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Social Mobility in Western Countries: The Role of Families, Networks, and Institutions.*

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Abstract

This chapter reviews recent advances on the drivers of intergenerational persistence in education and income, with a focus on causal mechanisms shaping social mobility across OECD countries. While the descriptive literature is vast, documenting substantial correlations between parents' and children's outcomes, recent research increasingly emphasizes the underlying factors driving these patterns. We begin with a brief illustration of global variation in intergenerational mobility using harmonized cross-country data, before turning to the literature on mechanisms. We outline a general theoretical framework, which organizes the discussion around three domains: pre-market factors (e.g., early childhood investment, parenting, education systems), labor market dynamics (e.g., sorting, networks, firm heterogeneity), and post-market institutions. We review topics such as the timing and nature of parental investments, parenting styles, credit constraints, neighborhood effects, and the role of social networks in school and on the labor market. We highlight how new data and empirical designs have broadened our understanding of the drivers of intergenerational inequality and, ultimately, interventions with the potential to mitigate it.

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1 Introduction

The close link between parents' and children's socioeconomic status is a pervasive feature of modern societies and remains a central topic of social-science research. With the basic facts of intergenerational persistence in outcomes such as education and income now firmly documented for virtually all developed countries – see surveys by, for example, Black and Devereux (2011), Björklund and Salvanes (2011), Blanden et al. (2023), Nybom (2024) – research efforts increasingly turn to exploring the determinants of these patterns. This chapter reviews recent developments in the literature, with a particular focus on the underlying *mechanisms* of intergenerational persistence. While there is emerging evidence also for lower-income countries (Narayan et al. 2018), our main focus is on evidence from high-income countries, including Europe, Japan, Australia, and North America.[1]

What drives the transmission of human capital and labor-market outcomes across generations? Economic research has traditionally emphasized the role of the family, focusing on parental resources and investments in children's human capital (Becker and Tomes 1979). Parents transmit not only unobserved abilities and traits—for example as genetic endowments—but wealth and financial resources also matter, especially for budget-constrained families (Loury 1981, Becker and Tomes 1986a). In such models, persistence in education and income arises from a combination of parental preferences, inherited traits, and monetary investments in children.

The literature has increasingly moved beyond this static view, noting the complex and dynamic nature of intergenerational transmission. Recent work emphasizes the *timing of investments* and their alignment with sensitive or especially productive periods of skill formation. It highlights the importance of *multiple skills*, including socio-emotional skills and personality traits alongside cognitive abilities. Moreover, research stresses the role of *different forms of investment*, such as parental time and the types of activities undertaken, underscoring the broader influence of parenting practices and early investments. At the same time, attention has shifted beyond the family to the role of neighborhoods, social networks, and the organization of education systems, which often segregate children by socioeconomic background. More recently, research has recognized the role of various labor-market mechanisms for intergenerational persistence.[2]

Our aim is to provide a comprehensive review of the literature on the drivers of intergenerational transmission. While the chapter builds on prior reviews, we put greater emphasis on these more complex features of transmission, as highlighted in recent work. We outline a theoretical model that encompasses and organizes the key mechanisms, followed by an in-depth discussion of the most relevant (primarily causal) empirical evidence.

[1] See other chapters in this Handbook for a focus on other parts of the world: Zhang et al. (2026), Ferreira et al. (2026), Earle and Bukowski (2026).

[2] See also Fogli et al. (2026) in this volume for a focus on neighborhoods.

We will not survey the large descriptive literature on the measurement of intergenerational mobility and instead refer to prior surveys as well as other chapters of the same edition.[3]

We start by providing some motivating evidence on intergenerational mobility around the world in Section 2. Using a new comparative data set on intergenerational mobility in income and education for a majority of the countries of the world, we illustrate mobility variation between and within continents. We then zoom in on the OECD countries, and illustrate correlates of mobility using national-level economic statistics and features of schooling and health-care systems.

With the basic fact of strong intergenerational persistence in education and income now well established, we shift the spotlight to the *mechanisms* underlying these patterns. In the main sections of this chapter, we structure the discussion around two broad sets of mechanisms: (i) pre-market drivers of persistence and (ii) labor-market drivers. While we acknowledge the potential importance of a third domain—post-market factors such as the roles of tax and transfer systems—we return to this topic only briefly. Given our emphasis on Western countries, we devote particular attention to policies that foster human capital accumulation. These include family policies designed to support early childhood investment—such as family leave, subsidized daycare, and child health services—as well as the design of schooling systems, from primary through higher education.

In Section 3, we develop a basic yet encompassing theoretical framework that captures the key forces driving the intergenerational persistence of socioeconomic status. Our objectives are threefold. First, the model identifies and formalizes the channels through which parents influence children's outcomes. Second, it provides a structure for assessing the relative importance of these channels across different contexts. Third, it illustrates how theories of intergenerational transmission have evolved over recent decades.

Our starting point is the Becker–Tomes framework (Becker and Tomes 1979, 1986a), the workhorse model of intergenerational mobility. It rests on two central assumptions: (i) parents are altruistic but also value their own consumption, and (ii) imperfect credit markets raise the effective cost of education for poorer families. Parents thus face a saving–consumption–type trade-off: resources can be spent on own consumption or invested in children's human capital. When education strongly predicts income, this trade-off generates persistent inequality, amplified by credit constraints.

While powerful, this benchmark captures only one transmission channel. We enrich it by adding two further forces. First, children of educated and affluent parents often acquire human capital more efficiently, not just more intensively, reflecting differences in

[3]In addition to the surveys referenced in the first paragraph, which primarily focus on intergenerational persistence, there is also evidence on alternative measures of the role of family background and inequality of opportunity, see e.g. Björklund et al. (2009), Roemer and Trannoy (2016), Björklund and Jäntti (2020).

the technology of skill formation (Becker et al. 2018a). Second, labor markets may reward the children of the rich disproportionately—even conditional on human capital—through discrimination, social networks, or other advantages. These additional mechanisms help explain why mobility varies across societies and why inequality persists even without credit constraints. Aligning with our review of the empirical evidence, the model encompasses our three key domains: pre-market factors (e.g. early childhood investments, parenting, and education systems), labor-market dynamics (e.g. sorting, networks, and firm heterogeneity), and post-market institutions.

Section 4 introduces our review of the empirical literature on drivers of intergenerational persistence, beginning with evidence on *pre-market* factors. A natural starting point is the role of family income. While parental income is strongly correlated with children's education, adult earnings, health, and well-being, causal evidence is more mixed. Quasi-natural experiments suggest that economic resources do contribute to intergenerational persistence, but much of the evidence comes from a narrow set of U.S. programs—often conditional transfers—which may not generalize. More recent experimental and quasi-experimental studies provide sharper evidence, though they also reveal important nonlinearities across the income distribution. In particular, experimental studies that randomly allocate income to families often find little to no impact on children's development.

Given the weak causal role of income alone, research has increasingly shifted from the *amount* of parental investment to its *form and timing*, drawing on insights from psychology and related fields. This literature emphasizes not only how much time and resources parents devote to children, but also the quality of interactions, the commitments they make, and the preferences and beliefs they transmit. Parenting styles—or more broadly, the parental production function of children's human capital—differ systematically across socioeconomic groups and shape both cognitive and socio-emotional skills of children, which in turn predict adult outcomes.

We next review the role of place and neighborhood in shaping socioeconomic differences in skill development and labor-market outcomes. With growing access to administrative data, recent studies document fine-grained geographic variation in intergenerational mobility within countries and link these differences to community-level characteristics. Theoretical research emphasizes how neighborhood spillovers and segregation interact to transmit parental status across generations. Empirically, Chetty et al. (2014) shows that intergenerational income mobility in the U.S. varies sharply across areas, with high-mobility regions featuring stronger schools, lower residential segregation and inequality, greater social capital, and more stable family structures.

A parallel literature highlights the long-run importance of early-life conditions. Early childhood investments have lasting effects on the development of cognitive and socio-

emotional skills, with later investments building on these foundations. Recent research exploits family policy reforms and natural experiments—such as expansions of parental leave, subsidized daycare, and child health care—using rich administrative data to analyze how early investments shape both short- and long-term human capital. These policies appear particularly important for mobility insofar as they disproportionately benefit children from disadvantaged backgrounds.

We conclude our review of pre-market drivers by considering public education, widely seen as the cornerstone of policies aimed at promoting equality of opportunity. Education plays a central role in shaping labor-market returns and intergenerational income transmission. We first examine whether expansions of primary schooling increased attainment and mobility, drawing on natural experiments that raised school-leaving ages, extended compulsory schooling, or increased instructional time. Most of these reforms date from the 1950s and 1960s, when attainment in Western countries was relatively low. We then turn to the design of education systems, reviewing evidence on tracking in middle and high school as well as admissions policies at secondary and tertiary levels. Particular attention is given to elite institutions, where admissions practices have critical implications for access to economic, political, and social elites.

Finally, we turn to the *labor market* as a driver of intergenerational persistence. The growing availability of administrative data—especially linked employer–employee panels—together with methodological advances, has opened new possibilities to study the role of firms, networks, and other labor-market mechanisms. We structure this discussion around three strands: (i) descriptive studies of employer sorting from an intergenerational perspective, (ii) analyses of parental networks in job search and early career outcomes, and (iii) other labor-market mechanisms that shape mobility. The third domain in our conceptual framework—post-market drivers, including taxes and transfers—receives less attention, as most of the literature on intergenerational mobility focuses on pre-tax incomes.

2 Background Facts

We start by using data from the Global Database on Intergenerational Mobility (Narayan et al. 2018), as well as a recent update of estimates of income mobility (Munoz and Van der Weide 2025), to illustrate global mobility variation. We have two objectives with this section. First, we illustrate patterns of income mobility across regions and countries using comparable data. Second, these data can be linked to country-specific information on inequality, economic development, and policy features, which help us motivate our theoretical framework in the next section and subsequent discussion of evidence on mechanisms. The estimates in the database are harmonized to be as comparable as

possible, though differences in underlying data and methodology obviously exist.[4]

The IGE estimates that we use are based on males aged between 30 and 55 with observed labor earnings in surveys around year 2015, and with non-missing information on paternal education, experience and occupation. For comparability, all estimates are based on two-sample two-stage least squares (TSTSLS), with father's earnings predicted in an auxiliary sample observed around 15-20 years prior to the surveyed sons. We present estimates at the subregional level (according to the World Bank's definitions) for all available countries or by countries (high-income countries only).

Figure 1 shows relative income mobility by subregions across the world. For each subregion, we compute the weighted mean of one minus the IGE in income across countries with non-missing IGE estimates, using the square root of the current population of each country as weight. Some countries within most subregions lack estimates but are still colored according to the subregion mean. Thus, the more blue the color in the graph is, the more income mobility. According to these estimates, income mobility is highest in Europe (outside Southern Europe), the Middle East, and Australia, and lowest in South America and Northern and Central Africa. Mobility is also at the lower end in other parts of Africa, Southwest Asia (India, Iran, etc), and Central America.

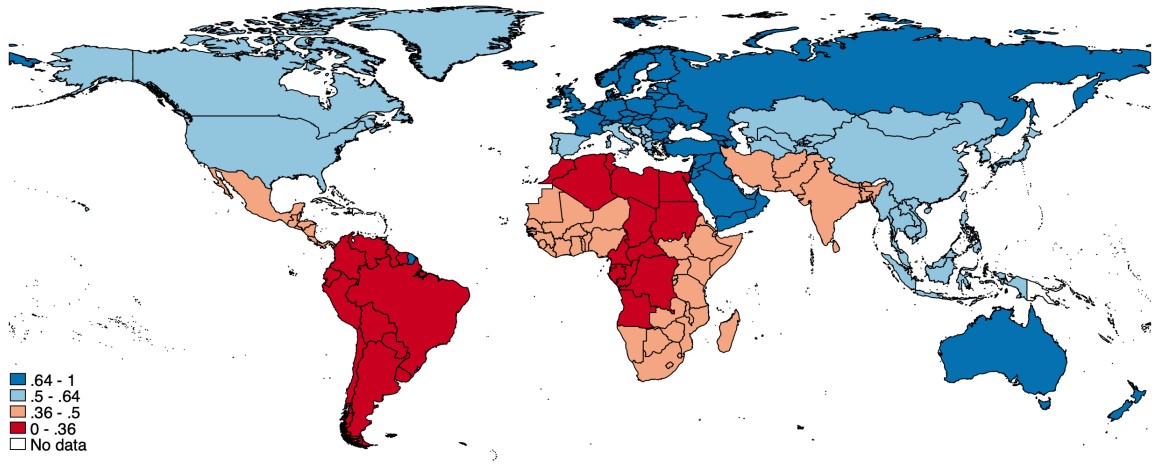


Figure 1: Intergenerational income mobility around the world, subregions

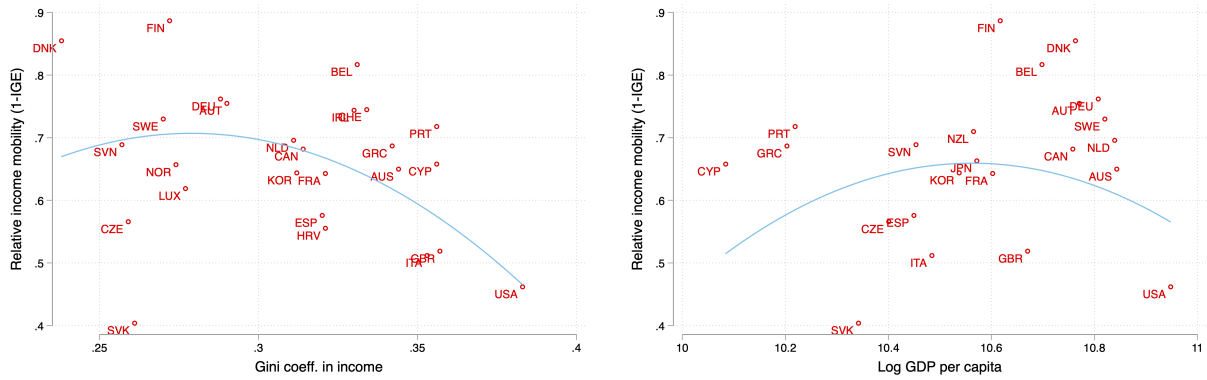
While country-specific estimates can be noisy, we illustrate variation in income mobility (1-IGE) across high-income countries in Figure A1 and Table A1 in the Appendix.

[4]The GDIM was first published in 2018 by researchers at the World Bank, and has since been revised (Van der Weide et al. 2024), with a focus on mobility in education. Munoz and Van der Weide (2025) have kindly provided us with their most updated country-specific estimates of the intergenerational income elasticity, which we use here. These estimates are produced with an aim of using comparable methods and survey data across countries, and for some countries differ from existing estimates found in the literature. Single-country estimates should thus be interpreted with some caution.

The US sticks out as a low-mobility country, followed by the UK and some countries in Southern Europe, like Spain and Italy. Among the more mobile countries, we find the Nordic countries, the German-speaking ones (Germany, Switzerland, Austria), and Belgium.

Figure 2 shows for the set of high-income countries associations between income mobility and either income inequality or level of economic development (GDP per capita). For example, subfigure (a) illustrates the so-called Great Gatsby Curve; that is, the higher the level of income inequality, the lower intergenerational income mobility tends to be across countries (Corak 2013). As the graph shows, the negative relationship is primarily driven by a small set of large, unequal, low-mobility countries (e.g. the US, UK, and Italy). Across most other countries, the Gatsby relationship is less pronounced. The relationship is not as stark as in Corak (2013). However, the IGE estimates in Figure 2 are both based on a different approach (2SLS for all countries) and a slightly different sample of countries.

Subfigure (b) of Figure 2 shows corresponding patterns with respect to GDP per capita. There is generally a positive relationship between the level of economic development and intergenerational mobility, though the pattern is weakened by the US. Note that the quadratic fitted lines included in the figures are weighted by the square root of the population size.



