Why do wealthy parents have wealthy children?

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Abstract: Strong intergenerational correlations in wealth have fueled a long-standing debate over why children of wealthy parents tend to be well off themselves. We investigate the role of family background in determining children's wealth accumulation and investor behavior as adults. Our research design allows us to credibly control for genetic differences in abilities and preferences and to identify the effects of exogenous changes in specific dimensions of family background. The analysis is made possible by linking Korean-born children who were adopted at infancy by Norwegian parents to a population panel data set with detailed information on disaggregated wealth portfolios and socio-economic characteristics. The mechanism by which these Korean-Norwegian adoptees were assigned to adoptive families is known and effectively random. We use the quasi-random assignment to estimate the causal effects from an adoptee being raised in one type of family versus another. Our findings show that family background matters significantly for children's accumulation of wealth and investor behavior as adults, even when removing the genetic connection between children and the parents raising them. In particular, adoptees raised by wealthy parents are more likely to be well off themselves, whereas adoptees' stock market participation and portfolio risk are increasing in the financial risk taking of their adoptive parents. These intergenerational causal links are not driven primarily by inter vivos transfers or bequests. The detailed nature of our data allows us to explore other mechanisms, assess the generalizability of the lessons from adoptees, and compare our findings to results from behavioral genetics decompositions.

Keywords: Intergenerational transmission; wealth; financial risk taking; family background

JEL codes: D31; J62

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1 Introduction

Why do children of wealthy parents tend to be well off themselves? The evidence of an acceleration of wealth inequality over the past few decades has fueled a growing interest in this question among policymakers and researchers alike.[1] Several explanations have been proposed. One is a pure selection story; parents may genetically pass on abilities and preferences, creating intergenerational associations in income, savings behavior or financial risk taking. This can generate a strong correlation in wealth across generations even if there is no actual effect of parents' wealth or behavior on the child. Another story is one of causation, where children's accumulation of wealth depends on the actions of their parents. An intergenerational causal link can operate through a number of channels, including direct transfers of wealth (inter vivos or through inheritance), parental investment that promotes children's human capital and earnings capacity, or learning of attitudes and traits that influence children's savings propensity or financial risk taking.

The research to date has been limited in its ability to distinguish between selection and causation in the intergenerational correlation of wealth (for a recent review, see Black and Devereux, 2011). However, sorting out these scenarios is central to understand how economic conditions or government policies may shape the persistence of wealth inequality across generations. In this paper, we investigate the role of family background in determining children's accumulation of wealth and investor behavior as adults. Our research design allows us to credibly control for genetic differences in abilities and preferences and to identify the effects of exogenous changes in specific dimensions of family background.

The analysis is made possible by linking Korean-born children who were adopted at infancy by Norwegian parents to a population panel data set with detailed information on disaggregated wealth portfolios and socio-economic characteristics. We provide empirical evidence and institutional details showing that the mechanism by which these Korean-Norwegian adoptees were assigned to pre-approved adoptive families is known and effectively random. Any relation between the outcomes of the adoptees and their adoptive parents is therefore driven by the influence parents have on their children's environment and not by parents passing on their genes.

We use the quasi-random assignment of the Korean-Norwegian adoptees to

[1] For evidence on the evolution of wealth inequality over time, see e.g. Piketty and Zucman (2014), Roine and Waldenstrom (2014), and Saez and Zucman (2014).

estimate the causal effects from a child being raised in one type of family versus another.[2] Our findings show that family background matters significantly, even after removing the genetic connection between children and the parents raising them. In particular, adoptees raised by wealthy parents are more likely to be well off themselves, whereas adoptees' stock market participation and portfolio risk are increasing in the financial risk taking of their adoptive parents. To assess the sensitivity of these results, we perform a number of robustness checks. We show that our main findings do not change appreciably if we use high quality measures of financial wealth or imperfect measures of gross wealth or net worth; if we estimate the impacts on the mean wealth or the median wealth; if we measure wealth at the household or the individual level; if we vary the age at which wealth is measured; and if we use rank-rank or log-log specifications to characterize the intergenerational associations in wealth.

