The Implications of Family Structure, Education Prices, and Policy Reforms for Inequality and Intergenerational Mobility*

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Abstract

Parents devote considerable resources towards their children's development, making trade-offs between time and education investments and working, consumption, and leisure. In recent decades, families in the United States experienced rising rates of single parenthood, increasing education prices, and changes to taxes and transfers, which altered available resources and trade-offs to investments across families. This paper explores the implications of these trends for inequality and intergenerational mobility. After documenting changes in family resources and parental investments over time, I develop a dynastic model of human capital investment to quantify the contributions of these trends to increases in inequality and intergenerational persistence. I find that single parenthood is a major contributor through two channels: (1) less available time for single parents limits work hours, family income, and investments for their children's human capital development and (2) the resulting lower human capital comes with a greater probability of becoming a single parent as an adult, as single parents tend to have less education and lower wages. Education prices, on the other hand, had only minimal effects as families reduce investments at similar rates in response to price increases. Moreover, changes to taxes and transfers had heterogeneous impacts on parental investments by producing differing income and substitution effects depending on family characteristics. The results highlight the importance of considering family structure and parental investments when designing assistance programs.

JEL classification codes: E24, J24, J62, J12, J13, D13, D31, I38, I24
Keywords: inequality, intergenerational mobility, human capital investment, family structure

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1 Introduction

During the past several decades in the United States, families experienced numerous changes affecting parental investments for children's development. One of these changes is the rise of single parenthood. In 1970, about one in ten children grew up in single-parent families; today it is over one in four. Single parents are more constrained than married parents, in large part due to differences in available time. Less parental time limits not only time investments for children, but also labor supply, family income, and education expenditures. Compounding the issue is the greater prevalence of single parents among those with less education and lower wages. Evidence suggests that this deficit of resources for children in single-parent families leads to poorer outcomes later in life (Kearney, 2023; Kalil and Ryan, 2020; Wasserman, 2020). Another change affecting investments is the increasing price of education. Over the last 50 years, education prices have risen roughly four times faster than overall prices. A declining return to education leads to less education investment all else equal. Lastly, means-tested transfers and tax credits have undergone several reforms since the mid-1960s, impacting time use and expenditure choices across families.

In this paper, I evaluate how cross-cohort changes in family time resources, expenditure costs, and public policies affected inequality and intergenerational mobility. Income inequality has increased substantially in the United States over the past several decades. Recent work by Guvenen et al. (2022) indicates that a significant share of the increase is due to greater dispersion in initial outcomes for newer cohorts, suggesting rising dispersion of the permanent components of income. Over the same period, there is evidence of declining intergenerational mobility. Aaronson and Mazumder (2008), for instance, find that the intergenerational elasticity (IGE) of income has risen since 1950, reflecting greater income persistence across generations.[1] Numerous theories exist linking inequality to mobility, but it is not yet clear quantitatively what forces are contributing most to these two trends.[2] In my analysis I first document changes in family resources and trends in parental investments. I then develop a model of heterogeneous dynasties to quantify the effects of trends in family structure, education prices, and policy reforms on inequality and intergenerational mobility.

I begin by analyzing trends in family structure, education prices, and taxes and transfers. These factors are important features of my model. They provide a more complete picture of family resources and the trade-offs parents face when allocating time and expenditures towards their children's development. The rise of single parenthood means a greater share of children are growing up in home environments with more limited resources, and increasing relative prices for education reflects a declining return to education, which discourages investments. In the mid-1960s,

[1] The IGE is the coefficient from regressing an estimate of children's log permanent income on their parent's permanent income. For further trends in persistence see Davis and Mazumder (2024), Jácome et al. (2021), Justman and Stiassnie (2021), Chetty et al. (2017), Chetty et al. (2014a), Chetty et al. (2014b), Lee and Solon (2009).

[2] See Acemoglu and Autor (2011) for a summary of key drivers of income inequality and Corak (2013) on the connection between inequality and intergenerational mobility.

means-tested transfers, such as Aid to Families with Dependent Children (AFDC), were greatly expanded with the additions of Medicaid, Food Stamps, and Supplemental Security Income (SSI), especially for single-parent families. With the introduction of the Earned Income Tax Credit (EITC) in 1975, lower-income families were also eligible to receive a wage subsidy. Subsequent reforms led to additional changes in the generosity of transfers and tax credits for lower-income families. These changes to family time resources, expenditure costs, and public policies affect parental investment choices differently across families.

I then document growing gaps in parental time and education investments over time. Using data from both the Panel Study of Income Dynamics (PSID) Child Development Supplement (CDS) and the American Heritage Time Use Study (AHTUS), I show that time investments are highly unequal across families and the disparities are growing. Children from single-parent families receive almost half as many hours in time investments from their parents compared to children with married parents, and these differences increase with parental education. For education investments, the level of expenditures heavily depends on parental resources, both for private and public education. Using data from the Consumer Expenditure Survey (CEX), I find that families with greater resources are spending increasingly more on their children's education over time. Further, due to how public education is funded in the United States, where variation in public education funding is driven largely by local revenues generated through property taxes, richer areas have better-funded schools. As inequality increases over time, so does dispersion in investments.

With these cross-cohort changes in mind, I develop a model of heterogeneous dynasties to quantify the effects of changes in family resources and trade-offs to parental investments on inequality and intergenerational mobility. In the model, families are heterogeneous along numerous dimensions, including parent human capital, wages, and child learning ability. Parents make decisions over family structure and how to allocate their time and expenditures. Differences in family characteristics lead to differences in investments as parents internalize their children's learning ability and their own human capital, which both affect the productivity of investments for child development. Education prices affect the returns to investments, which is not uniform across families.

An important feature of the model is that tax and transfer policies vary by family structure. This variation in policy treatment generates different trade-offs for parents. First, differences in tax progressivity and the generosity of transfers for single versus married parents influences the decision of parents to separate or not. The choice to separate depends on family characteristics, parents' match quality, and policy. More generous tax and transfer policies for single parents may lead to higher rates of single parenthood. Second, different policy treatment by family structure creates variation in available resources and trade-offs to investments across families. More generous transfers provide greater non-labor income and allows parents to work less, while tax credits act as a wage subsidy, increasing the returns in the labor market and incentivizing more work.

After discussing implications of the model, I use it to quantify to what extent trends in family resources impacted inequality and intergenerational persistence. I parameterize the model and evaluate model fit. I feed as driving forces into the model skill-biased technological change (SBTC), changes in non-economic factors that influence family structure, education prices, and taxes and transfers for three periods: (1) 1947-1970, (2) 1971-1994, and (3) 1995-2018. I estimate the model targeting key moments related to family structure, parental investments, and the distribution of family income. The model is successful in accounting for changes across cohorts in single parenthood, mean and dispersion of investments, inequality, and intergenerational mobility.

With the quantitative model I perform three sets of counterfactual exercises. First, taking all else equal, I shut off the increase in the share of single-parent families, keeping it at the 1950-1970 average of 9%. Second, taking family structure as given from the Baseline model, I turn off (1) SBTC, (2) rising education prices, and (3) changes to taxes and transfers. Finally, I repeat the three alternative scenarios from the prior step allowing for endogenous family structure in the counterfactual. I first evaluate the impact of each factor on family income. I then calculate their contributions to increases in inequality and persistence of wages, which here is the permanent component of income.

The main results are as follows. The increase in single-parent families contributed to both growing inequality and falling intergenerational mobility. Of the change in income inequality from the initial cohort of adults in 1947-1970 to those in 1995-2018, roughly 50-64% is due to the rise in single parenthood. Further, intergenerational persistence would be lower if the share of single-parent families had not risen, with the IGE falling from 0.543 in the baseline outcome to 0.498 in the counterfactual.[3] These results are driven by two factors: (1) less available time for single parents limits work hours, family income, and investments for their children's human capital development and (2) the resulting lower human capital comes with a greater probability of becoming a single parent as an adult, as single parents tend to have less education and lower wages. SBTC had the largest impact on inequality and intergenerational mobility, amplifying differences in human capital and prior human capital investments. Education prices, on the other hand, had minimal effects as families change investments at similar rates with price changes. These two results are largely unchanged with fixed or endogenous family structure.

Turning to the effects of taxes and transfers, the policy changes preceding the 1971-1994 period helped mitigate the rise in inequality and persistence when taking family structure as given. This is due to the increased generosity of transfers for single parents, which allowed for more time at

[3]For the permanent component of income (wages), the rise in single parenthood contributed to 21-23% of the increase in inequality and about 2% of the increase in the IGE. Prior empirical studies estimated how much the increase in income inequality from around 1970 to 2000 is attributed to changes in family structure, finding comparable results (Daly and Valletta, 2006; Burtless, 1999; Lerman, 1996). However, they do not speak to the effects of family structure on human capital or intergenerational mobility.

home with their children and less time working. With endogenous family structure in the counterfactual, we see that the increase in benefits for single parents led to a higher rate of single parenthood (20% in the Baseline, 16% in the counterfactual without expanded benefits). Thus, the policy change led to greater inequality as it increased the share of single parents, but the expanded generosity helped those parents who would become single parents regardless of the policy changes invest more in their children, which increased intergenerational mobility.

A large body of research emphasizes the importance of human capital investments for outcomes in adulthood (Heckman and Mosso, 2014; García et al., 2021). However, most of these studies are based on short-term, smaller-scale programs, so the aggregate effects of changing trends in investments are difficult to extrapolate. This paper contributes to a large literature in economics concerning the intergenerational transmission of economic status, both on the theoretical side (Becker and Tomes, 1979, 1986; Loury, 1981; Benabou, 2002; Han and Mulligan, 2001; Becker et al., 2018) and for quantitative applications (Restuccia and Urrutia, 2004; Caucutt et al., 2020; Erosa et al., 2010; Lee and Seshadri, 2019; Herrington, 2015; Blandin and Herrington, 2022; Daruich, 2025; Yum, 2023; Eckert and Kleineberg, 2024; Zheng and Graham, 2022; Krueger et al., 2025). The innovation of my framework is that it incorporates key factors determining the level of total available family resources (e.g. family structure) as well as those that impact the relative benefits and costs to different allocations of time and money (e.g. taxes, transfers, and prices). Despite ample evidence that single parenthood, education prices, and policy changes impact parental investments, there are surprisingly few studies that consider these factors together. My results also highlight the importance of considering parental investments when designing assistance programs.

I make three contributions. First, I develop a quantitative theory of dynastic human capital incorporating family structure, education prices, and income assistance programs into a unified framework. Surprisingly, there are few papers in macroeconomics concerning the role of trends in family structure and education prices on inequality and mobility. Blandin and Herrington (2022) study the impact of the rise in single-parent families, among other factors, on children's college preparedness and resulting economic outcomes, finding an important role for family structure as single parents are more constrained in their ability to invest in their children's development. Another paper, Moschini (2023), looks at differences in child skill development between families with married and single parents, focusing on the effect of childcare subsidies on lifetime consumption. Krueger et al. (2025) evaluates the effects of alternative public education policies to promote college completion, taking into account differences in human capital investments between single and married parents and the high rate of single parents in poverty. My main contribution is to provide some of the first estimates of the impact of the rise in single parenthood on recent trends in inequality and intergenerational mobility, and quantify how several different channels either contributed to or mitigated these trends.

Second, I contribute to a literature on empirical trends on changing family resources and parental investments. The results of these studies, just as I find, indicate that over the past several decades investments became more unequal across families, where positive investment gradients for parents with higher education, income, and who are married steepened. Blandin and Herrington (2022) show that college-educated parents who are married are spending more time and expenditures for their children's development. This trend is shown for time investments in Guryan et al. (2008) and Ramey and Ramey (2010). They find that highly educated parents spend considerably more time actively engaging with their children for development. These results correspond to findings in Belley and Lochner (2007) and Bailey and Dynarski (2011), who find that family characteristics, such as income and wealth, are becoming more important for investments over time.

Third, I provide evidence of the varying distributional effects of policy on family formation and parental investments, and in particular how tax credits and transfers produce differing substitution and income effects that impact parental investment choices. Similar to Agostinelli and Sorrenti (2022), I find that increased tax credits like the EITC can have a negative impact on time investments for disadvantaged mothers. This aligns with findings in Mullins (2022) regarding the design of policy for assisting low-income single mothers and in Kalil et al. (2022) and Reichman et al. (2020), who show that policy changes to assistance programs that incentivize work, such as after welfare reform in the 1990s, may lead to lower quality time investments.

The remainder of the paper is structured as follows: in Section 2.1 I document cross-cohort changes in family resources and trade-offs to parental investments. Section 2.2 presents evidence of growing inequality in parental investments across families. In Section 3 I develop a dynastic model of human capital investment. Section 4 discusses how I quantify the model and study the effects of changes in family resources and parental investments on inequality and intergenerational mobility with counterfactual exercises. In Section 5 I conclude.

2 Trends in family resources and investments devoted to children

In this section I present evidence of changes affecting family resources and investments. I document trends in family structure, education prices, and the generosity of transfers and tax progressivity. I then present evidence of growing gaps in investments between families with different resources. There are three time periods I focus on: (1) 1947-1970, (2) 1971-1994, and (3) 1995-2018.

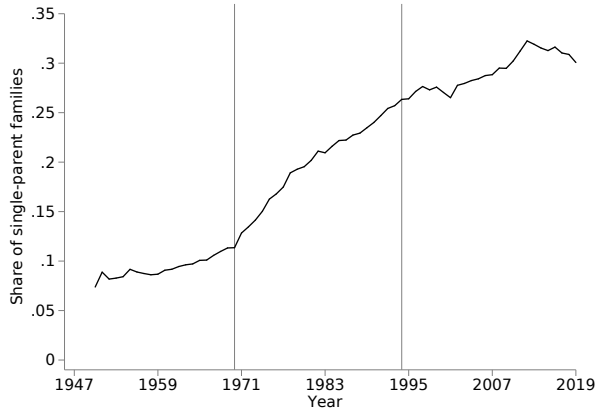
2.1 Changes affecting resources and trade-offs to investments

2.1.1 Single parenthood

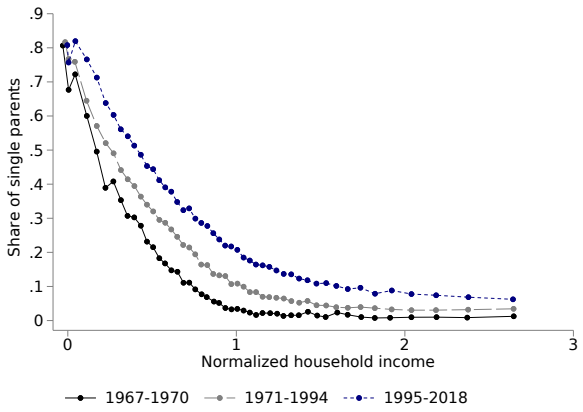
Figure 1a shows the share of single-parent families in the United States from 1950-2019. The share of single-parent families is the number of families with children under 18 headed by one parent

Figure 1: Single parenthood in the United States

(a) Share of single-parent families



(b) Share of single-parent families by normalized household income



Notes: This figure shows the evolution of single parenthood in the US. Panel (a) shows the share of single-parent families, which is the number of families with children under 18 headed by one parent as a fraction of all families with children under 18. Data from US Census Table FM-1. Panel (b) shows the share of single-parent families at different multiples of mean household income for each cohort in the data. Figures are binned scatter plots of the share of single-parent families by normalized household income, which is a household's income divided by mean household income in a given year. Data from the CPS-ASEC.

as a fraction of all families with children under 18. Over the course of about 50 years, the share of single-parent families rose from 11% in 1970 to just below 31% in 2018. This trend represents a major decline in resources at home for a large number of children relative to prior cohorts.

Single parents tend to have lower income and education compared to married parents. Figure 1b displays the share of single-parent families by normalized household income for each cohort using data from the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC).[4] The graphs show that the rate of single parenthood increases as household income declines. Among families with the lowest incomes, the rate of single parenthood is close to 80%.

Extensive research in the social sciences points to both intragenerational and intergenerational effects of growing up in a single-parent household on economic outcomes. McLanahan and Percheski (2008) summarize empirical work connecting family structure and inequality, concluding that they are both causes and consequences of each other, and in turn reduce intergenerational mobility. McLanahan and Bumpass (1988) provide evidence that women who spend part of their childhoods in single-parent households are more likely to marry and have children early, have non-marital births, and have their own marriages dissolve. Astone and McLanahan (1991) show that children who live with single parents receive less encouragement and less help with school

[4]Normalized household income is household income (pre-taxes and transfers) divided by mean household income in a given year. CPS data provided by Integrated Public Use Microdata Series (Flood et al., 2023).

work than those who live with both parents. This aligns with more recent work on parental time investments and parenting quality (Kalil et al., 2012; Reeves and Howard, 2013).

Why did single parenthood become more common? In a review of numerous hypotheses, Ellwood and Jencks (2004) state

> ...there is still no consensus about why single parenthood spread, much less about why it spread faster in some populations than in others. The most widely cited empirical papers seem to be those that disprove various hypotheses. Indeed, it is only as light exaggeration to say that quantitative social scientists' main contribution to our understanding of this change has been to show that nothing caused single-parent families to become more common. Nonetheless, they did.

The authors suggest that what likely had the biggest effects were a combination of changes in contraceptive technology, evolving attitudes towards non-marital sex and births, and dramatic shifts in gender roles and expectations surrounding maternal employment coupled with declining economic opportunity for less-educated men. There is also evidence of a weakly positive relationship between the expansion of welfare generosity during the 1960s and the subsequent increase in single parenthood (Moffitt, 1998). Recent work by Cunningham and Goodman-Bacon (2025) finds a causal effect of the introduction of programs that expanded access to the legal system for low-income communities on single parenthood, operating through greater access to welfare programs combined with increased generosity of benefits for single parents during the 1960s and 1970s. Whatever the reasons for the increase, children growing up in single-parent families on average have fewer resources than children growing up in two-parent families.

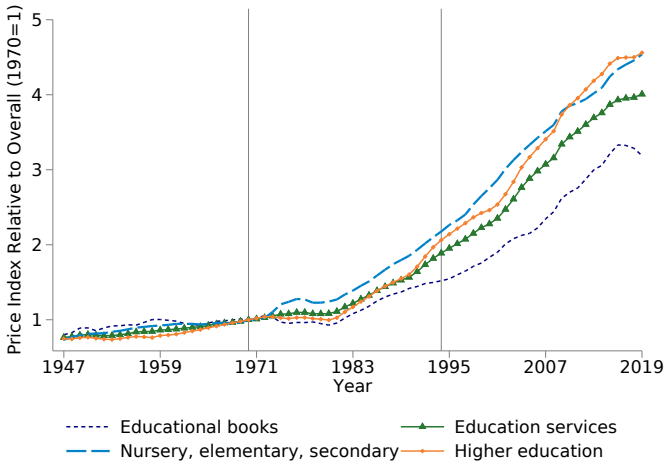
2.1.2 Education prices

The price of education in the United States has risen significantly faster than overall prices over the past 40-50 years. Figure 2 displays this trend. It shows education prices relative to overall prices normalized to 1 in 1970. By 2018, education prices have risen roughly four times faster than overall prices since 1970. Consistent with substitution effects from price changes, the rise in the relative price of education lowers the effective return to investments and evidence suggests this leads to less education expenditures all else equal. Kim (1988) and Savoca (1990) find negative own-price elasticities of education expenditures and Hemelt and Marcotte (2016, 2011) find that higher tuition weakens the propensity of high school graduates to enroll in college.

2.1.3 Taxes and transfers

Here I document changes in tax progressivity and the generosity of means-tested transfers for families with children. First I show how average taxes and transfers across the income distribution have changed for households with and without children using data from the Congressional Budget Office (CBO). Next, I turn to household survey data in the CPS-ASEC and document how

Figure 2: Relative prices of education goods and services



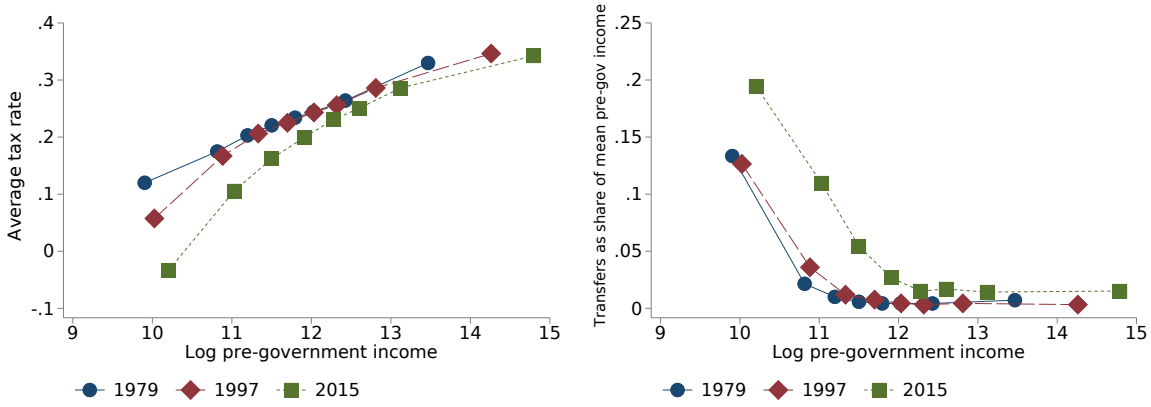
Notes: This figure shows relative changes in education prices since 1970. Price indices from the Bureau of Economic Analysis for education services and educational books are divided by the overall price index and normalized to 1 in 1970. Price indices: Personal Consumption Expenditure Price Index (PCEPI) for Educational books; Education services; Nursery, elementary, and secondary schools; and Higher education.

benefits changed across cohorts for households headed by single and married parents.

Figure 3: Average tax rates and transfers as a share of mean income by log income

(a) Tax rates: households with children

(b) Transfers: households with children

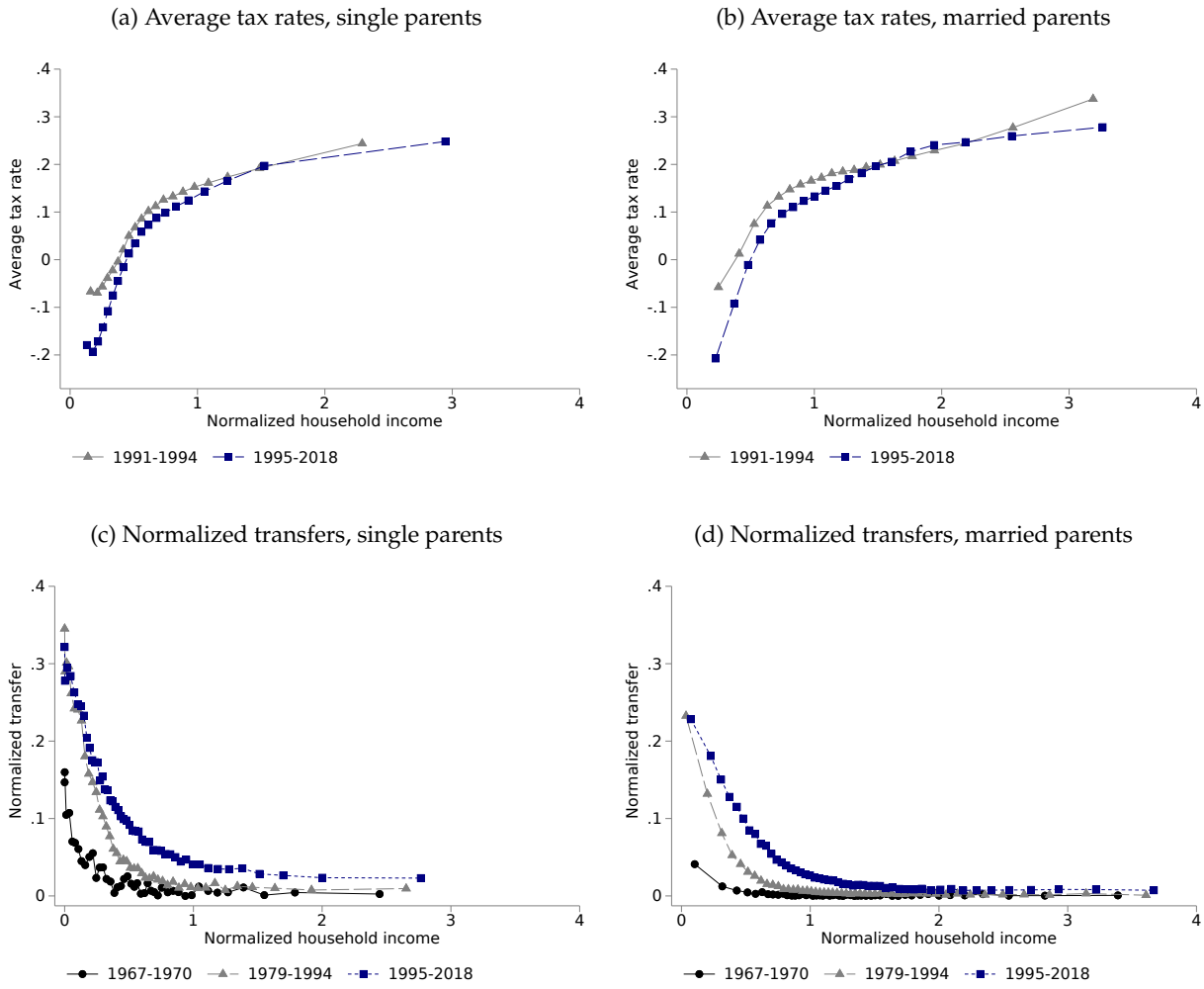


Notes: This figure shows average tax rates by log pre-government income and transfers as a share of mean pre-government income by log pre-government income for households with children. Data are from the CBO and used in the Distribution of Household Income, 2019 report.

Data from the CBO contains information on average pre- and post-tax income, means-tested transfers, and taxes by income quintile and for the top 5%, 1%, 0.1%, and 0.01% of the income distribu-

tion for households with and without children from 1979-2019.[5] Figure 3 shows average tax rates (Panel (a)) and transfers as a share of mean household income (Panel (b)) by log pre-government income for households with children. From 1979 to 2015 average tax rates for households with children became more progressive. The lowest-income households with children had average tax rates a little over 10% in 1979. In 2015 it was around -5% due to more generous tax credits. Households without children, on the other hand, saw effectively no changes in tax progressivity and a much smaller increase in transfers for low-income households, as shown in Figure D1.

Figure 4: Tax rates and normalized transfers by family structure and normalized household income



Notes: This figure shows average tax rates and normalized transfers by normalized household income. Normalized transfers and income are calculated by dividing a household's transfer income and income by mean household income in a given year. Data from CPS-ASEC with CBO imputations of transfers.

[5]This data are used in the CBO report on the Distribution of Household Income, 2019. See www.cbo.gov/publication/58353 for the report and links to underlying data for researchers.

I now look to data from the CPS-ASEC to evaluate changes in means-tested transfers and tax credits for families with children by family structure. To account for underreporting of means-tested transfers in the CPS I utilize the CBO's regression-based procedure to impute transfers when possible (Habib, 2018).[6] Figure 4 shows average tax rates and transfers as a share of mean household income by normalized household income and family structure in each period.[7] Taxes became considerably more progressive for both single and married parents. Average tax rates for very low income families was around -8% in 1991-1994 and dropped to roughly -20% in 1995-2018.

Transfers, in the first period, were relatively low. Single parents with the lowest pre-government incomes received about 15% of mean household income in transfers per year; married parents with similar incomes received about 7%. In the second period there was a large expansion of means-tested transfers and tax credits. Single parents with the lowest incomes received over 30% of mean household income in benefits; married parents 23%. In the final period, traditional welfare like AFDC was replaced with Temporary Assistance for Needy Families (TANF), which lowered benefits and instituted time limits and work requirements. Medicaid and SNAP, formerly Food Stamps, saw expanded eligibility and increased participation which made up for the decline in AFDC/TANF usage. Married parents, and families with relatively higher incomes than in prior years, saw increases in benefits from Medicaid and tax credits. Much of the expansion of benefits in the third period went to relatively higher-income families compared to in the second period.

Summing up, means-tested transfers and tax credits in the United States have undergone considerable reforms since the mid-1960s. First, the generosity of means-tested transfers was greatly expanded with additions of Medicaid, Food Stamps, and SSI, adding to existing programs like AFDC. In particular, benefits for single parents increased substantially. Second, with the introductions of the EITC in 1975 and CTC in 1997 plus several expansions to both, tax credits have become more generous across cohorts. Lastly, recent reforms in the 1990s onward led to greater eligibility and benefits for families higher up the income distribution, particularly for families with married parents. These reforms entailed greater emphasis on expanded tax credits for the lowest-income families versus means-tested transfers. My findings coincide with those in Splinter (2020) and Auten and Splinter (2023), who show that redistribution in the United States has risen markedly since the 1960s, and also with Hoynes and Schanzenbach (2018), who find much of the recent gains in social safety net spending for children went to relatively better-off families compared to prior cohorts. In the next section I present trends in parental investments.

[6]The procedure first uses administrative data to set targets of transfer receipt reflecting the CPS sampling frame, estimates the probability of receipt for households in the CPS, and then imputes transfer receipt based on estimated probabilities until the targets are reached. Replication files provided by the CBO at https://www.cbo.gov/publication/54234.

[7]For the first and second periods data on transfers is only available for 1967-1970 and 1979-1994, respectively, due to availability of transfers in the CPS-ASEC data and through CBO imputations. Data for taxes and tax credits are only available from 1991 onward. For a detailed breakdown by source see Figure D2, which shows income from means-tested transfer programs and tax credits as a share of mean household income by normalized household income bins.

2.2 Trends in parental investments

In this section I document growing inequalities in parental human capital investments, analyzing differences in time investments, private education expenditures, and public education funding across families and over time.

2.2.1 Time investments

I draw on two data sets for time investments: the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS) and the American Heritage Time-Use Study (AHTUS). Each data set offers different benefits and drawbacks. The PSID-CDS has detailed household information for children and parents, and collects information for both parents' time investments for a family unit compared to time diaries for individuals, as in the AHTUS. One drawback of the PSID-CDS is the limited number of years it covers, as my sample only has data for 1997 and 2002. A major benefit of the AHTUS, on the other hand is that data goes back to 1965 and has been used to document changes in time investments over time.

