An empirical analysis of the interplay between households consumption and children’s schooling decisions.

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Abstract

The simultaneity of judicial and university reforms let Italy be a quasi experimental setting to analyze the households joint decisions on consumption and the schooling of their children. On the one hand, the judicial reform has affected the marginal costs and benefits of the access into the credit market. On the other hand, the university reform has changed the marginal costs and benefits of the university degree. We exploit perfectly overlapping sources of exogenous variation in court efficiency and in the university structure to study the effects that judicial and university reforms have had on such joint decisions taken by Italian households during the early 2000s. We use a flexible parametric model specification and control function method to retrieve the parameters of interest. When averaging out across first stage residuals, we find that the relationship between family nondurable consumption and children’s years of schooling is weak. On the one hand, one more year of schooling of the child increases households nondurable consumption. On the other hand, an exogenous shock that increases nondurable consumption does not affect significantly children’s years of schooling. We show, then, that the interplay between households consumption and children’s schooling decisions is strongly influenced by household unobservable heterogeneity which contributes to determine the size and the sign of the marginal effects characterizing it.

Keywords: Education enrolment; Household consumption choices; Institutional reforms.

JEL Codes: I21; I28; D10; D14.

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1 Introduction

Household consumption decisions and children’s optimal amount of years of schooling are strictly correlated. Understanding the mechanisms behind this interplay is an important issue although it is a difficult task, at least for two reasons.

First, both the household choices are clearly endogenous since family’s optimization problem exhibits simultaneity. The literature suggests two different strategies to deal with such simultaneity. On the one hand, papers that analyze the relationship between household consumption and children’s enrolment decisions retrieves the policy parameters of interest through a calibration procedure whenever the microeconometric estimation is not feasible or practical (Abbot, Gallipoli, Meghir and Violante (2013)). On the other hand, Blundell, Pistaferri and Saporta-Eksten (2012) have documented the simultaneous link between wage shocks, labor supply and consumption decisions by identifying and estimating the parameters of interest through a GMM procedure, using US panel data on individual wages and earnings (or hours), and household consumption and assets.

In the current paper, we exploit perfectly overlapping sources of exogenous variation in court efficiency and in the university structure to study the effects that judicial and university reforms have had on the joint decisions to consume and enrol children at higher education taken by Italian households during the early 2000s. In presence of one reform that may exogenously manipulate either consumption or the children’s educational choices, it is possible to focus only on one of the two causality processes. Although the two reforms were implemented independently of each other, the simultaneity of their introduction gives us the opportunity to offer a more complete characterization of the relationship between household choices.

The second difficulty that arise when dealing with such objective is related to the unobservable heterogeneity which marks such relationship. Education is a multi-period investment whose return is uncertain despite the ex-ante commitment of resources and time (Levhari and Weiss (1974)). These uncertain returns and the nonpecuniary costs of education attendance are both extensively heterogeneous across individuals leading to self-selection into enrolment. To contain the extent of earnings risk during working life households could at least partially insure their children through borrowing, saving and labor supply adjustments (Blundell, Pistaferri and Preston (2008); Low, Meghir and Pistaferri (2010); Heathcote, Storesletten and Violante (2014)). This propensity to insure is likely to be heterogenous across families in terms of both observable (i.e. children’s age) and unobservable characteristics (i.e. household preferences and abilities).

Our strategy to deal with such issues is threefold.

First, we carry out a control function approach through which we take account of possible heterogenous marginal effects. We follow Blundell and Matzkin (2014) to clarify
the assumptions required to guarantee the existence of reduced form system of equations, which map the vector of exogenous variables into the vector of endogenous variables. We adopt a flexible parametric specification to let the regression functions be unknown.

Second, we construct two components, one permanent and one transitory, of the idiosyncratic innovations in income by imposing a cross-equation restriction on consumption and income processes as prescribed by the permanent income hypothesis view.

Third, we attempt at proxing household unobservable characteristics related to the occupational and the educational background of the grandparents. For each year of the analysis, we partition the population into groups, defined by the grandparents’ socioeconomic background. Starting from this classification we define three family background groups according to both the occupational condition of the fathers of both spouses and the educational level of all grandparents. Given the occupational condition of the fathers of both spouses, we draw for each group the income distribution. The household rank position identifies the set gathering all families with similar unobservable characteristics (for instance, abilities, preferences). Given this set, we consider as a sufficient statistics for the household unobservable characteristics related to the occupational condition of the grandfathers, the difference between the family background specific income quantile functions and the corresponding weighted average quantile function. The same procedure is followed to calculate the difference between the family background specific years of education quantile functions and the corresponding weighted average quantile function.

Given this framework, we use data for Italy to provide quasi-experimental evidence resulting from overlapping sources of exogenous variation in the court efficiency and university system. We merge data from the SHIW database by Bank of Italy, which permits to observe family incomes, family composition, family background, family consumption and saving and children’s years of schooling with data on Italian judicial enforcement drawn from a survey conducted by the National Institute of Statistics (ISTAT (1995-2006)). Our sample consists of 14,033 individuals aged between 14 and 23 years old in the period 1995-2006 and living in families whose head aged from 38 to 60 years old.

We consider the variation generated by a reform of the Italian judicial system resulting in a decreasing pending-incoming civil trials ratio (i.e. a higher court efficiency) across contiguous cohorts of individuals. We overlay to such effects the additional variability that results from the simultaneous reform of the university system which shortened the duration of the four year undergraduate programmes, introducing a three-year degree, after which a graduate could decide to enter the labour market or continue the studies with a further two-year degree course.

At a given age, we exploit the variability across households and cohorts to study the effects of judicial and university reform on household consumption (saving) decisions and
years of schooling of their children, by considering exogenously defined groups who have faced different rules for obtaining an university degree and have lived in environments characterised by heterogeneous court efficiency.

Our main results can be summarised as follows. First, overall the marginal effects are quite heterogeneous. Second, averaging out residuals from the first stage regressions, we find that the relationship between family nondurable consumption and children’s years of schooling is weak. On the one hand, one more year of schooling of the child increases households nondurable consumption. On the other hand, an exogenous shock that increases nondurable consumption does not affect significantly children’s years of schooling. A certain degree of substitution can instead be observed between either overall consumption or saving and the amount of years of schooling of the offsprings. Third, we show, then, that the interplay between households consumption and children’s schooling decisions is strongly influenced by household unobservable heterogeneity. In fact, the permanent component of the income innovations contributes to determine the size and the sign of the effects which characterize the interplay between the household consumption (saving) and children’s schooling decisions.

The remainder of this paper is organized as follows. Section 2 provides some background on institutional details and describes the Italian reforms of the judicial and university system. The data and the empirical approach are introduced in Section 3 and 4, respectively. Results are discussed in Section 5 that precedes our conclusions.

2 Framework

2.1 The setting

The aim of this section is twofold. We first review the judicial system in Italy, and how the reform introduced by Law 51/1998 impacted on court efficiency. Second, we discuss the role played by the 2001 university reform, and examine the extent to which its introduction overlapped with changes in the pending-incoming civil trials ratio that came with the judicial reform.

2.2 The Judicial Reform

Italy is a civil law country where the term magistrate comprises both prosecutors (standing magistrature) and judges (sitting magistrature). By law, protection of creditors’ (i.e. banks, financial intermediaries or finance companies) rights is guaranteed by the judicial court of the borrower’s district of residence to which creditors must apply to repossess collateral after a default. Although in some Italian regions (Lombardia, Campania, Puglia, Calabria, Sicilia and Sardegna) there is more than one judicial district, it can be argued
that each district basically matches a region. Two out of the three degrees of judgement (i.e. the lower and appeals court) can be undergone to let creditors gain recognition of their rights.

Law 51/1998 surely represents the most striking reform of the Italian judicial system that changed deeply the judiciary organization by eliminating the differences between the praetura (praetorship), and the tribunal. This reform is named the “Single Judge Reform” since the law establishes that the first degree of a civil trial is administered by a single judge in a Tribunal. The administrative offices of the first degree of the civil trials were, therefore, unified reducing the costs and the conflict of jurisdiction between the tribunal and the praetorship. Due to the high organizational costs required by such reform, it is reliable to assume that it was enforced only after 2000.

**The economic mechanism through which court efficiency affects the credit market.** La Porta, Lopez-de Silanes, Shleifer and Vishny (1997) developed the proposition that the breadth of credit markets is positively related to the degree of protection of creditors’ rights measured by both the character of legal rules and the quality of law enforcement. The immediate implication of this consideration is that the social cost of an inefficient judicial system is high. Efficiency of the judicial system not only influences the cost of intermediation but also the supply of credit itself by determining the effectiveness of credit markets in intermediating and allocating savings among alternative users and reducing the cost of frictions\(^1\) through four main channels.

First, creditors’ balance sheets show a lower volume of non-performing loans.

Second, an improved efficiency of the judicial system reduces strategic default by increasing the borrowers’ future willingness to pay since the gain from defaulting is lowered compared to the perceived cost. For instance, Fay, Hurst and White (2002) provide little empirical support for nonstrategic household decision to default and show that the family default probability increases as her financial benefits from filing for bankruptcy rise.

Third, higher judicial efficiency reduces the creditors’ cost in case of default since less time is required to repossess collateralized assets. The shorter the length of the trial, the lower the legal expenses and the decrease in the asset’s value due to depreciation, the lower the creditors’ costs, Jappelli, Pagano and Bianco (2005). As the effective liquidation value of the collateral asset increases and the lender’s participation constraint is eased, creditors charge lower interest rates\(^2\). Consequently, an improved efficiency of the judicial system increases the ex-ante willingness of creditors to extend loans determining an higher amount

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\(^1\)Credit market frictions are related to asymmetric information and limited commitment. Borrowers’ characteristics are unobservable to lenders. Collateral requirements act as incentives for borrowers not to default. Nevertheless, they may choose to default.