To help interpret the economic significance of family background, we estimate intergenerational associations in wealth separately for adoptees and their non-adopted siblings. This enables us to compare the predictive influence of family background when there is and is not a genetic link between children and the parents raising them. We find that wealth shows less transmission from parents to adoptees as compared to non-adoptees, whereas parental transmission of financial risk taking depends little on a genetic connection to the child. These findings complement previous evidence which suggests that measures of human capital show less transmission from parents to adoptees as compared to measures of risky behavior like drinking or smoking (see e.g. the review in Sacerdote, 2010).

Taken together, our findings provide new insights into the role of family background in determining children's wealth accumulation and investor behavior as adults. At the same time, they raise a number of questions such as: What are the mechanisms through which parents influences children? What can we learn from adoptees about the population of children at large?

We take several steps to shed light on these important but difficult questions. First, we examine whether the effects of parental wealth and investor behavior operate through other observable characteristics of childhood rearing environment. Our estimates suggest the effects are not operating through parents' education and household income or children's sibship size and place of residence in childhood.

Second, we show that the predictive influence of parental wealth and investor behavior remain strong if we condition on observed inputs to children's wealth

[2]As discussed in greater detail later, our analysis uses the same identifications strategy as Sacerdote (2007) though applied to a distinct question and set of outcomes.

accumulation and financial risk taking, including the adoptees' education and labor income as well as the direct transfers of wealth from their parents. One interpretation of this finding is that differences in childhood rearing environment create heterogeneity in wealth and portfolio choices, in part, by shaping the savings behavior and risk taking of individuals with similar economic resources.[3] Consistent with this interpretation, we find that being raised by parents who take more financial risk makes the adoptees engage in risky behavior also in contexts other than financial decision making.

Third, we examine three possible reasons why the external validity of adoption results might be limited: Adoptive parents may be different from other parents; adoptive parents may treat their children differently; and adoptees may be different from other children. Using the rich Norwegian data, we try to infer whether any of these differences are empirically important in our setting with Korean-born children who were adopted at infancy. We find suggestive evidence that the adoptive parents do not differ significantly from other parents when it comes to intergenerational wealth transmission. Furthermore, the socio-economic characteristics of the Korean-Norwegian adoptees and their adoptive parents are broadly similar to that of other children and parents (who are born in the same period).

Our study complements a small but growing literature that documents the intergenerational correlations in wealth across countries (see e.g. Charles and Hurst 2003; Boserup, Kopczuk, and Kreiner, 2014). What makes our study unique is the ability to credibly control for genetic differences in abilities and preferences and to identify the effects of exogenous changes in specific dimensions of family background. While our paper is the first to utilize assignment of adoptees to estimate the impact of family background on wealth accumulation and investor behavior, the approach has provided important evidence in other settings. A number of papers look at the transmission of other socio-economic variables from parents to adoptees and non-adoptees.[4] One concern, however, is that in many adoption studies it is difficult to establish a causal relationship between family background and children's outcomes because of selective placements. Selection effects can occur because parents request children with certain characteristics (such as gender and age) or because the adoption agencies may use information about the adoptees (or

[3]Theoretical models emphasize a key role for the intergenerational transmission of preferences and attitudes in the persistence of choices and outcomes (see e.g. Bisin and Verdier, 2000). Empirical evidence shows that attitudes to risk taking are correlated across generations (see e.g. Dohmen, Falk, Huffman, and Sunde, 2012), and a number of studies document the importance of attributes shaped in childhood in determining adult outcomes (Heckman and Mosso 2014).

[4]See e.g. Dearden, Machin, and Reed (1997); Björklund, Lindahl, and Plug (2006); Sacerdote (2007); Plug (2004); and Holmlund, Lindahl, and Plug (2011).

their biological parents) to assign children to adoptive families. A few adoption studies try to address this concern. For example, Björklund et al. (2006) and Björklund, Jäntti, and Solon (2007) use information on the adoptees' biological parents to control for their observable characteristics, hoping that any remaining bias is small. By comparison, Sacerdote (2007) takes advantage of information on Korean-born children who were quasi-randomly assigned to approved adoptive families in the U.S. He finds large effects on adoptees' risky behavior and smaller but significant impacts on their education and income from assignment to adoptive parents with more education or fewer biological children. Our analysis uses the same identifications strategy as Sacerdote (2007) though applied to a distinct question and set of outcomes.