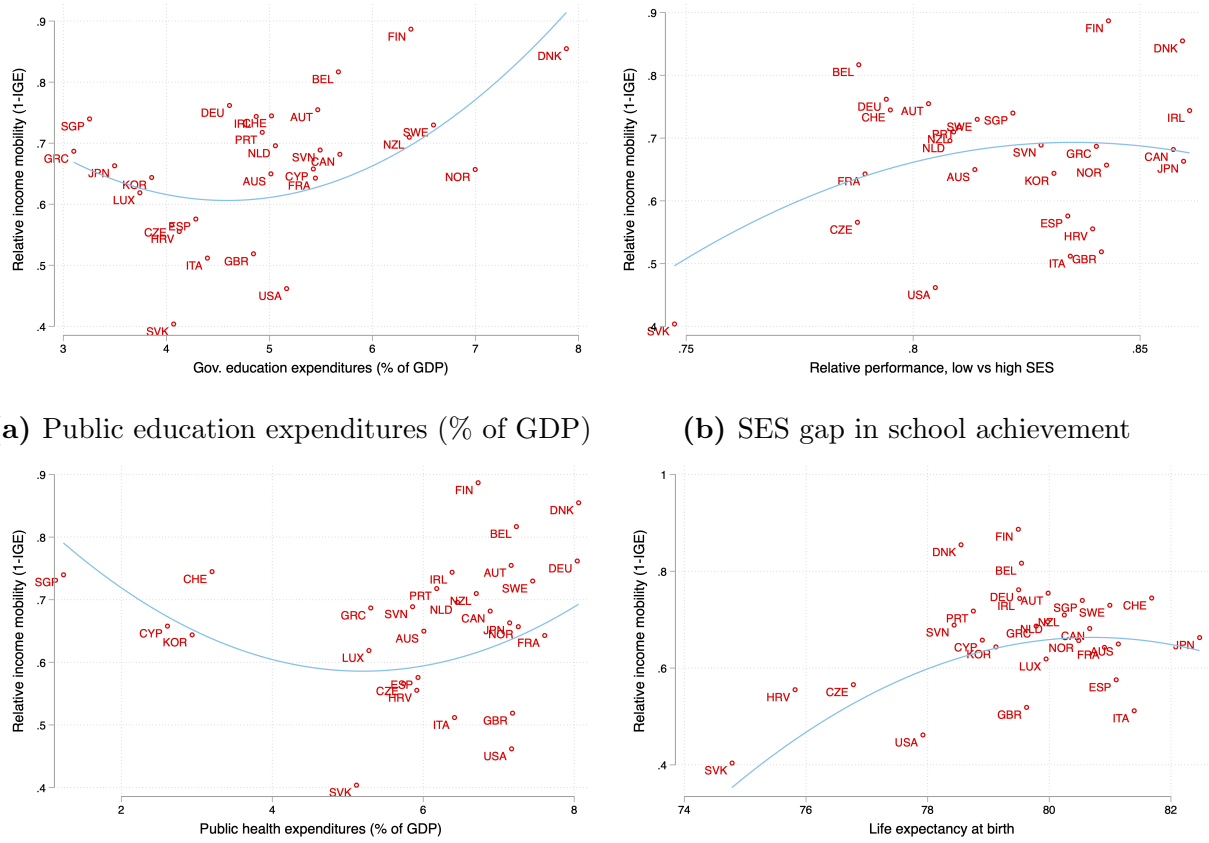
(a) Income mobility and inequality **(b)** Income mobility and GDP per capita

Figure 2: Correlates with income mobility, high-income countries

As a final exercise, we use other country-level statistics from the World Bank and OECD (PISA tests) to correlate mobility with various policy relevant statistics across countries. Figure 3 shows correlates between education- and health-related policy features and intergenerational income mobility. Subfigure (a) correlates income mobility with

governmental education expenditures (as % of GDP), subfigure (b) with primary school achievement gaps by socioeconomic background (in math), subfigure (c) with public health expenditures (as % of GDP), and subfigure (d) with life expectancy at birth.

Income mobility correlates positively with public expenditures on education, and also with the relative achievement of low-SES children in primary school math. The pattern is less clear for public expenditures on health. However, life expectancy is positively correlated with income mobility. We show correlations across all these, as well as several other, measures and income mobility in table form in Appendix A, including also indicators for statistical significance.



(a) Public education expenditures (% of GDP)

(b) SES gap in school achievement

(c) Public health expend. (% of GDP)

(d) Life expectancy at birth

Figure 3: Income mobility vs education and health correlates

We have focused our illustrations on income mobility. Prior work shows that intergenerational mobility in education is less dispersed across countries and less strongly related to inequality (see, e.g., Narayan et al. 2018). The more limited variation in educational mobility may reflect several mechanisms—for instance, cross-country (and within-country) differences in returns to education or other labor-market processes that

help explain cross-national gaps in intergenerational income mobility. While our illustrations highlight the importance of human-capital channels, they also suggest that labor-market mechanisms remain a promising avenue for future research on intergenerational transmission.

3 A Model of Intergenerational Mobility

In this Section, we develop a simple yet encompassing model of intergenerational transmission that captures the fundamental forces driving the persistence of socioeconomic status across generations. Our objective is threefold: first, to identify and formalize the channels through which parents shape children's outcomes; second, to provide a framework that facilitates the measurement of the relative importance of these channels in different institutional and historical contexts.

The empirical motivation is clear: children from more affluent families are systematically more likely to become rich themselves than those from poorer families. As shown in the previous Section, this fact is universal across societies and periods, though the degree of persistence varies substantially. Explaining this variation requires a model that disentangles the different mechanisms of transmission.

Our starting point is the Becker–Tomes framework (Becker and Tomes 1979, 1986a), which remains the workhorse model of intergenerational mobility. Its central ingredients are two assumptions: (i) parents are altruistic but also value their own consumption, and (ii) credit markets are imperfect, which raises the effective cost of education for children from poorer families. Parents, therefore, face a trade-off analogous to the saving–consumption decision: resources can be allocated to own consumption or to investment in their children's human capital. When education strongly determines future income, this trade-off generates persistent inequality, since credit market imperfections impose high costs on poorer parents when financing child investments, resulting in permanent differences in education.

This benchmark, while powerful, captures only one channel of transmission. We enrich the framework by incorporating two additional forces that are central to explaining the diversity of intergenerational mobility across societies and over time. First, the children of more educated and affluent parents often acquire human capital more efficiently, not just more intensively, reflecting differences in the technology of skill formation (Becker et al. 2018a). Second, the labour market itself may disproportionately reward the children of the rich, even after controlling for human capital, through mechanisms such as discrimination, social connections, or other advantages. Together, these forces provide a richer understanding of why intergenerational persistence varies and why inequality can remain entrenched, even in the absence of credit constraints.

3.1 Model Framework

We next present our extension of the Becker–Tomes framework. As in the canonical model, an agent makes a single choice: how much of her available resources to allocate to her children's education. Unlike the standard formulation, however, both the technology of human-capital accumulation and the income process are richer, generating more complex intergenerational dynamics.

Time is discrete, and generations do not overlap: each agent lives for one period. An agent is characterized by three state variables: talent, denoted A, human capital H, and income Y. Her only decision is how to allocate income Y between her own consumption C and investment in her children's education X.

To obtain closed-form solutions, we impose several simplifying assumptions. The baseline environment features logarithmic preferences and a radical version of financial market imperfections: no capital markets at all. We relax this assumption by going to the opposite extreme, considering an alternative benchmark in which financing constraints never bind, so that educational attainment is not limited by current resources. For most of the analysis, we abstract from public schooling, and later introduce public education as an extension.

Preferences are altruistic in the Beckerian sense. The model is rooted in parental love rather than "warm glow" giving: parents do not derive direct utility from the act of giving itself, but from its consequences for the child's well-being. Parents, therefore, choose X because they understand that sacrificing their own consumption raises their children's happiness; what matters for their willingness to invest is the utility value of the transfer for the child, not the transfer amount per se. Agents assume that their children have preferences similar to their own and will face analogous economic problems. They evaluate how their actions affect their children's welfare and discount the child's utility at an exogenous rate δ.

Each agent internalizes the intergenerational mapping from her current choices to her children's future outcomes. In particular, when choosing X, she takes into account how her children's educational achievement translates into their human capital, and how that human capital translates into their income.

We can then formally write the dynamic optimization problem faced by a family. After presenting the problem, we will discuss its structure, then present the solution in the following subsections. Regarding notation, variables in levels are denoted in capital letters (thus, parental income is Y), and their logarithm in lower case ($y \equiv \log Y$). The value for the children is denoted by a prime (i.e., the children's income is Y'). The dynamic problem faced by families is:

$$V(A,H,Y) = \max_{X,C}\left\{\ln C + \frac{1}{1+\delta}\,E\left[V(A',H',Y')\,\middle|\,X,Y,A,H\right]\right\} \tag{1}$$

$$\begin{aligned}
s.t. \qquad Y &= C + X && (2)\\
A' &= A^{\rho}\times e^{u}; \qquad u \sim i.i.d.\, N(\bar{u},\sigma_u^2) && (3)\\
H' &= (A')^{\tau}\times (X)^{\alpha}\times (H)^{\beta}\times (Y)^{\zeta}\times e^{\epsilon}; \qquad \epsilon \sim i.i.d.\, N(\bar{\epsilon},\sigma_\epsilon^2) && (4)\\
Y' &= H'\times\left(\frac{Y}{\overline{Y}}\right)^{\gamma}\times e^{v}; \qquad v \sim i.i.d.\, N(\bar{v},\sigma_v^2) && (5)
\end{aligned}$$

Equation (1) expresses one of the messages we want to stress. Unlike Becker and Tomes (1979) and Becker and Tomes (1986a), but similar to Becker et al. (2018a), the set of state variables here is a triplet: income, talent, and human capital. Two agents with the same income but differing in either talent or human capital will make different decisions regarding the education of their children.

As mentioned, we assume no capital markets. Thus, there is no heterogeneity in wealth and no access to loans to get education, even if we know that both of these margins can be important (see, for instance, Braxton et al. (2024) or Krueger et al. (2024) for some recent evidence). To partly address this, we will also consider the polar opposite case, where agents have access to the capital market and can lend or borrow in intergenerationally binding contracts at a fixed gross interest rate, R. However, we do not study the intergenerational persistence of financial wealth, focusing instead on the income-generating ability of individuals.[5]

Equation (2) is the budget constraint in our stylized problem without capital markets. What is not consumed is invested in your children, and this is the only way you can help them. In the opposite case, with the possibility to accumulate and bequeath assets (perhaps debts), parents could insure their children's well-being in the face of uncertainty about their talent and income. Parents would then invest in education up to the point where its return equals that of financial capital. Of course, the problem arises from the existence of borrowing constraints and financial frictions. Contractual rigidities make these sorts of imperfections prevalent in the context of an individual's lifetime, let alone in an intergenerational context, where debt incurred would need to be repaid by the next generation. In any case, although much research is needed on this issue, it is reasonable to think that better working financial markets should increase intergenerational labor income mobility.[6] Along the way, we will also consider an alternative environment in which agents

[5]See the chapter by Pfeffer and Jalalian (2026) in this volume for a focus on wealth transmission.

[6]A different, yet fascinating, issue is the intergenerational persistence of *financial wealth*. The economics literature has focused on the persistence of labor income, likely due to data availability; however, exceptions exist. Notably, Piketty (2014) suggests that return rates on investments are higher for wealth-

have access to *perfect* capital markets, as this comparison provides interesting insights.

Equation (3) is our metaphor of "nature". The value of A is determined exogenously, its logarithm being an AR(1) process, and affects the productivity and well-being of individuals. While not influenced by anyone's actions, it is partially inheritable via the parameter $\rho \in [0, 1)$. Thus, a parent who is more talented than the median expects her child to be less gifted than herself, albeit more talented than the median child. While there is mean reversion, there is also heterogeneity in talent, as u represents an idiosyncratic shock. The mean of the shock does not need to be zero, since we account for the concavity imposed by the logarithm.[7]

Equations (4) and (5) spell out the manner in which agents accumulate knowledge and how this transforms into income. They include the pre-market and labor market advantages that the children of the rich enjoy. To emphasize their significance, we provide somewhat more detailed explanations for them.

3.1.1 Pre-Market Advantages and Human Capital Production.

Equation (4) describes the human capital of an individual (H') as a function of four ingredients: the "natural talent" that an individual has (A'), the amount of resources that are devoted to her education (X), the human capital that her parents had (H), and the income that her parents had (Y). We describe it from the parents' point of view, as it is they who ponder how much to invest in their child's education. Notice that parental investment is distinct from the other inputs, as it is the only one chosen; the control variable of the parents. ϵ represents unpredictable noise, reflecting the serendipity in how these inputs translate into human capital, thereby generating heterogeneity.

We present a particular form of complementarity between the inputs (a Cobb-Douglas production function), and want to remark that assuming that the elasticity of substitution is constant and equal to one has substantial implications for the results. Nevertheless, it is necessary to generate clear analytical solutions. The parameters τ, α, β and ζ (all of them being non-negative scalars) capture the effect of each of the inputs. The exent to which talent influences the productive ability of agents is determined by τ. An environment where "inherent talent" does not affect productive ability would be characterized by $\tau = 0$. On the contrary, an environment where differences in "inherent talent" were

ier agents, decreasing wealth mobility and increasing wealth inequality, which can lead to a "rentier" society. See Pfeffer and Jalalian (2026) in this same volume for further reference.

[7] To treat talent as completely exogenous masks obvious aspects of reality. In our model, reproduction is sexless. In reality, it is rarely so, and the talents of both parents (father and mother) affect their children's talents. Thus, for any distribution of talent among the parents' generation, the degree of similarity between parents (assortative mating) is a determinant of the distribution of talent in the children's generation. The fact that the degree of assortative mating is surely endogenous implies that the distribution of talent can not be exogenous; it depends on the equilibria that shape the workings of society, dissolving the boundary between "nature" and "nurture".

prominent determinants of human capital would be characterized by a high value of τ.

The elasticity of human capital to parental investment is represented by α. If it were very low, there would be no point in sacrificing one's own consumption, regardless of how much one loves their child. The higher it is, the more you will value the effort of improving your child's education. This is the basic mechanism behind Becker and Tomes (1979). If α is positive, there is value in giving to your child; and given that arguably the rich value their marginal consumption less than the poor (as they consume more), they are bound to give more to their children, keeping them also richer on average than the children of less fortunate parents. As we will see, this is not the only reason why the rich may choose to invest more.

Becker et al. (2018a) proposed the inclusion of parental human capital as an input in the production function of education. That is, more educated parents are more productive per unit of effort at educating their children than less educated parents are. It is a metaphor of the fact that more educated parents know better how to educate their children, and they have better technology to do so. Thus, β determines the degree of advantage that educated parents have when educating their own offspring. This feature not only generates persistence by itself (even if there were no financial market imperfections), but also generates complex dynamics and further differences in the investment between educated and non-educated agents. Notice that H in eq. (4) is a state variable, determined by the investments made by the grandparents. When investing in your children, not only is your children's human capital H' influenced, but also the marginal effect of your children's investment in your grandchildren, thus affecting their decisions.

We include an additional element, Y, in the production function of human capital, which we see as a metaphor of powerful forces shaping inheritance, which, while not reflected in the previous inputs, have focused a large deal of academic debate as they surely have a significant incidence in the determination of persistence: externalities generated by segregation.

Parents are not the only direct determinant of a child's human capital. The neighbors, classmates, and environment in which they grow up shape their culture, attitudes, and even their hopes and aspirations. In many societies, there are considerable differences between living in a well-off or poor neighborhood, and there is direct evidence that the childhood neighborhood has a substantial impact on lifetime income (see Chetty et al. (2016), for instance). Naturally, parents to some extent *choose* where to live, and thus the externalities that impact their children. Moreover, mechanisms of segregation may generate separating equilibria mediated by differences in housing prices between neighborhoods, forcing poor families into bad neighborhoods, and exposing their children to externalities that inflict negatively on the process of human capital accumulation. In particular, peer effects may lead to neighborhood stratification that amplifies inequality

and dampens social mobility (Benabou 1993, Durlauf 1996, Fogli et al. 2025), public schools may be locally financed (Fernandez and Rogerson 1998), or there may be different scope for learning of the value of effort versus luck in the determination of outcomes across environments (as in Piketty (1995)).[8]

It is beyond the scope of our model to delve into the details of how the market generates segregation; only a general equilibrium model can do so. We just include a parameter ζ as a metaphor of these externalities as observed by the individual. It represents the measure by which richer people segregate themselves from poorer ones, creating a better environment for the development of their children. If either there is no segregation (so, children of rich and poor confront the same surroundings) or if, for whatever reason, the environment does not affect development, both cases would translate into a low value of ζ. Both effects need to be substantial for ζ to be large.

3.1.2 Labor Market Advantages of Having Rich Parents

Equation (5) shows the determination of the income of the child, Y'. The human capital of the child, H', determines her productivity, but we allow two wedges that make income differ from productivity. On one hand, there is an unpredictable exogenous shock v ("luck"), which ex-ante treats everyone in the same manner. More interesting is the second wedge between productivity and income, determined by the relative position of the parents. The parameter γ measures the degree to which the background of the agents directly affects their income.

If the parental income equals society's average, the expected income of the child equals her productivity. However, if $\gamma > 0$ and parental income is larger than the average, the income of the child is expected to be *larger* than her productivity. Likewise, if parental income is lower than average, the income of her child is expected to be *lower* than the child's productivity.

