based on the seminal paper of Eckstein and Wolpin (1999). In that paper, they develop and estimate a structural model of the decision of

whether to work and high school attendance, exploiting the NLSY79 to identify who drops out and when they do so.[1] They find that those who work at the same time as attending high school have lower school performance. In our paper, we theoretically consider parents and teens as jointly making decisions about how the teenager will allocate their time, and also consider a particular group of teenagers who are at the bottom of the income distribution, a significant share of whom neither study nor work, both of which introduce particular features in our model.

We also introduce skills development into the model as satisfaction that schooling gives to the child and their parents. As in Stinebrickner and Stinebrickner (2014), we estimate the grade point average (GPA) dynamic, and it is one of the channels to understand and quantify the decision between work and schooling. Poor educational performance, i.e., low GPA, has in the past increased the dropout probability Entwisle and Kabbani (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, because poor performances can generate frustration in the individual (Finn, 1989) and can reduce how enjoyable it is to be in school (Stinebrickner and Stinebrickner, 2014); and ii) household incentive through the aspirations of parents, i.e. the child's educational performance builds parents' incentives. Because they perceive bad signals in relation to their offspring's academic achievements, they reduce or stop investing in education (Mumford and Li, 2012). This investment in education can operate either through the time that parents spend with their children in educational activities such as reading or homework, or encouraging their children to do it (Del Boca et al., 2017). As in Bursztyn and Coffman (2012), we consider the time use decisions as a negotiation between generations through a weighted utility function. The decision to participate in the education system depends on both parents' and the 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 in alternative activities (school attendance or work). We assume that the utility from attending school depends not only on the GPA but also on completing the level of school.

The third contribution is the estimation of enforcement parameters, fitting statistical moments related to time use using a novel database, which includes time in home production as a part of the household optimization problem, and the interactions with education, work in the market and leisure. The estimation of this model uses a unique database from administrative records and a set of surveys that enable to follow their entire educational history, time in work in the market and time in home production, at no less than two points in time over seven years covering the two CCT programs. This dataset allows us to model how the families decide the teenagers' school attendance, their participation in the labor market and time spent in home production. In this case, we do not consider parents' time, because evidence suggests that parental investments in their child drops during adolescence (Del Boca et al., 2019, 2013; Heckman and Carneiro, 2003), as the effect of child self-investment increases(Cooper et al., 2006).

Finally, we contribute to the analysis of how the CCT program is designed, the mechanism behind the

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[1]The National Longitudinal Survey of Youth 1979.

enforcement level, the dynamics of entry and exit from the program and who in the household is the direct beneficiary of the cash transfer. Empirically, we work with a deprived group of teenagers whose families applied to receive a CCT, either the National Social Assistance Plan for Social Emergency (Plan de Asistencia Nacional a la Emergencia, hereafter PANES) or for Family Allowance (Asignaciones Familiares hereafter, AFAM). Both have encouragement of school participation as among their objectives, but the enforcement levels of these conditionalities were weak. Beyond the normative discussion in relation to CCTs (Pérez-Muñoz, 2017), the effects of CCT programs on school enrollment and attendance have been studied over the last decade in many developing countries. Through a meta-analysis, García and Saavedra (2017) find that the CCT programs have an overall sizable effect, but it is highly heterogeneous, depending whether primary or secondary school, the amount of the transfer, the frequency and the benchmark. Baird et al. (2013) study the effect on school enrollment, comparing the CCT with the unconditional cash transfer (UCT) programs, and within the former group of programs consider both those with and without enforcement by the respective governmental agency.[2] They find that both CCTs and UCTs affect enrollment, but there are no statistically significant differences among them. Moreover, across the three groups there is a clear statistical difference between those CCT programs with explicit monitoring, and the UCTs and the CCTs with weak control.

The rationale for CCT programs operates on the basis of the decision to attend school and/or work in the market; here, we propose to expand the set of decisions to include home production and leisure time. These decisions have gained relevance in recent years because the share of teenagers who drop out of school and do not enter the labor market has increased (Attanasio et al., 2010). According to the ILO (2013), in Uruguay, which in this regard is at an intermediate level in Latin America, one in five individuals aged between 14 and 19 neither study nor work, half of whom declare they do not do any specific activity during the day. This figure is even higher among individuals in households in the first quintile (lowest income).[3]

These conditionalities affect time use via two mechanisms. First, directly, because one of the conditions to participate in these programs is related to school attendance. Second, the programs indirectly generate behavioral changes based on a change in incentives, decreasing the household investment required to study or the opportunity cost of studying vis-à-vis 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 first the parents, and then the teenagers, decide either to work or attend school, as well as fertility behavior in the context of a transfer program. Additionally, they perform some counterfactual policy scenarios and propose a different scheme which leads to better school performance. Attanasio et al. (2010) also use a structural model to evaluate PROGRESA in Mexico. They use a randomized experiment to assess if the program is effective and in which respects 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

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[2]They consider the level of conditionalities and their enforcement as ranging from 0 to 6, with UCT programs unrelated to children or education being attributed zero, and those CCTs having explicit conditions with monitoring and enforcement of the attendance condition attributed six.

[3]See Table 1

include a GPA dynamic in the model.

We estimate the structural model that fits the data well and show the extremely low level of the enforcement in both programs. The strength of these parameters leads to change in the teenagers' time use, especially among those who neither study nor work, toward attending middle or high school. Our hypothesis is that we will find a very low level of enforcement in both programs. Also, if the teenager directly receives the transfer, it causes changes in their time use.

The rest of the paper is organized as follows. Section 2 describes the institutional background. In section 3 we describe the databases and the main descriptive statistics. In section 4 the model is developed. In section 5 we present the main results, in section 6 we perform some policy experiments, and in section 7 we discuss the results and the counterfactual experiments. Finally, section 8 concludes.

2 Institutional background

In recent years, the Uruguayan government established two social assistance program: PANES between 2005 and 2007 and after that AFAM starting in 2008. These programs have some similarities and many differences. Both programs target the beneficiaries using a baseline poverty score (in Spanish, Índice de Carencias Críticas, ICC) and the household's per capita formal labor market income. The ICC is a multidimensional index that identifies how vulnerable the household is; those above a threshold are eligible for the program. Both PANES and AFAM target poor households but use different thresholds. PANES targeted the first (poorest) quintile of the population and AFAM is focused on all poor households with children (below age 18). The formal income threshold was applied and fully enforced in both programs, but the amounts are not publicized and so have been of any salience for the citizens.

The main differences are the amount of the transfer and the enforcement mechanism. The transfer in PANES was the same amount for all the households, a lump sum which is around 55% of the full-time monthly minimum wage.[4] In comparison, the AFAM transfer is linked to the number of household members and educational achievement. The household receives an amount for the first child which is about 30% of the minimum wage if attending middle or high school and decreases by 40% for the next younger child up to a total of five siblings. [5]

The income requirement was monitored in PANES and also is in the AFAM program, but only via formal income which is registered through the employment records Bergolo and Cruces (2014). In other words, all income that the families have from informal work is not taken into account. Around 5% of the PANES and AFAM beneficiaries exit from the programs because those households' formal income is above the threshold. The enforcement of this requirement is widely known and enters into the decision function of the individual.[6]

The level of enforcement of education and health requirements operates on the basis of individual perceptions that if they do not satisfy the requirement they will lose the transfer. Both are perceived as having weak

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[4]The amount of the monthly transfer to the household was about 60 US dollars.
[5]The amount of the monthly transfer for a household with only one middle or high school student is about 50 US dollars.
[6]Similar features are identified by the World-Bank (2010) for Colombia.

enforcement. A priori, PANES can be expected to have had higher enforcement than that of AFAM, because the probability of losing the entire transfer depended on any single child. Conversely, in AFAM if one of the children drops out of the education system, the household only loses the part of the transfer that corresponds to that child. However, the enforcement could be expected to be higher in the AFAM case, because when a child starts middle school the family has to present the enrollment certificate in order to receive the 30% benefit.

We focus only on the period between 2005 and 2012 because of the data available, and because in 2013 the government started to verify the educational requirement twice a year. In April, the government monitors whether the children are enrolled in the educational system, and in September it checks the number of days that they actually attended school in the first months of the school year. This change led to the suspension of some individuals from the program and could have the effect of spilling over to other families through the enforcement perception.

3   The data and descriptive statistics

We use data 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), the follow-up survey for AFAM (FSA) and the middle and high school education record (SER). PANES was a transient program that started in April 2005 and ended in December 2007. The largest component was a lump sum transfer, independent of the number of household members.[7] The target population of this program was the first quintile (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 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) because they are slightly above the threshold. The beneficiary selection criterion was based on the ICC. This survey considers only the population near to the cutoff that identifies the treated and control groups.

The AFAM transfer depends on the number of children in the household and the educational level. The amount for children depends on whether they are in middle or high school and the birth order in the household.

In the same fashion as the FSP, the 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 populations similarly to the FSP, using the ICC and the formal per capita income threshold. To complement the FSP and FSA data, they are combined with information from the SER, which contains data on the educational performance, in this case the GPA, of students in secondary education. Middle school starts at 12 years of age, after 6 years of primary education, and lasts three years. After that, there are three years of high school, all of which are compulsory. Additionally, we estimate time in home production via the Time Use Survey carried out in 2008 by the National Statistics Institute.

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

In Table 2, we show the mean and standard deviation of the main variables during the respective periods of each CCT program. In the first panel, the data about PANES can be observed. We have 3090 observations of 12 to 18-year-old individuals. In this sample 75% attended school. However, only 56% attended middle school (1716 observations) and 44% attended 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 statistically significant changes in the distribution of variables as resulting from the missing cases. In our sample, 70% of the population was treated, nearly 65% did home production and 6% were working. Specific information about educational performance shows that 35% fail the year of study (obtain an F) and only 20% obtained a GPA of A. Finally, less than 9% attended the last years of high school.

In the second panel we show data relating to the AFAM. In this case, 82% attended formal education (7 points higher than in PANES). We have 2796 individuals between 12 and 18 years of age, and high school records were available 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 sample works less than the PANES one (3 percentage points less).

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 interest to us, 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 that the number of teenagers who only study decreases significantly with age, and that there is an increasing trend, by age, of those who neither attend school nor work. Additionally, the percentage of those who study and work remains below 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. Finally, under AFAM, more teenagers are studying and not working, and this is because of the smaller proportion who neither study nor work.

One of the distinguishing features in this paper is the presence of individuals who neither work nor study. In Table 1, we show the information about those teenagers who declare neither studying nor working in the market. These account for 11% of individuals in the age group of interest in the sample as a whole, although this is eight times higher in first than in the fifth income quintile.

