Intergenerational correlation of employment rate: Is there a role for work culture?

Gabriela Galassi, David Koll, Lukas Mayr
European University Institute

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Abstract

This paper analyzes the intergenerational correlation of employment rate among parents and children. While the literature on intergenerational transmission has focused on earnings, employment rates are important for the debate on equality of opportunities. Using a simple two generations model in which parents decide on human capital investment for the children and abilities are correlated across generations, we introduce endogenous labor supply and intergenerational transmission of preferences for work. We derive an intergenerational equation of employment rates, which is estimated using the NLSY79 and NLSY79 Children and Youth Adults. We find evidence in favor of the existence of this channel of transmission of work preferences. There is a significant correlation between employment rates of mothers and children, which remains significantly positive even after controlling for ability, education, wealth and family income. Alternative explanations like networks, specific human capital transmission or local labor markets do not seem the main drivers of the conditional correlation of employment rates. This correlation is stronger for mother-daughter pairs than father-sons. Interestingly, it is higher for the bottom and the top of the earnings distribution. These findings have relevant policy implications. The design of the tax and transfer system in a country traditionally aims at balancing efficiency (incentives to work and invest in human capital for more skillful individuals) and equity (insurance for individuals with lower ability). However, the effect potentially generated through preference transmission has not been included in the discussion so far.

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1 Introduction

The intergenerational correlation of labor market outcomes has caught attention of both academics and policy makers. However, the literature has focused on the correlation of earnings between one generation and the following (see Solon 1999 and Black and Devereux 2011 for reviews), on the understanding that a higher persistence of earnings across generations implies a lower intergenerational socioeconomic mobility. Correlations are estimated by regressing the earnings of one generation on the earnings of the previous one, limiting the sample to those for whom earnings are actually observed, i.e. who are employed (Solon 1992, Zimmerman 1992). This paper focuses instead on a different type of correlation, of the employment status of two consecutive generations. We believe this dimension provides important information for understanding intergenerational links in employment decisions, i.e. the extensive margin of labor supply.

There is anecdotal evidence that when parents do not work, their children are more inclined to be out-of-employment as well.[1] Employment status, which we understand here as a proxy for labor market attachment, might be transmitted from one generation to the following. Probably multiplicity of factors underly a non-null correlation of employment status. It is reasonable to think that more able parents tend to work more, have more able children in whom they invest more and who work more as a consequence, for instance. Here we take a step further and besides measuring intergenerational correlations of employment status, we partial out the effect of correlated abilities and human capital investments from parents to children. We then examine the residual correlation in employment status after controlling for ability and education. We provide some evidence in order to interpret this residual correlation that suggests that it is a "non-pecuniary" component which might capture work preferences. The idea is that for two children with the same ability and education, if a child sees his parents working throughout their life-time, she incorporates preferences such she will be more inclined towards work. We refer to this as "work culture", which in the terms of Bisin and Verdier (Palgrave 2008) captures transmission of preferences for work through social interactions across generations.[2]

In a theoretical framework of two generations inspired on Solon (1999) where parents are heterogeneous in disutility for work and productivity, and where generations are linked through correlated innate abilities and parental human capital investment on the children, we introduce endogenous labor supply decision and

[1] See for example the article "De mère en fille et de père en fils, le chômage pour seul horizon", published in *Le Monde* on May 24th, 2016.

[2] We focus in the so-called "direct or vertical" socialization, within the family, and we abstract from the "oblique or indirect" socialization that takes place with respect to the rest of the environment of a child.

transmission of preferences for work. Using this very stylized model, we derive an intergenerational equation of employment status which relates children's to parents' labor supply. The equation suggests that when ability and human capital are partialled out, the remaining intergenerational correlation of employment status represents transmission in preferences for work. This preference transmission channel hence acts in addition to the traditional channels of human capital investment and correlated abilities. Based on this equation we empirically test the existence of this channel.

We use data from the "NLSY79" and "NLSY79 children and young adults" to estimate the intergenerational equation derived. These data follow a representative sample of mothers in the US born between 1957 and 1964, and their children. Exploiting the rich availability of information, we estimate in a first step the permanent component of employment status or employment rate along the life-cycle of both, mothers and children. Employment status is defined as a binary variable which distinguishes whether an individual is employed or not in a certain observation. The permanent component expresses the employment rate of one individual along her life. In very simple terms,[3] if for example we observe an individual for 10 periods and she is employed during 5 periods, the permanent component of the employment rate is 0.5. This measurement differs substantially from a measure of the permanent component of earnings, for which we would average among the earnings during the 5 periods de individual is employed. Even though we would like to capture labor participation as opposed to inactivity, we use non-employment as an aggregate category comprising both unemployment and inactivity because of the difficulty to differentiate between these two states.[4] Using these permanent components, we compute the intergenerational correlation of employment rates.

We find robust support for a significant positive correlation: if mothers work during a higher share of periods along their lives, children has a higher share of periods in employment, conditional on ability, education and other relevant channel in the literature (though not incorporated yet in the model) which is wealth of both generations. We show that other alternative channels such as labor networks, sector-specific human capital or local labor markets are not likely to drive this residual

[3]For this stylized example we consider the permanent component as a simple average. Later we explain the actual computation of the permanent components, controlling for life-cycle and business-cycle temporary fluctuations.

[4]The formal definition of unemployment requires to know if the individual is actively looking for employment. This is difficult to see in the data. Many factors such as discouraged worker effect or requirements for being entitled to welfare-benefits may bias the response of individuals. Moreover, since unemployment is a transitory state regularly of short duration, the observation we consider, which refers to a year as will become explicit later, and the fact that we compute permanent components, makes our analysis robust to the use of the wider measure of non-employment. Finally, since unemployment might be greatly due to the inability of a person to keep a job, we consider that it also reflects information related to labor market attachment that it is useful to be included in the measure of non-employment.

correlation and instead interpret the results as evidence for a intergenerational transmission of work preference that depends on parental employment status.

Consistent with the literature on intergenerational correlations of earnings, the correlation is slightly stronger between mothers and daughters than between mothers and sons. Interestingly, the correlation is more important for the lower tail of the maternal income distribution.

This evidence supporting an intergenerational work preference transmission bears important implications for the dynamic effects of economic and social policies that affect labor market participation. Design of programs such as income support (transfers for poor people) and in-work benefits (earnings supplements for low income workers) which affect the labor participation decision of the current generation should consider the effects in future generations via changes in preferences.

The reminder of the paper is structured as follows. In the next section we review the relevant literature on intergenerational correlation of labor market outcomes. Next, we present a very simple model in which we derive some predictions regarding the channels underlying the intergenerational correlation of employment rates. We then explain the methodology and the data used to estimate the intergenerational correlation of employment rates. Estimations are presented in the next section, and finally we conclude.

2 Literature

Intergenerational correlation of labor market outcomes is a topic which has been present in the literature for at least three decades. The main focus has been on earnings, as suggested by the reviews by Solon (1999) and Black and Devereux (2011), being the main parameter of interest the so-called intergenerational elasticity (IGE) of earnings. There has been an evolution from early estimations using single-year measures of parents and children's earnings as proxies for the long-run components, to estimations reducing measurement error and other sources of biases exploiting the relatively recent availability of national representative samples which longitudinally follow people and their offsprings. Estimations, mostly using the PSID in the US, have shown a substantial correlation of earnings but with a high degree of heterogeneity across countries. The consensus is that the US is one of the countries with the lowest mobility within the developed world, with estimations of the IGE oscillating around 0.4.

Given this evidence, the effort has been directed towards understanding the nature of the intergenerational link. In the theoretical branch, the channel dominantly explored is human capital investment by parents. Solon (1999) derives the equation of intergenerational persistence of earnings using a very simplified framework inspired in Becker and Tomes (1979), in which altruistic parents decide on current consump-

tion and investment in human capital of their children, and abilities are correlated across generations. In this framework, the correlation in earnings is a product of the combination of genetically inherited abilities and decisions regarding children's education.