Differences in investments by parent human capital

Starting with the PSID-CDS, I focus on time investments as defined in Caucutt et al. (2020), which includes all activities where children are actively engaging with their parents: academic investment activities, health investment activities, play, arts and crafts with household children, sports, talk and listen, eating, socializing, religious activities, volunteering, and other activities.[8]

Table 1: Weekly hours in time investment by parent education and family structure

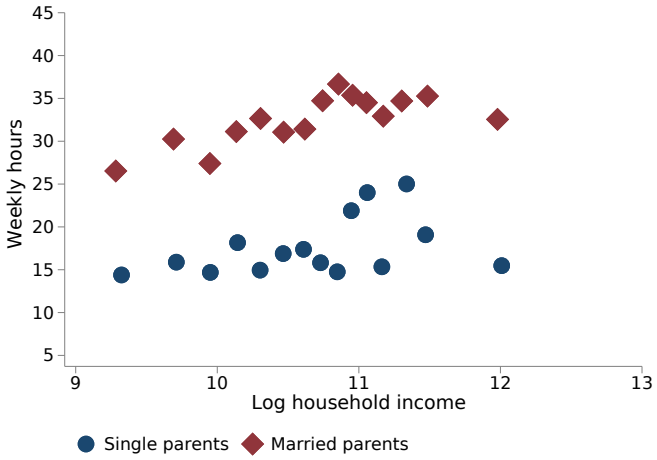
	All	Less than HS	High school	Some college	College+
Single parents	17.68	16.85	16.24	19.11	19.27
Married parents	32.72	25.92	31.96	31.40	35.47
Total	28.28	21.02	26.37	27.43	33.40

Notes: This table shows average weekly hours in time investment by parent education and family structure in the PSID-CDS 1997, 2002 samples. Activities constituting time investments include academic investment activities, health investment activities, play, arts and crafts with household children, sports, talk and listen, eating, socializing, religious activities, volunteering, and other activities.

Table 1 reports average weekly hours in time investments by family structure and parents' highest education level. First, the results indicate that married parents spend almost twice as much time actively engaging with their children than single parents, on average 33 hours per week versus 18 hours per week. Second, there are positive gradients in investments for parental education. College-educated married parents spend almost 20 more hours a week in time investment than single parents with less than a high school degree.

[8] See Section B of the appendix for their working paper.

Figure 5: Weekly hours in time investment by log income



Notes: This figure shows binned scatter plots of weekly hours in time investment by log household income and family structure in the PSID-CDS 1997, 2002 samples, controlling for mother's age and number of children. Activities constituting time investments include academic investment activities, health investment activities, play, arts and crafts with household children, sports, talk and listen, eating, socializing, religious activities, volunteering, and other activities.

A similar pattern emerges when looking at time investments by household income. Figure 5 shows binned scatter plots of weekly hours in time investment versus log household income, controlling for mother's age and number of children. The relationship is slightly steeper for married parents than single parents, potentially indicating single parents are more limited in their ability to invest more time in their children's human capital even at higher incomes.

Growing gaps in time investments

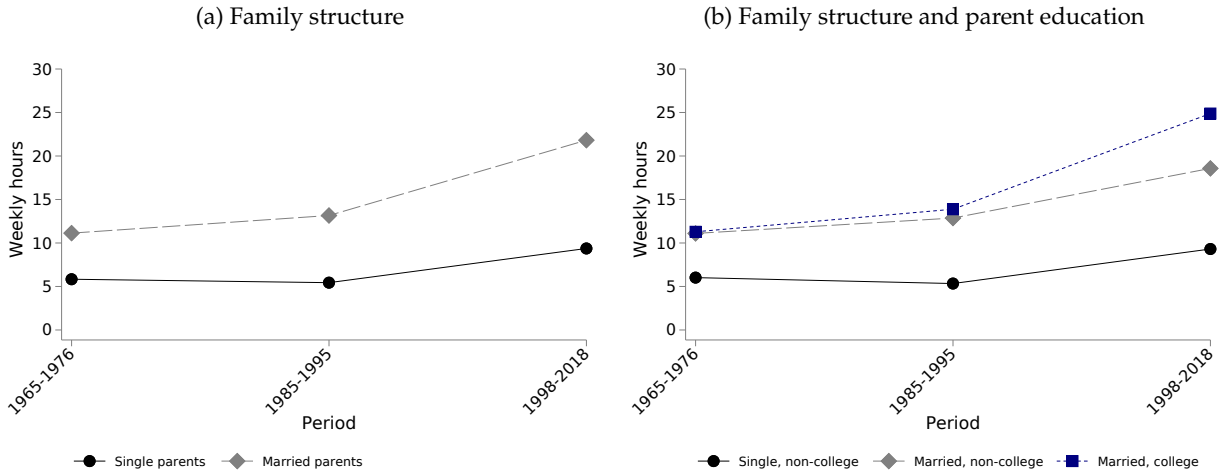
Turning to the AHTUS for trends over time, I evaluate average time investments from parents by family structure and whether they have a college education or not.[9] AHTUS data is not collected for parental units but for individuals, so to construct average hours for married parents I take the average time investment of individual parents who are married for each level of education and multiply by two. Due to smaller sample size, the time periods for this analysis do not line up exactly with the periods described in Section 2.1.[10] Time investments include child care, physical activities, and travel related to childcare.

The results are presented in Figure 6. Panel (a) shows average weekly hours in time investment by family structure. As with the PSID-CDS data, married parents spend roughly twice as much time actively engaging with their children, with the gap growing across periods. Panel (b) shows

[9]The AHTUS data has limited information on measures of parent human capital, such as no consistent data on household income across all survey years.

[10]My sample has data for 1965-1966, 1975-1976, 1985, 1992-1995, 1998-2000, 2003-2012, and 2018.

Figure 6: Weekly hours in active time with children by family structure and parent education



Notes: This figure shows average weekly hours in parental time investments over three periods by family structure in Panel (a) and by family structure and educational attainment Panel (b).

average weekly hours in time investment by family structure and highest parent education, either having a college degree or not.[11] The results show that over time the gap in time investments between single and married parents is driven by growing time investments for college-educated married parents. This is consistent with evidence that documents changing time-use patterns for highly educated parents (Guryan et al., 2008; Ramey and Ramey, 2010).

2.2.2 Education investments

Expenditures on education have grown considerably in the United States since 1947. As a share of total US personal income, education expenditures rose from 4.9% in 1947-1970 to 7.1% in 1971-1994 and 7.9% in 1995-2018.[12] However, the amount of education funding children receive in the United States is highly dependent on parental resources. Parents with higher education and income spend a larger amount on their children's education compared to those with less. This holds for both private and public education, where local funding generated largely through property taxes drives variation in public education funding across communities. The United States is somewhat unique in how it funds public education with local funding being such a large component, resulting in a regressive funding system where neighborhoods and communities with higher incomes have more funding for public education per student on average.

[11] Due to small number of single parents with a college degree I do not show time investments for college-educated single parents.

[12] Data are from the US Census, US Federal Budget, Bureau of Economic Analysis, Tax Policy Center, and College Board. See Section A.3. Adjusting personal income to correspond to personal income of families with prime age (25-54 year olds) household heads using average income and number of households by age in US Census Table F-11, expenditure shares were 7.0% in 1947-1970 to 10.3% in 1971-1994 and 12.2% in 1995-2018. These are targeted in the calibration as almost all parents in the US are prime age and this age closely aligns with the parent age in the model.

First, I document growing inequality in private education expenditures in the Consumer Expenditure Survey (CEX). Next, I show that public education funding is unequal across school districts using data on district-level expenditures and county characteristics. Due to limited data sources on education expenditures at the household and neighborhood levels before around 1990, the analysis here is limited to the past thirty years or so.

Growing gaps in private education expenditures

Here I analyze education expenditures in the Consumer Expenditure Survey (CEX) across households and over time. The sample covers 1990 to 2019. Table D2 reports summary statistics. My measure of education expenditures combines categories on childcare, schooling, lessons, and reading, and expenditures are adjusted to account for economies of scale in raising children.[13]

I group households by their level of resources with two measures: (1) number and highest education of parents and (2) total expenditure percentile groups. The first set are denoted by 1L, 2L, and 2H, where 1 refers to a single parent, 2 refers to two parents, L refers to less than college, and H refers to college or above. Households of single parents with a college degree or more are excluded due to small sample sizes. The second set are denoted by 0-40p, 40-80p, and 80p+. The first group are those in the bottom 40% of households in terms of total expenditures, the second group in the middle 40%, and the last group are in the 80th percentile or above.[14] Lastly, for cleaner comparisons across time, I separate the analysis by child and parent age. The two groups are for early and late childhood, which capture the bulk of expenditures before reaching college-age. Early childhood are households with children 0-7 years old and parents 24-42 years old, and late childhood are households with children 12-18 years old and parents 36-53 years old.

Figure 7 presents expenditures per child during early and late childhood for each resource group. Panels (a) and (c) have groups for number and highest education of parents and Panels (b) and (d) expenditure percentile groups. The top two figures are for early childhood and bottom two for late. In both early and late childhood, parents in the highest-resource groups, 2H and 80p+, are spending a growing amount compared to other households. Expenditures for the four lowest-resource groups are relatively flat or slightly decreasing from 1990 to 2019.

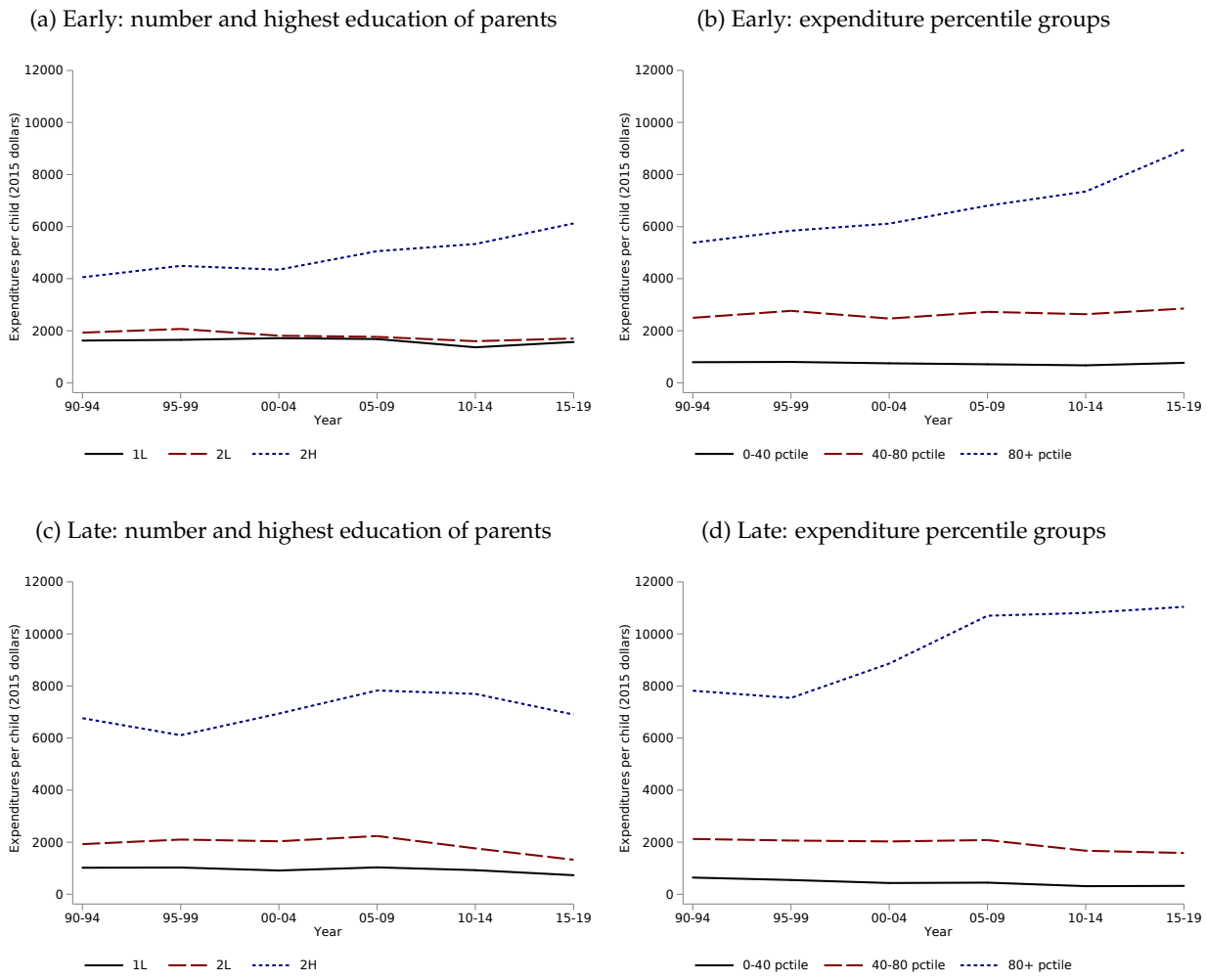
Unequal public education funding

Public education funding in the United States has considerable local and state control. Compared

[13]Other studies on child investments include expenditures on all goods and services purchased for children (Carlos Córdoba and Ripoll, 2019; Schoonbroodt, 2018). This paper concerns education and related expenditures. See Section A.5 for descriptions of expenditure categories and adjustment process for number of children.

[14]Total expenditure percentiles are calculated each year among all households (with or without children) in the same age ranges for comparing expenditure investments (early and late). The idea behind grouping households by their total expenditure percentile rank is that total expenditure is a closer measure to permanent income than current income. The results are similar using income percentiles.

Figure 7: Expenditures per child, early and late childhood



Notes: This figure shows expenditures per child in 2015 dollars from the CEX adjusting for the number of children in the household by different family resource groupings. The number and highest education of parents has groups 1L, 2L, and 2H, corresponding to single parents with less than college education; married parents with less than college education; and married parents with a college education or more, respectively. Expenditure percentile groups are 0-40p, 40-80p, and 80p+, corresponding to households in the 0-40 percentile of total expenditures; 40-80 percentile of total expenditures; and 80th percentile and up, respectively. Early childhood sample refers to households with children 0-7 years old, parents 24-42 years old. Late childhood sample refers to households with children 12-18 years old, parents 36-53 years old.

to other countries, the federal government in the United States provides little direct funding for public education (Herrington, 2015). This decentralized system means that where parents live and raise their children is important for the resources and quality of public schools in the area. Empirical evidence indicates families that are able to will move to more expensive neighborhoods for the quality of schools (Goldstein and Hastings, 2019).

The data I use to evaluate district-level public education funding comes from three sources. Data on expenditures and district characteristics come from the Department of Education Common Core of Data (CCD). I use data from the US Census Small Area Income and Poverty Estimates (SAIPE) Program for county median household income and poverty rate to capture economic characteristics of the area. Lastly, I use publicly-available data on county share of single-parent families, share of college educated, and population density from Chetty et al. (2018).

I create binned scatter plots of log expenditures per student versus log county median household income, county share of college-educated, county share of single-parent families. Lastly, I create a binned scatter plot of the district child poverty rate versus the county share of single-parent families. All binned scatter plots control for year fixed effects, share of special education students, and highest grade offered. The results are shown in Figure 8. Family resources at the community-level matter substantially for public education funding.[15] Panels (a) and (b) highlight that counties with higher income and more college-educated adults spend much more on public schools than those with lower incomes and fewer college-educated adults. Panels (c) and (d) show that a higher share of single-parent families is correlated with less public funding per student, driven by the positive relationship between single parenthood and child poverty.[16]

The key takeaway here is that expenditure investment gaps have grown over the past thirty years between households of different levels of parental resources. In particular, those with the highest permanent income, captured by total expenditures, are spending both a greater level and share of expenditures on education. These results, including for time investments, build on empirical evidence of widening investments gaps and a greater importance of family characteristics for investments (Guryan et al., 2008; Blandin and Herrington, 2022; Belley and Lochner, 2007).

3 Model

In this section I present the model, characterize equilibrium investments, and discuss implications. The model is then used to quantify the importance of cross-cohort changes in family resources and trends in investments for inequality and intergenerational mobility.

3.1 Environment

3.1.1 Overview

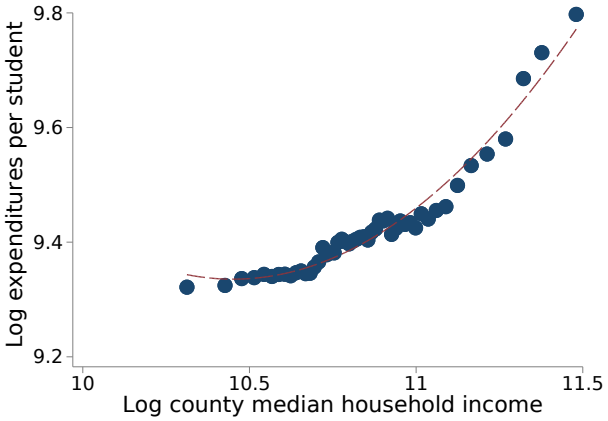
The economy is populated by a continuum of heterogeneous dynasties indexed by $i \in [0, 1]$. Time is discrete, indexed by $t = 0, 1, ...$, where each period is 24 years long. Agents live for two periods

[15] Differences in public school funding across areas in the US are a key source of economic inequality and intergenerational persistence (Fogli et al., 2024; Zheng and Graham, 2022; Eckert and Kleineberg, 2024).

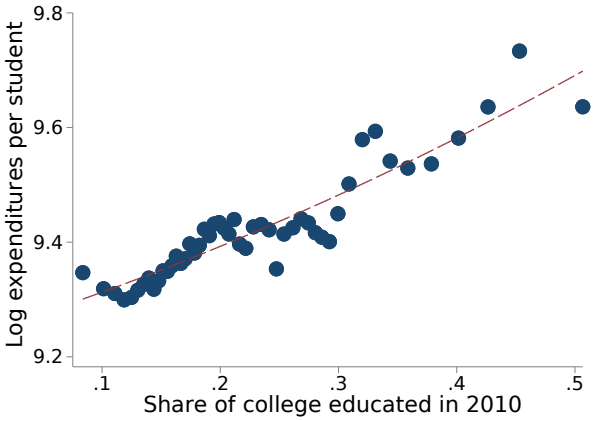
[16] Chetty et al. (2014a) find that one of the biggest contributors to lower intergenerational mobility in an area is the share of single-parent families.

Figure 8: District expenditures per student by county median household income and share of college-educated

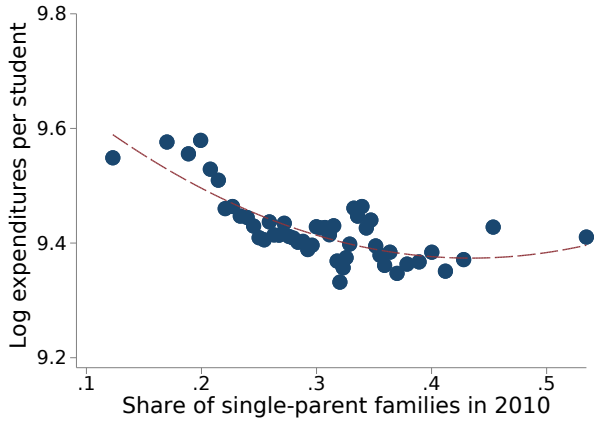
(a) Expenditures and county median household income



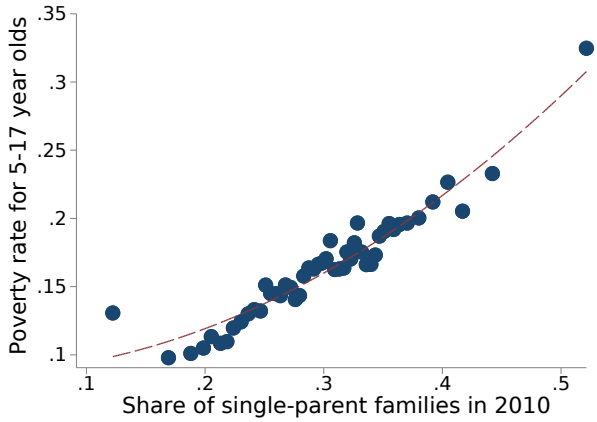
(b) Expenditures and share of college-educated (2010)



(c) Expenditures and share of single parents



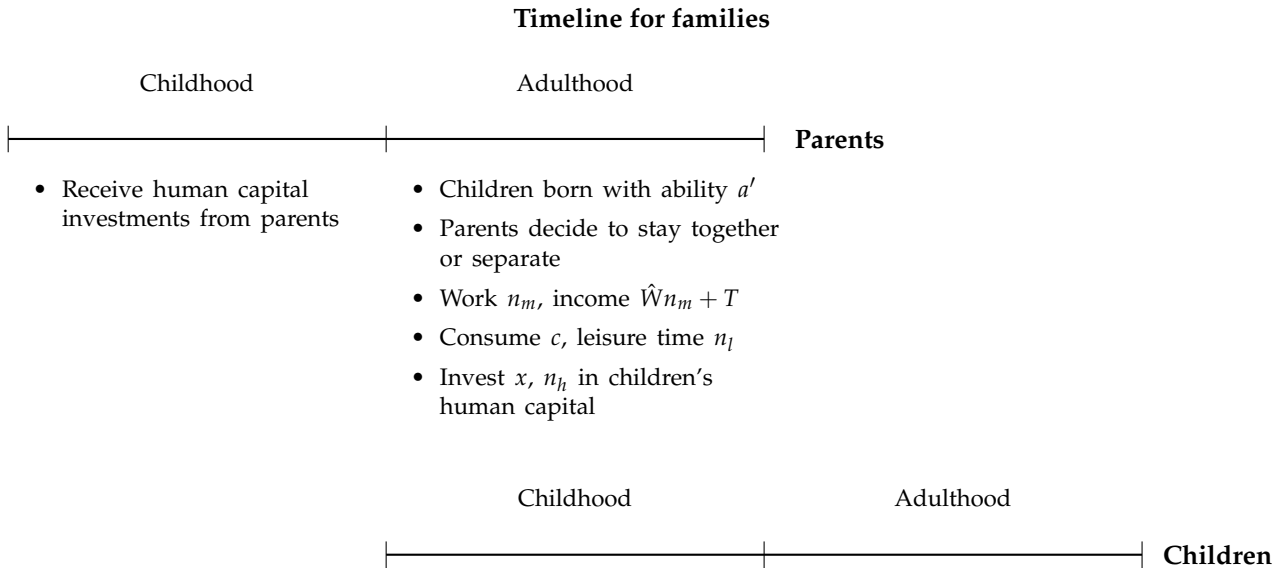
(d) Child poverty rate and share of single parents



Notes: This figure shows binned scatter plots, controlling for year fixed effects and district share of special education students and highest grade offered, of the relationships between district-level public education expenditures per student, county median household income, share of college-educated residents, and share of single-parent families.

of life, one as children and one as parents, so dynasties are sequences of overlapping generations of parents and children. The timeline for dynasties in each period is described below.

Children are passive and receive human capital investments from their parents. Upon reaching adulthood, new adults have children and then decide to separate or not, determining family structure and available parental time. Parents then allocate their time between market work, leisure, and time investments, and their expenditures between consumption and education investments.



3.1.2 Child ability and human capital production

Children are endowed with learning ability a_{it+1}, partially inherited from parents according to

$$\log(a_{it+1}) = \underbrace{\zeta \log(a_{it})}_{\substack{\text{Intergenerational} \\ \text{persistence}}} + \underbrace{(1-\zeta)\mu_a}_{\substack{\text{Mean} \\ \text{reversion}}} + \underbrace{\nu_{a_{it+1}}}_{\substack{\text{Ability} \\ \text{shock}}}.$$

The first term captures intergenerational persistence of ability across generations, where ζ is the degree of persistence; the second captures mean reversion; and the third is an iid ability shock.

Human capital is produced combining time ($n_{h_{it}}$), private education (x_{it}), and public education ($\bar{x}_t$) investments via human capital production technology, which can vary across cohorts

$$h_{it+1} = H_t(\bar{x}_t + x_{it}, n_{h_{it}}; a_{it+1}, h_{it}). \tag{1}$$

Child ability and parent human capital determine the productivity of human capital development, capturing intergenerational persistence not explained by economic behavior. Parent human capital determines the *human capital production efficiency* of the parents and also the *quality of the home or neighborhood environment*, similar to in Benabou (2002).[17] A key assumption here is that parental human capital increases productivity not only in the labor market but also in the production of children's human capital, a notion going back to Becker (1965). Education can help parents better understand the most effective methods to achieve similar outcomes. Highly educated parents might be better able to help navigate their children through the school system at various levels and

[17]The relationship between parental human capital, human capital production efficiency, and the quality of the home/neighborhood environment can change over time due to factors not modeled here, such as changes in parenting styles and neighborhood effects from increasing neighborhood income segregation (Doepke and Zilibotti, 2017; Fogli et al., 2024).

assist with school work of greater complexity (Becker et al., 2018). Children with highly educated parents are more likely to grow up in an environment conducive to human capital development.

3.1.3 Labor market productivity, wages, and income

Labor market productivity is characterized by human capital h_{it}, a permanent income shock ν_{it}, and technology parameter γ_t according to

$$h_{it}^{\gamma_t}\nu_{it}.$$

Permanent income shocks are iid drawn from a log normal distribution with mean one such that $\nu_{it} \sim \log\mathcal{N}(\frac{-\sigma_\nu^2}{2}, \sigma_\nu^2)$. The technology parameter γ_t captures cohort-specific returns to human capital. Changes in γ_t represent skill-biased technological change (SBTC). An increase in γ_t disproportionately raises the productivity of high-human capital workers, raising the skewness of the distributions of wages and income.

Wages W_{it} are a combination of labor market productivity and the overall price of effective labor w_t, and capture the permanent component of income

$$\log(W_{it}) = \underbrace{\log(w_t)}_{\substack{\text{Overall price}\\ \text{of labor}}} + \underbrace{\gamma_t \log(h_{it}) + \log(\nu_{it})}_{\substack{\text{Efficiency units}\\ \text{of labor}}}. \tag{2}$$

Hours worked in the market are $n_{m_{it}}$, so a household's (pre-tax) income is $W_{it}n_{m_{it}}$.

3.1.4 Taxes

The government taxes income to finance transfers, tax credits, and public education in addition to non-valued government expenditures, totaling G_t. If $W_{it}n_{m_{it}}$ is pre-tax income, then $\hat{W}_{it}n_{m_{it}}$ is after-tax income, where $\hat{W}_{it}$ is the after-tax wage given by

$$\log(\hat{W}_{it}) = \underbrace{\log(\lambda_t(n_{it}))}_{\substack{\text{Governs}\\ \text{tax level}}} + \underbrace{(1-\tau_t(n_{it}))}_{\substack{\text{Governs}\\ \text{progressivity}}}\log(W_{it}). \tag{3}$$

The parameters $\lambda_t(n_{it})$ and $\tau_t(n_{it})$ govern the level and progressivity of taxes, respectively, and vary by family structure, which is determined by n_{it}.[18] Income taxes are

$$\Big[\underbrace{w_t h_{it}^{\gamma_t}\nu_{it}}_{\text{Pre-tax wage}} - \underbrace{\lambda_t(n_{it})[w_t h_{it}^{\gamma_t}\nu_{it}]^{1-\tau_t(n_{it})}}_{\text{After-tax wage}}\Big] n_{m_{it}}.$$

[18] Boerma and Karabarbounis (2021) use a similar tax function, which is a modified tax schedule on wages instead of income as in Benabou (2002) and Heathcote et al. (2017). Guner et al. (2014) estimate parameters for this class of tax functions and find they differ by family structure for the United States.

3.1.5 Means-tested transfers

The government provides mean-tested transfers T_{it} to lower-income families with children.

$$T_{it} = T_t(W_{it} n_{m_{it}}, n_{it})$$

Transfers decline with household pre-tax income, $W_{it} n_{m_{it}}$, and differ by family structure, captured by n_{it}. Two values determine a household's transfers: (1) guaranteed transfer amount, which is how much a family receives in transfers with zero income, and (2) the benefits reduction rate, which is how much transfers decline with income. Both values can vary by family structure.

3.1.6 Public education

Public education expenditures for each family are $D_t = p_{xt} \bar{x}_t$, which are financed through income taxes and include public spending for elementary, secondary, and tertiary education (K-12 through college). Children receive effective public education investments of $\bar{x}_t$ after accounting for p_{xt}.

3.1.7 Preferences

Parents have preferences over two objects: current utility u_{it} from consumption and leisure and their children's human capital h_{it+1}. Lifetime utility is a constant elasticity of substitution (CES) aggregator of u_{it} and h_{it+1}

$$\left[\Big(u_{it} \Big)^{\frac{\rho-1}{\rho}} + \beta \Big(h_{it+1} \Big)^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}} \tag{4}$$

where β is captures the weight on children's human capital versus current utility and $\rho > 0$ is the elasticity of substitution between child human capital and current utility. Current utility is a function of effective per-parent consumption $\frac{c_{it}}{e_c(n_{it})}$ and leisure $n_{l_{it}}$

$$u_{it} = u\Big(\frac{c_{it}}{e_c(n_{it})}, n_{l_{it}} \Big), \tag{5}$$

where $e_c(n_{it})$ are economies of scale in consumption. The non-separability of preferences implies parents internalize both their children's learning ability and their human capital when allocating resources, leading to differences in time and expenditure levels and shares across families.

3.1.8 Family structure

After children are born, new parents make a discrete choice between staying together or separating after receiving a match quality (preference) shock ξ_{it}. The choice to separate or not is over per-parent expected utility, taking expectations over permanent income shock ν_{it}

$$\max_{M,S} \left\{ \underbrace{(1/2)\mathbb{E}_\nu[V_t(h, 2\bar{n}, \nu, a')] + \xi}_{\text{M = married}}, \underbrace{\mathbb{E}_\nu[V_t(h, \bar{n}, \nu, a')]}_{\text{S = single}} \right\} \tag{6}$$

where V_t is the parent's value function. Preference shocks are drawn from a normal distribution $\xi \sim \mathcal{N}(\mu_{\xi t}, \sigma_{\xi t}|h)$ whose mean and standard deviation can change across cohorts. The change in distribution over time captures trends in unmodeled and non-economic reasons for the rise in single parenthood.[19] Taxes and transfers available for single and married parents affect family formation as the relative economic benefits of staying together or not differs. Preference shocks are correlated with parental human capital, motivated by the negative correlation between single parenthood and income in the data.[20] In each period dynasties are endowed with $2\bar{n}$ units of total parental time. Families with married parents have a time endowment of $n_{it} = 2\bar{n}$. If parents separate, total parental time is divided between custodial and non-custodial parents such that a family's time endowment is $n_{it} = \bar{n}$ and non-custodial parent's time endowment is $n_{it}^{nc} = \bar{n}$.