The distribution of GPA by age and grade level is presented in Table 4. The GPA performance is worse when students attend higher level courses and also at higher ages (controlling for grade level). About 64% of those older than 16 years of age and 72% of those enrolled the final two years of secondary school do not pass the grade level. This difference is because many students are enrolled at a lower grade level than corresponds to their age because of having failed a grade one or more times. The percentage with a GPA equivalent to A is the same between grades 7 to 10 (20%), and decreases to only 10% in the last two grades.

Finally, the transition rates between states in consecutive years are shown in Table 5. The state sn is more stable than the others, with about one-third of the population only studying and remaining in that state in the following year. In all other cases, the proportion of the population remaining in the same state is above 10%.

Of those sw in $t-1$, in the next year about 60% stop working and continue studying; this percentage is 28% and 43% for the cases of nn and sw, respectively.

4 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). We consider the share of household utility which depends on the time allocation of the teenager: whether attending school, producing at home, working in the market or enjoying leisure. Additionally, that allocation determines if the household receives (or continues to receive) the CCT. Here we account for the utility that the teenager brings to the household by 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. (Del Boca et al., 2019)

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 (residual time after other activities). 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 a 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. The decision is how to split the time between school attendance, home production, leisure, and also market work after they are legally allowed to work.

Given the total hours available of L_1 (73 hours per week[8]) for those who attend school, and L_2 (98 hours per week[9]) for those who do not attend school, 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's 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 parameter η for teenagers who are not attending formal education. This parameter summarizes the enforcement

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

[9]This computation is the result of considering that they have 14 hours available per day.

spillover of the program, e.g. the perceived probability of being monitored. The size of the transfer is different in the two programs, and also depends on whether the formal income of the family exceeds a threshold, with a modelled assumption of perfect enforcement.

Teenagers' utility comes from leisure, school attendance and work in the market:

$$
\begin{aligned}
U_{ch,t}^{sn} &== B_{1,t}^n\left(L_1 - h_t^{hp}\right) + B_{1,t}^s \\
U_{ch,t}^{sw} &= B_{1,t}^n\left(L_1 - h_t^w - h_t^{hp}\right) + B_{1,t}^s + \omega_t h_t^w \\
U_{ch,t}^{nn} &= B_{1,t}^n\left(L_2 - h_t^{hp}\right) \\
U_{ch,t}^{nw} &= B_{1,t}^n\left(L_2 - h_t^w - h_t^{hp}\right) + \omega_t h_t^w
\end{aligned}
\tag{2}
$$

Parents' utility comes from the teenager's school attendance, time allocated in home production (h_t^{hp}), time working in the market (h_t^w) and the CCT (T_t):

$$
\begin{aligned}
U_{p,t}^{sn} &= B_{2,t}^s + B^{hp}(h_t^{hp}) + + T_t \\
U_{p,t}^{sw} &= B_{2,t}^s + B^{hp}(h_t^{hp}) + \omega_t h_t^w + T_t \\
U_{p,t}^{nn} &= B^{hp}(h_t^{hp}) + \left(1 - \eta\right)T_t \\
U_{p,t}^{nw} &= B^{hp}(h_t^{hp}) + \omega_t h_t^w + \left(1 - \eta\right)T_t
\end{aligned}
\tag{3}
$$

The value of leisure for the teenager depends positively on age (t), and it is convex in the hours that they do not spend working in the market, on home production, or in formal education. The value also depends on a set of parameters (b_{1t}^n and b_2^n) estimated in the model.

$$
B_{1t}^n(h) = b_{1t}^n(h^n)^{b_2^n} + b_{1t}^n
\tag{4}
$$

Rewards from school are to both the teenager and also the parents, and in both cases the rewards are positively affected by the GPA in the previous period (gpa_{t-1}) and the level of education achieved (E_{t-1}). The teenager's utility also depends negatively on the hours spent working in the market (h^{hw}) and on home production (h^{hp}). The teenager's and parents' parameters, b_1^s and b_2^s, are both estimated in the model.

$$
B_{1t}^s = b_1^s\left(gpa_{t-1}, E_{t-1}, h^{hp}, h^{hw}\right) + \epsilon_{1t}^s
\tag{5}
$$

$$
B_{2t}^s = b_2^s\left(gpa_{t-1}, E_{t-1}\right) + \epsilon_{2t}^s
\tag{6}
$$

The enforcement parameters are (η_{PANES} and η_{AFAM}), which are estimated in the model and will be the key

parameters to simulate policies:

$$\eta \in [0,1] \quad \text{if} \quad \eta = \begin{cases} 0 & \text{if no enforcement} \\ 1 & \text{if full enforcement} \end{cases}$$

The GPA follow an ordered logit process which depends on the age, the lag of GPA, the number of working hours, the home production hours and the CCT (X in Equation 4). The grades can take three values, A, B and F, the lower of which means that the student fails the course.

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

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 to receive the CCT which depends on school attendance, changes in income and the government enforcement. The probability of losing the transfer from CCT programs consequent to a formal income shock[10] is p_1 if the student is not working, and p_2 for those who are working. These percentages are estimated in two groups: those who are between 12 and 14, and those between 15 and 17 years old.

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

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

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

The wage in each time is determined by the age (t), the school attendance (At_t), the level of education achieved (CS_{t-1}[11], B_{t-1}[12]), the time spent in home production (h_t^{hp}) and whether the household receives the CCT transfer. The estimation is done in two steps. In the first step we estimate the probability of working, and in the second step we include the Mills ratio to correct for selection bias.

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

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[10]Note that those teenagers who are working mainly do so in the informal market, so exit from the program due to a formal income shock is generally determined by the working situation of their parents

[11]Middle school

[12]High school

The shock's structure is as follows:

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

The Bellman equations are shown in Equation 11 for each choice and depend on the vector of states S_t, which are: C_t the present level of study, the yearly work hours h^w, the hours spent on home production h^{hp}, the GPA, the age, the CCT (control or treatment) and the shocks (ϵ^s and ϵ^w):

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

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

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 at $t = 18$ is $V_{18}(S_{18})$ which depends on the educational achievement, with CS as completion of middle school and B as completion of high school. The parameters are estimated in the model:

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

5 Results

In this section, we describe how the model works, the estimation strategy for the set of model parameters and the goodness of fit of the data at the main moments. In the model, the individual can only enter the CCT at two times: at the beginning of PANES (in which case they are in that program for 2 years, and then receive AFAM for a maximum of 4 years) or at the beginning of AFAM (in which case they are in that program for a maximum of 6 years). They can enter at any age between 12 and 17, but the exit is always at 18 years of age. Tables 6, 7 and 8 show the age distribution, the educational level and treatment (control) status upon entry into each respective program.

There are differences between treatment and control in the background of the teenagers at the time of entry, both within programs and between programs. In both cases, control teenagers have a better educational background than the treated ones, although AFAM treated individuals have a better background than the PANES ones. Note that the AFAM program is more broadly applied than PANES; on average, the AFAM teenagers have a better socioeconomic situation and better educational background. We can observe in tables

7 and 8 that the percentage of teens not having completed primary school is 10 points lower in the AFAM population compared to PANES. These differences in educational level and age are the main heterogeneity of the individuals in our model, upon starting to receive benefits.

The estimation strategy has two steps. In the first, we use the model to estimate the wage function, the home production function, the GPA function and transition among states. The second step is the estimation of a group of parameters $\hat{\Omega}_{S,N,W}$ via Simulated Method of Moments (SMM). For each individual $i \in N$ we simulate the model S times, yielding SxN paths. We compare the simulated moments with those in the data, minimizing the distance weighted by the inverse of the simulated variance of the moments W_N.

$$\hat{\Omega}_{S,N,W} = \text{argmin}_{\Omega}\big(M_N - \tilde{M}_S(\Omega)\big)'W_N\big(M_N - \tilde{M}_S(\Omega)\big) \tag{15}$$

Then

$$p\lim_{N\to\infty,S\to\infty}\tilde{\Omega}_{S,N,W} = \Omega \tag{16}$$

Firstly, in tables 9 - 12 we present the estimated parameters out of the model. We estimate the wage equation (Equation 9) for the teenagers in our sample (Table 9) using the FSP and the FSA. We observe an unexpected negative sign on education, and a positive sign on home production and age. But, in the age range studied and in this context, work experience has a positive impact in the wage equation, whereas education does not. Home production has a positive correlation with wages because there is a complementarity between the intensity in the labor market and the amount of tasks that the teenager does at home.

In Table 10 we can see that time in home production increases with age, if they are female, and if they have offspring. The parameters are negative for education and working in the market.

The GPA dynamics estimated in Equation 4 are shown in Table 11. Performance in $t-1$ has a positive impact on t. The probability of increased GPA in t is similar at each age level: people over 14 years of age have similar probability regarding GPA in t when obtaining an F or B in $t-1$. Neither the coefficients on time in home production nor in market work are significant.

Finally, we perform a multinomial logit to estimate the transition between states in the model. The results are in Table 12. 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). Finally, the probability of losing the CCT pursuant to a formal income shock is estimated using the administrative records and, respectively at the ages of 12-14 and 15-17, setting p_1 as 5.08% and 3.97% and p_2 as 4.69% and 5.88%.[13]

The second step of the estimation is by SMM, minimizing the distance between the simulated moments in the model and those in the data, weighting by the inverse of the simulated variance of the moments. To construct the list of moments we use the treated and control groups. The first is defined as those who receive the CCT in the year of program entrance in the model, and the latter is the others.

The total number of hours that the teenagers have available to spend is 98 hours per week, and if they

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[13]PANES and AFAM respectively

attend school they spend 25 hours in that activity.[14] On a yearly basis, therefore, they have 5096 available hours after subtracting 3536 hours. Individuals can choose to do (or not do) some home production for 0, 6 or 12 hours per week (0, 312 and 624 hours per year) and to work (or not) in the market for 0, 10 or 20 hours per week (0, 520 and 1040 hours per year).

The constructed moments are as follows: for both control and treated populations/samples in each program, time spent in home production, time working in the market, GPA and the four states sn, sw, nn, and nw. The estimated parameters are presented in Tables 13 and 14.

In tables 13 and 14 we show the main parameters of the model. In Table 13 there is the set of parameters which vary with age, such as the utility function weights, the leisure and home production functional forms. As the teenagers became older, their relative weight in the household decision function increases, from less than one-third to more than three-quarters. Leisure values increase with age and exponentially with the number of hours that the teenagers have remaining after the school, home production and labor decision. The reward of home production does not show a monotonic behavior with age due to the set of options to change how they spend their time, and the probability of having offspring rises.

