Economic Deprivation in Early Childhood and Adult Attainment: Comparative Evidence from Norwegian Registry Data and the U.S. PSID

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Abstract

We describe child low-income dynamics in the United States and Norway and estimate associations between low childhood income and adult attainments, measured as late as age thirty-seven. Outcomes include years of completed schooling, adult earnings, and percent of adult years with any unemployment. Our particular focus is on low income early in childhood – between a child's prenatal year and fifth birthday – which may be most consequential for children's life chances. Using data from the Panel Study of Income Dynamics (PSID) and Norwegian Registries we describe cross-country distributional differences and estimate the relationship between our adult outcomes and family economic conditions in early childhood, middle childhood (ages six to ten) and adolescence (ages eleven to fifteen). Correlations between childhood income and adult outcomes are generally weaker in the Norwegian data. In both data sets, but larger in the PSID, we find statistically significant unfavorable associations between early childhood poverty and adult earnings. We discuss whether these results could be related to the Scandinavian egalitarian welfare model's ability to mitigate effects of family background and potentially correlated economic constraints imposed by low income in the family of origin.

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I. Introduction

Family influences early in life play an important role in children's development. It is well documented in studies from Europe and the United States that family environments of young children are important predictors of cognitive and behavioral skills, as well as of outcomes later in life, such as education, labor market participation, earnings, health, and crime (d'Addio 2007). In particular, the literature shows that children of families with low income and education have substantially worse prospects for success in life than other children (Duncan, Ziol-Guest and Kalil 2010; Holzer, Schanzenbach, Duncan and Ludwig 2007).

The early childhood period may be especially sensitive to environmental influences. Low income and its attendant stressors have the potential to shape the neurobiology of the developing child in powerful ways, which may lead directly to poorer outcomes later in life (Knudsen, Heckman, Cameron and Shonkoff 2006). Poverty in early childhood can also affect adult attainment, behavior, and health indirectly through parents' material and emotional investments in children's learning and development.

Detrimental effects of early family income may be less severe in stronger welfare states such as those in Scandinavia. This could be because high-quality basic services (like health care and child care) and educational opportunities are publicly provided and utilized by low- and high-income families alike. We explore this question with a comparative look between a country with a weak safety net and extensive childhood poverty (the United States) vs. Norway's strong welfare state that secures adequate income, basic needs, and education for all residents.

Specifically, we use comparable methods and data to investigate the adult attainment consequences of low childhood income in the United States and Norway. We describe child low-income dynamics in the two countries and estimate associations between low income between a child's prenatal year and fifteenth birthday and adult achievement outcomes, measured as late as age thirty-seven. Outcomes include completed schooling, adult earnings, and adult unemployment. Our particular focus is on low income early in childhood.

II. Previous Literature

Intergenerational mobility

Although parent-child correlations in labor market earnings are positive in Scandinavian countries, intergenerational mobility is somewhat higher than in Britain and the U.S. (Björklund and Jäntti 1997, 2000; Bratberg, Nilsen and Vaage 2007). This may result from the ability of the Scandinavian egalitarian welfare model to mitigate the effects of family background and the possible economic constraints imposed by low income on the family of origin. Bratberg et al. (2007) found that while intergenerational earnings mobility was generally high in Norway, it was lower at the bottom end of the offspring's adult earnings distribution than at the upper end. Specifically, the intergenerational earnings elasticity was three to four times as high at the fifth percentile of the offspring's earnings distribution than at the 95th percentile, with the intergenerational elasticities flattening out at about the 50th percentile of the offsprings' earnings distribution.

Why should Norwegian children who grow up to be high earning adults be immune (both absolutely and relative to children growing up to be low earners) to the influences of family background? Bratberg et al. (2007) point to the likely importance for low earners of family background factors such as low market skills and weak preferences for education, but discount

the possible role of financial constraints. At the same time, these authors report that mobility has increased over time, and the increase has been somewhat greater for those at the lower end of the earnings distribution, as was intended by the array of expansions of public programs that occurred during the 1970s and 1980s.

Nonetheless, the Norwegian intergenerational earnings elasticity for adult earnings in the bottom of the distribution (.32 for those born in 1960) is not that much less than the figure of .40 often cited for U.S. men. Indeed, despite its welfare system, Norway's gaps between children of advantaged and disadvantaged families are substantial. Schjølberg et al. (2008) find that, by age three, children of parents with university education have substantially better language development than other children. And large gaps in grades are found between children of parents with high and low education in Norwegian public schools (Hægeland et al. 2005). Skill differences persist through adolescence and into adulthood. Children of parents with low income are more likely to become low-income earners as adults (Bratberg et al. 2008); and children of social assistance claimants are more likely to claim social assistance as adults (Lorentzen and Nilsen 2008). Finally, low childhood socioeconomic position is associated with increased mortality for most causes of death during young adulthood (ages twenty-five to thirty-five) among Norwegians (Strand and Kunst 2007).

Causal effects of childhood income

Duncan and Brooks-Gunn (1997) were the first to take a broad look at the possible longer-run consequences of early childhood poverty in the U.S. Twelve groups of researchers working with ten different non-experimental but longitudinal data sets estimate longitudinal models of early childhood income effects on later attainment, behavior, and health. On the whole, the results suggest that family income has substantial, albeit selective associations with

children's subsequent attainments. First, family income had consistently larger associations with measures of children's cognitive ability and achievement than with measures of behavior, mental health, and physical health. Second, family economic conditions in early childhood appeared to be more important for shaping ability and achievement than did family economic conditions during adolescence. And third, the association between parental income and children's achievement appeared to be non-linear, with the biggest impacts at the lowest levels of income.

More recently, Duncan, Ziol-Guest, and Kalil (2010), using long-run U.S. data from the Panel Study of Income Dynamics, investigated the consequences of poverty between a child's prenatal year and fifth birthday for a host of adult achievement, health, and behavior outcomes, measured as late as age thirty-seven. Controlling for economic conditions in middle childhood and adolescence, as well as demographic conditions at the time of the birth, they find statistically significant and, in some cases, quantitatively large detrimental effects of early poverty on a number of attainment-related outcomes (adult earnings and work hours), some health outcomes (adult body mass; see Ziol-Guest et al. 2009) but not on such behavioral outcomes as out of wedlock childbearing and arrests. Most of the adult earnings effects appeared to operate through early poverty's association with adult work hours. This chapter replicates some of the Duncan et al. analyses using Norwegian registry data.