\(^2\)Collateral and interest rate are substitutes inducing the creditors to reduce the cost of credit as the liquidation value of the collateral increases.
of credit provided to both households and firms. Laeven and Majnoni (2005) show that judicial efficiency, together with inflation rates, explains cross-country variation in the ex-ante cost of bank credit measured by the spread between lending and deposit interest rates. Further evidence on this can be found in Demirgüç-Kunt, Laeven and Levine (2004) who document that rather than bank regulations and structure, institutional indicators such as the protection of private property rights are the main determinant of the countries’ cost of financial intermediation.

Fourth, it reduces the probability to be credit rationed, (Fabbri and Padula 2004, Jappelli et al. 2005). If the household is credit constrained, a reduction in the legal costs relaxes her incentive compatibility constraint. When contracts are more strongly enforced strategic default decreases and creditors respond by reducing rationing credit. Under this mechanism riskier and previously rationed borrowers may access into the credit market inducing creditors to charge them an higher interest rate. This composition effect, therefore, acts as a countervailing effect on the interest rate, Jappelli et al. (2005). However, it is likely that the former effect is stronger.

Although the literature mainly refers to the effect of judicial efficiency on the bank credit market, since interests rate are correlated, judicial efficiency could affect also the consumer credit market. Grant and Padula (2013) test whether the average length of civil trials affects the probability of repayment in consumer credit market finding no evidence. In consumer credit market where the amount of credit is used by consumers to purchase non-investment goods or services that are consumed and whose value depreciates quickly the mechanisms underlined above could be weaker. However, it might also be the case that competition with banks’ credit lowers the standards required by the consumer credit market which reduces the average quality of the borrowers. This composition effect compensates the lower strategic default rate leaving unaffected the average probability of repayment in the market.

From the credit market to household’s consumption (saving) decision. The previous paragraph has documented how judicial efficiency influences the credit market. We now analyze the effect that each mechanism has on the household consumption (saving) decision.

First, judicial efficiency influences the borrowers’ decision to default by altering how severely they are punished. Kehoe and Levine (1993) model the decision to default of infinitely lived consumers to show that this decision affects consumption smoothing. In presence of frictions in the credit market, the default premium (i.e. the difference between the loan and the deposit rate) depends on the proportion of borrowers which never defaults. A higher fraction of creditworthy borrowers reduces the default premium for all borrowers. In such a case consumption increases but saving reduces, for all borrowers.
Second, improved efficiency let the effective liquidation value of the collateral asset increase. An increased value of collateral used in consumer lending increases credit supply and reduces the interest rate. If the family is a borrower, her consumption increases but her saving decreases. If, instead, the household is a lender, a lower interest rate has an ambiguous effect on both consumption and saving because of countervailing income and substitution effects.

Third, judicial efficiency affects the household probability to be credit rationing and the amount of credit ceiling. Time-varying borrowing limit is necessary to produce a correlation between predictable credit growth and predictable consumption growth since spending is determined by this time-varying credit ceiling, Ludvigson (1999). There are two channels through which variation in the credit limit influences consumption (saving). It impacts upon consumption (saving) through its influence on current resources. Previously constrained households are mainly affected by such variation. Independently of current resources, exogenous variation in credit availability that is common across households, produces an additional source of variability in aggregate consumption (saving) that is not associated with shocks to conventional indicators such as income and interest rates but can be assimilated to a shock to household wealth. Even when families are currently unconstrained, they may alter their consumption (saving) behaviour since this exogenous shock in credit-market conditions impacts on the probability that they will be (un)constrained in the future. This might be an important mechanism when the dynamic consumption (saving) choice interact with a multiperiod investment such education.

All the considerations presented in this section points to the importance of accounting for households heterogeneity when dealing with the empirical assessment of the interplay between family decision on the education of her children and consumption (saving). There may exist differential effects for lending of different classes of borrowers. In such a case, an improvement in judicial efficiency influences differently the pricing of loans with different maturity and seniority of amount of collateral. From the borrower’s point of view, utility increases when contracts are weakly enforced since the defaulting borrower benefits more from ownership of the asset. Higher court efficiency reduces credit rationing and increases the access in the credit market of riskier families. According to their preferences and attitudes towards risk, households could react differently to the new credit market conditions. For instance, some households could adopt a more-prudent behaviour if they perceive that their new-found ability to borrow also increases their exposure to credit-market risk. Moreover, there could be differences in households’ nondurable and durable consumption choices as durable consumption is economically more like investment than consumption. These different choices could lead to different behaviour in the interplay

\footnote{For instance, this consideration matches observations from the latest financial crisis which has reduced lending decreasing consumption expenditures financed by mortgage debt.}
between consumption and educational choices.\footnote{From the household’s point of view, durable consumption might act as a substitute for education. Nondurable consumption goods and the schooling of the children, however, could also be complementary goods, especially for unconstrained families.}

**Description of the instrument.** We measure court efficiency in terms of the degree of congestion of the judicial district proxied by the pending-incoming civil trials ratio, Fabbri and Padula (2004). Our indicator include all ordinary civil trials and refers to the lower and appeal courts, which are the most relevant when households default. The backlog of pending ordinary civil trials is normalized as it could merely reflect the size of the judicial district rather than poor functioning. Two reasons justify why we use the number of incoming civil trials as a normalization factor. First, it is a better proxy of the demand for justice compared to the district’s population and the number of judges or the size of the administrative staff in the judicial district. Population is almost constant and judicial personnel depend upon the population. Second, it is also a proxy for the degree of litigation in the judicial district.

The regional variability over cohorts of the pending-incoming ratio is the main source, for a given child’s age, of cohort variation that we exploit with our instrument. To provide a more accurate measure of the degree of the household exposure to such court efficiency, our instrument is calculated as the expected value of the pending-incoming ratio faced by each household. For a given age and cohort of birth of the child, this expected value corresponds to:

\[
\tilde{z}_h := \sum_{m \in h} \frac{1}{M_h} \psi_i(a_m, g_m) \cdot z_r
\]

which amounts to the average expected pending-incoming civil trials ratio of household \( h \) made of \( M \) members and living in region \( r \). The ex-ante probability that each adult (all individuals aged more than 18 years old)\footnote{In a civil trial parents are responsible for individuals aged less than 18 years old. For this reason, we set the probability of these individuals, to be involved in a civil trial, equal to zero.} member would be involved in a civil lawsuit measures the extent to which each household member can be potentially exposed to the judicial reform. We let such probability be equal to the frequency in the Italian population distribution for a given age and gender. This is the more conservative choice provided that we do not have information on the national frequencies of people involved in all civil lawsuits conditional on age and gender\footnote{We were able to find some statistics only related to divorce lawsuits.}

For a given age and cohort of birth of the child, the household structure in terms of age and gender of her members is the exogenous source of across household variability. Since the national frequencies of the distribution of the Italian population are almost constant over time, the variability over cohorts of our instrument depends mainly on the regional
court efficiency.

In the pre judicial reform period (corresponding to the years 1995-2000), there is substantial variation across regions\(^7\) of the pending-incoming ratio, with Basilicata and Calabria in the South performing the worst (4.94), and Trentino Alto Adige in the North resulting to be the most efficient region (2.12). In the post-reform period (corresponding to the years 2002-2006), the pending-incoming civil trials ratio decreases for all regions suggesting an overall improvement in the court efficiency. However this reduction is not homogeneous across regions. For instance, it can be observed a relative enhancement of the court efficiency of Lazio in the central area of Italy.

What also matters in terms of exogenous source of variation is the residual variability after conditioning on the main regional indicators used in the empirical analysis: the GDP per employee; the unemployment rate; the rate of returns to a university compared to a diploma degree, regional and time dummies\(^8\). Figure 1 provides some evidence on this residual variability over cohorts of the expected pending-incoming civil trials ratio. The left hand side panel of the figure shows these residuals in the pre judicial reform period while the right hand side panel of the figure shows the same residual variability across Italian regions for the post judicial reform period. The figure clearly shows that, even conditional on the main regional indicators, the judicial reform provides an heterogenous and exogenous shock to the court efficiency and potentially through this an exogenous shock to consumption and saving decisions of the households. Moreover, panel (a) of figure 2 presents the extent to which the expected pending incoming ratio varies within regions as the result of the different household structures in terms of age and gender of her members.

We overlay to such exogenous effects the additional variability that results from the introduction in year 2001 of a two-tier structure of the university degrees on the basis of which students enrol into a three-year degree (Laurea breve) first, and, then after graduation they may decide to achieve a second two-year degree (Laurea magistralis). This reform has consequently exogenously manipulated the educational choices of those cohorts entering in post-compulsory schooling age in year 2001. The next section discuss in more details this issue.

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\(^7\)To avoid having region by year cells with too few observations, we grouped the 20 Italian regions into 17 macro-areas using active population in each region as weight. These macro-areas are: Piemonte and Valle d’Aosta; Lombardia; Trentino Alto Adige; Veneto; Friuli Venezia Giulia; Liguria; Emilia Romagna; Toscana, Marche; Umbria; Lazio; Abruzzo and Molise; Campania; Puglia, Basilicata and Calabria; Sicilia and finally Sardegna.

\(^8\)In our empirical model specification we will control for age and cohort of birth dummies instead of time dummies.
Figure 1: Regional variability across cohorts for a given age of the child of the expected pending-incoming civil trials.

Note: The figure plots the estimated residuals of a model where the regional pending-incoming trials ratio is regressed on the regional GDP per employee, regional unemployment rate, regional returns to university degree, regional and time dummies. These regressions are run separately for the pre (panel on the left hand side corresponding to years from 1995 to 2000) and post (panel on the right hand side corresponding to years from 2002 to 2006) judicial reform periods.