In Table 14 we show a second set of parameters. The school reward parameter is higher for the teenagers than for their parents. The set of enforcement parameters in both programs appears to have been very low, reflecting that households do appear to be aware that school attendance is not monitored by authorities, i.e. that the risk to lose the transfer is negligible. However, the two programs differ on this point. These low levels of enforcement mean that there is room for policymakers to propose means of achieving better results.

The enforcement parameters in the model influence the cash transfers that the parents receive, i.e. the teenagers do not account for this income in their school attendance rewards. This could mean that either they decide to use their time more intensively in other activities such as work in the market or in the home, or leisure, or, if they fail a grade they do not have incentives to continue.

Finally, the total value that the individuals obtain at the age of 18 depends on equation 14 and the set of parameters in Table 14, where α_1 is the parameter of middle school achievement, α_2 of high school and α_3 the parameter related to completion of each grade.

In figures 1 - 8, we present how well the model fits the main moments from the data, when using the parameters estimated above. In the set of figures 1 - 4 we show how well the model fits the main activities through the four states (sn, sw, nn and nw) in both programs for treated and control populations. In both programs, the model fits well with the only exception being for control samples where there is an underestimation of sn and an overestimation of nn. The initial heterogeneity is that these teenagers have better conditions than the treated ones, and so parametrization cannot perfectly replicate the behavior of control ones (figures 1 and 3).

In figures 2 and 4, we include the working situation in the time use and this activity fits the model well. However, when we separately consider those who study and work and those who work but do not

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[14]The total number of hours in a week is 168 hours. We subtract 70 hours for personal needs.

study, the model has more problems. Those who only work is somewhat overestimated, and those who study and work underestimated. In the model, there are more incentives to only work than to work and study contemporaneously. Comparing the treated and control teenagers, the model captures a slightly higher attendance rate for the treated ones. The construction of the model paths depends on the initial heterogeneity and control individuals have better background than the treated. The rewards are also a little higher than the control ones due to self-selection: the teenagers that attend are the ones who previously obtained higher academic results.

The model also properly fits home production, work and GPA, as is shown in figures 5-8. In the case of home production, the model reveals different results for the teenagers that do less than 10 hours per week and those that do more. The model is able to replicate the trend by age in both time brackets. This trend appears in both time brackets, but in the first there is no clear difference by age, whereas in the second the size of the difference is clearly increasing in age. In the case of number of working hours, the model has poor goodness of fit for hours in market work, because as we mentioned before the model overestimates the more intensive workers, and underestimates the less intensive ones.

Finally, the model effectively captures variation in GPA by age of the teenagers as is shown in Figure 8. The trend is captured well in terms of decreasing frequency of grades of A and B, and increasing frequency of F. Note that at the age of 12 the percentages are 14.2%, 54.0% and 31.8% respectively for the GPAs corresponding to F, B and A, whereas at the age of 17 these are 57.0%, 31.6% and 11.3%.

6   Policy experiments

In this section we perform several policy experiments with the enforcement parameters and who in the household receives the transfer: a) slightly higher enforcement, b) maximum enforcement, c) change in who receives transfer, and then combine the previous, with d) a change in who in the household receives the transfer with a small increase in enforcement, and e) in this case also with maximum enforcement. We measure the effects of the policy experiments in both programs, observing the difference-in-difference between treated and control, and between the policy and benchmark. We find that for any age, the total effect sums to zero because we compute the change of time use of teenagers among the four states described above.

We set first the enforcement parameters η_{PANES} at 0.557 instead at 0.057, and η_{AFAM} at 0.611 instead at 0.111 (see Figure 9.) Here we consider only the time studying and working in the market[15] There is a rise in the time use to only study and to study and work, and a fall in all the other states at all the ages. These rises are higher in PANES than AFAM and for the younger ones: recall that the teenagers in the second program have a better background than in the first one.

Secondly, we set the enforcement parameters at the maximum of 1 (η_{PANES} and η_{AFAM}). The results in Figure 10 show the effect on the time spent studying as being much bigger than before. There are about 10 percentage

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[15]In the Appendix there are the effects of all policy experiments on home production, the amount of hours working in the market and the grades.

points more teenagers who study and do not work. Those teenagers that study more mainly come from among those who neither study nor work in contrast to the preceding case. Here again, the effect is higher in PANES than in AFAM, although in this case it is for ages. These two polices on enforcement parameters also change other aspects of the time use, reducing the home production in the early ages and the amount of hours they work in the market (figures A.1, A.2, A.4, and A.5).

In the third policy, we change the cash transfer beneficiary with the estimated level of enforcement in the benchmark. In Figure 11 there is no a clear pattern of change if the teenagers now receive the transfer, which could be because due to the low level of enforcement there are no clear incentives to behave differently.

Finally, in the fourth and fifth policy experiments we then combine the two of the previous policy experiments: the teenagers receive the transfer, and either a small increase of enforcement or the maximum value of enforcement. The results in Figure 11 and Figure 12 show a change in the time use in favor of study and not working. If the teenagers receive the transfer and there is a small increase in enforcement, there are similar consequences than in the second policy when the level of enforcement was maximum.

7   Discussion

The main point of this paper is to estimate the level of enforcement of two transfer programs and time use among teenagers. One of the issues that we have to deal with is the initial heterogeneity of individuals in the model, especially among the control ones. This issue can be observed when matching moments, but does not appear to be relevant in the policy experiments.

The model is effective at capturing the extensive margin of the labor supply, but it has more problems to discern between those who work and study from those who do not, and also the intensity of the work. Most individuals do some home production, but these activities are not fully captured in the model when they spend few hours doing this activity. When we perform policy experiments, the results about the work and home production intensity are not so evident as the other households' decisions.

Note that enforcement perception depends both on the belief of individuals about which is the right thing to do and the level of monitoring in practice. The former point is related to social norms and moral/ethical views about the law whereas the role of the policy is more difficult to determine. The latter point can be related to the probability and the beliefs about being effectively audited, and here there is wide room of action of any policy.

Finally, the policy experiments show that the enforcement policies can be complementary with changes to the transfer beneficiary, both of which policies can lead to more time in school.

8 Concluding remarks

In this paper we develop a dynamic model of teenagers' time use to estimate the level of enforcement of two transfer programs. We exploit the fact that teenagers have to comply with some requirements to qualify for eligibility to receive the CCT. We model not only school attendance, but also work and the home production. Moreover, we model the enforcement of the CCT program, in particular estimating a parameter that shows how the beneficiaries perceive the enforcement level. We exploit a wide, rich and novel dataset 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 made by the teenagers and their parents, in consideration of the utility that each decision brings to the household, although the weight of the teenagers in the decision changes over time. This model is effective in capturing the distribution of states of individuals, not only among the school attendance and number of hours in the labor market, but also the time that they spend in home production. A large percentage of teenagers neither study nor work, and this is a challenge for the model. The estimated enforcement level is very low in both programs, which may provide impetus toward policies which may, normatively, increase it toward better behaviors.

We perform five policy experiments to assess the role of the enforcement parameter, and who receives the transfer, in the household decision. When the enforcement is higher the treated teenagers attend formal education more, especially between the ages of 14-17, before which there is little room to improve given the already higher rates. The younger teenagers cannot attend more, but they change their time use as time progresses, spending fewer hours on home production. Those teenagers who are legally able to work do so less and with less intensity. These policy experiments show that if the level of enforcement is moderately higher (50 percentage points higher than in the estimation), the rate of those who study rises by between 4% and 10% and if it is maximum (set at 1), the rate of those who study rises by between 9% and 18%.

The policies which change who receives the transfer impact time use, when we simultaneously increase the level of enforcement. Those impact are similar to when we set the enforcement value to the maximum value, and give some insight to design policies that include both dimensions.

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Tables

Table 1: Characteristics of Young People (Neither Working Nor Studying) in Uruguay

| | Incidence | Main activity | | | Total |
		Unemploy-ment	Home production	Other activities	
Overall	17%	37%	33%	30%	100%
Male	13%	48%	7%	45%	100%
14-17 years old	12%	17%	10%	73%	100%
18-24 years old	16%	59%	5%	36%	100%
25-29 years old	9%	58%	8%	34%	100%
Female	21%	30%	49%	21%	100%
14-17 years old	11%	9%	37%	54%	100%
18-24 years old	26%	35%	46%	19%	100%
25-29 years old	23%	30%	59%	11%	100%
Income per capita					
First quintile	31%	34%	36%	30%	100%
Fifth quintile	4%	47%	15%	38%	100%

Source: 2015 Household Survey

Table 2: Descriptive Statistics

| | 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

Source: FSP, FSA and SER.

Table 3: Decisions by Age Group

		State				Hours Worked			Home Production	
PANES										
	sn	sw	nn	nw	0	0-15	> 15	0	0-10	> 10
12-13	0.82	N.A.	0.18	N.A.	N.A.	N.A.	N.A.	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										
	sn	sw	nn	nw	0	0-15	> 15	0	0-10	> 10
12-13	0.96	N.A.	0.04	N.A.	N.A.	N.A.	N.A.	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

Source: FSP, FSA and SER.

Table 4: The Grades Distribution by Age Group

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

Source: FSP and SER.

Table 5: Transitions of States

	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

Source: FSP, FSA and SER.

Table 6: Age and Treatment Distribution at the Entrance Moment

	PANES			AFAM		
Age	Total	Treated	Control	Total	Treated	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

Source: FSP, FSA and SER.

Table 7: Education Background at the Moment of Entering in PANES

Age	Primary		Middle and High school					
	Not Completed	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	
Treated								
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	

Source: FSP, FSA and SER.

Table 8: Education Background at the Time of Entering in AFAM

Age	Primary		Middle and High school					
	Not Completed	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	
Treated								
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	

Source: FSP, FSA and SER.

Table 9: Wage Equation

Dependent variable: wage (15-18 years)	OLS (1)	Heckman (2)	Selection eq. Pr(work=1) (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)			
Middle School	-0.460*	-0.448*	0.022
	[0.245]	[0.245]	[0.099]
High School	-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]
Treated (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	

Source: FSP, FSA and SER.

Table 10: Home Production: OLS

	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=Capital City)	-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)
Source: FSP, FSA and SER.

Table 11: GPA: Ordered Probit

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=Capital City)		-0.197		-0.296		-0.013
		[0.149]		[0.207]		[0.201]
Treated (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

Source: FSP, FSA and SER.

Table 12: Transitions: Multinomial Logit 15-18 Years old

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=Capital City)			-0.503			-0.117			-0.483***
			[0.524]			[0.282]			[0.373]
Treated (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

Source: FSP, FSA and SER.