Our paper is also related to a literature in household finance on why observationally equivalent individuals make widely different financial decisions, such as whether to invest in the stock market and the choice of portfolio risk (Campbell, 2006; Guiso and Sodini, 2013). This literature aims at sorting out the underlying contributions of pre-birth factors, including genes and prenatal environment, from post-birth factors such as family environment. Important evidence comes from behavioral genetics decomposition of financial risk-taking (Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace, 2010; Barnea, Cronqvist, and Siegel, 2010) and saving decisions (Cronqvist and Siegel, 2015) of identical and fraternal twins. These studies suggest that an individual's financial decisions have a significant genetic component, while family environment plays a minor role. However, recent work opens the possibility that twin studies overestimate the genetic pre-determination of individual behavior at the expense of family environment (see e.g. Björklund et al., 2006; Sacerdote, 2010; Calvet and Sodini, 2014). To directly compare what we find to the household finance literature, we provide an interpretation of our data through the lens of a behavioral genetics model. The results from this model indicate that family environment is more important than genes in explaining the variation in children's financial risk taking if the researcher uses data on (randomly assigned) adoptees instead of twins.

The remainder of this paper proceeds as follows. Section 2 presents our data. Section 3 describes how the adoptees were assigned to families. Section 4 presents our research design, describes our main findings, and discusses their economic significance and robustness. Section 5 explores mechanisms, assesses the generalizability of the lessons from adoptees, and compares our findings to results from behavioral genetics decompositions. The final section summarizes and concludes.

2 Data and sample selection

Below we describe our data and sample selection, while details about the data sources and each of the variables are given in Appendix Table B.1.

2.1 Data sources and variable definitions

Our analysis employs several data sources from Norway that we can link through unique identifiers for each individual and family. Information on adoptees comes from the national adoption registry, which contains records on all native-born and foreign-born adoptees since 1965. The data set includes information about the adoptees (such as date of birth, gender, country of origin, date of adoption) and identifiers of the adoptive parents. We merge this information with administrative registers provided by Statistics Norway, using a rich longitudinal database that covers every resident from 1967 to 2011. For each year, it contains individual socio-economic information (including sex, age, marital status, educational attainment, income, and gross wealth) and geographical identifiers. Over the period 1993-2011, we can link these data sets with information for every Norwegian on most types of assets holdings and liabilities (such as real estate, financial portfolio, debt). The values of assets holdings and liabilities are measured at the last day of the year.

These data have several advantages over those available in most other countries. First, there is no attrition from the original sample due to refusal by participants to consent to data sharing. In Norway, these records are in the public domain. Second, our income and wealth data pertain to all individuals, and not only to jobs covered by social security, individuals who respond to wealth surveys, or households that file estate tax returns. Third, most components of income and wealth are third-party reported (e.g. by employers, banks and financial intermediaries) and recorded without without any top or bottom coding. And fourth, unique identifiers allow us to match spouses to one another and parents to (biological or adoptive) children.

The key limitation of our wealth data is that tax appraisals of real estate do not reflect the actual market values.[5] Therefore, our main analysis focuses on *financial wealth*, which includes bank deposits, bonds, stocks (of listed and non-listed companies), mutual funds and money market funds. We take three year averages of financial wealth of each household to reduce the influence of transitory changes, as

[5]The Norwegian Tax Authorities stipulates that the tax value of real estate should be about 25 percent of the market value (Fagereng, Gottlieb, and Guiso, 2015). However, the tax values are not always updated regularly (especially prior to 2009), which may create measurement error when converting tax values to market values.

often done in the literature (see e.g. Charles and Hurst, 2003; Boserup et al., 2014).[6] To analyze how people compose their investment portfolio, we follow the literature in considering a two asset-portfolio: Risky assets are defined as the sum of mutual funds with a stock component and directly held stocks; the other components of financial wealth are classified as non-risky assets. Our primary measure of portfolio risk, which we denote *risky share*, is the proportion of the financial wealth invested in risky assets over the three year period. We complement this measure of portfolio risk with a *stock market participation* indicator, taking the value one if at least some fraction of financial wealth is invested in risky assets over the three year period. Broadly similar measures of financial risk taking have been used by recent studies of financial risk-taking, such as Cesarini et al. (2010), Barnea et al. (2010), and Calvet and Sodini (2014).