Formally, γ captures the extent to which children of well-off parents gain labor-market advantages *independent of* their realized productivity. In other words, γ measures the degree of preferential treatment or discrimination that translates parental status directly into income, even when productivity does not justify such rewards.

Two mechanisms rationalize this effect. First, statistical discrimination may arise in environments where there is imperfect information about individual productivity. Employers may rely on parental background as a signal, systematically favoring children of rich parents (see Comerford et al. (2022, 2024)). Second, parental income can be thought of as a proxy for access to social connections and networks, which confer tangible labor-market advantages. Well-connected parents can open doors to opportunities that would

[8] See also Fogli et al. (2026) in this same volume.

otherwise remain closed, while the absence of such networks hampers access to jobs when competing against better-connected peers. We refer to empirical illustrations of these mechanisms in Section 5.

Notice that this channel is fundamentally different from the effect of ζ in equation (4). The parameter ζ governs the intergenerational transmission of human capital: richer parents are more effective in providing education and skills, thereby increasing their children's productivity, which the labor market then rewards efficiently. In contrast, γ introduces a distortionary wedge: it raises the income of children of wealthy parents irrespective of their actual productivity—for instance, even after an adverse shock to A or in the absence of parental investment in education.

This distinction has direct implications for allocative efficiency. While the elasticity of human capital to parental income, ζ, is efficiency-enhancing (in the sense of boosting productivity), the conditional elasticity of income to parental income (γ) distorts the mapping between productivity and income, leading to a misallocation of talent. In equilibrium, individuals are not allocated according to their relative productivity advantages, resulting in static inefficiency. This mechanism aligns with the broader misallocation literature that studies how wedges between productivity and factor allocation reduce aggregate efficiency (see Hoppenhayn and Rogerson (1993), Hsieh and Klenow (2009), Hsieh et al. (2019)). The recent evidence on intergenerational occupational mobility in a general equilibrium context (e.g., Lo Bello and Morchio (2022) and Almgren et al. (2025)) should be contextualized within this tradition, highlighting how family background acts as a source of allocative inefficiency, thereby reducing total factor productivity.

3.2 Solution

In Appendix B we establish the following result, which solves the model when there are no financial markets available to families:

Result 1 *The solution to the optimization problem 1 implies that investment is always a constant fraction of income, independent of the other state variables:*

$$X = \lambda Y \qquad \forall\, H, A, \tag{6}$$

where[9]

$$\lambda = \frac{\alpha}{1 + \delta - \beta - \left(1 - \frac{\beta}{1+\delta}\right)\gamma - \zeta}. \tag{7}$$

In this setting, the Euler equation implies that all families devote the same fraction

[9]We assume parameter values such that $\lambda \in (0, 1)$.

of their income to their children's education. More affluent families, therefore, invest more in absolute terms only because they have higher income, not because they allocate a larger share. This linear scaling of investment with income implies that, in expectation, the children of more affluent families enjoy higher future income than those of poorer families.

The degree of intergenerational persistence depends on how strongly additional investment translates into higher future income. In the Becker–Tomes framework, this channel operates exclusively through the parameter α, which measures the effectiveness of educational investments in producing human capital and income. The larger α is, the greater the differences in investment between rich and poor, and the lower the degree of intergenerational mobility.

In our environment, however, persistence is shaped not only by α but also by forces stemming from pre-market and labor-market advantages that society grants to the children of the rich. A higher α increases both investment and persistence, but advantages enjoyed by the rich—captured by β, ζ, and γ—also raise investment and thereby reinforce persistence.

Talent moves exogenously, and changing investment will not change its future value, whereas it affects the future values of human capital and income, as well as the advantages they provide (β, ζ, γ). Thus, while talent may affect the degree of persistence, it does not change the investment effort.

Because the model features three endogenous state variables, the characterization of dynamics is necessarily rich. In Appendix B, we show that the following system describes the equilibrium dynamics of a dynasty in this environment:

$$y' = \gamma\,(y - \bar{y}) + h' + v, \tag{8}$$

$$h' = \alpha\,\ln\lambda + (\alpha + \zeta)\,y + \beta\,h + \tau\,a' + \epsilon, \tag{9}$$

$$a' = \rho\,a + u. \tag{10}$$

Perfect Financial Markets The opposite assumption to equation 2 is to grant families access to perfect financial markets that allow agents to lend or borrow as they see fit, and to insure against risks efficiently. Optimality then demands that, in addition to choosing their consumption to make the Euler equation hold, agents need to equalize their returns across all possible ways of moving resources intergenerationally.

Assuming further the existence of a risk-free interest rate R, the return to sacrificing one unit of current consumption to invest in the financial asset, R, needs to equal the return to investing in the education of their children, $\frac{\partial E(Y')}{\partial X}$. This condition is sufficient to determine the degree of persistence of labor income across generations in this hypothetical case where families are never credit-constrained in their education decisions.

Note that perfect capital markets is a radical and empirically implausible assumption that, among other things, allows agents to insure against heterogeneous shocks.[10] Still, as in Becker et al. (2018b), it is a useful exercise providing a benchmark on what agents with different states would *want* to do differently if borrowing were possible (and forgetting the fact that some could be luckier than others), as it informs on the speed of convergence.

Next, it is instructive to consider separately how the different mechanisms and forces shape the dynamics of intergenerational mobility.

3.2.1 Talent

Consider first a case where only exogenous talent transforms into human capital and output. That is, $\tau, \rho \in (0,1)$, while $\alpha = \beta = \zeta = \gamma = 0$, and without loss of generality, ϵ and v are degenerated random variables with zero variance. In that case, the law of motion of (log) income within a family is

$$y' = \rho y + \tau u. \tag{11}$$

The investment in education would obviously be zero, as there is no point in sacrificing income, while the intergenerational elasticity of income (IGE) is given by the degree to which exogenous talent is inherited, ρ. The child of a rich parent is expected to be more talented and richer than other children on average, but less so than their parent, because their parent was more talented than the average. This is a process given by nature that takes place with or without imperfect capital markets insofar as talent is rewarded ($\tau > 0$) and inherited ($\rho > 0$).

3.2.2 Parental Investment

Consider now an environment in which educational investment is the only source of intergenerational transmission: $\tau = \beta = \zeta = \gamma = 0$ and $\alpha \in (0,1)$. In this case, in the absence of financial markets, the optimal policy implies $X = \lambda Y$ with $\lambda = \alpha/(1+\delta)$, and the law of motion of (log) income reduces to

$$y' \;=\; \alpha \ln \lambda \;+\; \alpha\, y \;+\; v \;+\; \epsilon, \qquad\qquad \lambda = \frac{\alpha}{1+\delta}. \tag{12}$$

Intuitively, parental investment is increasing in α (as your children get more out of your effort) and decreasing in δ (as you care less about them). Perhaps less intuitively, the IGE depends only on how strongly investment translates into income, α, irrespective of

[10] Thus, heterogeneity lies exclusively in existing differences in the state variables, not in serendipity in their ex-post outcomes. All agents with the same state variables would end up in the same position in the next generation. Actually, it would ensure consumption in all future generations, and unless the solution shows multiple steady states (poverty traps), the dynamics lead to homogeneity in the long run.

how much people care about their children. This is the classic Becker–Tomes insight in the presence of imperfect capital markets, where investment must be financed out of current income.

Notice that the discount factor does not affect the IGE as everybody is assumed to have the same one, or at least it is not supposed to differ in a manner that is inheritable. If it were, it would matter by generating persistence in the savings rates. For instance, if there were two sorts of families, one type with a higher discount rate on their children's utility, they would tend to save less, be less educated, and be poorer than the other family over time. This would generate further intergenerational income persistence insofar as the state "having large δ" were somehow persistent across the generations. In our model, this would manifest in equation 12 in a higher level of λ for more patient families, and higher average incomes. Intergenerational persistence would depend not only on α, but also on the probability of changing δ.

This dependence on parental income disappears with perfect capital markets, where families borrow and lend at a fixed gross return ($R > 0$) under intergenerationally binding contracts. Optimality requires *return equalization*, $R = \left[\frac{\partial \mathbb{E}Y'}{\partial X}\right]$. In this environment ($\tau = \beta = \zeta = \gamma = 0$), this amounts to

$$R \;=\; \alpha\,\mathbb{E}\big[e^{\,v+\epsilon}\big]\,X^{\alpha-1} \quad\Longrightarrow\quad X^{*} \;=\; \left(\frac{\alpha\,\mathbb{E}_t\big[e^{\,v+\epsilon}\big]}{R}\right)^{1/(1-\alpha)},$$

which depends only on primitives, α, R, and the scale of expected shocks, but *not* on parental income Y. With access to a fixed-return asset and enforceable intergenerational contracts, any parent can finance the same utility-maximizing education level X^{*}; hence, human capital investment is independent of Y, and—under the present assumptions—there is no intergenerational persistence *of labor income earnings*.

3.2.3 Educational Advantage in Human Capital Acquisition

Following Becker et al. (2018a), we now allow that, in addition to the intergenerational investment mechanism, more educated parents are also more effective in producing their children's human capital. Formally, set $\beta \in (0, 1)$ while keeping $\tau = \zeta = \gamma = 0$ and let v be degenerate (zero variance). The law of motion is

$$y' \;=\; \alpha \ln \lambda \;+\; (\alpha + \beta)\, y \;+\; \epsilon, \qquad\qquad \lambda \;=\; \frac{\alpha}{1 + \delta - \beta}. \tag{13}$$

Not only α, but also β determines both the investment rate and the degree of persistence.[11] A larger β induces agents to invest more because making your children more educated not only makes them richer, but also makes them better at educating your

[11] We assume $\alpha + \beta < 1$ as this insures stationarity and $\lambda < 1$.

grandchildren. The IGE (i.e., income persistence) is now $\alpha+\beta$, as both translate current into future well-being; if you are richer, you invest more (wich affects your children via α), and you tend to have more human capital which makes you more productive at investing in your children (β).

An important lesson is that the effect of β is independent of the degree of financial market imperfections. To illustrate this, revisit the hypothetical scenario with access to perfect financial markets. Optimality requires equalizing the expected marginal return to educational investments with the financial return,

$$R \;=\; \left[\frac{\partial\,\mathbb{E}\,Y'}{\partial X}\right] \;=\; \alpha\,H^{\beta}\,\mathbb{E}\big[e^{\epsilon}\big]\,X^{\alpha-1} \qquad \Rightarrow X(H)=\left(\frac{\alpha\,H^{\beta}\mathbb{E}[e^{\epsilon}]}{R}\right)^{1/(1-\alpha)},$$

which is independent of parental income but increasing in parental education H.

Thus, with perfect capital markets, the rich (who are also more educated) invest more in education, not because they have more resources, but because they face a higher return to educational investment. Using (4) and (5) and noticing that in our example $Y=H$, it is easy to show that the IGE is $\frac{\beta}{1-\alpha}$. Hence, there is intergenerational persistence even if no agent is deterred from education due to financial constraints. The IGE depends on β, which improves the technology of educational investments for the educated (and rich), and on α, as it induces the more educated to invest more.[12]

The lesson is that the persistence generated by differences in the production function of education will be manifested across widely different institutional setups, even if the relatively poor are not financially constrained. The issue is that they *want* to devote fewer resources (money, time, etc.) to education than the more educated (and rich).

3.2.4 Advantages Given by Parental Income

We now turn to the implications of advantages enjoyed by the children of the rich that do not stem from parental investments, but rather from more favorable treatment by society—either through easier access to education (ζ) or through higher incomes despite equal productivity (γ). We allow parental investment, $\alpha\in(0,1)$, but for clarity, we abstract from the link produced by the better ability of the highly educated to educate ($\beta=0$).

Without capital markets, the law of motion of (log) income is now:[13]

$$y'=\alpha\ln\lambda-\gamma\bar{y}+(\alpha+\zeta+\gamma)y+\epsilon+v; \qquad \lambda=\frac{\alpha}{1+\delta-\gamma-\zeta}, \tag{14}$$

[12]Notice that if there is no role for parental investment (i.e., $\alpha=0$), the result is the same with and without capital markets. Obviously, there is no investment, but there is persistence, as the model simplifies to a setup analogous to the "talent model" above.

[13]We assume $\alpha+\zeta+\gamma<1$

which is similar to the previous case. Intergenerational persistence increases not only with α, but also with ζ and γ, as they directly transform parental into child income. The investment share is also higher. More advantages make everybody invest more in their children (rich and poor), but this means that the *absolute* differences in education between their children magnify, increasing persistence.

Using an analogy with the previous case, it is evident after some consideration that advantages in education acquisition (such as the externalities produced by better neighbors), characterized by ζ, need to increase the incentives to invest very much as β above: by providing a better technology to educate children.

It is less obvious that labor-market advantages for one's children (γ) should have the same effect, since parents cannot directly influence these advantages: they are determined by parental income, which is itself fixed. The key point, however, is that the stronger the labor-market advantages of the children of the rich (and disadvantages of the poor), the greater the value of being rich. In this setting, investing in one's children increases the prospects of one's grandchildren. As a result, both rich and poor parents exert greater effort in educating their children.

With access to capital markets and binding contracts at an exogenous rate R, it becomes similar to the previous case:

$$R \;=\; \left[\frac{\partial\, \mathbb{E}\, Y'}{\partial X}\right] \;=\; \alpha\, Y^{\zeta+\gamma}\, \mathbb{E}\big[e^{\epsilon}\big]\, X^{\alpha-1} \qquad \Rightarrow X(Y) = \left(\frac{\alpha\, Y^{\zeta+\gamma}\, \mathbb{E}[e^{\epsilon}]}{R}\right)^{1/(1-\alpha)}.$$

If there are no financial constraints, the relatively poor *choose* to invest less in their children. Not only are the rich treated better by society, but they also face stronger incentives to invest in their children, which magnifies income differences in the subsequent generation and results in an IGE of $\frac{\gamma+\zeta}{1-\alpha}$ without financial constraints. The lesson is that anything that gives advantages to the relatively rich is likely to magnify persistence, not only because of those advantages themselves, but also because they strengthen the incentives to devote resources to the education of their children.

3.3 Discussion

It is well established that the multi-generational dynamics of mobility are complex and need not follow a simple linear path (see, for instance, Nybom and Stuhler (2024)). In this context, and in the absence of financial markets, our model generates non-trivial dynamics once all mechanisms (equations 8, 9, and 10) are incorporated simultaneously.

To illustrate, consider the simplified case with $\tau = 0$ and no innovation v. In this setting, the joint dynamics of the vector of state variables (y_t, h_t) follow a VAR process.

The univariate representation of y_t is an AR(2):

$$y_{t+1} = \left[\alpha \ln \lambda - \gamma(1-\beta)\bar{y}\right] + (\alpha + \beta + \zeta + \gamma)\, y_t - \beta\, \gamma\, y_{t-1} + \epsilon_{t+1}, \tag{15}$$

which is stationary provided that $\alpha + \beta(1-\gamma) + \zeta + \gamma < 1$.

Although the system is not straightforward to analyze, the intergenerational autocorrelation—i.e. the coefficient obtained by regressing children's income on parental income—is given by

$$\rho_1 = \frac{\alpha + \beta + \zeta + \gamma}{1 + \gamma\beta},$$

which is increasing in all of the parameters.[14] The interpretation is direct: each of the mechanisms reinforces persistence. The investment share,

$$\lambda = \frac{\alpha}{1 + \delta - \beta - \left(1 - \frac{\beta}{1+\delta}\right)\gamma - \zeta},$$

though identical across agents, rises with the strength of each mechanism.[15]

These forces remain relevant when financial markets are available. Under return equalization, the optimal investment of an agent with state variables (A, Y, H) is:

$$X(A, Y, H) = \left(\frac{\alpha\, A^{\rho\tau}\, H^{\beta}\, Y^{\zeta+\gamma}\, \mathbb{E}[e^{v+\epsilon+u}]}{R}\right)^{1/(1-\alpha)},$$

which is increasing in parental talent, income, and human capital—and more so the stronger the respective advantages. Absent financial constraints, all three mechanisms induce higher investment by wealthier parents: talented agents expect higher returns from talented offspring, educated parents are better at fostering education, and rich parents find their investments both more productive and more highly rewarded in the labor market.

Thus, with or without binding credit constraints, parental advantages are amplified by differential investment, strengthening the persistence of relative positions across generations.

The preceding analysis assumes unit elasticity of substitution between parental investment and inherited advantages. Relaxing this assumption opens the door to richer dynamics. If investment and advantages are *complements*, stronger background advantages raise the productivity of additional investment disproportionately. This can create multiple steady states: those born into disadvantage find that even high effort yields little return, while the advantaged reap compounding gains. In such cases, the equilib-

[14] This follows under the assumption of stationarity and elasticities bounded within $(0, 1)$.