The economics literature has typically ignored the idea that the effects on children's development of economic conditions depend upon childhood stage and instead focuses on the role of "permanent" income, with the assumption that families anticipate bumps in their life-cycle paths and can save and borrow freely to smooth their consumption across these bumps (Blau 1999). However, there are several reasons to think that the family income during early childhood is critical for children's long-term attainments. Cunha, Heckman, Lochner, and

Masterov (2005) propose an economic model of development in which preschool cognitive and socio-emotional capacities are key ingredients for human capital acquisition during the school years. In their model, "skill begets skill," with early capacities boosting the productivity of school-age human capital investments. To the extent that cognitively-enriching early home environments lay the groundwork for success in preschool and beyond, parents' ability to purchase books, toys, and enriching activities during this stage of development is paramount (Yeung, Linver and Brooks-Gunn 2002).

Income and economic insecurity can also affect parental abilities by influencing parents' mental health. Parental psychological stress or harsh parenting behaviors can be especially detrimental during early childhood (Bronfenbrenner and Morris 1998; Godfrey and Barker 2000; Shonkoff and Philips 2000) given the primacy of sensitive mother-child interactions for the development of young children's emotion regulation (Waters and Sroufe 1983). For example, children's mastery in early childhood of the developmental task of regulating their emotions can have long-run impacts on their achievement, behavior, and health (Fox 1994). Finally, early childhood stressors related to low income could interfere with critical periods in biological development, for example by altering or dysregulating biological systems, with adverse implications for future health (Godfrey and Barker 2000).

A recent series of studies has used Scandinavian registry data to estimate various intergenerational economic models associations (Aakvik, Salvanes and Vaage 2005; Björklund and Jäntti 2000; Bratberg et al. 2008; Bratsberg et al. 2007; Humlum 2008; Jäntti et al. 2006). In an approach similar to the one we take here, Aakvik, Salvanes, and Vaage (2005) find that family income when children are zero to six years of age is a significant predictor of children's educational attainment and that the effect of early childhood income on children's eventual years

of schooling is about twice as big as the effect of income during the years sixteen to eighteen, even when permanent income is controlled. Although statistically significant, effects sizes in the Aakvik et al. (2005) study are quite small.

Other recent studies using administrative registers from Statistics Norway have used displacement of fathers as a consequence of plant closings to examine the intergenerational consequences of income shocks. In one study, Rege, Telle, and Votruba (2007) find that fathers' job losses occurring as a result of plant closures have an adverse effect on adolescents' school grades when graduating from secondary school (though the effect does not seem to be driven by income losses, suggesting a potentially adverse effect owing to the social distress of unemployed fathers). Bratberg et al. (2008), also using similar data, analyze the effects of worker displacement in 1982-1985 on their children's earnings in 1999-2001, when the children are twenty-five to thirty years old. They find that although displacement appears to have a negative effect on earnings and employment of those affected, there are no significant effects on offsprings' earnings. Their study, however, does not distinguish income losses in different childhood periods, nor does it capture income losses that might have occurred during the early childhood period.

Researchers generally do not dispute simple correlations between income and child developmental outcomes, but there is much controversy about whether these correlations can be given causal interpretations. Unobservable determinants of children's adult outcomes that are correlated with early childhood family income, such as parental abilities or mental health problems, or moving frequently, are of key concern in assessing the causal impact of early family income on children's adult outcomes. Studies using more sophisticated methods to address this omitted variable problem have recently emerged. For example, Milligan and Stabile

(2008) and Dahl and Lochner (2008) utilize reforms in child transfer programs and tax rules in Canada and the U.S. to generate exogenous changes in family income. Both studies find effects of early childhood family income on children's achievement-related outcomes.

The approach we pursue here is to use children born in Norway and the U.S. between 1968-1975 to estimate the association between early childhood family income and outcomes of the child measured from age twenty-four to thirty-seven (until 2005). Our work extends that of Aakvik et al. (2005) by including more cohorts, adopting a longer time horizon and a broader array of outcomes, allowing for differential effects of increments to low versus high family income, using a more comprehensive measure of childhood income and most importantly, by comparing Norwegian and U.S. results. To avoid attributing to income what should be attributed to correlated determinants of both childhood income and adult outcomes, we include a number of key control variables available around the time of birth of the child. In addition, our estimates of the association between early childhood income and adult outcomes include controls for income in middle childhood and adolescence. It is difficult to think of omitted-variable bias stories involving early income that would not be controlled in large measure with the inclusion of income later in childhood.[i]

III. Data

We use administrative register data compiled by Statistics Norway, which includes every individual in the entire resident population of Norway, on average comprising more than 50,000 children born each year. We are able to link information on parents to children around the time of birth and throughout childhood. Additionally, a host of measures of the child's adult outcomes are generally available from 1992 until 2005. We focus on three: completed schooling, earnings and unemployment. The target study sample consists of the roughly 500,000 males and females

born between 1968 and 1975, with register data beginning in the prenatal year and extending to 2005, when these individuals were between ages thirty and thirty-seven. The very large case counts in the Norwegian data produce narrow confidence intervals for regression coefficients, which prompts us to pay special attention to the magnitude, not just the statistical significance, of estimated coefficients.

Comparative data, also spanning 1968-2005, are drawn from the U.S. Panel Study of Income Dynamics (PSID). The PSID has followed a nationally-representative sample of families and their children since 1968. Our analysis sample consists of 1,589 respondents who participated in the PSID in adulthood and had nonmissing data on at least one outcome. While the Norwegian data cover every resident of Norway, the U.S. data suffer from possible bias owing to differential nonresponse, which is highest among the poorest households. We adjust for differential nonresponse by using the PSID's attrition-adjusted weights in all of our analyses.