While focusing on financial wealth helps in addressing concerns about measurement error, it raises the question of whether our findings generalize to broader measures of wealth. In Section 4.3, we therefore perform sensitivity checks to make sure that our findings are robust to using measures of gross wealth (net worth), defined as the sum of financial wealth and real estate (net of debt).[7] This section also presents results from other specification checks. We perform median regressions which are less sensitive to extreme values, finding that effect estimates on the median are quite similar to those on the mean. We use alternative summary measures of the intergenerational associations in wealth, including the traditional log-log specifications and the correlation between parent and child percentile ranks. We investigate the sensitivity of the results to whether children's wealth and their portfolio risk are measured at the household or the individual level; the estimates do not differ appreciably. Our baseline specification is based on household level measures, in part to incorporate any effect of family background that operates through assortative mating but also to avoid making arbitrary splits across spouses of jointly owned assets.[8]

Our main analysis is based on parental financial wealth observed in 1993-1995 and children's financial wealth observed in 2009-2011. By focusing on these years, we get reliable and comparable measures of wealth for both the children and their parents. At the same time, it means that the ages at which child and parental wealth are measured vary across cohorts. In our baseline specification, we follow

[6]The estimates do not change appreciably if we instead use yearly data on wealth.

[7]In constructing the measures of gross wealth and net worth, we follow the guidelines of the Norwegian Tax Authorities and multiply the reported tax value of real estate by four.

[8]In Norway, married couples file separate income and wealth tax returns. However, total taxes paid do generally not depend on how spouses split the values of jointly owned assets.

Charles and Hurst (2003) and Boserup et al. (2014) in pooling the cohorts in our estimation sample while flexibly controlling for age of children and parents at the time at which their wealth is measured. This specification produces a weighted average of potentially heterogeneous effects across different ages. In Section 4.3, we show that our main findings are fairly robust to the age at which we measure child and parental wealth. This section also addresses concerns over simultaneity bias from measuring parental wealth after the adoptive parents observe the quality and behavior of their adoptive children.

2.2 Sample selection and summary statistics

In most of our analysis, we study Korean-born children who were adopted by Norwegian parents. We refine the sample of these Korean-Norwegian adoptees to be appropriate for studying the role of family background in determining children's wealth accumulation and investor behavior as adults. We begin by restricting the sample to children who were adopted at infancy (eighteen months or less). The reason for this sample restriction is to capture as much as possible of the differences in early child environment across adoptive families. We further restrict the sample to adoptees who were born between 1965 and 1986. This sample restriction allows us to observe the adult outcomes and behavior for a sizable sample of adoptees.

Taken together, these restrictions give us a baseline sample of 2 265 Korean-Norwegian adoptees. Table 1 displays summary statistics of the baseline sample, while Figure 1 shows the distribution of financial wealth of adoptees. The adoptees are between the ages of 25 and 46 in 2011; on average, the age is 32.8.[9] The adoptees are more likely to be female, and they have on average 15 years of schooling and almost USD 100 000 in household income.[10] Over the period 2009-2011, the mean financial wealth is about USD 47 000, of which 12 percent is invested in risky assets. During these years, none of the adoptees had zero or negative financial wealth. Around two out of five adoptees participate in the stock market at least once over the period 2009-2011.

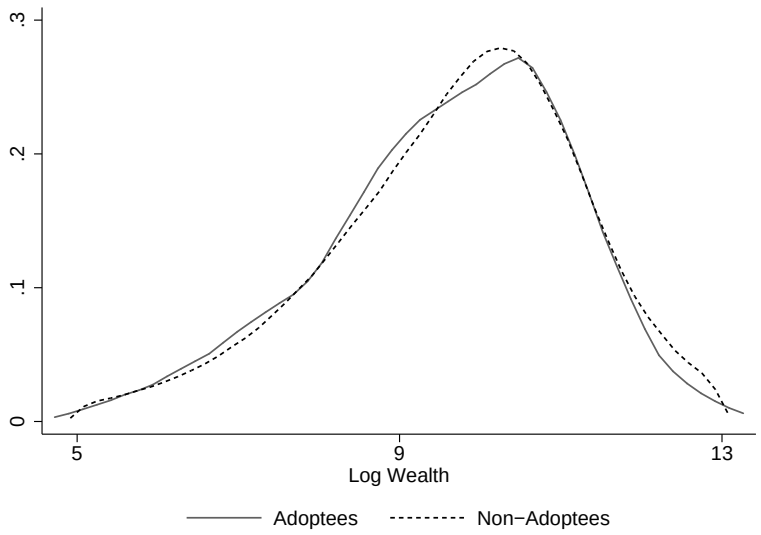
In Table 1 and Figure 1, we also provide a comparison of the Korean-Norwegian adoptees and the population of non-adoptees (children raised by their biological parents), making sure that both groups of children were born between 1965 and 1986. The adoptees tend to be a few years younger and they are more likely to be female. More importantly, the Korean-Norwegian adoptees are fairly comparable

[9]The lower age restriction is the same as in Charles and Hurst (2003). By comparison, Boserup et al. (2014) include children who are at least 21 years of age.