[15] Notice that the effect of γ interacts with β: labor market advantages magnify persistence not only directly but also through inducing further human capital accumulation.

rium distribution of outcomes may become non-ergodic, giving rise to poverty traps and entrenched stratification (see Bowles et al., eds (2006), Galor and Zeira (1993)).

By contrast, if investment and advantages are *substitutes*, then additional investment partly compensates for a lack of inherited advantages. In this case, the marginal effect of investment on persistence is weaker: richer parents still pass on their advantages directly, but the incremental role of greater investment is reduced. Persistence remains, but it is less amplified through educational effort.

Public Education This leads us to discuss the role of public education, which we have so far abstracted from. Although in the model educational decisions were entirely private, in all Western societies there is a significant public investment in education. Two issues are central: whether public education acts as a substitute or a complement to private education, and who benefits the most from it.

Consider a modification of the accumulation function of human capital (4):

$$H' = G(g) \times A^{\tau(g)} \times (X)^{\alpha(g)} \times (H)^{\beta(g)} \times (Y)^{\zeta(g)} \tag{16}$$

where g represents the degree of public intervention in the education process, which affects all children equally. Now the elasticity of H' to A, X, H and Y becomes a function of public education.

Public education should increase attainment for all children (so $G(g)$ is an increasing function), but this alone does not reduce persistence. In our model, it would not even affect λ due to the assumption of unit elasticity of substitution. The reason why public education may reduce persistence is that it changes the elasticities of human capital acquisition with respect to the state variables and private actions.

The standard narrative that public education increases mobility rests on the assumption that it is a substitute for private investment, i.e., $\frac{\partial \alpha}{\partial g} < 0$. If the main barrier to mobility lies in difficulties accessing education (that is, when α is relatively large), and public education reduces this barrier (while providing schooling through $G(g)$), then one can expect it to decrease persistence. This interpretation is consistent with the development process of many societies during the expansion of universal public education. Such crowding out of private investment by its public provision is the most common argument of why public education may increase mobility, and is akin, for instance, to the mechanism developed in Solon (2004).

However, even if α converges to zero (so that private investment in education is very small), in our model persistence still arises from the advantages enjoyed by the children of the rich (see equations 13, 14, and 15). Moreover, it is highly unlikely to find a society in which parents do not invest privately in their children in some form,

whether in time, money, or effort. Parental involvement is universal, and richer parents will continue to devote more resources to their offspring *and to amplify their advantages via this mechanism.* This helps explain why, even in modern, developed societies with universal public education, substantial intergenerational persistence persists.

Furthermore, a perverse effect of certain forms of public education may arise, as public investment may complement rather than substitute for existing advantages. Better-educated parents may be more adept at navigating the complexities of the public system, in which case $\beta(g)$ increases with g, reinforcing persistence. Similarly, richer or better-connected families may have greater access to elite institutions, and highly meritocratic admission systems may disproportionately benefit exceptionally talented children, who are less likely to come from disadvantaged backgrounds. Thus, universal public education by itself seems unlikely to reduce persistence beyond a certain point.

General equilibrium considerations. Before concluding, it is important to emphasize that our framework is deliberately partial equilibrium: the elasticities $(\tau, \alpha, \beta, \zeta, \gamma)$ are treated as primitives. In reality, it is reasonable to think of them as *equilibrium objects* shaped by institutional choices, market structure, and the politico-economic environment. This observation is relevant to both positive and normative analysis. Positively, it implies that cross-society comparisons of persistence summarize different underlying institutional equilibria; normatively, it warns that counterfactual policy exercises that hold them fixed may be misleading if policies themselves reshape their equilibrium values.

The parameter ζ is a prime example. Interpreting ζ as capturing the contribution of neighborhood, school, and network advantages to individual earnings, its magnitude is the outcome of equilibrium segregation and local public-good provision. General-equilibrium models show that sorting by income or talent, financed in part through local taxation and reinforced by peer externalities, can endogenously generate large neighborhood effects and stratified opportunity sets (Bénabou 1993, 1996, Durlauf 1996, Fernandez and Rogerson 1998, Fogli et al. 2025, Biasi 2019). In such environments, the "reduced-form" return ζ reflects not a technological constant but the equilibrium outcome of households' location choices, local fiscal capacity, and the intensity of peer spillovers. It follows that reforms to school finance or district boundaries can change ζ not only directly (by altering peer composition and resources) but also indirectly, via the induced reshuffling of households across communities.

Likewise, γ should be viewed as an equilibrium object summarizing how labor markets translate parental status into offspring earnings. In models where firms face informational frictions and choose screening or referral-intensive hiring, the degree of meritocracy—and thus the weight on parental networks and background γ—emerges endogenously and interacts with the extent of intergenerational mobility (Comerford et al. 2022, 2024). In

related settings where young individuals sort into careers with heterogeneous returns to parental assistance (e.g., occupations differentially reliant on contacts, reputation, or upfront search), γ is determined jointly with occupational choice and market clearing, so that changes in institutions or technologies that alter career payoffs also shift the equilibrium strength of parental advantages (Lo Bello and Morchio 2022, Almgren et al. 2025). In both cases, policies that ostensibly aim to increase meritocratic selection (information design, disclosure, or auditing) or to reduce barriers to specific careers (licensing, internships, or financial aid) can move γ in ways that depend on firms' and workers' equilibrium responses.

These equilibrium feedbacks also matter for aggregate outcomes. Because ζ and γ shape who is matched to resources, peers, and jobs, they influence the allocation of talent across activities. When family background crowds out high-ability but low-background individuals, the result is misallocation. Evaluating the aggregate consequences of persistence, therefore, requires moving beyond partial-equilibrium experiments (which fix wages, prices, and peer groups) to analyses that allow prices, sorting patterns, and institutional choices to adjust jointly.

The upshot is methodological as much as substantive. First, empirical estimates of "persistence parameters" should be interpreted as equilibrium objects. Second, policy evaluation should account for the possibility that interventions targeting one margin—say, public education g in (16)—shift other margins endogenously by changing sorting (ζ), screening and hiring practices (γ), or the returns to parental inputs (α, β). Third, theory and empirics need to be brought together: microfounded models within a tractable politico-economic environment can discipline the likely directions and magnitudes of equilibrium adjustments; conversely, research designs that isolate exogenous shifts in the institutional primitives of our elasticities can yield policy-relevant insights. This perspective complements the measurement agenda that quantifies the strength of inherited advantages themselves and argues for treating those magnitudes as objects of primary interest for understanding mobility (Cholli and Durlauf 2022).

These considerations highlight that the strength and form of intergenerational persistence depend not only on whether financial markets constrain poor families who would like to invest more, but also on how educational environments, public institutions, and labor markets treat individuals from different backgrounds. Measuring mobility across societies, therefore, requires assessing both the direct effects of inherited advantages and their interaction with investment decisions, as well as the institutional and social settings that determine the interaction between advantages and investments.

4 Pre-Market Drivers of Social Mobility

As illustrated in the theory section above, the economics literature has long emphasized the role of the family and parental investment in the human capital of children (Becker and Tomes 1986a, 1979). Parents may also transmit unobserved abilities and other genetic traits. In addition, parents' wealth and financial resources can influence the extent to which children from poorer backgrounds face borrowing constraints.

Over time, however, this canonical model of transmission has been extended in several important directions. First, a large body of research across economics and related fields has broadened the parental role beyond financial investment in education to emphasize: (i) the timing of investments in relation to sensitive periods of skill formation; (ii) the importance of multiple skills, such as socio-emotional as well as cognitive skills; and (iii) the role of different modes of investment, including various forms of parental time and engagement. Second, scholars have increasingly stressed that intergenerational transmission operates not only through the family, but also through non-family institutions such as the school system, the neighborhood or community context, and the labor market, i.e., effects captured within our model by the parameter β.

In this section, we focus on the role of pre-market inequalities and the opportunity-equalizing potential of various relevant policies, before turning to the labor market as a channel of intergenerational (im)mobility. We begin with a review of the literature on the role of financial resources in reducing inequality and, in particular, child poverty. Importantly, the issue is not only whether parents can afford to send their children to university, but whether children from low-income and low-education families are adequately prepared for higher education in the first place. This links to a broader literature on parenting practices, or more generally, the parental production function of their children's human capital, as an explanation for differences in children's later success. We next provide an updated review of that literature as either a complement or a contrast to income-based explanations.

We then turn more directly to what is known about pre-market policies, reviewing evidence on the effects of family policies such as access to daycare, parental leave, and child health care. As our descriptive statistics show, the design and generosity of these policies vary considerably across advanced economies. Finally, we conclude this section with a discussion of how access to education, and the characteristics of education systems themselves, help explain patterns of intergenerational transmission. Other reviews on this topic, often with an explicit focus on educational inequality and the role of education for social mobility, include Björklund and Salvanes (2011), Blanden et al. (2023), and Holmlund and Nybom (2023). However, before turning to the main topics of this chapter, we provide a brief discussion of the role of genetic heritability from parents to children,

and the potential implications this has for limiting the role of policy.

4.1 Heritability

The emerging field of genoeconomics investigates how genetic variation contributes to differences in education, income, and other socioeconomic outcomes, but its policy relevance remains limited and often misunderstood. In this section, we will only provide a brief discussion of this topic, and for further details we refer to overviews of the role of transmission of ability and genes related to the intergenerational mobility literature, see Björklund and Salvanes (2011) and Mogstad and Torsvik (2023).

Heritability estimates measure how much of the variation in an outcome is associated with genetic differences *in a given* population and environment, not how "fixed" or unchangeable the outcome is. This distinction is crucial for family and social policy: even if traits such as educational attainment or income exhibit high heritability, this does not imply that policy cannot alter them. As the classic example of eyesight shows (Goldberger 1979), outcomes with strong genetic roots can still be effectively improved through environmental or institutional interventions. Similarly, highly heritable differences in educational success can be mitigated by family support policies, equal access to quality schooling, and income stabilization programs. Further, there is evidence that differences in intergenerational mobility *across populations* (e.g. countries) is driven primarily by environmental factors. As a consequence, Engzell and Tropf (2019) show that in societies with higher intergenerational mobility, a relatively larger share of the variance in educational attainment is attributable to genetic factors. These observations underscore that while the overall role of inherited abilities can be substantial, we should look primarily for other factors if we want to understand mobility variation across time and space.

In the context of intergenerational mobility and related policies, the main contribution of genoeconomics lies in improving our understanding of heterogeneous treatment effects—that is, why children and families respond differently to the same interventions. Genome-wide association studies (GWAS) and polygenic scores (PGS) can help researchers identify genetic moderators of policy impacts, allowing for more precise evaluations of educational or social interventions. However, their practical use for policy design—such as tailoring early-childhood or educational programs to children's genetic profiles—remains uncertain.

4.2 Family Resources or Parental Style?

Family background remains the strongest predictor of children's educational success. As shown in the descriptive section, even after decades of government spending on high-quality schools, expanded access to higher education, the provision of generous student

loans and scholarships in some countries, and widespread availability of early childhood education and daycare, parental education and income continue to be powerful predictors of adult outcomes.

In the standard model of household behavior and intergenerational transmission, parental resources—broadly defined—play a central role, see Section 3. In this section, we ask: what is the causal evidence for the role of family income in shaping children's success? And what do we know about alternative mechanisms that explain why the family environment is critical for intergenerational outcomes?

4.2.1 The Role of Money

What is the empirical support for family income as a predictor of children's human capital, adult earnings, and health—and more precisely, what is the causal evidence for the impact of parental income on children's future success? This question has many facets; for instance, permanent versus temporary income effect, effects of income on poverty reduction versus income effects higher up in the income distribution.

First, there is robust evidence of a correlation between family income and children's adult income and other dimensions of well-being. However, evidence for a causal role of family income is less conclusive. Economic resources clearly contribute to the persistence of intergenerational poverty, even when natural experiments are used to identify causal effects. Yet most of this evidence stems from a limited set of U.S. programs, often conditional transfers, and does not easily generalize. In this section, we focus on a new wave of research employing convincing experimental and quasi-experimental designs to identify the causal impact of parental income on child outcomes, with particular attention to the possibility of nonlinear effects across the parental income distribution. For a comprehensive review, see also Page (2024).

Perhaps the cleanest quasi-experimental setting is the random allocation of household income through lotteries. These winnings are uncorrelated with effort or behavior, and thus provide unusually strong identification of income effects. Cesarini et al. (2016), studying Swedish lottery winners, compared children of parents who won large prizes—on average, seven times median annual income—to those of parents who participated but did not win. They found precise zero effects on children's health and human capital outcomes. Similarly, Bleakley and Ferrie (2016) analyzed the 1832 Cherokee Land Lottery, which distributed substantial wealth in the form of land parcels. Comparing winners and losers, they found no significant differences in children's school attendance or adult outcomes such as wealth, occupation, or literacy. On the contrary, Bulman et al. (2021), exploiting variation in the size of state lottery winnings, find positive impacts on children's college attendance, though only for sufficiently large winnings (above $100000). The overall reading of these findings, however, suggests limited causal effects of windfall income on

children.

By contrast, studies of U.S. antipoverty programs typically find positive impacts. These include means-tested or near-cash programs such as Food Stamps (now SNAP), the Earned Income Tax Credit (EITC), and the Child Tax Credit (CTC). Although these transfers differ from lotteries in that they are conditional—EITC requires employment, while SNAP benefits are reduced with additional earnings—they represent more sustained income changes that allow families to plan. Quasi-experimental studies exploiting program expansions or administrative rules generally find modest but positive effects. For example, Dahl and Lochner (2012) used variation in EITC expansions in the 1990s to instrument parental income and found improvements in children's math and reading scores. Moreover, Bastian and Michelmore (2018) documents longer-term effects of the EITC on adult children's education, employment, and earnings, where increases in parental income is argued to be the causal driver.

Hoynes et al. (2016) examined the rollout of the Food Stamp Program in the 1960s and 1970s, finding important benefits in early childhood. More recently, Barr and Gibbs (2022) studied tax credit eligibility differences based on children's birth timing and found small but significant effects on adult earnings. Taken together, this literature indicates that permanent income supports to low-income families can improve child outcomes, particularly when received early in life. As Page (2024) notes, it is possible that differences in the source of the income – or features of the income-generating event – contribute to the discrepancies in these vs lottery-based studies' conclusions.[16] Note that Carneiro et al. (2024) does not find any impact on children's outcomes of either permanent or temporary parental income shocks.

A related line of research exploits parental job loss as a source of income variation. Displacement events typically cause large and persistent earnings declines (Ruhm 1991, Jacobson et al. 1993, Davis and von Wachter 2011, Salvanes et al. 2024). Studies comparing children of displaced workers to similar children of non-displaced workers generally find negative, though not large, effects on educational attainment, labor market outcomes, and health (Rege et al. 2009, Hilger 2016, Oreopoulos et al. 2008). Interpretation is complicated, however, because job loss entails more than just lost income: it disrupts the family environment and may create psychological stress. Moreover, most studies do not distinguish between the ages at which children are exposed, despite strong evidence of sensitive developmental periods (Cunha and Heckman 2007, Currie and Almond 2011, Carneiro et al. 2021). A recent contribution by Carneiro et al. (2022) finds that exposure in early adolescence may matter as much as, or more than, early childhood exposure. They also show that maternal job loss, in particular, has lasting adverse effects on chil-

[16]For example, the theory of mental accounting suggests that households may respond differently to different types of income shocks (Thaler 1990).

dren's mental health and well-being, pointing to mechanisms beyond income, such as parental stress. Others have studied "positive" shocks, adding to the evidence on nonlinear effects with respect to the parental income distribution. Løken et al. (2012) exploit the boost in parental income induced by the Norwegian oil boom and find positive impacts on child outcomes in low-income families, while average impacts are statistically insignificant.

Responding to the limitations of quasi-experimental approaches, several recent randomized controlled trials (RCTs) have directly allocated unconditional income to families with children. These transfers are large, regular, and unconditional, making them close to an ideal test of income effects. The most prominent is the Baby's First Years study, which randomly assigned 1,000 low-income families to receive either $333 or $20 per month for the first years of their child's life (Noble et al. 2025). The high-cash treatment substantially reduced poverty and increased parental spending and time investments. Yet after four years, Troller-Renfree et al. (2022) found no significant differences across groups in children's cognitive, socio-emotional, or health outcomes.