Childhood income

We created a measure of household income in each year of the child's life starting in the prenatal year.[ii] Norwegian total household income in Kroner is based on tax files, which include net income that is subject to taxation (earnings from labor, unemployment money, sick leave money, pensions, income from self-employment, and income from capital including interest and dividends). To this income measure we add cash transfers like child allowances. These values are calculated for the child's mother and added to the amount reported for the mother's cohabitant (generally her husband).[iii] For the U.S. comparison, we used the PSID's high-quality edited measure of annual total family income, which includes taxable income and cash transfers to all household members. For the analyses Norwegian and U.S. incomes are inflated to 2005 levels using the Norwegian and U.S. Consumer Price Indexes. To establish comparability between the

two data sets, we convert the 2005 Norwegian Kroner to U.S. dollars using the exchange rate for 2005 obtained from OECD (6.4 Norwegian Kroner per U.S. dollar). We averaged these annual income measures across three periods: the prenatal year through the calendar year in which the child turned five; ages six to ten; and ages eleven to fifteen.

Although income is measured in similar ways in the two datasets, some issues may be important to keep in mind when interpreting our findings. Using exchange rates or purchasing power parities (PPP) to adjust for differences in actual purchasing power is problematic, particularly for individuals at different portions of the income distribution. There are considerable discrepancies between PPP and exchange rates – in 2005, the PPP was 8.90 while the exchange rate was 6.44. The exchange rate has also been volatile, but the PPP is fairly stable over recent years. Although this might argue for using the PPP relative to the exchange rate, the latter provides a more comparable set of income distributions for our descriptive comparisons. The qualitative regression results will be the same regardless of whether we convert the measures of family income in fixed 2005 prices by using the PPP of 8.90 or the exchange rate of 6.44. Our adult attainment measures – years of completed schooling, log earnings and percent of adult years of unemployment – are unaffected by currency conversion issues.

We use pre-tax income measures in both countries. The public provision of health services, education and social insurance (sick leave and unemployment for example) in Norway, and country differences in tax schedules and in-kind transfer programs introduce noncomparabilities in both pre- and post-tax income. In addition, sources of income included in the PSID, like pecuniary support from friends and relatives and alimony, are not included in the Norwegian measure. There are also some public transfers, in particular generous public loans for

education and housing, scholarships and access to highly subsidized child care (center-based/pre-school), that are not included in the Norwegian measure.

Adult Outcomes

Dependent variables in our analyses span educational and employment domains. Years of completed schooling are based on reports around age twenty-four.[iv] Data on the child's adult earnings were gleaned from all available annual survey or register reports of earned income beginning when the child was age twenty-four. As with childhood income, we use country CPIs to adjust for inflation and the exchange rate to convert from 2005 Kroner to 2005 U.S. dollars. To adjust earnings for age and calendar year, we regressed all of our yearly earnings observations on sets of dummy variables measuring the age of the respondent in the given year, and the calendar year of measurement. We then generated residuals from this regression for each sample individual's earnings observations and averaged these residuals across all of the yearly earnings observations that a given individual generated. We centered these average residuals around the sample mean by adding them to the overall sample mean earnings. As a final step we took the natural logarithm. This adjusted earnings measure is used in all regression analyses presented.

Unemployment experiences are captured with the percent of years after age 24 that the individual received any unemployment compensation (in Norway) or reported any time unemployment (in the PSID).

Control Variables and Regression Procedures

To avoid attributing to income what should be attributed to correlated determinants of both childhood income and our outcomes of interest, we included a number of control variables in all of our regressions.[v] The controls used in the regressions for both datasets are birth year

dummies, child sex (female=1), whether the child was the first born to his/her mother, the number of siblings, the age of the mother at the time of the birth, whether the child's mother was married at the time of the birth, years of completed schooling of parent in the birth year (mother and father in the Norwegian Registry and head of household in the PSID) and fixed effects for geographic location around the time of birth (mother's municipality of residence – 430 in all – in Norway and region of the U.S. in the PSID). The PSID regressions also include controls for race. All of our OLS regressions were run in STATA 10.0 SE and adjust for family-of-origin clustering on the mother using Huber-White methods.

IV. Results: A comparative look at childhood income

Describing the Samples

Table 1 presents descriptive statistics on the Norwegian and the PSID samples. The 496,110 Norwegian children resided within 338,738 families. Forty-two percent of the children in both samples are first born; PSID children have more siblings on average than do Norwegian children. Parental schooling levels around the time of the child's birth are slightly higher in the PSID than in Norway. Norwegian mothers average twenty-six years of age when the child was born, which was roughly one and one-half years older than PSID mothers. At the time of the child's birth the vast majority of these mothers were married.

INSERT TABLE 1 ABOUT HERE

On average, the Norwegian cohorts had completed 12.9 years of schooling by age 24; the comparable PSID sample average is 13.4 years. The Norwegian birth cohort experienced unemployment in almost 12 percent of their adulthood (since age twenty-four); the counterpart figure for the PSID sample is just below 10 percent. Finally, mean earnings are slight lower in Norway than the U.S. In figure 1 we focus on distributional differences by converting Kroner

into dollars using the ratio of the medians in the two data sets. We observe that Norway has more zero earners than the U.S. but, apart from the zeroes, the U.S. has more low earners.

INSERT FIGURE 1 ABOUT HERE

Comparing Income Distributions

Both of our data sets provide annual income measures between children's prenatal years and late adolescence. As shown in table 1, average household income increases across childhood in both countries but more rapidly in Norway (by 38 percent between the birth to age five and eleven to fifteen year age periods) than in the U.S. (where the comparable increase was 23 percent).[vi] This is presumably related to the higher economic growth in Norway compared with the U.S. over the period. As expected, there are lower within-period variances in the Norwegian data.