3.1.9 Parent's problem

Parents enter the decision stage with state vector $\{h_{it}, n_{it}, \nu_{it}, a_{it+1}\}$ and choose $\{n_{m_{it}}, n_{l_{it}}, n_{h_{it}}, c_{it}, x_{it}\}$ to solve the following problem

$$\begin{aligned} V_t(h_{it}, n_{it}, \nu_{it}, a_{it+1}) = \max_{\substack{n_{m_{it}}, n_{l_{it}}, n_{h_{it}} \\ c_{it}, x_{it}}} & \left[\left(u_{it}\right)^{\frac{\rho-1}{\rho}} + \beta \left(h_{it+1}\right)^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}} \\ \text{s.t. } & n_{it} = n_{m_{it}} + n_{l_{it}} + n_{h_{it}} \\ & p_{ct} c_{it} + p_{xt} x_{it} = \hat{W}_{it} n_{m_{it}} + T_{it} \\ & u_{it} = u\left(\frac{c_{it}}{e_c(n_{it})}, n_{l_{it}}\right) \\ & h_{it+1} = H_t(\bar{x}_t + x_{it}, n_{h_{it}}; a_{it+1}, h_{it}) \end{aligned} \tag{7}$$

3.1.10 Sectoral production

There are two sectors, consumption (c) and education (x). Production technology in each sector is linear in efficiency units of labor. Output is given by $Y_{jt} = A_{jt} Z_{jt}$, where A_{jt} is productivity for sector j and Z_{jt} is total efficiency units of labor. The price for sector j goods and services is p_{jt}, and

[19] Ellwood and Jencks (2004) suggest single parenthood increased due to a combination of changes in contraceptive technology, evolving attitudes towards non-marital sex and births, and dramatic shifts in gender roles and expectations surrounding maternal employment coupled with declining economic opportunity for less-educated men. Moffitt (1998) finds a weakly positive relationship between the expansion of welfare during the 1960s and single parenthood.

[20] There is no child support or visitation for non-custodial parents; non-custodial parents solve a consumption-leisure problem independently and are not involved in the children's lives going forward. See Section B.1 for the non-custodial parents problem.

the overall price of effective labor is w_t, equalized across sectors due to labor mobility.

Taking prices as given, the firm's profit maximization problem in sector $j \in \{c, x\}$ is

$$\max_{Z_{jt}} \; p_{jt} A_{jt} Z_{jt} - w_t Z_{jt}.$$

In equilibrium, sectoral prices are given by

$$p_{jt} = \frac{w_t}{A_{jt}} \implies \frac{p_{xt}}{p_{ct}} = \frac{A_{ct}}{A_{xt}}.$$

Thus, if A_{ct} grows faster than A_{xt}, the relative price of education will rise over time.

3.1.11 Equilibrium

The formal definition of equilibrium is stated in Section B.3.

3.2 Equilibrium allocations

In this section I specify functional forms for current utility and human capital production technology and derive equilibrium allocations for investments in closed-form. I then show under household optimality how dynasty human capital evolves over time and the impact family resources, prices, policy, and technology have on dispersion and persistence of wages.

3.2.1 Functional forms

Current utility u_{it} is a function of effective per-parent consumption $\frac{c_{it}}{e_c(n_{it})}$ and leisure $n_{l_{it}}$, given by

$$u_{it} = \left[\frac{c_{it}}{e_c(n_{it})}\right]^{\psi} n_{l_{it}}^{1-\psi}, \tag{8}$$

where ψ governs the importance of consumption relative to leisure.

The technology for human capital production is

$$h_{it+1} = a_{it+1} h_{it}^{\eta_t} [\bar{x}_t + x_{it}]^{\phi} n_{h_{it}}^{1-\phi}, \tag{9}$$

where ϕ governs the importance of education investments relative to time investments and η_t is the elasticity of child's human capital with respect to parent's. When η_t is combined with parental human capital it forms parents' human capital production efficiency $h_{it}^{\eta_t}$.[21] While Cobb-Douglas

[21] Human capital production efficiency also captures the quality of the home or neighborhood environment, i.e. how conducive the children's environment is to human capital development. Changes in η_t represent unmodeled changes in the mapping between a parent's human capital and the parent's human capital production efficiency. This includes factors like parenting quality, parenting styles, and neighborhood quality, all positively correlated with parent human capital (Reeves and Howard, 2013; Fogli et al., 2024). Doepke and Zilibotti (2017) shows there have been broad changes

technology with constant returns to scale is somewhat restrictive, it allows to maintain tractability and exhibits complementarities between investments.

3.2.2 Optimal investments

Building on Benabou (2002), this model has closed form solutions for parental investments, child human capital, inequality, and persistence. In this section I explore these analytical results and use them to derive intuition about the key mechanisms of the model. Throughout, I focus on the case $\rho > 1$ and $\psi > \phi$, which is consistent with the full calibrated version of the model below.

Denote relative expenditures of education to consumption as $\theta \equiv \frac{p_x[\bar{x}+x]}{p_c c}$. Under household optimality, θ is given by

Relative expenditures

$$\log(\theta_{it}) = \Gamma + \underbrace{(\rho-1)\log(a_{it+1})}_{\text{Child ability}} + \underbrace{(\rho-1)\log(h_{it}^{\eta_t}) - (\psi-\phi)(\rho-1)\log(\hat{W}_{it})}_{\text{Parent human capital production efficiency and after-tax wage}} \tag{10}$$
$$+ \underbrace{\psi(\rho-1)\log(e_c(n_{it}))}_{\text{Economies of scale}} - \underbrace{\phi(\rho-1)\log(p_{xt})}_{\text{Price of education}} + \underbrace{\psi(\rho-1)\log(p_{ct})}_{\text{Price of consumption}}$$

This relation shows many of the trade-offs parents face when deciding between investments versus consumption and leisure. Because parents internalize their children's learning ability and their own human capital production efficiency, they will invest more if their children has high ability and/or they have high human capital, all else equal. These two effects, the *child ability* and *human capital production efficiency* effects, work to offset substitution effects of after-tax wages and prices. This is consistent with parental investments in the data: parents with higher human capital tend to investment more in their children's development.

Equation 10 also highlights how tax progressivity affects parental investments. For instance, if there is an increase in tax progressivity such that after-tax wages are now higher than pre-tax wages due to a wage subsidy for lower-income families, then the substitution effect of after-tax wages will be larger, leading to less investment for parents in lower-income families. The main channel for this reduction in investments is through a lower relative return to time investments compared to market work. Agostinelli and Sorrenti (2022) find evidence that expansions of the

towards more effective parenting styles since the 1960s, with greater uptake by highly educated parents. See Section D.4 for more discussion and empirical evidence on parenting styles. Trends at the neighborhood level indicate less diverse communities in terms of socioeconomic background due to an increase in income segregation (Reardon and Bischoff, 2011). Fogli et al. (2024) find that inequality and income segregation amplify each other because of local spillovers from neighborhood peer effects that change returns to education. Rising income segregation means that children are growing up in more unequal communities in terms of neighborhood and peer quality. Greater income segregation is correlated with lower mobility for an area Chetty et al. (2014a). These effects combined steepen the relationship between parent human capital and human capital production efficiency. Human capital production efficiency, along with child ability, determine the productivity of human capital development.

EITC in the 1990s had unintended negative effects on child development. Their results indicate that higher returns to working from the expanded tax credit lead to greater labor supply and a decline in the amount and quality of time investments.[22]

Turning to education and time investments in Equations 11 and 12, tax progressivity and the generosity of means-tested transfers have important implications for parental investments. Since investments depend on total available family resources, which is the full value of parents' time priced at their after-tax wage plus the amount received in transfers and public education expenditures, policy design directly affects how much parents invest by altering total family resources. First, transfers produce an income effect, leading to more investments if a family receives benefits. Second, after-tax wages produce both a substitution and income effect. Note that for time investments the substitution effect of after-tax wages is substantially higher than for education investments and more closely-tied to a family's wage. While the substitution effect of education prices is higher for education than for time investments, an increase in the price of education leads to almost uniform declines in investments across all families. Whichever effects dominate depends on the level of tax progressivity and shape of transfer functions for different family types. This suggests there should be more debate on how to design assistance programs for disadvantaged families to support child development (Agostinelli and Sorrenti, 2022).

Education investments

$$\begin{aligned}\log(\bar{x}_t + x_{it}) = \Lambda &+ \underbrace{(\rho-1)\log(a_{it+1})}_{\text{Child ability}} + \underbrace{(\rho-1)\log(h_{it}^{\eta_t})}_{\substack{\text{Human capital}\\ \text{production efficiency}}} - \underbrace{(\psi-\phi)(\rho-1)\log(\hat{W}_{it})}_{\text{After-tax wage}} \\ &+ \underbrace{\log(\hat{W}_{it}n_{it} + T_{it} + p_{xt}\bar{x}_t)}_{\text{Total available resources}} + \underbrace{\psi(\rho-1)\log(e_c(n_{it}))}_{\text{Economies of scale}} - \underbrace{\log(\phi+\psi\theta_{it})}_{\substack{\text{Relative}\\ \text{expenditures}}} \\ &- \underbrace{[1+\phi(\rho-1)]\log(p_{xt})}_{\text{Price of education}} + \underbrace{\psi(\rho-1)\log(p_{ct})}_{\text{Price of consumption}}\end{aligned} \tag{11}$$

Time investments

$$\begin{aligned}\log(n_{h_{it}}) = \Sigma &+ \underbrace{(\rho-1)\log(a_{it+1})}_{\text{Child ability}} + \underbrace{(\rho-1)\log(h_{it}^{\eta_t})}_{\substack{\text{Human capital}\\ \text{production efficiency}}} - \underbrace{[1+(\psi-\phi)(\rho-1)]\log(\hat{W}_{it})}_{\text{After-tax wage}} \\ &+ \underbrace{\log(\hat{W}_{it}n_{it} + T_{it} + p_{xt}\bar{x}_t)}_{\text{Total available resources}} + \underbrace{\psi(\rho-1)\log(e_c(n_{it}))}_{\text{Economies of scale}} - \underbrace{\log(\phi+\psi\theta_{it})}_{\substack{\text{Relative}\\ \text{expenditures}}} \\ &- \underbrace{[\phi(\rho-1)]\log(p_{xt})}_{\text{Price of education}} + \underbrace{\psi(\rho-1)\log(p_{ct})}_{\text{Price of consumption}}\end{aligned} \tag{12}$$

[22] Kalil et al. (2022) also finds declines in parenting quality but no significant change in hours.

Further, single parenthood affects investments in two ways. First, due to economies of scale in consumption, married parents are able to allocate more resources towards investments as they do not need exactly double the amount of consumption as two single adults. This is reflected in relative expenditures in Equation 10 and investments in Equations 11 and 12. Second, family structure results in lower total available resources for investments compared to married parents with similar attributes, constraining investments significantly. This, coupled with the higher probability of single parenthood for those with lower human capital, can result in poverty traps. Thus, if a dynasty experiences single parenthood it can have persistent effects on future generations.

3.3 Implications for inequality and intergenerational mobility

Taking optimal investments in Equations 11 and 12 and inputting them into the human capital production function gives the law of motion for dynasty human capital in Equation 13. The evolution of human capital naturally depends on family heterogeneity and trade-offs of allocating time and expenditures between investments and consumption, leisure, and market work.

Law of motion for dynasty human capital

$$\begin{aligned}\log(h_{it+1}) = \Psi &+ \underbrace{\rho \log(a_{it+1})}_{\text{Child ability}} + \underbrace{\rho\eta_t \log(h_{it}) - [(\psi-\phi)\rho + (1-\psi)]\log(\hat{W}_{it})}_{\text{Parent human capital and after-tax wage}} \\ &+ \underbrace{\log(\hat{W}_{it} n_{it} + T_{it} + p_{xt}\bar{x}_t)}_{\text{Total available resources}} + \underbrace{\psi(\rho-1)\log(e_c(n_{it}))}_{\text{Economies of scale}} - \underbrace{\log(\phi + \psi\theta_{it}(\mathcal{S}_{it}))}_{\text{Relative expenditures}} \\ &- \underbrace{\phi\rho \log(p_{xt})}_{\text{Price of education}} + \underbrace{\psi(\rho-1)\log(p_{ct})}_{\text{Price of consumption}}\end{aligned} \tag{13}$$

where $\mathcal{S}_{it} = (\hat{W}_{it}, h_{it}^{\eta_t}, n_{it}, a_{it+1}; p_{xt}, p_{ct})$.

Importantly, Equation 13 demonstrates how family resources of previous cohorts – determined by family heterogeneity, prices, technology, and policy – impacts dispersion and intergenerational persistence of wages (i.e. the permanent component of income) for the next cohort through the mapping of human capital to wages.

Log wages for individuals in cohort $t+1$ are

$$\log(W_{it+1}) = \log(w_{t+1}) + \gamma_{t+1}\log(h_{it+1}) + \log(\nu_{it+1}),$$

with variance

$$\sigma^2_{Wt+1} = \gamma^2_{t+1}\boxed{\sigma^2_{ht+1}} + \sigma^2_{\nu}. \tag{14}$$

Taking the variance over Equation 13 gives the variance of log human capital

$$\sigma^2_{ht+1} = \underbrace{\rho^2\sigma^2_a}_{\substack{\text{Variance of}\\ \text{ability}}} + \underbrace{\rho^2\eta^2_t\sigma^2_{ht} + [(\psi-\phi)\rho + (1-\psi)]^2\sigma^2_{\hat{W}t}}_{\substack{\text{Variance of parent human}\\ \text{capital and after-tax wages}}} \tag{15}$$
$$+ \underbrace{\sigma^2_{(\hat{W}n+T+p_x\bar{x})t} + \psi^2(\rho-1)^2\sigma^2_{e_c(n)t}}_{\substack{\text{Variance of total available resources}\\ \text{and economies of scale}}} + \underbrace{\sigma^2_{(\phi+\psi\theta)t}}_{\substack{\text{Relative}\\ \text{expenditures}}}$$

Prior cohorts' distributions of human capital, after-tax wages, and total family resources are important for wage dispersion for subsequent cohorts. Family structure also plays a direct role through economies of scale, further amplifying investment differences between single and married parents. Note that the price of education only enters through the final term related to relative expenditures. Relative expenditures are small compared to ψ and ϕ, so the variance of $\log(\psi + \phi\theta_{it})$, and prices, is likely not a major driving force of inequality.

Lastly, taking the law of motion for dynasty human capital in Equation 13 and applying it to log wages gives the relationship between child and parent wages, shown in Equation 16.[23] This relationship details how various factors affect intergenerational persistence. Note the importance of SBTC, a key driver of changes in persistence across cohorts just like for inequality.[24]

Relationship between child and parent wages

$$\begin{aligned}\log(W_{it+1}) = \Psi &+ \underbrace{\log(w_{t+1}) - \gamma_{t+1}\frac{\rho\eta_t}{\gamma_t}\log(w_t)}_{\text{Overall price of labor}} + \gamma_{t+1}\underbrace{\left[\psi(\rho-1)\log(p_{ct}) - \phi\rho\log(p_{xt})\right]}_{\text{Consumption and education prices}}\\
&+ \gamma_{t+1}\Big[\underbrace{\rho\log(a_{it+1})}_{\text{Ability}} + \underbrace{\psi(\rho-1)\log(e_c(n_{it}))}_{\text{Economies of scale}}\Big]\\
&+ \gamma_{t+1}\underbrace{\left[\frac{\rho\eta_t}{\gamma_t}\log(W_{it}) - [(\psi-\phi)\rho + (1-\psi)]\log(\hat{W}_{it})\right]}_{\text{Pre- and post-tax wages}}\\
&+ \gamma_{t+1}\Big[\underbrace{\log(\hat{W}_{it}n_{it} + T_{it} + p_{xt}\bar{x}_t)}_{\text{Total resources}} - \underbrace{\log(\phi + \psi\theta_{it}(\mathcal{S}_{it}))}_{\text{Relative expenditures}}\Big]\\
&+ \underbrace{\log(\nu_{it+1}) - \gamma_{t+1}\frac{\rho\eta_t}{\gamma_t}\log(\nu_{it})}_{\text{Permanent income shocks}}\end{aligned} \tag{16}$$

where $\mathcal{S}_{it} = (\hat{W}_{it}, h_{it}^{\eta_t}, n_{it}, a_{it+1}; p_{xt}, p_{ct})$.

[23] This is similar to the intergenerational transmission of earnings from Equation 10 in Becker et al. (2018).

[24] Davis and Mazumder (2024) find that increased intergenerational persistence is likely driven by rising returns to education and an increasing gradient in the likelihood of marriage by parent income.

Equation 16 highlights how differently wages evolve for dynasties. Due to heterogeneity across families, including for policy treatment, the mapping from parent to child wages varies due to family characteristics, and in the aggregate, is influenced by factors that affect the distribution of family resources and trade-offs to parental investments versus working, consumption, and leisure. Mobility at different points of distribution can be affected by targeted policy. This implies a potentially important channel for affecting long-run inequality and intergenerational mobility by considering differential impacts of policy on parental investments across families. Policy can be targeted more effectively towards lower-income families to promote greater investments.

4 Quantitative analysis

Here I perform the quantitative analysis. First I parameterize the model. Next I evaluate how well the model accounts for trends in family structure, parental investments, inequality, and mobility. Finally, I conduct counterfactual experiments for alternative scenarios of changes in family resources. The counterfactuals quantify how changes in family resources and trade-offs to investments contributed to or mitigated the rise in income inequality and intergenerational persistence.

4.1 Parameterization

The parameterization of the model involves setting several parameters external to the model and then jointly calibrating remaining parameters to minimize the distance between simulated moments from the model and targeted moments from the data.

4.1.1 Parameters set outside the model

A model period is 24 years long with periods corresponding to (1) 1947-1970, (2) 1971-1994, and (3) 1995-2018. The available time per parent is $\bar{n} = 112$ hours, giving 224 total available hours for each set of parents.[25] Economies of scale $e_c(n) = 1.34$ are set to the mean of estimated household equivalence scales for a family of two from Table 1 in Fernández-Villaverde and Krueger (2007).

Relative prices in the model are given by $\frac{p_{xt}}{p_{ct}} = \frac{A_{ct}}{A_{xt}}$. For relative sectoral productivity, $\frac{A_{ct}}{A_{xt}}$, I take the Personal Consumption Expenditures Price Index (PCEPI) for *Education services*, divide by the PCEPI for overall prices, and normalize such that relative productivity for 1947-1970 equals 1. I take averages for each period:

$$\left\{\frac{A_{ct}}{A_{xt}}\right\}_t = \{1, 1.51, 3.47\}.$$

To estimate tax parameters by family structure I draw on data from the CPS-ASEC as described in Section 2.1, using information on pre-tax income, tax liabilities at the federal and state level,

[25] Available time per parent is set to the number of hours parents are available in a week for work, leisure, and time investments (16 hours per day) allowing personal time of 8 hours per day.

Table 2: Tax progressivity parameters

Cohort	**Single parents**	**Married parents**	**Non-custodial parents**
1947-1970	0.05	0.08	0.07
1971-1994	0.06	0.10	0.07
1995-2018	0.13	0.15	0.07

Notes: This table shows the values of tax progressivity parameters $\tau_t(n)$ estimated from the CPS-ASEC and Feenberg et al. (2017)

payroll taxes, tax credits, and hours worked. The estimates come from regressions of log after-tax wages on log pre-tax wages for each family type in every year, and take averages of estimates for the three periods corresponding to the model. Since the CPS-ASEC data on taxes and tax credits is only available from 1991 onward, I impute back to 1960 by taking a similar estimate of tax progressivity from Feenberg et al. (2017) and assuming that tax progressivity starts deviating for households with children in the late 1980s.[26] The imputed values take estimates from the above regressions and follow the same path backward in time as the tax progressivity estimates from Feenberg et al. (2017). Estimates for $\tau_t(n)$ used in the model are in Table 2.[27] Tax progressivity increased markedly for households with children in the final period with expansions of tax credits.

Transfers $T_{it} = T_t(W_{it}n_{m_{it}}, n_{it})$ take the following form

$$\begin{aligned} T_t(W_{it}n_{m_{it}}, n_{it}) &= G_t(n_{it}) && \text{if } G_t(n_{it}) - r_t(n_{it})W_{it}n_{m_{it}} > 0 \\ &= 0 && \text{if } G_t(n_{it}) - r_t(n_{it})W_{it}n_{m_{it}} \leq 0 \end{aligned}$$

$G_t(n_{it})$ is the guaranteed transfer amount and $r_t(n_{it})$ is the benefit reduction rate, both differing for single and married parents, and $W_{it}n_{m_{it}}$ is pre-tax income. If a family receives a positive transfer, their effective after-tax wage is $\hat{W}_{it} = \lambda_t(n_{it})W_{it}^{1-\tau_t(n_{it})} - r_t(n_{it})W_{it}$ to incorporate the benefit reduction rate $r_t(n_{it})$. I estimate the guaranteed transfer amounts and benefit reduction rates using CPS-ASEC data as described in Section 2.1.3. First, I normalize household income and transfers by mean household income in each year then regress normalized transfers on normalized household income for each period. As the data corresponds to annual income and transfers, I multiple normalized transfers by 1/4 (6 years receiving benefits/24 year periods), as households who ever receive transfers participate in means-tested transfer programs for about six years over their lifetime on average (Pavetti, 1996). Estimated transfer functions are shown in Figure C3, which display the benefits families receive by normalized pre-tax and transfer household income.[28]

Public education expenditures $D_t = p_{xt}\bar{x}_t$ are set as a fraction of mean family income, combining

[26] See Figure C1 in Section C.1.

[27] The parameters for the level of taxes ($\lambda_t(n)$) are set in the model such that total taxes as a share of income are 11.5%, which is the average ratio of personal current taxes to personal income in NIPA Table 2.1 from the BEA.

[28] Transfer functions are similar to those estimated in Guner et al. (2023).

federal and state sources of funding for public K-12 and higher education expenditures per student, the latter weighted by full-time equivalent enrollment rates as not all young adults attend higher education institutions. Before summing, K-12 expenditures and higher education expenditures are weighted by the share of years that the expenditures cover within a model period of 24 years: 13/24 years for K-12 and 6/24 years for higher education. See Section C.1 for more details.

4.1.2 Joint calibration of remaining parameters

Here I discuss joint calibration of the remaining parameters. There are seven parameters fixed across cohorts $(\beta, \rho, \phi, \psi, \sigma_v, \sigma_a, \zeta)$, five parameters that vary across cohorts $(w_t, \gamma_t, \eta_t, \mu_{\xi t}, \varrho_t)$, and the mean and standard deviation of the initial distribution of human capital, assumed log normal (μ_{h0}, σ_{h0}). First I make distributional assumptions then discuss the joint calibration procedure.

Distributional assumptions
Initial distributions of human capital and ability correlated. I use a Gaussian copula to derive a joint distribution with dependence parameter r within the model.

$$\begin{bmatrix} h_{i0} \\ a_{i0} \end{bmatrix} \sim \log N(\boldsymbol{\mu_0}, \boldsymbol{\Sigma_0})$$

Process for generating the initial distributions of parent human capital and ability is the following

1. Draw two samples from from a standard normal distribution, $\{s^1_{i0}\}, \{s^2_{i0}\}$
2. Generate initial distribution of log ability such that $\log(a_{i0}) = \mu_a + \sigma_a s^1_{i0}$
3. Initial human capital (correlated with ability) s.t. $\log(h_{i0}) = \mu_{h0} + \sigma_{h0} \cdot \left(\varrho_a s^1_{i0} + \sqrt{1-\varrho_a^2} s^2_{i0}\right)$

where (μ_a, σ_a) are the mean and standard deviation of log ability and (μ_{h0}, σ_{h0}) the mean and standard deviation of initial log human capital, to be estimated jointly.[29]

For the match quality preference shocks, I first set the standard deviation as half of the mean $\sigma_{\xi t} = (1/2)\mu_{\xi t}$. Match quality preference shocks for family formation are assumed correlated with human capital $\xi_{it} \sim N(\mu_{\xi t}, \sigma^2_{\xi t}|h)$ to capture the negative relationship between single parenthood and human capital. The dependence parameter is ϱ_t can vary across periods. The process for using a Gaussian copula to derive the joint distribution is

1. Standardize the distribution of log human capital, which is approximately normal, to have mean zero and standard deviation one $\log(\bar{h}_{it}) = (\log(h_{it}) - \mu_{ht})/\sigma_{ht}$
2. Draw sample from a standard normal distribution for all households $\epsilon_{it} \sim \mathcal{N}(0,1)$
3. Preference shocks are constructed as $\xi_{it} = \mu_{\xi t} + \sigma_{\xi t} \cdot \left(\varrho_t \log(\bar{h}_{it}) + \sqrt{1-\varrho_t^2}\epsilon_{it}\right)$

[29] Correlation = 0.3 from NLSY data on log wages and AFQT score.

Ability shocks are drawn from a stationary distribution, $\nu_{a_{it+1}} \sim \mathcal{N}(0, (1-\zeta^2)\sigma_a^2)$. Learning ability is distributed log normal with mean equal to 1, such that $a_{it+1} \sim \log\mathcal{N}(\frac{-\sigma_a^2}{2}, \sigma_a)$. Permanent income shocks are distributed log normal such that $\nu_{it} \sim \log\mathcal{N}(\frac{-\sigma_\nu^2}{2}, \sigma_\nu^2)$. In each period human capital is normalized to have the same mean.

Minimum distance estimation

Here I describe the joint calibration procedure for the remaining parameters: seven parameters that are fixed across cohorts $(\beta, \rho, \phi, \psi, \sigma_\nu, \sigma_a, \zeta)$, five time-varying parameters $(w_t, \gamma_t, \eta_t, \mu_{\xi t}, \varrho_t)$, and the mean and standard deviation of the initial distribution of parent human capital, assumed log normal (μ_{h0}, σ_{h0}). To estimate the remaining parameters I minimize the sum of squared percentage differences between simulated moments from the model and targeted moments from the data. When setting parameters I do not target investments by family structure. The targeted moments are chosen such that the model captures key aspects of single parenthood, the family income distribution, and investments for the US during 1947-1970, 1971-1994, and 1995-2018.

Targeted moments for single parenthood are the average share of single-parent families and the correlation between (pre-tax and transfer) log household income in each period. The share of single-parent families is calculated using data from US Census Table FM-1 and is most closely related to $\mu_{\xi t}$, the mean of match quality preference shocks. The correlation of single parenthood with log household income comes from the CPS-ASEC and is most closely associated with ϱ_t, the dependence parameter for match quality preference shocks.

Moments for the distribution of family income are mean family income (weekly), Gini coefficient of family income, P95-P20 ratio of family income, the share of income variance due to permanent factors for 1971-1994, and the IGE of family income in 1971-1994 and 1995-2018.[30] I target mean family income in each period for mean log human capital in the initial period and the overall price of labor for the second and third periods. For the standard deviation of log human capital in the initial period and standard deviation of log ability I target the Gini coefficient for family income. For the returns to human capital, captured by γ_t, I target the P95-P20 ratio for family income as increases in γ_t skew the income distribution. The standard deviation of permanent income shocks, σ_ν, determines the variation in the permanent component of income after reaching adulthood not due to human capital, so I target the estimated share of income variance due to permanent factors from Huggett et al. (2011), which corresponds most closely to the second period of my model. For the intergenerational persistence of ability I target estimates of the IGE of family income for 1980 and 2000 from Aaronson and Mazumder (2008) in the second and third periods, respectively.

[30] The first three family income distribution moments are calculated from US Census data: Table F-5, Table F-4, and Table F-1, respectively. The share of income variance due to permanent factors for 1971-1994 comes from Huggett et al. (2011), who estimate the share of lifetime income variance attributed to permanent factors on data from 1969-2004. The IGE of family income for 1971-1994 and 1995-2018 cohorts are estimates of the IGE of family income for 1980 and 2000, respectively, from Table 1, Column (2) from Aaronson and Mazumder (2008).

Table 3: Cohort-invariant parameters

Parameter	Description	Value
β	Degree of paternalism	0.20
ρ	Elasticity of substitution between current utility and child human capital	2.05
ϕ	Importance of education investments for human capital production	0.27
ψ	Importance of consumption for current utility	0.34
σ_ν	Standard deviation of log permanent income shocks	0.44
σ_a	Standard deviation of log ability	0.18
ζ	Intergenerational persistence of ability	0.33

The moments targeted for investments and labor supply are aggregate relative expenditures of education versus consumption $\frac{\sum p_x x}{\sum p_c c}$, the elasticity of education expenditures to income, the ratio of mean time investments between the highest and lowest human capital quintile, average time investment share, and the average market hours share.[31] The parameter β is the weight on children's human capital in preferences so I target the ratio of education expenditures to consumption expenditures. The target moment for the elasticity of substitution between current utility and child human capital (ρ) is the ratio in average time investments for college-educated parents compared to parents with less than a high school degree (highest and lowest human capital quintiles in the model). Equation 12 indicates parents with higher human capital will spend more time on time investments if $\rho > 1$ (i.e. substitutes). The parameter ϕ captures the importance of education investments compared to time investments, $1 - \phi$, and I target the mean time investment share for families. Similarly, for ψ, the importance of consumption in current utility, I target the average market work time share for families.