Other recent RCTs report similar findings. The OpenResearch Unconditional Income Study (ORUS) allocated $1,000 per month to treatment families and $50 to controls across a broader population sample (Krause et al. 2025). While positive effects on parenting behaviors and neighborhood quality were observed—particularly among poor families—no significant effects were found on children's educational or socio-emotional outcomes. The Chelsea Eats pilot program reached similar conclusions (Jeffrey Liebman et al. 2022). Importantly, none of these studies found evidence that unconditional cash transfers harmed children, nor that parents diverted funds toward "temptation goods" or reduced labor supply.

In summary, while family income is strongly correlated with children's long-run outcomes, the causal evidence is more mixed. Lottery-based windfalls show little impact, while means-tested, sustained transfers such as EITC and SNAP do yield measurable benefits to poor families, especially when targeted to early childhood. Job loss studies reveal modest negative impacts, though mechanisms beyond income—such as stress—appear central. Recent RCTs with unconditional transfers have not shown significant improvements in child outcomes, despite clear reductions in poverty and modest improvements in parenting behaviors. These findings suggest that while money undoubtedly matters mechanically for reducing poverty, its causal role in fostering children's human capital may depend critically on timing, program design, targeted families, and complementary factors such as parenting practices and institutional support.

4.2.2 Socioeconomic Differences in Parenting Style

Given the weak evidence for a substantial causal effect of income on child development—and for income alone as an explanation of the strong persistence of outcomes across generations—recent research in economics, drawing on insights from psychology and related fields, has shifted attention from the amount of parental investment to its form. This literature emphasizes not only how much time and resources parents devote to children, but also the quality of interaction, the commitments they make, and the preferences and beliefs they transmit, as well as the timing of investments. The economics of parenting styles, which may differ markedly across socioeconomic groups, focus on the ways parents interact with their children.

The concept of parenting style originates in developmental psychology (Baumrind 1967) and has been popularized in economics by Doepke et al. (2019). It highlights parenting as a multidimensional activity that extends beyond financial and time investments. Parenting styles capture how parents nurture, support, and set limits for their children, shaping behavior, personality traits, and school performance. Developmental psychology in particular distinguishes between two main dimensions of parenting: cognitive stimulation and emotional support (Kalil and Ryan 2024). Positive socioemotional interactions include warmth, consistency, and the absence of harsh discipline, while cognitive stimulation involves activities such as reading, engaging with numbers, or practicing arts and crafts. These behaviors are strongly correlated with parental background, notably income and education. For example, cross-country time-use surveys show that more educated parents spend substantially more time engaging in developmental activities with their children (Guryan et al. 2008).

A related strand of this literature emphasizes self-control in children, a broad concept that encompasses impulsivity, conscientiousness, self-regulation, delay of gratification, and intertemporal choice (Moffitt et al. 2011). Correlational evidence indicates that children with stronger self-control skills experience better health, higher educational attainment, and improved labor-market outcomes in adulthood. These skills also display a steep socioeconomic gradient, and self-control appears to be transmitted across generations (Moffitt et al. 2011). Another related study, evaluates the role of socio-emotional skills on long-term educational success as adults Sorrenti et al. (2025). Using a large data set in primary schools in Switzerland, they find long-term effects of a randomized intervention targeting socio-emotional skills. Importantly, the study finds that socio-emotional skills are malleable even at school ages, and they are predictive of adult school choices. The main mechanisms are reduced attention deficits and less impulsive and disruptive behavior.

Another central focus has been on parents' beliefs about the returns to human capital investment. A growing literature suggests that gaps in parental expectations and beliefs

help explain socioeconomic differences in early investments (Attanasio and Kaufmann 2009, Cunha et al. 2013, Cunha 2015, Kalil 2014, Boneva and Rauh 2018, Boneva et al. 2022, Attanasio et al. 2020). While much of this research has measured adolescents' or students' beliefs, some studies have examined parents directly. For instance, Jensen (2010) showed that providing poor students in a developing country with information on higher returns to education led them to complete 0.20–0.35 more years of schooling. Cunha et al. (2013) found that low-SES mothers hold median subjective expectations of child-development elasticities between 4% and 19%. Boneva and Rauh (2018) further documented substantial heterogeneity in beliefs across socioeconomic groups in the UK, in contrast to the more homogeneous patterns reported by Attanasio et al. (2020).

A complementary explanation for underinvestment in children is not ignorance of the production process or misperceptions of returns, but rather differences in time preferences. Parents with present-biased preferences may underinvest in long-run developmental activities (e.g., reading), despite recognizing their benefits, because immediate gratification is more salient (Mayer et al. 2019). Research in psychology and behavioral economics has shown that impatience and present bias are linked to lower parental investment. For example, Dohmen et al. (2012) documented the intergenerational transmission of risk preferences, while a growing literature examines how patience and time preferences are transmitted (Alan et al. 2016, Zumbuehl et al. 2021, Brenøe and Epper 2022). Patience—manifested in a willingness to forgo short-term consumption in favor of educational or career investments—predicts later outcomes in education, health, and labor-market success (Goldstein and Naglieri, eds 2014, Golsteyn et al. 2014). Moreover, Brenøe and Epper (2022) shows that the transmission of patience itself is moderated by parenting styles.

Overall, the literature on parenting styles highlights how socioeconomic gradients in preferences, beliefs, and cultural practices shape investments in children and help explain intergenerational persistence. These mechanisms operate strongly through the early development of cognitive and socioemotional skills, which in turn predict adult outcomes. While correlational studies document substantial socioeconomic differences in parenting styles (Fiorini and Keane 2014, Price and Kalil 2019), the evidence that parenting styles causally affect child outcomes remains limited. There is, however, robust support for the intergenerational transmission of preferences and traits such as risk attitudes, patience, and self-control (Dohmen et al. 2012, Zumbuehl et al. 2021). Whether these childhood traits and skills can causally account for the persistence of income and education across generations remains an open question. This is a promising research frontier, with early but compelling evidence—such as the longitudinal study by Moffitt et al. (2011)—showing that childhood self-control predicts adult health, wealth, and even criminal behavior.

4.3 The Role of Place

Research spanning many fields of social science have long emphasized the role of the place where children grow up in shaping socio-economic differences in skill production and labor-market outcomes (Wilson 1987, Jencks and Mayer 1990, Sampson et al. 2002). With growing access to population-wide administrative data, many recent papers provide descriptive analyses of fine-grained geographic differences in intergenerational mobility within countries, as well as various community-level correlates (Chetty et al. 2014).

Our model in Section 3 featured the role of the neighborhood and local spillovers, but in an admittedly coarse way (via the parameter ζ). However, an existing strand of (mostly) theoretical research considers equilibrium impacts of geographical segregation on inequality and intergenerational transmission in more detail (see Durlauf 2004, Durlauf et al. 2022). In these models, local spillover effects interact with income-based neighborhood segregation to transmit parental economic status from generation to generation. The core idea is that geographical segregation of high- and low-income families generate community-level differences in both economic resources and social interactions among children (e.g. peers), which can worsen social mobility.

4.3.1 Regional Mobility Differences and their Correlates

An earlier wave of research focused on decomposing "neighborhood effects", often by correlating outcomes by geographical areas and contrasting with, for example, sibling correlations (Solon et al. 2000, Sampson et al. 2002, Page and Solon 2003, Durlauf 2004, Raaum et al. 2006). More recently, however, there has been a wave of descriptive studies of within-country mobility differences using large-scale administrative data.[17] In an influential paper, Chetty et al. (2014) document substantial variation in intergenerational income mobility across areas within the United States. By exploring area-level correlates, they further show that high-mobility areas tend to have better schools, less residential segregation and income inequality, and more social capital and stable families.

Subsequent studies have provided similar-style evidence on geographic mobility differences for many different countries, often but not always using administrative data. Corak (2020) documents substantial mobility variation within Canada, while Connolly et al. (2019) contrast subnational estimates between Canadian and US regions, including those along the border. Studies of Sweden (Heidrich 2017, Nybom and Stuhler 2025), Denmark (Eriksen and Munk 2020), Australia (Deutscher and Mazumder 2020), and the UK (Bell et al. 2023) find smaller, but still significant regional differences in these countries. Güell et al. (2018) and Acciari et al. (2022) show a strong North-South divide in Italy, with

[17] Mogstad and Torsvik (2023) provides a more detailed discussion of this research, including various econometric concerns and the crucial but often overlooked question of how to geographically define the relevant neighborhood.

mobility being higher in the richer Northern part. The former study explores correlates with area-level mobility, finding qualitatively similar patterns as those in Chetty et al. (2014) for the US. Britto et al. (2022) study Brazilian regions, noting the importance of accounting for informal incomes in the context of developing countries, while Neidhöfer et al. (2018) document mobility variation across 52 Latin American regions and over time, finding that improved social mobility correlates with economic development and growth. Battiston et al. (2025) find that despite complex dynamics, these correlations are persistent in a long-run historical context in the US.

A common theme across these studies is that more mobile regions tend to have lower income inequality, echoing the cross-country discourse on the "Great Gatsby curve" (Corak 2013). Various measures of social capital tend to correlate with higher mobility, as well as the quality of local primary schools, and (inversely) the extent of within-region residential segregation (e.g. by income or ethnicity). It is noteworthy that the characteristics of high vs low-mobility areas appear largely similar across studies, despite large differences in the extent to which policies vary subnationally or mostly at the national level.

A key question is to what extent regional differences in intergenerational mobility can be interpreted as causal rather than merely reflecting selective sorting of families into different areas. If local variation in rates of upward mobility primarily reflects selection, then the potential of place-based policies to foster mobility would be limited. Chetty and Hendren (2018a,b) develop a framework to decompose regional differences into selection and causal place effects (or "exposure effects") by analyzing families who move across areas when their children are of different ages. Their findings show that the time spent in higher-quality neighborhoods improves children's educational and other long-run outcomes—particularly for those from disadvantaged backgrounds. Building on this evidence, Chetty and Hendren (2018b) conclude that much of the observed regional variation in upward mobility reflects causal childhood place effects. This "movers design" has since been applied in a variety of settings, including Australia (Deutscher 2020), Brazil (Britto et al. 2022), Canada (Laliberté 2021), and several African countries (Alesina et al. 2021). Most studies find substantial childhood place effects of magnitudes comparable to the original U.S. estimates. Notably, Laliberté (2021) attribute roughly 50–70 percent of the gains from moving to a better area to improved access to higher-quality schools.

However, the movers design has also faced methodological criticism, particularly concerning its key identifying assumption—that the timing of moves with respect to children's ages is uncorrelated with unobserved family characteristics (see, e.g., Mogstad and Torsvik 2023). This assumption is explicitly tested and questioned in a recent study by Eshaghnia (2023), based on rich administrative data from Denmark. Using similar data, Cholli et al. (2024) employ an alternative empirical strategy and argue that much of the

observed neighborhood heterogeneity can be explained by family selection and sampling error, implying that true place effects may be smaller than previously thought.

Complementary experimental evidence, however, supports the view that neighborhoods exert real causal influence. The U.S. Moving to Opportunity (MTO) experiment, in which families were randomly offered housing vouchers enabling relocation to lower-poverty neighborhoods, shows long-run intergenerational gains consistent with the movers-design findings (Chetty et al. 2016).[18] These results reinforce the notion of "exposure effects": neighborhood influences are stronger for children who move at younger ages, and the benefits are concentrated among families moving from the lowest-quality to moderately better neighborhoods (Aliprantis and Richter 2020). Evidence from a Danish social-housing assignment design similarly finds large impacts on child outcomes of narrowly defined neighborhoods, though with the effects dissipating when neighborhoods are defined over broader geographic areas (Billings et al. 2024).

In addition, a growing body of *quasi*-experimental evidence further emphasizes the causal importance of childhood neighborhoods. Studies exploiting plausibly exogenous variation in residential location arising from public-housing demolitions, natural disasters, and quasi-random residential assignments of military families (e.g., Chyn 2018, Haltiwanger et al. 2024, Nakamura et al. 2022, Kawano et al. 2024) consistently find that moving to less disadvantaged areas improves children's educational attainment and adult earnings, particularly when moves occur early in childhood.[19] Taken together, the experimental and quasi-experimental literatures provide compelling evidence that neighborhood environments are important determinants of intergenerational mobility. Yet, the question whether *much* or rather *some* of the regional variation in upward mobility reflects causal place effects appears up for debate.

Less is known about the mechanisms underlying such place effects. Research indicates that the estimated effects increase with years of exposure and are strongest at fine geographic levels, indicating an important role for local social and institutional factors—such as school quality, safety, and social networks—in improving long-term outcomes. Recent work emphasizes the important role of social spillovers at the local level, including neighbor and peer quality, though further research is certainly needed (Eshaghnia et al. 2023).

[18] While moving to better neighborhoods had positive long-term effects on children's economic outcomes, earlier analyses of the same experiment found more mixed impacts on parents and on short-run child outcomes (Kling et al. 2007, Ludwig et al. 2013). Nevertheless, the intervention markedly improved adults' subjective well-being.

[19] Interestingly, Nakamura et al. (2022) document large intergenerational gains from relocations induced by a volcanic eruption in Iceland, even though displaced families moved out of a relatively prosperous area—suggesting that mobility itself can generate substantial benefits for children who are strongly mismatched to their original locations but also face high moving costs.

4.3.2 Segregation and Local Spillovers

Many of the above-referenced studies identify residential segregation as a key obstacle to intergenerational mobility, though typically in a correlational sense. The role of geographical segregation for inequality and intergenerational transmission is theoretically and empirically analyzed within the tradition of so-called social models of intergenerational transmission (Durlauf 1994, Durlauf et al. 2022). These models usually focus on geographical segregation in terms of parental income, and distinguish two different mechanisms through which segregation affects intergenerational mobility.

First, in contexts with local provision and funding of public education (e.g., via local property taxes in the United States), income segregation across areas causes disparities in school spending between children from low- and high-income families. While recent evidence finds positive impacts of education expenditures on long-term outcomes (Jackson and Mackevicius 2021), the aggregate effects of this mechanism on social mobility are less clear. Evidence that house prices react to local school quality, however, indicates that families use residential sorting to improve the child environment and that the housing market can put a price on school quality also in public education systems (Black and Machin 2011, Gibbons et al. 2013).

Second, neighborhoods and schools can have spillover effects on children through various social interactions, such as peer effects, learning and information, role models and norms, and networks. Some of these mechanisms might have direct effects on skill formation in school, such as school peer quality, while others might affect long-run outcomes independent of such skill impacts. For instance, neighborhoods might influence aspirations and norms or transmit information about and improve the access to job opportunities through social connections (Durlauf et al., 2021).

Most research focuses on segregation by income and its interaction with overall inequalities in generating child disparities. But segregation in other dimensions might also generate disparities, most notably segregation along racial or ethnic lines (Card et al. 2008). For example, a demand for racial segregation can increase the cost of living in majority-group neighborhoods, spurring economic segregation and racial disparities in local public resources (e.g., schools). Because race and income tend to be correlated, a desire to racially segregate can therefore spur economic segregation even if families do not care about economic segregation as such (Boustan, 2010). However, the evidence on the consequences of racial segregation for child school outcomes appears mixed (e.g., Böhlmark and Willén 2020).

We already reviewed the causal evidence that children's, and especially disadvantaged children's, time spent in better neighborhoods improves various long-term outcomes (Chetty et al. 2016, Chetty and Hendren 2018b). But there is also evidence on complementarities between family and social influences, most notably because disadvan-

taged children are more negatively affected by growing up in poor communities (Fogli et al. 2025, Wodtke et al. 2016).

The key message is that family background can influence children's long-run prospects through the effects of parents' resources on their choice of neighborhood and school. Thus, segregation and income inequality raise the importance of the family background, independent of the direct importance of parental investments. Nevertheless, more causal evidence on how and through which mechanisms segregation impacts intergenerational transmission would be useful.

Recent work from the Chetty research group, Chetty et al. (2022a,b) shifted the focus from neighborhood characteristics or institutional quality alone to the structure of social networks themselves. Using large-scale social network data, their two companion papers show that who people are socially connected to, and how those connections form, plays a central role in shaping economic opportunity. The first paper, introduces a new measure of social capital based on friendship networks using Facebook friends data, and asks which dimensions of social connectedness are most strongly related to upward mobility. The key concept is economic connectedness: the extent to which individuals from low-income backgrounds form friendships with higher-income individuals. Across neighborhoods, schools, and regions, economic connectedness is by far the strongest network predictor of intergenerational mobility. In contrast, other commonly emphasized forms of social capital—such as dense, tightly knit communities ("bonding" social capital) or civic participation—are much less strongly associated with children's chances of moving up the income distribution. The main finding in that cross-class social ties matter more for mobility than social cohesion per se. The second paper, turns to the question of why some places and institutions generate more cross-class connections than others. It decomposes differences in economic connectedness into two components. The first is exposure: whether low- and high-income individuals are present in the same social settings, such as schools, neighborhoods, workplaces, or religious organizations. The authors show that low economic connectedness arises roughly equally from segregation across settings and from friending bias within settings. This distinction is crucial because it highlights two distinct policies; integration across institutions versus changes in how interaction occurs within institutions. Taken together, these papers provide a network-based interpretation of intergenerational mobility. They suggest that mobility is facilitated not simply by access to better schools or safer neighborhoods, but by social environments that enable sustained interaction across socioeconomic lines. From this perspective, policies that alter institutional design—such as school assignment rules, tracking, extracurricular organization, or residential integration—may affect mobility partly by reshaping social networks and reducing barriers to cross-class friendship formation.