The empirical literature has also turned to look deeper into the mechanisms behind the correlations in earnings (Black and Devereux 2011), being the most intensively explored ability, human capital investment and wealth transfers as determinants of family background. This paper contributes to the literature of intergenerational correlation of labor market outcomes, with a different focus, employment status.

We also incorporate a different element: transmission of preferences for work. This is motivated by a separate brunch of studies that has studied the intergenerational transmission of culture. Bisin and Verdier (2001) propose a model where parents transmit preferences to children via socialization decisions, i.e. contacts inside the family (vertical socialization) or the rest of society (oblique socialization). In their model, parents make a rational decision on the type of socialization they provide to their children in order to induce the desired preference trait. We abstract from this consideration in the paper, and we only focus on whether preferences are transmitted or not.

Baron, Cobb-Clark, and Erkal (2009) apply this framework to understand the cultural transmission of work ethic, very close to the focus of this paper. Differently from their model in which they abstract from ability and human capital investment, the framework in this paper also includes them. The authors provide empirical evidence about the existence of cultural transmission of attitudes towards work, welfare and individual responsibility using data from the Youth in Focus Project and linked administrative welfare reception data in Australia. Estimations rely on respondents' declared views about unemployment benefits and determinants of social inequality, which are treated as imperfect indicators of youth's and mothers' latent attitudes. They find that children tend to favor a work culture and believe that individuals are responsible for their economic situation when the mothers have a history of higher work and less welfare receipt. The main drawback of evidence drawn from self-reported perceptions is that they might reflect what people think is a correct answer more than how people actually behave, and that is why this work do not rely on self-perception data.

Another related paper is Fernandez (2007), in which the effect of culture on labor force participation is analyzed. The author uses the "epidemiological approach" which allows to disentangle the effect of the background where women live and the culture. She documents that the labor force participation of a second-generation of migrant women in US is related to female participation in the country of origin of their mothers. The concept of work culture that we analyze in this paper is related to a mother-to-child link which goes beyond the concept of country cultural

differences. In this sense, we allow for mothers to be born in the same country and yet have a different preferences towards work.

Addressing a very similar question as in this paper, Toledo (2010) documents an intergenerational correlation in working hours using PSID data.[5] Calibrating a model of intergenerational transmission of leisure preferences, human capital and wealth to match the empirical intergenerational correlation of wages, earnings, consumption, and preferences for leisure (the latter estimated as a residual from the intratemporal labor supply decision), he shows that transmission of leisure preferences is key for the empirical persistence in hours.[6] Even though the question addressed in this paper is similar, the approach and findings are substantially different. First in their model preferences are transmitted only through preferences, making it difficult to draw policy implications. In our model, which is simpler and allows for a closed form solution of the intergenerational equation for employment status, children form preferences also through the labor status of parents, which leaves a margin for intervention. Moreover, the data used here provides proxies of innate ability besides schooling information, an important channel of intergenerational transmission according to the literature.

A connected line of the literature has analyzed the intergenerational transmission of welfare-benefits' reception. Dahl, Kostl, and Mogstad (2014) use the design of the disability insurance in Norway to show the transmission of welfare cultures. Exploiting a rich administrative data-set on individuals who appeal after being rejected in the first round when applying for the insurance, and are assigned randomly to judges, they show that the probability of being approved depends on judge leniency and not on personal or case characteristics. Instrumenting the insurance approval by judge leniency, they estimate that children have 6 to 12 pp. higher probability to apply for the program if the parents got the approval. Similarly, Corak, Gustafsson, and Osterberg (2000) examine whether reception of unemployment insurance by young people is related to the reception by their parents. Using Swedish and Canadian longitudinal data for a male cohort and controlling for unobserved heterogeneity, they find that the timing of claim for the benefit by the youth is related to parental reception of it in Canada but not in Sweden. However, as the authors acknowledge, in the interpretation of intergenerational correlations of welfare-benefits it is difficult to disentangle the role of culture from the effect of information about the existence and functioning of the system.

Closely related to this paper, Macmillan (2011) estimates a measure which captures potentially the same information as our estimations: the intergenerational correlation of worklessness, comprising spells of both unemployment and inactivity. She

[5] Point estimations are similar to the values found here with respect to employment status, however they are very imprecise and are not statistically significant.

[6] However, wage persistence explains a larger fraction of the observed correlation in earnings than persistence in hours.

uses data on three different cohorts and their offsprings in UK and finds a significant correlation of worklessness, consistent with the findings here. This paper confirms this findings with data from the US. We also take a step further in the interpretation, analyzing whether there is any remaining correlation in employment status once we partial out ability, education and wealth.

3 Model

In this section, we provide a simple two generations model, based on the canonical framework by Solon (1999). We introduce endogenous labor supply and a mechanism of transmission of preferences for work, and we derive an equation of intergenerational correlation of labor participation.

3.1 The Environment

There is a continuum of families, each consisting of one parent and one child. Generations are indexed by $k \in \{0,1\}$ for parents and children respectively. Parents are altruistic, in the sense that they care about children's expected utility with a weight α. They decide on their consumption c_0, labor supply l_0 and human capital investment H_0. Children also decide on consumption c_1 and labor supply l_1, whereas they do not have offspring and hence do not invest in human capital. Agents are heterogeneous in their ability e_k and disutility from labor θ_k. Abilities are correlated across generations denoting genetic inheritance.

The main assumption of the model is that there is a process of transmission of preferences:

$$log(\theta_1) = \kappa_0 - \kappa_1 log(l_0) + \eta_1 \tag{1}$$

where children's labor disutility θ_1 depends on parental labor supply decision l_0, through a parameter κ_1. This assumption is less restrictive than it might seem at first sight. A value of κ_1 different from 0 means that parents, through their labor choice, exert an effect on children's preferences for work. We do not impose any prior on the direction of the effect. If $\kappa_1 > 0$, the more parents work, the less children dislike working, and the opposite for $\kappa_1 < 0$. If $\kappa_1 = 0$, parental employment does not have any influence on children's work preferences, i.e. there is not preference transmission as defined above.

The problem of the parents is:

$$V_0(\theta_0, e_0, u_0) = \max_{c_0, l_0, H_0} \frac{c_0^{1-\sigma}}{1-\sigma} - \theta_0 \frac{l_0^{1+\chi}}{1+\chi} + \alpha E_0 V_1(\theta_1, w_1) \tag{2}$$

s.t.

$$c_0 + H_0 = w_0 l_0 \tag{3}$$

$$log(w_0) = log(e_0) + v_0 \tag{4}$$

where (2) is the value function for parents, who maximize their life-time utility. We use standard parametrization and assumption of additive separability of utility in consumption and labor. The optimization is subject to the budget constraint (3) which reflects that labor earnings $w_0 l_0$ are spent in own consumption c_0 and human capital investment on the children H_0. The wage equation (4) relates the earnings by each unit of labor w_0 to ability e_0, and a random term v_0 which captures "labor-market luck".

The problem of the children is:

$$V_1(\theta_1, w_1) = \max_{c_1, l_1} \frac{c_1^{1-\sigma}}{1-\sigma} - \theta_1 \frac{l_1^{1+\chi}}{1+\chi} \tag{5}$$

s.t.

$$c_1 = w_1 l_1 \tag{6}$$

$$log(w_1) = log(e_1) + \psi log(H_0) + v_1 \tag{7}$$

$$log(e_1) = \bar{e} + \lambda log(e_0) + u_1 \tag{8}$$

and equation (1). Children maximize their life-time utility (5), similar to the parents' problem except for that there is not a forward looking component because it is a two generation model. They consume all their earnings (6). The wage of the children w_1 also depends on their ability e_1 and on the human capital acquired H_0 with a return ψ, as specified in (7). There is also a component of randomness v_1 capturing "labor-market luck". Equation (8) reflects imperfect inheritance of innate ability: the ability of the children e_1 follows an AR(1) process and u_1 stands for "endowment luck".