Parameter values

The estimated parameter values are listed in Tables 3 and 4. There are a few things worth noting. First, the elasticity of substitution ρ is greater than one (2.05), indicating that current utility and child human capital are substitutes in parents' utility. This means that parents with higher human capital will invest more in their children's development compared to parents with lower human capital, lining up with evidence provided in Section 2.2. Second, $\psi > \phi$, indicating consumption is more important for current utility than education investments are for human capital production. This means an increase in wage subsidies for lower-income families will decrease time investments as there are greater returns to working while the parents' human capital production

[31] Aggregate relative expenditures are total public and private education expenditures divided by total consumption, which is calculated as total after-tax personal income minus total education expenditures. See Section A.3 for details. The elasticity of education expenditures to income is an average of estimated public and private education expenditure elasticities. See Section C.1 under **Elasticity of education expenditures**. The ratio of mean time investments between the highest and lowest human capital quintile comes from the PSID-CDS but instead of human capital quintiles is calculated as the ratio of average time investments for college educated parents versus parents with less than a high school education. Average time investment share combines average time investment shares from the AHTUS for each cohort but adjusted up by 1.5 to roughly coincide with the broader set of activities that are included in time investments in the PSID-CDS. Average market hours share is the midpoint between the average share of work hours for parents in the PSID-CDS and CPS-ASEC.

Table 4: Cohort-specific parameters

Parameter	Description	Cohort	Value
μ_{h0}	Mean and standard deviation of	1947-1970	4.55
σ_{h0}	log human capital for initial cohort		0.72
w_t	Overall price of effective labor	1947-1970	1.00
		1971-1994	1.35
		1995-2018	0.80
γ_t	Elasticity of human capital to wages	1947-1970	0.56
		1971-1994	0.61
		1995-2018	0.78
η_t	Elasticity of parent to child human capital	1947-1970	0.23
		1971-1994	0.34
		1995-2018	0.46
$\mu_{\xi t}$	Mean of match quality shocks	1947-1970	51.00
		1971-1994	43.00
		1995-2018	40.00
ϱ_t	Correlation coefficient for match quality shocks	1947-1970	0.33
		1971-1994	0.15
		1995-2018	0.22

efficiency is unchanged. The opposite is true for higher-income families who receive no subsidy but higher tax rates. Lastly, the mean of match quality shocks and correlation between match quality shocks and human capital change over time to capture non-economic reasons for the rise of single parenthood and the spread further up the income distribution, as shown in Figure 1b.

4.2 Comparing the model with the data

4.2.1 Targeted moments

The simulated model moments and targeted moments are presented in Table 5 (single parenthood), Table 6 (family income distribution), and Table 7 (investments/labor supply).[32] The quantitative model does a good job hitting the targets, capturing salient features of the main objects of interest: single parenthood, investments, inequality and intergenerational mobility.

4.2.2 Untargeted moments

Here I discuss how the model performs matching untargeted moments from the data for single parenthood, parental investments, and inequality and intergenerational mobility.

Single parenthood

The model captures a key relationship in the data for single parenthood: high concentration of

[32] Figures D11 and D12 further compare measures of inequality and persistence in the model to empirical estimates.

Table 5: Targeted family structure moments for calibration

Target	Cohort	Data	Model
Share of single-parent families	1947-1970	0.09	0.09
	1971-1994	0.20	0.20
	1995-2018	0.29	0.30
Correlation of single parenthood and log income	1947-1970	−0.43	−0.43
	1971-1994	−0.42	−0.43
	1995-2018	−0.42	−0.42

Notes: This table shows moments for family structure targeted in the joint calibration. The last two columns report the moments from the data and simulated moments from the Baseline model.

Table 6: Targeted income distribution moments for calibration

Target	Cohort	Data	Model
Mean family income (weekly)	1947-1970	960	964
	1971-1994	1520	1543
	1995-2018	2000	2032
Gini coefficient for family income	1947-1970	0.36	0.35
	1971-1994	0.38	0.36
	1995-2018	0.44	0.42
P95-P20 ratio for family income	1947-1970	4.84	5.06
	1971-1994	5.64	5.44
	1995-2018	7.22	7.15
Share of income variance due to permanent factors	1947-1970	–	–
	1971-1994	0.61	0.59
	1995-2018	–	–
IGE of family income	1947-1970	–	–
	1971-1994	0.38	0.40
	1995-2018	0.55	0.54

Notes: This table shows moments for the family income distribution targeted in the joint calibration. The last two columns report the moments from the data and simulated moments from the Baseline model.

single parents for families with the lowest incomes. Figure C4 shows the share of single-parent families by normalized household income in the data and model for each cohort. The model is able to capture the spread of single parenthood across the distribution of income. For the second and third cohorts, single parenthood became more common amongst families with higher incomes compared to in cohort 1, though single parenthood is still heavily concentrated at the bottom of the income distribution.

Investments

Figures C5 and C6 show time and education investments, respectively, from the data and model. Investments in the model follow the same patterns as seen in the data. Figure C5 Panel (a) presents average weekly hours by log household income from the PSID-CDS for 1997, 2002. Panels (b) and

Table 7: Targeted investment and labor supply moments for calibration

Target	Cohort	Data	Model
Aggregate relative expenditures $\frac{\sum p_x x}{\sum p_c c}$	1947-1970	0.09	0.09
	1971-1994	0.13	0.13
	1995-2018	0.16	0.17
Elasticity of education expenditures to income	1947-1970	0.93	0.93
	1971-1994	0.96	0.89
	1995-2018	1.07	0.91
Ratio of mean time investments, high vs. low human capital quintiles	1947-1970	1.60	1.60
	1971-1994	1.70	1.73
	1995-2018	1.80	2.10
Average time investment share $\mathbb{E}\left[\frac{n_h}{n}\right]$	1947-1970	0.07	0.07
	1971-1994	0.10	0.10
	1995-2018	0.14	0.14
Average market hours share $\mathbb{E}\left[\frac{n_m}{n}\right]$	1947-1970	0.30	0.32
	1971-1994	0.30	0.30
	1995-2018	0.30	0.29

Notes: This table shows moments for parental investments targeted in the joint calibration. The last two columns report the moments from the data and simulated moments from the Baseline model.

(c) show the similar figures from the model for the 1971-1994 cohort and 1995-2018 cohort, respectively. The model generates a large gap between single and married parents and a positive gradient in time investments where parents with higher income spend more time with their children. Figure C6 shows education expenditures by log household income in the CEX with imputed public education expenditures from the CCD for 1990-2018.[33] High-income families spend much more than low-income families in both the data and model.

Inequality and mobility

Lastly, I review moments across the distribution of family income in the data and model and compare income quintile transition matrix for the middle cohort from the model to Chetty et al. (2014a). The model generates inequality and mobility as seen from data on the distribution of family income and for estimates in the literature. The middle statistics in Table C2 show the model is able to capture inequality across other parts of the family income distribution such as the P95-P50, P50-P20, and P80-P20 percentile ratios, in addition to the Gini coefficient, P95-P20 ratio, and IGE of family income targeted in calibration. Table C3 shows quintile transition matrices for income from Chetty et al. (2014a) and income and wages from the calibrated model. The model generates more persistence for the lowest and highest income quintiles than Chetty et al. (2014a), but still captures the same features of lower rates of upward mobility for children born in poorer

[33]For imputed public education spending, I regress log county median district revenues per student on log county median household income separately for Federal & State revenues and Local revenues. I then use the coefficient estimates from the regressions to compute imputed public spending with log household income in the CEX.

households and lower rates of downward mobility for children born in richer households.

4.3 Counterfactual analysis

With the calibrated model I perform three sets of exercises to quantify which changes in family resources either contributed to or mitigated the increases in inequality and declines in intergenerational mobility. The exercises consist of simulating counterfactual scenarios to see how parental investments and aggregate outcomes compare to those in the Baseline parameterized model.

First, taking all else as given, I limit the share of single-parent families to the average from 1950-1970 of 9% for all periods. Second, taking family structure as given from the Baseline model, I consider scenarios (1) no SBTC, (2) the relative price of education equals 1 in all periods, and (3) no changes to taxes and transfers before the 1971-1994 period. Third, I repeat the three scenarios from the previous step but allow for endogenous family structure in the counterfactual.[34]

In each exercise I simulate the model starting from the same initial conditions as in the Baseline model, keeping child ability and permanent income shocks the same in all periods and for all families.[35] I simulate the model forward from initial conditions to compare model outcomes for adults in the most recent cohort we have data on (i.e. those born in 1971-1994 who are adults in 1995-2018). I then perform a similar analysis but on predicted outcomes for the next cohort (i.e. those born in 1995-2018 who will be adults in 2019-2042). To simulate the predicted outcomes, I use the calibrated parameters for the most recent cohort of adults. This allows for comparisons of predicted outcomes across different scenarios to be driven solely by changes affecting family resources: family structure, education prices, and taxes and transfers. The analysis reflects the path dependence of human capital, both at the dynasty level and for the entire distribution. Long-run outcomes depend on prior dynasty choices and the changing economic environment.

4.3.1 Driving forces of inequality and intergenerational mobility

The main results for family income for the cohort of adults in 1995-2018 in the model are presented in Table 8. This table shows the Gini coefficient, standard deviation of logs, and the IGE of family income for the Baseline and main counterfactuals. Each row reports measures of inequality and intergenerational mobility if, for instance in the second row of Table 8, the share of single-parent families remained at 9% in all periods. A smaller number relative to the Baseline outcome indicates that without the change in family resources for a given row, inequality and/or persistence would have been lower. In other words, that specific change in family resources led to

[34] In each counterfactual, average tax parameters adjust so the overall tax rate is ∼11.5% and transfers and public education are both functions of mean family income. For counterfactuals without SBTC I adjust the overall price of labor w_t so that the average family income is the same as in the Baseline model.

[35] In the first scenario, limiting the share of single-parent families to 9% in all periods, parents are randomly assigned separation shocks that determine their family structure. The separation shocks are $\hat{\zeta}_{it} \in \{0, 1\}$ and are correlated with human capital. See Section C.3 for details on the deriving the joint distribution of separation shocks and human capital.

greater inequality and/or persistence. The bottom two portions of the table reports results under counterfactual scenarios (1) taking family structure as given from the Baseline scenario (i.e. fixed family structure), and (2) when allowing endogenous family structure in the counterfactual.[36]

Table 8: Inequality and intergenerational mobility of family income: Baseline model and counterfactuals

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.419	0.798	0.543
Share of single parents 9%	0.386	0.720	0.498
Family structure fixed to Baseline			
No SBTC	0.372	0.702	0.393
Relative price of education = 1	0.418	0.798	0.546
Taxes and transfers pre-1971	0.422	0.835	0.585
Endogenous family structure			
No SBTC	0.373	0.705	0.396
Relative price of education = 1	0.420	0.803	0.552
Taxes and transfers pre-1971	0.410	0.809	0.559

This table shows the Gini coefficient, standard deviation of logs, and IGE of family income under the Baseline and counterfactual scenarios.

If the share of single-parent families remained at 9%, all else equal, the Gini coefficient of family income would decline from 0.419 to 0.386, standard deviation of log income from 0.798 to 0.720, and the IGE of income from 0.543 to 0.498. These are large differences. The change in the Gini coefficient from the initial to most recent cohort in the Baseline model was 0.067.[37] If the share of single-parent families was limited to 9%, the increase would have been 0.033, indicating that the rise of single parenthood accounts for roughly 50% of the increase in Gini index. For the standard deviation of log income, the growth of single parenthood accounts for 64% of the increase, and for the IGE the contribution is 32%.[38] Part of the difference for inequality compared to Baseline can be attributed to time constraints. Two parents can provide greater market work hours leading to higher income. A lower share of single parents brings up the bottom of the distribution given the prevalence of single parents amongst lower-income families. The other part is due to the impact of single parenthood on investments and the distribution of human capital. This last channel combined with persistence of single parenthood across generations reduces intergenerational mobility.

[36] Section D.5.1 includes binned scatter plots of child vs parent log income in the Baseline and counterfactuals.

[37] In the Baseline model, the Gini for each cohort is 0.352, 0.360, and 0.419; the standard deviation of log family income is 0.676, 0.696, and 0.798; and the IGE is 0.401 and 0.543. The change in Gini from third cohort to first is 0.067; for standard deviation of log income is 0.122; and for the IGE of income is 0.142.

[38] These estimates are upper bounds of the impact of rising single parenthood. Non-custodial parents in the model do not spend time with their children or provide money for child support or their children's education. Additionally, extended family and community can be additional sources of resources for constrained families. This analysis also does not factor in dynamics of family disruptions throughout childhood, psychological impacts of family instability, and positive effects from parental separations when one parent has a negative effect on the family and children.

The most significant driving force of rising inequality and intergenerational persistence is SBTC. SBTC disproportionately increases wages for those with high human capital. The results are largely unchanged when either taking family structure as given (middle portion of Table 8) or allowing endogenous family formation (bottom portion of Table 8). Without SBTC, the Gini coefficient would be 11% lower compared to the Baseline outcome, going from 0.419 to 0.372 in the counterfactual. SBTC thus accounts for about 71% of the increase in the Gini coefficient from the initial cohort to third. The standard deviation of log income would be 12% lower without SBTC at 0.702 compared to 0.798 in the Baseline scenario, accounting for roughly 79% of the increase since the initial cohort, keeping all else equal. Without SBTC the IGE would be almost 28% lower at 0.393 compared to 0.543. There would be significantly more mobility and less inequality if technological change were skill-neutral: SBTC amplifies differences in human capital and prior investments.

Rising relative prices for education, on the other hand, have only a small impact on inequality and intergenerational mobility. As discussed later in this section, all families see similar declines in investments when the relative price of education rises. Further, the effect of education prices on inequality and intergenerational mobility are almost identical with fixed family structure and endogenous family structure as both the counterfactual share of single-parent families and correlation between single parenthood and log income are roughly the same as in the Baseline model.

Turning to the effects of policy changes, expansions of transfers and tax credits ahead of the 1971-1994 cohort differ by whether family structure is fixed to the Baseline scenario or allowed to be endogenous. When family structure is taken as given from the Baseline model, if taxes and transfers had not been expanded after the first cohort, inequality and intergenerational persistence would both be higher. Thus, policy changes in the 1960s helped mitigate the rise of inequality and intergenerational persistence driven mostly by SBTC and single parenthood. Without changes to taxes and transfers ahead of the second period, the IGE of income would be 0.585 compared to 0.543 in the Baseline outcome, indicating greater intergenerational persistence.[39]

When family structure is endogenous, policy changes after the initial cohort have more nuanced implications for inequality and intergenerational persistence. Without the expansion of benefits to tax credits and transfers, the Gini index would have been lower but both the standard deviation of log income and IGE would be higher than in the Baseline. This last set of results is due to two factors stemming from no expansions to transfers and tax credits. First, the lack of assistance for low-income single-parent families constrains family resources, further pulling down the lowest family incomes increasing the standard deviation of log income and deepening poverty traps with fewer resources for human capital investments. Second, with less generous benefits, more

[39]Section D.5.5 presents similar tables to Table 8 but when changes to taxes and transfers are evaluated separately. Table D19 shows that most of the difference in the IGE is due to the expansion of transfers ahead of the second period.

families are headed by two parents resulting in greater relative equality further up the income distribution leading to a lower Gini index despite greater absolute dispersion.

Next, I discuss how investments and endogenous family formation in each counterfactual leads to the results for inequality and mobility just presented. Table 9 presents average time investments for the all families, bottom income decile, bottom income quartile, and the top income quartile.[40] Table 10 reports the share of single-parent families and correlation between single parenthood and log family income for counterfactuals with endogenous family structure.

Table 9: Average time investments overall and for bottom income decile, bottom income quartile, and top income quartile: Baseline model and counterfactuals

	Overall	**Bottom decile**	**Bottom quartile**	**Top quartile**
Baseline	21.07	13.48	15.94	25.40
Share of single parents 9%	22.43	16.66	18.84	25.74
Family structure fixed to Baseline				
No SBTC	21.04	13.44	15.95	25.23
Relative price of education = 1	23.28	14.96	17.67	28.00
Taxes and transfers pre-1971	20.82	12.76	15.35	25.39
Endogenous family structure				
No SBTC	21.03	13.42	15.86	25.23
Relative price of education = 1	23.24	14.88	17.54	28.01
Taxes and transfers pre-1971	21.23	13.81	16.26	25.45

Notes: This table shows average time investments for all families and families in the bottom income decile, bottom income quartile, and top income quartile for the Baseline model and counterfactuals.

Part of the reason why inequality and intergenerational persistence would be lower if the share of single-parent families had not risen is because children growing up in low-income families would receive greater investment than in the Baseline scenario. This is due to the high concentration of single parents among low-income families, as seen in the data. Less investment leads to lower child human capital, which then raises the likelihood of becoming a single parent and having lower income as an adult. The difference in time investments for children in low-income families is shown in Table 9. Children in the lowest income decile (and quartile) would receive almost three hours more in time investment per week on average if the share of single-parent families had not risen, 13.48 hours in the Baseline versus 16.66 in the counterfactual for families in the lowest decile.

SBTC, however, did not lead to significantly different investments for either high- or low-income

[40] See Section D.5.3 for additional results on investments across scenarios.

families compared to without. The increase in the returns to market work lead to counteracting income and substitution effects. Higher wages increase total available family resources, which has a positive effect on time investments, while higher wages increase the return to working, which has a negative effect on time investments. Due to these counteracting forces, SBTC has minimal effect on average time investments. These forces are also at play for education investments, and the effects are also small. Average education expenditures slightly rise for lower-income families and slightly fall for higher-income families without SBTC, as shown in Table D7. Thus, SBTC has a minimal effect on investments across the income distribution but amplifies existing differences in investments and human capital leading to greater inequality and intergenerational persistence.

Higher relative price of education leads to parents spending more time at work and expenditures on consumption as the effective return to human capital investments falls. Due to complementarities of investments in human capital production, an increase in the relative price of education lowers the return to both time *and* education investments. The percentage difference in investments between the Baseline outcome and the counterfactual where the relative price of education does not increase compared to consumption is roughly the same for all families. Families in the lowest income decile and quartile invest 11% more time on average in the counterfactual relative to Baseline where families in the highest quartile invest 10% more. This difference leads to small changes in inequality and persistence in the counterfactual. The results are similar with fixed family structure and endogenous family structure as the share of single-parent families is 20% in both the Baseline and counterfactual with the same correlation between single parenthood and log income as shown in Table 10.

Table 10: Single parent families for counterfactual scenarios with endogenous family structure

	Share of single-parent families	**Correlation with log income**
Baseline	0.20	0.43
No SBTC	0.20	0.47
Relative price of education = 1	0.20	0.44
Taxes and transfers pre-1971	0.16	0.45

Notes: This table reports the share of single-parent families and correlation between single parenthood and log income (pre-tax and transfer) in the Baseline and counterfactuals with endogenous family structure.

The expansion of benefits resulted in fewer hours at work and more hours in time investment for parents in lower-income families when family structure is fixed from the Baseline outcome. Table 9 highlights this result. Without the expansion of benefits, average time investments would be 5% lower for families in the first income decile (12.76 versus 13.48 hours, 43 fewer minutes per week) and 4% lower for families in the first quartile (15.35 versus 15.94 hours, 35 fewer minutes per week) compared to Baseline. More non-labor income produces an income effect where parents can spend more time actively engaging with their children. When family structure in the counterfactual is

endogenous, no expansion of benefits led to lower rates of single parenthood and increased time investments compared to Baseline. As shown in Table 10, without changes to taxes and transfers, the share of single-parent families in the second cohort would have been 16% compared to 20% in the Baseline scenario. As a result, family income inequality is lower as fewer families are time constrained with one parent, raising market work hours and income for lower-income families. However, without the expansion of benefits, the IGE of family income would be higher than in the Baseline model as low-income families have fewer resources for investments compared to in the Baseline scenario, as shown in Table 11. Despite the expansion of benefits leading to more single-parent families, the alternative would leave children in single-parent families with fewer resources for investments and greater persistence at the bottom of the income distribution. Thus, there is a trade off between inequality and intergenerational mobility when designing transfers.

Table 11: Average time investments for families in bottom decile of income distribution by family structure: Baseline model and counterfactuals where taxes and transfers were not expanded

	All	**Married parents**	**Single parents**
Baseline	13.48	20.61	10.73
Family structure fixed to Baseline	12.76	19.58	10.08
Endogenous family formation	13.81	19.66	10.27

Notes: This table shows average time investments for families in the bottom income decile by family structure for the Baseline model and counterfactuals with no expansion of taxes and transfers after initial cohort.

To separate the effects of changes in family resources on investments and human capital compared to returns to skill, work hours, and receipt of transfers, I feed in combinations of sequences from counterfactual scenarios while keeping all other sequences the same as in the Baseline. Household and government budget constraints and market clearing will not hold. This exercise will demonstrate how much underlying differences in investments and the distribution of human capital contributed to rising inequality and declining mobility compared to other sources. As the rise in single parenthood and SBTC contributed most to inequality and persistence, I focus on decomposing these counterfactuals. First, I construct two distributions of family income using sequences from the counterfactual where the share of single-parent families is limited to 9% and all else is from the Baseline outcome: (1) counterfactual investments and human capital and (2) counterfactual work hours and transfers. Second, I construct two distributions of family income in the same way but with (1) counterfactual investments and human capital and (2) counterfactual work hours and transfers from the counterfactual with no SBTC. Lastly, I construct a distribution of family income using data from the Baseline outcome except the returns to human capital γ_t is held at its initial value.The results are in Table 12.[41]

[41] Section D.5.4 contains additional results for the full set of counterfactuals.

Table 12: Inequality and intergenerational mobility of family income for the Baseline model and counterfactuals, separating the effects into human capital, work hours and transfers, and returns to skill channels

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.419	0.798	0.543
Share of single parents 9% full counterfactual	0.386	0.720	0.498
Counterfactual human capital	0.412	0.782	0.422
Counterfactual work hours and transfers	0.393	0.733	0.431
No SBTC full counterfactual	0.372	0.702	0.393
Counterfactual returns to skill	0.376	0.720	0.412
Counterfactual human capital	0.419	0.798	0.542
Counterfactual work hours and transfers	0.416	0.784	0.528

Taking sequences of investments and human capital from the counterfactual where the share of single-parent families is limited to 9%, the Gini index would be 0.412, lower than 0.419 in the Baseline and higher than 0.386 in the full counterfactual. This indicates that of the difference between Baseline and full counterfactual, 21% is due to the distribution of human capital while the remainder is due to how the increase in single parenthood impacts work hours and transfers. This translates to 11% of the change in Gini from the first to third cohort driven by differences in human capital between the Baseline and counterfactual. The standard deviation of log income with counterfactual human capital would be 0.782, compared to 0.720 in the full counterfactual and 0.798 in the Baseline. The impact of the rise in single parenthood on human capital accounts for 21% of the difference from Baseline and 13% of the increase in the standard deviation of log income. The IGE when investments and human capital are taken from the counterfactual (0.422) is significantly lower than in the Baseline (0.543) and even lower than in the full counterfactual (0.498).

Almost all of the increase in inequality driven by SBTC is due to the change in returns to skill and not the underlying distribution of human capital. For the counterfactual distribution of income constructed with allocations from the Baseline model but keeping the returns to skill the same as in the initial period, the Gini coefficient would be 0.376 compared to 0.372 in the full counterfactual and 0.419 in the Baseline. The standard deviation of log income would be 0.720 compared to 0.702 in the full counterfactual and 0.798 in the Baseline outcome. The IGE would be 0.412 compared to 0.393 in the full counterfactual and 0.543 in the Baseline. On the other hand, when income is constructed with counterfactual investments and human capital but all else is from the Baseline scenario, inequality and persistence are effectively unchanged compared to the Baseline model.

Lastly, I turn to the impact of changes in family resources on pre-tax wages, which in this framework captures the permanent component of income. Focusing only on family income may mask changes in the underlying distribution of the returns to permanent skills and attributes, as the level of market hours, and thus family income, is so dependent on family structure and policy.

Table 13 shows how much family structure, education prices, and policy changes contributed to or mitigated the increase in inequality and intergenerational persistence of wages. Values can be positive or negative, indicating whether a specific scenario contributed to or mitigated the rise in inequality or intergenerational persistence. Note that this table does not show results related to SBTC. By taking SBTC as given in this part of the analysis, I can directly compare changes in the distribution of wages across counterfactual scenarios because each has the exact same distribution of wages in the first and second period, including for the Baseline model.

I calculate the change in Gini coefficient, standard deviation of logs, and IGE of wages from the previous period for the Baseline model (Δ) and for each counterfactual c (Δ_c). The top row shows Δ for each statistic. For instance, the Gini of wages increased by 0.04 from period 1 to period 3 in the Baseline model. The remaining values show how much the change in each statistic can be attributed to trends in family structure, education prices, or policy reforms. For each counterfactual c, the share attributed to the corresponding change in family resources is calculated as

$$\text{Share of } \Delta \text{ due to counterfactual } c = 1 - \frac{\Delta_c}{\Delta}$$

Table 13: Percent contributions to changes in inequality and intergenerational mobility of the permanent component of income due to trends in family resources

	Gini of wages	**SD log wages**	**IGE of wages**
Δ since 1947-1970	0.04	0.08	0.14
Share of Δ due to family structure	21.13	22.56	2.16
Family structure fixed to Baseline			
Share of Δ due to education prices	0.21	−1.49	−3.75
Share of Δ due to tax and transfer reforms	−5.24	−6.30	−10.28
Endogenous family formation			
Share of Δ due to education prices	−1.27	−2.91	−5.37
Share of Δ due to tax and transfer reforms	3.93	4.23	−6.99

For example, in the counterfactual keeping the share of single-parent families to 9%, the change in Gini coefficient from period 1 (1947-1970) to period 3 (1995-2018) was .032, and in the Baseline scenario it was 0.040. The share of Δ for the Gini of wages due to the increase in single parenthood is $1 - \frac{0.032}{0.040} = 0.211$. Thus, the increase in the share of single-parent families contributed to 21% of the overall change in the Gini coefficient of wages. Further, the rise of single parenthood contributed to 23% of the increase in the standard deviation of log wages, but a more modest contribution of around 2% of the increase in the IGE of wages.

Education prices had a minimal effect on inequality and mobility, both with fixed or endoge-

nous family structure. The expansion of generosity to taxes and transfers, taking family structure as given, mitigated the rise in both inequality and intergenerational persistence, with a *negative* contribution of 5-6% for inequality and 10% for persistence. With endogenous family structure, changes in transfers contributed to about 4% of the increase in inequality but mitigated the rise in persistence by about 7%. This is due to how family structure changed because of more generous transfers available to single parents. The increase in generosity of means-tested transfers led to more single parents, which increased inequality, but the generosity of transfers helped lower-income families better invest in their children's development, reducing persistence.

4.3.2 Implications of changes in family resources for the next cohort

Here I briefly discuss outcomes for an additional cohort, continuing the Baseline and counterfactual scenarios for another period. Table 14 indicates that the growth in single parenthood over the past several decades will have a significant, persistent impact on the predicted changes in inequality and intergenerational persistence for the cohort of children raised in 1995-2018, compounding on the effects discussed in the prior section in Table 13.[42] The increase in single parenthood contributes to 40% of the increase in the Gini coefficient of wages, 43% of the increase in the standard deviation of log wages, and 16% of the increase in the IGE of wages predicted for the period following 1995-2018. Thus, the full effect of rising single parenthood takes decades to fully manifest.

Table 14: Predicted contributions to changes in inequality and mobility due to trends in family resources

	Gini of wages	**SD log wages**	**IGE of wages**
Δ predicted after 1995-2018	0.05	0.10	0.14
Share of Δ due to family structure	40.42	43.03	16.08
Family structure fixed to Baseline			
Share of Δ due to education prices	5.79	-1.57	-6.54
Share of Δ due to tax and transfer changes 1971	-7.90	-6.75	-9.40
Endogenous family formation			
Share of Δ due to education prices	5.06	-3.38	-7.98
Share of Δ due to tax and transfer changes 1971	9.92	10.59	2.94

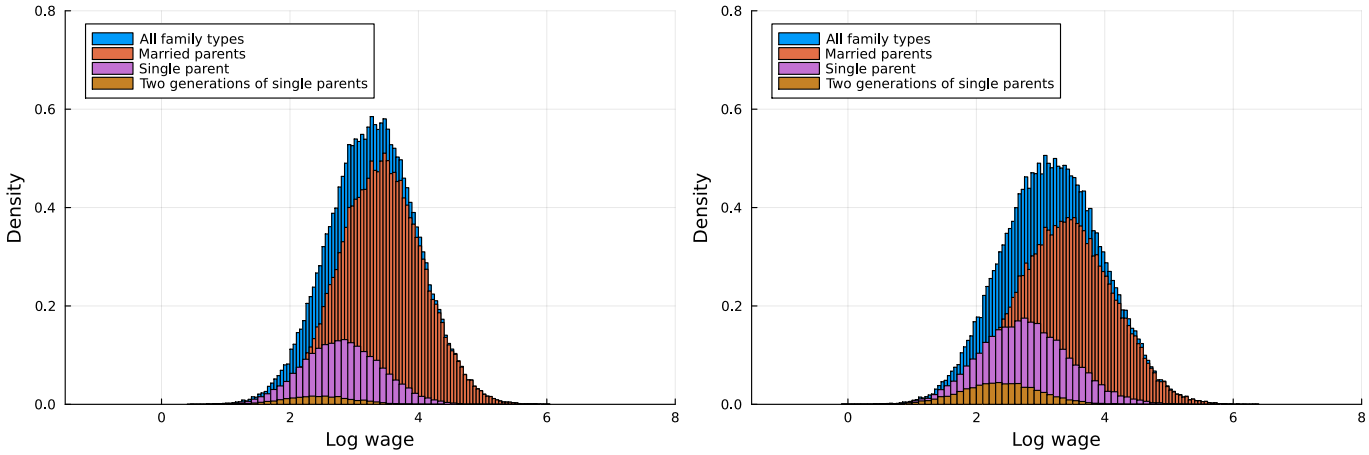
Figure 9 highlights why. This figure shows the distribution of log wages in the Baseline model grouping dynasties by the family structure they grew up in during childhood. The blue group corresponds to all families; orange is those who grew up with married parents; magenta are those who grew up in single parent families; and the small gold group are those who grew up in a household with two successive generations of single parents (a subset of those who grew up with single parents). Panel (a) shows the distribution of log wages for the prior period (cohort raised in 1971-1994) and Panel (b) shows the predicted distribution for the next period (cohort raised

[42] Section D.5.6 has additional results for the predicted outcomes.