2.3 The University Reform

In Italy, students holding a high school diploma, which can be academic (licei classici and licei scientifici) or vocational (istituti tecnici and istituti professionali) and usually completed at age 19, can enrol at any university degree. Financial aid for university students is limited\footnote{In 2000 only 12\% of students received a public university grant (RUI and di Camerino (2002)).} but public university fees are moderate because mainly state funded and fees are established on the family financial resources basis. Nevertheless, there is a clear socio-economic gradient in university enrolment: children with low income and/or poorly educated parents are unlikely to enrol in a university (Checchi, Ichino and Rustichini (1999)). This gap in the university enrolment explains the strong intergenerational correlation in educational attainment in Italy (Hanushek and Wößmann (2006); Checchi and Flabbi (2013)).

The Italian university system traditionally included only academic degrees with little vocational or professional purposes and with an official duration that varied between 4 and 6 years according to the subject. By Law 509/99, implemented in 2001, this university
system changed. Chiefly, the reform shortened the duration of the undergraduate programmes, introducing a three-year degree, after which a graduate can decide to enter the labour market or continue the studies with a further two-year degree course. Furthermore, the reform also gave to universities full autonomy over teaching, including freedom of freely deciding on curricula, number of exams, and their contents.

We therefore construct an university reform indicator, $z_2$, which takes the value of 1 if, given age and cohort of birth, the individual is affected by the reform.

Figure 3 shows the extent to which in our sample the university reform affects at different ages the marginal cohorts. In fact, focusing on ages ranged from 14 to 23 years, all cohorts born before 1981 are unaffected at all ages. All individuals born after 1986 are instead affected at all ages. Marginal cohorts born between 1982 and 1986 are affected at different age. Consequently, for them, our instrument varies across cohorts given age and across ages given cohort. The vertical line refers to the cohort of those born in 1982 and aged 19 in 2001. This is the first cohort to be affected by the university reform at the most relevant age to access to a university degree course.

We expect that these institutional changes, especially the introduction of short degrees and the reduced workload, could have shrunk the opportunity costs of tertiary education investment, making the university attendance less costly (See Cappellari and Lucifora 2009). Moreover, this reform could also have potentially changed the returns of a three rather than four year university degrees with respect to a diploma inducing individuals to change their optimal amount of years of schooling. To this extent, the reform could have potentially changed the years of schooling at all ages considered.

\footnote{In our data collected for year 2002, the reform indicator of such cohort takes the value of 1 at age 20.}
Figure 3: Age profiles for university reform.

Note: The figure plots the age profiles for university reform of marginal cohorts of individuals born between 1982 and 1986 who are affected at different ages by the reform.

2.4 Identification issue and parameters retrieved

As discussed above, there are two exogenous sources of variation: the one coming from the judicial reform ($z_1$), and the other coming from the university reform ($z_2$). It is assumed that these two sources act independently. On the one hand, the key maintained exclusion restriction is that $z_1$ affects the children’s years of schooling only through its effect on either the household consumption or saving decision. The objective here is to uncover information about (features of) the distribution of the changes of potential outcome, the optimal amount of education, due to changes in the household consumption or saving decisions. On the other hand, it is assumed that the university reform $z_2$ enters the model only through its effect on the years of schooling (which is the variable that it targets). The issue here instead is to retrieve (features of) the distribution of the changes (either consumption or saving) due to changes in the amount of education chosen.

Household consumption (saving) and children’s years of schooling decisions closely interact. The interplay is analyzed at the household level since, as well documented in the literature, Italy is a country characterized by “latest (with respect to other countries) late transition to adulthood” of the youth (Billari and Tabellini (2010); Manacorda and Moretti (2006)) as suggested by the pattern of late transition measured in terms of median
We expect years of schooling to be positively correlated with the university reform and to have a direct effect on consumption (saving) which is ambiguous on a priori grounds. On the one hand, years of schooling and nondurable consumption may act as substitute. On the other hand, years of schooling and nondurable consumption could be complementary goods. It is not clear how years of schooling affect household saving decision either. If years of schooling increase, household could either react increasing precautionary saving against the risk of future negative income shocks or decreasing saving to finance the investment in higher education. Which mechanism prevails likely depends upon the child’s age since physics costs and expected returns may be different across ages and upon the quintile of the income distribution where the household sits since the magnitude of the substitution and income effect could differ across the income distribution.

We expect the pending-incoming ratio to be negatively correlated with either consumption or saving. Moreover, we expect that here an important role could be played by changes in overall consumption due to a variation in durable consumption. While it is not clear whether nondurable consumption and years of schooling act as complements rather than substitute goods, and increase in durable consumption goods might act as a substitute of education if latter is conceived as an investment good. Finally, if education is an investment good the potential effect of saving is ambiguous. In fact, higher saving could imply higher education as long as more resources are devoted to finance the human capital investment. On the other hand, higher saving could imply lower years of schooling if the household substitutes human capital with monetary investment.

We consider a setting that allows us to study what would happen to household consumption (saving) decisions if we were to exogenously manipulate the amount of years of education chosen. The source of identifying variation that is needed to this end is that coming through changes in $z_2$, induced by the university reform. Similarly, we investigate what would happen to the years of schooling if we were to exogenously manipulate either consumption or saving decisions. The source of identifying variation that plays a role in this case is the one coming through changes in the judicial reform. Italy represents a quasi experimental case study since these two sources of exogenous variation perfectly overlap allowing us to offer a characterization, related to such judicial and university reforms, of the interplay between household consumption (saving) choices and children’s educational enrolment.

11 For instance, for men and women born between 1966 and 1970, on average, education is completed at age 19.2 (men) and 19.3 (women), individuals enter into the labour market at age 21.4 (men) and 24.0 (women) and leave parental home at age 27.2 (men) and 25.1 (women), respectively (Mazzucco, Mencarini and Rettaroli (2007)).
3 Data and Estimation Issues

3.1 SHIW Data

We make use of 1995-2006 waves of the SHIW (Survey on Households Income and Wealth) to estimate the model. The SHIW is a nationally representative household survey conducted in Italy every two years by the Bank of Italy collecting information on a sample of roughly 22,000 individuals and 8,000 households per wave. A great advantage of SHIW is that, in addition to net income data and demographics, it collects information about household saving and consumption expenditures. To the best of our knowledge this makes the SHIW the only representative large scale Italian dataset to include both household net income, consumption, saving data and children’s enrolment status. We proxy the household consumption choices using the amount of both the log of equivalent nondurable and overall consumption expenditures (i.e. the sum of nondurable and durable consumption expenditures). In presence of exogenous shocks to the access to the credit market, households could adjust the nondurable versus durable consumption choice even if overall consumption is smoothing. Comparison between these two consumption measures could also provide insights about the nature of durable consumption expenditures. In fact, by including them into the overall consumption indicator, they are treated as consumption expenditures even if they share some features of savings. We model the household saving decisions using the log of the amount saved within the year of the survey, equalized by a measure of family’s size. In fact, all these amounts and the household net of taxes income are equalized using the square root of household size to account for scale economies within the family and the monetary values are normalized in terms of 2000 constant prices. Educational choices are captured by the years of schooling of the children. If a child is still enrolled at school (or university) the years of schooling are equal to the difference between the age and either 6 or 5. In Italy, individuals aged 5 are allowed to enter into the schooling system although the statutory age is 6. Since we have information on the degree achieved at the time of the interview, we are able to identify those who started schooling at age 5. When an individual does not classify himself as student we impute as years of (effective) schooling those required to achieve the declared degree. For instance, an individual who declares to have a diploma degree and not to be a student has been

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12 There is only one exception in year 1998 which follows the 1995 wave.
13 Moving towards logarithms requires making a choice on how to deal with zero values in levels for the savings. Since excluding such observations amounts to introduce some selection bias (for instance a value of zero saving could indicate some form of liquidity constraint), we make the choice to set to $-5$ the log values of such zero in levels. Roughly speaking, $-5$ is the logarithm of $0.00001$.
14 The data do not provide information on the university attended by the children. Students’ mobility, however, is pretty low in Italy. Moreover, even if students enrolled at a university located in a region other than that of their parental home, they use not to change their residence. In such a case, they are surveyed by the Bank of Italy within the family.
imputed 13 year of schooling (5 years to get a diploma degree which adds to the 3 years of lower secondary and 5 years of primary school).\textsuperscript{15}

\subsection*{3.2 Sample Selection Criteria}
Given the children’s age (from 14 to 23), we centre our data around 2002, the threshold year when, in our data, both reforms were implemented, see sections \textsuperscript{2.2} and \textsuperscript{2.3}, and covering an interval of -7, +6 years. This selection rule implies that three cohorts of birth are unaffected by both reforms and are balanced out by three affected cohorts.\textsuperscript{16} Our baseline specification focuses, therefore, on individuals aged between 14 and 23 years old in the period 1995-2006 amounting to 14,674 age/individuals observations. To contain the extent of heterogeneity related to changes in the socio-economic structure of the economy, we cut the lower and the upper 5\% of the distribution of the age of the head of the family. Consequently, our final sample is composed by 14,033 individuals living in families whose head aged from 38 to 60 years old. Since missing data on family background indicators are likely to be related to either whether one of the individual’s parents was absent in the household while he or she was growing up or to unobservable characteristics of the family, it would be inappropriate to eliminate cases with such missing data from the analysis. We keep observations with missing values for the educational level of the head of the family, the spouse and the grandparents (i.e. the parents of both spouses) and the occupational conditions of the grandfathers assigning a value to the variable of interest\textsuperscript{17} and including in our regressions a dummy variable taking the value of one in case of missing information.

\subsection*{3.3 Descriptive statistics}
To provide a sense of how much variation in the years of schooling, nondurable and overall consumption and saving occurs within and across cohorts, we provide information in Table \ref{table1} where we report the means and standard deviations for the variables used in the analysis for the full sample and for the subsample of those persons from cohorts who are affected by both reforms. The differences between the two samples are minor. The Table clearly shows that, on average, a higher amount of nondurable and overall consumption and saving while the years of schooling slightly increase.