3.2 The Solution

We solve the model for the last period, where all the choices of the parents are already made and uncertainty regarding the random terms is revealed. The first order condition for l_1 is:

$$l_1 = \left(\frac{w_1^{1-\sigma}}{\theta_1}\right)^{\frac{1}{\sigma+\chi}} \tag{9}$$

Taking logs:

$$log(l_1) = -\frac{1}{\sigma+\chi} log(\theta_1) + \frac{1-\sigma}{\sigma+\chi} log(w_1) \tag{10}$$

and substituting $log(\theta_1)$ and $log(w_1)$ using equations (1), (7) and (8), we obtain:

$$log(l_1) = \alpha + \beta log(l_0) + \gamma log(e_0) + \delta log(H_0) + E \tag{11}$$

This is the intergenerational equation which relates the labor choice of the children to the labor choice of the parents, partialling out ability and human capital investment or education. Taking natural logarithm allows us to obtain a linear specification, where the coefficients α, β, γ and δ are functions of the structural parameters

and the shocks:

$$\alpha = \frac{(1-\sigma)\bar{e}-\kappa_0}{\sigma+\chi} \qquad \gamma = \frac{1-\sigma}{\chi+\sigma}\lambda$$
$$\varepsilon = \frac{(1-\sigma)(u_1+v_1)-1}{\sigma+\chi} \quad \delta = \frac{1-\sigma}{\chi+\sigma}\psi \tag{12}$$

$$\beta = \frac{\kappa_1}{\sigma+\chi} \tag{13}$$

Our coefficient of interest is β, which relates the part of the correlation of the labor participation of children and parents orthogonal to ability and education, and captures the process of preference transmission according to the model. β has the same sign as κ_1 under the conventional signs assumed for σ (inverse of the coefficient of risk aversion in the CRRA specification) and χ (inverse of the Frisch elasticity of labor). Note that ability and education have the role to control for "potential wage" of individuals, a very important determinant of labor supply decisions.

Equation (11) provides a suitable tool to test for the presence of preference transmission empirically. If β is not statistically significant, it would suggest that there is not room for the channel of work culture we argued before. But if β is different from 0, it is not only indicative that the channel exists, but also the sign of β informs about the type of transmission. A positive β implies that, conditional on ability and human capital, if parents work more, children have a lower disutility from labor (higher work ethic) and work more in consequence. And the opposite if β is negative. This result is potentially important for policy recommendations.

Before taking the model to the data, it is worth making some clarifications. As it was mentioned in the introduction, we are interested in accounting for the extensive margin of the labor decision, i.e. if individuals are employed or not. This is a dichotomous variable, whereas in the model l_0 and l_1 are continuous. On the other hand, the model considers one period for each generation, whereas in the data we observe individuals along their life-time (or at least a long enough window). We can hence compute a continuous measure which accounts for the decision at the extensive margin throughout the life-time. Following standard techniques in the literature of intergenerational correlations, we obtain the permanent component of employment status as a variable which is actually continuous and represents the proportion of periods each individual is employed out of the total periods observed. The resulting measure is considered as an indicator of "labor market attachment". This is different from considering hours, which accounts for the intensive margin of labor supply, even if 0 hours are included, and it is more informative of "effort". Having said this, we believe hours have an important informational content for our story and we show the results are qualitatively robust when hours of the parents are used.

4 Estimation of intergenerational correlation of employment status

In this section we present the results of the estimation of intergenerational equation (11), focusing on the correlations in employment status. We first describe the data and then we present the estimation results.

4.1 Data

The data used are "NLSY79" and "NLSY79 Children and Young Adults". The former surveys a representative sample of people born in the US between 1957 and 1964, who were 14-22 years old in the first wave in 1979 and are followed until 2012, when they are 47-56 years old. The survey is annual in 1979-1994, and since then collection is biannual. The original sample consists of 12,686 respondents. The children of the women in this cohort are followed biannually since 1986 by the NLSY79 Children and Young Adults. As of 2012, more than 10,000 out of the 11,512 children born from these mothers have been interviewed in at least one survey round. Given women of the original cohort are the key for the intergenerational links, we will analyze pairs mother-children.[7]

Multiple reasons determine the selection of the data. First, it is one of the sources of information mostly used in the literature for estimation of intergenerational correlation. The recent availability of waves which survey the young adults in a more advanced age allows for exploration of labor market outcomes of this group.

Another reason is that these data feature desirable characteristics which allow reducing some of the risks of underestimation of intergenerational correlations, suggested in the literature with respect to the intergenerational elasticity of earnings. First, Zimmerman (1992) and Solon (1992) show that early estimations based on single-year measures of parents' and children's outcomes as proxies for permanent components are subject to substantial measurement error which leads to attenuation bias. This problem is particularly relevant for parental outcomes, which are the explanatory variables in the intergenerational equations. In this sense, the longitudinal nature of the NLSY79 allows to use several observations of both generations, particularly in the case of the mothers.

A second risk mentioned in the literature (Solon 1999) is the lack of heterogeneity in the samples, aggravating the measurement error. The NLSY79 consists of three sub-samples: (1) cross-sectional (6,111 individuals), a representative sample of the US population in 1979, (2) supplemental (5,295 individuals), which over-samples disadvantaged groups (Hispanic or Latino, black and poor people), and (3) military sub-sample (1,280 individuals), an over-sample of the population participating in

[7] We believe this makes sense because women has more variability in their labor participation.

the army. We restrict the analysis to the cross-sectional sample to ensure representativeness.[8]

Finally, another issue is represented by the life-cycle bias (Haider and Solon 2006, Grawe 2006), which arises when the observed parental and children's outcomes are not representative of their life-time earnings due to non-stable trajectories along the life. This problem is mitigated when observations correspond to when individuals are in their thirties and forties (Black and Devereux 2011). To attenuate this problem, we hence restrict the sample to mothers between 30 and 50 years old. In the case of children, the literature recommends to avoid observations when they are too young. In an attempt to keep a considerable sample size and length as well, we retain observations of children who are 25 years old or more,[9] obtaining a final subs-ample of 2,259 children paired to 1,335 mothers.

Yet another advantage of these data is that they provide all the information necessary to estimate the equation (11) as derived from the model, as well as other channels of intergenerational links mentioned in the literature, on top of extensive information on labor market outcomes. There is educational achievement, captured by completed years of schooling, and wealth, including assets and debts. Importantly, there are measures of ability. For the 1979 cohort, the Armed Services Vocational Aptitude Battery (ASVAB) is collected around 1980, when mothers are between 15 and 23 years old. The scores provided come from the Armed Force Qualification Tests (AFQT), which is a composite of test results in arithmetic reasoning, word knowledge, paragraph comprehension and numerical operations. It is an observable (though imperfect) measure of scholastic ability.[10] Similar measures of cognitive abilities are collected for the children cohort since 1986. In particular, we use the latest measurement for each child of the Peabody Individual Achievement Test (PIAT) for Math, considered as the most appropriate measure of ability among the test-scores available in the data (Abott, Gallipoli, Meghir, and Violante 2013).[11]

Table (5) presents some summary statistics on the sample of mothers and their children. Mothers are observed in 11.6 waves on average, and children in 2.3. Mothers are on average 38 years old, and children, 27 years old, being half women. Even if representativeness is required strictly for mothers, the sample of children seems representative as well in terms of the characteristics. Three quarters of the sample

[8]The cross-sectional sub-sample is several times bigger than cohorts formed from the Survey Research Center (SRC) component, the analogous of the PSID, typically used in empirical studies of intergenerational earnings' correlations (see Solon 1992).

[9]Results are qualitatively robust for different choices of mothers' and children's age.

[10]We use the version of the AFQT revised in 2006 to control for differences in cohorts within the NLSY79.

