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ECONOMIC MOBILITY MEMO 1: DEFINITIONS AND TRENDS

This memo is the first in a series of three memos on economic mobility produced by the Institute for Research on Poverty. It discusses definitions of economic mobility and U.S. trends for several metrics. The second memo describes the research that focuses on mobility over an individual's prime working years (intragenerational mobility) and the third memo discusses the research findings from studies of mobility across generations (intergenerational mobility).

Introduction

Social service programs frequently aim to help their participants achieve upward economic mobility. However, economic mobility is defined in a variety of ways. Mobility can occur over the course of an individual's working life (intragenerational), or across generations (intergenerational). Further, mobility can be measured in absolute or relative terms. Though related, each of these mobility definitions measure a different phenomenon, and different approaches to measurement are best suited to answering different types of questions about economic well-being.

Glossary of Terms

Absolute mobility refers to any economic changes (often increases or decreases in income) at the individual or household level, adjusted for inflation.

Relative mobility refers to how individuals or households move their position along an economic distribution.

Intragenerational mobility describes changes in economic status over the course of an adult's working life (ages 25 to 64), i.e., within a generation.

Intergenerational mobility compares an adult child's economic status to that of her or his parents, typically at or near the same age, i.e., across generations.

Key Mobility-Trend Takeaways

- Most steadily employed adults experience absolute upward mobility over their prime working years, as earnings and income typically increase with age. Although absolute earnings mobility has slowed for men in recent years, the rates of absolute intragenerational mobility for families have stayed stable as women entered the labor force in greater numbers, thereby compensating for men's slowed absolute earnings mobility.
- An individual's position in the income distribution generally does not change from year to year, but can fluctuate over their working lives. Relative family income mobility among working-age married couples declined between 1969 and 2006, particularly in the 1980s.
- Most children experience absolute upward intergenerational mobility by having higher incomes as adults than their parents, but these rates of mobility have declined in the United States over time.
- Rates of absolute intergenerational mobility are typically higher than rates of relative intergenerational mobility. Because the United States has historically experienced positive economic growth, most children earn more than their parents as adults, even after accounting for inflation. However, given that this is true for most children within a cohort, each child's relative position in the income distribution as an adult is often quite similar to that of their parents.
- Children born to parents at the top and bottom of the distribution are especially likely to remain in similar positions as adults. Rates of relative mobility have stayed stable over time.
- African Americans and Hispanic Americans tend to experience lower rates of upward mobility than non-Hispanic whites. Individuals with less education also experience lower rates of upward mobility compared to those with more years of schooling. Both are true within and across generations, and in absolute and relative terms.

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Conceptualizing Mobility

The research literature uses a wide range of terms to discuss mobility.[1] However, for conceptual simplicity this memo organizes its discussion of economic mobility by relative and absolute mobility within and across generations. The distinction between relative and absolute mobility is more prevalent in intergenerational mobility research; intragenerational mobility research often focuses on life-cycle effects on earnings and the payoff to human capital investments.

The discussion of trends in this memo is primarily focused on *upward* mobility, but it is important to understand that upward relative mobility is only possible with corresponding downward mobility within the total population. Relative mobility operates within a zero-sum structure—for one person to move up the relative economic ladder, another person must move down.

Not all measures of mobility move in concert. Absolute upward mobility is often described as "rising tides lift all boats." General economic growth can mean that everyone earns more over time, and if that growth is equally distributed across the population, all people would experience absolute upward mobility without changing their relative position. This is illustrated in Figure 1. Person A's salary increased in absolute terms from Time Period 1 to Time Period 2, but because the income distribution also changed, she remained in the same quintile.

Figure 1. Example of a person experiencing upward absolute mobility without a change in relative mobility.

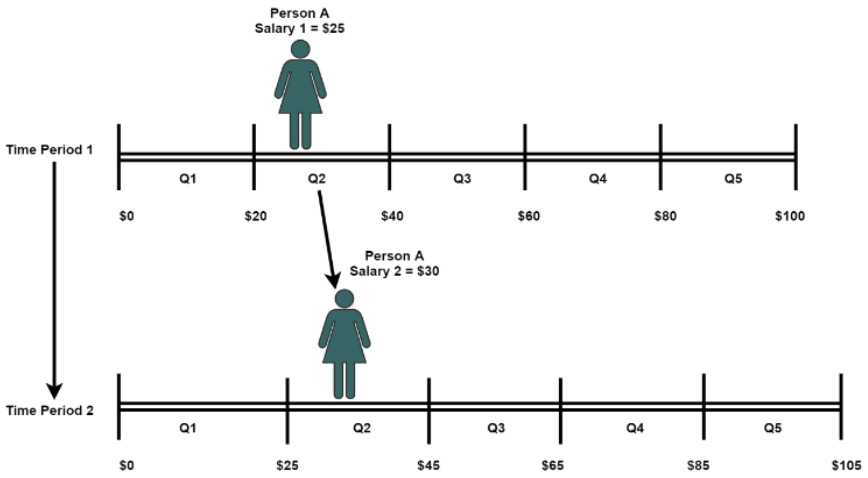
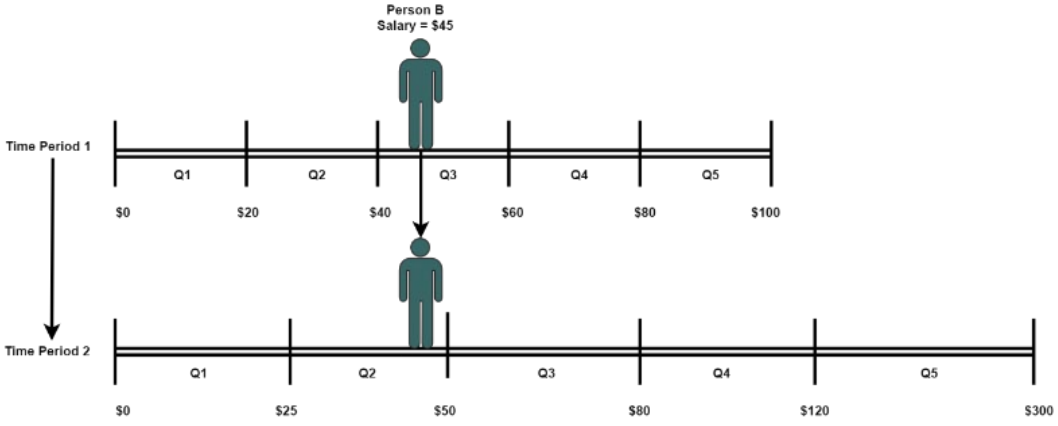


Figure 2. Example of a person experiencing downward relative mobility without a change in absolute mobility.



It is also possible to stay at the same income level but experience downward relative mobility as distributional thresholds change (Auten & Gee, 2009). Figure 2 shows how Person B, with the same salary in both time periods, falls in different income quintiles over time. As the income distribution changes, so do the income quintiles.

[1]See Measuring Mobility section for discussion of potential mobility measures.

Measuring Mobility

Conflicting research on observed trends within mobility categories often stems from measurement differences. How and when mobility is measured, as well as who the sample includes, all have implications for observed results. Each approach to measurement has its strengths and weaknesses. These are summarized in Table 1 below. For greater clarity on which studies use which measures, see Appendix A.

Table 1. Mobility Measurement Influences Our Understanding of Mobility Trends

Measurement category	Measurement options	Implications
Intergenerational mobility measurement	Rank-rank mobility vs. intergenerational elasticity	**Rank-rank mobility** metrics compare the relative positions of parents to their adult children at similar points in the life cycle (Venator & Reeves, 2015). The "rank" (position) of the parent is compared to the rank of the adult child at a time deemed to be equivalent. This allows researchers to make claims about changes in mobility at different points in the distribution, and in different directions (Bhattacharya & Mazumder, 2011; Corak, Lindquist, & Mazumder, 2014; Winship, 2017). Much intergenerational mobility research—particularly international comparisons—measures mobility using persistence, or **intergenerational earnings elasticity (IGE).** IGE could also be understood as the rate of regression to mean income. IGE measures the extent to which economic differences between families persists across generations (Aaronson & Mazumder, 2008). It estimates the percentage of a child's income (as an adult) attributable to their family income during childhood. IGE does not, however, allow for differentiation between upward and downward mobility (Mazumder, 2015). IGE is typically considered a relative mobility metric (Chetty, Hendren, Kline, Saez, & Turner, 2014), but some argue it better describes absolute mobility (Winship, 2017). Some research also uses **intergenerational correlation (IGC)**, which measures positional mobility, i.e., the likelihood of moving positions in the income distribution relative to parental position at the same age. IGC and IGE patterns do not always align (Aaronson & Mazumder, 2008). IGC is similar to rank-rank mobility. IGC measures the correlation of parent and child incomes, whereas rank-rank mobility measures the correlation of parent and child income percentile ranks (Chetty et al. 2014). Some of the literature uses IGC and rank-rank mobility interchangeably (Mazumder, 2015).
Mobility indicator	Income, earnings, wealth, occupational status	Most studies measure economic mobility using **income** or **earnings**. In the mobility literature, researchers generally use the term "income" to refer to family or household income; and "earnings" to refer to individual earnings/income. The literature is inconsistent about the forms of income included in each (see Relevant Income below). See Appendix A for more detail on the measure used in each cited study. Although measures of **wealth** may be of interest, those data are rarely available (Winship, 2017) and the few studies that include wealth elasticity have findings similar to income elasticity (Killewald, Pfeffer, & Schachner, 2017). Most wealth mobility research uses the Panel Survey of Income Dynamics (PSID), which began asking about wealth only in 1984. Sociological research historically measured intergenerational mobility with **occupational categories** that correspond to differing levels of education and income. Large datasets with individual income data are only available for recent decades; historically, occupation data was much easier to obtain (Torche, 2013). Occupational rankings, however, are more subjective than income, and thus, changes in occupational mobility are harder to interpret (Winship, 2017).
Unit of measurement	Household or family vs. individual	Some research compares income at the **individual** level, while other studies look at the **household or family** income, as larger households and families benefit from economies of scale with respect to living costs (Levine, 2012; Rose, 2018) and pool income among earners. Trends in mobility vary depending on the unit of measurement, so both are valuable to consider.
Type of data	Individual vs. aggregate data	While most mobility studies compare **matched parent-child samples**, some rely in part on **aggregate** data. For example, Aaronson and Mazumder (2008) estimate intergenerational elasticity by comparing an adult son's earnings to an estimate of his parents' household earnings, derived from aggregate state and year specific census data.