A complementary paper highlights the role of school-based networks in shaping so-

cioeconomic trajectories, extending the social capital lens into everyday educational environments. (Cattan et al. 2025) examines how exposure to elite-educated peers during high school influences both elite degree enrollment and later labor-market outcomes in Norway. They show that students from non-elite backgrounds are less likely to be exposed to peers whose parents have elite education — a form of social capital deficit that contributes to high intergenerational persistence in elite education and income. Causal analysis exploiting lottery variation in assessment reveals that, on average, elite peer exposure increases the likelihood of enrolling in an elite degree and boosts early-career earnings; but the magnitude of these peer effects is much larger for high-SES students than for low-SES students, creating both mobility at the bottom and persistence at the top of the distribution. Mechanistically, exposure to elite peers tends to lower low-SES students' GPA through teacher-assessment, i.e., grading to the curve, yet also stimulates applications to elite programs through aspirational and informational channels, illustrating how social ties influence both achievement and decision processes.

4.4 Institutions: Family Policies and Time Investment

There is a growing recognition in economics that early-life conditions can have profound and lasting effects on later outcomes (Cunha and Heckman 2009). Cunha et al. (2010) develops and estimates a model of skill development spanning multiple stages of interaction and investment. Their analysis demonstrates that early investments strongly influence subsequent outcomes: the cognitive and non-cognitive skills acquired later in life build upon foundations established in early childhood. Through dynamic complementarities, even modest policy interventions at early stages can generate substantial and persistent effects.[20]

Recent work has leveraged family policies and natural experiments—such as reforms to parental leave and the expansion of subsidized daycare—together with rich administrative datasets to analyze the role of early investment in shaping both short- and long-term human capital. These policies may be crucial for intergenerational mobility, insofar as they differentially affect children from different socioeconomic backgrounds. By altering especially low-SES children's early-life environments and parental labor-market attachment and monetary resources, such policies have the potential to influence the trajectory of children's skill formation and therefore long-run economic outcomes.

[20] A substantial body of evidence shows that adverse early-life shocks have long-term consequences for health, human capital accumulation, and economic outcomes in adulthood (Almond et al. 2018, Barker 1992, Heckman 2006, Black et al. 2007, Carneiro et al. 2021).

4.4.1 Parental leave

A growing body of literature explores whether paid parental leave can positively affect children's long-term educational and economic outcomes, although the evidence remains mixed. Parental leave policies provide parents—particularly mothers—with additional time to invest in early childcare, which has been associated with improvements in children's cognitive and non-cognitive development (Carneiro and Heckman 2003, Lalive et al. 2013). Generous leave schemes have also been linked to higher educational attainment and earnings in adulthood (Rossin-Slater 2011, Carneiro et al. 2015, Dustmann and Schönberg 2012). At the same time, some studies caution that extended leave periods may have adverse labor market consequences for mothers, potentially lowering family income and thereby altering patterns of intergenerational transmission (Schlotter 2011).

Several studies exploiting administrative panel data and policy reforms in the Nordic countries have examined the causal effects of universal parental leave policies on children's outcomes. Rasmussen (2010) study the extension of parental leave in Denmark from 14 to 20 weeks in 1984, applying a regression discontinuity design that compares children born just before and after the reform. They find no measurable effect on long-term educational outcomes. Similarly, Liu and Skans (2010) analyze a Swedish reform that increased parental leave from 12 to 15 months, again finding no discernible effect. In Norway, Dahl et al. (2014) exploit multiple policy reforms extending parental leave and likewise find no significant impact on children's later outcomes. These findings are consistent with broader evidence across a range of countries suggesting limited effects of parental leave expansions on long-run child outcomes (Dustmann and Schönberg 2012).

An important exception is Carneiro et al. (2015), who study the introduction of up to 18 weeks of paid leave in Norway and find a significant reduction in high school dropout rates, particularly among children of less-educated mothers. One possible explanation is that this reform affected children relatively early in life, when returns to parental investment are especially high. Their findings have, however, been questioned by Lillebo et al. (2023), who argue that earlier transitional arrangements complicate identification. In response, Carneiro et al. (2023) show that their main results remain robust when these concerns are addressed.

The rationale for publicly funded parental leave is that giving parents more time with their children enhances child development and, ultimately, intergenerational mobility. The evidence to date indicates that while the aggregate impact of such policies on children's long-term outcomes is modest, policy design matters. Differences in leave duration, generosity of benefits, and the timing of leave relative to children's developmental stages all shape the extent to which parental leave reduces socioeconomic disparities across generations.

4.4.2 Daycare

The provision of universal daycare services and/or preschool is another central policy instrument examined in the context of intergenerational mobility. Evidence shows that high-quality early childhood education programs disproportionately benefit disadvantaged children, thereby reducing socioeconomic disparities in educational attainment (Havnes and Mogstad 2011, Heckman and Mosso 2014). The introduction of universal childcare programs across multiple countries has increased maternal labor force participation and improved both cognitive and social outcomes among children from low-income families (Baker et al. 2008, Havnes and Mogstad 2015, Felfe and Lalive 2018). Long-term studies further suggest that access to subsidized daycare enhances future earnings potential and reduces reliance on social welfare programs, with supporting evidence from both the United States and Argentina (Cascio and Schanzenbach 2013, Berlinski and Galiani 2007).

A useful distinction can be made between universal daycare or preschool programs and means-tested programs. The central conclusion of the literature is that universal access to high-quality daycare fosters greater equality of opportunity, with consistent evidence of positive effects for children from low-SES families. Nordic studies report improvements in school readiness, test scores, educational attainment, and labor-market outcomes (Havnes and Mogstad 2011, 2015, Bingley and Westergaard-Nielsen 2012), while similar effects have been documented in Germany, Switzerland, and Israel (Felfe and Lalive 2018, Cornelissen et al. 2018, DeMalach and Schlosser 2025). Recent work in the United States likewise finds strong benefits for low-SES children from universal preschool expansions (Cascio 2021).

Several country-specific studies illustrate these findings. Bingley and Westergaard-Nielsen (2012) examine preschool expansions in Denmark and find lasting improvements in adult education and earnings between ages 22 and 30, particularly for children from disadvantaged and middle-class backgrounds. Havnes and Mogstad (2011) analyze the expansion of subsidized formal daycare in Norway beginning in the mid-1970s. Exploiting variation across municipalities in the timing of expansion, they find significant positive effects on adult outcomes in the early 30s, including higher educational attainment, stronger labor-market attachment, and reduced welfare dependency. Subgroup analyses indicate that most of the educational gains accrue to children of low-educated mothers. A follow-up study by Havnes and Mogstad (2015) finds that daycare attendance increases long-run earnings for children from low-SES families but decreases earnings for those from high-SES families, thus lowering measured intergenerational earnings persistence. The authors argue that disadvantaged children gain from replacing low-quality informal care with high-quality formal care, whereas high-SES children experience smaller or even negative returns when substituting away from relatively effective informal care. Com-

plementary evidence from Black et al. (2014) shows that targeted daycare subsidies for low-income families improve children's middle-school performance.

Overall, the literature suggests that universal daycare and preschool programs can play an important role in enhancing intergenerational mobility. However, their effectiveness depends critically on program design and implementation. Variation in age of eligibility, program duration, and quality of services determines the extent to which such policies reduce socioeconomic disparities across generations.

4.5 Health Policies and Human Capital

The strong interplay between health and economic outcomes has long been recognized across disciplines. While much of the literature has focused on how health improvements shape human capital accumulation and labor market outcomes, an increasing body of work examines the determinants of health in childhood and the long-run consequences of early-life health for adult outcomes (Almond et al. 2018, Black et al. 2007, Barker 1992).

Grossman's seminal framework conceptualizes health both as a consumption good and as an input into the production of future health and productivity, with investments in the health stock yielding long-term returns (Grossman 1972). This framework has been extended by Cunha and Heckman (2007), who highlight how early investments in health and skills form the basis for subsequent investments, amplifying returns through dynamic complementarities. Within this perspective, childhood health is a key input into human capital accumulation: differences in health capital affect children's ability to attend school and learn effectively, thereby influencing later educational attainment and labor market success. A large empirical literature documents a strong socioeconomic gradient in health, with children from low-SES backgrounds having, on average, lower health stocks, greater exposure to health shocks, and fewer parental resources to mitigate these shocks.

The evidence strongly suggests that health in utero and early childhood has lasting consequences for later-life health and human capital. These early health outcomes depend critically on the family environment and, in particular, parental socioeconomic status. In this section, we do not provide a full review of the literature on intergenerational health mobility (see the chapter by Davis, Deutscher and Mazumder in this volume). Instead, our focus is narrower: we ask whether large-scale childhood health programs can causally reduce health inequalities, especially by improving outcomes for children from disadvantaged backgrounds, and thereby improve intergenerational mobility. While our illustration in Section 2 gives a somewhat mixed message, more detailed descriptive evidence suggests that public health spending, in particular on child health services, supports mobility. For example, a cross-country comparison of the socioeconomic gradient in health

inequality across OECD countries—including the U.S., U.K., Germany, France, Spain, Norway, and Finland—shows substantial differences in child health outcomes (Banks et al. 2021). The Nordic countries, particularly Norway and Finland, consistently outperform the U.S. and U.K. Notably, child mortality is substantially lower in Scandinavia than in both the U.S. and many European countries, and mortality differences across rich and poor areas are also smaller (Banks et al. 2021). Due to the paucity of individual-level data linking health and socioeconomic background, these comparisons rely on regional variation by income levels.

Although relatively few child health programs have been studied, evidence from small-scale initiatives introduced in the early stages of the Scandinavian welfare states during the 1930s points to large and lasting benefits, particularly for disadvantaged children (Wüst 2022). These early interventions later served as templates for the universal roll-out of child health services across the region.

For instance, Bhalotra et al. (2017) finds that an infant care program introduced in Sweden in the 1930s significantly reduced infant mortality and had lasting effects on survival, with reduced mortality observed even at age 75. Expanding on this, Bhalotra et al. (2022) show that exposure to the program improved primary school test scores and had enduring effects on secondary schooling, employment, and earnings. Particularly striking is the large positive effect for children born to unmarried mothers, who initially faced worse health outcomes. The intervention substantially improved survival rates and fourth-grade school performance for this vulnerable group.

Similarly, several studies examine the introduction of a Danish home-visit program in the 1930s (Wüst 2012, Hjort et al. 2017). These studies report both short- and long-term health improvements, although they find no significant effects on educational attainment or income. A limitation of these studies is the lack of data to assess heterogeneous effects by socioeconomic background. In related work, Bütikofer et al. (2019) analyze the roll-out of mother-and-child health centers in Norway. They find that access to well-child visits significantly increased educational attainment for children from low-SES families, while no effect was detected for children from more advantaged backgrounds. The program is estimated to have reduced intergenerational persistence in educational attainment by approximately 10 percent.

4.6 The Education System: Creating Opportunities or Barriers?

Because of its central role in enhancing productivity and prosperity, as well as its potential for promoting equality of opportunity, public education has long been a cornerstone policy in most countries. Education is widely regarded as the primary mechanism for

explaining both earnings differences in the labor market and the intergenerational transmission of income. The canonical model of intergenerational transmission by Becker and Tomes (1986b), together with more recent extensions such as Becker et al. (2018a), provides the main theoretical framework. However, and as we also discuss in Section 3, an education system can have theoretically ambiguous impacts on intergenerational mobility depending on its exact features. While many emphasize its opportunity-equalizing potential, especially in relation to *public* education, others have cautioned that some aspects of education systems might in fact cement socioeconomic advantages.

We begin by reviewing what is known about whether public investment in expanding access to primary education increased educational attainment and, in particular, whether such expansions improved intergenerational mobility in education. Our focus is on studies that exploit education reforms at the primary level as natural experiments to identify causal effects on mobility. These reforms typically involved raising minimum school-leaving ages, expanding the number of compulsory years of schooling, or increasing instructional time. Such reforms have been studied in a range of contexts—including the United States, the United Kingdom, and, especially, the Nordic countries. Most of these reforms date back to the 1950s and 1960s, when educational attainment in Western societies was still relatively low.

The first half of the 20th century up to the 1950s was characterized by declining income inequality, expanding access to primary and secondary schooling, and the emergence of the welfare state, particularly in Europe and the Nordic countries. Evidence from this period suggests that educational mobility—as well as class and income mobility—rose, particularly for cohorts born in the mid-1930s and later.

We then turn from the broad question of whether educational expansion improved intergenerational mobility to the role of education system design. First, we review the literature on tracking in middle school (and, to some extent, in high school) and its implications for intergenerational mobility. Second, we examine evidence on admission policies for both high school and higher education. Of particular interest is the comparison between meritocratic admissions systems and more opaque systems, and their consequences for social mobility. Special attention is devoted to admission into elite institutions, where different systems of selection have important implications for recruitment into the economic, political, and social elites.

4.6.1 Intergenerational Mobility and Education Reforms

A large number of studies examine intergenerational mobility for cohorts born between the 1930s and early 1970s—the so-called "golden age of upward mobility." These studies exploit reforms across many countries, using data of varying quality and different forms of exogenous variation. In this review, we focus on a subset of papers that employ

clear identification strategies and, crucially, data that allow measurement of children's educational attainment in adulthood.

We begin with compulsory schooling reforms, which raised school-leaving ages and extended mandatory years of education. These reforms have been analyzed in the U.S., the U.K., France, West Germany, Canada, and the Nordic countries. Most studies focus on the impact of additional years of schooling on educational attainment, labor-market returns, and intergenerational mobility in education. Since the reform impacts and the returns to schooling can be estimated separately by socioeconomic background, these reforms also allow for analyses of intergenerational income mobility. While it is possible to assess mobility implications by simply estimating direct impact heterogeneity by SES, the general idea of most of these papers is to assess the mobility impacts of various education reforms by estimating first the effect on the directly affected generation, and then how the education of these parents-to-be affected their children.

For the U.S., Oreopoulos (2006) and Oreopoulos and Page (2006) document large effects of compulsory schooling laws on children's education. Oreopoulos (2006) also shows high returns to education (7–14%) using these reforms as instruments. Similar findings are reported for Canada. In the U.K., studies exploiting the 1947 compulsory schooling reform find positive but more modest effects: returns of 0% for women and between 4–7% for men (Devereux and Hart 2010). In contrast, studies for West Germany and France report no measurable returns to comparable reforms (Pischke and von Wachter 2008, Grenet 2013).

In the Nordic countries, a number of studies exploit rich register data and staggered roll-outs of reforms. Holmlund et al. (2011) estimate that about 40% of the intergenerational correlation reflects reform-induced causal effects, and similarly so for fathers and mothers.[21] A key result in this study is that IV estimates based on mandatory schooling reforms are largely similar to those from alternative identification strategies (twin- or adoption designs), at least in the Swedish setting. Other studies have a more explicit focus on mandatory school reforms. In Finland, Pekkarinen et al. (2009) evaluate the effect of the comprehensive school reform on the intergenerational income elasticity and find that the elasticity declined from 0.30 to 0.23 for men. In Sweden, Meghir and Palme (2005) show that the 1950s reform increased attainment above the new mandatory minimum, with particularly strong effects for children of less-educated fathers and for high-ability children. In Norway, Aakvik et al. (2010) find similar results: education reforms raised attainment up to some college, with especially large effects for children from low-SES backgrounds. Black et al. (2005) estimate a direct but modest causal effect

[21] However, the estimates are somewhat sensitive to the exact sample and specification used. For example, the effect of mothers' education on child outcomes is substantially attenuated once assortative mating is controlled for.

of fathers' education on children's attainment, though they find no effect of mothers' education. Recent evidence for Sweden confirms that reforms reduced intergenerational persistence in income and education by about 10% (Nybom and Stuhler 2024).