[11]It has been argued that these measures capture not only genetic ability, which is the variable of interest in the model, but also some components from scholastic skills. We think this does not represent a risk because the model also requires to control for educational attainment.

is white and the same proportion comes from urban areas (a lower proportion for children). The fact that a lower proportion of children is married or cohabiting can be due to the fact that they are younger, and hence raise a concern about potential life-cycle biases, or to the second demographic transition behind a tendency to delay couple formation. The children's cohort is slightly more educated than mothers', with 24% with complete college versus 13%, and 48% of mothers with high school or less versus 61% among children.

Regarding the measurement of the employment status, we use comparable available measures for mothers and children. In the case of mothers, we consider employed if they declare a positive number of weeks worked the past calendar year, whereas for children we use positive earnings in the past calendar year.[12] The employment rate is 78% for mothers between 30 and 50 years old, and 84% for children 25 years old or older. These number might seem higher than expected, compared to standard measures of female labor force participation, but this could be due to the fact that the window of observation is the calendar year before the survey, whereas official numbers typically use the week before.

Employed mothers and children work on average 30.5 and 36.5 hours a week respectively, the hourly wage is \$6.1 and \$5.7, and earnings are \$10,765 and \$13,187 a year, in 1980 dollars deflated with the Consumer Price Index. Only few mothers and children work outside the private sector. Net worth (assets minus debts) is \$56,079 for mothers and \$10,319 lower for children.[13] Family income is \$28,540 and \$24,761 respectively. The average in the cognitive test for mothers is in the 39th percentile, for children the average is in the 49th percentile. It is worth noting that mothers take the test at an older age (18 years old on average) than children (9 years old).

4.2 Empirical strategy

We estimate the intergenerational equation derived from the model:

$$log(l_{1i}) = \alpha + \beta log(l_{0i}) + \gamma log(e_{0i}) + \delta log(H_{0i}) + \varepsilon \tag{14}$$

where β the coefficient the intergenerational correlation of employment rates, e_{0i} is the ability of the mother as proxied by the AFQT, and H_{0i} are the years of schooling of the child. The estimation of the permanent components of $log(l_{ki})$ for each generation $k \in \{0,1\}$ is explained in more detail below.

Figure (6) in the Appendix shows that the measurement of the employment rate varies considerably along the life-cycle of mothers and children and with the business cycle. For example, it peaks for mothers at the age of 39, and there is a drop when they are 48, because most of the sample of mothers is this age in 2008. For

[12] Results do not change qualitatively when we use other measures of employment, shown in the Appendix.

[13] The difference in level in wealth can potentially be due to the fact that parents are mostly alive when children are surveyed and hence there might not be bequests yet.

Table 1: Summary statistics mother-children pairs NLSY79

	Mothers		**Children**	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	38.2	1.48	27.3	1.51
Female			50%	0.500
White	73%	0.442	72%	0.447
Black	18%	0.385	19%	0.393
Migrant	5%	0.211		
Married/cohabiting	77%	0.422	34%	0.474
Number of children in the HH	2.6	1.14	1.1	1.22
Urban	75%	0.435	69%	0.461
Father at home			46%	0.499
Years of education	12.8	2.24	13.4	2.37
High school drop-out	10%	0.306	12%	0.320
High school complete	51%	0.500	36%	0.480
Incomplete college	26%	0.439	28%	0.451
Complete college	13%	0.337	24%	0.427
Employed	78%	0.283	84%	0.322
Hours/week**	30.5	12.51	36.1	13.36
Hourly wage**	6.1	5.61	5.7	4.00
Earnings**	10,765	8,706	13,187	10,128
Public sector	8%	0.279	4%	0.199
Private sector	87%	0.335	92%	0.269
Self employed	4%	0.195	2%	0.145
Family worker	0%	0.067	2%	0.124
Percentile cognitive test*	39.3	26.74	48.9	27.69
Age when test	18.3	4.21	9.1	6.17
Net worth*	56,079	102,148	10,319	32,831
Family income*	28,540	24,491	24,761	25,836
Number of interviews	11.6	2.35	2.3	1.18
Observations	1,335		2,259	

Note: Cognitive tests are AFQT for parents and PIAT Math for children. Partnership means marriage either marriage or cohabitation. *: lower response rate than 100%. **: only for observations with positive values.

the children it is similar, with most of them being 35 in 2008. The downwards trend in the case of the children is due to the fact that older children with higher number of interviews in the sample come from younger mothers, as seen in figure (6) in the Appendix.

It is hence necessary to separate the transitory components due to life-cycle and business-cycle from the permanent components. We take a standard approach in the literature to estimate these, by regressing the natural logarithm of the employment indicator (1 if the individual is working when observed, 0 if observed not working)[14] on a series of covariates and individual fixed effects for each generation separately. The fixed effects are then retrieved and they represent the permanent component to be included in the intergenerational equation.

Regarding the covariates, we include a second polynomial of age (A_{kit}) and a series of controls for demographic events ($XDemo_{kit}$), such as births, couple formation and dissolution, job loss and finding by partner, presence of children 0-3 with/without child-care, older children, moving out from parental home. These are aimed at abstracting from life-cycle transitory shocks. We also include years fixed effects (λ_{kt}) to extract business-cycle components. The estimated regression to extract the permanent component is:

$$log(l_{kit}) = log(l_{ki}) + \sum_{n=1}^{2} \pi_{nk} A_{kit}^{n} + \lambda_{kt} + XDemo'_{kit}\varsigma + \upsilon_{kit} \tag{15}$$

The permanent component hence can be understood as a measure of the proportion of observations in which each individual is working, l_{ki}. Under the assumption that the observations for each individual are representative of their life-cycle, this is a good measure of the intensity of labor at the extensive margin.

4.3 Main estimation

In this section we present preliminary results from the estimation of the intergenerational equation (14) using the permanent component of the logarithm of employment rate of children and mothers estimated as obtained by the fixed effects of equation (15). We also control for the age at birth of the mother. We present clustered standard errors at the mother level to account for possible auto-correlation in siblings' error term. Table (2) presents the estimation results.

The first column shows the unconditional correlation of employment rates, which is 0.17 statistically significant. When introducing ability of the mothers and education of the children as derived from the model, this correlation decreases to 0.12, but remains statistically significant. Besides, ability and education have predictive power as suggested by the model. This estimation results are consistent with the

[14] In order to take the log of 0, we assign 0.0001 as it is standard in the literature.

model presented before. The fact that the correlation in employment rates across generations conditional on education and ability is significantly different from zero can be interpreted as evidence of transmission for preferences for work through the lenses of the model.

We further include the ability of the children and the education of the mother in the third column, and the conditional correlation between employment rates does not change. While the coefficient on the education of the mother is statistically insignificant as expected, different from what the model predicts the it is the ability of the child and not of the mother which has predictive power. It is common knowledge that test scores aiming at capturing innate ability are imperfect and this could be a potential explanation. In the last column we introduce wealth (net worth) of both generations. Even though this variable is not in the model, the literature on intergenerational correlations suggests it might have an important role. The coefficients are statistically insignificant, which is in favor of the specification of our model, and the correlation in employment rates decreases slightly to 0.11.[15]

The results are robust to multiple specifications: introducing discrete levels of education instead of the continuous value of years of schooling, including interactions among all the variables different from employment rate. The correlation of employment rates does not fall below 0.10 and it is always statistically significant. The findings do not change qualitatively when we use alternative measures of employment available in the data, though less comparable as the preferred ones, or when we use directly employment status without taking logarithm (see tables (6) and (7) in the Appendix).