Table 13: Estimation: Parameters Estimated by SMM

	12 -13	14 -15	16-17
γ_t	0.3082	0.5808	0.7613
	(0.000344)	(0.00235)	(0.00255)
b_{1t}^n	5.42	90.68	90.68
	(0.112)	(31.76)	(31.76)
b_2^n	8.99	8.99	8.99
	(0.343)	(0.343)	(0.343)
b_{1t}^{hp}	262.95	121.69	198.03
	(37.15)	(6.25)	(10.34)
b_2^{hp}	6.89	6.89	6.89
	(0.228)	(0.228)	(0.228)

Table 14: Estimation: Parameters Estimated by SMM.

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	(64.038)
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)

Figures

Figure 1: Model Fits: PANES Time Use Moments
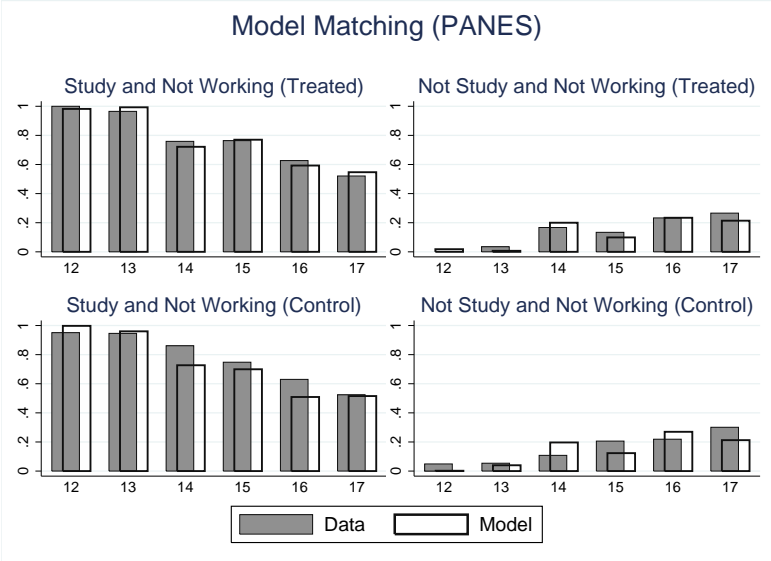
Figure 2: Model Fits: AFAM Time Use Moments
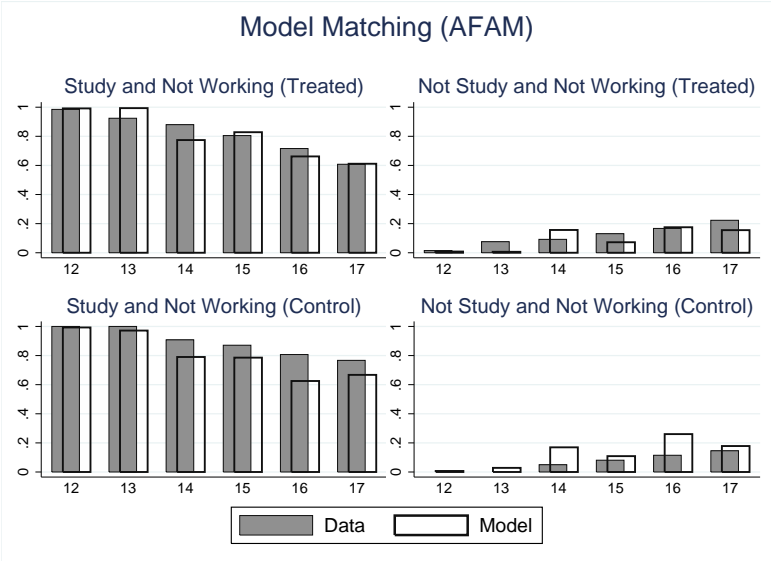
Figure 3: Model Fits: PANES Time Use Moments
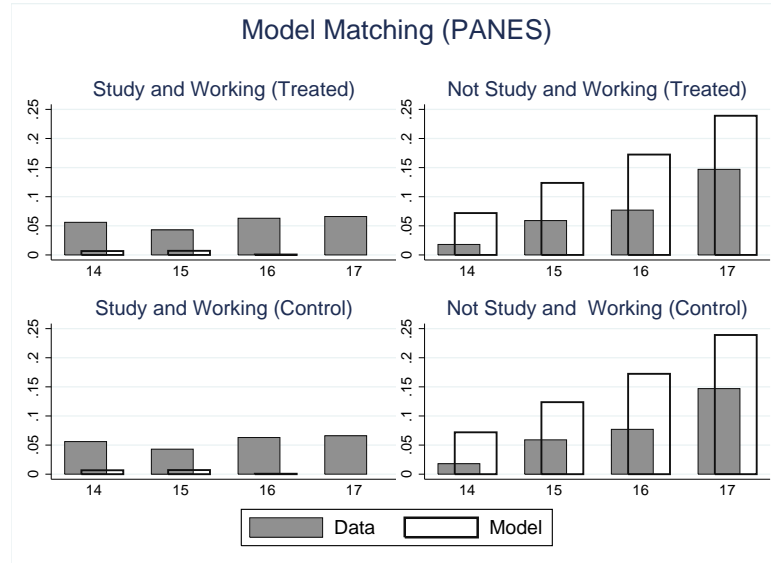
Figure 4: Model Fits: AFAM Time Use Moments
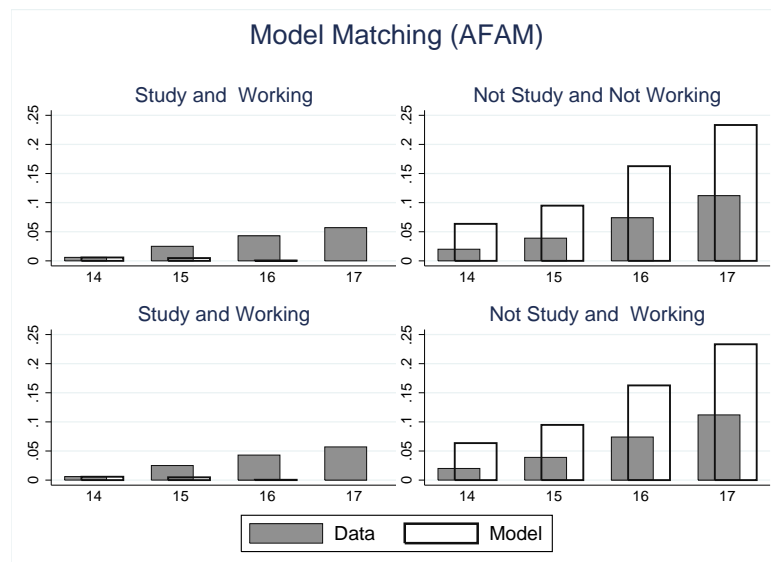
Figure 5: Model Fits: Home Production PANES