Childhood income distributions for the two countries are shown for early childhood (prenatal to age five) in figure 2 and the entire childhood period (prenatal to age fifteen) in figure 3. To focus exclusively on distributional differences, we convert Kroner into dollars using the ratio of the medians in the two data sets. Compared with the U.S. distribution, the Norwegian income distribution is compressed with relatively small right and left tails. Though it is well documented that these differences largely reflect important and actual differences in the income distribution between the two countries (see for example Aaberge et al. 2002), we cannot rule out that minor differences in how income is measured in the two datasets may be attributing to some of the differences in the distributions.

INSERT FIGURES 2 AND 3 ABOUT HERE

While average income rises more quickly across childhood for Norwegian than U.S. children, table 2 presents a more complete picture of income mobility between early and late

childhood. In this table, each child is sorted into his or her respective family income quintile for income averaged across early (the prenatal year to age five) and late (ages eleven to fifteen) childhood. Each row shows the proportion of the early income group's movement to later income groups. For example, among Norwegian children 46 percent of children who were in the lowest income quintile in early childhood were also in the lowest income quintile in adolescence, whereas 5 percent moved from the lowest into the highest income quintile. Corresponding U.S. figures are 56 percent and 1 percent, respectively – indicating less mobility out of the bottom in the U.S. By and large, table 2 shows somewhat greater income mobility among Norwegian than American children.[vii]

INSERT TABLE 2 ABOUT HERE

V. Results: Childhood income and adult attainments

To preview results from our full regression analysis, table 3 presents results from a series of descriptive regressions for both the Norwegian Registry and PSID samples. Across the columns of the first row, each of our three outcomes is regressed only on a measure of the seventeen-year average childhood income (prenatal through age fifteen). All coefficient estimates are standardized, so first-row entries amount to simple correlations between income and each of the outcomes. As expected, all of the correlations are positive, although, for schooling and especially earnings, are much smaller in the Norwegian than U.S. data.

INSERT TABLE 3 ABOUT HERE

In the second row (Model 2), the simple correlations shown in the first row are adjusted for the extensive set of background control variables noted in Section III, all of which are measured around the time of birth. In the U.S. data, all of the correlations become considerably smaller; in the case of unemployment the adjusted correlation is no longer statistically

significant. Thus, a substantial portion of the simple correlation between U.S. childhood income and these three adult outcomes can be accounted for by the disadvantageous conditions associated with birth into a low-income household. In the Norwegian data, adjustments for correlated background conditions drops the completed schooling correlation by more than half and the unemployment correlation by nearly half, but does not change the earnings correlation at all.

To assess whether increments to low income may matter more than increments to the incomes of children growing up in middle-class or affluent families, Model 3 regresses the adult outcomes on the natural logarithm of the seventeen-year average childhood income, plus background controls. Whereas our first two models assumed that an incremental dollar increase to a poor family's income had the same beneficial effect on a child's adult outcomes as the same increase to an affluent family's income, the logarithmic transformation assumes equal *percentage* effects. Higher standardized coefficients (in absolute value) in logarithmic as opposed to linear models would suggest that money may matter more for the outcomes of children reared in lower than higher income households.

As shown in the third (Model 3) row of table 3, the standardized coefficients for the logarithmic models are at least as large as the coefficients for the linear models (Model 2) for both the Norwegian and U.S. samples, although the jumps are much higher in the PSID. That is, the adjusted correlation with unemployment time becomes statistically significant again. Thus, these adult measures appear more sensitive to low childhood incomes in the U.S. relative to Norway.

To address the issue of the childhood stage-specificity income associations, the final (Model 4) regressions in table 3 replace the single seventeen-year average log childhood income

measure with three childhood stage-specific measures of log income. All background controls are included in these models. With each childhood stage accounting for approximately one-third of childhood, we would expect that the three coefficients should (approximately) sum to the all-childhood coefficient presented in Model 3. If childhood income mattered equally across all three stages, the three coefficients should be roughly the same size and about one-third the magnitude of the Model 3 coefficients.

In the case of completed schooling, adolescent income has larger associations than earlier incomes for both countries, with the correlation being almost twice as large in the U.S. than in Norway. Early income also has a statistically significant coefficient ($p<.05$) in both countries.

The largest stage-specific correlation is in the PSID between adult earnings and early childhood income. Indeed, for U.S. children, there appears to be little role for income beyond age five. In the case of adult earnings in the Norwegian data, early childhood and adolescent income have similar modest but statistically significant coefficients. The size and patterns of statistical significant in the case of unemployment suggests little role for income in any stage of childhood.

Taken together, the descriptive regression results shown in table 3 suggest that childhood stage matters in understanding links between childhood income and adult success, although not as much in the Norwegian compared with the U.S. data. Moreover, many of the adult outcomes appear to be more sensitive to increments to low as opposed to middle-class or higher family incomes.

A more detailed look at childhood-specific income effects is provided in the regression models shown in table 4. For each childhood stage's income, two spline coefficients are estimated. The first reflects the estimated effect of an additional $10,000 annual income in the

given stage for children whose income in that stage averaged less than $25,000 USD. All three sets of income variables, plus the background controls, are included in all regressions. The column labeled "Different Slopes" reports results from a statistical test of the null hypothesis of equal within-period slopes. The final row shows results for a test of equality of all three lower-income segment (<25K) slopes.

INSERT TABLE 4 ABOUT HERE

In contrast to table 3, coefficients in table 4 are unstandardized and therefore show changes in originally-scaled dependent variables associated with $10,000 increments to average childhood stage-specific income. The less than $25,000 results are termed the "lower-income" segment; the other results relate to what we will term the "higher-income" segment.

The most striking result in table 3 – of the importance of early childhood income for adult earnings in the PSID – persists in table 4. The ".56" coefficient means that, adjusting for income later in childhood and the other control variables, an additional $10,000 per year of family income between the prenatal year and the child's fifth birthday is associated an increase in the natural logarithm of adult earnings of .56 (75 percent). In contrast, $10,000 increments to early-childhood income for higher-income U.S. children are associated with a .04 (4 percent) increase in log earnings. The *p*-value reported in the "Different Slopes" column indicates that the slope for the lower income early childhood group is significantly different from the slope for those with higher income. More modest coefficient differences show up in the Norwegian earnings data – a $10,000 increment in low income early in childhood is associated with a .23 (26 percent) increase in adult log earnings; a comparable increment for higher-income children is associated with a .02 (2 percent) adult log earnings increase. In both countries' adult earnings regressions, early childhood income appears to matter more than income later in childhood.