Earlier reforms in the 1930s also matter. In Sweden, school terms were extended from 35 to 39 weeks, and mandatory years increased from 6 to 7, mainly in rural areas (Fischer et al. 2019). In Norway, the 1936 reform introduced minimum schooling standards, particularly raising rural requirements, and crucially established the principle of central government funding for education reforms (Acemoglu et al. 2025). These reforms had substantial effects: in Norway, required weeks of schooling in rural areas rose by about 30%, translating into an increase of nearly one-third of a year of education. Returns in the labor market were sizable, with men's earnings rising by 8%. In Sweden, Fischer et al. (2019) find strong labor-market returns to both term-length extensions (about 5%) and increased years of schooling. Notably, these reforms coincided with sharp increases in intergenerational mobility in education and income across Scandinavia (Pekkarinen et al. 2017, Björklund et al. 2002).

Taken together, most evidence suggests that education reforms in the postwar Nordic countries significantly raised attainment, improved equality of opportunity, and reduced intergenerational persistence in income and education. Importantly, effects were strongest among disadvantaged groups, consistent with the view that expanding access to schooling is an equalizing force. At the same time, results highlight the importance of context. While reforms in Scandinavia, the U.S., and Canada show substantial effects, those in France and West Germany find none. Beyond labor-market outcomes, recent work also shows that educational expansions affected fertility, crime, health, political participation, and subjective well-being.

4.6.2 Tracking

Countries organize their school systems differently at all levels. At the primary stage, some countries track students into different schools or classes based on assessed ability, exposing them to partly different curricula. At the secondary level, most OECD countries divide students into vocational or academic tracks: vocational programs prepare students for specific occupations, while academic programs provide preparation for higher education. The rationale for tracking is that grouping students by ability creates learning environments better suited to their needs, thereby improving outcomes. However, the timing of tracking is crucial. At early ages, ability is measured with error, and small differences in performance—often linked to socioeconomic background—may be amplified into large disparities.

A widely held concern is that tracking reinforces socioeconomic differences and thereby reduces intergenerational mobility. Several mechanisms may explain this: peer effects

(with higher-achieving students clustered together), teacher sorting (where more experienced teachers gravitate toward higher-performing schools or classes), and differences in curricula. Despite the importance of these issues, relatively few studies analyze the long-term effects of tracking on intergenerational mobility, and the existing evidence is mixed.

Regarding tracking in primary and middle school, one of the earliest studies relating to intergenerational mobility is Dustmann and Schönberg (2012), who examine Germany. They find a strong link between parental background and children's choice of secondary track, which in turn has large effects on educational disparities. Because German students are tracked at the age of 10, the early timing of selection appears to reinforce the low intergenerational mobility (especially measured in terms of education) observed in Germany. Similar evidence comes from Finland. Two studies exploit a major reform in the 1970s that delayed tracking from age 11 to 15 and was implemented gradually across municipalities. Pekkarinen et al. (2009) show that the reform substantially increased intergenerational income mobility, reducing the elasticity from 0.30 to 0.23—a large effect, roughly half the gap between Sweden and the U.S. as reported by Björklund et al. (2006). In a follow-up, Pekkarinen et al. (2017) find that delaying tracking significantly improved ability scores and educational attainment, particularly for children from low-SES families.

Turning to tracking in high school, and the selection into vocational or academic tracks, the implications for intergenerational mobility appear less conclusive. At the upper secondary level, about half of students in most OECD countries enroll in vocational programs, with a disproportionate share drawn from low-SES backgrounds. This raises the question of whether high-school tracking is a barrier to intergenerational mobility. Cross-country evidence suggests that vocational education provides higher short-run earnings, but academic education yields better long-run outcomes by fostering adaptability. However, these comparisons are complicated by selection bias. Exploiting a regression discontinuity design in Finland, Silliman and Virtanen (2022) find that for students at the margin of the two tracks, vocational education leads to higher lifetime earnings than academic education. Similarly, Bertrand et al. (2021), using a Norwegian reform, show that policies allowing entry into vocational tracks while preserving the option to switch into academic programs are particularly beneficial.

More broadly, international evidence indicates that the timing of tracking matters for intergenerational mobility. Brunello and Checchi (2007) use cross-country data to show that earlier tracking tends to magnify the advantages of high-SES backgrounds, increasing intergenerational persistence in both education and earnings. Their study, however, does not differentiate by gender or by position in the parental income distribution—dimensions that later work has shown to be central for understanding mobility patterns.

Apart from the issue of the timing of tracking, an important aspect is whether track-

ing takes place within or between schools (see also Holmlund and Nybom 2023). The European-style tracking into vocational versus academic programs typically implies sending relatively early-age students of different abilities and backgrounds to entirely different schools, with likely negative mobility impacts. The effects of within-school tracking are less well understood. However, there are a few studies that use experimental methods to study how different students perform under different configurations of peers, estimating the net effect of both peer effects and effects of tracking. For example, Carrell et al. (2013) studied classroom composition at the U.S. Air Force Academy and found that mixing high- and low-performing students harmed rather than helped low performers. Booij et al. (2017) exploited random variation in peer GPA among college undergraduates, where the results suggested that low- and middle-ability students gain substantially from tracking.

However, the evidence on within-school tracking typically comes from very specific contexts and might be difficult to generalize to other education settings. Most evidence however point towards within-school tracking not necessarily being detrimental to the weakest students and may in fact even generate positive effects holding other inputs constant. The literature on school tracking thus gives somewhat mixed messages. While the two-tier systems segregating young students by both curricula and schools appear detrimental for social mobility, within-school tracking might, if anything, even have positive mobility impacts. On the latter, however, more research from varying contexts is needed.

4.6.3 Elite Education

Much of the literature on intergenerational mobility implicitly assumes a smooth pattern of child outcomes across the parental income or education distribution—that is, the correlation between parental and child outcomes is constant across the socioeconomic scale. This assumption has recently been challenged. One line of research finds that low SES children make very different choices in higher education, sorting into college tracks below their ability level. Another literature asks whether the admission rules of elite higher-education institutions disproportionately favor children from advantaged backgrounds, thereby sustaining a high degree of self-recruitment into the elite. A related question is whether socioeconomic background exerts a direct effect on labor market outcomes: even when children from disadvantaged backgrounds succeed in completing higher education, do they face barriers in translating educational attainment into labor market success? The latter question is closely tied to the broader role of the labor market in elite recruitment.

There are two main aspects to non-linearities in intergenerational mobility. First, threshold effects may exist at the bottom of the socioeconomic distribution ("poverty traps"), where children below a certain level of disadvantage experience very limited

upward mobility despite overall educational expansion. Second, thresholds may also exist at the top, where children from highly advantaged backgrounds enjoy particularly high probabilities of attending higher education and elite institutions, and reaching prestiguous positions on the labor market ("entrenched elites"). Durlauf et al. (2016) identify such *status traps* in U.S. income mobility data, showing that thresholds are driven not only by income but also by parental education, cognitive and non-cognitive skills, and their interaction with children's characteristics.

Focusing on the role of higher education polcies on upward mobility, a set of papers finds that high and low SES children, given ability, sort in to very different colleges (Black et al. 2015, Hoxby and Avery 2012, Dillon and Smith 2017). These papers also indicate that disadvantaged students tend to enroll in colleges that do not fully align with their abilities.

Turning to elite higher education, Chetty et al. (2020) documents stark differences in recruitment across college types in the United States. Students from the top quintile of the parental income distribution are 23 times more likely to attend an "Ivy Plus" college than students from the bottom quintile. Similar patterns have been documented elsewhere: in Chile and the U.K., graduates of private tuition-based high schools are overrepresented in elite universities by factors of 16 and 7, respectively (Barrios-Fernández et al. 2022, Britton et al. 2021). Evidence from Norway, where admissions are centralized and based strictly on high school GPA, shows comparable patterns: for every student from the bottom 20% of the parental income distribution admitted to an elite program, seven students come from the top 20% (Cattan et al. 2025).

The mechanisms underlying these patterns vary across countries. In the U.S., Chile, and the U.K., high university tuition fees, expensive private feeder schools, and legacy admissions play central roles (Zimmerman 2019, Barrios-Fernández et al. 2022, Britton et al. 2021, Michelman et al. 2022, Chetty et al. 2020). By contrast, Norway—and many European countries—features low or no tuition fees, no legacy admissions, and no private feeder school systems. Instead, admissions are centralized and meritocratic. Why, then, does unequal recruitment persist? Cattan et al. (2025) point to social capital as a key mechanism. Specifically, exposure to peers from elite-educated families in high school—so-called "elite peers"—matters. Students from disadvantaged backgrounds are much less likely to have such peers, and causal evidence shows that this lack of exposure significantly reduces their probability of entering elite higher education. This concept of social capital closely parallels the notion of "economic connectedness" in friendship networks, which Chetty et al. (2022a) show is strongly associated with upward mobility.

The second question concerns labor market performance conditional on attending college. Chetty et al. (2020) show that once students complete higher education, income differences between graduates from low- and high-SES families are reduced, however, still

a considerable SES premium is found in the US. This holds both for elite and non-elite colleges. These findings underscore the role of higher education as a pathway for upward mobility. This finding is in line with results for elite colleges in Chile and to some extent for the UK (Barrios-Fernández et al. 2022, Britton et al. 2021). However, it is in contrast to the finding in Norway, where the SES premium is relatively small given the same elite degree (Cattan et al. 2025). The premium differs by type of elite degree though, where in particular a law shows a considerable high SES premium.

5 The Role of the Labor Market for Social Mobility

Recent research has increasingly studied the role of the labor market for social mobility. Our model in Section 3, as well as Becker et al. (2018a), highlights various deviations from the standard model of parental investments in the human capital of children that directly or indirectly stem from labor-market mechanisms. For example, SES differences in returns to child investments could arise if high-income families have access to information and networks that enable them to not only make more efficient child investments but also to provide further advantages in the labor market. In this case, the labor market will act as a multiplier by magnifying the consequences of differential human capital investments in children. But, as we illustrate in our model in Section 3, labor-market mechanisms might also generate SES gaps in incomes *conditional on* human capital. In this case, equally productive children would face unequal labor-market opportunities, for example through access to parental networks, information or other resources.

The labor market's role in intergenerational transmission has been addressed in sociological research since (at least) the mid-20th century. While occupational and class gaps have been at the core of the sociology literature, the focus on schooling and different forms of human capital has remained dominant. However, there has also been a debate around incorporating employers and labor markets into such stratification research (Spilerman 1977, Baron and Bielby 1980). Moreover, and predating the recent interest in the role of parental networks, early studies highlighted the involvement of parents in the job finding process (Blau and Duncan 1967, Granovetter 1973).

A renewed interest in labor-market drivers has been seen not only in sociology but also among economists. An important source to this development has been improved access to administrative datasets in many countries – especially panel data linking workers with employers – together with refined methods to analyze such data. Consequently, and following a broader trend in labor economics, there has been an increase in attention to the role of employer-employee matching in social mobility research.

We next review this recent wave of research in economics, organizing the studies into three broad categories. First, a set of papers documents descriptive facts on employer

sorting from an intergenerational perspective. Second, several studies examine the role of parental networks in job search and early career outcomes. Although many contributions span both themes, we discuss them separately for clarity. Our primary focus is on the economics literature and the evidence concerning employers and firms, but in a final subsection we also briefly review work on other labor-market mechanisms.

5.1 The Role of Employer Sorting

Children are overrepresented in firms or workplaces where parents work or have worked before. An early wave of research documented that families and friends are important in the job finding process, though primarily based on small-scale surveys or for particular sectors of the economy (see Granovetter (1995); Ioannides and Loury (2004)). More recent studies have analyzed the intergenerational transmission of employers on a broader scale, using administrative data. Corak and Piraino (2011) use Canadian data and document that, by their early 30s, about 40% of sons have worked at least once for an employer who also employed their father.

This transmission of employers is higher among sons whose fathers have higher earnings, and strikingly so at the very top of the earnings distribution: almost 70% of the sons with fathers in the top income percentile have at some point worked for a firm that also employed their fathers. Similar patterns have later been documented for other countries. Bingley et al. (2012) find largely similar patterns in Denmark as those in Canada, with employer transmission rising sharply at the top of the distribution. Stinson and Wignall (2018) and Staiger (2025) find similar, though somewhat weaker employer transmission in the US.

These results have implications for intergenerational earnings persistence. In Canada and Denmark, the upward mobility of children from low-income backgrounds has little to do with inheriting an employer from the father, while the persistence of high incomes is distinctly related to this tendency. More generally, the role of employers in intergenerational earnings persistence depends on two potential heterogeneities: whether employer transmission differs and whether the earnings impact of employer sharing differs across the parental income distribution. While Stinson and Wignall (2018) show that sharing the father's employer indeed correlates with slightly higher earnings for sons (though not at all for daughters), this earnings boost is constant across the distribution. However, since employer sharing is more common at the top, it contributes to higher earnings persistence among sons.

That this employer sharing is more common among high-income families is intuitive, if it depends on the extent to which parents directly control the chances their children will receive a job offer. High-income parents are typically in positions with more autonomy

and influence in the workplace, and may thus also increase the likelihood their employers will extend a job offer to their children. Along the same lines, we might expect employer sharing to be more common among the self employed. As an extreme example, studies focusing on elite positions have found very strong family-based succession of CEOs among publicly traded companies (Pérez-González (2006); Bennedsen et al. (2007)). However, it is important to stress that none of these studies quantify the extent to which parental employers causally impacts the child's employer or earnings. Intergenerational transmission of skills or preferences might also play a role for these sorting patterns.

A more recent strand of literature quantifies the role of employer sorting for intergenerational mobility using so-called AKM models (Abowd et al. 1999) and estimates of firm pay premia. Using two-way fixed effects models combined with intergenerational links, it is possible to decompose the IGE (or some other measure of earnings persistence) into a firm and an individual component. Using administrative data from Israel, Dobbin and Zohar (2025) document that firm pay differences explain 23% of the IGE, whereas permanent individual characteristics contribute the rest. Two recent studies from Sweden (Engzell and Wilmers 2024, Forsberg et al. 2024) find a larger influence of firms (about 30%) on intergenerational earnings persistence, which might be due to data or country-specific differences. About half of the "firm part" documented in these studies is due to skill sorting – high-income children tend to have higher skills, which improves their access to high-paying firms. Moreover, the SES gap in firm pay is substantial already at career start, and magnifies further over the early part of the career. Other than that, however, these studies are largely silent on which mechanisms are responsible for such differences in access to high-paying firms.

5.2 Parental Networks and the Early Career

Consistent with these descriptive findings, there is strong evidence that parental networks, information, and other resources play an important role in shaping labor market outcomes, particularly at the point of labor market entry. Beyond the descriptive patterns already documented by Corak and Piraino (2011), several causal studies show that access to parents' professional networks directly influences where and whether young workers secure their first jobs. Kramarz and Skans (2014) use population-wide linked employer–employee data on Swedish school graduates to show that having a parent employed at a firm significantly increases a child's chances (compared to their classmates) of securing their first job at the same workplace. Interestingly, these network effects are larger when the child's position is "weak" (low education, during high unemployment years, etc) and when the parent's position is "strong" (long tenure, high wage). Therefore, it is unclear what the causal consequences of such parental networks are for

intergenerational mobility.

The implications of parental networks for intergenerational mobility are more explicitly analyzed by Staiger (2025), using US employer-employee data. Exploiting transitory fluctuations in hiring conditions at the parent's employer, he finds that working for a parent's employer substantially increases a child's initial earnings. Here, individuals with higher-earning parents are both more likely to work for a parent's employer and experience larger earnings gains when doing so. Consequently, intergenerational earnings mobility would be higher if no one found jobs through these connections.

But others have found somewhat contrasting results. In a recent paper, San (2022) documents that connections with parents' previous co-workers ("weak" connections) positively impact job finding and wages. While impacts on intergenerational mobility are not explicitly analyzed, the implications for (between-group) inequality are somewhat surprising. Disadvantaged groups indeed tend to be connected to lower-paying firms, but hiring through social connections nevertheless *reduces* between-group inequality since the disadvantaged group in this setting exploits such hiring more intensively. In fact, this partly aligns with Kramarz and Skans (2014), who find a socio-economic gradient for "strong" connections but not for "weak" indirect ties.

The impacts of parental networks on early labor-market outcomes could arise for different reasons, including favoritism in hiring and promotions ("nepotism"), through information mechanisms, or through an employer-side monitoring motive. These are hard to distinguish, though there is compelling evidence that the information channel is an important driver of network-based hiring in general (Kramarz and Skans 2014, Hensvik and Skans 2016). Moreover, the relevance of these explanations might differ along the income distribution; for example, the information channel (a la Montgomery (1991); Altonji and Pierret (2001)) is likely to matter more for high-income families who are more likely to belong to high-quality networks.

5.3 Other Labor-Market Mechanisms

SES gaps that arise or magnify after the human-capital investment phase and on the labor market could also stem from mechanisms other than family networks and connections to employers. While the evidence on parental networks might be the most developed, factors such as risk, access to family wealth, and credit constraints could also impact employer sorting, as well as career trajectories more generally. Compensating differentials might also matter for differences in employer sorting and career choices. More research on such alternative explanations is certainly needed.