Measurement category	Measurement options	Implications
Relevant income	Taxable income; pre-tax income; disposable cash income; unrealized capital assets and noncash transfers	Income distribution position and mobility estimates can vary depending on which type of income is measured. **Taxable income** (derivable from federal tax data) includes all income reported on tax returns and includes capital income but does not include some public benefit cash transfers, such as Social Security and unemployment compensation. **Pre-tax income** (derivable from the Census's Current Population Survey), alternatively, includes cash transfers but does not include capital gains. **Disposable household money income** adds cash transfers and adjusts for taxes and household size (Levine, 2012). Marginal tax rates and tax credits can have large effects on disposable income at the top and bottom of the distribution, respectively. For this reason, mobility estimates that exclude taxes may misrepresent people's economic realities. None of these measures reflect **unrealized capital assets**, such as home purchases, nor do they reflect **noncash transfers**, such as Supplemental Nutrition Assistance Program benefits and housing subsidies.
Age and timing of sample	Point-in-time vs. average income	Many people do not experience linear income growth throughout their adult life, which can make it challenging to determine the appropriate points of comparison to provide a meaningful measure of mobility. About 10 percent of U.S. households shift income quintiles every year due to life cycle effects (Larrimore, Mortenson, & Splinter, 2015) and income may look very different before and after having a child, particularly for women who are more likely to temporarily leave the labor force. The common solution is to measure income near **age 40**, when transitory fluctuations are less common and earnings trajectories are typically well established (Torche, 2013). For intergenerational comparisons, Mazumder and Acosta (2015) recommend using **10-year averages** centered at age 42.
Demographics of the sampled population	Include only native-born individuals, working adults, or men	A fair amount of mobility research examines mobility among only **native-born** U.S. citizens and does not disaggregate mobility trends by race. The research that does disaggregate generally only examines **blacks and whites** due to sample size limitations for other racial and ethnic groups. Mobility research frequently excludes Asian Americans and American Indians/Alaskan Natives due to small sample sizes, particularly in the PSID. Trends for Hispanic, Asian, and Native Americans are discussed where available. Several studies exclude households making **very low, zero, or negative income**, particularly studies that use tax data, as people with extremely low and zero income who file tax returns are not considered representative of the zero income population, and people who report negative income typically experienced large capital losses, which typically signifies wealth (Chetty et al., 2014). Winship (2011), for example, excludes the bottom (and top) 2% of income observations from his analysis. However, excluding these individuals from analysis can bias results and overstate rates of mobility (Dynan, Elmendorf, & Sichel, 2012; Chetty et al., 2014; Mazumder, 2015). Finally, individual intergenerational earnings mobility estimates typically compare men, specifically **fathers to sons**, excluding women from analysis, as well as sons from single-mother households, which can bias estimates (Corak et al., 2014). While these studies may not generalize to women or to children from single-mother families, other research suggests that men and women experience similar rates of household intergenerational mobility, but that women's household mobility is more often attributable to their spouse or partner's earning mobility, whereas men's mobility is generally due to their own earnings (Chadwick & Solon, 2002). Further, increases in women's labor force participation over time complicate trends both at the individual level and at the household level.

Intragenerational Mobility Research and Trends

Much of the literature on income mobility over the adult working life focuses on changes across workers' earnings over the life course and under certain macroeconomic conditions, such as the Great Recession.

Absolute Intragenerational Mobility

Researchers have given less attention to intragenerational mobility than to intergenerational mobility. Most individuals start their working lives with low wages while they invest in schooling and work experiences and then increase their earnings over their working lives. Additionally, income at any given point in time is sensitive to temporary fluctuations, such as childbirth or loss of a job. As a result, it is hard to know when to measure income or earnings in a way that captures real changes in long-run economic status. It is also challenging to identify the appropriate comparison group. Should individuals be compared only to themselves to determine

upward mobility, or to all other workers, or to a similar age cohort of workers? Given life-cycle patterns of earnings, each of these differing comparisons would yield a different estimate of upward mobility. Another limitation of this research is that there are only a few high-quality data sources that enable researchers to measure income across the entire life course. Appendix A outlines the data sources commonly used in this field.

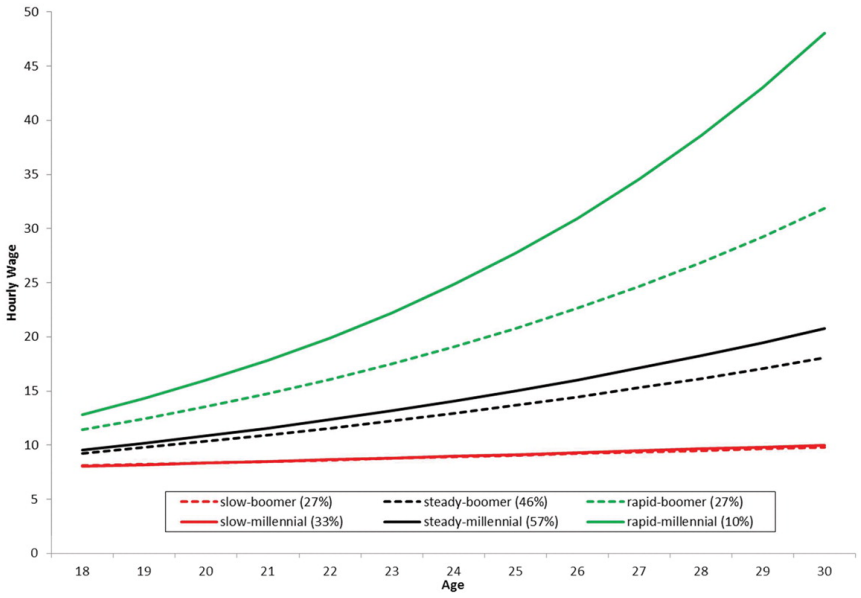
Available research focuses on wage growth either over the entire life course or when looking at a shorter time period over at least a decade. The studies in this area examine these decade-long earnings trajectories to evaluate two questions: (1) Which households are upwardly mobile? and (2) How has this mobility changed over time? The studies in this section find that earnings have a general upward trend over the life course, though this trend has faded in recent decades. There are differences in wage growth by race and education (though these differences are not widely studied).

Most steadily employed adults experience absolute upward income and earnings mobility over their prime working years (ages 25 to 64) as they gain work skills and experience, but see small changes from year to year. In order to observe significant earnings growth, researchers therefore must examine longer periods of time. In the 10-year period ending in 2004, 45 percent of households experienced an income gain of at least 25 percent (Rose & Winship, 2009). Yet, in any given year, most workers experience small changes in earnings (Guvenen, Karahan, Ozkan, & Song, 2015). For example, U.S. economic growth from 2009 to 2012 did not translate into major income growth for most U.S. households. Less than a quarter of households increased their income by 25 percent or more in that period (Hisnanick, Giefer, & Williams, 2017).

Trends over Time

Male workers in recent years may be less likely to experience upward absolute earnings mobility over their careers than in years past due to labor market changes. As seen in Figure 3, when examining two cohorts of men entering the labor force, Maume and Wilson (2015) find that men entering the labor force in the 2000s in lower-earning trajectories ("slow-millennials") saw growth similar to those who entered the labor force in the 1980s ("slow-boomers"), while wages grew faster for men in higher-earning trajectories ("rapid-millennials" vs. "rapid-boomers"). However, "slow" and "steady" trajectory men made up a greater percent of the male workforce in the millennial cohort (33% and 57%, respectively) than in the boomer cohort (27% for slow boomers and 46% for steady boomers), suggesting that men were more likely to experience slower wage growth in the 2000s than in the 1980s.

Figure 3: Wage growth was more unequally distributed for men entering the labor force in the 2000s ("millennials") than men entering the labor force in the 1980s ("boomers").



Source: Maume & Wilson, 2015.

In contrast, research indicates that absolute family income mobility has stayed stable over time (Acs & Zimmerman, 2008). This is likely attributable to upward trends in women's earnings and workforce participation and earnings.

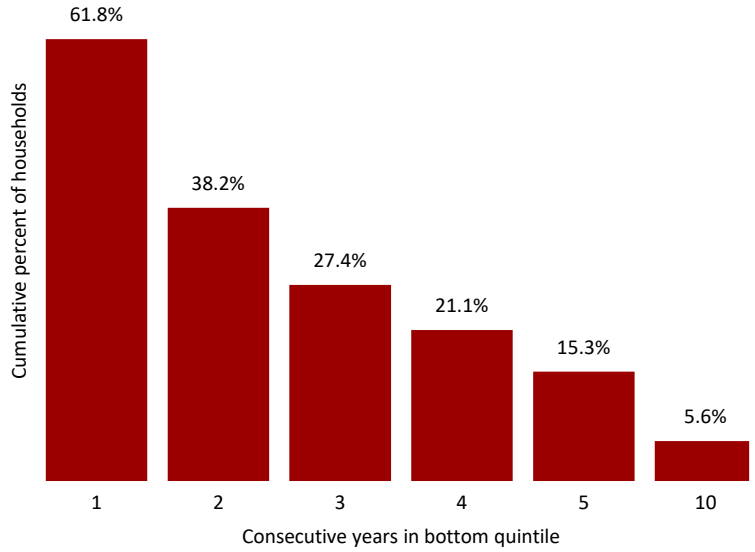
Variation by Race, Gender, and Education

Measuring absolute intragenerational mobility, Maume and Wilson (2015) found that African American men were more likely than Hispanic and non-Hispanic white men to experience lower wage trajectories in both the 1980s and the 2000s, while Hispanic men and non-Hispanic white men experienced similar wage trajectories in both periods. Further, men who completed college by age 24 and had college-educated parents were more likely to have higher wage trajectories than those who did not. Studies regarding absolute intragenerational mobility mainly include only men or household income; as a result, not much is known about women's absolute mobility.