The effects of interest could be heterogeneous across two dimensions. First, the main identification strategy relies on the idea that the effects of interests could be retrieved by comparing at a given age cohorts affected by both reforms with those unaffected. To

\textsuperscript{15}The years of schooling of the 20 individuals who have declared to have any degree take the value of 3.
\textsuperscript{16}For instance, at age 15 we keep individuals born between 1980 and 1991 while at age 16 we consider those born between 1979 and 1990, and so forth.
\textsuperscript{17}We assign the value of zero to missing information in either the educational level of one of the parents, while we include the family into the mixed background group if we do not have information on the grandparents. For more details, see section 3.4.
Table 1: Descriptive Statistics.

<table>
<thead>
<tr>
<th></th>
<th>Overall Sample</th>
<th>Sample of those affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Equivalent consumption (log)</td>
<td>9.25</td>
<td>0.55</td>
</tr>
<tr>
<td>Log of saving equilized</td>
<td>2.00</td>
<td>4.14</td>
</tr>
<tr>
<td>Equivalent nondurable consumption (log)</td>
<td>9.17</td>
<td>0.49</td>
</tr>
<tr>
<td>Missing income</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td>Exp. pending-incoming civil trials ratio</td>
<td>1.05</td>
<td>0.36</td>
</tr>
<tr>
<td>University reform</td>
<td>0.37</td>
<td>0.48</td>
</tr>
<tr>
<td>Gender</td>
<td>0.47</td>
<td>0.50</td>
</tr>
<tr>
<td>Siblings, (number)</td>
<td>1.21</td>
<td>0.91</td>
</tr>
<tr>
<td>Hh age</td>
<td>49.04</td>
<td>5.06</td>
</tr>
<tr>
<td>Hh education, (years)</td>
<td>9.94</td>
<td>4.07</td>
</tr>
<tr>
<td>Both parents, (dummy)</td>
<td>0.91</td>
<td>0.29</td>
</tr>
<tr>
<td>Sp education, (years)</td>
<td>8.63</td>
<td>4.75</td>
</tr>
<tr>
<td>Sp missing education</td>
<td>0.02</td>
<td>0.15</td>
</tr>
<tr>
<td>Hh missing education</td>
<td>0.03</td>
<td>0.16</td>
</tr>
<tr>
<td>Transitory component income innovations</td>
<td>1.20</td>
<td>12.72</td>
</tr>
<tr>
<td>Permanent component income innovations</td>
<td>0.23</td>
<td>1.34</td>
</tr>
<tr>
<td>Abilities related to family background</td>
<td>-1.42</td>
<td>12.69</td>
</tr>
<tr>
<td>Hh missing family background education</td>
<td>0.06</td>
<td>0.24</td>
</tr>
<tr>
<td>Hh missing family background occupation</td>
<td>0.07</td>
<td>0.25</td>
</tr>
<tr>
<td>GDP per employee</td>
<td>49.17</td>
<td>6.28</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.11</td>
<td>0.06</td>
</tr>
<tr>
<td>Expected returns</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>11.22</td>
<td>2.75</td>
</tr>
<tr>
<td>Sample Size</td>
<td>14.033</td>
<td>6.005</td>
</tr>
</tbody>
</table>

Sources: SHIW, Bank of Italy, wave 1995-2006, all individuals aged between 14 and 23 years old and survey by the National Institute of Statistics (ISTAT (1995-2006)).

provides more insights into the exogenous variability of the two instruments, the working sample is now collapsed across cohorts, distinguishing between pre and post reform(s) cohorts and age of the children. Post reform cohorts are defined as those individuals who entered the relevant age after year 2001 when both reforms were enforced.

Figure 4 clearly shows that the almost perfectly overlapping sources of exogenous variation generated by both the judicial and university reforms depend on the randomly assigned cohort of birth of the individuals. Panel (a) of the figure illustrates that at a given age, all individuals belonging to the affected cohorts were exposed to a higher courts efficiency as measured by a lower ratio of the pending-incoming civil trials. The jump at age 18 results from assign a zero weight in the household’s expected value of the pending incoming civil trials ratio to individuals aged less than 18. This jump is controlled for
Figure 4: Age profiles for court efficiency and university reform.

(a) Court efficiency

(b) University reform

Note: Post reform cohorts are defined as those individuals who entered the relevant age after year 2001 when both reforms were enforced.

by age dummies which will be included into the main regression model. Panel (b) shows instead that the university reform is quite well randomized up to age 20 because on average the indicator is equal to 0.5. In fact, the panel depicts further the extent to which the two sources of exogenous variation are overlapping. These two sources perfectly overlaps up to age 20. At age 21 not all individuals affected by the judicial reform are also affected by the university reform and for this reason the mean value of the university reform indicator is lower than 1. For these cohort-age pairs, we are underestimating those affected. Consider, for instance, the case of the 1981 cohort affected at age 21 by the judicial reform and unaffected by the university reform since aged 20 when the university reform took place and consequently already enrolled if in due course. These individuals could in principle have switched upon request to the new system.

Summarizing, the university reform identifies the effect of interest at a given age comparing pre and post reform cohorts. In such a case the randomized assignment rule depends on the year of birth of the children. The judicial reform modifies the degree of the court efficiency. Given the age of the child and the cohort of birth, its effect therefore depends upon the regional variability of the pending incoming civil trials ratio before and after the reform as depicted by panel (a) (the household’s structure does not change much over time neither do the frequencies of the Italian population distribution). For a given age and cohort of birth of the child in a given region, the household structure in terms of age and gender of her members is the exogenous source of variability across households. All these arguments hold for all income quintiles.

Figure 5 illustrates the age profiles for the four main variables of interest. On the one hand, the data shows a small increase of schooling attendance of post-reform cohorts, especially after the twenties. On the other hand, post-reform cohorts have a higher amount
Figure 5: Age profiles for years of schooling, nondurable consumption, overall consumption and saving.

(a) Years of schooling
(b) Equivalent nondurable consumption (log)
(c) Equivalent consumption (log)
(d) Log of saving equilized

Note: Post reform cohorts are defined as those individuals who entered the relevant age after year 2001 when both reforms were enforced.

The second dimension across which the effects of interest could be heterogeneous is household income. We avoid to deal with the endogeneity of household income by considering the quintiles of the income distribution in which the household sits. Graphical inspection of Figure 6 suggests that the individuals affected by the two reforms and coming from the lower quintiles of the income distribution are those who increase their years of schooling most. In fact, the difference in the years of schooling between the pre and post reform cohorts shrinks after the third income quintile. Nondurable and overall consumption and the amount saved are slightly higher for post reforms cohorts. However, this small difference appears to be constant across income quintiles.

All the graphs reported in figures 5 and 6 refer to unconditional outcomes and by definition do not control for households unobservable heterogeneity which may affect the

\(^{18}\) We can also show that both the judicial and university reforms are quite well randomized in terms of households’ income quintile. These graphs are available upon request from the authors.
Figure 6: Income profiles for years of schooling, nondurable consumption, overall consumption and saving.

(a) Years of schooling
(b) Equivalent nondurable consumption (log)
(c) Equivalent consumption (log)
(d) Log of saving equilized

Note: Post reform cohorts are defined as those individuals who entered the relevant age after year 2001 when both reforms were enforced.

interplay of interest. In the next paragraph we discuss in more details the estimation issues related to this point.

3.4 Estimation Issues

Exogeneity of the instruments and exclusion restriction. While it is clear that the university reform generates a randomly assigned exogenous shock to affected individuals and the exclusion restriction unlikely does not hold, it is worth instead providing some validity checks on the other instrument, the expected pending-incoming civil trails ratio. Two main reasons justify why the instrument is exogenous.

First, given the age of the child and the region of residence, the expected value of the pending-incoming is as good as randomly assigned to households according to the year of birth of the child.

Second, the key maintained hypothesis is that the family structure and composition in terms of age of adults is orthogonal with household unobservable characteristics which
drive the consumption and saving choice. As discussed by Attanasio and Weber (2010), demographics play an important role in shaping consumption over the life cycle. Consequently, even if we use the log of equivalent consumption and the log of saving equalized by family size, we check whether our consumption and saving variables are correlated with household’s composition, thus rising potential concerns about the exogeneity of the instrument. We collapse data across the relevant dimensions of variability of the instrument, age and year of birth of the child and region of residence. We estimate the conditional mean expectations of both consumption expenditures, saving and our instrument given family’s age structure, where the latter is defined as the sum of the age of all adults within an household divided by the household size. Panel (a) of figure 7 illustrates these conditional mean expectations suggesting that the conditional mean expectations of both consumption expenditures are flat supporting the orthogonality condition. Moreover, these conditional means almost coincide suggesting the household’s age structure is uncorrelated with durable consumption choice. The instrument exhibits a positive profile but flatter compared to saving. The correlation between consumption and the family’s age structure is positive while panels (b), (c) of figure 7 show a reverted pattern for the correlation between the instrument and consumption given family’s age structure. The pattern of the correlation between the instrument and households saving is instead less clear.

The exclusion restriction for identification of the effect of consumption (saving) on years of schooling requires that the expected pending incoming civil trials ratio does not have a direct impact on the years of schooling, even when conditioned for the household’s age structure. The family’s age structure could be, in fact, the potential channel through which there is a direct link between the expected pending incoming civil trial ratio and the years of schooling of the children. The linkage is mechanical since higher household’s age structure (even if it is related to the age of the adults only) is associated to higher grown up children who on average have higher years of schooling. We proceed, as above, collapsing first data across the family’s age structure and then across the age and the cohort of birth of the child and the region of residence. As illustrated by figure 8 there is a lot of variation within household’s age structure but not much variation across age structure.