Figure 9: Distribution of log wages by family structure during childhood

(a) Cohort raised in 1971-1994, adults in 1995-2018

(b) Cohort raised in 1995-2018, adults in 2019-2042



Notes: This figure shows the distribution of log wages (permanent component of income) by family structure raised in during childhood in the Baseline scenario for adults in 1995-2018 and 2019-2042.

in 1995-2018). Looking from Panel (a) to Panel (b), the increase in single parenthood is heavily concentrated among low-wage families. In fact, it appears that the distributions of wages for those who grew up with married parents and those who grew up with a single parent are moving farther apart. This subtle bifurcation of the distribution of wages is what drives the increases in inequality and intergenerational persistence: children who grew up in single-parent households are more likely to become single parents themselves, leading to poverty traps.

5 Conclusion

In this paper I evaluate how cross-cohort changes in family resources and parental investments contributed to rising inequality and intergenerational persistence in the United States after 1970. Family resources devoted to children's development have changed dramatically over the last 50 years. Since 1970, the share of single-parent families has risen from 11% to over 30% in 2018. This increase represents a significant decline in resources for many families, as less available parental time limits time investments, work hours, and income for mostly low-income families. Further, rising relative prices of education and increases in tax progressivity and the generosity of transfers altered the trade-offs parents face when allocating their resources towards their children's development. Longstanding positive investment gradients for parents with higher education, income, and who are married have steepened as parents with greater resources are spending increasingly more time and expenditures on their children's human capital development.

I develop a dynastic model of parental human capital investments to analyze how these aforementioned changes affected inequality and intergenerational mobility compared to other driving

forces such as skill-biased technological change (SBTC). An important feature of the model is that tax and transfer policies vary by family structure. This variation in policy treatment generates different trade-offs for parents. Not only does it influence the decision to separate or not, but affects the relative costs and benefits of allocating time and expenditures to investments versus working, consumption, and leisure across families with different characteristics. I then bring the model to the data and perform counterfactual analyses to quantify how much changes in these sources of family resources contributed to or mitigated the rise in inequality and intergenerational persistence. While SBTC was the main driving force of both trends, single parenthood had a large impact on inequality and intergenerational mobility, accounting for 50-64% of the increase in inequality and 32% of the increase in intergenerational persistence. Rising education prices had minimal effects. For policy reforms, expansions to transfers and tax credits had mixed effects on inequality but helped mitigate the increase in persistence driven by SBTC and single parenthood.

I make three contributions. First, I develop a quantitative theory of dynastic human capital that incorporates family structure, education prices, and income assistance programs into a unified framework. The key innovation of my model is that it includes important factors for family resources and human capital investments that are often overlooked in studies of aggregate, distributional changes in income. With the model, I provide some of the first estimates of the impact of the rise in single parenthood on recent trends in inequality and intergenerational mobility, as well as channels through which various driving forces operate. Second, I provide empirical evidence on growing dispersion in family resources and parental investments. Third, I present evidence of the effects of changes in tax and transfer policies on family structure, parental investments, and the distribution of income. Taxes and transfers offer differing trade-offs for parents, highlighting the importance of understanding how different policies affect family formation and parental investments when designing assistance programs.

My results point to several potential channels for providing resources to low-income and single parent families to increase investments. Moreover, the results are not meant to suggest parents should be forced to stay together, but to highlight the potential long-term effects of changes in family resources and investments for children's development. Improving home and local environments for children can yield large effects. Greater funding for lower-income communities can improve educational outcomes and increase social mobility (Lafortune et al., 2018; Jackson et al., 2016). Mentoring programs have been shown to be effective at enhancing student outcomes (Kearney and Levine, 2020). Interventions to improve parenting practices can be helpful at changing beliefs about parental investments, enrich parent-child interactions, and increase time investments (Kalil and Ryan, 2020; List et al., 2021). Lastly, neighborhood choice is crucial for determining the quality of a child's learning environment, capturing differences in public school quality, neighborhood peer effects, beliefs, and other factors important for human capital (Chyn and Katz, 2021; Fogli et al., 2024; Eckert and Kleineberg, 2024). These are all important areas for further work.

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A Data appendix

A.1 Current Population Survey

The Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) is a nationally-representative survey containing information on demographic characteristics, household income, family structure, taxes, and transfers. I start with CPS data provided by Integrated Public Use Microdata Series (Flood et al., 2023). I use information on family characteristics, marital status, income, hours worked, taxes, and transfers.

To account for underreporting of means-tested transfers in the CPS I utilize the CBO's regression-based procedure to impute transfers when possible (Habib, 2018). The procedure first uses administrative data to set targets of transfer receipt reflecting the CPS sampling frame, estimates the probability of receipt for households in the CPS, and then imputes transfer receipt based on estimated probabilities until the targets from the administrative data are reached. Replication files provided by the CBO at https://www.cbo.gov/.

A.2 Time investments

A.2.1 PSID-CDS

Data provided by Joseph Mullins as used in Caucutt et al. (2020). Activities constituting time investments include academic investment activities, health investment activities, play, arts and crafts with household children, sports, talk and listen, eating, socializing, religious activities, volunteering, and other activities.

A.2.2 AHTUS

I start with replication files from Blandin and Herrington (2022), who draw data from AHTUS data provided by Integrated Public Use Microdata Series, and then I add data for 2018 from https://www.ahtusdata.org/ahtus/ (Fisher et al., 2023).

A.3 Aggregate education expenditures

Education expenditures in aggregate come from numerous sources. I start with total public and private education expenditures, which come from sources listed below

- Public education expenditures come from the US Census, including Historical Statistics of the United States, Statistical Abstract of the United States, Annual Survey of State and Local Government Finance,the US Federal Budget, and The College Board
- Private education expenditures are Personal Consumption Expenditures on Education from the Bureau of Economic Analysis

Public education direct spending is divided between local, state, and federal sources

- Local: spending is mostly for preK-12, some for community college, libraries
- State: spending is mostly for higher education institutions and student grants
  - Expenditures for higher education does not remove state charges for tuition and other fees that individuals and households pay, so I manually remove. About 40% of higher education spending was state charges in 2018, up from 30% in 1977. I impute linearly backward to 1947 using a time trend. State charges come from Tax Policy Center and Urban Institute who draw data from US Census Bureau Annual Survey of State and Local Government Finances.
  - Add State Higher Education Grants from the US College Board Trends in Student Aid 2022 for 1970-2018.
- Federal: spending for higher education (not including grants or loans) is largely for R&D to universities so is not included. Add Federal Undergraduate Grants from the US College Board Trends in Student Aid 2022 for 1970-2018. Excludes Veterans and Military Grants.

For share of education expenditures divide by Personal Income, which comes from the Bureau of Economic Analysis.

A.4 District-level funding and county characteristics

Public pre K-12 education funding
Department of Education Common Core of Data (CCD) school district data

- Funding: expenditures per student
- Characteristics: student poverty rate, special education students, highest grade offered

US Census Small Area Income and Poverty Estimates (SAIPE)

- County median household income and poverty rate

Neighborhood Characteristics by County from Chetty et al. (2018)

- Data accessed through Opportunity Insights, https://opportunityinsights.org/data/. Select years for county characteristics: share of single-parent families (1990, 2000, 2010), share of college+ educated (2000, 2010), population density (2000, 2010).

Sample

- About 288,000 district-year observations for 1995-2018

Department of Education Common Core of Data (CCD) accessed through Education Data Portal, Urban Institute, https://educationdata.urban.org/documentation/.

A.5 Consumer Expenditure Survey

A.5.1 Expenditure categories

Childcare
Universal Classification Codes (UCC)

1. Babysitting and child care: 340210
2. Babysitting and child care in your own home: 340211
3. Babysitting and child care in someone else's home: 340212
4. Day care centers, nursery, and preschools: 670310

Schooling
Universal Classification Codes (UCC)

1. Tuition and student loans: 670110 670210 670410 005520 670901
2. Education supplies: 660110 660210 660410 660900 660901 660902 660000
3. Education services: 670903
4. Other school expenses including rentals: 670902
5. Housing while attending school; food or board at school; school lunches: 210310 190901 790430

Lessons
Universal Classification Codes (UCC)

1. Fees for recreational lessons or other instructions: 620310

Reading
Universal Classification Codes (UCC)

1. Books thru book clubs Books not thru book clubs: 590220 590230
2. Newspapers, magazines, newsletters subscriptions: 590310 590111 590211 590900
3. Newspapers, magazines, newsletters non-subscriptions: 590410 590110 590210 590112 590212
4. Encyclopedia and other sets of reference books: 660310
5. Digital book readers: 690118

A.5.2 Accounting for economies of scale in raising children

I adjust measures of expenditures for human capital investments to account for differences in economies of scale in raising children. The adjustment process is as follows: let χ be expenditures per child $\frac{p_x x}{Nkids}$ or expenditure shares $\frac{p_x x}{p_x x + p_c c}$. For each variable, I regress $\log(\chi)$ on indicator variables for the number of children I_k, and a set of household variables Z (log income, log total expenditures, parent education, and number of parents at home).

$$\log(\chi) = \sum_{k=1}^{K} \varphi_k I_k + \Omega Z + \epsilon$$

Adjusted measures of education investment expenditures are

$$\hat{\chi} = \exp\Big(\log(\chi) - \sum_{k=1}^{K} \hat{\varphi}_k I_k \Big)$$

B Model appendix

B.1 Non-custodial parents problem

$$
\begin{aligned}
V_t^{nc}(h_{it}, n_{it}^{nc}, \nu_{it}) = \max_{c_{it}^{nc}, n_{m_{it}}^{nc}, n_{l_{it}}^{nc}} \quad & u(c_{it}^{nc}, n_{l_{it}}^{nc}) \\
\text{s.t. } \; & p_{ct} c_{it}^{nc} = \lambda_t^{nc} (w_t h_{it}^{\gamma_t} \nu_{it})^{1-\tau_t^{nc}} n_{m_{it}}^{nc} \\
& n_{it}^{nc} = n_{m_{it}}^{nc} + n_{l_{it}}^{nc} \\
& n_{it}^{nc} = 2\bar{n} - n_{it}
\end{aligned}
$$

B.2 Government budget and market clearing

Taxes and government expenditures

G_t is total government spending, including means-tested transfers and public education expenditures, equaling net taxes (tax revenues minus tax credits).

$$
G_t = \int \left(w_t h_{it}^{\gamma_t} \nu_{it} - \lambda_t(n_{it}) [w_t h_{it}^{\gamma_t} \nu_{it}]^{1-\tau_t(n_{it})} \right) n_{m_{it}} + \left(w_t h_{it}^{\gamma_t} \nu_{it} - \lambda_t^{nc} [w_t h_{it}^{\gamma_t} \nu_{it}]^{1-\tau_t^{nc}} \right) n_{m_{it}}^{nc} \, di
$$

Public education, transfers, and government budget

Expenditures on public education and means-tested transfers are less than or equal to total government expenditures.

$$
\int T_{it} + D_t \; di \leq G_t
$$

The government's budget is

$$
\int T_{it} + D_t \; di + Y_{Gt} = G_t
$$

where Y_{Gt} is government expenditures not valued by households.

Market clearing

$$
\begin{aligned}
\text{Total output} \quad & p_{ct} Y_{ct} + p_{xt} Y_{xt} + Y_{Gt} = \int w_t h_{it}^{\gamma_t} \nu_{it} [n_{m_{it}} + n_{m_{it}}^{nc}] \, di \\
\text{Consumption} \quad & Y_{ct} = \int [c_{it} + c_{it}^{nc}] \, di \\
\text{Education} \quad & Y_{xt} = \int [\bar{x}_t + x_{it}] \, di
\end{aligned}
$$

B.3 Equilibrium

Given

- Initial distributions of human capital and ability $\{h_{i0}, a_{i0}\}_i$
- Technology and sectoral productivities $\{H_t(\cdot), \eta_t, \gamma_t, A_{ct}, A_{xt}\}_t$
- Tax, transfer, and public education systems $\{\lambda_t(\cdot), \tau_t(\cdot), \lambda_t^{nc}, \tau_t^{nc}, T_t(\cdot), D_t\}_t$
- Distributions of shocks for permanent income, ability, and parent match quality

a competitive equilibrium is household parental time endowments $\{n_{it}, n_{it}^{nc}\}$, household allocations $\{c_{it}, x_{it}, n_{m_{it}}, n_{l_{it}}, n_{h_{it}}\}_{i,t}$, $\{c_{it}^{nc}, n_{m_{it}}^{nc}, n_{l_{it}}^{nc}\}_{i,t}$, firm allocations $\{Z_{ct}, Z_{xt}\}_t$, and prices $\{w_t, p_{ct}, p_{xt}\}_t$ such that:

1. Given prices, parents maximize lifetime utility
2. Given prices, firms maximize profits
3. Government budget balances
4. Markets clear

B.4 Optimal consumption and leisure

Consumption

$$\log(c_{it}) = \log(\psi\phi) + \underbrace{\log(\hat{W}_{it} n_{it} + T_{it} + p_{xt}\bar{x}_t)}_{\text{Total available resources}} - \underbrace{\log(p_{ct})}_{\substack{\text{Price of} \\ \text{consumption}}} - \underbrace{\log(\phi + \psi\theta_{it})}_{\substack{\text{Relative} \\ \text{expenditures}}}$$

Leisure

$$\log(n_{l_{it}}) = \log([1-\psi]\phi) + \underbrace{\log(\hat{W}_{it} n_{it} + T_{it} + p_{xt}\bar{x}_t)}_{\text{Total available resources}} - \underbrace{\log(\hat{W}_{it})}_{\substack{\text{After-tax} \\ \text{wage}}} - \underbrace{\log(\phi + \psi\theta_{it})}_{\substack{\text{Relative} \\ \text{expenditures}}}$$

C Quantitative analysis appendix

C.1 Calibration

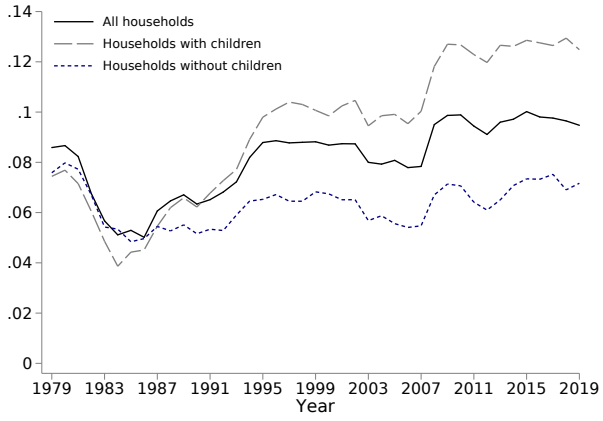
Tax progressivity

Here I estimate measures of tax progressivity over time, showing that increasing progressivity is driven largely by greater progressivity for families with children since the mid-1980s. Using CBO data I regress log after-tax income on log pre-tax income to estimate τ_t in the following equation

$$\log(\hat{y}_{it}) = \log(\lambda_t) + (1 - \tau_t)\log(y_{it}),$$

where λ_t governs the average level of income taxes and τ_t determines the progressivity of income taxes. Figure C1 shows annual estimates of tax progressivity parameter τ_t for all households and separately for households with and without children. The estimates show that for all households tax progressivity has increased, as shown in the black solid line, but the increase is driven almost entirely by rising progressivity for households with children, the gray dashed line.

Figure C1: Progressivity measures of income taxes



Source: Congressional Budget Office (CBO) - *The Distribution of Household Income, 2019* Data Files

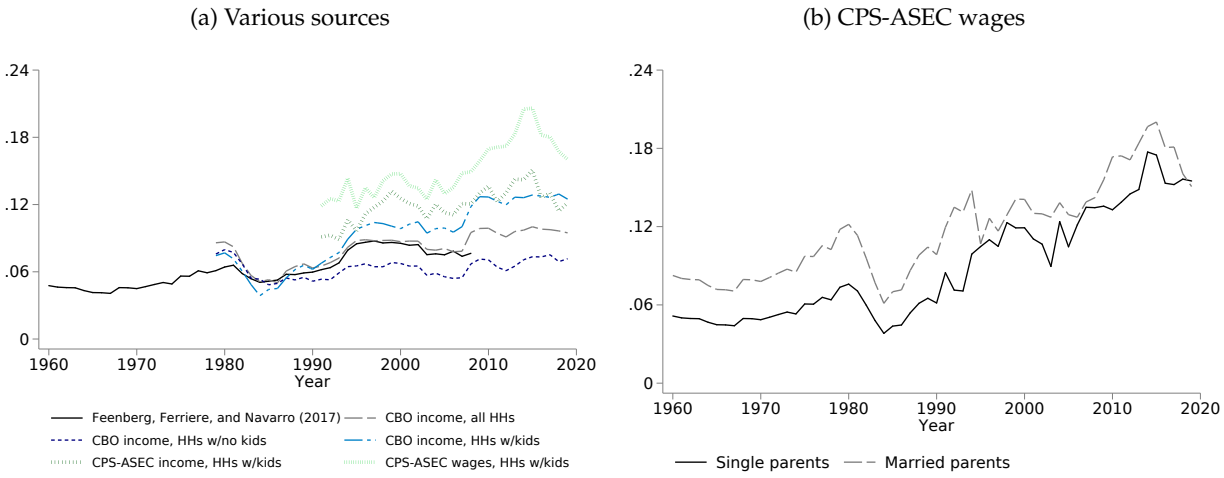
Since the CBO data is only for income and not wages, I turn to data in the CPS-ASEC to estimate the progressivity parameter from the model and used in the quantitative analysis. I regress log after-tax wages on log pre-tax wages in CPS-ASEC to estimate the following equation separately for single and married parents

$$\log(\hat{W}_{it}) = \log(\lambda_t(n_{it})) + (1 - \tau_t(n_{it}))\log(W_{it}).$$

The CPS-ASEC data on pre-tax and after-tax wages only goes back to 1990, so I impute these measures back to 1960 using estimates from Feenberg et al. (2017), extending the estimated series from

the CPS-ASEC backward while preserving the average difference in progressivity between single and married parents in the beginning part of the sample. The assumption here is that progressivity for all household types moved together until the the mid and late 1980s and started to deviate for different household types from then on. Figure C2 shows measures of tax progressivity since 1960 using a variety of sources in Panel (a) and the estimates from the CPS-ASEC for wages for single versus married parents in Panel (b).

Figure C2: Measures of tax progressivity

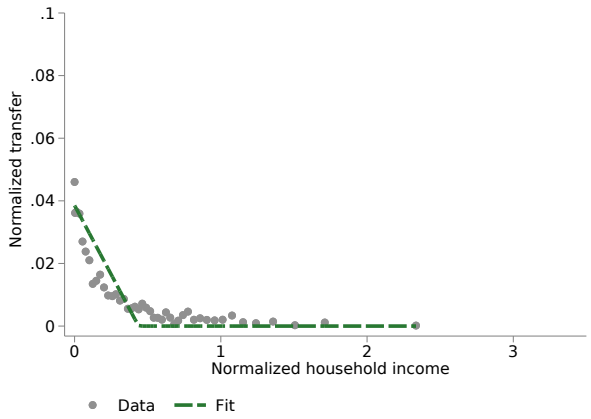


Source: CBO; CPS-ASEC; Feenberg, Ferriere, and Navarro (2017)
Note: Wage progressivity measures in panel (b) imputed for 1960-1990

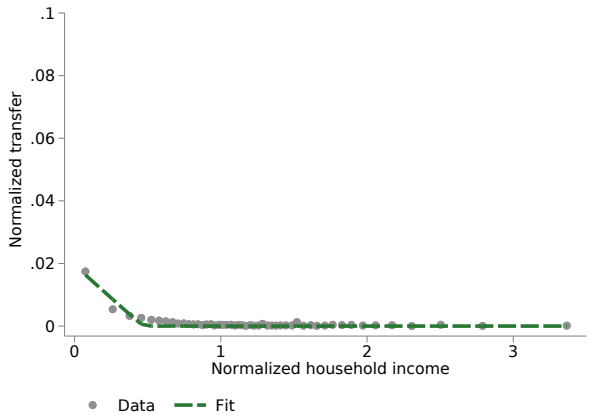
Transfer functions

Figure C3: Transfer functions used in the quantitative model

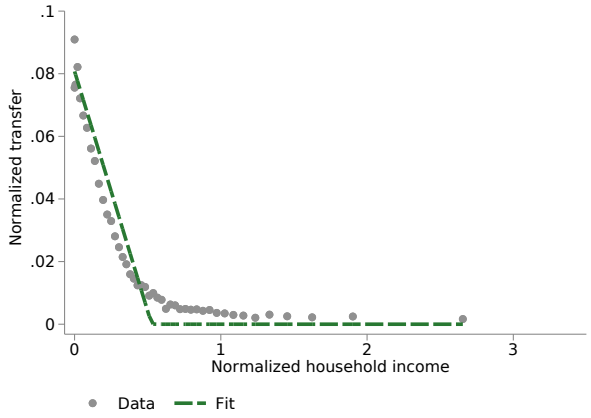
(a) Single parents, 1947-1970



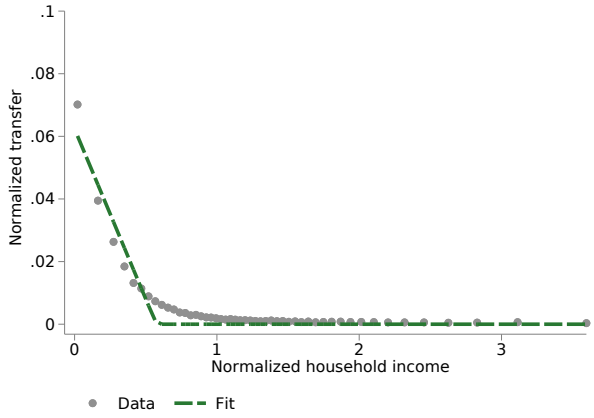
(b) Married parents, 1947-1970



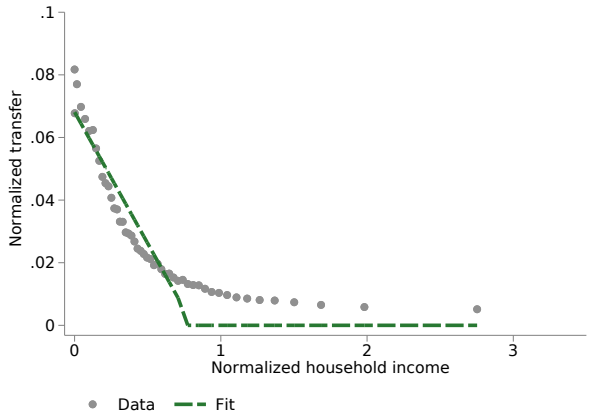
(c) Single parents, 1971-1994



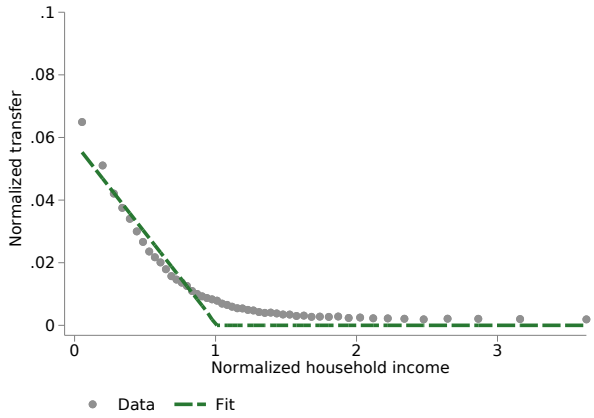
(d) Married parents, 1971-1994



(e) Single parents, 1995-2018



(f) Married parents, 1995-2018



Public education expenditures

Public education expenditures $D_t = p_{xt}\bar{x}_t$ are set as a fraction of mean family income, combining federal and state sources of funding for public K-12 and higher education expenditures per student. Per pupil K-12 public school expenditures from federal and state sources are calculated using total expenditures per pupil in average daily attendance and federal and state revenue shares from the US Department of Education Digest of Education Statistics Tables 236.55 and 235.10, respectively, and divided by mean family income. Public expenditures for higher education combine data on federal and state expenditures from the US Census, US Federal Budget, Tax Policy Center, and College Board as described in Section A.3. These expenditures are then divided by full-time equivalent (FTE) fall enrollment from the US Department of Education Digest of Education Statistics Table 307.10 for an estimate of per student public higher education expenditures. Expenditures per student are divided by mean family income and then multiplied by the full-time equivalent enrollment rate (FTE enrollment as a share of 18 to 23 year olds) as not all young adults attend higher education institutions after high school. Finally, before summing, K-12 expenditures and higher education expenditures are weighted by the share of years that the expenditures cover within a model period of 24 years: 13/24 years for K-12 and 6/24 years for higher education.

Income elasticity of education expenditures

Estimates from the literature of the elasticity of income to education expenditures have a wide range. The elasticity of public education funding is generally found to be at or below one, ranging from the low end of about 0.50 to above 1 at the top. Results from numerous studies on the income elasticity of public education spending are reported in Table C1. The bulk of these studies find an estimate in the range [0.7,1.0]. Further, while most of the papers concern data for 1970 and earlier, those covering 1970-1990s do not indicate any significant change in estimates. In particular, Fernandez and Rogerson (1997) find estimates for periods 1950-1970 and 1970-1990 to be roughly the same between 0.9 and 1. Given the range of estimates, I choose a midpoint of 0.85 as the income elasticity of public education spending.

The income elasticity of private education has been estimated to be higher than for public education and above 1. Kim (1988) finds an elasticity of 1.34 for private education expenditures for 1958-1982. For higher education only, Campbell and Siegel (1967) report an income elasticity of 1.2 for 1919-1964 while Lehr and Newton (1978) report an estimate of 1.88 for 1960-1974. In more recent decades, using the replication files of Aguiar and Bils (2015) who estimate demand elasticities of various goods in the CEX correcting for measurement error, the elasticity for education and domestic services (i.e. childcare) combined is 1.52 (1.56 for education, 1.48 for domestic services) for 1980-1994 and 1.88 (1.95 for education, 1.79 for domestic services) for 1995-2010. The results from the CEX following the procedure in Aguiar and Bils (2015) indicates an increase in the elasticity for education and childcare from the 1980s to 2000s. The income elasticities of private education

and childcare expenditures for each cohort used in calibration are 1.34, 1.52, and 1.88.

The income elasticity targets for η_t are expenditure-weighted averages of income elasticities for public and private expenditures on education for each period in the model. Private expenditures were 16%, 17%, and 21% of total expenditures on education. Assuming the public education elasticity remains stable at 0.85, I target income elasticities of (public + private) education of 0.93, 0.96, and 1.1 for each period, respectively.

Table C1: Estimates of income elasticity for public primary and secondary education funding

Paper	Description	Sample	Period	Estimate
Fabricant (1952)	Cross section, state public education expenditures on per capita income	US	1938-1942	0.78
Brazer (1959)	Cross section, city public education expenditures on median family income	US	1949-1953	0.73
Hirsch (1961)	Time series, public education expenditures on per capita income	US	1900-1958	1.09
Hirsch (1961)	Cross section, public education expenditures on district per pupil property value	St. Louis	1951-1955	0.59
Barlow (1970)	Cross section, public education expenditures on personal income per pupil	Michigan	1960	0.64
Bradford and Oates (1974)	Cross section, public education expenditures on district median family income	New Jersey	1960	0.65
Feldstein (1975)	Cross section, expenditures per pupil on median family income	Massachusetts	1970	0.48
	Pooled years		1965,1970	0.64
	Corrected by Bergstrom, Rubinfeld, and Shapiro (1982)		1970	0.76
Inman (1975)	Cross section, expenditures per pupil on district median family income	Long Island	1970	0.61
Ladd (1975)	Cross section, expenditures per pupil on median family income	Boston	1970	0.46
	Corrected by Bergstrom, Rubinfeld, and Shapiro (1982)		1970	0.70
Peterson (1975)	Cross section, expenditures per pupil on median family income	CA, MI, NJ, NY, KC	1970	0.84-1.35
Lovell (1978)	Cross section, expenditures per pupil on median family income	Connecticut	1970	0.65
Perkins (1977)	Cross section, public education expenditures on median family income	Massachusetts	1969-1970	1.02-1.07
Bergstrom, Rubinfeld, and Shapiro (1982)	Survey, desire for more public education expenditures on family income	Michigan	1978	0.83
Romer, Rosenthal, and Munley (1992)	Outcomes of school district voting referenda on district mean family income	New York	1974-1975	0.98
Poterba (1997)	Cross section, state education spending per child on per capita income and demographics	US	1961-1991	0.78
Fernández and Rogerson (1997)	Pooled cross section, state-level spending per student on permanent income	US	1970-1990	0.87-1.05
			1950-1970	0.94-1.03
Cohen-Zada and Justman (2003)	Cross section, cities with pop. over 25,000	US	1990	0.70-0.90
	Sensitivity analysis		1990	0.64-1.03
	Control for Tiebout sorting		1990	0.83-1.13

Minimum distance estimation

The calibration procedure is as follows:

1. Select initial guess for parameters
2. Simulate the model
3. Compare model-simulated moments to targeted moments from the data by summing the squared percentage differences between simulated and target moments
4. Update parameters
5. Repeat steps 2-4 until sum of squared percentage deviations between simulated and target moments minimized

I use the Nelder-Mead method to find the set of parameters that minimizes the sum of squared percentage difference between simulated and target moments.

C.2 Model fit

Table C2: Inequality mobility of family income

	1947-1970		1971-1994		1995-2018	
Statistic	Data	Model	Data	Model	Data	Model
P95-P50	2.45	2.79	2.73	2.77	3.28	3.60
P50-P20	1.97	1.82	2.06	1.97	2.20	1.99
P80-P20	3.09	3.10	3.48	3.35	4.09	4.02

Notes: Moments for Gini and percentile ratios are calculated from US Census Tables F-1, F-4, and F-5.