Relative Intragenerational Mobility

Over the life course, household income can fluctuate as families experience temporary setbacks, such as job losses, and household composition changes, such as marriages or divorces. About 70 percent of households reach the top quintile of income for at least one of the years in which they are working (Hirschl & Rank, 2015) and almost 62 percent of households experience poverty (taxable income in the bottom quintile) for at least one year (Rank & Hirschl, 2015; Figure 4). However, these changes often reflect temporary fluctuations, as most households do not spend more than one or two consecutive years in the bottom quintile.

Figure 4: Most Americans spend at least one year in the bottom income quintile, but few spend more than a few consecutive years in that quintile.



Source: Rank & Hirschl, 2015.

Generally, individuals do not typically change their relative position in the income distribution over the short term. Hisnanick and colleagues (2017) found that in the three-year period between 2009 and 2012, over 70 percent of households in the top quintile and 70 percent of households in the bottom quintile remained in those quintiles for all three years. Over half of the households in each of the middle quintiles remained in their original quintile.

Trends over Time

Most research suggests that rates of intragenerational relative mobility declined from the 1970s to the 1980s, but some of the literature suggests mobility was stable after that point, while other studies indicate a continued decline, depending on the economic variable being measured. Carr and Wiemers (2016) found that the likelihood of moving to the top quintile of earners in 15 years for workers who started in the middle quintile in 1981 and 1993 declined by 20 percent over the period. Díaz-Giménez, Glover, & Ríos-Rull (2011) similarly observe greater earnings mobility from 1989 to 1994 than from 2000 to 2006. However, looking at family income rather than earnings, Bradbury (2011) finds that relative mobility among working-age married couples has stayed largely stable since a decline from 1969 to the 1980s.

Variation by Race, Gender, and Education

Non-Hispanic whites are advantaged compared with other racial and ethnic groups in terms of relative intragenerational mobility. White households are more likely to remain in a higher income quintile and less likely to remain in a lower income quintile than other racial groups; they are also the most likely to move up two or more quintiles (Hisnanick et al., 2017). Black families in particular experience less upward and more downward mobility than white families, both on average and among those families that start in or near the bottom of the income distribution (Bradbury & Katz, 2009). Comparing those who start their careers in low-wage positions, nonwhite and female workers are more likely to continue earning low wages over their careers than white and male workers, respectively (Campbell, 2012; Schultz, 2019). College-educated workers are more likely to experience upward mobility, but this relationship has grown weaker since the early 1980s (Carr & Wiemers, 2016).

Intergenerational Mobility Research and Trends

Historically, most of the research on intergenerational mobility used intergenerational elasticity (IGE), which estimates the percentage of a child's income (as an adult) attributable to their family income during childhood (Mazumder, 2015).[2] More recently, new measures of intergenerational mobility have been used that provide a more nuanced description of the extent to which advantage and disadvantage are passed down through generations. For the discussion on relative intergenerational mobility, this memo primarily uses rank-rank mobility measures.[3] This more recent measure of intergenerational mobility allows researchers to make claims about changes in mobility at different points in the distribution and in different directions.

Absolute Intergenerational Mobility

While the literature on absolute intergenerational mobility is small compared to that on relative intergenerational mobility (Chetty et al., 2016), we know that, as of the early 2000s, most adult workers in their 30s and 40s had higher inflation-adjusted household incomes than their parents at the same age (Isaacs, Sawhill, & Haskins, 2008; Lopoo & DeLeire, 2012). Parental income plays a substantial role in their children's income as adults, although how much of a role depends on the child's gender and their choice of partner (Chadwick & Solon, 2002). Absolute mobility is typically negatively correlated with family income during childhood because the more a parent earns, the harder it is for the adult child to earn more than them (Acs, Elliott, & Kalish, 2016). Therefore, the lower a parent's income, the more likely it is that the child will be able to earn more than them as an adult.

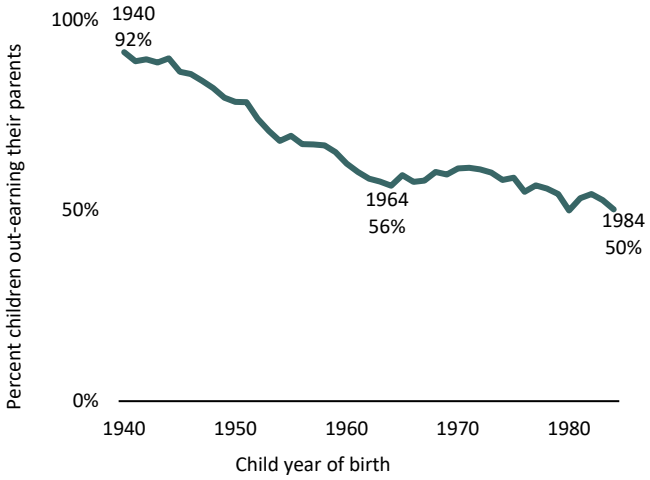
[2]See Measuring Mobility section for more on intergenerational elasticity (IGE) and how it differs from the rank-rank correlations discussed in this memo.

[3]Estimation approaches vary. See Appendix A for more information on how the cited studies calculate rank-rank mobility.

Trends over Time

Even though most children still experience absolute upward intergenerational mobility, rates of mobility have declined in the United States over time (Figure 5), especially for middle-class families and those living in industrial Midwestern states. About 90 percent of children born in 1940 earned more than their parents; for children born in the 1980s, that share was only 50 percent (Chetty et al., 2016). Studies suggest that declines in absolute intergenerational mobility are due to the slow wage growth at the bottom of the wage distribution (Danziger, 2019; Rose, 2018).

Figure 5: Americans are less likely to out-earn their parents in recent years than in the past.



Source: Chetty et al., 2016.

Note: Income was measured at age 30. An individual born in 1950 was therefore measured in 1980.

Variation by Race, Gender, and Education

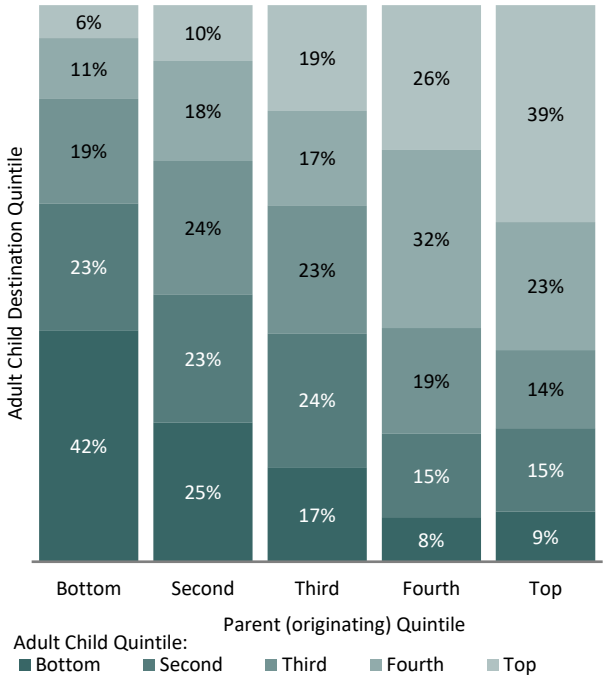
Whites, both Hispanic and non-Hispanic, experience more upward absolute intergenerational mobility than blacks and American Indians/Alaskan Natives (Acs et al., 2016; Chetty, Hendren, Jones, & Porter, 2018). These trends play out geographically as well. Areas with higher shares of black residents experience lower rates of upward mobility (Chetty et al., 2014), and residing in a racially integrated community as a child is positively correlated with absolute upward mobility. However, white boys continue to experience higher rates of upward mobility than black boys, even within the same neighborhoods (Chetty et al., 2018).

College education is also associated with upward mobility. Children with a college education are more likely to out earn their parents as adults than those who did not go to college, at each quintile. While rates of college attendance have increased for all racial and ethnic groups, black and Hispanic Americans still lag behind white and Asian Americans (Isaacs et al., 2008).

Relative Intergenerational Mobility

Rates of relative intergenerational mobility are typically low, especially at the top and bottom of the distribution. For example, as shown in Figure 6, children born to parents whose income is in the bottom quintile have the highest likelihood of staying in the same quintile as an adult (42 percent) compared to other income quintiles. In contrast, these children have only a 6 percent chance of entering the top quintile as an adult. Of the children born to parents in the third

Figure 6: Parental household income position is a strong predictor of adult child income position, especially at the tail ends of the income distribution.



Source: Isaacs et al., 2008.

Note: The figure is organized by the parent's income quintile. The shaded sections of each bar delineate the quintile adult children, who were raised in that quintile, were in as adults. For example, 39% of the children raised in the top quintile were also in the top quintile as adults, while 9% of the children raised in the top quintile were in the bottom quintile as adults. Quintiles may not sum to 100 due to rounding.

quintile, 36 percent move to a higher quintile and 41 percent move to a lower quintile in adulthood.

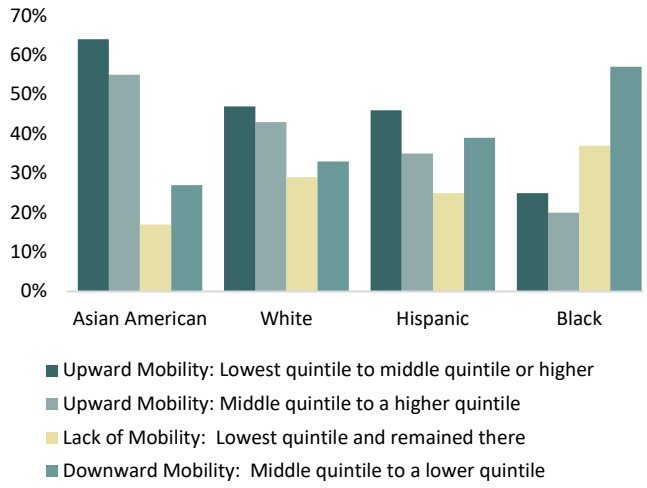
Trends over Time

Although some research finds that relative intergenerational mobility has declined over time (Aaronson & Mazumder, 2008), the most recent and methodologically rigorous studies find that relative mobility has remained stable (Chetty et al., 2014; Hertz, 2009; Lee & Solon, 2009).[4] For example, Chetty et al., 2014, find that about 8 percent of children born into the bottom income quintile in 1971 reached the top quintile in adulthood. That percentage stayed largely the same (9 percent) for children born in 1986.