However, related strands of the literature provide complementary perspectives using other types of data. For example, several descriptive or (structural) model-based studies

explore the role of occupational choice. Haeck and Laliberté (2025) combine Canadian census with administrative tax data to investigate the role of occupations for income mobility. While they find substantial persistence in occupational choices, especially in low-income families, such occupational following has a fairly limited overall influence, explaining around 10 percent of the persistence in earnings. However, it is notoriously difficult to sharply distinguish occupational from educational choices.

More structural studies examine the sources to and aggregate consequences of occupational following. Lo Bello and Morchio (2022) distinguish three channels of occupational persistence – parental networks, preferences, and comparative advantage – and calibrate their model using UK data. While networks is identified as the most important source of occupational persistence, only the comparative-advantage channel would have beneficial allocative and welfare consequences. In a related study, Almgren et al. (2025) use direct data on talent proxies, finding that reduced occupational following would improve skill-based job matching and increase intergenerational income mobility without reducing output.

Employers and occupations are only observed for the employed. In follow-up work on UK data, Lo Bello and Morchio (2025) study how the correlation of employment across generations affects the persistence of earnings. While children of employed fathers have higher employment and substantially higher job-finding rates themselves, this can only account for up to 9 percent of the intergenerational persistence of earnings. However, Dobbin and Zohar (2025) provide a slightly different picture, finding that the labor-force participation margin could explain as much as 25 percent of the IGE in their Israeli data.[22] Moreover, when examining women's income mobility—particularly in the case of mothers—it is essential to account for participation margins and the intergenerational transmission of labor supply (Altonji and Dunn 2000, Brandén et al. 2025).

Other studies have considered the impact of various macro-structrual changes on intergenerational mobility. An interesting example is Butikofer et al. (2018), who study the mobility impacts of the Norwegian oil boom in the 1970s, which effectively boosted the relative demand for low- and middle-skilled workers in affected regions. The shock resulted in a lasting positive impact on intergenerational income mobility, mainly by suppressing the returns to higher education. Others have estimated the impacts of technological change. For example, Arntz et al. (2025) find that the introduction of computer technologies in Germany in the 1990s had an equalizing effect on labor market opportunities by increasing the returns to skills *relative to* the returns to parental background. The results align with both the theoretical predictions that in times of technological change,

[22]As they note, this could be due to the fact that non-employment (or employment in the informal sector) is strongly segregated by class and demographics in Isreal, concentrated mainly to ultra-orthodox jews and Israeli arabs.

the returns to parental background decrease relative to the returns to individual skills (Galor and Tsiddon 1997, Hassler and Mora 2000), and that more innovative regions tend to have higher levels of social mobility (Aghion et al. 2019).[23]

6 Summing up and Challenges for Future Research

The evidence reviewed in this chapter underscores that intergenerational persistence in income and education reflects a web of reinforcing mechanisms rather than a single determinant, such as the amount of educational investments. While parental resources and investments matter, their explanatory power is limited once other dimensions of the parental environment are considered. Instead, the timing and form of early investments, parenting practices, neighborhood environments, and institutional features of education systems emerge as critical drivers of persistence. Moreover, labor-market mechanisms—including sorting, networks, and firm heterogeneity—have increasingly been recognized as central to the intergenerational transmission of advantage.

Yet major research challenges remain, including understanding the mechanisms driving the role of neighborhoods, the transition from adolescence to early adulthood, and the labor market. Compared to the now well-documented role of early-life investments and education policies, the evidence on how labor markets shape mobility remains particularly fragmentary. We have only a partial understanding of how workers of different backgrounds sort across jobs and employers, how parental networks influence hiring and promotion, or how occupational structures and wage-setting institutions contribute to persistence. Further, this evidence is mostly drawn from a small set of countries. Evidence on the extent to which labor markets amplify or dampen intergenerational persistence—conditional on human capital—remains limited, and with only a few exceptions, we lack causal evidence that connects specific labor-market mechanisms and institutions to long-run intergenerational outcomes.

Beyond the labor market, two additional gaps deserve attention. First, while recent work highlights important nonlinearities in mobility—especially at the top and bottom of the socioeconomic distribution—the mechanisms underlying these patterns are not fully understood. Second, despite the growing use of administrative data, most evidence on the drivers of intergenerational transmission comes from a handful of high-income countries, limiting external validity.

Advancing this research frontier requires both methodological and data innovations. Linking intergenerational datasets with employer–employee matched records as well as

[23]However, somewhat constrasting, Heyman and Olsson (2023) find that *parental* exposure to automation technologies (robots) is associated with worse labor market and educational outcomes of their children and reduce income mobility. Note also that the mobility impacts of structural changes might differ dramatically for directly affected and subsequent generations (Nybom and Stuhler 2024).

combining survey data and experiments, offers new possibilities for studying a host of different transmission channels, both within the pre-market and the labor-market spheres. Moreover, the literature remains dominated by well-designed yet reduced-form empirical studies. In the future, more research combining causal research designs with structural models can help quantify the relative importance of various pre-market and labor-market drivers.

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Appendix

A Background Facts, Additional Material

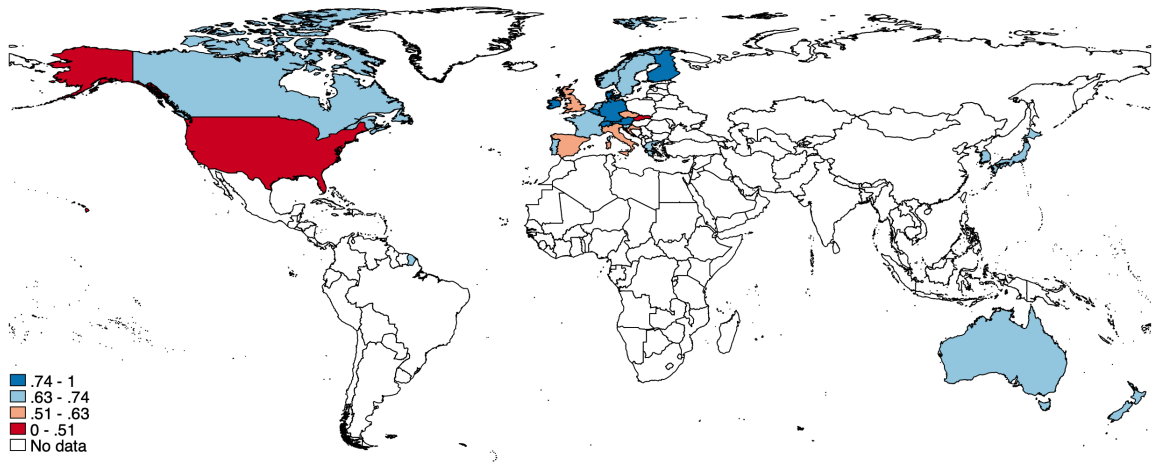

Figure A1: Intergenerational income mobility, high-income countries

Rank	Country	$1 - IGE$	Rank	Country	$1 - IGE$
1	Finland	.88	16	Japan	.66
2	Denmark	.85	17	Cyprus	.65
3	Belgium	.81	18	Norway	.65
4	Germany	.76	19	Australia	.65
5	Austria	.75	20	South Korea	.64
6	Switzerland	.74	21	France	.64
7	Ireland	.74	22	Luxembourg	.62
8	Singapore	.74	23	Spain	.57
9	Sweden	.73	24	Czech Republic	.56
10	Portugal	.71	25	Croatia	.55
11	New Zealand	.71	26	United Kingdom	.52
12	Netherlands	.69	27	Italy	.51
13	Slovenia	.68	28	United States	.46
14	Greece	.68	29	Slovakia	.40
15	Canada	.68			

Note: Estimates of the intergenerational income elasticity (IGE) from the Global Database of Intergenerational Mobility. Restricted to high-income countries according to the World Bank's categorization. Estimates are retrieved with an aim to use comparable methods and data across countries, and occassionally differ from more state-of-the-art country-specific studies.

Table A1: Income Mobility Ranking, High-Income Countries

Pairwise correlations:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Weighted by pop. size											
(1) Income mobility $(1 - IGE)$	1.00										
(2) Gov. edu. exp. (% of GDP)	0.24	1.00									
(3) Pre-primary edu. exp. (%GDP)	0.07	0.52***	1.00								
(4) Pupil-teacher ratio (primary ed.)	-0.07	-0.48***	-0.55***	1.00							
(5) Gov. tertiary edu. exp. (%GDP)	0.35*	0.89***	0.43**	-0.54***	1.00						
(6) PISA reading score, P50/P10	-0.09	0.05	0.47**	-0.49***	0.03	1.00					
(7) PISA reading score, P90/P50	-0.32*	0.11	0.44**	-0.55***	0.10	0.93***	1.00				
(8) Log health expenditures (PPP)	-0.17	0.45**	0.10	-0.47**	0.50***	0.23	0.34*	1.00			
(9) Gov. health exp. (%GDP)	-0.02	0.43**	0.41**	-0.48***	0.36*	0.33*	0.38**	0.55***	1.00		
(10) Hospital beds per 1000	0.29	-0.46**	-0.33*	0.34*	-0.47**	0.03	-0.18	-0.24	0.10	1.00	
(11) Life expectancy at birth	0.35*	-0.13	-0.18	-0.03	-0.13	-0.05	-0.22	-0.00	0.06	0.34*	1.00
Panel A: Unweighted											
(1) Income mobility $(1 - IGE)$	1.00										
(2) Gov. edu. exp. (% of GDP)	0.46**	1.00									
(3) Pre-primary edu. exp. (%GDP)	0.10	0.40**	1.00								
(4) Pupil-teacher ratio (primary ed.)	-0.20	-0.48***	-0.58***	1.00							
(5) Gov. tertiary edu. exp. (%GDP)	0.57***	0.90***	0.43**	-0.55***	1.00						
(6) PISA reading score, P50/P10	-0.20	-0.09	0.29	-0.34*	-0.09	1.00					
(7) PISA reading score, P90/P50	-0.36*	-0.09	0.28	-0.37**	-0.09	0.96***	1.00				
(8) Log health expenditures (PPP)	0.26	0.40**	0.09	-0.52***	0.53***	0.01	0.02	1.00			
(9) Gov. health exp. (%GDP)	0.10	0.50***	0.39**	-0.45**	0.40**	-0.08	-0.02	0.46**	1.00		
(10) Hospital beds per 1000	0.04	-0.33*	-0.18	0.22	-0.38**	0.04	-0.07	-0.11	0.13	1.00	
(11) Life expectancy at birth	0.37*	0.08	-0.20	-0.15	0.14	-0.07	-0.17	0.50***	0.07	0.02	1.00

*Notes: *** p¡0.01, ** p¡0.05, * p¡0.1*

Table A2: Correlations between the IGE and education and health variables

B Proof of Result 1

We have a standard recursive program, a contraction.

$$V(Y,A,H) = \max_{X,C}\left\{\ln C + \frac{1}{1+\delta}E\left[V(Y',A',H')|X,Y,A,H\right]\right\} \tag{A1}$$

$$s.t. \qquad Y = C + X \tag{A2}$$

$$H' = (A')^{\tau} \times X^{\alpha} \times H^{\beta} \times Y^{\zeta} \times e^{\epsilon} \tag{A3}$$

$$Y' = (H')^{\times}\left(\frac{Y}{\bar{Y}}\right)^{\gamma} \times e^{v}; \tag{A4}$$

$$\ln A' = \rho \ln A + u \tag{A5}$$

We guess and verify that the optimal policy is to invest a fixed proportion of income, and the value function is log-linear on the three state variables.

$$X = \lambda Y \tag{A6}$$

$$V(A,H,Y) = C_0 + C_y y + C_a a + C_h h \tag{A7}$$

taking logs on A3 and A4, substituting into the guess and taking expectations, after some manipulations yields:

$$\begin{aligned}
&E\left[V(Y',A',H')|Y,A,H\right] \\
&= C_0 + C_y\big(\gamma\bar{y} + \bar{v}\big) + \big(C_y\tau + C_a + C_h\tau\big)\bar{u} + \big(C_y + C_h\big)\bar{\epsilon} \\
&+ \big(C_y + C_h\big)\alpha\ln(X) \\
&+ \big(C_y\tau + C_a + C_h\tau\big)\rho a \\
&+ \big(C_y + C_h\big)\beta h \\
&+ \big(C_y[\zeta+\gamma] + C_h\zeta\big)y
\end{aligned}$$

Under our guess of $V(.)$, the Euler equation is:

$$\frac{1}{Y-X} = \frac{1}{1+\delta}\big(C_y + C_h\big)\alpha\frac{1}{X} \tag{A8}$$

$$X = \frac{\alpha\big(C_y + C_h\big)}{1+\delta+\alpha\big(C_y + C_h\big)}Y \tag{A9}$$

This is, investment is a constant percentage of income:

$$\lambda = \frac{\alpha\big(C_y + C_h\big)}{1+\delta+\alpha\big(C_y + C_h\big)}$$

and

$$\ln C = \ln(1-\lambda) + y \tag{A10}$$

$$\ln X = \ln \lambda + y \tag{A11}$$

Our guess is correct iff:

$$C_0 + C_y y + C_a a + C_h h = \ln C + \frac{1}{1+\delta} E\left[V(Y', A', H')|Y, A, H\right] \tag{A12}$$

which afer after substituting $EV(Y', A', H'|X, A, H, Y)$, and some some manipulation becomes:

$$C_0 + C_y y + C_a a + C_h h \tag{A13}$$

$$= \ln(1-\lambda) + \frac{C_0 + C_y\big(\bar{v} - \gamma\bar{y}\big) + \big(C_y + C_h\big)\bar{\epsilon} + \big(C_y\tau + C_a + C_h\tau\big)\bar{u}}{1+\delta} \tag{A14}$$

$$+ \frac{1}{1+\delta}\left\{\big(C_y + C_h\big)\alpha\right\}\ln\lambda \tag{A15}$$

$$+ \frac{1}{1+\delta}\left\{\big(C_y\tau + C_a + C_h\tau\big)\rho\right\} a \tag{A16}$$

$$+ \frac{1}{1+\delta}\left\{\big(C_y + C_h\big)\beta\right\} h \tag{A17}$$

$$+ \left[1 + \frac{1}{1+\delta}\left\{C_y(\alpha+\zeta+\gamma) + C_h(\alpha+\zeta)\right\}\right] y \tag{A18}$$

Thus, the guess is correct for the values of C_0, C_a, C_h, C_y such that:

$$\begin{aligned}
C_0 &= \ln(1-\lambda) + \frac{\big(C_y + C_h\big)\alpha}{1+\delta}\ln\lambda \\
&\quad + \frac{C_0 + C_y\big(\bar{v} - \gamma\bar{y}\big) + \big(C_y + C_h\big)g + \big(C_y\tau + C_a + C_h\tau\big)\bar{u}}{1+\delta} \\
C_a &= \frac{\big(C_y\tau + C_a + C_h\tau\big)\rho}{1+\delta} \\
C_h &= \frac{\big(C_y + C_h\big)\beta}{1+\delta} \\
C_y &= 1 + \frac{C_y[(\alpha+\zeta)+\gamma] + C_h(\alpha+\zeta)}{1+\delta} \\
\textit{with} \qquad \lambda &= \frac{\alpha\big(C_y + C_h\big)}{1+\delta+\alpha\big(C_y + C_h\big)}
\end{aligned}$$

Which is a system of linear equations that, while cumbersome, can be easily solved by noticing that C_y and C_h are solved independently:

$$C_h = C_y \frac{\beta}{1+\delta} + C_h \frac{\beta}{1+\delta} \tag{A19}$$

$$C_y = 1 + C_y \frac{(\alpha+\zeta)+\gamma}{1+\delta} + C_h \frac{\alpha+\zeta}{1+\delta} \tag{A20}$$

implying:

$$C_y = \frac{1+\delta}{1+\delta-(\alpha+\zeta)\frac{1+\delta}{1+\delta-\beta}-\gamma} \tag{A21}$$

$$C_h = \frac{\beta}{1+\delta-\beta}\frac{1+\delta}{1+\delta-(\alpha+\zeta)\frac{1+\delta}{1+\delta-\beta}-\gamma} \tag{A22}$$

and

$$\lambda = \frac{\alpha}{1+\delta-\beta-\left(1-\frac{\beta}{1+\delta}\right)\gamma-\zeta} \tag{A23}$$

From which it is immediate to obtain C_a and then C_0.

The dynamics of the system follow from substituting $X = \lambda Y$ in equations A3 and A4.

Q.E.D.