Table C3: Income quintile transition matrices, Chetty et al. (2014a) and model

(a) 1980-82 birth cohort, Chetty et al. (2014a) Table II

Child	Parent quintile				
quintile	1	2	3	4	5
1	33.7	24.2	17.8	13.4	10.9
2	28.0	24.2	19.8	16.0	11.9
3	18.4	21.7	22.1	20.9	17.0
4	12.3	17.6	22.0	24.4	23.6
5	7.5	12.3	18.3	25.4	36.5

(b) Model 1971-1994 birth cohort, income

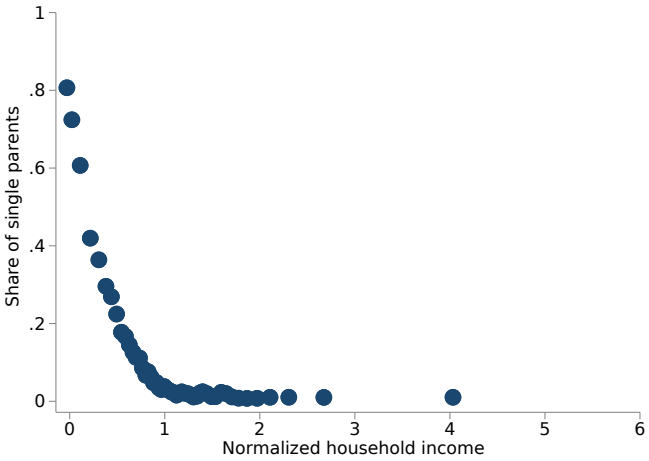
Child	Parent quintile				
quintile	1	2	3	4	5
1	42.0	25.6	16.6	10.7	5.0
2	26.7	24.6	21.0	16.9	10.8
3	17.6	22.0	22.5	21.4	16.6
4	9.6	17.3	22.1	25.2	25.8
5	4.0	10.5	17.8	25.8	41.9

(c) Model 1971-1994 birth cohort, wages (permanent component of income)

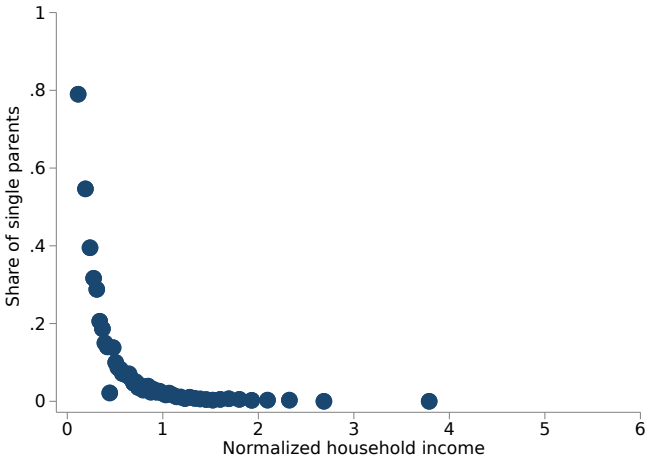
Child	Parent quintile				
quintile	1	2	3	4	5
1	37.1	25.8	18.2	12.7	6.2
2	26.1	23.9	21.2	17.2	11.6
3	19.0	21.0	21.5	21.2	17.3
4	11.7	17.8	22.0	23.9	24.6
5	6.0	11.5	17.2	25.0	40.4

Figure C4: Share of single parents by normalized household income

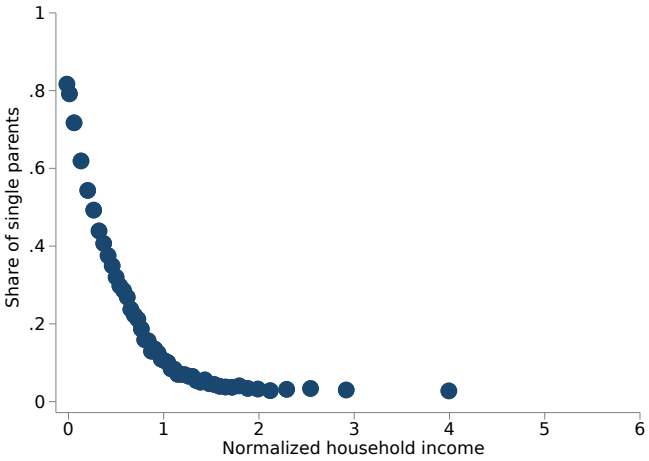
(a) 1967-1970 (CPS-ASEC)



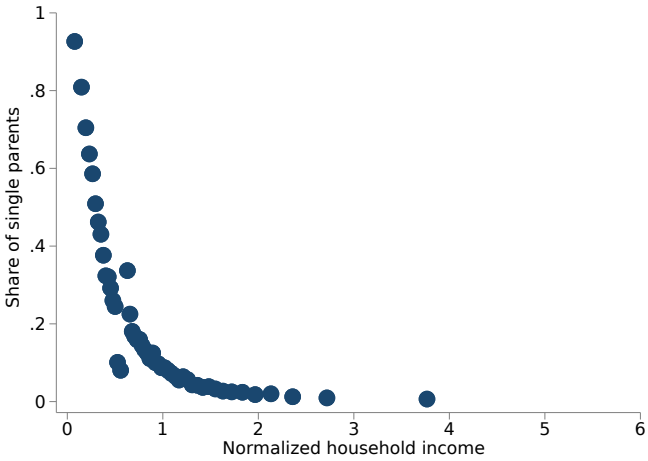
(b) 1947-1970 cohort (model)



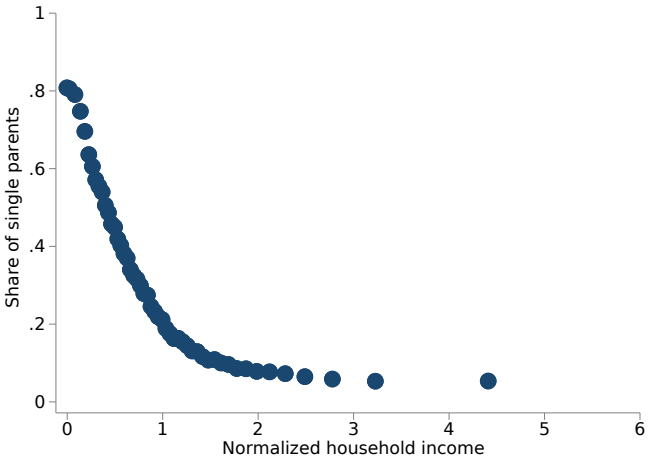
(c) 1971-1994 (CPS-ASEC)



(d) 1971-1994 cohort (model)



(e) 1995-2018 (CPS-ASEC)



(f) 1995-2018 cohort (model)

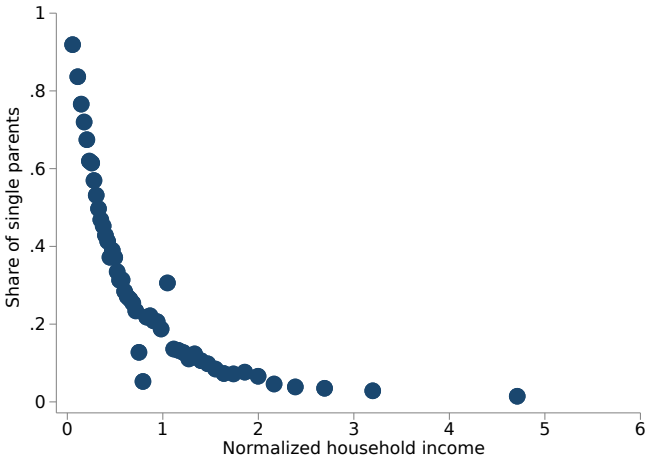
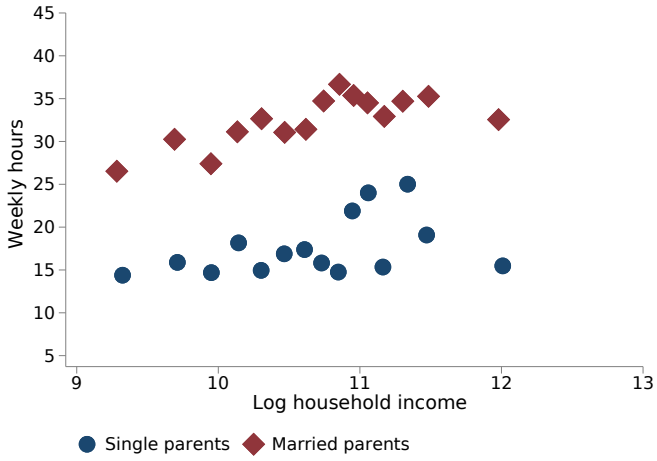
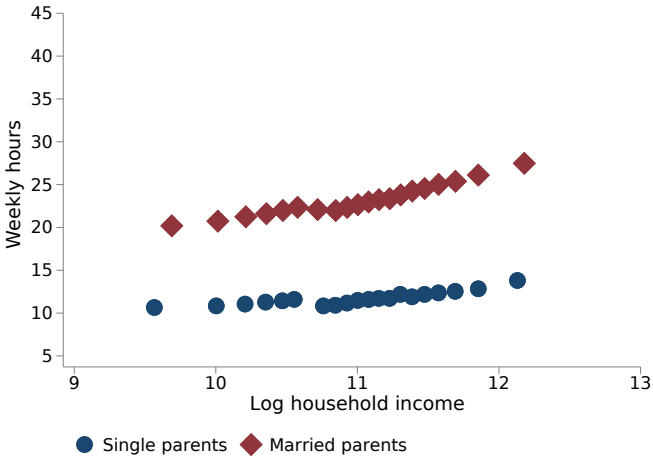


Figure C5: Time investments by log income, data and model

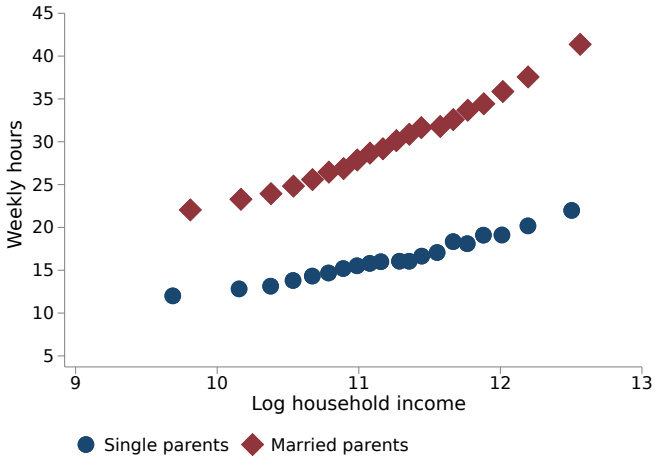
(a) 1997,2002 (PSID-CDS)



(b) 1971-1994 cohort (model)

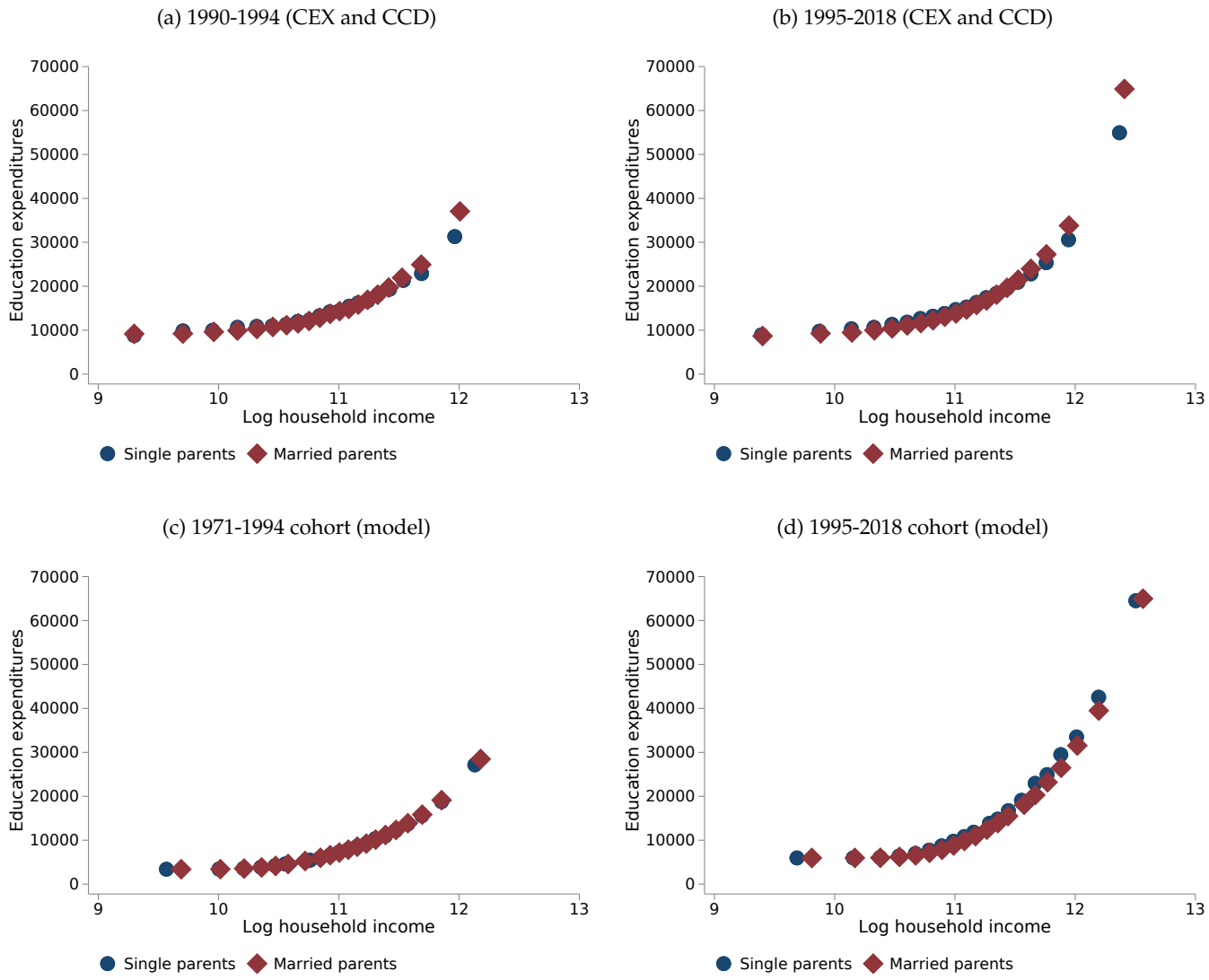


(c) 1995-2018 cohort (model)



Notes: This figure shows binned scatter plots of weekly hours in time investment by log household income and family structure from the PSID-CDS 1997 & 2002 samples and the model. Time investments from the PSID-CDS include time use activities as described in Section 2.2.1.

Figure C6: Education investments by log income, data and model



Notes: This figure shows education investment expenditures from the data and model by log household income. Education expenditures from the data combine private household expenditures from the Consumer Expenditure Survey (CEX) and imputed public education expenditures. Imputed public education expenditures are calculated by (1) regressing log county median district revenues per student on log county median household income separately for Federal & State revenues and Local revenues and (2) using the coefficient estimates from the regressions to compute imputed public spending with log household income in the CEX.

C.3 Counterfactual limiting share of single-parent families

For the counterfactual exercises where the share of single-parent families is limited to 9%, separations are random but correlated with human capital. Similarly to how the match quality preference shocks for parents staying together are constructed, separation shocks $\hat{\xi}_{it} \in \{0, 1\}$ are constructed in a similar way

- Use Gaussian copula to derive joint distribution
- Dependence parameter $\hat{\varrho}_t$
- Marginal success probability for each cohort is share of married families $1 - \pi_t$ from the data
- $\hat{\varrho}_t$ is calibrated so that the model matches the correlation between log income and single parenthood as in the baseline calibration with endogenous family formation. When calibrating $\hat{\varrho}_t$, the marginal success probability (i.e. share of single-parent families) in each period is taken from the data.

    1. Standardize the distribution of log human capital, which is approximately normal, to have mean zero and standard deviation one $\log(\bar{h}_{it}) = (\log(h_{it}) - \mu_{ht})/\sigma_{ht}$
    2. Draw sample from a standard normal distribution for all households $s^1_{it} \sim \mathcal{N}(0, 1)$
    3. Construct *correlated* random draws as $s^2_{it} = \left(\varrho_t \log(\bar{h}_{it}) + \sqrt{1 - \varrho_t^2} s^1_{it}\right)$
    4. Evaluate the cumulative probability for a standard normal at s^2_{it} to generate values from a uniform distribution in $s^3_{it} \in [0, 1]$
    5. If the uniform correlated draws s^3_{it} are greater than or equal to the marginal success probability (share of married-parents families) then the parents stay together ($\hat{\xi}_{it} = 0$); if less than the marginal success probability then parents separate ($\hat{\xi}_{it} = 1$)

$\hat{\varrho}_t$ is calibrated so that the correlation between single parenthood and log income is the same as in the Baseline model.[43]

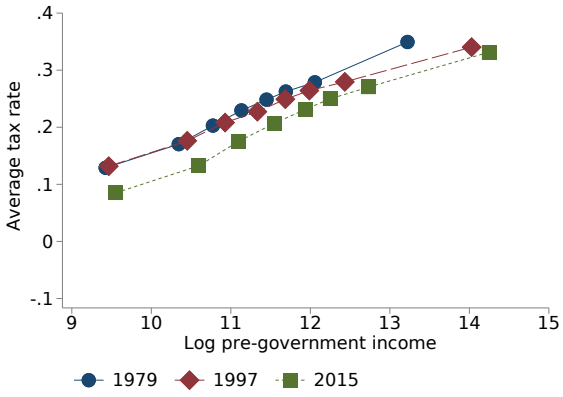
[43] Changes in the dependence parameter between shocks affecting parent separations (i.e. $\hat{\xi}_{it}$ and ξ_{it} with endogenous separations), reflect the spread of single parenthood to parents with higher educations and incomes, despite continued high rates of single parenthood for low income families across cohorts.

D Additional figures and tables

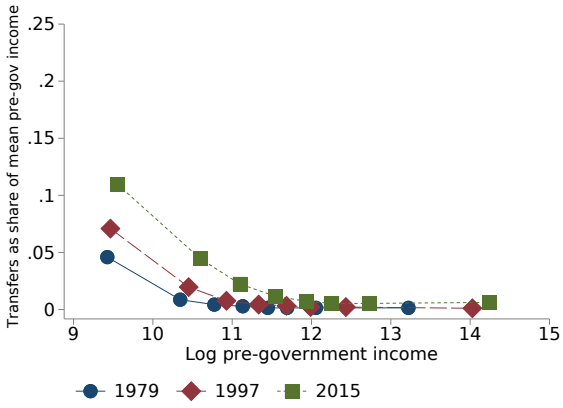
D.1 Taxes and transfers

Figure D1: Average tax rates and transfers as a share of mean income by log income

(a) Tax rates: households without children



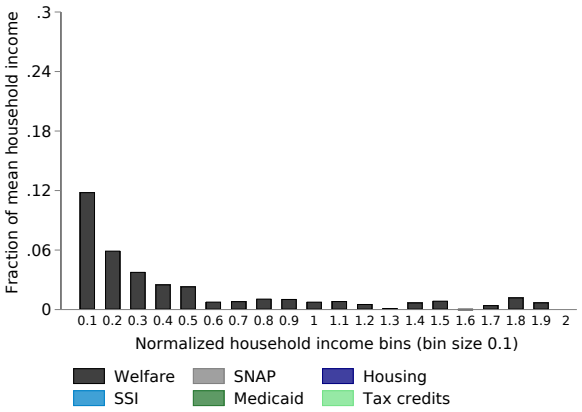
(b) Transfers: households without children



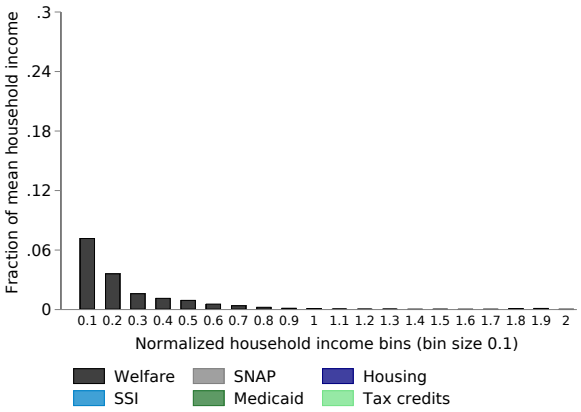
Notes: This figure shows average tax rates by log pre-government income and transfers as a share of mean pre-government income by log pre-government income for households without children. Data are from the CBO and used in the Distribution of Household Income, 2019 report.

Figure D2: Transfers and tax credits as share of mean household income by normalized household income bins and family structure

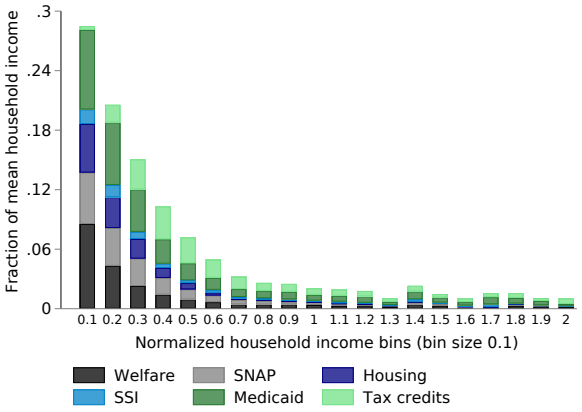
(a) Single parents, 1967-1970



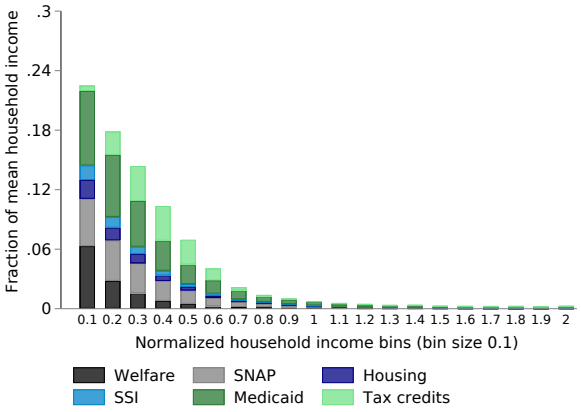
(b) Married parents, 1967-1970



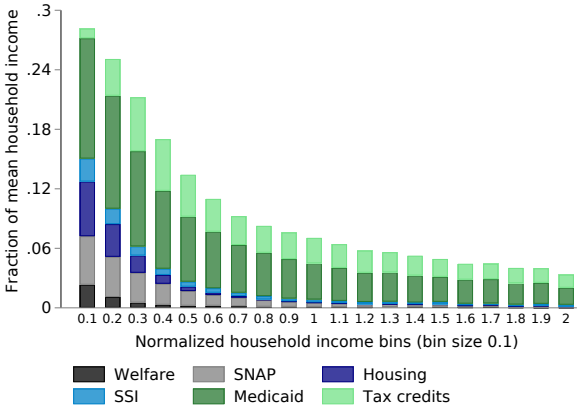
(c) Single parents, 1979-1994



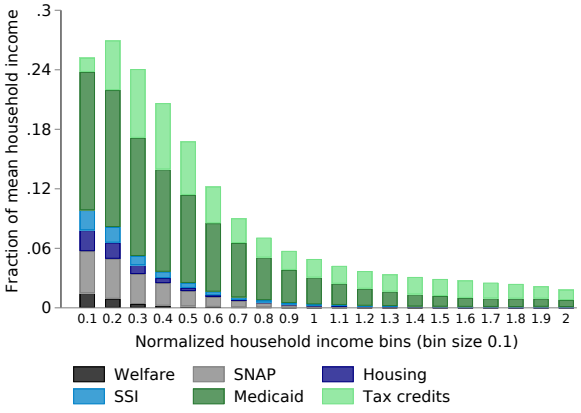
(d) Married parents, 1979-1994



(e) Single parents, 1995-2018



(f) Married parents, 1995-2018



Notes: This figure shows transfers and tax credits as a share of mean household income by normalized household income bins of size 0.1. Data from CPS-ASEC with CBO imputations of means-tested transfers.

D.2 Parental investments

D.2.1 Public education

Table D1: Regression of log district expenditures per student on county median household income quintile

	(1)	(2)	(3)	(4)
Quintile 2	0.023***	0.017***	0.021***	0.019***
	(0.002)	(0.002)	(0.002)	(0.002)
Quintile 3	0.062***	0.054***	0.047***	0.046***
	(0.002)	(0.002)	(0.003)	(0.003)
Quintile 4	0.105***	0.089***	0.088***	0.087***
	(0.002)	(0.003)	(0.003)	(0.003)
Quintile 5	0.203***	0.177***	0.127***	0.129***
	(0.002)	(0.003)	(0.004)	(0.004)
Constant	9.121***	8.909***	9.140***	8.998***
	(0.003)	(0.025)	(0.003)	(0.019)
Year FE	Yes	Yes	Yes	Yes
District controls	No	Yes	No	Yes
District FE	No	No	Yes	Yes
Observations	288,227	288,227	288,227	288,227

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: School district data from CCD and county economic indicators from SAIPE for 1995-2018. County poverty is the overall county poverty rate, district controls include share of school-age population (ages 5–17) in poverty, share of special education students, and highest grade offered.

D.2.2 Education expenditures in the CEX

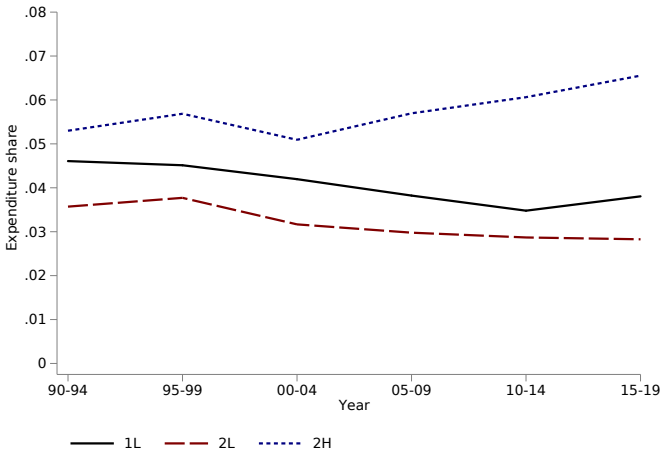
Table D2: Summary statistics of CEX sample

Observations	301,254
Households	90,138
Mean household income	72,891
HS or below	35.8
Some college	30.1
College or more	34.1
Percent married	69.2
Average age of household head	40.1
Average age of youngest child	7.4
Average age of oldest child	10.7
Average number of children	1.9

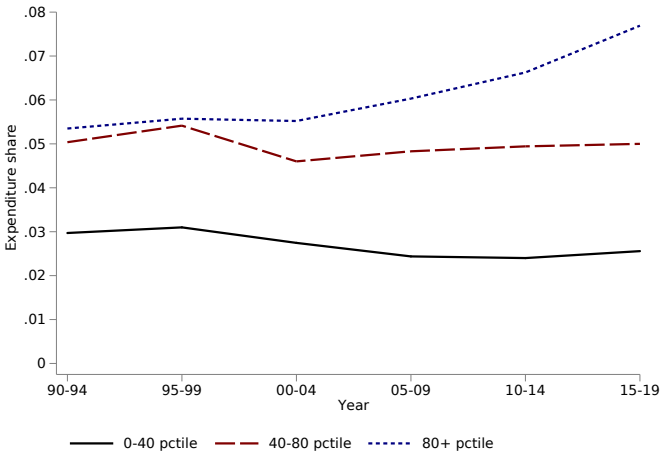
Note: Income and expenditures are deflated using CPI-U-RS with base year 2015.