Variation by Race, Gender, and Education

Rates of upward relative intergenerational mobility vary by race. Asian American adults experience the highest rates of upward intergenerational relative mobility in the United States, white and Hispanic adults have similar levels of upward mobility, and black adults have the lowest upward mobility (Figure 7).

Figure 7: Black Americans experience more downward mobility than other races; other races experience more upward mobility.



Source: Badger et al., 2018, Chetty et al., 2014.

Note: Measures of mobility based on household incomes as adults.

Black adults are the most likely to be born in and remain in the lowest quintile; they also have the highest rates of downward relative mobility. The share of black adults who experience poverty in their 30s is about the same for those who experienced poverty as a child as for those who did not (Acs et al., 2016). Black men face particularly low rates of mobility from the lowest quintile; almost 50 percent of black men born in the lowest quintile did not move up. These differences in mobility seem primarily attributable to differences in wages and employment rates between black and white men rather than factors such as educational attainment, test scores, their parent's marital status, and family wealth (Chetty et al., 2018).

American women in the bottom quintile experience greater upward individual earnings mobility than men. Mother-daughter comparisons of individual mobility, rather than the more standard father-son comparisons, show that 44 percent of the daughters of bottom-quintile mothers enter the middle quintiles as adults, compared to 31 percent of the sons of bottom-quintile fathers (Winship, 2017).

Notably, black and white women demonstrate similar mobility rates when based on *individual* earnings but different mobility rates when based on household income. White women are more likely to marry than black women, which affects household income and increases white women's upward mobility by that measure (Chetty et al., 2018; Winship, 2016).

College education increases the likelihood a child will earn an income in the top quintile. This is true for children born into all income quintiles. Without a college degree, nearly half of children born into a family with an income in the bottom quintile will remain there as adults. With a college degree, these children are equally likely to rise to the top quintile as they are to remain in the bottom. Attaining a college degree makes children raised in the bottom quintile over three times more likely to rise to the top quintile: only 3 percent of non-degree

[4]Chetty et al., 2014, attribute these discrepancies to Aaronson and Mazumder's approach (2008), which uses state of birth Census data as a proxy for parent income. For more information, see Appendix A.

holders from the bottom rise to the top; for degree holders the rate is 10 percent (Isaacs et al., 2008; Lopoo & DeLeire, 2012).

Conclusion

As policymakers seek to address economic mobility, it is important to first define the type of mobility being considered. Patterns of mobility vary substantially within and across generations, in absolute and relative terms, and depending on methods of measurement. Defining mobility more precisely can enable policymakers to better articulate their goals and strategies.

The following two memos provide a high-level overview of programs and policies that may encourage intragenerational and intergenerational mobility, respectively.

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Appendix A

The tables included in this appendix provide key information on the data sources and measures for cited research, as well as a summary of each study's findings and limitations. Some key concepts that appear in the tables are described below for convenience.

Economic Mobility Assessment Tools

- **Intergenerational elasticity** (IGE): measures the relation between family income of parents and the family income of their child. IGE can be interpreted as the percentage of child income attributable to parent income. A lower IGE coefficient indicates that parental income matters less in terms of their child's income as an adult.
- **Intergenerational correlation** (IGC): measures the amount of positional mobility from parent to child. An IGC of 1, for example, means that an adult child occupies the exact same position in the income distribution as their parent.
- **Rank-rank mobility**: measures the association between parents' and adult children's ranks in the percentile distribution of income. A lower coefficient indicates more mobility.

Inflation Adjustors and Other Measurement Tools

- **Consumer Price Index for Urban Consumers** (CPI-U) is the Bureau of Labor Statistics' (BLS) primary measure for inflation adjustment. It measures average changes over time in prices paid by urban consumers, nationally and regionally, for a representative "basket" of goods and services. It is also used to adjust Social Security payments.
- **CPI-U-RS** is the research series of the CPI-U and integrates all historical changes to the CPI-U into its estimates for inflation from 1978–present. Inflation estimates with CPI-U-RS are typically slightly lower than CPI-U before 2000 as most changes to the CPI-U occurred before 2000.The CPI-U and the CPI-U-RS provide similar estimates after 2000.
- **Personal Consumption Expenditures (PCE)** is the Bureau of Economic Analysis's inflation measure. It calculates inflation using a similar method to the CPI, but uses different weights than the CPI to reflect demand elasticity differences between goods. Further, PCE bases its estimates on sales surveys; CPI bases its estimates on purchasing surveys. While PCE includes indirect expenditures, such as employer-provided insurance, the CPI only includes out-of-pocket expenditures. PCE tends to report lower inflation than the CPI. The Federal Reserve uses PCE to estimate inflation.
- **Equivalence-adjusted income** considers the number of people living in the household and how these people share resources and take advantage of economies of scale.

Survey Data

- **SIPP** (Survey of Income and Program Participation) is a multi-stage panel survey of a stratified representative sample of U.S. households. Each year from 1984 to 1993, a new nationally representative panel was introduced. Interviews were conducted in waves with four months in between each interview for panels ranging from two to four years. The SIPP produces monthly data regarding demographic and household characteristics, labor force participation, and income sources for members of sampled households.
- **SIPP GSF** (Gold Standard File) combines earnings data to provide total earnings reported to the IRS for the years 1978 to 2011, including both deferred and non-deferred earnings, self-reported earnings and work hours, as well demographic and human capital information. The earnings data come from the **SER** (Summary Earnings Records) and the **DER** (Detailed Earnings Records), maintained by the Social Security Administration (SSA) and the Internal Revenue Service (IRS).

- **PSID** (Panel Survey of Income Dynamics) is a longitudinal data set with a single panel that began with 4,800 households and their 18,000 members in 1968. PSID provides annual measures of income sources and labor force participation as well as household composition from a representative U.S. sample. The survey was administered annually from 1968 to 1997 and biennially after 1997. The PSID is the United States' longest running longitudinal survey. Prior to 1997, the survey excluded immigrants.
- **NLSY** (National Longitudinal Survey of Youth) is a survey of individuals who were ages 12 to 22 in 1979 (Cohort 1) or 1997 (Cohort 2) on education, employment, income, and household composition. The survey continues to follow these individuals as they age.
- **SPD** (Survey of Program Dynamics) was an annual Census survey that collected information on the range and utilization of state welfare programs along with economic, demographic and family changes of participants. SPD followed respondents annually from 1997 to 2002.
- **CPS ASEC** (Current Population Survey Annual Social and Economic Supplement, also called the March Supplement) is a survey of more than 75,000 households that asks a series of questions about income received in the previous calendar year. Each respondent is in a sample for four months, off for eight, then back on for four. The survey has relatively low attrition, and is administered near tax season, which means that the data are potentially more reliable than other surveys. Many questions have also been consistent since the 1960s. However, the CPS does not include identifiers that allow researchers to link respondents over time. It also samples housing units, not households, meaning the CPS tracks the address, not the people. Households with more residential instability are therefore underrepresented.
- **Cross-National Equivalent File** from Cornell University imputes net taxes across surveys from the United States, United Kingdom, Australia, Korea, Russia, Switzerland, Canada, and Germany. It uses the PSID for U.S. tax data and assumes that all U.S. taxpayers use the standard deduction and all eligible families file for the EITC.

Administrative Data Sources

- **MEF** (Master Earnings File) is the SSA's main earnings data source. It contains earnings and basic demographic information for every person ever issued a U.S. Social Security number. Data comes from W-2 forms, provided by employers since 1978, and reflects wages, salaries, bonuses, and exercised stock options.
- **SOI** (Statistics of Income) **Databank** is an individual-level panel survey of 0.1 percent of all taxpayers born before 2012 and still alive in 1996 from the IRS. It includes Form 1040 (marital status, dependents, Schedule C income), Form W-2 (wage and employer), Form 1099-G (Unemployment Insurance), and the Death Master File (sex and year of birth). Sampling weights show that the SOI sample represents 88 percent of children in each birth cohort, with slightly lower coverage in early cohorts, as children are less likely to get claimed as dependents as they approach 18 and because tax credits for claiming dependents have grown over time.
- **CWHS** (Continuous Work History Sample) is the oldest federal longitudinal sample dataset. The SSA uses it to track Social Security program statistics and workforce data. It includes demographic, earnings, employer, and claims data from a 1-percent stratified cluster probability sample of all possible SSNs. The CWHS is processed annually, and extracts information from other government data files.