Panel (b) of figure 8 clearly documents that variability of the instrument does differ substantially from the variability of years of schooling registered for both the location and the scale of the distributions, as shown by the different slopes of the conditional quantile functions given household’s age structure. In fact, panels (c) and (d) of figure 8 indicate that the instrument varies mainly within household’s age structure according to the age and cohort of birth of the children and the region of residence while years of schooling vary mainly across household’s age structure likely by virtue of the mechanical increasing relationship between years of schooling and the age of children and parents.
The last concern is whether we are using regions as instruments even if we control for regional dummies. Figure 2 plots the conditional quantiles function for the expected pending incoming civil trial ratio (panel (a)), and overall consumption expenditures (panel (b)), indicating clearly that we are not using the region of residence as our instrument. This is because, given age and cohort of birth of the children, the expected pending incoming ratio varies both across and within regions as the result of the combination of different regional variability, cohort of birth of the children and different household structures in terms of age and gender of her members.

**Innovations in household income.** The amount of children education, household consumption and saving and consequently the interplay between these choices may not be optimal in presence of credit constraints. In the current paper, we do not address the issue of either how pervasive credits constraints are. Nevertheless, we cannot disregard that the

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19 Similar pictures can be drawn for nondurable consumption and saving.

20 The issue on the role of financial aid for college students is hotly debated. On the one hand, Cameron and Heckman (1998); Keane and Wolpin (2001); Carneiro and Heckman (2002); Cameron and Taber (2004) after controlling for child ability and several other family background characteristics find evidence on a small role in college attendance decisions of the family income. On the other hand, Belley and Lochner (2007) provides evidence of a family income effect which is roughly twice that observed in the 1980s.
interplay between household consumption choices and children educational enrolments can be shaped by the household income (wealth). To this end, we adopt a threefold strategy.

First, we control for the quintile of the income distribution where the household sits.

Second, we attempt at disentangle parental income, which determines the household’s income quintile, from household unobservable characteristics those which may be correlated with children’s psychic costs, expected returns of schooling and preferences. In fact, if the main channel through which parental income affects the children enrolments pass through child (unobservable) psychic costs and expected returns, credit constraints might not have a strong role.

Third, we try to measure idiosyncratic transitory and permanent income innovations. Consumption and children’s education choices could not necessarily depend on current income. This is because current income may not reflect the longer run level of resources available to an household. Temporarily low or high incomes may alter the true position of the household in the consumption distribution when borrowing or saving is allowed to smooth the stream of consumption. If people behave according to the permanent income hypothesis, consumption variability is related only to permanent idiosyncratic unantici-
pated income shocks since the optimal rule is to respond one to one to permanent shocks and to revise consumption only by the annuity value of the income innovation of the transitory shocks. In fact, consider the following consumption model specification:

\[ \ln c_{h,a} = \ln c_{h,a-1} + \phi \left( \frac{r}{1 + r} \epsilon_{h,a} + \psi_{h,a} \right) \]  

where \( \phi \) measure the extent to which consumption responds to income shocks (\( \epsilon \) is a transitory shock while \( \psi \) is a permanent shock).

At any age (log of equivalent) consumption is given by past (log equivalent) consumption plus a term which reflects an innovation to permanent income. By recursive substitution, for each household log consumption is given by the sum of innovations (in permanent income) from the beginning of life to the current age. By substituting recursively:

\[ \ln c_{h,a} = \phi \sum_{s=1}^{a} \psi_{h,s} + \phi \frac{r}{1 + r} \epsilon_{h,a} \]  

averaging across ages when \( a \) is sufficiently large gives exactly the Gibrat’s law (Battistin, Blundell and Lewbel (2009)) since the transitory component vanishes out (even if it is not i.i.d but serially correlated):

\[ \frac{\ln c_{h,a}}{a} = \phi \frac{\sum_{s=1}^{a} \psi_{h,s}}{a} \]  

Our main identification assumption is that the judicial reform generates a unexpected permanent shock for affected cohorts. Identification is achieved by comparison across children’s cohorts of birth for given children’s age. It is hence assumed that children of similar age have parents of similar age. Fixing the range of the age of the head of the household is important to make comparisons across cohorts be reliable measures of inequality in living standards unrelated to the different ages at which they are observed make such comparisons and to changes in the age composition of the population.

If, instead, the judicial reform affects the credit market interest rate but it does not generate any shock in the permanent income, the effect on consumption is much smaller, does not persist and operates through the shock in the transitory income component. However it is likely that the judicial reform affects both (shock in permanent income and the interest rate).

\[ ^{21}\text{We can provide suggestive evidence that this is a reliable assumption in our data as long as fixing children’s age, the interquantile range of the distribution of the age of the head of the household lies in the range of 6 to 8 year bands.} \]
All these considerations imply that permanent income and consumption are drawn from some common underlying distribution. We assume that such distribution depends upon some unobserved characteristics of the household related to the family background. Suppose that incomes are randomly assigned by the lottery of birth which accordingly distributes abilities and parenting. The latter provides the environment where the individual grows up (inherited skills and networks) and contribute further to the development of innate abilities. In absence of (or in presence of low) social mobility, the distribution of family characteristics or socio-economic status maps into the initial distribution of permanent income. This mapping depends on the socio-economic structure of the society since some inherited skills provide higher returns in certain rather than others labour markets.

All these arguments posit the necessity to control for the common underlying distribution from which both consumption and permanent income are drawn, and for both the permanent and transitory innovations of current income. A solution for consumption can hence be obtained by imposing a cross-equation restriction for the joint time series processes of consumption and income.

**Household unobserved heterogeneity and family background.** Assume that the consumption process is described by equation (3) and (4). Consider further that the income for the household depends upon her family background through two channels: first, the direct effect (i.e. identified across family background groups) of providing the environment where the child grows up (inherited skills and networks) and second, an indirect effect (i.e. identified within the family background group), contributing further to the development of innate abilities and preferences which determine the position in the distribution of income conditional on the family background. As long as the rank position within the group specific income distribution depends upon the household’s decisions, the properties of the distribution itself (such as the median, the mean, and variance) are exogenous to the family’s choice and are related to the permanent income generation process and to a transitory income innovation. Household’s consumption and children’s enrolments choices depend, hence, on the contributions of the family background (considering both the direct and indirect effect) and the idiosyncratic innovation which can be divided into a transitory and permanent component.

We start from the consideration that at least part of the correlation between household unobservable characteristics and children’s psychic costs, expected returns of schooling and

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22 This is for instance what has been observed as a consequence of the so called skill-biased technological change. If the individual education level is related to the family background, this idea is consistent with Jappelli and Pistaferri (2006)’s evidence according to which different population groups are systematically exposed to different idiosyncratic shocks (and therefore face different income processes). They find that the estimated variance signal that the less well-educated face a higher variance of permanent income shocks, a pattern also uncovered by Carroll and Samwick (1997) with US data.
preferences can be captured by the family background. SHIW data provide information on the education and socio-economic position of the grandparents.\textsuperscript{23} After cutting the lowest and the highest 5\% of the age of the head of the household distribution, we retain all 96,523 individuals in the full dataset. For each year of the survey, we start by partitioning the observed families into homogeneous groups as in Andreoli, Casalone and Sonedda (2015) according to the grandfather’s occupational background. Households are divided into two groups, the \textit{disadvantaged grandparental background} gathering the grandfathers who were unemployed or employed either in agriculture or as an unskilled manual worker and the \textit{advantaged grandparental background}, comprising all the other cases. Starting from this classification, we define three family background groups according to the occupational condition of the fathers of both spouses. The disadvantaged background group includes all the families for which both grandfathers were disadvantaged. Symmetrically, the purely advantaged group refers to all the families where both spouses’ fathers were advantaged. Residually, it is possible to define a third group comprising all families with a grandfather belonging to the advantaged background of origin while the other to the disadvantaged one\textsuperscript{24} For each of these three groups and for each year of the survey, we rank households within each group according to their income under the assumption that the rank position (the percentile) identifies the set gathering all families with similar unobservable characteristics (for instance, abilities, preferences). To disentangle the contribution of the background of origin at fixed degree of unobservable characteristics, we compare the income of a family at a given rank (percentile) of the group specific income distribution with the income that this family would have reached if the backgrounds of origin were equalized across all families. This counterfactual income corresponds to the weighted average income of all families belonging to different groups but sharing the same degree of abilities/preferences proxied by the rank position in the group specific income $I$ distribution $F_g(I)$. Let $w_t$ be the weight of group $g$, the average income $\mu$, at a given percentile $p$ of the full sample income distribution, corresponds to $\mu(p) = \sum_{g=1}^{G} w_g F_g^{-1}(I)$.

Given this set, the estimated residuals $\varepsilon_h$ of a model where the household income is regressed on dummies capturing the family’s rank position and a dummy variable that controls for missing information on the background of origin amounts to the empirical counterpart of the vertical distance between the family background specific quantile functions $F_g^{-1}(p)$ and the weighted average quantile function.

\textsuperscript{23}The questionnaire of the survey reports this question: “What were the educational qualifications, employment status and sector of activity of your parents when they were your present age? (If the parent was retired or deceased at that age, refer to time preceding retirement or death).”

\textsuperscript{24}In this category we include also those families with missing information on the occupational background of either or both grandfathers.
where 1[.] is an indicator function for the condition expressed in its argument to be satisfied. This indicator function is empirically captured by sets of dummies which take the value of 1 in correspondence of the rank occupied by the household in her group specific income distribution.

Under such environment, there are no differences in families’ unobservable characteristics with respect to the grandparental backgrounds when the corresponding residuals \( \varepsilon_h \) are equal to zero for each percentile of the income distribution in such a way that the family background group specific distributions are (statistically) identical.