Other results presented in table 4 produce fewer cross-country similarities. Focusing on coefficient size rather than significance level, income in adolescence appears to matter the most for Norwegian children but has an insignificant (and negative) coefficient estimate in the U.S. In the case of unemployment, the scaling of the dependent variable (as percent of years in which any unemployment is reported) produces larger coefficients, but only in the case of the PSID are the estimates larger than one (that is, a $10,000 income increase is associated with at least a one percentage point increase in the percent of years unemployed).

VI. Discussion

It has been suggested that the high mobility observed in the Scandinavian countries compared with the United States is a function of a variety of policies aimed at reducing inequality. The Norwegian welfare state, with its high-quality and universally available public programs, ranks low in terms of economic inequality (Bratberg et al. 2007). Nevertheless, we find a regression-adjusted correlation between low income experienced in early childhood in Norway and the chances of later-life economic success. These correlations are, however, substantially lower than in the U.S. data.

One potential puzzle is how early income can be linked (positively) to earnings but not (negatively) to unemployment. In our earlier PSID-based work (Duncan et al. 2010), we found that variation in adult work hours accounted for the bulk of the link between early childhood income and annual adult earnings and that childhood income had an insignificant effect on hourly earnings in adulthood. We investigated the work hours effects further by estimating whether early childhood income appeared to operate by reducing unemployment or time out of the labor force altogether as opposed to full versus part-time work. For both men and women, the income effects were strongest for full versus less-than-full time work. Lacking adequate

measures of work hours in the Norwegian Registry, we are unable to replicate these analyses, but at least for the U.S. data they suggest that the margin on which early childhood income has its biggest effect is in sustaining full time as opposed to part time work rather than avoiding unemployment.

Comparisons of intergenerational mobility across countries raise important questions about cross-national differences in whether countries offer fair opportunities for their citizens. As Bratberg et al. (2007) discuss, poor children may grow up to be poor adults because of inherited preferences for market work, inherited differences in market ability, or constraints on their ability to secure and invest in opportunities, such as for education and skill development (see also Roemer 2004). Many regard it as unfair that a child's future prospects depend on his or her parents' capabilities in these domains (Swift 2005)

The Norwegian welfare state has attempted in many ways to "level the playing field" with respect to the circumstances that are beyond children's control, including parental earnings.[viii] This has been especially true for publicly subsidized center-based child care, as well as for higher education which is publicly financed and for which there are no fees. Expansions of child care and educational opportunities in Norway have increased attainment over time for the most disadvantaged, as intended (Aakvik et al. 2005; Havnes and Mogstad 2009). As such, Norway, to a greater extent than in the U.S., has sought to reduce the importance of family background in securing opportunities typically associated with successful human capital development.

Nonetheless, we find continuity over time in the economic success of parents and offspring, even in a country as generous as Norway. An important task that remains is to identify the mechanisms that account for the intergenerational persistence of economic status and to

decide, as a society, the state's role in blocking or preventing these mechanisms. Few people believe that there should be complete independence between parents' and children's economic success. In the name of fairness, one may reasonably ask whether the state should play a role in mitigating circumstances whereby disadvantaged children are unable to realize their potential not simply because their parents lack the economics means but also because their parents lack the abilities, mental health, or knowledge to help them maximize their chances for success. After all, as Swift (2005) argues, from the child's perspective "what one's parents are like is entirely a matter of luck" (p. 267). From a normative perspective it may make no difference for the child whether it inherits genes or a supportive environment or money. This is a potentially more radical notion of equality, but it forces us to ask the question "What does it mean to 'level the playing field?'"

Swift (2005) offers one framework for thinking about which mechanisms producing intergenerational correlations in outcomes are "morally suspect," thereby warranting prevention or intervention, and which, in contrast, reflect the "essence" of the family and therefore should be respected as private interactions, valued and protected by society. In the former group, he argues, belong bequests of property, the purchasing of expensive education or advantaged neighborhoods, or access to superior healthcare. The latter group, in contrast, includes all manner of "spontaneous and informal parent-child interaction" (p. 274) that constitute children as the people they are or will become (Swift offers as examples such parental activities as reading bedtime stories, transmitting positive attitudes towards work, and talking about things at mealtimes). A key tenet in Swift's framework is that direct activities that allow parents to marshall their own resources to (unfairly) maximize their children's future economic well-being are the least worthy of respect. Although some private family interactions may, in fact, account

for the intergenerational persistence of economic success, Swift views this as an "accidental by-product" of such interactions (p. 275).

Three interrelated goals can help to guide our thinking on this issue. From an empirical perspective, the relative importance of different mechanisms in generating persistence across generations in economic status must be better understood. From a philosophical perspective, the lines between freedom of familial association and state intervention in the pursuit of equality of opportunity must continue to be debated. And from a policy perspective, the plausibility and practicability of different modes of state intervention must be assessed.

Empirical social scientists can contribute to these efforts by working to establish the channels that link early childhood poverty to later life outcomes. In the Norwegian case, we can rule out with greater certainty that such channels include reduced access to health care, education, and the like (indeed, recent evidence from a variety of countries seems to suggest that "the cultural capital" of families plays a key role in accounting for intergenerational correlations in economic status; Esping-Andersen 2004).