[10]Throughout this paper, all monetary figures are in USD, 2011 prices. We have used the following exchange rate: NOK/USD = 5.61.

to the non-adoptees in their distribution of wealth and investor behavior. We can also see that adoptive parents have, on average, higher income and financial wealth than parents who do not adopt. However, these differences are largely because the adoptive parents in our sample tend to be somewhat older; as shown in Section 5.2, the socio-economic characteristics of the adoptive parents are broadly similar to those of other parents once we condition on their birth years.

Figure 1. Distribution of financial wealth for Korean-Norwegian adoptees and Norwegian non-adoptees



Notes: The figure plots kernel density estimates of the distribution of (log) financial wealth for the Norwegian non-adoptees and the Korean-Norwegian adoptees (see Table 1 for further details).

Table 1. Descriptive statistics of key outcomes and characteristics for Korean-Norwegian adoptees and Norwegian non-adoptees

	Korean-Norwegian adoptees		**Norwegian non-adoptees**	
Variable	Mean	Std. Dev	Mean	Std. Dev
A. Children				
Age, 2011	32.8	5.1	36.1	6.4
Gender	0.7	0.4	0.5	0.5
Years of schooling, 2011	15.0	2.9	14.1	3.0
Mean income, 2009-2011	98 927	75 699	113 736	76 649
Mean financial wealth, 2009-2011	47 156	104 412	54 873	118 030
Risky assets, 2009-2011:				
Participation	0.421	0.494	0.465	0.499
Share	0.120	0.217	0.149	0.245
B. Parents				
Mother's, 2011:				
Age	64.0	6.1	62.7	8.2
Years of schooling	12.7	2.6	12.0	2.6
Father's, 2011:				
Age	66.2	6.6	65.7	8.9
Years of schooling	13.3	3.0	12.5	3.0
Number of children	1.7	0.7	2.3	1.0
Mean income, 1993-1995	91 479	44 700	75 524	45 766
Mean financial wealth, 1993-1995	48 589	76 376	39 331	69 685
Risky assets, 1993-1995:				
Participation	0.359	0.429	0.384	0.486
Share	0.139	0.228	0.118	0.219
Number of children	2 265		1 204 386	

Notes: The Korean-Norwegian adoptees are born in South Korea between 1965 and 1986, and adopted at infancy (not older than 18 months) by Norwegian parents. The non-adoptees are born in Norway between 1965 and 1986, and raised by their biological parents. All monetary values are measured in USD, 2011 prices. Income and wealth are measured at the household level. Risky assets are defined as the sum of mutual funds with a stock component and directly held stocks. Risky share is measured as the proportion of the financial wealth invested in risky assets over the three year period. Stock market participation is an indicator variable taking the value one if at least some fraction of financial wealth is invested in risky assets over the three year period. Number of children of the parents includes own-birth and adopted children.

Table 2 summarizes the dependence in wealth across generations by displaying parents' and children's relative positions in the financial wealth distributions. Panel A considers the non-adoptees, whereas panel B shows results for the Korean-Norwegian adoptees. To adjust for age differences, each panel is based on separate regressions

of child and parent log financial wealth on a full set of indicators for birth years of children and parents (and year of adoption for the adoptees); we then split the residuals from these two regressions into five equal segments, and create parent-child wealth transition matrices. Each element of the matrix shows the probability that a child belongs to the a ith quintile of the distribution for children, given that her parents belong to the jth quintile of the parental distribution. The more independent children's and parents' wealth are, the greater the likelihood that the elements of this transition matrix should be close to one-fifth.