Appendix Table 1. Absolute Intragenerational Mobility Citations[5]

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Acs, G., & Zimmerman, S. (2008). U.S. intragenerational economic mobility from 1984 to 2004: Trends and implications.	PSID (1984, 1994, 2004) Equivalence-adjusted, pre-tax, post-transfer family income Measure distribution in quintiles	Household heads or partners, ages 25–44 *N* = 2,681 (1984); 2,288 (1994) Compare individuals against themselves at each 10-year period; Compare 1984–1994 trends to 1994–2004 trends.	Over 60% of families moved beyond their original quintile thresholds over 10 years in both periods (61.1% from 1984–1994; 62.6% from 1994–2004). Rates of downward absolute mobility are lower than rates of downward relative mobility. Little change in downward absolute mobility over time. White Americans are decreasingly represented in the bottom quintile over time.	Mobility rates may be influenced by the relative strength of the economy during periods studied. Analysis excludes families with incomes < $1,200 (2015 USD) or in top 1% in base or end year. Excludes immigrant subsample.
Auten, G., & Gee, G. (2009). Income mobility in the United States: New evidence from income tax data.	Tax return data (1996, 2005) Cash income (2015 USD, CPI Current Methodology Series) reported on tax returns + Social Security benefits. Cash income is equivalence-adjusted for some metrics, but not all. Additional information on data sources, income criteria, and considerations available in the paper's Technical Appendix. Measure distribution in quintiles	Nondependent tax return filers, ages 25+ (including immigrants) *N* = 107,000 tax returns from 175,800 primary and secondary taxpayers Compare distributional percentage of change in real income at each quintile. Findings compared to earlier research on 1987–1996 mobility (same methods).	**General findings (1996–2005):** Median taxpayer income rose by 23% from 1996–2005, largely due to economic growth. Real income increased for 2/3 of taxpayers. Median real income growth was highest for those who start at the bottom, and most likely to decline for those who start at the top. **Comparisons to 1987–1996**: Median incomes for baseline bottom and middle quintile taxpayers rose by more in the 1996–2005 period than the 1987–1996 period. Baseline top quintile taxpayers went from median income loss from 1987–1996 to gains in 1996–2005. More taxpayers experienced real income growth from 1996–2005 than from 1987–1996.	Median income declines for the top 1% in 1996 by 2005 were likely due to life cycle factors (incomes grow fastest for younger workers, peak in middle-age, then decline with retirement) and "mean reversion" (i.e., incomes were temporarily high in 1996 then reverted to long-run averages). Mean and median incomes *not* adjusted for household size. Compare results for pre- and post-tax cash income. Using post-tax income, baseline top 1% taxpayers experience lower median income loss and baseline lowest quintile taxpayers experience lower median income gains.
Bradbury, K. (2011). Trends in U.S. family income mobility, 1969-2006.	PSID (1969–2006) + Cross-National Equivalent File Tests with both pre-tax, pre-transfer combined family money income and post-tax, post-transfer family income. Equivalence- and inflation-adjusted (CPI-U-RS). Averages the 2 years at the start and end of each 10-year period. See paper for additional detail. Measures *dollar-relative mobility*, or changes in family income and associated relative positional changes: both an absolute and relative mobility metric	Family head or spouse, ages 16–62 *N* = 2,500–4,000 observations per period Baseline to end income position in 10-year periods (1977–1978, 1981–1991, and 1995–2005)	**Overall**: Downward trends in recent years. **Position-specific**: Absolute mobility out of bottom quintile rose from 1972–1982 to 1982–1992, then declined slightly. Pre-tax, pre-transfer absolute mobility estimates are lower for the bottom quintile than post-tax, post-transfer mobility estimates after 1979–1989. Over time, families have become less likely to move from their absolute decile or quintile of origin. When they do move, they go less far than they used to.	Excluded if family income data are missing. Income averaged over all years included in period. For post-tax, post-transfer income, exclude top and bottom weighted incomes of each year. Pre-tax, pre-transfer income excludes top 1% in each year. Excludes split-off families (when children move from parental to independent family income). Uses individual weights on observations to correct for the PSID over-sampling the bottom of the income distribution.

[5]None of the following appendices include Rose (2018). Rose (2018) outlines measurement considerations for studying inequality, most of which apply to mobility studies as well. It does not directly discuss mobility measurement or trends.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Bradbury, K., & Katz, J. (2009). Trends in U.S. family income mobility, 1967–2004.	PSID (1968–2004) Pre-tax, post-transfer combined family income, adjusted for family "needs" (rather than size). Group by decile rather than quintile. Define absolute mobility as movement relative to some standard of well-being or purchasing power (e.g., poverty or median income at start period). Measure by starting rank. Also calculate "interaction mobility," or the interaction of relative and absolute mobility.	For sample criteria, see Bradbury 2011. Results broken out for black and white families. Compare income changes by starting rank across 4-, 10-, and 16-year periods.	The percentage of families leaving extreme poverty over 10 years decreased from 67% in 1968–1978 to 63% from 1993–2003. The likelihood of falling into poverty was the same in both periods. Both rates were worse in the intervening periods. Income grew slower than needs for poorer families than richer ones. Black families experience less mobility than white families, and slower wage growth. Mobility rate discrepancies have stayed the same over time, but long-term income differences have risen.	Family income measurements produce higher estimates of upward mobility than income-to-needs measurements. Typical equivalence-adjustment accounts for family size, rather than "needs." This study, which does not account for family size and composition, may not reflect well-being. Authors do not describe how they adjusted for inflation.
Campbell, C. (2012). Low-wage mobility during the early career.	PSID (odd years only, 1969–1998) Measures labor market earnings Defines upward mobility as movement from below $12/hour to above $12/hour. Defines downward mobility as the reverse. Uses logistic regressions to assess transitions.	Low-wage workers (<$12/hr, 2008 USD) entering the workforce between 1969 and 1978, 1979 and 1988, or 1989 and 1998 *N* = 3,392 Compares wage changes from ages 23/24 to 31/32 in two-year intervals. Also compares wage growth patterns for low-wage workers over time.	Women, African Americans, Southerners, and people with lower education are less likely to exit low wages and maintain higher wages. People have also become more likely to experience low wages in recent years than in the 1970s.	Includes only black and white respondents with a wage above $1.00/hour (2003 USD) and below $100/hour (1991 USD) at each time point or who listed their status as "unemployed." Findings did not change when unemployed individuals were dropped from analysis. Sensitivity analysis to account for biases from nonrandom attrition shows direction and size of findings do not change, but some coefficients lose significance from decreased sample size. Race-gender interaction effects were statistically insignificant.
Dynan, K. E., Elmendorf, D. W., & Sichel, D. E. (2012). The evolution of household income volatility.	PSID (1967–2008) Household labor earnings (head + spouse) and individual earnings (full criteria on p. 10 of paper) Define volatility as the standard deviation of two-year percentage changes in income. Also calculate volatility of hours worked and hourly wage.	Non-student, non-retiree household heads or spouses Compare income changes over 2-year periods, and trends in those changes from 1967–2008.	Overall, volatility increased by 26%. Household incomes became more volatile from the early 1970s to late 2000s. The percentage of households experiencing a 50% income loss in two-years rose from 7% in the 1970s to 12% in the early 2000s. Trend stems from increasing frequency of large income changes, not from large changes through the distribution of income changes. Men's earnings increasingly volatile, both in earnings/hour and hours worked. Authors discuss trends by education and age groups.	Exclude households where head is a student, retired, or recently moved from their parents' home. Include recent widows and the recently separated/divorced. Exclude positive farm income. Include zero or low income. Authors modify top- and bottom-coding in the PSID.
Guvenen, F., Karahan, F., Ozkan, S., & Song, J. (2015). What do data on millions of U.S. workers reveal about life-cycle earnings risk?	Social Security Administration Master Earnings File (1978–2010) Measure annual individual labor earnings. Includes wage, salary, bonuses, and exercised stock options. PCE adjusted to 2005 USD. Examine level-log earnings changes at 1 and 5 years using nonparametric approach	Men alive in or after 1979, ages 25–60 in the year sampled Compare earnings changes over one- and five-year periods. Compare trends across income and age groups, and over time.	In a given year, most people experience small earnings shocks and a small number of people experience very large earnings shocks. People with low earnings experience large earnings shocks that are not persistent. Positive shocks are more persistent; negative shocks are more transient. The opposite trends are true for people with high earnings. Paper also analyzes earnings risk.	Authors impose a top-code above the 99.999th percentile to avoid outliers. Base sample limited to workers whose annual earnings ≥ $1,885 (2010 USD). Exclude self-employed earnings above a threshold.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Larrimore, J., Mortenson, J. A., & Splinter, D. (2015) Income and earnings mobility in U.S. tax data.	IRS SOI Databank; IRS CWHS (1999–2011) Measure both individual earnings (wages and salaries from Form W-2 and self-employment income) and total income of the tax unit (size-adjusted total cash income, excluding capital gains)	Random sample of 0.1% of IRS SOI databank; "Tax units" through the IRS CWHS panel Compare income mobility of men and women	Find about 50% of workers experience earnings increases or decreases of at least 25%, and about 40% of tax units have similar income changes. Male and female income mobility patterns are similar, but marriage is associated with earning gains for men and declines for women.	n/a
Maume, D. J., & Wilson, G. (2015). Determinants of declining wage mobility in the new economy.	NLS (1979 & 1997) Observe hourly wage from ages 18-30. Adjust to 2009 USD with CPI. Conduct latent class trajectory analyses	Working men, ages 18–30 Compare wage mobility of "boomer" (ages 14–22 in 1979) and "millennial" (ages 12–16 in 1997) men	Men experience slower wage growth and more wage stagnation in recent than previous generations. Employment patterns (e.g., part-time employment, service work, etc.) predicted mobility more strongly than in years past and better than family background and cognitive skills. Non-Hispanic white and Hispanic men experience similar wage mobility. Black men are less mobile. Compare trends by region, age at survey start, and family background as well.	Exclude if wages < $1.00/hour or > $150/hour (lose about 2% of men in each sample). Patterns remain the same when the authors exclude college graduates from their analysis.
Rose, S. J. & Winship, S. (2009). Ups and downs: Does the American economy still promote upward mobility?	PSID (1967–2004) Pre-tax, post-transfer family income. Adjusted to 2006 USD with CPI-U-RS. See additional criteria on p. 29.	Adults, ages 26–59 Spouses are analyzed separately, but with the same household income. Compare income changes over 2- and 10-year periods, and recoveries from 1- and 10-year income drops, from 1967–2004.	Americans are no more likely to experience income drops than in the past, and recover at similar rates. Family income changes by more than 25% for about 45% of adults. About one-quarter of adults saw family income decrease by more than 25% from 1994–2004. One-third of the adults who lost more than 25% of their income in 1994 had not recovered by 2004. Over half of adults saw a 10-year income gain in that period. Slightly over half of adults who lost more than 25% of their income from 1984–1994 recovered by 2004. Adults who experience >25% income losses have lower median family incomes over time. Women are at decreased risk of income drops after separating from their partner; men are at higher risk. Additional trends discussed in Executive Summary. Authors examine trends by age, race, gender, education, relationship status, and income quintile.	Later analysis from Winship (2011) found higher levels of volatility than those presented in this paper. Authors do not adjust income for needs or household size, nor do they differentiate between expected and unexpected shocks (e.g., childbirth vs. job loss). Estimates likely overstate true income changes due to measurement errors.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Winship, S. (2011). Economic instability trends and levels across household surveys.	CPS ASEC (1996, 2001, 2004, and 2008 panels); SIPP (1984–88 and 1990–1993 panels); PSID (use both SRC sample and SEO sample, and immigrant samples added in 1997 and 1999) Includes male household head earnings, male earnings generally, women's earnings, and pre-tax, post-transfer household income. See pp. 12–13 for full criteria. Defines instability as a form of volatility. Specifically, the probability of experiencing a 25% income drop in a 1- or 2-year period.	Adults, ages 20–59 Compares income declines in one- and two-year intervals over time. Compares results across data source.	Volatility estimates vary by data source and imputation methods. CPS shows increased instability over time, but the effects are modest when analysis excludes imputed income values. SIPP shows similar patterns of economic instability over time. PSID shows the same for individual earnings, but increases in household income instability.	Excludes observations with ≤ $0 income. With CPS and SIPP, excludes observations where a significant fraction of income was imputed, which decreases the uptrend in instability. Excludes occupants of group quarters. Considerations for each data source discussed in Methods section of paper (pp. 7–8). Full discussion of imputations used on p. 10.