Figure D3: Expenditure shares, early and late childhood

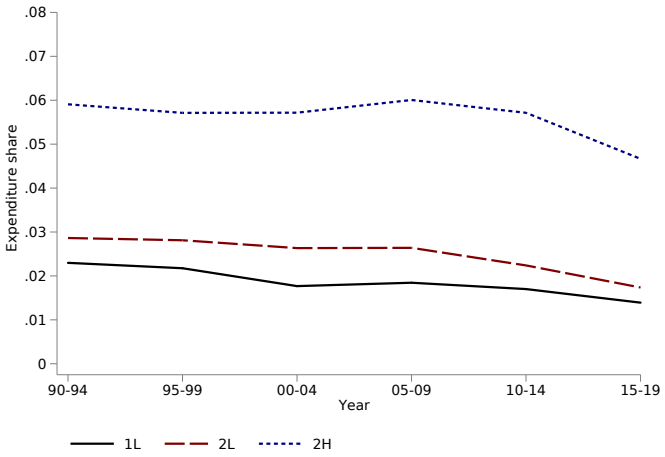
(a) Early: number and highest education of parents



(b) Early: expenditure percentile groups



(c) Late: number and highest education of parents



(d) Late: expenditure percentile groups

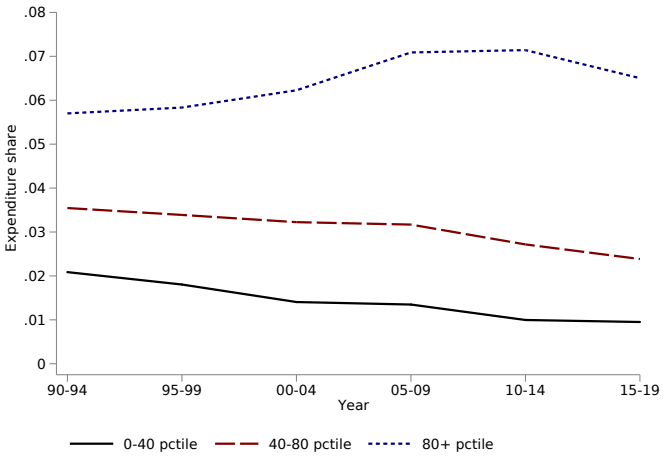
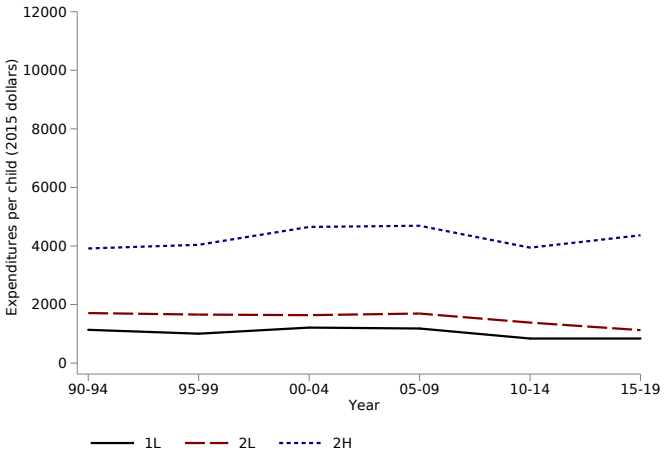


Table D3: Expenditures in early childhood, 1995-1999 and 2015-2019

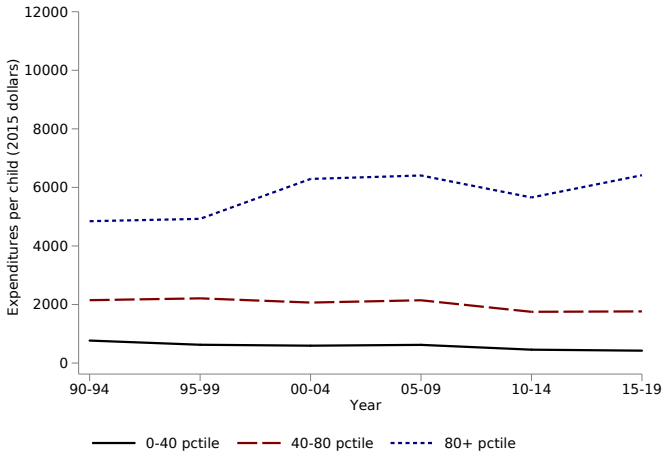
Group	Expenditures per child			Expenditure shares		
	1995-1999	2015-2019	Change	1995-1999	2015-2019	Change
1L	1,652	1,569	-83	0.045	0.038	-0.007
2L	2,070	1,702	-367	0.038	0.028	-0.009
2H	4,492	6,123	+1,631	0.057	0.066	+0.009
0-40p	802	768	-34	0.031	0.026	-0.005
40-80p	2,766	2,854	+88	0.054	0.050	-0.004
80p+	5,844	8,952	+3,108	0.056	0.077	+0.021

Figure D4: Expenditures per child and expenditure shares, mid childhood

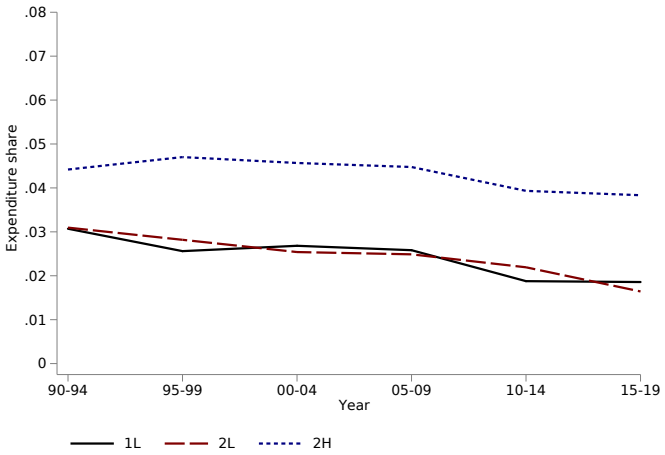
(a) Expenditures per child by number and highest education of parents



(b) Expenditures per child by expenditure percentile groups



(c) Expenditure shares by number and highest education of parents



(d) Expenditure shares by expenditure percentile groups

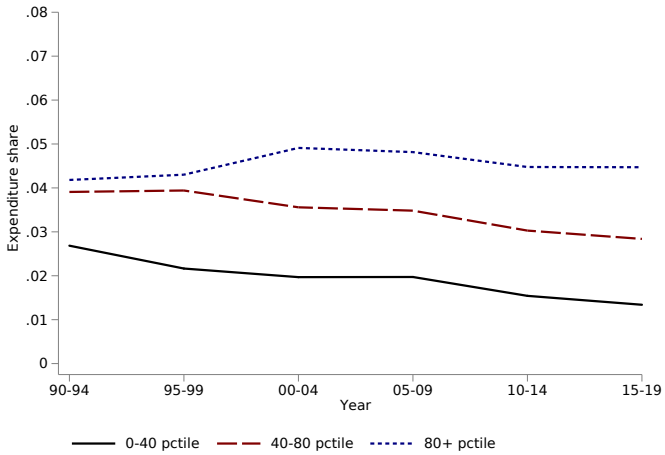


Table D4: Expenditures in late childhood, 1995-1999 and 2015-2019

Group	**Expenditures per child**			**Expenditure shares**		
	1995-1999	2015-2019	Change	1995-1999	2015-2019	Change
1L	1,026	731	-295	0.022	0.014	-0.008
2L	2,101	1,325	-776	0.028	0.017	-0.011
2H	6,109	6,904	+794	0.057	0.047	-0.010
0-40p	547	321	-226	0.018	0.010	-0.009
40-80p	2,036	1,584	-478	0.034	0.024	-0.010
80p+	7,541	11,041	+3,500	0.058	0.065	+0.007

Table D5: Expenditures per child and expenditure shares by resource groups and over time

	Early childhood		**Late childhood**	
	Expenditure shares	Expenditures per child	Expenditure shares	Expenditures per child
40-80p	0.023***	1735.728***	0.011***	958.659***
	(0.002)	(132.878)	(0.002)	(264.810)
80p+	0.023***	4550.220***	0.031***	5869.408***
	(0.002)	(162.308)	(0.002)	(320.832)
2L	-0.015***	-478.767***	0.000	142.535
	(0.002)	(146.384)	(0.002)	(275.053)
2H	-0.002	718.087***	0.021***	2485.591***
	(0.002)	(167.599)	(0.002)	(333.755)
05-09	-0.008***	-91.567	-0.004**	-26.927
	(0.002)	(171.896)	(0.002)	(302.314)
15-19	-0.009***	-252.573	-0.007***	-153.972
	(0.002)	(173.124)	(0.002)	(315.681)
40-80p × 05-09	-0.001	-163.941	0.001	-79.515
	(0.002)	(184.494)	(0.002)	(360.795)
40-80p × 15-19	-0.002	-260.252	-0.001	-544.602
	(0.002)	(188.063)	(0.002)	(377.715)
80p+ × 05-09	0.008***	676.325***	0.016***	2702.036***
	(0.003)	(223.262)	(0.003)	(441.539)
80p+ × 15-19	0.022***	2600.245***	0.012***	2598.063***
	(0.003)	(226.602)	(0.003)	(471.206)
2L × 05-09	0.001	-143.801	-0.001	-238.946
	(0.002)	(204.178)	(0.002)	(372.428)
2L × 15-19	-0.001	-103.233	-0.002	-295.794
	(0.003)	(210.846)	(0.002)	(393.237)
2H × 05-09	0.005*	380.155*	-0.002	390.311
	(0.003)	(229.218)	(0.003)	(448.721)
2H × 15-19	0.009***	786.780***	-0.007**	155.905
	(0.003)	(228.448)	(0.003)	(461.500)
Constant	0.038***	938.166***	0.016***	314.186
	(0.001)	(121.523)	(0.001)	(229.180)

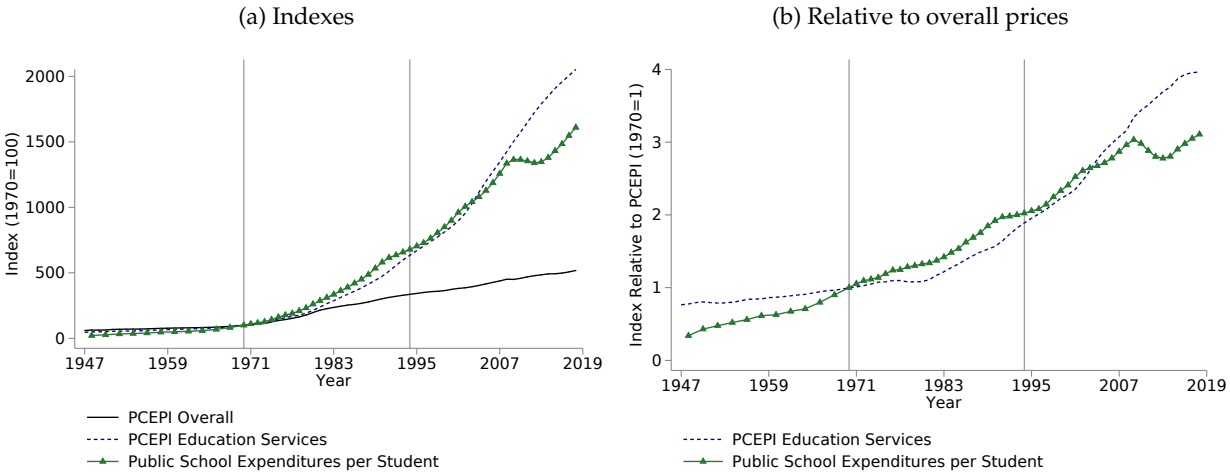
Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

D.3 Public education expenditures and the price of education

Public K-12 education expenditures per student have risen dramatically in the United States since 1947. This increase in expenditures closely aligns the increase in the price index for education services as measured by the Bureau of Economic Analysis Personal Consumption Expenditures Price Index series. Figure D5 displays how closely public education expenditures per student have tracked the price of education services. Excluding the drop in expenditures following the Great Financial Crisis, these two series have risen in roughly the same magnitude since 1947.

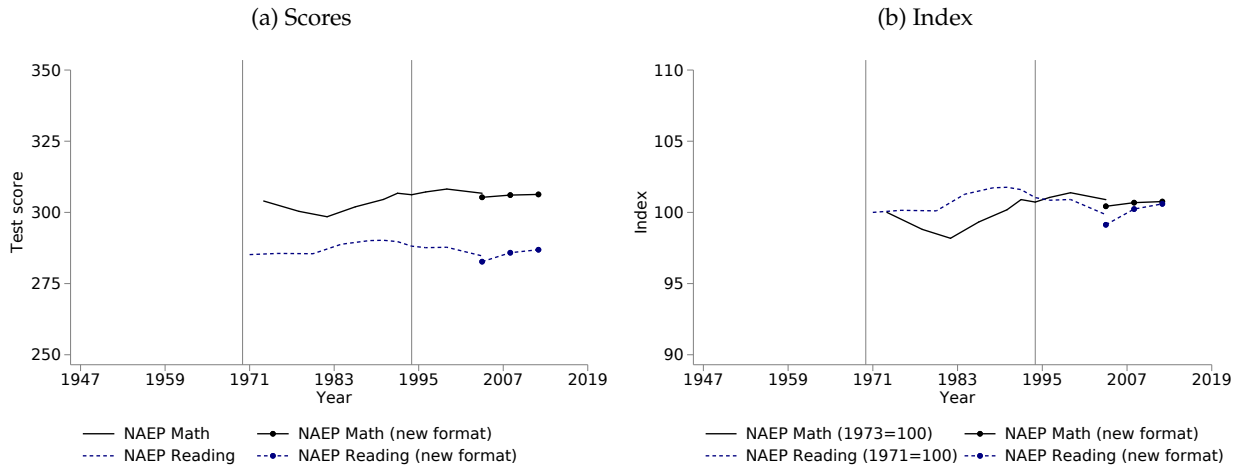
Figure D5: Education prices and public education expenditures



Source: Bureau of Economic Analysis, Department of Education National Center for Education Statistics
Notes: Panel (a) plots indices for overall prices and prices/expenditures for education (1970=100). Panel (b) plots indices of prices/expenditures for education divided by the overall price index (1970=1).

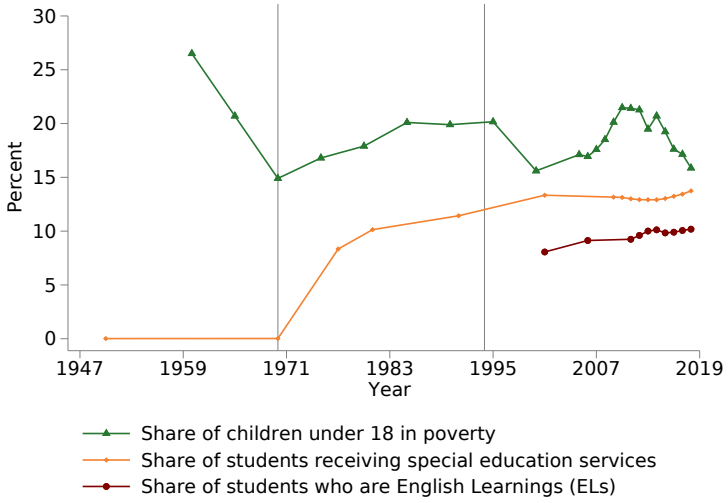
Figure D5 highlights that the increase in public expenditures on education may reflect the increase in the relative price of education more broadly rather than an increase in the effective level of education provided to students. The output of public education per year is a student receiving a year of schooling. The level of output per student, or effectiveness/productivity of public schooling, appears to have not fundamentally changed despite such a drastic increase in expenditures. This would indicate that the increase in the relative price of both private and public education is roughly the same, which makes sense given the inputs to both private and public education are also roughly the same. Looking at educational outcomes, average test scores have not changed in any significant way despite real expenditures per student increasing by a factor of almost three since 1970 (Figure D6). This does not appear to be driven by student composition. Other than the significant increase in share of students receiving special education starting in the 1970s, the composition of students has not changed dramatically over the past several decades (Figure D7).

Figure D6: National Assessment of Educational Progress (NAEP) test scores



Source: Department of Education National Center for Education Statistics
Notes: Figures plot average National Assessment of Educational Progress (NAEP) test scores for 17 year olds in the United States. Panel (a) has average scores and Panel (b) has an index for average scores equal to 100 in the earliest year of data.

Figure D7: Share of public school K-12 students who are in poverty, receiving special education services, and English language learners



Source: Department of Education National Center for Education Statistics

D.4 Human capital production efficiency: parenting styles

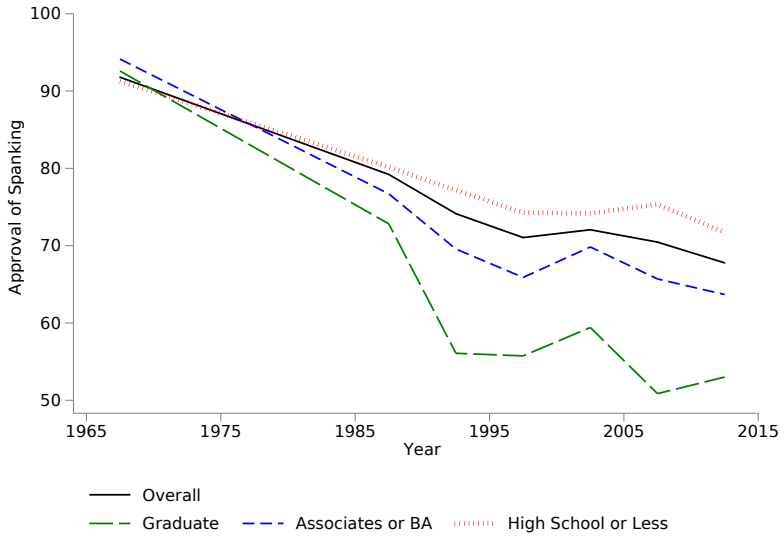
As discussed in Doepke and Zilibotti (2017), there have been long-standing trends in average parenting styles in the United States since the 1960s. Here I show empirical evidence suggesting these trends in parenting styles improve parents' human capital production efficiency. The greater uptake of more effective parenting styles by parents with higher education steepens the relationship between parent human capital and human capital production efficiency across families.

There are four common parenting styles

1. Uninvolved/neglecting: neither supportive or strict
2. Authoritarian: not supportive but strict
3. Permissive: supportive but not strict
4. Authoritative: supportive and strict

Since the 1960 has been decline in authoritarian parenting and a rise in authoritative parenting

Figure D8: Decline in authoritarian parenting: fall in approval of spanking



Notes: Data come from replication files for Doepke and Zilibotti (2017): General Social Survey (GSS, 1986–2014) and "Study of Political Violence Attitudes, Personal Experiences with Violence, Emotional Reactions to Assassination and Violence in the Media, 1968" (ICPSR Study No. 7354).

This societal change in parenting occurred mostly with parents with higher education. As discussed in Section C.4 of the Supplemental Material to Doepke and Zilibotti (2017), "for both mothers and fathers, authoritarian and neglecting parenting is most prevalent for those with the lowest education level (up to high school), and authoritative parenting is most common among parents

with advanced degrees (master, Ph.D., or professional degree)."

Next I show that parenting style impacts educational outcomes with NLSY data from the replication files of Doepke and Zilibotti (2017). I regress child high school GPA and an indicator for having a BA degree on parents' education interacted with parenting style, controlling for household income and demographic variables. Authoritative and permissive styles have positive effects on educational outcomes.

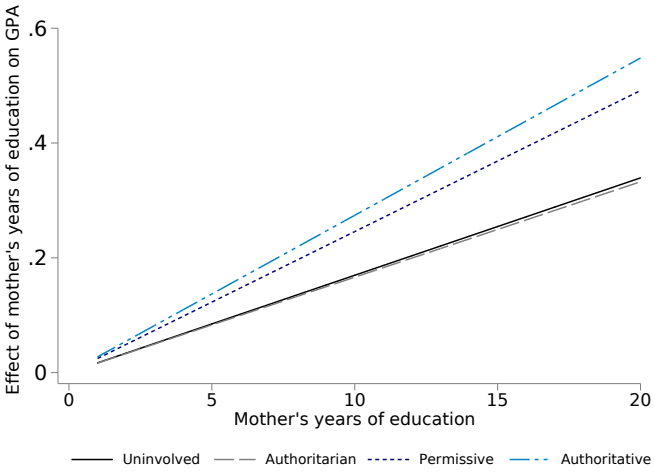
Table D6: Effects of parent education and parenting styles on high school GPA and probability of BA degree

	HS GPA		BA Degree	
Mother's years of education	0.016***	0.017***	0.018***	0.020***
	(0.006)	(0.006)	(0.004)	(0.004)
Father's years of education	0.028***	0.024***	0.025***	0.024***
	(0.005)	(0.005)	(0.003)	(0.003)
Authoritarian × Mother's years of education	-0.001	-0.000	0.003	0.003
	(0.004)	(0.004)	(0.002)	(0.002)
Permissive × Mother's years of education	0.006*	0.008**	0.005**	0.006***
	(0.003)	(0.003)	(0.002)	(0.002)
Authoritative × Mother's years of education	0.008**	0.010***	0.006***	0.007***
	(0.003)	(0.003)	(0.002)	(0.002)
Authoritarian × Father's years of education	0.006*	0.005*	0.002	0.002
	(0.003)	(0.003)	(0.002)	(0.002)
Permissive × Father's years of education	0.012***	0.011***	0.007***	0.007***
	(0.003)	(0.003)	(0.002)	(0.002)
Authoritative × Father's years of education	0.012***	0.013***	0.007***	0.007***
	(0.003)	(0.003)	(0.002)	(0.002)
Household income	Yes	Yes	Yes	Yes
Demographic controls	No	Yes	No	Yes
N	2721	2710	3840	3826

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure D9: Estimated impact of parent education and parenting styles on high school GPA

(a) Mother's



(b) Father's

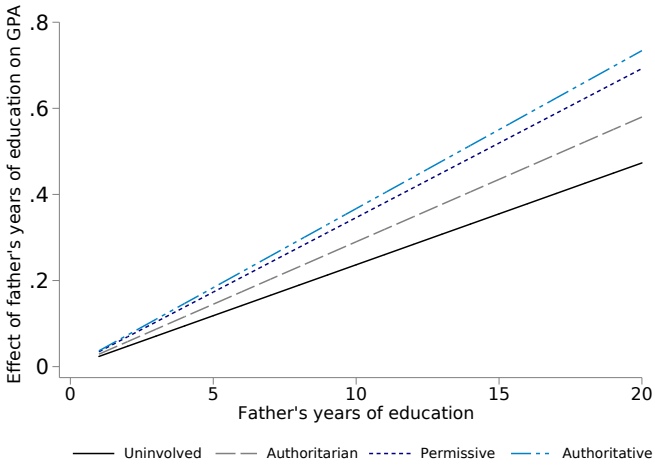
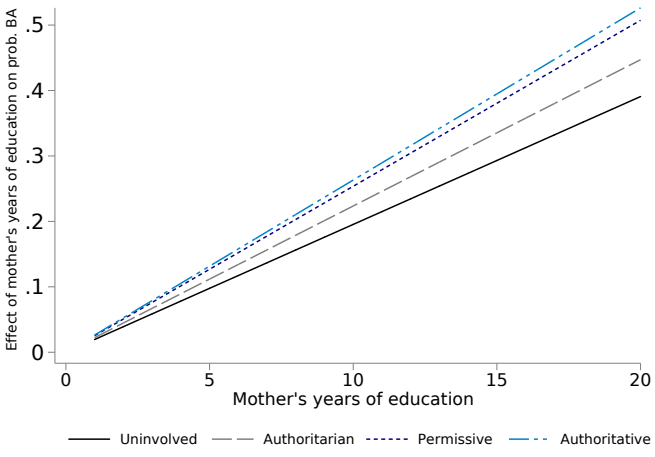
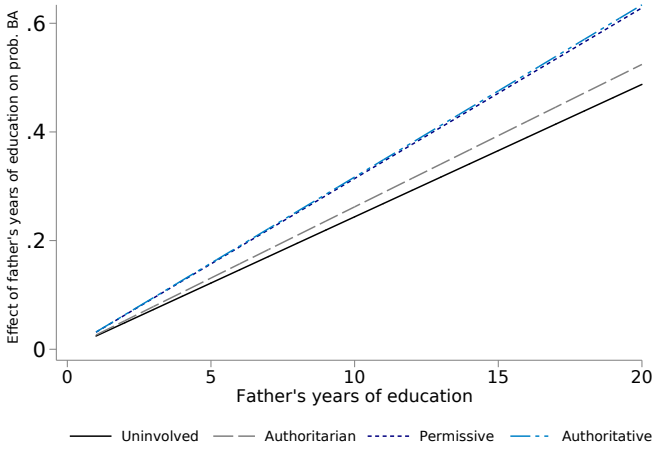


Figure D10: Estimated impact of parent education and parenting styles on probability of BA degree

(a) Mother's



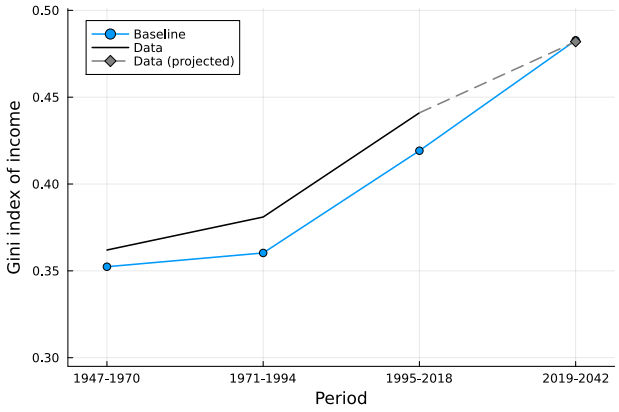
(b) Father's



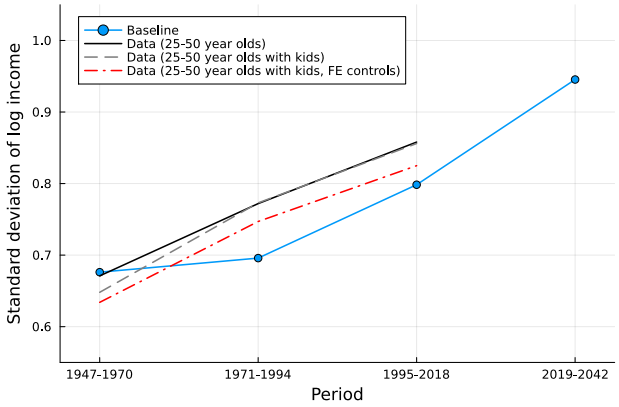
D.5 Quantitative analysis

Figure D11: Gini index, standard deviation of logs, and IGE of family income in the Baseline and data

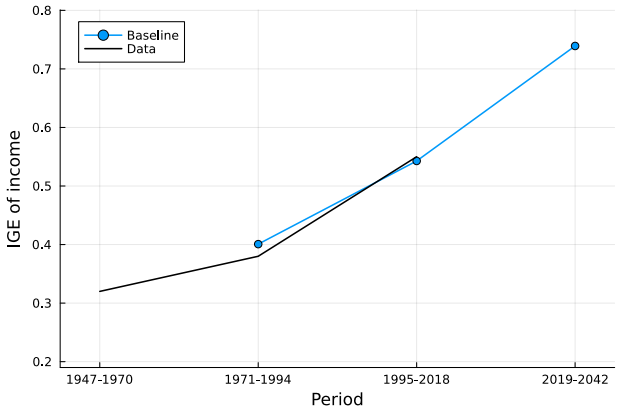
(a) Gini index of family income



(b) Standard deviation of log family income

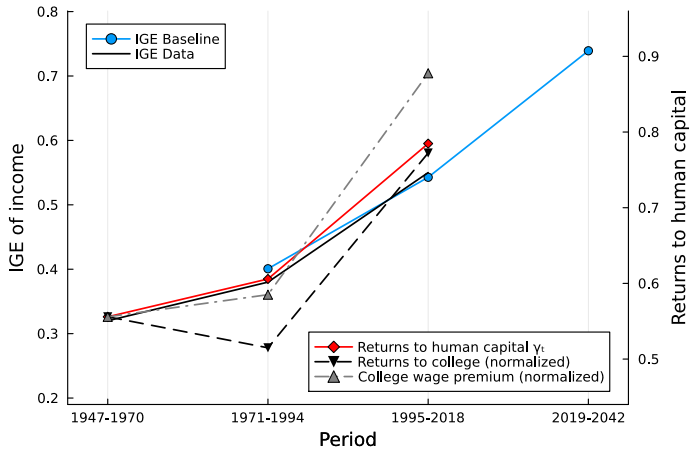


(c) IGE of family income



Notes: Gini index from US Census Table F-4. Standard deviation of log income from CPS-ASEC data on income for households headed by 25-50 year olds, with and without kids. IGE estimates from Table 1, Column (2) in Aaronson and Mazumder (2008) for 1960, 1980, and 2000.

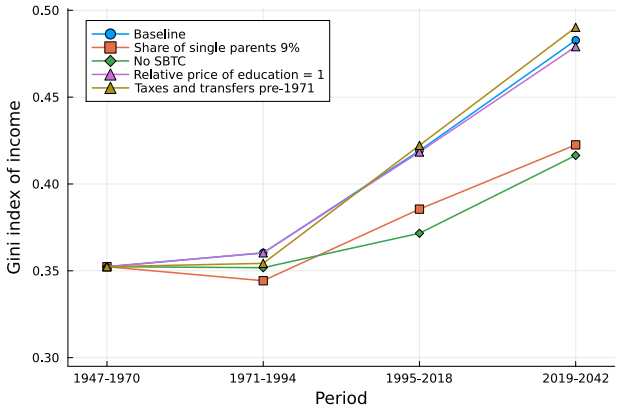
Figure D12: IGE of family income and returns to human capital, Baseline and empirical estimates



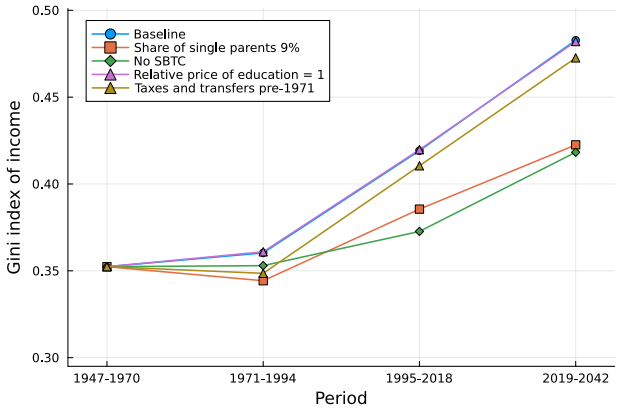
Notes: IGE estimates from Table 1, Column (2) in Aaronson and Mazumder (2008) for 1960, 1980, and 2000; also shown in Davis and Mazumder (2024). Return to college from Davis and Mazumder (2024), estimated using the methodology of Goldin and Katz (2009), for 1960, 1980, and 2000. College wage premium from Autor et al. (2020) Figure 1 and Figure A1 for 1960, 1980, and 2000. Different measures of returns to human capital are normalized to the same value as the parameter γ_t in the first model period.