For a given year, these residuals \( \varepsilon_h \) reflect both household idiosyncratic (unrelated to the family background) shocks and household unobservable characteristics related to the family background. Moreover, the purely idiosyncratic component could capture not only the permanent but also the transitory component of income innovation. To separate the influence of the family background on the household unobserved characteristics from such residuals, we follow the procedure suggested by Björklund, Jäntti and Roemer (2012) adding and subtracting to the residuals \( \varepsilon_h \) an innovation term \( u_h \) which corresponds to the residuals \( \varepsilon_h \) normalized by the fraction of overall variation explained by the family background group specific variation.

\[
y_h = \sum_{j=1}^{100} \gamma_j \cdot 1[h \in P(p_j)] + \tilde{\varepsilon}_j + u_h,
\]

where \( k = \left( \frac{1}{\sum_j \sigma_j^2} \right)^{-\frac{1}{2}} = \frac{1}{\sigma} \); \( u_h = \frac{\varepsilon_h}{k \sigma_h} \) and \( \tilde{\varepsilon}_j = \varepsilon_h - \frac{\varepsilon_h}{k \sigma_j} \).

The term \( \tilde{\varepsilon}_j \) hence captures both the direct and the indirect contributions of the family background to the income innovation in a given year. The idiosyncratic innovation \( u_h \) has variance \( \frac{1}{k^2} = \sigma^2 \) across all family background groups. This separates between idiosyncratic innovation \( u_h \) that is measured in terms of a common distribution and that part of innovation \( \varepsilon_h - \frac{\varepsilon_h}{k \sigma_j} \) that captures the influence of family background on the conditional variation of income around the expected value for each group. This method accounts for variations in the distribution of innovations, by distinguishing between hetero and homoschedastic residual variation and builds on the assumption that exists heterogeneity across groups. This term can be obtained starting from the OLS residuals \( \varepsilon_h \) in (5) and
then calculating the family background group specific variances $\sigma_j^2$. In the case of very few observations for some groups and/or very small estimated variances (leading to very large standardized residuals $u_h$) we follow what suggested by Björklund et al. (2012) and we regress the estimated variances on the background characteristics and use the fitted values from that regression as the basis for $\frac{\sigma_h}{\sigma_j^2}$. This procedure smooths out the more extreme values.

Decomposing transitory and permanent income innovations The idiosyncratic innovation $u_h$ can be decomposed into a transitory and permanent component. We attempt at disentangling these two components using the information on the evolution of the consumption distribution. For a given year, we repeat the same procedure used for income to obtain the idiosyncratic innovation $u_h$ starting from the consumption distribution conditional on the grandfathers occupational status. We exploits the within-household variation over time of such residuals to uncover residually the transitory component. We then average across time (age) to obtain an empirical counterpart of $\frac{\sigma_h}{\sigma_j^2}$. Under all the hypotheses discussed above, $\frac{\sigma_h}{\sigma_j^2}$ captures the permanent component of the income innovation. Subtracting such permanent component from $\varepsilon_h$ one retrieves the transitory component of income innovations.

Unobservable characteristics related to the educational background of the family. We repeat the classification of the households into groups also according to years of schooling of the grandparents. In this case, the purely disadvantaged (advantaged) background group includes all the households for which both spouses’ parents had on average either less (more) of 5 years of education. The mixed (third) group is residually defined. The procedure is similar as above. First, we rank households within each group according to the average years of schooling of the parents (if the spouse is present, otherwise we consider the years of schooling of the head of the family). We consider deciles instead of 100 percentiles to identify the rank position in the parents’ years of schooling distribution. Second, the years of schooling of both the grandparents and the parents are fixed over time. Therefore we interpret the residuals, of the regression of the average years of schooling of the parents on the dummies capturing the rank position into the group specific years of schooling distribution and the dummy controlling for the missing values, as a fixed component of the household unobservable characteristics related to the educational background of origin. To clarify the concept, families with positive (fixed over time) resid-

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25Starting in 1989 a panel component has been added to the SHIW data. A subsample of households, is interviewed repeatedly over the years. However, the survey attrition rate if quite high, only about half of the sample is interviewed in the subsequent survey. Nevertheless, this weak panel structure allows us to control for the transitory component of the families’ unobservable characteristics related to the background of origin.
uals are those which have unobservable characteristics (such as abilities or preferences) that have provided them an advantage in the years of schooling chosen with respect to the other households experiencing different family background but sitting in the same decile of the years of schooling distribution. These disadvantaged households would counterfactual have had the same years of schooling realization of the advantaged one if grown-up in a different family background. As above, given this framework, there are no differences in families’ abilities (preferences) with respect to the educational family background when the corresponding residuals are equal to zero for each decile of the years of schooling distribution in such a way that the family background specific distributions are (statistically) identical.

4 Empirical Strategy

This section briefly reviews the control function approach which we use to account for endogeneity and fully simultaneous model of households’ choices. Let \( y_a \) be the vector of the outcome variables where \( a \) denotes age and the indexes for individuals and households are suppressed for the sake of simplicity. This vector is composed by two main scalars \( y_1a \) comprising in turn either household nondurable or overall consumption or saving when individual \( i \) is aged \( a \) and \( y_2a \) defining the years of schooling at age \( a \) of individual’s \( i \) in household \( h \). We start by considering the following structural model:

\[
y_1a = m_1a(y_2a, z_1a) + e_1a \tag{7a}
\]

\[
y_2a = m_2a(y_1a, z_2a) + e_2a \tag{7b}
\]

This structural simultaneous model can also be expressed in reduced forms:

\[
y_1a = g_1a(z_a) + \epsilon_1a = h_1a(z_a, \epsilon_1a, \epsilon_2a) \tag{8a}
\]

\[
y_2a = g_2a(z_a) + \epsilon_2a = h_2a(z_a, \epsilon_1a, \epsilon_2a) \tag{8b}
\]

where the functions \( g_1a \) and \( g_2a \) are estimated via flexible parametric models by including either quadratic polynomials of age and income quintiles and interactions terms of these polynomials with all the exogenous variables.

Four main assumptions are required to achieve identification of the parameters of interest (Blundell and Matzkin (2014)). First, the joint distribution of the reduced form errors terms \((\epsilon_1a, \epsilon_2a)\) is independent of the instruments \( z_a \). Second, these independent errors terms enter additively into the reduced form equations. Since we are considering
continuous variables, both these two assumptions are plausible, although strong. Third, we exploit the two overlapping sources of exogenous variation generated by the judicial and university reforms to have the sufficient exclusion restrictions which allow identification. On the one hand, the elements characterizing the judicial reforms enter into the structural equation of the years of schooling only through their effects on either nondurable or overall consumption or saving. On the other hand, the elements characterizing the university reform enter into the structural equation for either nondurable or overall consumption or saving only through their effects on the years of schooling’s choice. Fourth, at the heart of the endogeneity problem there is the correlation between the error terms in the structural equations. Moreover, assumptions on how the reduced form and the structural errors are related are crucial for identification. These assumptions help explaining how reduced form and structural parameters are connected. To illustrate the point, we rewrite the reduced form simultaneous equation system using matrix notation:

\[ \Pi(Z)y_a = \epsilon_a \] (9)

where \( \Pi(Z) = I_n - \Pi_kZ_k \) and \( \epsilon_a \sim VWN(0, \Sigma) \).

For the sake of simplicity, we consider first the case where unobservable heterogeneity affects the intercept of the relationship of interest without interacting with the endogenous explanatory variables. Under this hypothesis we assume that the reduced form disturbances are connected to the structural form disturbances by the following linear relationships:

\[ A\epsilon_a = Be_a = \eta_a \] (10)

where \( e_a \sim VWN(0, I_n) \) and \( \eta_a \sim VWN(0, \Omega) \) and \( \Omega = B'B \).

We assume that the matrix \( A \) is unit diagonal while we relax the hypothesis of a triangular \( B \) matrix as a consequence of the presence of overlapping sources of exogenous variation. This amounts to say that, on the one hand, by exploiting the exogenous variation in \( y_{2a} \) due to the university reform, the structural unobservable random term, \( e_{2a} \) in the second equation of the simultaneous equations system can be represented as a linear function of the reduced form unobservable random term, \( \epsilon_{2a} \) in the second equation of the system and the unobservable random term, \( e_{1a} \) in the first equation of the simultaneous

\[^{26}\text{For this reason, we have ruled out the possibility to apply our identification strategy to discrete or fractional response variables such as the enrolment probability and the consumption (saving) share.} \]
equations system. On the other hand, by exploiting the exogenous variation in $y_{1a}$ due to
the judicial reform, the structural unobservable random term, $e_{1a}$ in the first equation of
the simultaneous equations system can be represented as a linear function of the reduced
form unobservable random term, $e_{1a}$ in the first equation of the system and the unob-
servable random term, $e_{2a}$ in the second equation of the simultaneous equations system.
Roughly speaking, we consider jointly a control function model which assures that the
simultaneous system can be expressed in the triangular form:

\begin{align}
y_{1a} &= m_{1a}(y_{2a}, z_{1a}) + e_{1a} \\
y_{2a} &= s_{2a}(z_a) + \eta_{2a}
\end{align}

where the function $s_{2a}$ is strictly increasing in the unobservable scalar $\eta_{2a}$ and where
$z_a$ is independent of $(e_{1a}, \eta_{2a})$

and

\begin{align}
y_{1a} &= s_{1a}(z_a) + \eta_{1a} \\
y_{2a} &= m_{2a}(y_{1a}, z_{2a}) + e_{2a}
\end{align}

where the function $s_{1a}$ is strictly increasing in the unobservable scalar $\eta_{1a}$ and where
$z_a$ is independent of $(e_{2a}, \eta_{1a})$.