Three points are worth mentioning. First, the unconditional intergenerational correlation of employment rates is high and significant, which is a new stylized fact. Second, ability and education have predictive power for the employment rate, consistent with the model. They are both highly correlated across generations (0.41 and 0.38, both statistically significant) and represent an important source of intergenerational link, as it is already suggested in the literature of earnings. However, even after introducing these variables (and also wealth), there is still a correlation in employment rates across generations which is statistically significant and strong. The conditional correlation of employment rates between generations is only one third lower than the unconditional one. This is in line with the model and hints in the direction of the presence of a preference transmission channel, or "work culture" in a broad sense. It can be thought as comprising attitudes and preferences for work, specific human capital passed from parents to children, networks, etc..

[15] In all following exercises, we keep wealth in the especifications.

Table 2: Estimation of intergenerational correlations in employment rate

VARIABLES	Unconditional	Model	Model "plus"	Model "plus" and wealth
Employment rate (ln) Mother	0.17***	0.12***	0.12***	0.11***
	(0.030)	(0.030)	(0.030)	(0.029)
Ability (ln) Mother		0.15***	0.04	-0.01
		(0.058)	(0.062)	(0.061)
Ability (ln) Child			0.48***	0.35***
			(0.103)	(0.109)
Yrs. schooling (ln) Mother			0.27	0.24
			(0.203)	(0.204)
Yrs. schooling (ln) Child		1.29***	0.71**	0.15
		(0.320)	(0.329)	(0.312)
Net worth (ln) Mother				0.03
				(0.090)
Net worth (ln) Child				-0.18
				(0.121)
Control mother's age at birth	YES	YES	YES	YES
Observations	2,158	2,066	2,066	1,785
Adjusted R-squared	0.02	0.04	0.05	0.03

Standard errors clustered by mother ID in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.3.1 Discussion about results in the context of the inter-generational correlations' literature

Even though the estimated inter-generational correlation of employment rate of 0.17 may appear low compared to 0.4 found in the literature of earnings, it is consistent with findings regarding working hours. For example, Toledo (2010) finds an OLS estimate of 0.04 for hours of fathers-sons pairs in the PSID, not statistically different from zero. After instrumenting one half of the parental sample with the other half to overcome the errors-in-variables problem, the coefficient raises to 0.20 but remains statistically insignificant due to the large standard errors.

Further, we provide in table (8) in the Appendix estimations of the inter-generational correlation in other outcomes typically looked at in the literature. We consider the natural logarithm in the case of hours worked, hourly wage, earnings and family income. To avoid discarding observations with 0 values, we replace them with a very low value (0.001) before taking logarithm. The values we obtain for all these variables are statistically significant and in line with the literature in terms of the magnitude. The coefficient estimated for the persistence of hours is 0.15 statistically significant, 0.09 for wage, 0.13 for earnings, 0.38 for family income (though there are many missing observations for children), 0.14 for net worth, 0.41 for ability and 0.38 for years of schooling.[16]

In the next section, we provide some evidence in order to improve the interpretation of the correlation in employment rates which is unexplained by the usual channels of intergenerational transmission.

4.4 Assessing alternative explanations

One potential explanation for the residual correlation in employment rates is that it might be the father and its relationship with the mother (assortative mating) driving this excess correlation. In the first column of table (3) we introduce the employment status of the spouse of the mother and in the third column, the interaction with the employment status of the mother, only for those observations in which the mother reports a spouse.[17] The employment status of the spouse does not have predictive power, nor it does the interaction, suggesting that assortative mating is not the main driver of this excess correlation.

Another possibility is that it is not employment but hours or intensity of work of the mother what affects children employment. In the third column we use the annual

[16]Monetary variables are truncated above, which might be driving that correlations for these dimensions.

[17]The data do not provide direct information on fathers. However, mothers respond some information about their spouses and this is what we use here. Not all the mothers report spouses all the time nor they are the same spouse. The regressions in columns one and two correspond to the triples spouse-mother-child for which there is a spouse reported.

hours worked by the mother, included the null values, instead of employment status. The results do not change qualitatively. Similarly, the result does not change when we include the hours worked by the spouse of the mother and the interaction, as shown in the last two columns of the table.

Table 3: Estimation of intergenerational correlations in employment rate: including spouse, hours

VARIABLES	Spouse ER		Hours mother	Hours mother + Spouse	
Employment rate (ln) Mother	0.12***	0.11***			
	(0.034)	(0.032)			
Employment rate (ln) Spouse	0.03	0.02			
	(0.031)	(0.029)			
ER Mother (ln) x ER Spouse (ln)		-0.03			
		(0.022)			
Annual hours (ln) Mother			0.05***	0.05***	0.05***
			(0.014)	(0.015)	(0.015)
Annual hours (ln) Spouse				0.05	0.05
				(0.046)	(0.047)
Ann. hrs. Mother (ln) x Ann. hrs. Spouse (ln)					-0.00
					(0.012)
Controls	YES	YES	YES	YES	YES
Control mother's age at birth	YES	YES	YES	YES	YES
Observations	1,813	1,813	1,785	1,714	1,714
Adjusted R-squared	0.02	0.02	0.02	0.02	0.02

Standard errors clustered by mother ID in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Another possible explanation of the residual correlation in employment rates might be that working parents may help children through their network, either to enter in the same business or to find another job using contacts. The second column of table (4) shows that the interaction between maternal employment rate and an indicator for same industry and sector for mothers and children, as a proxy of business, is not statistically significant. The correlation is significant even for pairs mother-child who work in different sector or industry.

In the second column, we introduce the interaction between same industry and occupation and maternal employment rate, in order to test whether the correlation between employment rates is driven by specific human capital accumulation.[18] The coefficient of the interaction is not statistically significant, pointing at a remaining correlation in employment rates for mothers and children working in different occupations.

Finally, it could be that local labor markets are driving the results, i.e. if mothers and children live in the same area with certain levels of aggregate employment. Given

[18]Results are the same if we also consider spouse's occupation.

constraints by data availability, we perform two exercises. In column three we introduce the interaction of maternal employment rate and same region (South, West, Northeast and Northcentral).[19] We observe that the coefficient of the interaction is statistically insignificant and small in nominal terms. However, the coefficient on maternal employment rate becomes statistically insignificant despite a high point estimation, mainly due to few observations left of mothers and children living in different regions. In a further exercise, we combine the information of the region with urban and rural and SMSA-Central City residence. Pairs mother-child with the same combinations in the three variables are considered as in the "same location". The interaction of this variable with maternal employment rate is not statistically significant, whereas the coefficient on employment rate, corresponding for pairs in different location is statistically significant and high (0.09). This result suggest that local labor markets are not likely to drive the results.

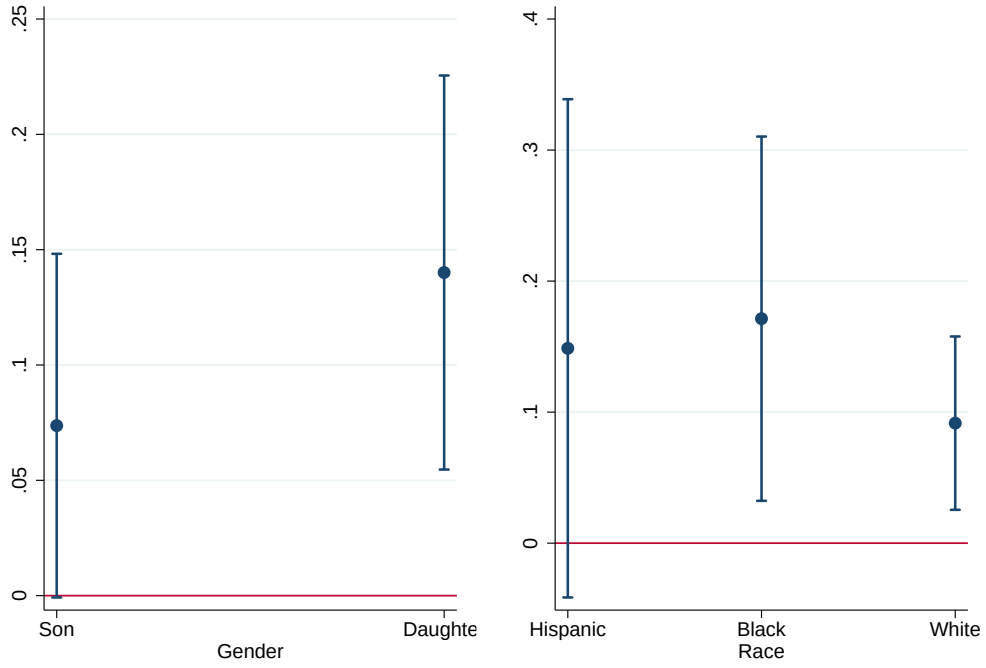
Table 4: Estimation of intergenerational correlations in employment rate: discarding networks, specific human capital and local labor markets