Appendix Table 2. Relative Intragenerational Mobility Citations

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Acs, G., & Zimmerman, S. (2008). U.S. intragenerational economic mobility from 1984 to 2004: Trends and implications.	PSID (1984, 1994, 2004) Equivalence-adjusted pre-tax, post-transfer family income Measure distribution in quintiles	Household heads or partners, ages 25–44 *N* = 2,681 (1984); 2,288 (1994); 2004 not listed Compare individuals against each other at each 10-year period	Percentage of families moving quintiles over 10 years: 1984–1994: 60.4% 1994–2004: 61.1% There was more downward relative mobility than downward absolute mobility.	See Appendix Table 1
Auten, G., & Gee, G. (2009). Income mobility in the United States: New evidence from income tax data.	See Appendix Table 1	(*Differences from absolute*): Compare how incomes in each quintile group from 1996 changed relative to taxpayers in comparable filing population in 2005	General findings (1996–2005): About 56% of bottom quintile taxpayers in 1996 moved to a higher quintile by 2005 (27.4% moved up two or more quintiles). More than twice as many middle-income taxpayers moved up quintiles than down, and 1/3 stayed in the same position. Authors discuss mobility patterns for other quintile groups as well. Marital status strongly associated with large upward and downward movement. Comparisons to 1987–1996: Middle-quintile families were more likely to move to a higher income quintile in the recent period. Relative mobility looked similar for bottom quintile families.	See Appendix Table 1
Bradbury, K. (2011). Trends in U.S. family income mobility, 1969–2006.	Measures *position-relative mobility* (changes in relative position at start and end of period). Author uses dollar-relative mobility as both an absolute and relative mobility. See Appendix Table 1 for additional detail	Compares baseline to end income position in 10-year periods (1977–1978, 1981–1991, and 1995–2005) See Appendix Table 1 for additional detail	Family income mobility decreased over time (i.e., future family incomes increasingly depend on starting incomes). Distribution of lifetime incomes has grown more unequal. **Overall**: Lower mobility from 1995–2005 than in the 1970s. **Position-specific**: Fewer top quintile families move down, and slightly fewer bottom quintile families move up over time. Top quintile families are more likely to move down than bottom quintile families are to move up.	See Appendix Table 1
Bradbury, K., & Katz, J. (2009). Trends in U.S. family income mobility, 1967–2004.	See Appendix Table 1	See Appendix Table 1	Black families experience less mobility than white families, but all families experienced declining mobility over time. Poor black families have much lower upward mobility than poor white families.	See Appendix Table 1

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Carr, M., & Wiemers, E. (2016). The decline in lifetime earnings mobility in the US: Evidence from survey-linked administrative data.	SIPP GSF (1974–2011); earnings history comes from the SER and DER (from the SSA and IRS) Average reported earnings across 7 years at entry and exit into workforce Estimate lifetime earnings mobility. Calculate rank-rank regressions for time trends (from Chetty et al., 2014) and nonparametric probability measures (probability of starting at the bottom and ending at the top).	Taxpayers, aged 25–59 *N* = 250,000–450,000 for each yearly cross-sectional sample (over 700,000 people total) Estimate the relation between average earnings at a younger age and 15 years later Compare trends in lifetime earnings mobility over time	The likelihood of moving to the top decile of the earnings distribution declined by 20% from early 1980s. The probability of moving from the bottom two quartiles to the top quartile fell by 1 percentage point from 1981 to 1993. The effect was bigger for men than women, but declined for both. Also observe a 20% decline in the probability of moving from the third and fourth quartile to the fifth. Correlation between starting and ending rank increased by 15% from 1981 to 1993. Correlation strongest for college-educated men who start at the top of the earnings distribution. Authors also discuss trends by education-level.	Missing data if SIPP participants skipped questions or could not be matched to administrative data. Match rate is around 80% in the 1980s and 1990s, 47% in 2001, and 90% starting in 2004. Low match rate in 2001 affects only individuals interviewed in that year, but not individuals followed through other panels. Include imputed observations. Seven-year average earnings must be > $3,770 (USD) (one-quarter of a full-year of minimum wage in 2013).
Díaz-Giménez, J., A. Glover, & J.-V. Ríos-Rull. (2011). Facts on the distributions of earnings, income, and wealth in the United States: 2007 update.	PSID (2001–2007) Transition matrices for earnings, income, and wealth quintiles from 2000–2006 and mobility statistics by quintile (fraction of households who changed quintiles in six years). See paper for additional measures. Income is pre-tax, post-transfer. See paper appendix for full list of earnings, income, and wealth criteria (pp. 30–31).	PSID respondents, ages 35–45 in 2001 and overall Compare earnings, income, and wealth patterns from 2000–2006 across quintiles Compare 2000–2006 patterns to 1989–1994 patterns.	One-third of households not in the top or bottom quintile change quintiles after six years. **Fraction of households exiting a quintile in 6 years**: Lowest earning households are the least mobile. **Time trend**: Earnings were generally more mobile from 1989–1994 than from 2000–2006. See paper for additional measures.	Exclude ≤ $0 earnings. Look at mobility within 10-year age groups to account of effects of aging on mobility. Compare 2000–2006 to 1989–1994, which are different lengths. Mobility results for the 35–45 age group may be due to sampling error.
Hirschl, T. A., & Rank, M. R. (2015). The life course dynamics of affluence. Rank, M. R., & Hirschl, T. A. (2015). The likelihood of experiencing relative poverty over the life course.	PSID (1968–2011) Individual and family taxable and transfer income of the household head, spouse, and other household members (These two studies used very similar methods to get to these two outcomes.)	Household member, ages 25–60 *N* = 8,500 (1996 core sample); 6,168 (1997 core sample) Describe how people move along the income distribution throughout their working lives	Top incomes are fluid and transient. 61% of households enter the top income quintile for two consecutive years at some point (nearly 70% for one year; about 20% for 10 years); 39% enter the top income decile for two consecutive years (less than 7% stay in the top decile for 10 consecutive years); 5% enter the top 1% for at least two years; 20% of households experience poverty for at least two consecutive years. Older, white, married, higher educated, nondisabled people are more likely to experience affluence.	PSID 90th percentile thresholds are higher than IRS thresholds for 1967–2010, and at the 99th percentile for all but 3 years. Possibly because PSID defines family more completely. The IRS defines family as "taxable units." Authors use sample weights to account for attrition. Insufficient sample size to represent immigrant population.
Hisnanick, J. et al. (2017). Dynamics of economic well-being: Fluctuations in the U.S. income distribution: 2009–2012.	SIPP 2008 Panel Measure annual household income (earnings from employment, pensions, property and assets, and cash transfers)	Civilian, non-institutionalized households (2009–2012) *N* = 113.3 million households Examine mobility by race, age, marital status, and educational attainment	Find about 60% of households remained in the same quintile between 2009 and 2012; majority of households in top and bottom quintiles did not move quintiles during that period.	It is hard to know whether these transitions are permanent—which individuals move out of bottom income quintiles for good and which are bouncing around. Research identifies flows, but fails to capture changes by individual/family.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Levine, L. (2012). *The U.S., income distribution and mobility: Trends and international comparisons.*	Review of the literature Primarily use IGE as mobility measure, but include some findings with sibling correlations and rank-rank mobility	**General**: Samples not specified. Parent income compared to adult child income. Findings come from Isaacs et al. (2008). **Time trends**: Studies include both parent-son and parent-daughter family income mobility, as well as sibling correlations. They include observations from the 1940s to 2000. **Cross-country comparisons**: IGE estimates compare father and son earnings (years not specified). Countries include the U.S., Canada, Finland, Norway, Denmark, Germany, Sweden, the U.K., and France.	**General**: IGE is about 0.5 in the U.S. **Time trends**: Very little change in father-son IGE after the 1990s. Sibling correlation increased between 1983 and 1995, which would suggest decreased mobility. **Cross-country comparisons**: Fathers' earnings have a larger effect on sons' earnings in the U.S., U.K., and France than in Canada, Finland, Norway, and Denmark overall. Men in the bottom quintile in the U.S. in particular experience less upward mobility than in other countries.	Levine interprets an IGE of 0.5 to mean that, if a parent's family income was 30% higher than the average family income in their generation, the child's family income will be 15% higher than their generational average. Levine only includes a few studies in his review, with a limited definition of intergenerational mobility. The time trends research also stops in 2000.
Schultz, M. A. (2019). The wage mobility of low-wage workers in a changing economy, 1968 to 2014.	PSID (1968–2014) Discrete-time event history analysis (to account for truncation) and models time-varying covariates, reports average marginal effects calculated over the sample	Young-adult workers, ages 25–34, and prime-age workers, ages 35–54, who enter low-wage employment spells Compares mobility rates by age, gender, race, education, occupation and job characteristics	Mobility out of low-wage work has declined since late 1990s, women have lower mobility rates relative to men, and people of color have lower rates of mobility relative to white people.	Household heads and spouses (jobs and earnings), using current or last/previous job, matches job-year observations to worker's hourly wages for that year, uses actual annual hours to reflect increase in overwork.