Although the functions $m_{1a}, m_{2a}, g_{1a}$ and $g_{2a}$ can be estimated using flexible parameter
models, the error terms are additively separable ensuring the control function separability
condition stated by Blundell and Matzkin (2014). In fact, we can express the direct system
of structural equations, defined by $(m_{1a}, m_{2a})$ in terms of a structural inverse system of
functions mapping any vector of observable variables $(m_{1a}, m_{2a}, z_a)$ into the vector of
unobservable variables $(e_{1a}, e_{2a})$:

\begin{align}
A(Z)y_a &= Be_a = \eta_a
\end{align}

where $A(Z) = A + A_k Z_k$ and reduced forms and structural parameters are connected
by $A\Pi_k = -A_k$ and $A\Sigma A' = \Omega$

The existence of a unique value for $(y_{1a}, y_{2a})$ given any $Z = z$ (i.e. $Z_1 = z_1$ and
\( Z_2 = z_2 \) guarantees the existence of the reduced form system of equations (8a) and (8b) which maps the vector of exogenous variables \((e_{1a}, e_{2a}, z)\) into the vector of endogenous variables \((y_{1a}, y_{2a})\). All these assumptions also ensure that the reduced form function \(h_{1a}\) is monotone increasing in \(e_{1a}\) and the reduced form function \(h_{2a}\) is monotone increasing in \(e_{2a}\). In what follows, under the crucial assumptions of additive errors and a linear relationship between the reduced form and the structural form disturbances, we consider a more general error specification which allows for unobservable heterogeneity to interact with the endogenous variables:

\[
(A + \Psi Y_a)\epsilon_a = Be_a + \sum_{i=1}^{4} C f_a
\]

(14)

where the term \(\sum_{i=1}^{4} C f_a\) captures the role played by the four household unobservable heterogeneity indicators.

The next section will present our main results. The procedure is standard. Consider, for instance, to estimate the effect of overall consumption on years of schooling. We estimate first the reduced form equation (8a) using the court efficiency indicator altered by the judicial reform to exogenously manipulate the household’s consumption level. The model specification of \(g_{1a}(z_a)\) which is unknown on a priori ground is estimated using a flexible parametric model specification. We then obtain the residuals \(\hat{\epsilon}_{1a} = y_{1a} - \hat{g}_{1a}(z_a)\). Finally, we estimate \(E(y_{2a}|z_{2a}, y_{1a}, \epsilon_{1a})\) using a flexible parametric model where \(\hat{\epsilon}_{1a}\) replaces \(\epsilon_{1a}\).

5 Results

5.1 Reduced form regressions

Drawing on the econometric framework discussed above, we now investigate the statistical relevance of the interplay between household consumption (saving) decisions and children’s educational choices. We start from the reduced form setting where we include as controls individual’s characteristics such as the gender, age and year of birth dummies; characteristics of the household whom the individual belongs to such as dummies for the income quintile, the years of schooling of both parents (if the spouse is present), a dummy for the presence of the spouse, the number of siblings, the age and age square of the head of the household, the permanent and transitory innovation of the household income, our two proxies for the unobservable characteristics related to the grandparental background, dummies for missing information on income, years of schooling of the parents, regional variables...
Figure 9: Age profiles of an exogenous shock in court efficiency for the relevant outcome variables.

(a) Years of schooling
(b) Log of saving equalized by family needs
(c) Log of equivalent nondurable consumption
(d) Log of equivalent consumption

Note: Marginal effects of a one unit change in the pending-incoming civil trials ratio for the relevant outcome variables. These marginal effects are estimated using a flexible parametric model specification including as regressors individual’s characteristics, local market conditions proxied by regional variables, income quintile, age and year of birth dummies and an indicator of changes in compulsory schooling age. We consider all possible interactions with ages and income quintiles. Confidence bands at 95% level.

such as the gdp per employee, the unemployment rate, the returns to university degree with respect to a diploma and regional dummies which captures the economic environment where the household lives. We also include an indicator of changes in compulsory schooling age. In fact, Law 20/1999 (*Legge Berlinguer*) raised the compulsory schooling age from 14 to 15 years for individuals born after 1985. After a couple of years, Law 53/2003 (*Riforma Moratti*) restored the compulsory schooling age for cohorts of individuals born after 1989.

We start from the assumption that the model specification is unknown and we follow the strategy, discussed above, to carry out a parametric flexible model specification. We consider the more general specification when all interactions with ages and income quintiles. We cluster standard errors by household and children’s cohort of birth which together define the level of variability of our two instruments.

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Results from model specification (8a) and (8b) are illustrated by the following figures 9 and 10. We consider first the effects on the outcome variables of interest (i.e., children’s years of schooling, household nondurable and overall consumption and saving) of a unit change in the pending-incoming ratio of judicial trials, $z_1$, our measure of court efficiency, given the university reform $z_2$. Panel (a) of Figure 9 shows that higher court efficiency (a lower pending-incoming ratio) increases years of schooling only up to about age 17 in the fourth and fifth income quintiles. In fact, in the panel, the columns refer to the income quintile for which the age profiles of the effects of interest are plotted. Panel (b) of the Figure focuses on the age profiles for the household saving. These effects are clearly not precisely estimated casting doubts on the use of judicial reform as an instrument for savings. Panel (c) of the figure presents instead the effect of court efficiency on the equivalent nondurable consumption. A higher court efficiency increases the level of equivalent nondurable consumption for all income quintiles but the first and the fifth. Similar but weaker results can be found when we use the equivalent overall consumption level (panel (d)).

We complete the picture of the reduced form main results by presenting in Figure 10 the effects for the outcome variables of interest of the university reform $z_2$ indicator, given court efficiency. Panel (a) of Figure 10 illustrates that the university reform increases significantly the years of schooling, although not at all ages. The effect is not significantly different from zero from age 15 to age 19 suggesting that the reform have not changed significantly the individuals’s university enrolment decision but rather it has encouraged individuals to complete the university course degree shortened from four to three years. The marginal effect of the university reform on the amount saved by the households is not significant different from zero. As documented by panel (c) of Figure 10 the effect of the university reform on nondurable consumption is only significantly different from zero and positive for those families who have children aged more than 18 years indicating clearly an interplay with the years of schooling decision related to university attendance. This pattern is confirmed when considering the overall consumption indicator (panel (d)).

Overall, these reduced form findings suggest two main concerns. First, the effects are quite heterogeneous. Second, the two sources of exogenous variation do not affect significantly either all ages (i.e. see the age profiles for the years of schooling) or all income quintiles (i.e. see the income profiles for consumption). Moreover, the heterogeneity of the effect of the judicial reform might be evaluated across income quintiles while the heterogeneity of the effect of the university reform is relevant across ages. Keeping these considerations in mind, we proceed to present our empirical analysis based on the control function method.

Table 2 in appendix reports the estimated coefficients.

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27Table 2 in appendix reports the estimated coefficients.
Figure 10: Age profiles of an exogenous shock in the university system for the relevant outcome variables.

(a) Years of schooling  
(b) Log of saving equalized by family needs  
(c) Log of equivalent nondurable consumption  
(d) Log of equivalent consumption

Note: Marginal effects of a one unit change in the pending-incoming civil trials ratio for the relevant outcome variables. These marginal effects are estimated using a flexible parametric model specification including as regressors individual’s characteristics, local market conditions proxied by regional variables, income quintile, age and year of birth dummies and an indicator of changes in compulsory schooling age. We consider all possible interactions with ages and income quintiles. Confidence bands at 95% level.

5.2 Control Function

We start by considering the interplay between the household nondurable consumption and children’s years of schooling, illustrated by Figure [11].

As a benchmark, panels (a) and (c) of the Figure present the OLS estimates while panels (b) and (d) illustrate the marginal effects obtained using the control function approach. These marginal effects are evaluated setting at their sample mean level the first stage residuals, the permanent and transitory innovations to household income and the two components of the household unobservable characteristics related to the family background. On the one hand, an increase in nondurable consumption does not significantly affect the children’s years of schooling. On the other hand, a one more year of schooling increases the amount of equivalent nondurable consumption.
Figure 11: Interplay between equivalent nondurable consumption and years of schooling.

(a) OLS: years of schooling on durable consumption
(b) CF: years of schooling on nondurable consumption
(c) OLS: non-durable consumption on years of schooling
(d) CF: nondurable consumption on years of schooling

Note: This Figure plots the marginal effects of the endogenous variable. These marginal effects are estimated using a flexible parametric model specifications which add to the controls indicated in previous figures also the first stage residuals, their interaction with the endogenous variable and the permanent and transitory innovation shocks to household income, the two components of the household unobservable characteristics related to the family background, all evaluated at their sample mean. Confidence bands at 95% level.

With the same structure of Figure 11, Figure 12 describes the interplay between the log of household equivalent consumption and children’s years of schooling. Panel (b) of the figure confirms the effects found when using the log of equivalent nondurable consumption. This evidence suggests that changes in overall consumption are mainly driven by changes in nondurable rather than durable consumption expenditures.

A certain degree of substitution could be observed between saving and years of schooling. On the one hand, Panel (d) of Figure 13 shows that changes in years of schooling do not affect savings. On the other hand, panel (b) higher savings reduce years of schooling for all income quintile but the highest.

However, as illustrated by Figure 9, the judicial reform cannot be considered as a proper instrument for savings.
Figure 12: Interplay between equivalent consumption and years of schooling.

(a) OLS: years of schooling on consumption
(b) CF: years of schooling on consumption
(c) OLS: consumption on years of schooling
(d) CF: consumption on years of schooling

Note: This Figure plots the marginal effects of the endogenous variable. These marginal effects are estimated using a flexible parametric model specifications which add to the controls indicated in previous figures also the first stage residuals, their interaction with the endogenous variable and the permanent and transitory innovation shocks to household income, the two components of the household unobservable characteristics related to the family background, all evaluated at their sample mean. Confidence bands at 95% level.