VARIABLES	Same ind. and sect.	Same ind. and occup.	Same region	Same location
Employment rate (ln) Mother	0.12***	0.11***	0.14	0.09***
	(0.032)	(0.030)	(0.096)	(0.033)
ER Mother (ln) x Same ind./sect.	-0.06			
	(0.077)			
Same industry and sector	0.16			
	(0.110)			
ER Mother (ln) x Same ind./occup.		-0.02		
		(0.131)		
Same industry and occupation		0.06		
		(0.195)		
ER Mother (ln) x Same region			-0.04	
			(0.100)	
Same region			-0.28**	
			(0.142)	
ER Mother (ln) x Same location				0.09
				(0.069)
Same location				0.25**
				(0.103)
Controls	YES	YES	YES	YES
Control mother's age at birth	YES	YES	YES	YES
Observations	1,785	1,785	1,785	1,785
Adjusted R-squared	0.03	0.02	0.03	0.03

Standard errors clustered by mother ID in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[19] This is the only geographical disaggregation publicly available.

Figure 1: Gender (left), Race (right)



4.5 Heterogeneity in the intergenerational correlations of employment rates

In this section we analyze how the correlation of employment rates, after controlling for observables pointed out as channels of intergenerational transmission in the literature, differs across groups. Figure (1) shows that the intergenerational correlation in employment rates is stronger for mother-daughters pairs (0.14, statistically significant) than mother-sons (0.075). This is consistent with the literature of intergenerational correlation of other labor market outcomes, and points in the direction of a role model underlying the correlation in employment rates.

There is substantial difference across races. The correlation among blacks is the highest, close to 0.18. Whites have a statistically significant correlation as well, though it is lower than 0.1, and for hispanics the coefficient is in between though not precisely estimated due to the reduced number of observations in this group.

The influence of the mother appears important regardless of the presence of spouse or father of the child in the household, as shown by figure (2). The coefficient is statistically significant and above 0.1 for mothers married or in cohabitation, and slightly lower but still significant when the father lives in the household.

It is interesting that the correlation disappears for children with a partner (figure

Figure 2: Marital situation mother (left), Dad living at home (right)

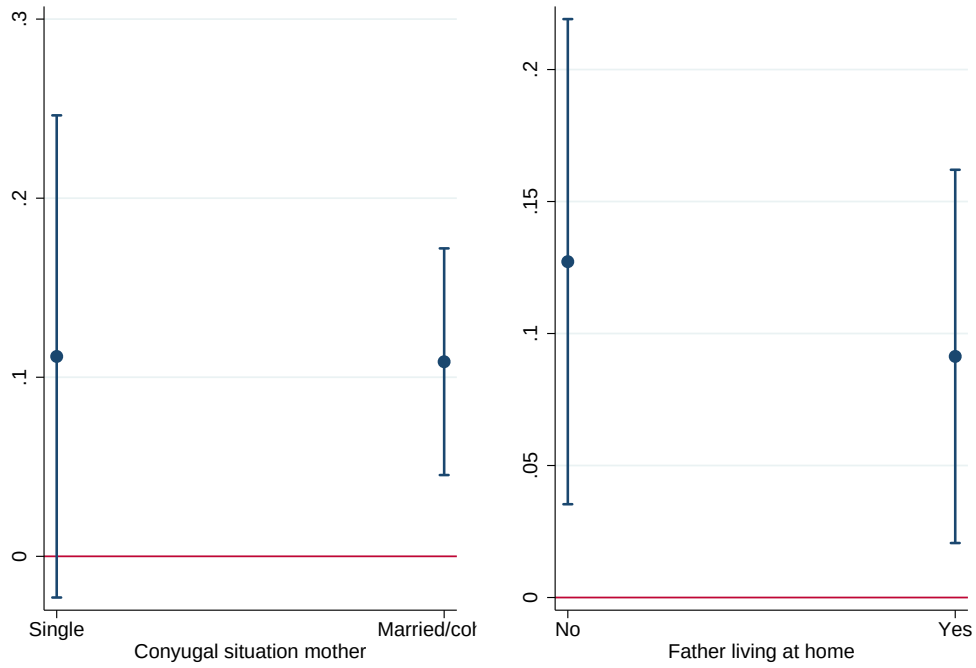
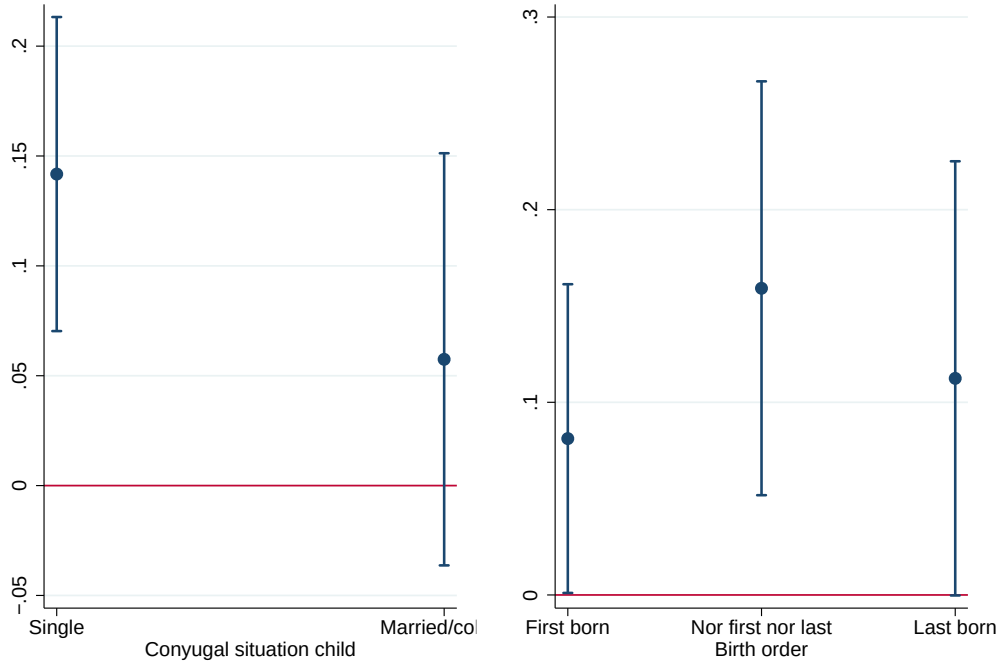


Figure 3: Marital situation child (left), Birth order (right)



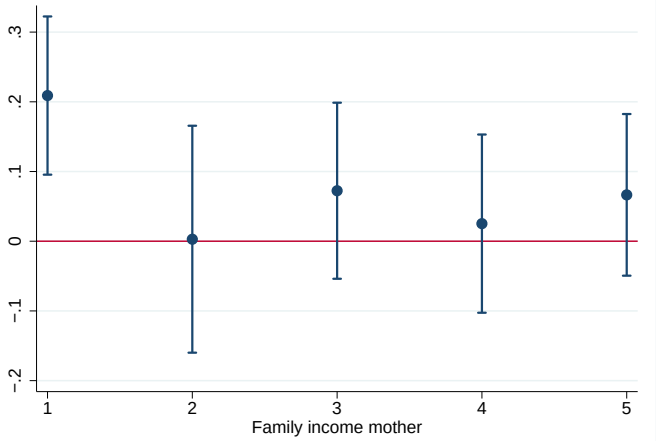
(3)), potentially due to intra-family insurance. Children who are not the first or last born display the highest correlation in terms of their employment rates with the mother's. We would expect that correlations are different for first and last born. If a child is the first born, the mother would potentially be out of employment in the periods to come due to childbearing of the following kids. If she is the last born, then fertility would not affect the labor supply decision. The interaction terms with the order of birth however are not statistically significant, not providing support to this story.