Appendix Table 3. Absolute Intergenerational Mobility Citations

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Acs, G., Elliott, D., & Kalish, E. (2016). What would substantially increased mobility from poverty look like?	PSID (1967–2009); CPS ASEC (1973–2014) Equivalence-adjusted pre-tax, post-transfer family income (2013 USD) Rank comparisons by quintile	Children: Ages 0–5 in 1968; ages 30–39, 1993–2009 Compare child family income in their 30s (1993–2009) to average parent family income in their 30s (1967 and beyond)	About two-thirds of children have higher incomes than their parents at similar ages. Over 80% of children born into the bottom quintile have higher incomes than their parents (87% for white people; 67% for black people). White people are more likely to earn more than their parents than black people. Incomes grew by less than 1% from 1973–2014 for bottom quintile earners, and by 61% for top 5% earners.	Only compares white and black differences. Very little in-depth description of methods and data.
Chadwick, L., & Solon, G. (2002). Intergenerational income mobility among daughters.	PSID (1968 sample) Compare child's (born 1951–1966) adulthood income (1991) against parental income during childhood.	533 daughters in PSID: Comparison of household income at Time 1 (1967–1971), and adult daughter's (household) income at Time 2 (1991 or later). Primary estimation is of income elasticity— % of income determined by childhood parental income.	Estimates of intergenerational income elasticity is 0.43 (range from 0.43–0.49) for daughters, and 0.54 for sons.	Limited sample size. Examines oldest daughter when multiple in same household. Daughter income includes spouse/cohabiter. Including family, not just householder, earnings tends to produce higher estimates of elasticity.
Chetty, R., Grusky, D., Hell, M., Hendren, N., Manduca, R., & Narang, J. (2016). The fading American dream: Trends in absolute income mobility since 1940.	Census and CPS for income distributions; De-identified federal tax income data Taxable income (use W-2s for non-filers). If no tax return and nothing filed on their behalf, taxable income = 0. See paper for full criteria. Compute family income as sum of spouses; personal pre-tax income at age 30, adjusted for inflation (CPI-U-RS and CPI-U times CPI-U-RS ratio for pre-1977 data). Child income for 1980–1982 birth cohort measured as mean of 2011 and 2012 income; parent income measured as mean taxable income from 1996–2000. Sensitivity analysis includes post-tax, post-transfer, alternate inflation measures, and measurement at different ages.	U.S.-born adults, not institutionalized, age 30 Estimate fraction of children out-earning their parents at age 30 by combining the marginal income distributions with copula in each cohort (defined as the joint distribution of parent and child income ranks)	Rates of absolute mobility fell from 92% for children born in 1940 to 50% for children born in 1984. Biggest declines for: children born into the middle class; the Industrial Midwest; sons (individual earnings relative to their fathers). Fraction of daughters earning more than their fathers increased from 1960–1984, but not to 1940 levels. Changes in growth distribution explain more of the decline than aggregate GDP growth reductions.	For more recent cohorts, the authors directly estimate joint distribution using de-identified federal income tax returns. For earlier cohorts, these data are unavailable, and the authors assume that copulas (i.e., joint distributions of parent and child income ranks, or which parents are linked to which children) are stable for all birth cohorts. Before 1970, they construct upper and lower bounds for each cohort with each plausible copula. These bounds are very tight for the 1940–1950 birth cohorts. Income grew very rapidly across the distribution from 1940–1970. Restricted to native-born. Parents are 15–40 when they have children in 1980–1982. Exclude parents with zero or negative income when constructing the copula because they cannot be linked to their children in the tax data. Fraction of parents with zero income in each cohort is included in average rates of absolute mobility (their children would have an absolute mobility of 100%). Findings consistent across a variety of sensitivity analyses.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Corak, M., Lindquist, M. J., & Mazumder, B. (2014). A comparison of upward and downward intergenerational mobility in Canada, Sweden and the United States.	Match SIPP (1984, 1990–1993) to SER and DER (1978–2007); impute SER with CPS. Measure average taxable earnings; son earnings averaged from 2003–2007; father earnings averaged from 1978–1986 Translate mean percentile gains and losses into USD	Sons lived with their parents at age 20 or younger; observed at ages 28–43 Fathers ages 30–60 at time of observation. *N* = 3,251 Compare average taxable earnings of fathers and sons	Small rank mobility differences translate to large absolute differences due to inequality. U.S. sons make the smallest absolute gains over their fathers (compared to Canada and Sweden). Earnings at the low end of the distribution in the U.S. have fallen. Canada has higher relative downward mobility, but the U.S. has higher absolute downward mobility. Absolute losses for the downwardly mobile are larger than absolute gains for the upwardly mobile in the U.S. and Canada.	Use individual income instead of family income. Analysis excludes women, as well as sons from single-mother households. Using family income lowers transition probability estimates in the U.S. Individuals not covered by the social security system are recorded with a $0 income in the SER, and the SER stops at the maximum earnings subject to the social security tax. DER excludes self-employment earnings. Authors combine SER and DER information with the maximum earnings in both, and impute the SER with CPS data. Sons must have positive income in at least 2 years from 2003–2007. Fathers must have positive earnings in all 9 years from 1978–1986. Possible that survey data capture low incomes better than tax data.
Danziger, S. (2019). Policy.	n/a	Compares “millennials” to “baby boomers”	Employed millennial men earn the same wages at age 25 as baby boomers. Household incomes have mostly increased over time due to increased female workforce participation and earnings.	Policy paper; not a formal study.
Killewald, A., Pfeffer, F. T., & Schachner, J. N. (2017). Wealth inequality and accumulation	n/a	n/a	Wealth share owned by the top 1% increased from 32% to 36% between 2001 and 2013; wealth inequality rose during and after the Great Recession.	A methodological review of measures of wealth accumulation and inequality.
Winship, S. (2017) Economic mobility: A state of the art primer.	PSID Measures absolute mobility by income level, intergenerational elasticity, and income-rank associations	Over 200 different samples (varying by gender, years of non-missing earnings, and age)	64% of 30-year-olds in 2010, 2011, and 2012 had higher size-adjusted incomes than their parents at the same age.	Adjusts income for family size and cost of living (using the Personal Consumption Expenditures (PCE) deflator, rather than the CPI-U-RS, which is used by Chetty). Includes income from federal cash transfers. Does not include employer benefits, federal noncash benefits or disposable income after taxes. (The author argues that tax rates have declined over time and refundable tax credits have increased.) Does not include later sample of immigrants, due to lack of data on parental income.