Table 2. Intergenerational transition matrix of age-adjusted wealth position

A. Norwegian non-adoptees: Child age-adjusted wealth quintile (2009-2011)	Parental age-adjusted wealth quintile (1993-1995)				
	1	2	3	4	5
1	36	24	18	13	9
2	24	23	21	18	13
3	17	21	22	22	18
4	13	18	21	24	24
5	10	14	18	23	36
Total	100	100	100	100	100

B. Korean-Norwegian adoptees Child age-adjusted wealth quintile (2009-2011)	Parental age-adjusted wealth quintile (1993-1995)				
	1	2	3	4	5
1	27	19	20	20	15
2	24	19	19	19	18
3	19	22	23	19	17
4	15	23	21	21	20
5	15	17	17	21	30
Total	100	100	100	100	100

Notes: The table displays transmission matrices for wealth quintiles of two different samples of parents and children: Norwegian non-adoptees (N=1 204 386) and Korean-Norwegian adoptees (N=2 265). See Table 1 for further details. To adjust for age differences, each panel is based on separate regressions of child and parental log financial wealth on a full set of indicators for birth years of children and parents (and year of adoption for the adoptees).

Panel A shows substantial persistence in wealth position from parents to non-adopted children. For instance, 36 percent of parents in the lowest age-adjusted wealth quintile have children whose wealth places them in that same quintile in the children's adjusted wealth distribution. Only 9 percent of parents in the highest quintile have children whose wealth places in the lowest quintile in the child distribution. Similar persistence is evident at the other tail of the parental wealth distribution.

Panel B suggests lower but still considerable persistence in the wealth position from adoptive parents to adopted children. 27 percent of adoptive parents in the lowest age-adjusted wealth quintile have adoptive children whose wealth places them in that same quintile in the children's adjusted wealth distribution. 15 percent of adoptive parents in the highest quintile have adoptive children whose wealth places in the lowest quintile in the child distribution. Similar persistence is evident at the other tail of the adoptive parents' wealth distribution. Taken together, the two panels in Table 2 point to the presence of intergenerational links in wealth accumulation, even after removing the genetic connection between children and the parents raising them. Indeed, a likelihood ratio chi-squared test confirms the persistence evident in the table: In each panel, we can strongly reject the hypothesis that the entries in the wealth position transition matrix are equal to each other (p-value < 0.001).

2.3 Comparison to other developed countries

A small but growing literature is documenting intergenerational correlations in wealth across countries. Consider the research most related to our study. Charles and Hurst (2003) describe the persistence of wealth inequality across generations in the United States. Their analysis focuses on net worth, based on the information available in the PSID about the value of assets minus the value of liabilities. By comparison, Boserup et al. (2014) use administrative data from Denmark to construct measures of net worth among parents and children. Both these studies measure child and parental wealth at similar ages as we do.

In Appendix Table B.9, we compare the intergenerational wealth associations that we observe in our data to those reported in Charles and Hurst (2003) and Boserup et al. (2014). We begin by comparing results from traditional log-log specifications. For comparability, we also focus on net worth, restricting the sample to parent-child pairs in which both the child and the parent had positive net worth when measured. The intergenerational elasticity is lower in Norway (0.20) and Denmark (0.26) as compared to the United States (0.37). This finding is not surprising. The Nordic countries has a relatively homogeneous population and a high degree of redistribution. Indeed, comparative studies tend to find lower intergenerational earnings elasticities in the Nordic countries as compared to the United States (Lindersø and Heckman, 2015).

An alternative way to summarize the intergenerational associations in wealth is to look at the positions of children and parents in the wealth distribution measured

by within-cohort ranks. The rank-rank measure has the advantage of working well with zero and negative observations, which occurs in data on net worth. While Charles and Hurst (2003) do not explore the relationship between the wealth ranks of children and parents, Boserup et al. (2014) find a rank-rank correlation of .27 in Denmark. Using the same specification, we find a a rank-rank correlation of about .18. This indicates that there is more churning in wealth position across generations in Norway as compared to Denmark.

3 Assignment of adoptees to families

This section documents how the Korean born adoptees were assigned to Norwegian families.

3.1 Assignment process

Between 1965 and 1986, a large number of South Korean children were adopted into Norwegian families, making Korean-born children the largest group of foreign adoptees in Norway. The majority of Korean-born children sent for adoption were born to lower- or middle-class unwed mothers.

During the period we consider, virtually all the Korean-Norwegian adoptees were handled through the organization called Children of the World, Norway (CNW). This organization has its origin in the Norwegian Korean Association, which was founded in 1953 by personnel at the Norwegian field hospital stationed in South Korea during the Korean War. In the 50s and early 60s, CNW conveyed contact between Norwegians who wanted to adopt children and Korean institutions that arranged adoption to foreign countries. In the 1960s, the organization was granted a unique license for adoption arrangement from South Korea to Norway and started its cooperation with Holt International Children's Services in Korea.