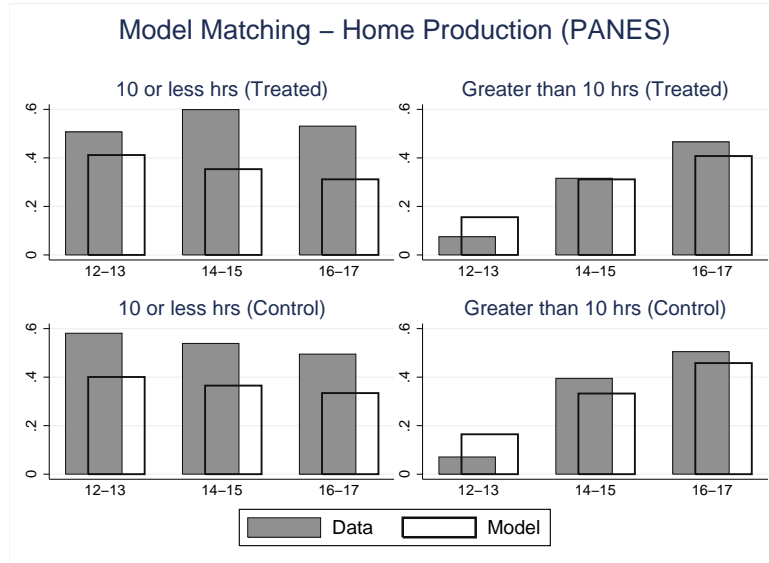
Figure 6: Model Fits: Home Production AFAM
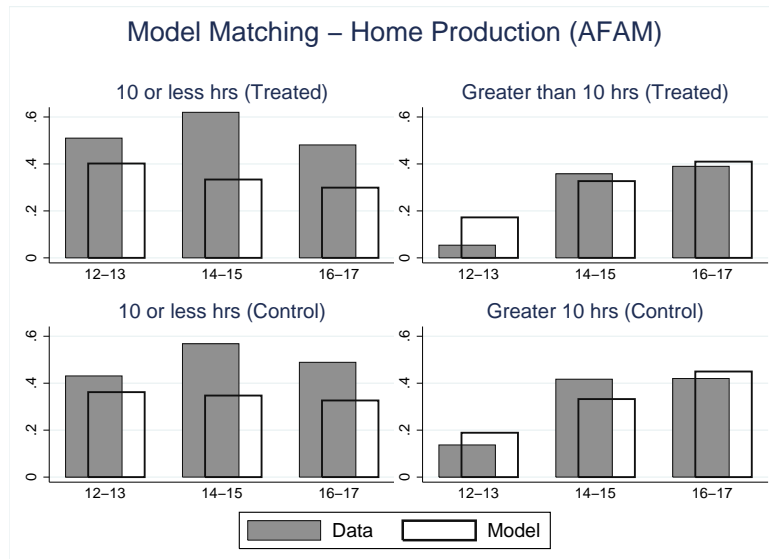
Figure 7: Model Fits: Working in the Market
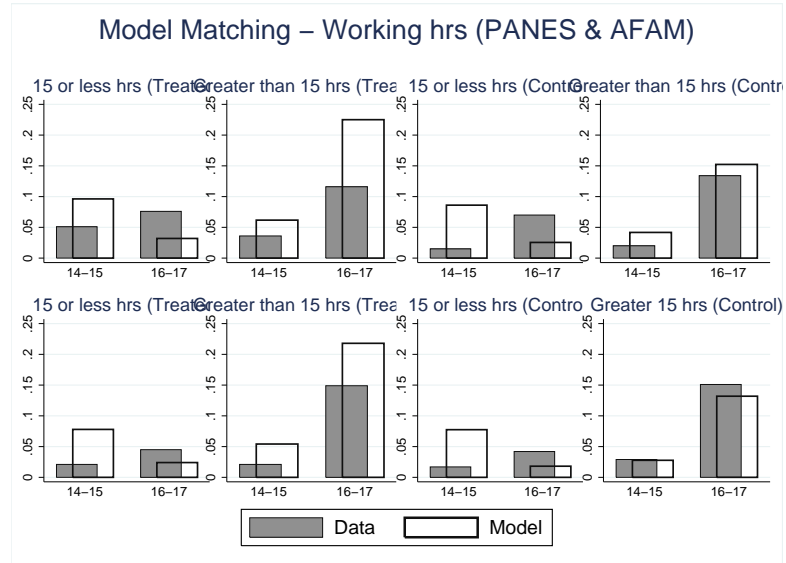
Figure 8: Model Fits: Grades Distribution
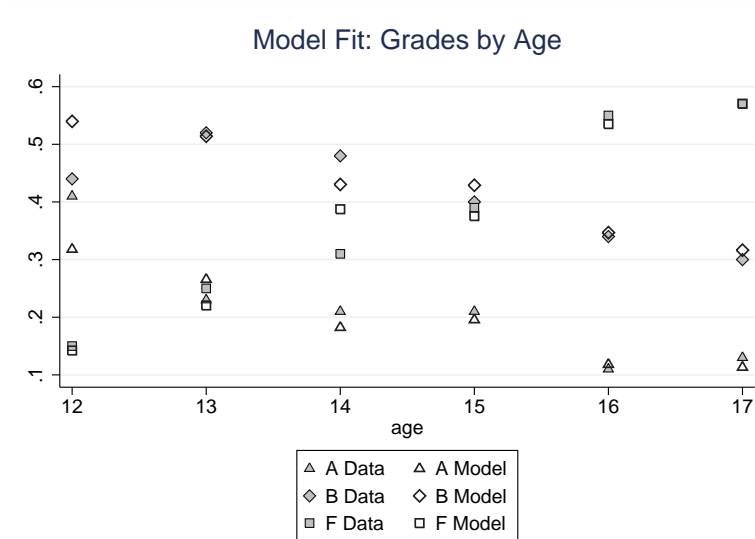
Figure 9: First Policy Experiment: Differences Between Treated and Control and Policy with a Small Increase of the Enforcement Parameter
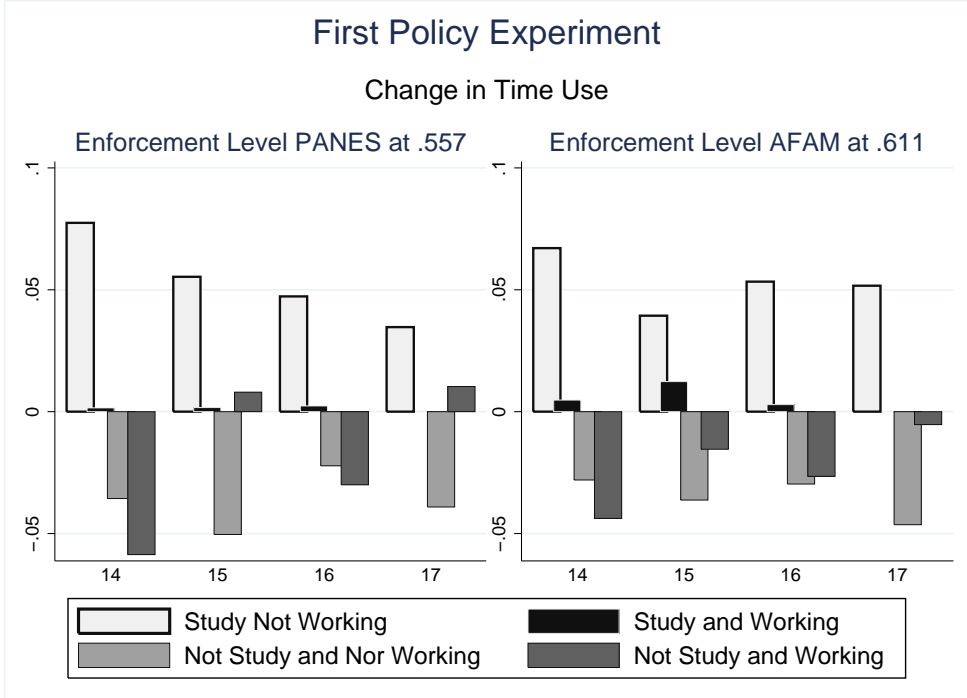
Figure 10: Second Policy Experiment: Differences Between Treated and Control and Policy with Maximum of the Enforcement Parameter
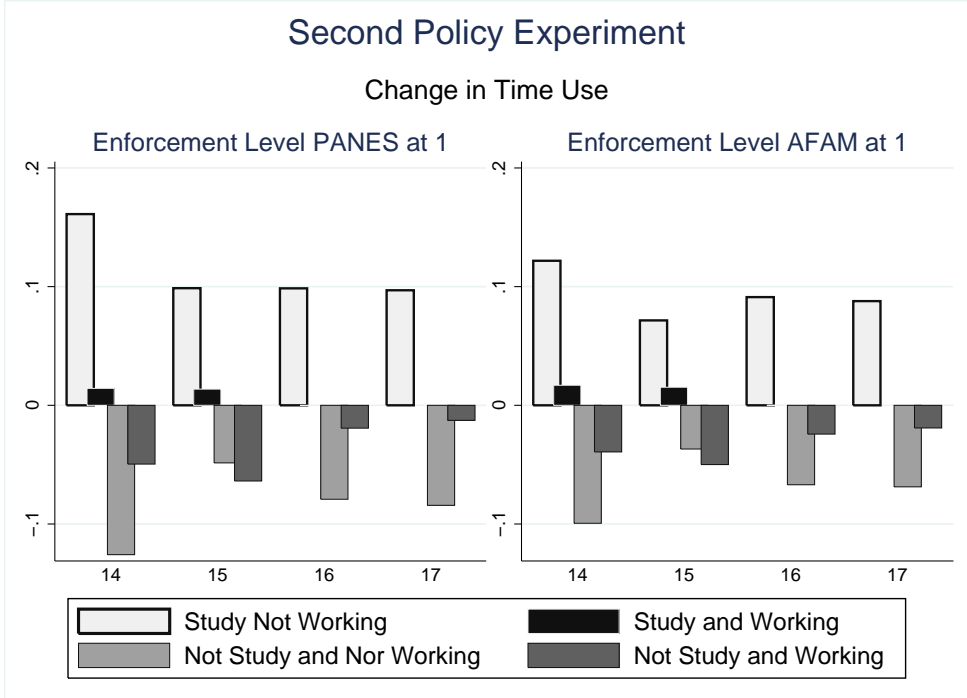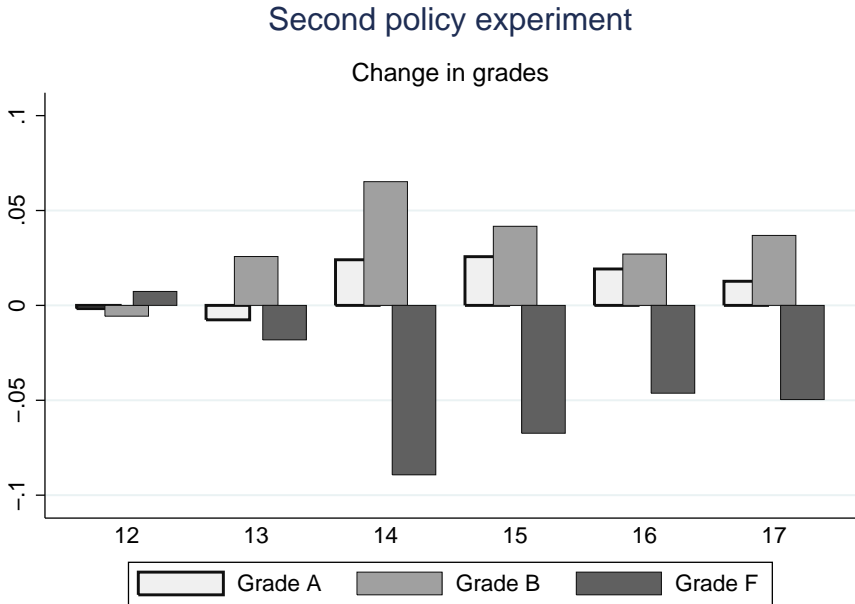
Figure 11: Third Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer
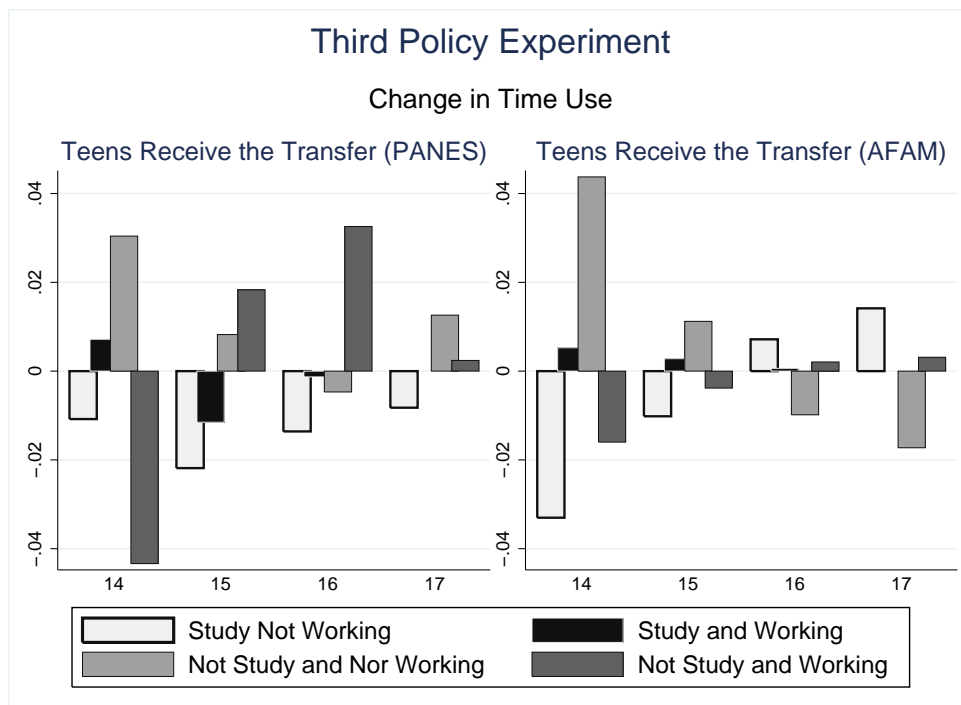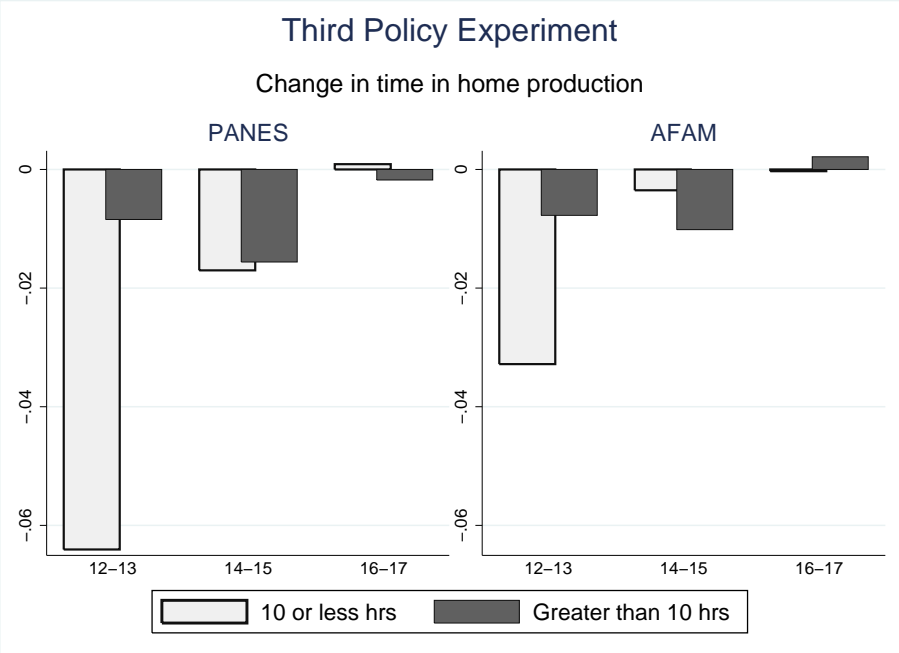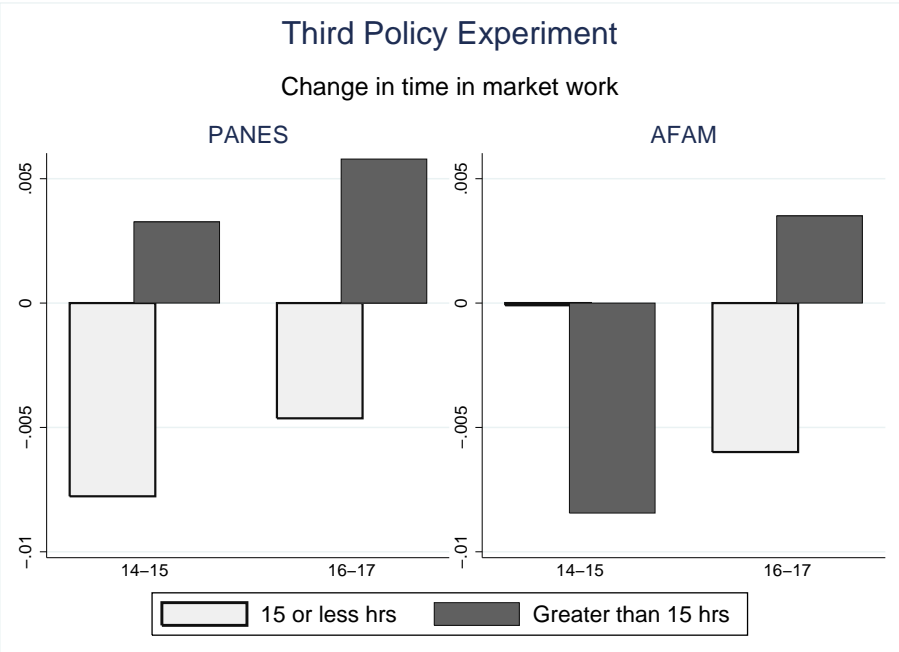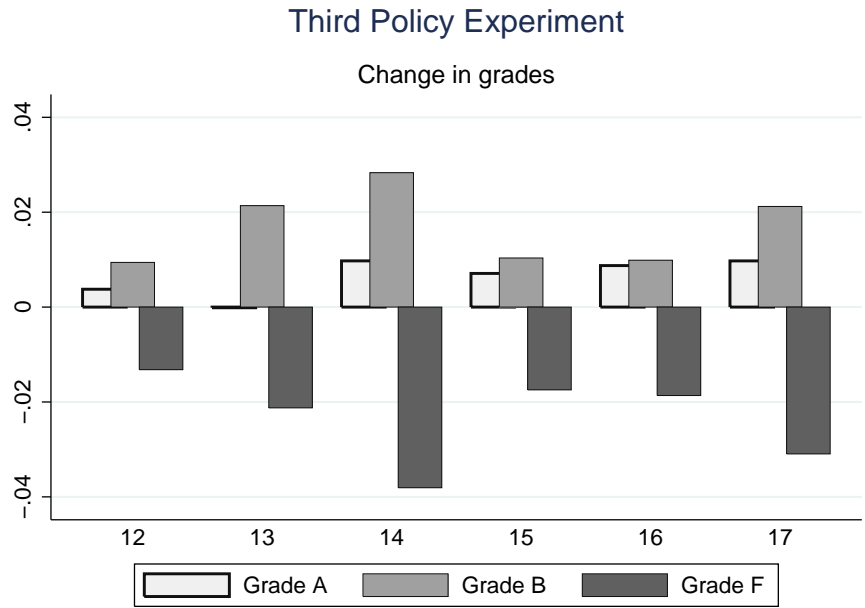