Appendix Table 4. Relative Intergenerational Mobility Citations

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Aaronson, D., & Mazumder, B. (2008). Intergenerational economic mobility in the United States, 1940 to 2000.	Census (IPUMS) Measure IGE and IGC (two-sample instrumental variable estimator); earnings (used interchangeably with income; inclusion of transfers not specified)	Adult men surveyed every decade, 1950–2000 Separate analysis of subsample age 35–44 Compare adult son earnings to synthetic estimate of family income based on state of birth	Earnings regressing to the mean more slowly than any time since World War II, meaning differences between family incomes are more persistent (higher IGE). This is true even after accounting for changes in the return to education over time. Trends in IGE over time similar to trends in inequality over time.	Do not have individualized parent-child matches. Two-sample estimator could upwardly bias estimate and overstate birth-location factors. Sensitivity analysis finds that state effects cannot fully account for mobility declines. Authors find the same trends over time whether they compare son earnings to family income or father earnings, use one census year for family income or averaging over two, and include or exclude zero income families. Bias minimized at age 40.
Acs, G., Elliott, D., & Kalish, E. (2016). What would substantially increased mobility from poverty look like?	See Appendix Table 3	Compare children in their 30s (1993–2009) to their parents' average income in their 30s (1967 and beyond).	Bottom quintile (child) - bottom quintile (adult): 37% (26% for whites; 64% for blacks) Bottom quintile (child) – top quintile (adult): 5% (5% for whites; 3% for blacks) White children born in the bottom quintile are much more likely than black children born in the bottom quintile to reach a middle quintile by adulthood. Authors discuss findings for other quintiles as well.	See Appendix Table 3
Bhattacharya, D., & Mazumder, B. (2011). A nonparametric analysis of black–white differences in intergenerational income mobility in the United States.	NLSY (biannually: 1998–2004); Armed Forces Qualifying Test (1980) Labor market earnings in 1978 USD (CPI-U) Estimate nonparametric probability of transition across quantiles and probability of moving up relative to parental position	Men who were ages 14–21 as of Dec. 31, 1978 (around age 40, 1998–2004) *N* = 2,766 white and black men Compare sons' average income (1997–2003) to their parents' average family income (1978–1980)	Blacks experience less upward mobility than whites, which the authors largely attribute to cognitive skill gaps in adolescence (as measured by the AFQT).	Analysis limited to sons due to labor force participation limitations, and to black and white respondents. Include zero earnings (sons) and zero income (parents). Analysis may be limited to pre-tax, pre-transfer earnings, although this is unclear.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Chetty, R., Hendren, N., Jones, M., & Porter, S. (2018). Race and economic opportunity in the United States: An intergenerational perspective	Longitudinal census data (2000, 2010). Linked to federal income tax returns (1989, 1994, 1995, 1998–2015) and the ACS (2005–2015) **Child income**: Mean pre-tax household (head + spouse) income, 2014–2015 (ages 31–37). Includes W-2 wages and other AGI, divided by number of tax filers. **Parent income**: Mean pre-tax household (head + spouse) income, 1994–2000. Includes AGI, tax-exempt interest income, and non-taxable Social Security and Disability benefits (no W-2). All income inflation-adjusted to 2015 USD (CPI-U) Measure mobility using rank specification	**Children**: U.S.-born or authorized immigrants who moved to the U.S. during childhood, born in 1978–1983; claimed as a dependent on a 1040 tax form from 1994–2015 **Parents**: U.S.-born or authorized immigrants and claimed the child as a dependent; measured when children were ages 11–22 *N* = 20 million children **For rank distributions**: Compare child income to incomes relative to other children in their birth cohort; compare their parents' income to the other parents with children in the same birth cohort **For mobility estimates**: Compare child rank to parent rank	Hispanic Americans experience high rates of upward income mobility. Black Americans experience low rates of upward mobility and high rates of downward mobility. American Indian/Alaskan Native children also experience more downward mobility than whites. The black-white income gap is driven by differences in wages and employment rates between black and white men. Parental marital status, education, and wealth explain very little of the black-white income gap, as do test scores. The gap exists between black and white men who grew up in the same neighborhood (true for 99% of Census tracts).	Excludes unauthorized immigrants or children of unauthorized immigrants because they do not appear in the file that matches IDs across the data. Children first claimed by a single filer are considered to have a single parent, regardless of future changes in parent marital status or dependent claiming. Parents who never file a tax return are not linked to their child (this is rare). Analysis sample includes 94% of the target sample frame. Income distributions and demographics resemble the ACS. Excludes parent incomes of ≤ $0 (affects 1% of children), as this is a sign of large capital loss, which is a proxy for wealth. Analysis includes homeownership data from the long-form census and ACS. Fewer sensitivity tests than Chetty et al. (2016).
Chetty, R., Hendren, N., Kline, P., Saez, E., & Turner, N. (2014). Is the United States still a land of opportunity? Recent trends in intergenerational mobility.	**Children born on or after 1980**: population tax records (1996–2012) **Children born before 1980**: SOI annual cross-sections **Parent income**: Tax records If no taxes filed, authors use W-2, 1099-G, SSA-1099 **Measure**: Mean family income (2012 USD) (for parents, average when child ages 15–19; for SOI sample, authors use the year linking child and parent); see paper for full criteria Calculate IGE and rank-rank comparisons using joint distribution of parent and child ranks (copula) and marginal distributions of parent and child income	**Post-1980**: U.S. citizens as of 2013, born 1980–1993, claimed as a dependent on a tax return in or after 1996; income at age 30 (or 26 for later cohorts) *N* = 3.7 million children per cohort **Pre-1980**: U.S. citizens, born 1971–1982; income at age 30. *N* = 4,331 (1971 birth cohort) – 9,936 (1982 birth cohort) Rank child relative to others in birth cohort based on mean family income, ages 29–30, and parent family income relative to other parents of children in the same birth cohort. Compare child rank to parent rank.	Children entering the labor market today have the same chance of out-ranking their parents as children born in the 1970s.	Drop observations with zero or negative parent income. Individual income results not shared, but authors claim the results are similar. Sensitivity analysis shows no life-cycle bias from measuring income at early or late ages, nor attenuation bias from noise in annual income measures.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Corak, M., Lindquist, M. J., & Mazumder, B. (2014). A comparison of upward and downward intergenerational mobility in Canada, Sweden and the United States.	See Appendix Table 3 for sample Calculate directional rank mobility comparison of fathers and sons, i.e., the likelihood of a son out-ranking his father by a given amount, conditional on the father being at or below a given percentile (upward) or the reverse (downward) Also calculate upward transition probability (probability of child percentile exceeding parent percentile), IGE, IGC, mean percentile gains for each sample, conditional on the son outranking the father, and mean percentile loss, conditional on the son ranking below the father	See Appendix Table 3	In comparing Canada, Sweden, and the U.S., Canada has the most downward mobility, and the U.S. the least. IGE estimates show lower mobility in the U.S. than rank-rank comparisons.	See Appendix Table 3
Hertz, T. (2009). Rags, riches, and race. Unequal chances: Family background and economic success.	Survey Research Center component and non-randomly sampled Survey of Economic Opportunity portion of the PSID Measures the observed probability of moving from one quintile to another (as a function of both expected and unexpected components of mobility)	Families observed across two generations over 32 years *N*= 6,273 Compares black and white families	Intergenerational correlation in long-run average income is 0.4 or higher, finds black families much less likely to move up from the bottom of the income distribution.	n/a
Isaacs, J. B., Sawhill, I., & Haskins, R. (2008). Getting ahead or losing ground: Economic mobility in America.	n/a	n/a	Absolute intergenerational mobility: there is upward absolute intergenerational mobility (but biggest gains at the top of the distribution and smallest gains at the bottom), rates of absolute mobility has declined since the 1970s. Relative intergenerational mobility: little relative mobility for those at the bottom and those at the top.	A review of research on intergenerational absolute and relative mobility (including international comparisons, wealth mobility, mobility by gender and race, and the relationship between mobility, immigration and education).
Lee, C. I., & Solon, G. (2009). Trends in intergenerational income mobility.	PSID Measures changes in relative intergenerational mobility over time (uses multi-year measure of parental income)	Children born between 1952 and 1975 Compares birth cohorts and years.	Intergenerational income mobility has not seen large changes since the 1980s.	n/a

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Levine, L. (2012). *The U.S., income distribution and mobility: Trends and international comparisons.*	Review of the literature Studies included measure family, household, or individual income mobility using the PSID, or individual income using tax panel data.	Studies looked at family income for working-age married couples from 1969-2006, individual income for adults age 25-44 from 1989-2004, taxable income for tax units age 25 and older from 1987-2005, and household income from 1989-1994 vs. 2001-2007. One study compares mobility across countries.	Working-age married couples became decreasingly likely to change positions in the income distribution from the 1980s to 2006. Individual income mobility stayed stable from 1989-2004. Households in the bottom quintile of income experience less mobility than the middle three-quintiles. There is no clear relationship between inequality and intragenerational mobility.	Levine only includes a few studies in his review, with a limited definition of intergenerational mobility. The research also stops in the early 2000s. Assumptions, methods, and samples are not consistently specified.
Lopoo, L. & DeLeire, T. (2012). Pursuing the American Dream: Economic mobility across generations.	PSID (1968–2009) Measure mean taxable family income and cash transfers, adjusted for family size Measure personal earnings (not family-size adjusted)	Sample for analysis of family income includes children between the ages of zero and 18 in 1968 *N* = 2,736 Sample for analysis of individual earnings includes sons between ages of zero and 18 in 1968 *N* = 1,014 Compare white and black families, as well as mobility by education level	Absolute intergenerational mobility: a majority of children have higher family incomes than their parents. Relative intergenerational mobility: those raised at the bottom and top of the distribution are likely to remain there, and blacks are more likely than whites to remain in the bottom quintile or fall from the middle quintile.	Sensitive to econometric assumptions and sample specification (Chetty, 2016); adjusted for inflation to 2008 USD using CPI-U-RS and CPI-U-X1 (a forerunner experimental CPI-U measure).
Mazumder, B. (2015). Estimating the Intergenerational Elasticity and Rank Association in the US: Overcoming the Current Limitations of Tax Data.	PSID (1967-2010) Family income Estimates both IGE and rank-rank mobility.	Parents (averaged from ages 25-55) and children (averaged from ages 35-45) *N* = 2,681 (1984); 2,288 (1994) Compare parent and child average family income, centered on age 40. Mazumder compares his results using the PSID to Chetty et al.'s (2014) using tax data.	Time averages of 10-15 years produce IGE estimates greater than 0.6 for family income. Mazumder's IGE estimates are higher than those from Chetty et al. (2014) across multiple different measurement methods and multiple sensitivity tests. Mazumder demonstrates that this is attributable to the limitations of tax data.	Mazumder's interpretation of IGE – regression to the mean – was uncommon in the literature reviewed, though it was also used by Levine (2012). Mazumder interprets IGE as the number of generations it would take for a family's income to match the national average. With PSID data, expanding the number of years included in the averages reduces the sample size and makes the results less representative. Including more years in the average parent income calculation, however, reduces attenuation bias, or mismeasurement, and raises the IGE estimate. Including more years in the son's family income estimate has little effect. Using averages with tax data – for which attrition is less of a concern – also shows IGE estimates increase with the number of years included in parent income.
Mazumder, B., & Acosta, M. (2015). Using occupation to measure intergenerational mobility.	PSID (1968–2009) Measures intergenerational mobility in income and occupational prestige	Sample includes father-son pairs (fathers born between 1921 and 1950 and sons born between 1950 and 1972) *N* = 681	Intergenerational occupation mobility is overstated when using a single year of fathers' occupation (compared to 10-year average centered on mid-career), mobility estimates are largest when measured at mid-career.	The authors recommend using 10-year averages, centered on mid-career.

Citation	Data and measurement	Sample and comparison groups	Findings	Considerations and limitations
Torche, F. (2013). How do we characteristically measure and analyze intergenerational mobility?	n/a	n/a	n/a	A review of the literature: author explores mobility literature that examines occupational status mobility, class mobility, earnings mobility, and total family income mobility
Venator, J., & Reeves, R. V. (2015). Measuring relative mobility, part 1.	n/a	n/a	n/a	A descriptive paper that explores the strengths and weakness of two measures of intergenerational relative mobility: intergenerational elasticity and rank-rank slopes.
Winship, S. (2016). The State of economic mobility and why it matters.	National Longitudinal Survey of Youth (1979)	Compares rates of upward and downward mobility by race and gender, and also over time	Finds mobility rates have not changed substantially for cohorts of sons born between 1948 and 1982. Finds low rates of upward mobility and high rates of downward mobility for black men.	A review of studies comparing intergenerational mobility in the U.S. to other countries; argues that upward economic mobility is not much worse in the U.S. than in Europe and that it has not decreased over time.