Figure D13: Inequality and intergenerational mobility of family income in the Baseline and counterfactuals

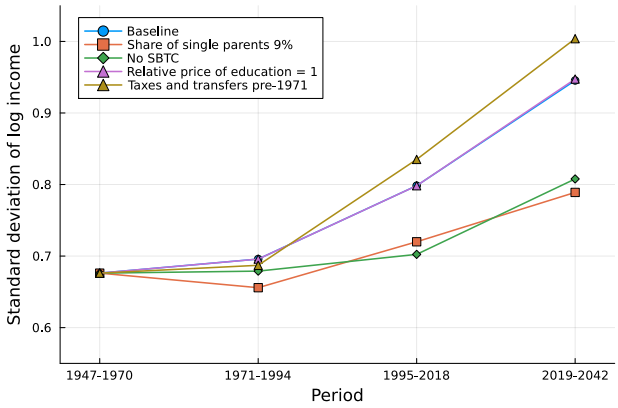
(a) Gini: fixed family structure



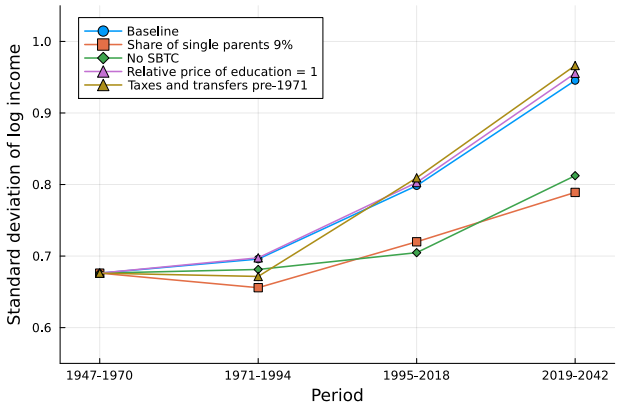
(b) Gini: endogenous family structure



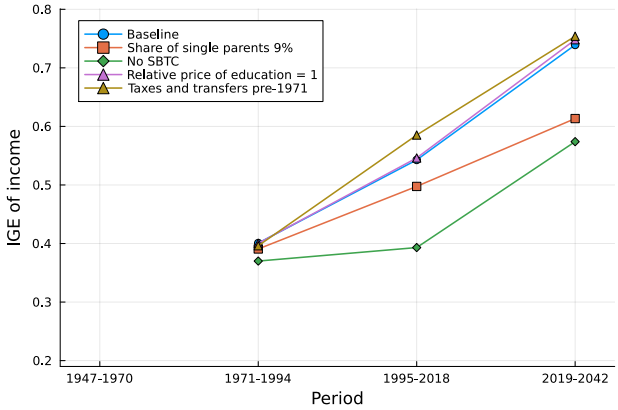
(c) SD of logs: fixed family structure



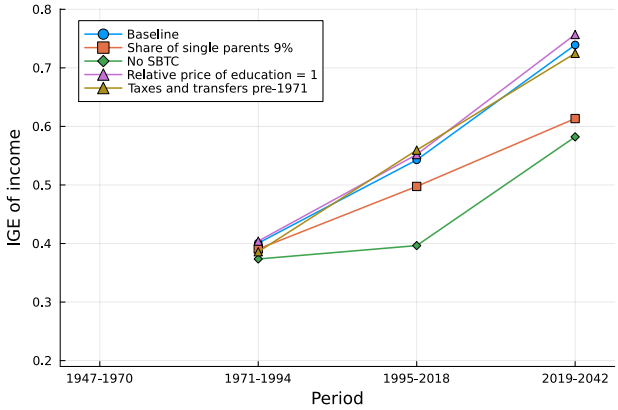
(d) SD of logs: endogenous family structure



(e) IGE: fixed family structure



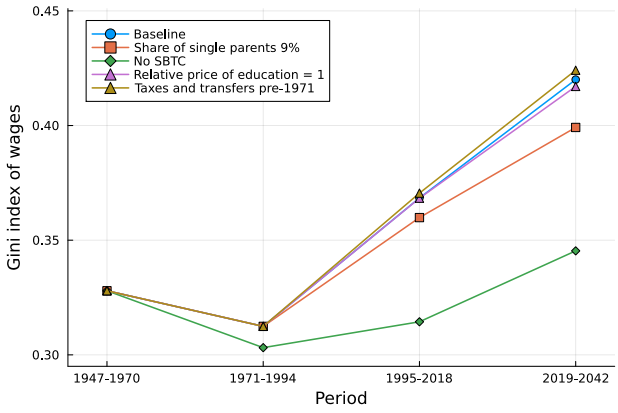
(f) IGE: endogenous family structure



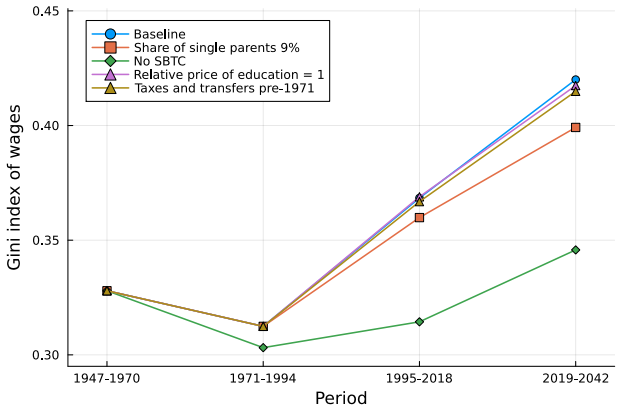
Note: The series for 'Baseline' and 'Share of single parents 9%' are the same in both fixed and endogenous family structure figures.

Figure D14: Inequality and intergenerational mobility of wages in the Baseline and counterfactuals

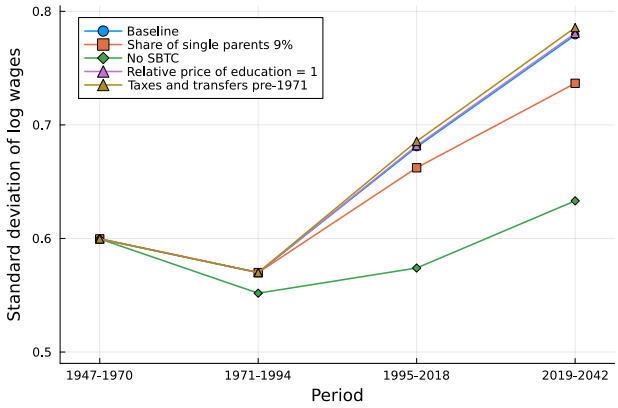
(a) Gini: fixed family structure



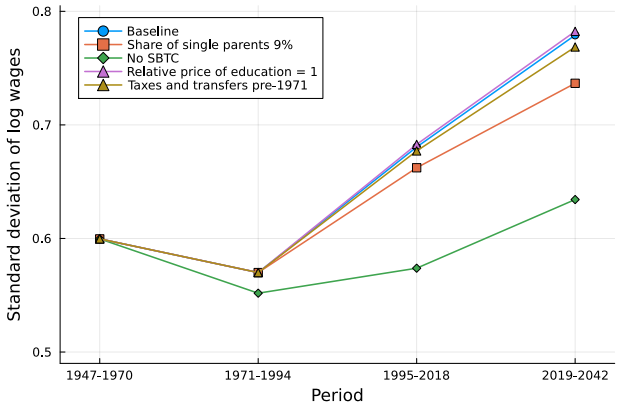
(b) Gini: endogenous family structure



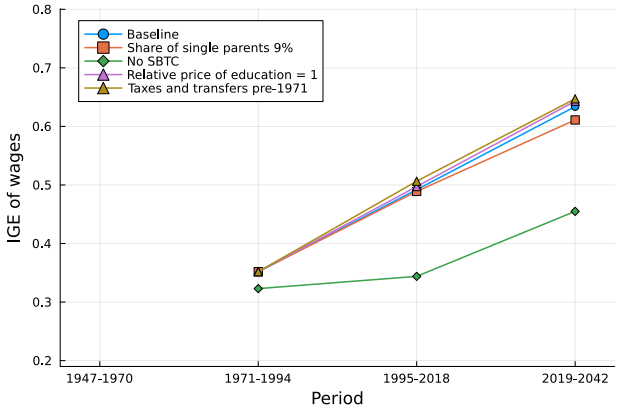
(c) SD of logs: fixed family structure



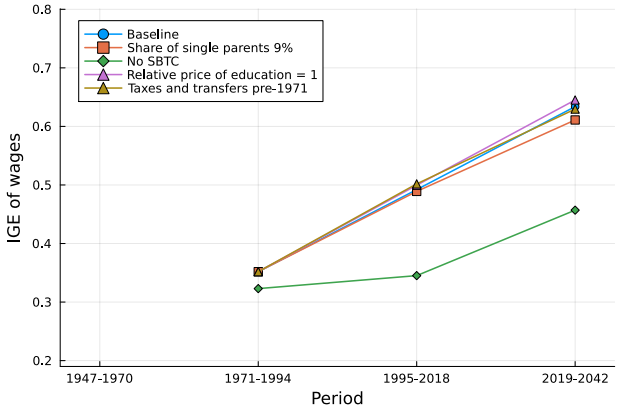
(d) SD of logs: endogenous family structure



(e) IGE: fixed family structure



(f) IGE: endogenous family structure



Note: The series for 'Baseline' and 'Share of single parents 9%' are the same in both fixed and endogenous family structure figures.

D.5.1 Child and parent incomes in Baseline and counterfactual scenarios

Figure D15: Child and parent log incomes: Baseline and share of single parents 9% counterfactual

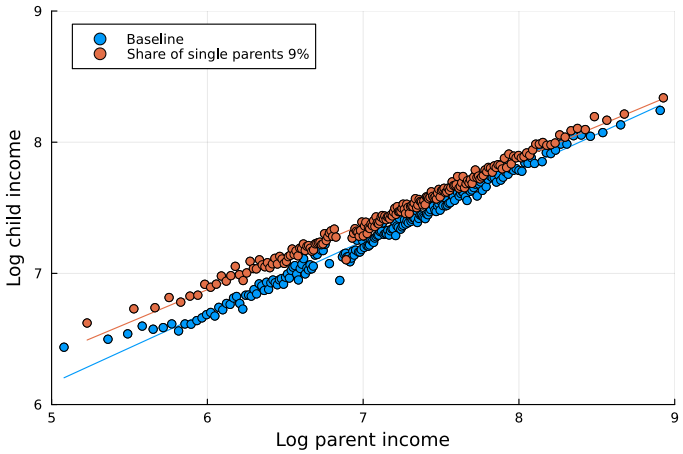
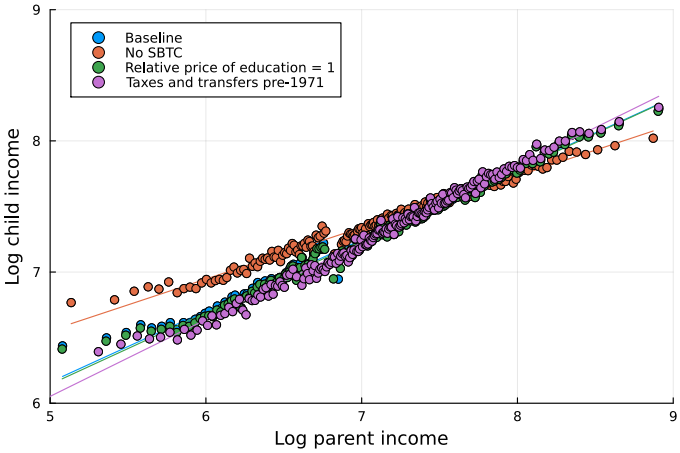
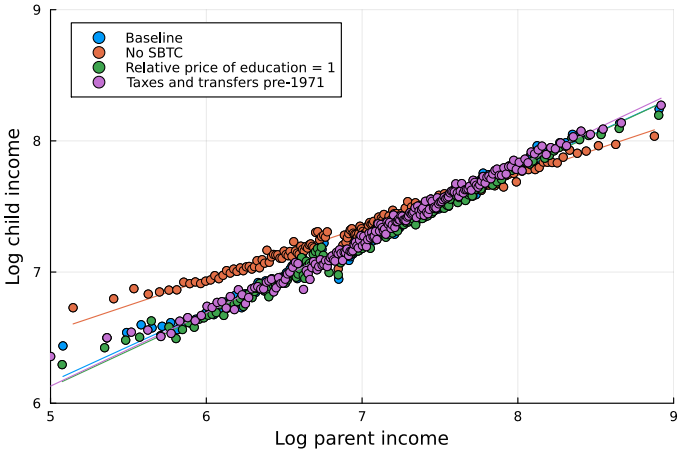


Figure D16: Child and parent log incomes: Baseline and counterfactuals

(a) Fixed family structure



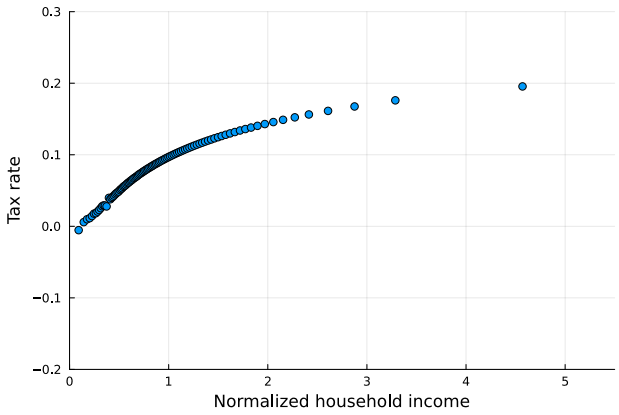
(b) Endogenous family structure



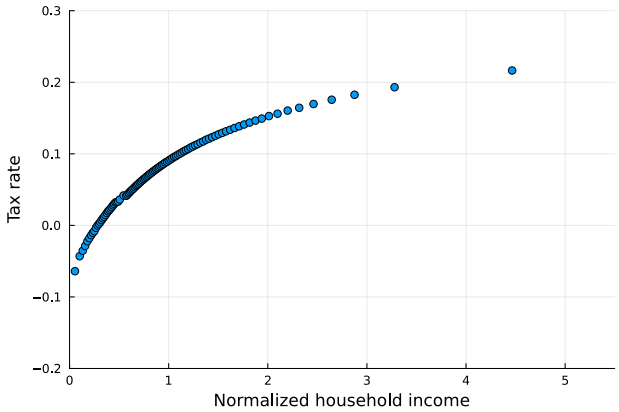
D.5.2 Tax rates

Figure D17: Tax rates but normalized household income, Baseline scenario

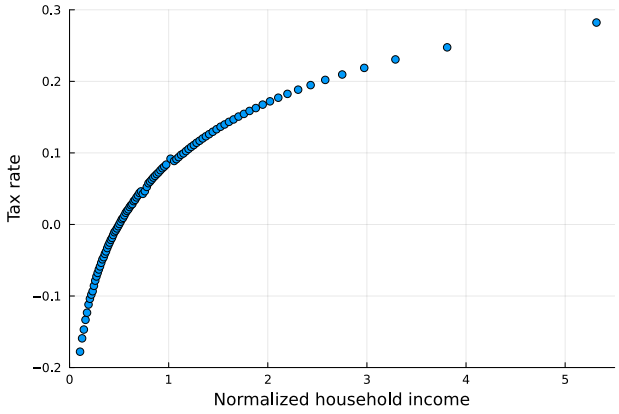
(a) Period 1 (1947-1970)



(b) Period 2 (1971-1994)



(c) Period 3 (1995-2018)



D.5.3 Investments

Parental investments in second period, Baseline and counterfactuals

Table D7: Average education investments overall and for bottom income decile, bottom income quartile, and top income quartile: Baseline model and counterfactuals

	Overall	Bottom decile	Bottom quartile	Top quartile
Baseline	177.41	65.51	70.58	344.61
Share of single parents 9%	187.29	70.16	76.90	356.69
Family structure fixed to Baseline				
No SBTC	177.15	66.23	71.90	338.66
Relative price of education = 1	194.70	66.07	73.84	379.80
Taxes and transfers pre-1971	178.46	66.73	72.29	347.65
Endogenous family structure				
No SBTC	177.19	66.48	71.87	338.89
Relative price of education = 1	194.55	65.53	73.27	380.12
Taxes and transfers pre-1971	181.30	68.00	74.35	351.05

Notes: This table shows average weekly education expenditures for all families, families in the bottom income decile, families in the bottom income quartile, and families in the top income quartile for the Baseline model and counterfactuals.

Table D8: Average time investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with fixed family structure

	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Baseline	21.07	15.94	20.36	22.57	25.40
Share of single parents 9%	22.43	18.84	21.79	23.38	25.74
No SBTC	21.04	15.95	20.40	22.58	25.23
Relative price of education = 1	23.28	17.67	22.54	24.93	28.00
Taxes and transfers pre-1971	20.82	15.35	19.95	22.58	25.39

Table D9: Average time investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with endogenous family structure

	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Baseline	21.07	15.94	20.36	22.57	25.40
Share of single parents 9%	22.43	18.84	21.79	23.38	25.74
No SBTC	21.03	15.86	20.38	22.65	25.23
Relative price of education = 1	23.24	17.54	22.48	24.93	28.01
Taxes and transfers pre-1971	21.23	16.26	20.40	22.83	25.45

Table D10: Average education investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with fixed family structure

	All	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Baseline	177.41	70.58	114.05	180.41	344.61
Share of single parents 9%	187.29	76.90	124.39	191.18	356.69
No SBTC	177.15	71.90	116.46	181.58	338.66
Relative price of education = 1	194.70	73.84	125.83	199.32	379.80
Taxes and transfers pre-1971	178.46	72.29	114.44	179.48	347.65

Table D11: Average education investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with endogenous family structure

	All	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Baseline	177.41	70.58	114.05	180.41	344.61
Share of single parents 9%	187.29	76.90	124.39	191.18	356.69
No SBTC	177.19	71.87	115.95	182.06	338.89
Relative price of education = 1	194.55	73.27	125.64	199.16	380.12
Taxes and transfers pre-1971	181.30	74.35	117.35	182.45	351.05

Parental investments in third period, Baseline and counterfactuals

Table D12: Average education investments overall and for bottom income decile, bottom income quartile, and top income quartile: Baseline model and counterfactuals

	Overall	**Bottom decile**	**Bottom quartile**	**Top quartile**
Baseline	331.15	114.75	119.16	717.18
Share of single parents 9%	366.60	127.81	138.25	761.78
Family structure fixed to Baseline				
No SBTC	321.81	115.29	125.58	646.51
Relative price of education = 1	425.45	113.91	130.62	927.03
Taxes and transfers pre-1971	338.39	115.10	117.64	749.50
Endogenous family structure				
No SBTC	323.19	116.73	126.63	651.83
Relative price of education = 1	423.05	113.11	129.46	923.12
Taxes and transfers pre-1971	343.23	119.40	122.81	747.18

Notes: This table shows average weekly education expenditures for all families, families in the bottom income decile, families in the bottom income quartile, and families in the top income quartile for the Baseline model and counterfactuals.

Table D13: Average time investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with fixed family structure

	All	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Baseline	26.42	17.18	23.87	29.06	35.56
Share of single parents 9%	29.92	23.02	28.34	31.65	36.66
No SBTC	26.26	17.05	24.52	28.84	34.63
Relative price of education = 1	34.80	23.06	31.74	38.26	46.15
Taxes and transfers pre-1971	26.05	16.85	23.27	28.53	35.54

Table D14: Average time investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with endogenous family structure

	All	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Baseline	26.42	17.18	23.87	29.06	35.56
Share of single parents 9%	29.92	23.02	28.34	31.65	36.66
No SBTC	26.33	17.03	24.55	28.87	34.85
Relative price of education = 1	34.57	22.74	31.45	38.10	46.00
Taxes and transfers pre-1971	26.74	18.08	24.34	29.04	35.52

Table D15: Average education investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with fixed family structure

	All	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Baseline	331.15	119.16	176.29	311.99	717.18
Share of single parents 9%	366.60	138.25	213.11	353.24	761.78
No SBTC	321.81	125.58	193.38	321.78	646.51
Relative price of education = 1	425.45	130.62	232.23	411.92	927.03
Taxes and transfers pre-1971	338.39	117.64	173.47	312.96	749.50

Table D16: Average education investments overall and by income quartile across scenarios: Baseline, share of single-parents 9%, counterfactuals with endogenous family structure

	All	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Baseline	331.15	119.16	176.29	311.99	717.18
Share of single parents 9%	366.60	138.25	213.11	353.24	761.78
No SBTC	323.19	126.63	193.47	320.83	651.83
Relative price of education = 1	423.05	129.46	231.07	408.54	923.12
Taxes and transfers pre-1971	343.23	122.81	182.63	320.31	747.18

D.5.4 Separating the effects: human capital, work hours & transfers, and returns to skill channels

Figure D18: Child and parent log incomes: Baseline and share of single parents 9% counterfactual decomposition

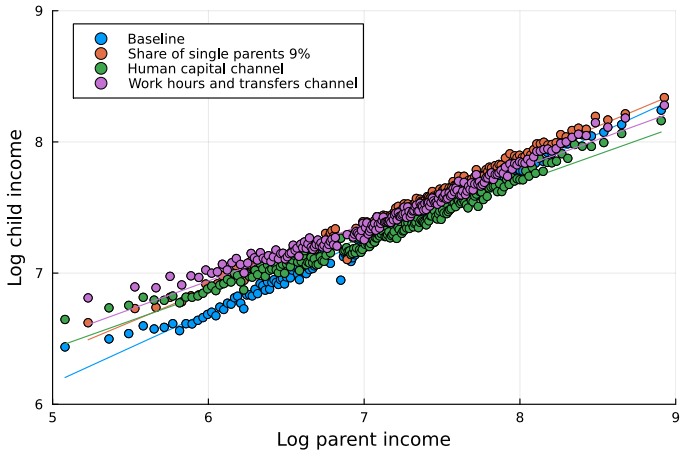
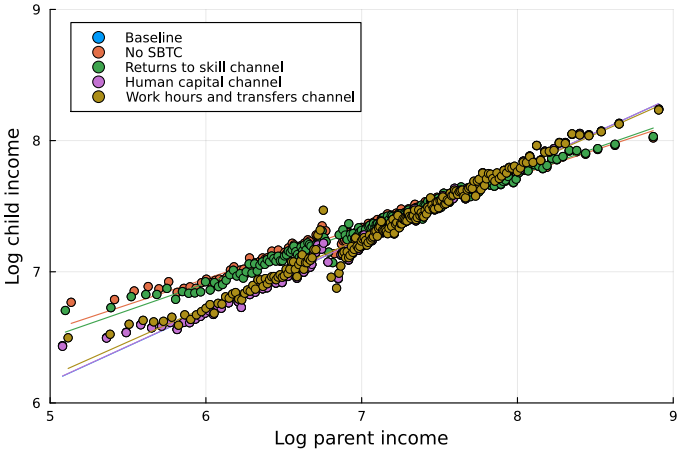


Figure D19: Child and parent log incomes: Baseline and No SBTC counterfactual decomposition

(a) Fixed family structure



(b) Endogenous family structure

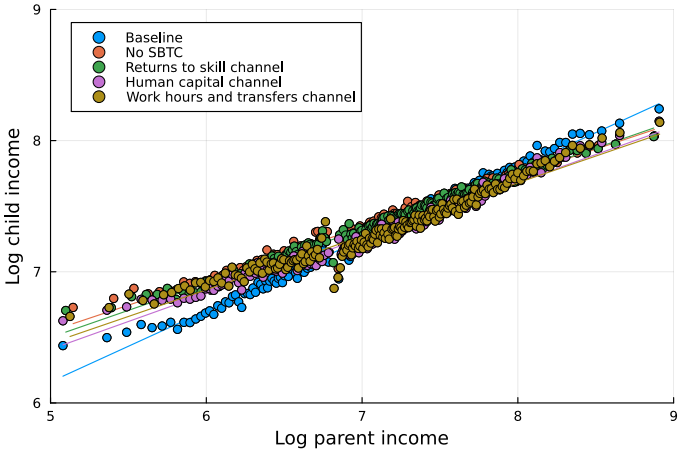


Table D17: Inequality and intergenerational mobility of family income for the Baseline model and counterfactuals with fixed family structure

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.419	0.798	0.543
Share of single parents 9% full counterfactual	0.386	0.720	0.498
Counterfactual human capital	0.412	0.782	0.422
Counterfactual work hours and transfers	0.393	0.733	0.431
No SBTC full counterfactual	0.372	0.702	0.393
Counterfactual returns to skill	0.376	0.720	0.412
Counterfactual human capital	0.419	0.798	0.542
Counterfactual work hours and transfers	0.416	0.784	0.528
Relative price of education = 1 full counterfactual	0.418	0.798	0.546
Counterfactual human capital	0.419	0.799	0.548
Counterfactual work hours and transfers	0.419	0.798	0.541
Taxes and transfers pre-1971 full counterfactual	0.422	0.835	0.585
Counterfactual human capital	0.421	0.802	0.555
Counterfactual work hours and transfers	0.420	0.831	0.572

Notes: This table shows outcomes for the Baseline and counterfactual scenarios. Results are shown for the full counterfactual and when entering counterfactual sequences of human capital, work hours & transfers, and returns to skill (No SBTC) while keeping all else equal to those in the Baseline model.

Table D18: Inequality and intergenerational mobility of family income for the Baseline model and counterfactuals with endogenous family structure

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.419	0.798	0.543
Share of single parents 9% full counterfactual	0.386	0.720	0.498
Counterfactual human capital	0.412	0.782	0.422
Counterfactual work hours and transfers	0.393	0.733	0.431
No SBTC full counterfactual	0.373	0.705	0.396
Counterfactual returns to skill	0.376	0.720	0.412
Counterfactual human capital	0.418	0.793	0.424
Counterfactual work hours and transfers	0.417	0.782	0.408
Relative price of education = 1 full counterfactual	0.420	0.803	0.552
Counterfactual human capital	0.419	0.796	0.428
Counterfactual work hours and transfers	0.419	0.796	0.425
Taxes and transfers pre-1971 full counterfactual	0.410	0.809	0.559
Counterfactual human capital	0.418	0.792	0.430
Counterfactual work hours and transfers	0.412	0.808	0.434

Notes: This table shows outcomes for the Baseline and counterfactual scenarios. Results are shown for the full counterfactual and when entering counterfactual sequences of human capital, work hours & transfers, and returns to skill (No SBTC) while keeping all else equal to those in the Baseline model.

D.5.5 Effects of changes in tax progressivity versus changes in the generosity of transfers

Inequality and intergenerational mobility in period 3 (1995-2018)

Table D19: Inequality and intergenerational mobility of family income: tax and transfer counterfactuals with fixed family structure

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.419	0.798	0.543
Taxes and transfers pre-1971	0.422	0.835	0.585
Taxes pre-1971	0.422	0.814	0.550
Transfers pre-1971	0.420	0.822	0.577

Table D20: Inequality and intergenerational mobility of family income: tax and transfer counterfactuals with endogenous family structure

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.419	0.798	0.543
Taxes and transfers pre-1971	0.410	0.809	0.559
Taxes pre-1971	0.419	0.808	0.547
Transfers pre-1971	0.411	0.803	0.557

Table D21: Inequality and intergenerational mobility of wages: tax and transfer counterfactuals with fixed family structure

	Gini of wages	**SD log wages**	**IGE of wages**
Baseline	0.368	0.680	0.492
Taxes and transfers pre-1971	0.371	0.686	0.506
Taxes pre-1971	0.368	0.680	0.492
Transfers pre-1971	0.370	0.685	0.505

Table D22: Inequality and intergenerational mobility of wages: tax and transfer counterfactuals with endogenous family structure

	Gini of wages	**SD log wages**	**IGE of wages**
Baseline	0.368	0.680	0.492
Taxes and transfers pre-1971	0.367	0.677	0.502
Taxes pre-1971	0.368	0.679	0.493
Transfers pre-1971	0.367	0.678	0.499

D.5.6 Implications of changes in family resources for the next cohort

Here I present full results for predicted outcomes of the next cohort. I use the model to quantify the long-run implications of prior changes in family resources across cohorts. I also include more recent changes to taxes and transfers following reforms in the 1990s. The motivation for this section is that changes in parental investments across families takes a generation to manifest for outcomes like inequality and intergenerational mobility, and may have different medium- and long-term effects.

I first present results for family income, comparing inequality and mobility under each counterfactual. Then I show which long-term trends and recent changes to family resources contributed to or mitigated the predicted changes in inequality and intergenerational mobility[44].

Table D23: Inequality and intergenerational mobility of family income for the Baseline model and counterfactuals

	Gini of income	**SD log income**	**IGE of income**
Baseline	0.483	0.945	0.739
Share of single parents 9%	0.423	0.789	0.613
Family structure fixed to Baseline			
No SBTC	0.416	0.808	0.574
Relative price of education = 1	0.479	0.947	0.748
Taxes and transfers pre-1971	0.490	1.004	0.754
Endogenous family structure			
No SBTC	0.418	0.812	0.582
Relative price of education = 1	0.482	0.955	0.757
Taxes and transfers pre-1971	0.473	0.966	0.725

Table D23 presents the Gini coefficient, standard deviation of logs, and IGE of family income predicted for the next cohort, continuing the Baseline and counterfactual scenarios from the previous section. In the Baseline model, inequality in family income grows compared to the previous cohort, with the Gini coefficient rising from 0.419 to 0.483 and the standard deviation of log income increasing from 0.798 to 0.945. Persistence increased substantially, from 0.543 to a staggering 0.739. This means that a 10% difference between two sets of parents' incomes leads to a 7.4% difference in their respective children's incomes.

If the share of single-parent families remained at 9% for all cohorts, both inequality and intergenerational persistence would be markedly lower. Relative to the Baseline outcome, the Gini

[44]Outcomes for the next cohort are simulated using the calibrated technology parameters for the prior cohort, so the predicted changes in inequality and intergenerational mobility are absent increases in the returns to skill due to SBTC, which has been a key driver of these two trends. The results here are driven by inequality in parental resources and investments during 1995-2018.

coefficient would be 0.423 compared to 0.483, standard deviation of log income would be 0.789 compared to 0.945, and the IGE of income would be 0.613 compared to 0.739. Family structure thus had a significant impact on inequality and mobility, leading to greater dispersion and persistence in both the medium- and long-term. Only SBTC had a larger impact. The relative price of education, which rose rapidly during 1995-2018, did impact inequality and mobility, but again the effect was relatively small as families change investments similarly in response to price changes.

Table D24: Share of single-parents for counterfactual scenarios with endogenous family structure

	Share of single-parent families	**Correlation with log income**
Baseline	0.30	0.42
No SBTC	0.29	0.52
Relative price of education = 1	0.31	0.42
Taxes and transfers pre-1971	0.25	0.38

When taking family structure as given, tax and transfer changes in 1971-1994 mitigated the rise in inequality and intergenerational persistence driven by SBTC and single parenthood. Without expansions to the generosity of transfers and tax credits, there would be greater dispersion in family income and a more rigid economic landscape. While the Gini coefficient would be only slightly higher compared the Baseline outcome, the standard deviation of log income and IGE would both be almost 6% larger compared to the Baseline model. The IGE of income without any policy reforms would climb to 0.754. Thus, a 10% difference in income between two sets of parents leads to an expected 7.5% difference in their children's incomes.

When family structure is endogenous, a different story emerges. Without the policy changes in 1971-1994, the share of single-parent families rises less than in the Baseline model. Recall from the previous section that in the absence of policy changes in 1971-1994, the share of single-parent families in the second period would be 16% instead of 20%. When simulating this counterfactual another period, the share would be 25% compared to 30% in the Baseline model. While the policy changes led to more single parents, in the long-run the standard deviation of log income is roughly the same compared to the Baseline. What differs is the Gini coefficient and IGE. In the Baseline model, the Gini coefficient predicted for the period is 0.483. In the counterfactual with endogenous family structure and no policy reforms, it is 0.473. Thus, while the distributions of income in both cases have similar width as measured by the standard deviation of logs, the composition of the distributions are different. The lower share of single-parent families means that income is more evenly distributed compared to the Baseline model, so less concentration of incomes at different points of the distribution. Further, with endogenous family structure and no policy reforms, the predicted IGE one period ahead is lower than in the Baseline prediction (0.725 vs 0.739). The higher share of single-parent families driven by the expanded benefits eventually starts to reduce mobility despite the add resources from expanded benefits.