The process of adoption from South Korea to Norway consisted of several steps.[11] The first step was the submission of an application to CNW for review by case examiners. Adoptive parents had to meet several pre-specified criteria, including being married for three years or longer, an age difference between the spouses of less than ten years, and a minimum family income. At the time of application, the adoptive parents also had to be between the ages of 25 and 40, and have no more than 4 children. If the applicant satisfied these formal criteria, a case examiner met the adoptive parents to talk about their personal history and family relationships.

[11] Our description of the process is based on written documentation from CNW and interviews with its employees. See Sacerdote (2007) for a discussion of a similar assignment process of Korean-born children to American families.

This home study had to be approved before a family was qualified to adopt. The entire review process usually took about one year.

The next step in the adoption process was that CNW sent the approved files to Holt Korea, which assigned children in its system to the adoptive families in the order the applications arrived, without other biases or preferences. This first come, first served policy meant that precisely which adoptee that was assigned to which family depended on the order the application arrived rather than the characteristics of the child or the adoptive parents. As a result, assignment of children to pre-approved adoptive families should be effectively random conditional on the time of adoption. Importantly, adoptive parents could not specify the gender, age or anything else about the child they wanted to adopt.

3.2 Verifying quasi-random assignment

Table 3 verifies that the queuing policy created a setting where assignment to adoptive families is as good as random conditional on time of adoption. This table conducts the same type of statistical tests that would be done for a randomized controlled trial to verify compliance with randomization. We regress pre-assignment characteristics of the adoptee on pre-assignment characteristics of the adoptive family. Each column is a separate regression. The dependent variables are the adoptee's age at adoption and gender.[12] These are important characteristics to test for selective placements, as many countries other than South Korea allowed adopting parents to choose or request the age and gender of their child.

The first and fourth column of Table 3 use the same family background characteristics as Sacerdote (2007) in his randomization test: the log of family income, father's years of schooling, mother's years of schooling, and log median income in the county of residence in childhood. The other columns add key regressors for parent's financial wealth and investor behavior. In the second and fifth column, we measure parental financial wealth in 1993-1995; in the third and sixth column we measure parental gross wealth around the time of adoption. All regressions include dummies for calendar year of adoption and birth cohort. None of the family background characteristics are statistically significant predictors (at the 5 % significance level) of adoptee's age or gender. In fact, the point estimates are small, and taken together, the family characteristics explain very little of the variation in the adoptee characteristics.

To assess the power of the randomization test, we have run the same regressions

[12]Sacerdote (2007) also have information about the Korean adoptee's weight and height upon entering the Holt system. His results show that the queuing policy of the Holt system generates no correlation between these variables and the pre-assignment characteristics of the adoptive family.

Table 3. Testing for quasi-random assignment of Korean-Norwegian adoptees

	Dependent variable:					
Regressors	**Age at adoption**			**Female adoptee**		
Family (log) income	-0.00868	-0.00898	-0.00842	0.01597	0.01534	0.01597
	(0.00745)	(0.00748)	(0.00748)	(0.01320)	(0.01320)	(0.01320)
Mother's years of schooling	-0.00042	-0.00052	-0.00047	0.00058	0.00006	0.00037
	(0.00209)	(0.00211)	(0.00211)	(0.00387)	(0.00391)	(0.00388)
Father's years of schooling	0.00166	0.00159	0.00165	-0.00024	-0.00037	-0.00002
	(0.00185)	(0.00189)	(0.00186)	(0.00352)	(0.00355)	(0.00352)
Median (log) income in childhood county	-0.03881	-0.04079	-0.03778	0.06893	0.06482	0.06649
	(0.02759)	(0.02772)	(0.02771)	(0.04232)	(0.04235)	(0.04259)
Parental (log) financial wealth, 1993-1995		0.00359			0.00764	
		(0.00267)			(0.00456)*	
Parental stock market participation, 1993-1995		-0.01641			-0.00432	
		(0.01346)			(0.02310)	
Parental risky share, 1993-1995		0.02209			-0.03055	
		(0.02933)			(0.05050)	
Parental (log) wealth at at adoption			-0.00520			-0.00287
			(0.00586)			(0.01044)
Dependent mean	0.79	0.79	0.79	0.75	0.75	0.75
F-statistic for joint significance of regressors	1.03	1.01	0.97	1.21	1.14	0.92
[p-value]	[0.38]	[0.42]	[0.43]	[0.31]	[0.33]	[0.46]
Partial R-squared of regressors	0.002	0.003	0.002	0.002	0.003	0.002