Figure 12: Fourth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Small Increase the Enforcement Parameter
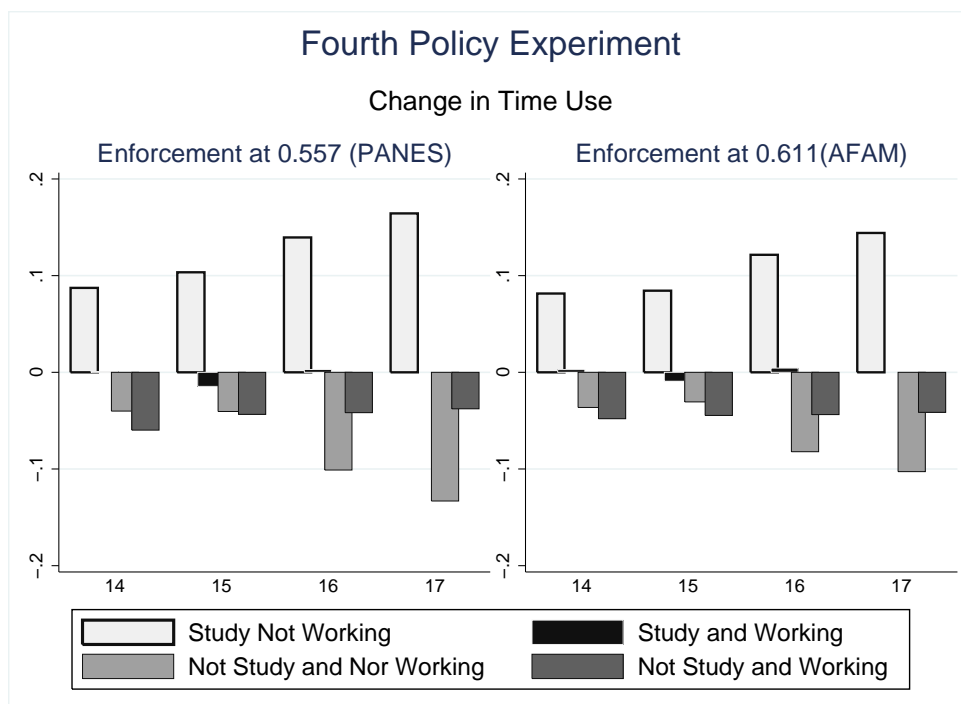
Figure 13: Fifth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Maximum Enforcement Parameter
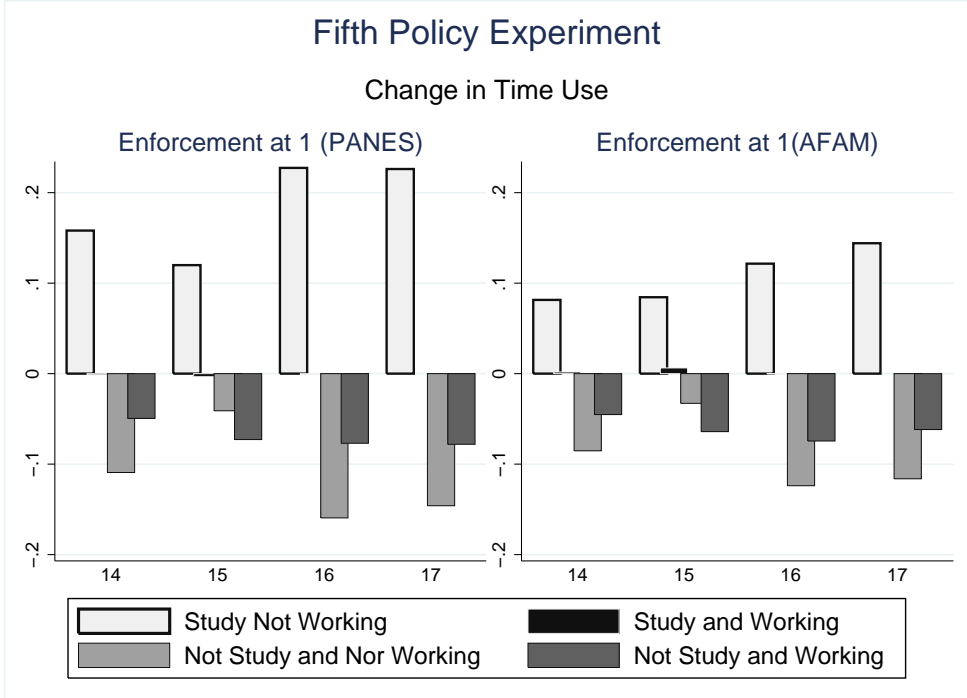
9 Appendix