Finally, figure (4) shows the heterogeneity in the correlation in employment rates across quintiles of the maternal family income distribution. Interestingly, the correlation is highest (and only statistically significant) for the first quintile. This is suggestive that the fact that parents work or not is crucial for the more disadvantaged households.

5 Conclusion

This paper contributes to the literature in intergenerational correlation of labor market outcomes. Differently from the existing literature, we focus on employment status, under the understanding that this is a key feature underlying mobility which

Figure 4: Maternal family income



has been overlooked by the literature.

In a very simple model of intergenerational transmission in which altruistic parents decide on their own labor supply and human capital investment for the children, abilities and preferences for work are correlated, we derive an intergenerational equation that links parents and children's employment rates. We estimate this equation using the NLSY79 and NLSY79 Children and Youth Adults. We document the existence of a significant correlation in employment rates, which is a novel fact to the best of our knowledge. We observe that the correlation persists after controlling for traditional channels of intergenerational link, such as ability, education and wealth. This is consistent with our model and we hence take this as an indication of the potential presence of intergenerational transmission of preferences or work culture.

Testing for some alternative explanations, such as networks or specific human capital transmission, local labor markets, we observe that these do not seem the main drivers of the correlation of employment rates conditional on ability, education and wealth. The correlation seems stronger for mother-daughter than mother-son, consistent with the literature in intergenerational persistence of labor market outcomes and hinting about the possibility of a role model. The presence of a partner or the father does not seem to diminish the correlation with the employment rate of the mother. Importantly the correlation is higher for the bottom of the family income distribution.

We believe that the findings documented here have relevant implications for policy design. In particular, whereas institutions such as the tax and transfer system are designed to balance efficiency (incentives for high skilled agents to work and/or accumulate human capital) and equity (insurance for low skilled individuals), intergenerational transmission of preferences through parental behavior in terms of labor

supply have not been considered.

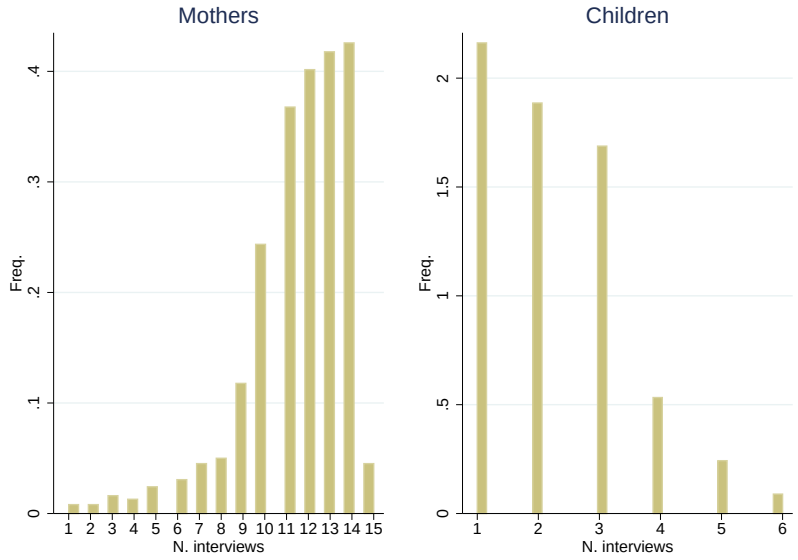
Recently, the literature has acknowledge the interaction between public policy and the intergenerational correlation of earnings. Institutions such as the market and the government are considered the most important determinants of the differences across countries in terms of earnings' mobility (Corak 2011). Solon (2004) introduces progressive governmental investment in children's human capital. He shows that while the intergenerational elasticity of earnings increases with the degree of inheritability of endowments related to earnings and the returns to human capital investments, it has a negative relation to the progressivity of government investment. Going further, Restuccia and Urrutia (2004) distinguish between the role of early and college education. Calibrating a quantitative life-cycle model of intergenerational transmission of human capital and earnings disparity which focuses in persistence in innate ability, early and college education, to the US at the beginning of the 1990s, they show that early education accounts for roughly one half of the earnings persistence, whereas investment in college is responsible for generating one fourth of the cross-sectional disparity in earnings. The main mechanism is that investment in early education, interpreted as the quality more than the attainment, determines the probability of graduation or drop out from college, scenarios which imply very different returns. The persistence in the model is generated through borrowing constraints,[20] which weigh more heavily with respect to early education as parents are younger and have lower earnings. Important policy implications are derived in a series of experiments, showing that an increase in public expenditure in early education is more effective than college subsidies to increase mobility, and substituting a progressive college subsidy with a flat one reduces mobility particularly due to lower incentives to invest in early education.

The literature on taxation and the relationship with intergenerational persistence of earnings has limited its focus to human capital accumulation. The main idea is a more progressive taxation dampens the incentives for parents to invest on human capital of their children. However, recent papers have discussed that public expenditure in education acts maintaining the level of human capital accumulated and breaking the link between parental income and abilities and children earnings (Holter 2015 and Krueger and Ludwig 2013).

This paper draws attention on a novel dimension of the intergenerational correlation, embedded in the decision to work. We also push the hypothesis that a potential driver of intergenerational links is work culture. Since policies distort the labor participation decision of a given generation, we consider it is important to take into account the effect on decisions of future generations via transmission of work preferences. The future steps of this research is to introduce this new fact of intergenerational correlation into a policy evaluation assessing alternative interven-

[20]The model does not allow for saving or borrowing but the authors discuss that it reproduces reasonable borrowing constraints as observed in the data.

Figure 5: Number of interviews of mothers (left) and children (right)



tions.

6 Appendix

Figure 6: Employment age by age of mothers (left) and children (right)