Unfortunately the administrative data we rely on here provide little insight into plausible mechanisms. One mechanism linking early childhood poverty to adult earnings identified in our previous work with the U.S. data (Duncan et al. 2010) was adult work hours – early childhood poverty predicted adult differences in individuals who were and were not successful in sustaining full-time working careers. But the factors that influence adult work hours are not entirely clear – individuals' preferences for long work hours and ability to maintain work are plausible "non-cognitive" skills that could be important, might be influenced by the attitudes and preferences that prevailed in the family of origin, and might not necessarily be related to the economic investments that parents did (or did not) make in raising their children. But this does not rule out

the potential importance of trying to shore up those skills with the same degree of effort that has been mounted to increase public supports to disadvantaged children via channels that operate largely outside of their families. As Esping-Andersen (2004) notes, such efforts are most likely to succeed when mounted in tandem with financial investments in disadvantaged families. Indeed, the analysis of Bratberg et al. (2007) suggests, importantly, that although constraints in the form of influence of family on offspring's preferences play an important role for those children who end up in the bottom of the Norwegian income distribution as adults, these constraints have weakened over time, in particular for this population, along with expansions in the Norwegian welfare state. These trends suggest that public-sector investments (such as in education or other socio-economic arenas) can affect the long-run influence of family background in the more private spheres of family preferences and aspirations.

Comparing the relative magnitude of the impact of early childhood poverty on the long-run outcomes in the two countries, it would be tempting to conclude that if the U.S. adopted some of the generous child-focused programs provided in Norway, it could reduce the deleterious effects of early childhood poverty that stem from constraints on accessing sufficient health care, higher education, and the like. But this is a difficult conclusion to draw given the relative homogeneity and small size of Norway versus the vast and heterogeneous landscape of the U.S. and the nature of behavioral responses to the policy changes. Nevertheless, evidence from studies such as by Dahl and Lochner (2008) have shown that expansions in U.S. social welfare programs such as the Earned Income Tax Credit can make meaningful improvements in the lives of poor children. That evidence, in concert with our present chapter's findings suggest it may be possible to dampen the influence of early childhood poverty with some of the more comprehensive programs and services provided by a generous welfare state.

Transfer policies directed toward children in the United States rarely take into account the age of the child. If indeed a child's development in early childhood is more sensitive to economic deprivation than later, then perhaps child age should figure more prominently into setting benefit levels. This could take the form of adding to the existing child tax credits or benefit levels for such families or, if budget constraints are binding, reducing the credits or benefits for families with older children in order to finance the higher benefits for families with young children. Targeting these transfers, or similar programs, to families with the youngest children may offer the largest benefit for later-life attainment and achievement.

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Figure 1: Median-equated Adult Earnings