Figure A.1: First Policy Experiment: Differences Between Treated and Control and Policy with a Small Increase of the Enforcement Parameter
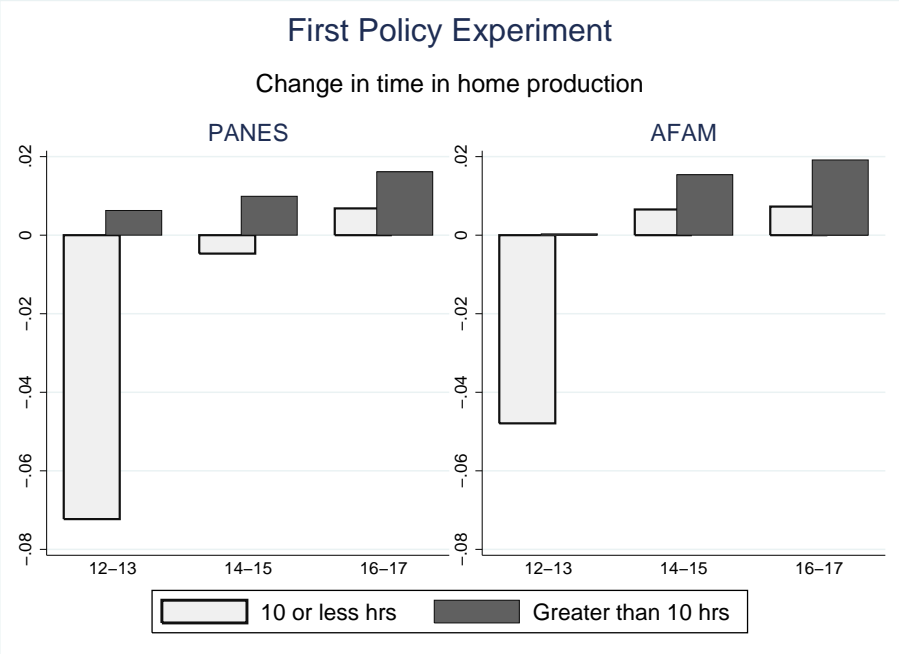
Figure A.2: First Policy Experiment: Differences Between Treated and Control and Policy with a Small Increase of the Enforcement Parameter
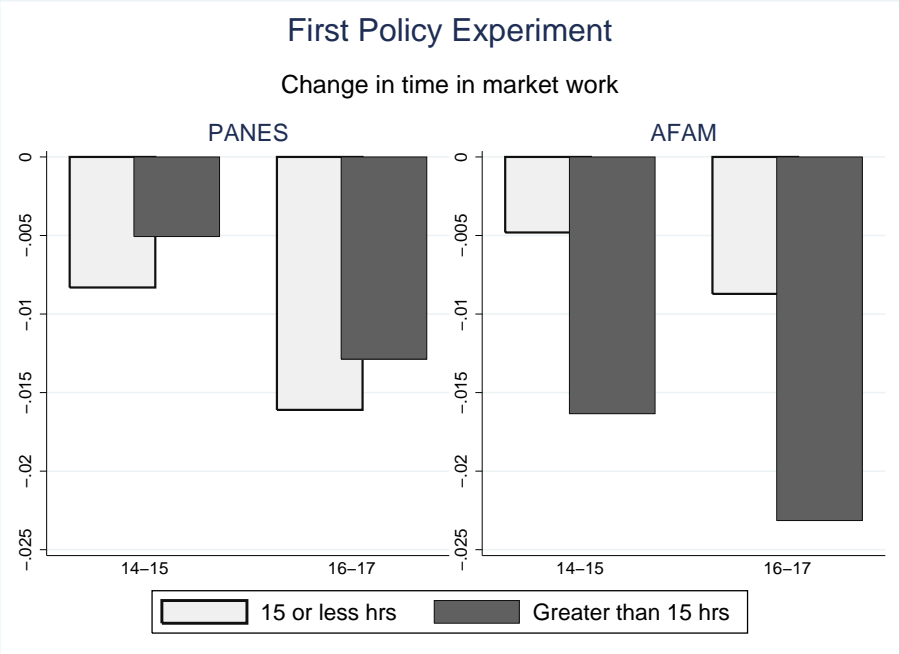
Figure A.3: First Policy Experiment: Differences Between Treated and Control and Policy with a Small Increase of the Enforcement Parameter

First Policy Experiment

Change in grades
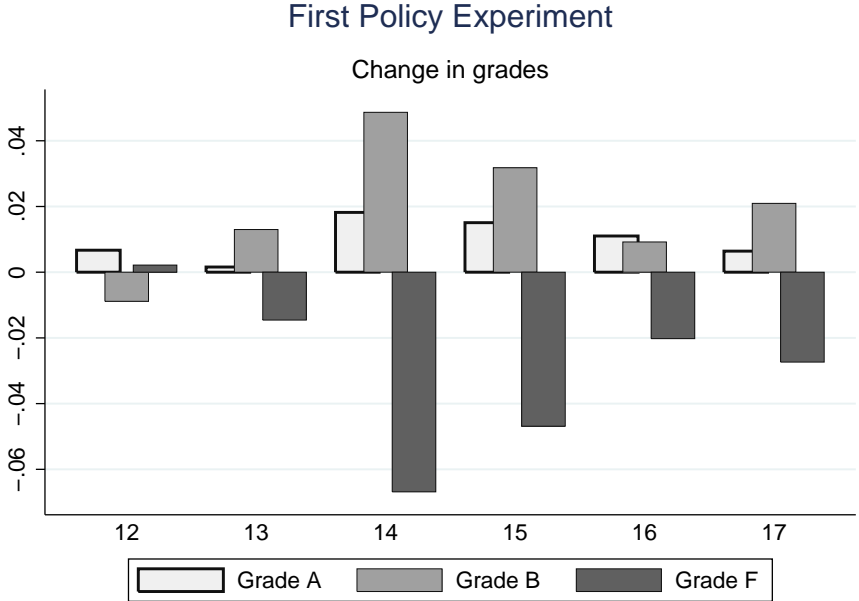
Figure A.4: Second Policy Experiment: Differences Between Treated and Control and Policy with Maximum of the Enforcement Parameter

Second policy experiment

Change in time in home production
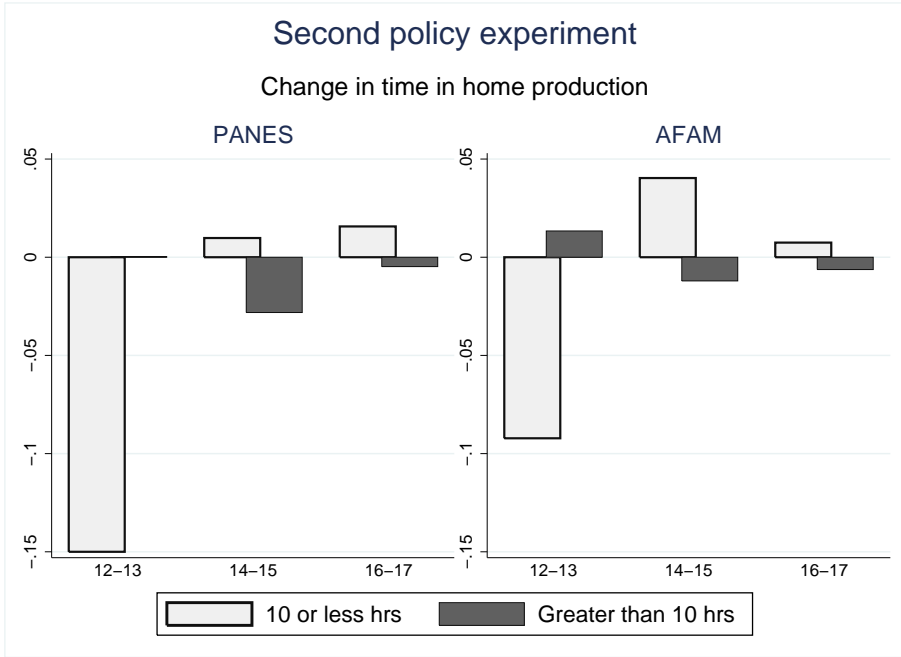
Figure A.5: Second Policy Experiment: Differences Between Treated and Control and Policy with Maximum of the Enforcement Parameter
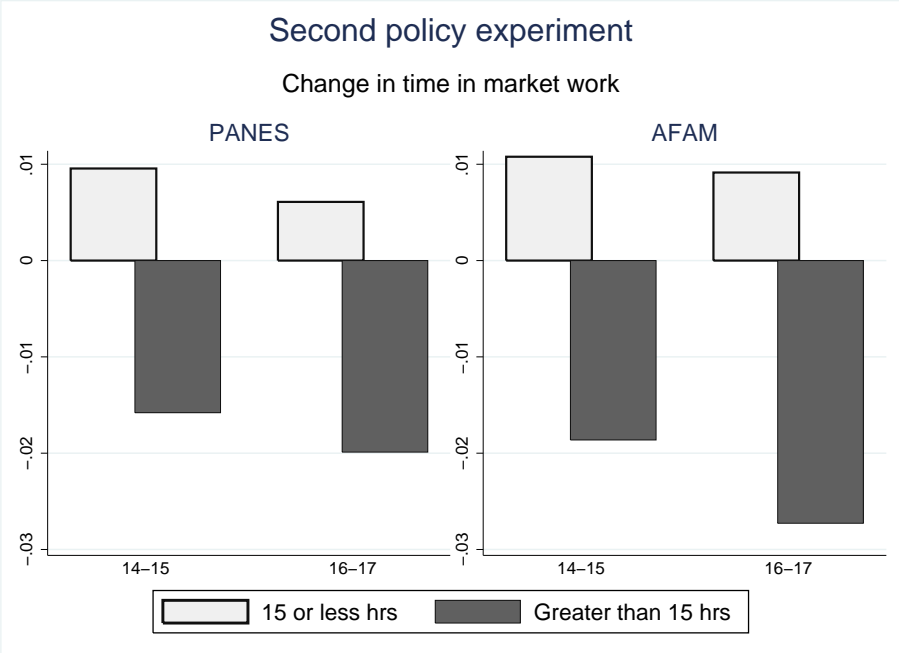
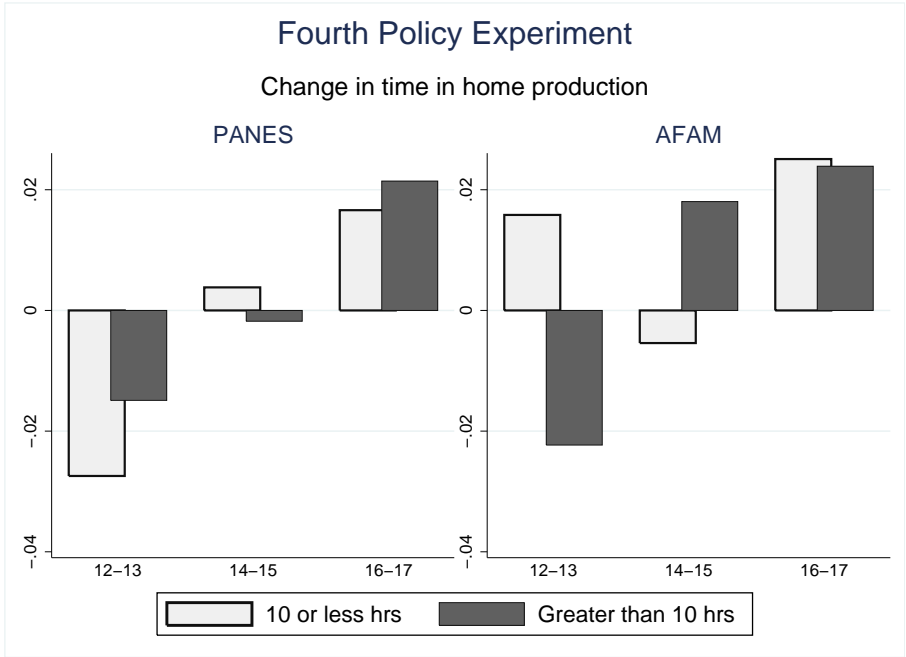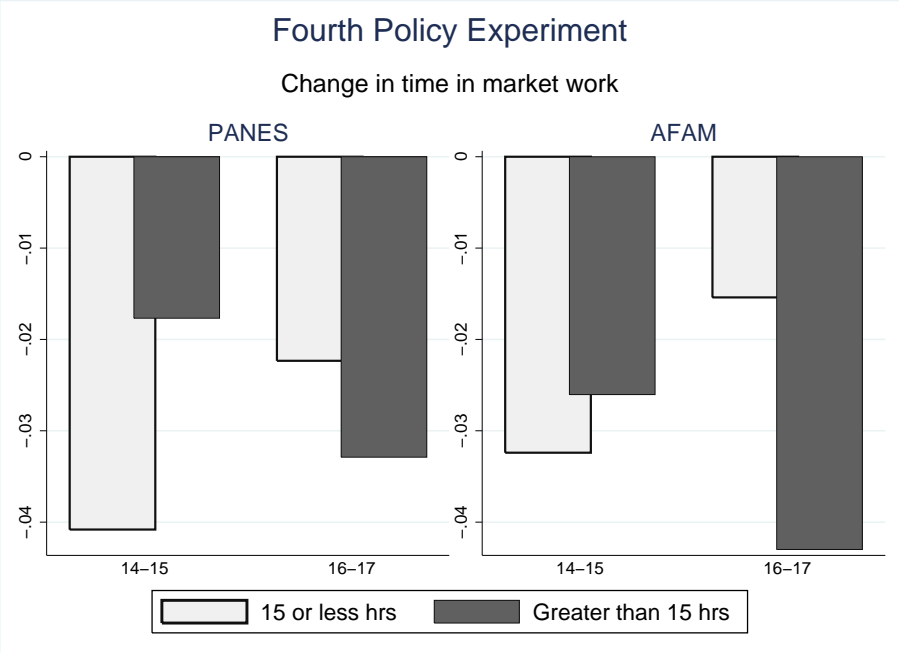Figure A.6: Second Policy Experiment: Differences Between Treated and Control and Policy with Maximum of the Enforcement Parameter