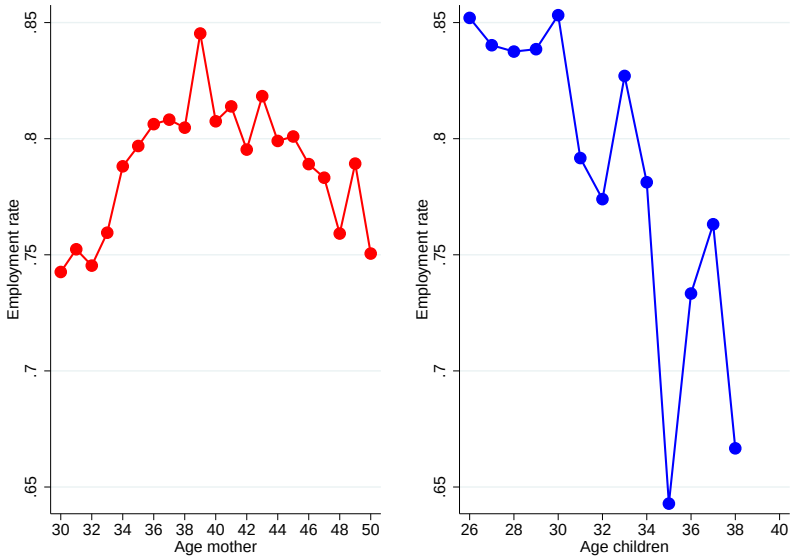


Figure 7: Age of mothers at birth

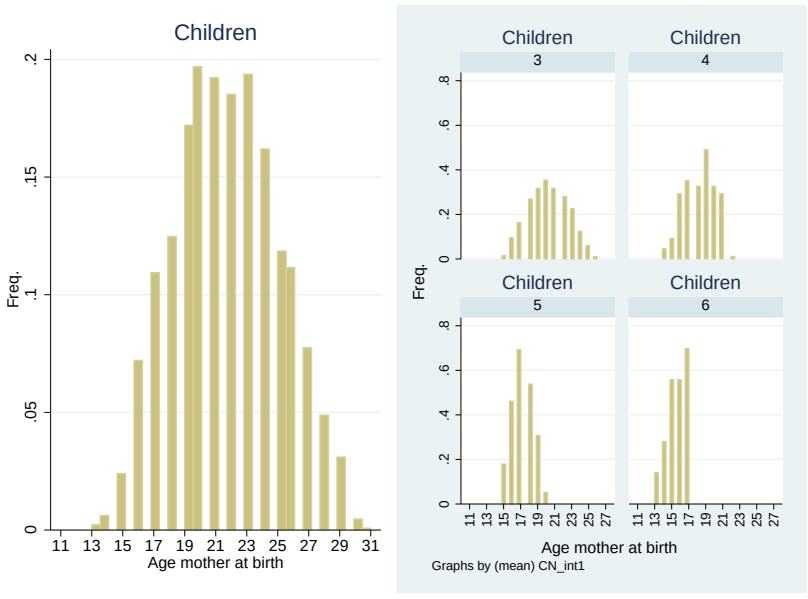


Table 5: More summary statistics linked mother-children NLSY79

	Mothers		**Children**	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Mother migrant	5%	0.228		
Father migrant	13%	0.340		
Second generation of migrants	14%	0.352		
Both parents migrants	4%	0.201		
Living with mother (when child)			95%	0.210
Living in own dwelling	95%	0.116	76%	0.370
Partner works	66%	0.357	52%	0.450
Children 0-3 no child care	10%	0.151	23%	0.350
Children 0-3 in child care	3%	0.079	9%	0.229
Children 4-5	13%	0.135	19%	0.299
Children 6-12	51%	0.213	29%	0.411
Children 13-15	32%	0.153	3%	0.119
Children 16-18	28%	0.134	1%	0.052
Births	6%	0.095	18%	0.289
Couple disolution	5%	0.070	7%	0.174
Couple formation	4%	0.069	17%	0.288
Partner job loss	6%	0.074	6%	0.169
Partner job finding	5%	0.075	16%	0.277
Observations	1,335		2,259	

Figure 8: Distributions

Figure 9: Distributions (cont.)

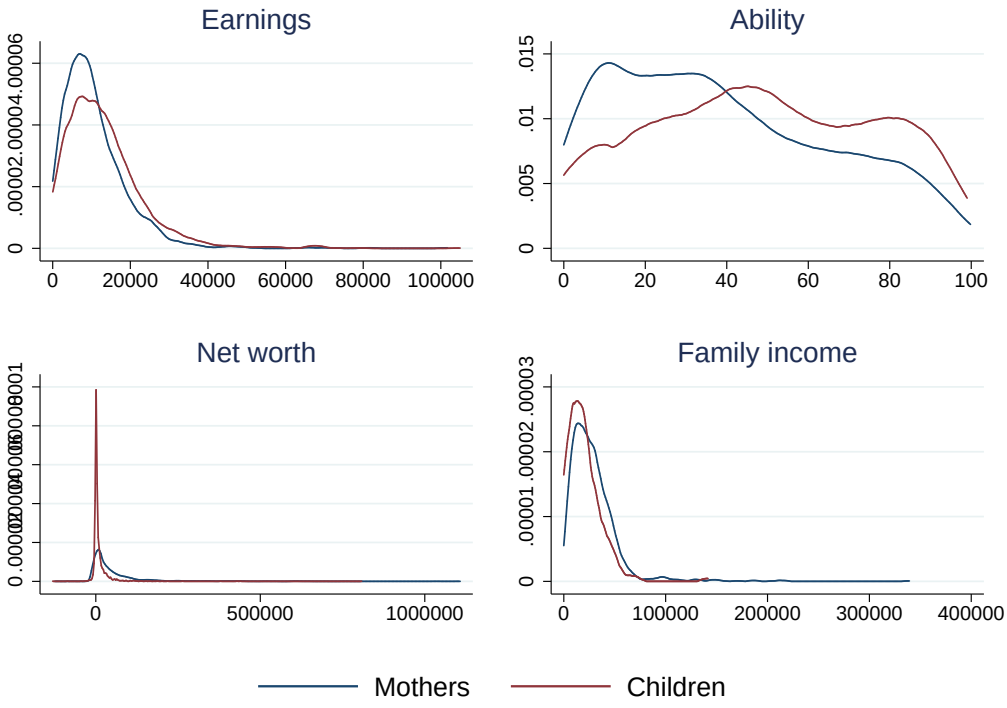


Table 6: Estimation of intergenerational correlations in employment rate (no logs)

VARIABLES	Unconditional	Model	Model "plus"	Model "plus" and wealth
Employment rate Mother	0.17***	0.14***	0.13***	0.12***
	(0.030)	(0.030)	(0.030)	(0.030)
Ability Mother		0.06**	0.00	-0.02
		(0.029)	(0.031)	(0.030)
Ability Child			0.13***	0.08***
			(0.030)	(0.028)
Yrs. schooling Mother			0.01	0.00
			(0.004)	(0.004)
Yrs. schooling (ln) Child				0.04
				(0.046)
Net worth Mother				0.00
				(0.007)
Net worth Child				-0.01
				(0.007)
Yrs. schooling Child		0.01***	0.01**	
		(0.003)	(0.003)	
Control mother's age at birth	YES	YES	YES	YES
Observations	2,158	2,066	2,066	1,785
Adjusted R-squared	0.02	0.03	0.04	0.02

Standard errors clustered by mother ID in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Estimation of intergenerational elasticities in employment rate: alternative definition of employment status

VARIABLES	Unconditional	Model	Model "plus"	Model "plus" and wealth
Employment rate (ln) Mother	0.08***	0.05**	0.04**	0.04**
	(0.021)	(0.020)	(0.020)	(0.019)
Ability (ln) Mother		0.17***	0.09	0.04
		(0.052)	(0.056)	(0.054)
Ability (ln) Child			0.46***	0.34***
			(0.090)	(0.094)
Yrs. schooling (ln) Mother			-0.01	-0.07
			(0.102)	(0.060)
Yrs. schooling (ln) Child		0.74***	0.24	-0.40*
		(0.263)	(0.263)	(0.234)
Net worth (ln) Mother				0.15**
				(0.066)
Net worth (ln) Child				-0.13
				(0.102)
Control mother's age at birth	YES	YES	YES	YES
Observations	2,250	2,150	2,150	1,842
Adjusted R-squared	0.01	0.03	0.05	0.02

Standard errors clustered by mother ID in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Estimation of intergenerational correlations: Other outcomes

VARIABLES	Week. hrs. (ln) C	Hr. wage (ln) C	Earnings (ln) C	Fam. income (ln) C	Net worth C	Abil. C	Yrs. sch. C
Weekly hours (ln) Mother	0.15***						
	(0.032)						
Hourly wage (ln) Mother		0.09***					
		(0.022)					
Earnings (ln) Mother			0.13***				
			(0.027)				
Family income (ln) Mother				0.38***			
				(0.081)			
Net worth Mother					0.14***		
					(0.033)		
Ability Mother						0.41***	
						(0.022)	
Yrs. schooling Mother							0.38***
							(0.024)
Observations	2,366	1,473	1,958	562	2,047	2,257	2,366
Adjusted R-squared	0.01	0.01	0.02	0.03	0.02	0.17	0.13

Standard errors clustered by mother ID in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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