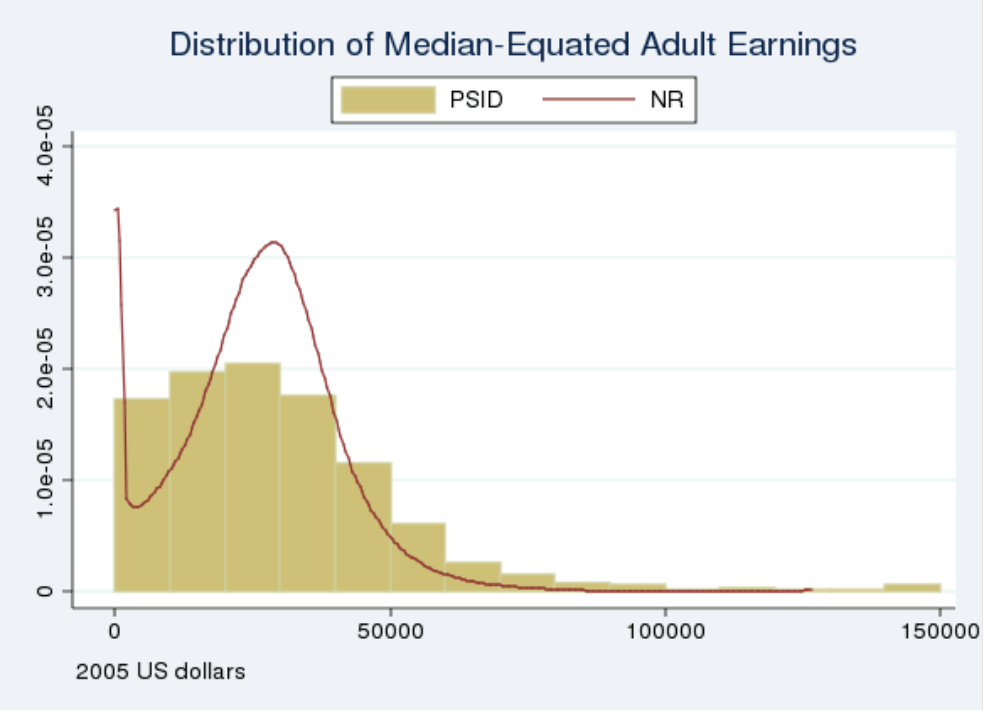


Figure 2: Median-equated Early Childhood Income

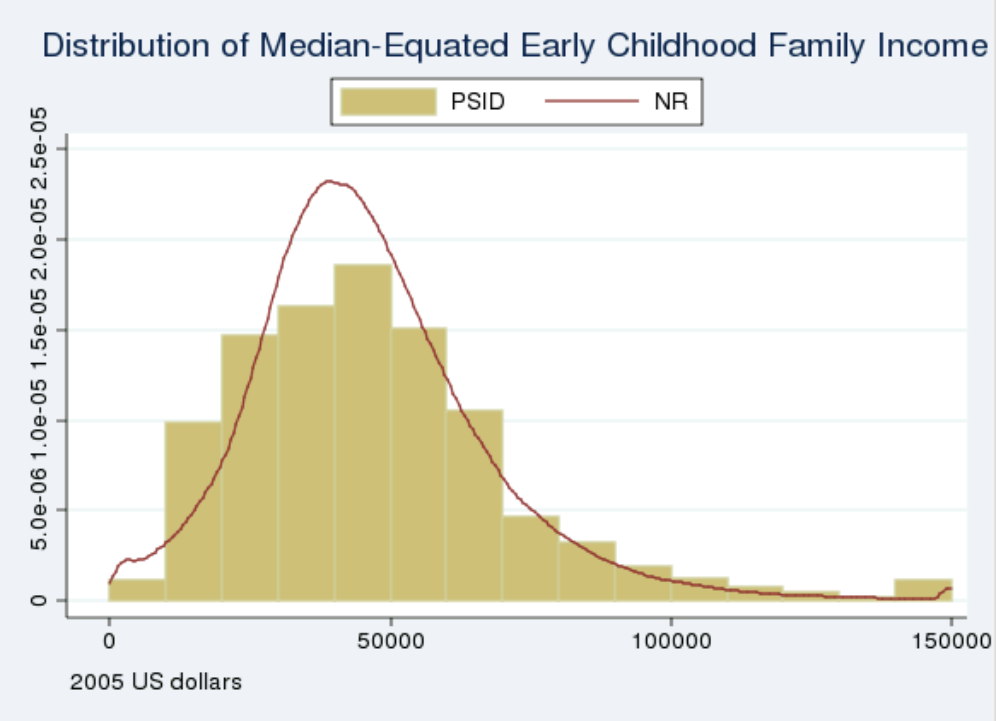
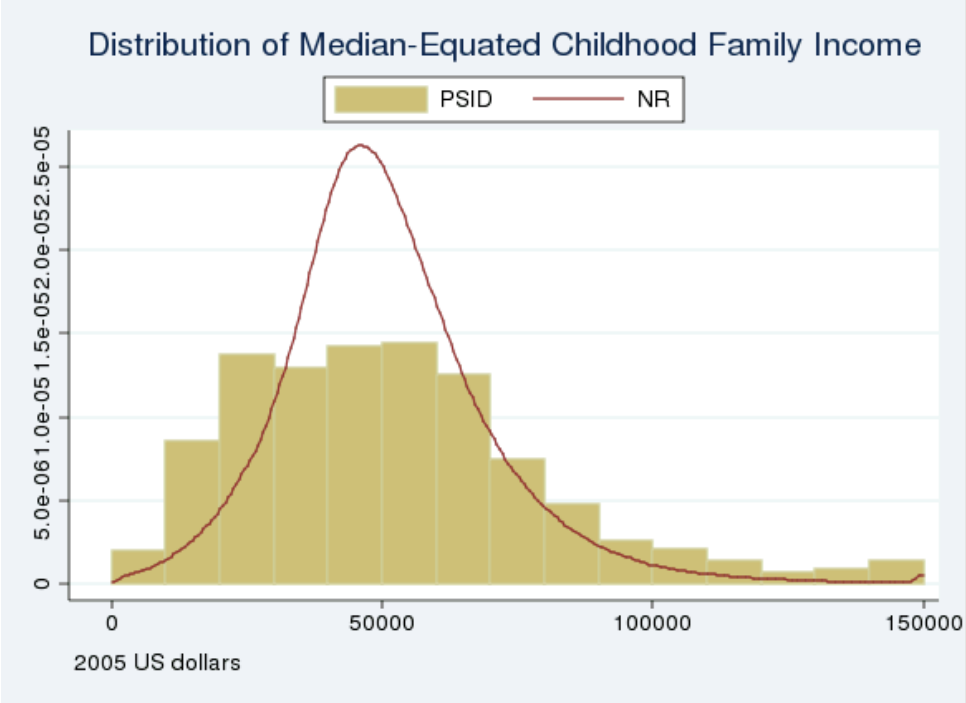


Figure 3: Median-equated All-Childhood Income



Endnotes

[i] Another common way of handling omitted-variable bias is with family fixed effects (sibling difference) models. We estimated such models with our PSID data and found qualitatively similar results but very large standard errors. Precision is not an issue with large-n Norwegian registries, and we intend to explore such models in future work.

[ii] With income reported for calendar years and conceptions occurring continuously, there was some imprecision in matching income to the prenatal year. If a child was born prior to July 1, we took the prenatal year to be the prior calendar year. If the birth was after July 1, then the prenatal year was considered to be the year in which the birth occurred. Similarly, we defined "under age six" as the last calendar year before the child's sixth birthday. Thus defined, our "early childhood" period consists of seven calendar years.

[iii] The registries provide us with unique identifiers for spouses, and we rely on mainly two assumptions to form households. First, we assume that married couples live together. Second, we assume that the two parents live together if they got an additional child together or got married after the birth of the child (and that they were neither married to someone else nor got a child with anyone else in between).

[iv] There may be a tendency to complete schooling at older ages in Norway than in the U.S. Experimentation with regressions where years of completed schooling were measured at age thirty in Norway, provided estimates of different magnitudes, but the main qualitative picture remained similar.

[v] In an effort to make the analyses as comparable as possible, we include control variables that are relatively identical in both countries. Our findings are robust to inclusion of early childhood measures of wealth in the Norwegian regressions; as well as a list of parental attitudes, expectations, and test scores available around the time of birth in the PSID regressions.

[vi] To facilitate comparability across the two countries in the 1970s, in table 1 we have converted income in Kroner to U.S. dollars *annually* using exchange rates (PPPs in brackets), and then to fixed 2005 U.S. dollars using the U.S. consumer price index. Elsewhere in the chapter we maintain comparability over time by following the conversion approach as outlined in Section III.

[vii] One potential reason for greater mobility out of low income is that Norwegian children might have incomes that are closer to the first quintile threshold. The final column shows that this was not the case – children in the lowest income quintile in both countries had income that averaged 76 percent of the first quintile cutoff. High-income children in the U.S. were 22 percent above the fifth quintile cutoff compared with 18 percent of Norwegian children.

[viii] It is important to keep in mind that our analyses of the effects of early childhood income use data from the 1970s, when the Norwegian welfare state was considerably less generous than it is today. To see if there were any trends in effects *within* our 1968-1975 birth cohorts, we reran our earnings models with a dummy variable for the 1968-71 subset of this cohort interacted with the two prenatal to age five spline segments. Small (but statistically significant) positive coefficients indicated that the first spline segment was indeed more steeply sloped (coefficient of .25 vs. .20) for the earlier cohorts, as was the coefficients on the second spline segment (roughly .04 vs. .02).