Figure A.7: Third Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer

Figure A.8: Third Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer

Figure A.9: Third Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer

Figure A.10: Fourth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Small Increase the Enforcement Parameter
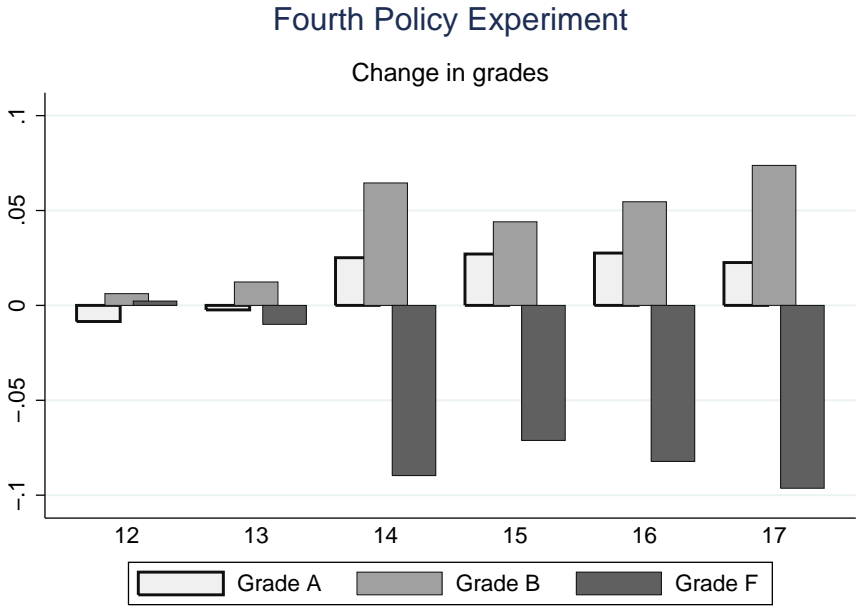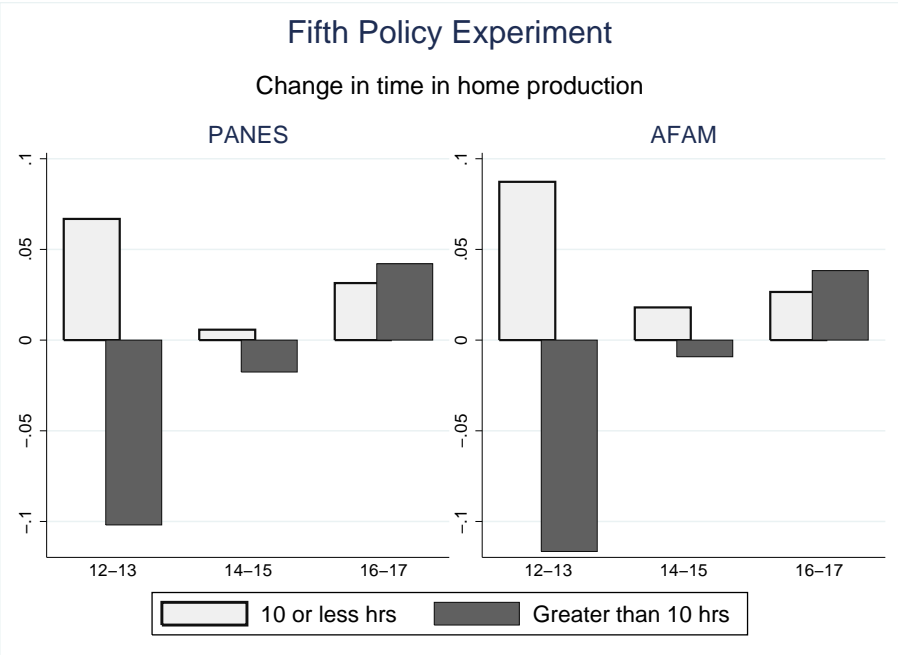
Figure A.11: Fourth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Small Increase the Enforcement Parameter

Figure A.12: Fourth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Small Increase the Enforcement Parameter

Figure A.13: Fifth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Maximum Enforcement Parameter

Figure A.14: Fifth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Maximum Enforcement Parameter
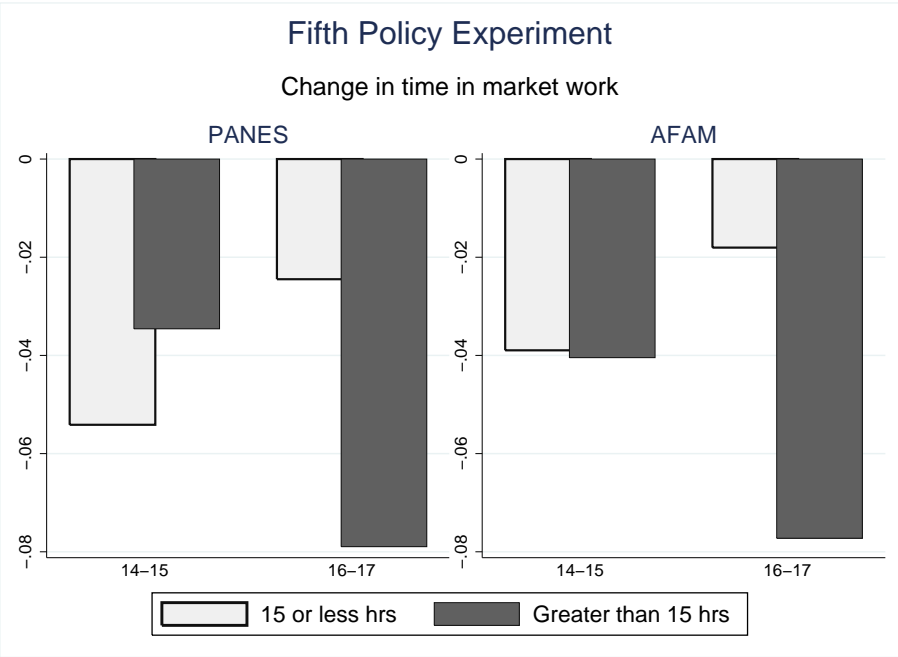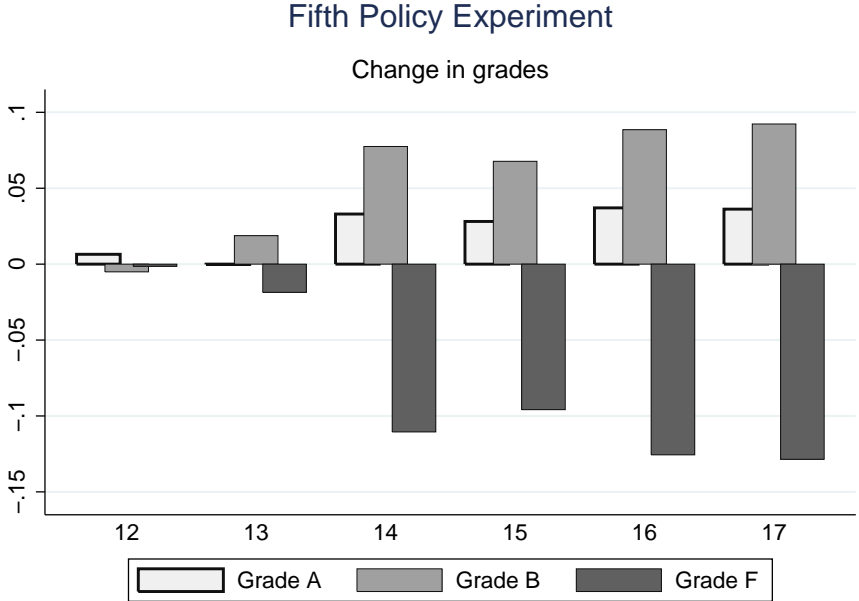
Figure A.15: Fifth Policy Experiment: Differences Between Treated and Control and Policy of Change Who Receives the Transfer and Maximum Enforcement Parameter

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