All these marginal effects are evaluated at the average level of the first stage residuals, the permanent and transitory innovations to household income and the two components of the household unobservable characteristics related to the family background. The next section analyzes in more details the role of such unobservable characteristics.

5.3 The role of unobservable heterogeneity

We investigate the role of the permanent and transitory income innovations and household unobservable characteristics coming from the granparental background in a twofold perspective. First, we consider how these characteristics affect the marginal effect of interest. Second, we estimate the direct marginal effects of such characteristics on the outcome of concern.
Figure 13: Interplay between equivalent saving and years of schooling.

(a) OLS: years of schooling on saving
(b) CF: years of schooling on saving
(c) OLS: saving on years of schooling
(d) CF: saving on years of schooling

Note: This Figure plots the marginal effects of the endogenous variable. These marginal effects are estimated using a flexible parametric model specifications which add to the controls indicated in previous figures also the first stage residuals, their interaction with the endogenous variable and the permanent and transitory innovation shocks to household income, the two components of the household unobservable characteristics related to the family background, all evaluated at their sample mean. Confidence bands at 95% level.

5.3.1 Unobservable heterogeneity affecting marginal effects

Panel (a) of Figure 14 illustrates the control function estimates of the marginal effects of interest evaluated at the lowest 10% of the distributions of first stage residuals, the permanent and transitory innovations to household income and the two components of the household unobservable characteristics related to the family background. We interpreted these marginal effects as those faced by low skilled individuals.

In contrast to results which may be referred to individuals with average abilities, panels (b) and (d) of Figure 11 an increase in years of schooling does not affect the nondurable consumption of low skilled individuals. However, at the first and second income quintiles an exogenous shock to nondurable consumption reduces the child’s opportunity cost of working and through this increases the years of schooling. There is not a clear statistical relationship between durable consumption and years of schooling for this kind of children.
Figure 14: Assessing the role of unobservable heterogeneity: low skilled individuals.

Note: Marginal effects of the endogenous variable evaluated at the lowest 10% of the distributions of first stage residuals', the permanent and transitory innovations to household income and the two components of the household unobservable characteristics related to the family background. Confidence bands at 95% level.

Different results hold true for those who are characterized by the highest 10% of the distributions of the first stage residuals and the permanent and transitory innovations to household income and the two components of the household unobservable characteristics related to the family background (i.e. the high skilled individuals). Figure 15 shows that both nondurable and overall consumption reduces the years of schooling at the fourth and fifth income quintiles. The two patterns are almost identical suggesting that the households durable consumption decisions do not impact on the children’s education. The age profiles of the marginal effects of years on schooling are instead positive and statically significantly different from zero. The effects are stronger for the nondurable consumption indicator suggesting that families substitute durable consumption with years of schooling. The intertemporal nature of the education good make it act as a substitute for durable and as a complement for nondurable consumption goods.

Figure 16 illustrates the extent to which the marginal effects of one more year of
education on household saving strictly depends upon the household unobservable characteristics. On the one hand, in Panel (c) of the Figure, these marginal effects are positive when evaluated at the lowest 10% of the distributions of first stage residuals’ distribution, the permanent and transitory innovations to household income and the two components of the household unobservable characteristics related to the family background. They turn out to be negative when we consider the case of high skilled individuals. This evidence seems to indicate that an exogenous shock to years of schooling induce low skilled individuals to increase savings as an insurance against the investment. The amount of savings is instead reduced in the case of the high skilled ones who invest in education resources that would have been saved otherwise. This holds true especially for the lower income quintiles at ages higher than 17.

All these graphs document that household unobservable characteristics play a role in shaping the marginal effects of interest. The next section assesses their direct marginal
Transitory and Permanent Innovation in income  We start by considering how idiosyncratic transitory income innovations affect consumption and children’s years of schooling. Under the permanent income hypothesis these kind of shocks might not alter the households consumption decisions.

Figure [17] supports this hypothesis for all income quintiles but the highest where both nondurable and overall consumption are positively influenced by a transitory income shock. For these families the effect on saving is instead negative. For those families who sit at the intermediate income quintiles a transitory income innovations reduce savings and increase years of schooling.

We consider now idiosyncratic permanent income innovations which are constructed...
imposing the cross-equation restriction that the permanent component in the consumption distribution exactly matches the permanent component of the income distribution. Both distributions are conditional on the family background of origin.

The marginal effect of permanent income innovations on both consumption measures is heterogeneous across income quintiles since it is negative in the first income quintile, insignificant in the intermediate ones but positive in the highest income quintiles. Children’s years of schooling appears not to be influenced by permanent innovations in income while families belonging to intermediate income quintiles reduce their savings in presence of a positive permanent income innovation. By construction all these shocks are idiosyncratic in nature, we now consider the extent to which households unobservable characteristics related to the family background impact on households decisions.
5.3.2 Unobservable heterogeneity related to family background

We start by considering the marginal effect on the outcomes of interest of the household unobservable characteristics (abilities/preferences) related to the level of education of the grandparents. For each income quintile, these effects are calculated at the average level of the first stage residuals’ distribution and at the average level of the endogenous variable distribution.

Figure 20 clearly shows that conditional on the level of the education of the grandparents those who have parents with higher schooling level increase their years of schooling if belonging to the lower income quintiles. All the other marginal effects are not significantly different from zero.

Finally, we consider the marginal effect of household unobservable characteristics which provide an advantage in terms of income as a consequence of the direct and indirect contribution of the family background to the household income formation. The patterns are
Figure 19: Assessing the role of household unobservable characteristics related to the education level of the grandparents.

(a) Marginal effects on nondurable consumption
(b) Marginal effects on consumption
(c) Marginal effects on savings
(d) Marginal effects on years of schooling given nondurable consumption

*Note:* Marginal effects of the transitory income innovations evaluated at the average level of the distributions of first stage residuals’ and of the endogenous variable. Confidence bands at 95% level.

Overall, it seems that the household unobservable heterogeneity plays a relevant role in the analysis of the interplay between the household consumption decisions and children’s enrolment by contributing to determine those who are and to what extent they are affected by the overlapping sources of exogenous variation.

similar to those related to the marginal effect of the idiosyncratic permanent innovations in income. By construction, here we are able to assess the nature of these kind of permanent innovations which stem from the occupational conditions of the grandfathers. The parenting, which is randomly assigned by the lottery of birth, provides the environment where the individual grows up (inherited skills and networks) and contribute further to the development of innate abilities. However, such unobservable characteristics seems to be closely related to the household permanent income. Consequently, they affect positively only consumption at the higher quintiles of the income distribution and reduce savings for those families who sit at the second and third quintiles.
Figure 20: Assessing the role of household unobservable characteristics related to the grandfathers’ occupational conditions.

(a) Marginal effects on nondurable consumption  
(b) Marginal effects on consumption  
(c) Marginal effects on savings  
(d) Marginal effects on years of schooling given nondurable consumption

Note: Marginal effects of the transitory income innovations evaluated at the average level of the distributions of first stage residuals’ and of the endogenous variable. Confidence bands at 95% level.

6 Conclusions

Analyzing the interplay between household consumption decisions and the children’s educational choice is a difficult exercise. Italy represents a quasi experimental case study where perfectly overlapping sources of exogenous variation in court efficiency and in the university system allow to study the effects that judicial and educational reforms have had on the decisions to consume and invest in children’s education taken by Italian households during the early 2000s. Nevertheless, to offer a characterization of such stochastic relationships, it is important to address the issue of unobservable heterogeneity. On the one hand, education can be conceived as a multi-period investment whose return is uncertain despite the ex-ante commitment of resources and time. These uncertain returns and the nonpecuniary costs of education attendance are both extensively heterogeneous across individuals leading to self-selection into enrolment. On the other hand, to contain the extent
of earnings risk during working life households could at least partially insure their children through borrowing, saving and labor supply adjustments (Blundell et al. (2008); Low et al. (2010); Heathcote et al. (2014)). The propensity to use such an insurance scheme depend upon household unobservable characteristics leading to different propensities to consume or save. We have dealt with the unobservable heterogeneity issue using a threefold strategy. First, we have carried out a control function approach using a flexible parametric model specification. Second, we have included into our empirical models two indicators which might capture, at least part of, the household unobservable heterogeneity related to the grandparents’ occupational and educational background. Third, we have included into the analysis an indicator of transitory and one related to permanent innovations in income. We have shown that the interplay between household nondurable consumption decisions and children’s years of schooling is weak. On the one hand, one more year of schooling of the child increases households nondurable consumption. On the other hand, an exogenous shock that increases nondurable consumption does not affect significantly children’s years of schooling. The pattern of these marginal effects is similar when we consider overall consumption. This evidence suggests that durable consumption expenditures do not change much. All these effects are calculated averaging out the first stage residuals and all our four proxies for household unobservable heterogeneity. In fact, we have also shown that household unobservable heterogeneity contributes to determine the size and the sign of the effects characterizing the interplay between the household consumption and children’s years of schooling decisions.
References


### A Additional tables and figures

#### Table 2: Reduced form regressions.

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*Note:* Reduced form regressions for kid’s years of schooling (YOS), household nondurable consumption (NDC), consumption (CON) and saving (SAV). The regression model specification includes gender, dummies for age and year of birth of the individual and the income quintile where the household sits, the years of schooling of both parents (if the spouse is present), a dummy for the presence of the spouse, the number of siblings, the age and age square of the head of the household, the permanent and transitory innovation of the household income, our two proxies for the unobservable characteristics related to the grandparental background which affect income and education; dummies for missing information on income, years of schooling of the parents and family background and the interaction of such dummies with the relevant variables; regional variable such as the gdp per employee, the unemployment rate, the returns to university degree with respect to a diploma and regional dummies and finally an indicator of changes in compulsory schooling age.