Table 1

Descriptive Statistics: Norwegian Registry and US Panel Study of Income Dynamics

	NR		PSID	
	Mean or Proportion	SD	Mean or Proportion	SD
Childhood income				
Prenatal to age 5	34,846 [26,722]	16,829	47,842	28,341
Age 6 to age 10	45,779 [33,538]	20,336	54,226	39,013
Age 11 to age 15	46,732 [37,007]	22,788	59,068	45,369
Demographics				
Female	49%	---	47%	---
First born	42%	---	42%	---
Number of siblings	1.97	1.29	2.21	1.79
Mother education	10.87	2.03	---	---
Father education	11.46	2.7	12.09	2.94
Age of mother at birth	26.22	5.37	24.84	5.76
Mother married at birth	92%	---	84%	---
Outcomes				
Completed schooling (years)	12.89	2.21	13.39	2.14
Average annual earnings	30,245 [24,230]	18,593	34,564	30,932
Percent years spent any time unemployed	11.88	18.34	9.92	18.00
N	*496,110*		*1,589*	

Note: Norwegian childhood income in Kroner converted annually to U.S. dollars using exchange rates (PPP-adjusted income is shown in brackets), and then to fixed 2005 dollars using the U.S. consumer price index. PSID is weighted using the attrition-adjusted weights provided in the dataset.

Table 2
Family Income Mobility across Childhood

NORWAY	Average family income between ages 11 and 15						
Average family income between the prenatal year and age 5	(Lowest) Quintile 1	Quintile 2	Quintile 3	Quintile 4	(Highest) Quintile 5		Ratio of median income (prenatal to age 5) to quintile breakpoint (prenatal to age 5)
Quintile 1	46	26	15	9	5	100%	0.76
Quintile 2	22	30	25	16	6	100%	
Quintile 3	15	23	27	24	11	100%	
Quintile 4	11	14	22	30	24	100%	
Quintile 5	7	7	11	21	54	100%	1.18

US (PSID)	Average family income between ages 11 and 15						
Average family income between the prenatal year and age 5	(Lowest) Quintile 1	Quintile 2	Quintile 3	Quintile 4	(Highest) Quintile 5		Ratio of median income (prenatal to age 5) to quintile breakpoint (prenatal to age 5)
Quintile 1	56	30	10	3	1	100%	.76
Quintile 2	29	32	22	12	5	100%	
Quintile 3	9	21	33	25	12	100%	
Quintile 4	4	11	23	38	24	100%	
Quintile 5	1	6	12	23	58	100%	1.22

Note: Table entries show proportion of the prenatal to age 5 income group in later period income group. Rows add up to 100%.

Table 3

Standardized Regression Coefficients from Various Models of Childhood Income and Adult Outcomes

		Years Completed Schooling		Annual Earnings (ln)		Percent Years Spent Any Time Unemployed	
		NR	PSID	NR	PSID	NR	PSID
Model 1--No controls; 17-year average childhood income	Prenatal to age 15	.20**	.34**	.08**	.27**	-.13**	-.12**
Model 2--Background controls; 17-year average childhood income	Prenatal to age 15	.08**	.18**	.08**	.18**	-.07**	-.04
Model 3--Background controls; natural logarithm of 17-year average childhood income	Prenatal to age 15	.10**	.28**	.11**	.27**	-.07**	-.09*
Model 4--Background controls; natural logarithm of average stage-specific childhood income	Prenatal to age 5	.01*	.15**	.09**	.21**	-.04**	-.04
	Age 6 to age 10	.01**	-.04	.00	.07	.00	.04
	Age 11 to age 15	.10**	.20**	.06**	.02	-.04**	-.10

Note: * $p < .05$, ** $p < .01$.

Table 4

OLS Spline Regression Models of Childhood Income and Years of Completed Schooling, Adult Earnings, and Percent of Years Spent any Time Unemployed

		Years Completed Schooling				Annual Earnings (ln)				Percent Years Spent Any Time Unemployed			
		NR		PSID		NR		PSID		NR		PSID	
		Coeff (SE)	Different Slopes	Coeff (SE)	Different Slopes	Coeff (SE)	Different Slopes	Coeff (SE)	Different Slopes	Coeff (SE)	Different Slopes	Coeff (SE)	Different Slopes
Average annual income	<$25K	.17**		.30		.23**		.56*		-.62**		-4.89	
		(.01)	**	(.33)	ns	(.01)	**	(.24)	*	(.11)	**	(4.31)	ns
Prenatal to age 5	>$25K	.00		.05		.02**		.04*		-.07		-.08	
		(.00)		(.04)		(.01)		(.02)		(.05)		(.27)	
Average annual income	<$25K	.13**		.78**		.06**		.13		-.41**		-1.78	
		(.02)	**	(.25)	**	(.01)	**	(.17)	ns	(.11)	**	(3.54)	ns
Age 6 to 10	>$25K	-.01**		-.06		-.01**		.01		-.10+		.31	
		(.00)		(.04)		(.01)		(.02)		(.05)		(.28)	
Average annual income	<$25K	.29**		-.26		.16**		-.09		-.14		.83	
		(.02)	**	(.20)	*	(.01)	**	(.13)	ns	(.16)		(2.36)	ns
Age 11 to 15	>$25K	.08**		.10**		.02**		.00		-.31**		-.32	
		(.00)		(.03)		(.01)		(.02)		(.10)		(.26)	
Test of equality of three <$25K coeffs		**		*		**		*		**		ns	

*Note: + p<.10, * p* <.05, ** *p*<.01. Regressions include controls for birth year fixed effects, child sex (female=1), whether the child was the first born to his/her mother, the total number of siblings,, the age of the mother at the time of the birth, and whether the child's mother was married at the time of the birth (and whether the child's mother was cohabiting at the time of the birth in NR). To account for parental schooling, both mothers' and father's education at birth were included in the NR regressions, and head schooling was included in the PSID regressions. Finally, about 430 fixed effects for mother's municipality of resident around time of birth were included in the NR regressions, and PSID regressions included controls for region of residence in the year of the child's birth. PSID regressions are weighted. In both sets of analyses standard errors are corrected to account for presence of siblings by clustering on the mother's ID. The columns "Different Slopes" provide the significance of the test that the low-income (<25k) and higher-income (>25K) slopes are different.