Notes: Each column is a separate regressions of a pre-determined characteristic of the adoptee (age at adoption or gender) on family background variables and a full set of indicators for birth years of children and parents and year of adoption. The estimation sample consists of 2 265 Korean-Norwegian adoptees (see Table 1 for further details). Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

for native-born children who were adopted by Norwegian families. These domestic adoptions were not assigned through a queuing policy, and some of them occur between related family members. Selective placement can also occur between unrelated individuals because adoptive parents could request children with certain characteristics or because the adoption agencies used information about the adoptees (or their biological parents) to assign children to adoptive families. Indeed, the regression results show significant correlations between adoptive parents' education and family income and the adoptee characteristics. The evidence of significant non-random assignment of domestic adoptions is not driven by larger a sample size, as there are a similar number of native-born adoptees and Korean born adoptees.

4 Empirical analysis

This section presents our research design, describes our main findings, and discusses their robustness.

4.1 Research design and parameters of interest

We use the quasi-random assignment of Korean adoptees to estimate the causal effects from a child being raised in one type of family versus another. In our main analysis, we take the baseline sample of Korean-Norwegian adoptees and run OLS regressions of the model:

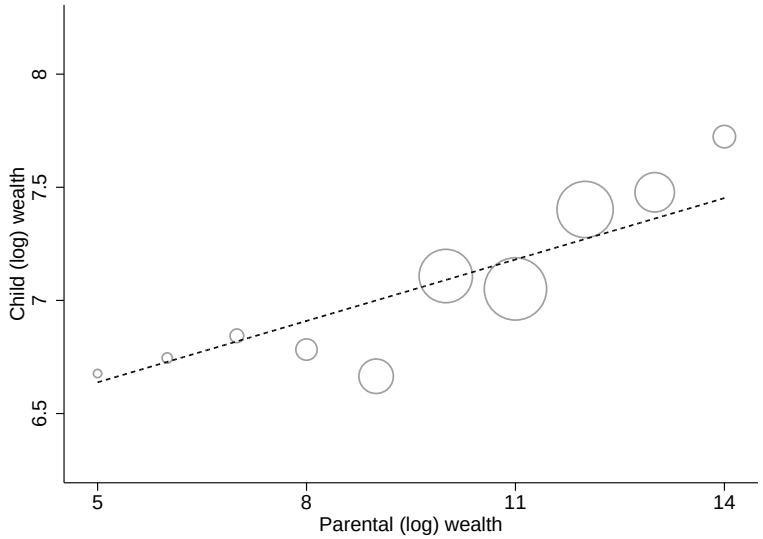
$$y = x'\beta + w'\theta + \epsilon \tag{1}$$

where y denotes the adult outcome of the adoptee, x is a vector of observable characteristics of his adoptive family, and w is a vector of controls, including a full set of indicators for calendar year of adoption and the birth year of both the adoptee and his adoptive parents.

Our interest is centered on estimating β, giving the effect of being raised in different types of families as described by their observables x. We will be estimating several specifications of equation (1). To fix ideas, consider a simple specification in which y is measuring the (log of) financial wealth of the child and x includes only the (log of) financial wealth of the adoptive family. Due to the quasi-random assignment, β is a child-parent wealth elasticity that can be interpreted as a weighted average of the causal effects of being raised by parents with higher wealth. Figure 2 illustrates the variation in our data that we use use to estimate β, graphing the adoptee's wealth as adult by the wealth of the adoptive family they happened to be assigned to. This figure displays the residuals from separate regression of child and parent log financial wealth on a full set of indicators for year of adoption and birth years of

children and parents. The graphical evidence suggests that being raised by wealthy parents tend to make the child wealthier as an adult.

Figure 2. Association between adoptee's (log) wealth and adoptive parents' (log) wealth



Notes: The figure displays the relationship between log child wealth and log parental wealth in the sample of Korean-Norwegian adoptees (N=2 265). We plot the residuals from separate regressions of child and parental log financial wealth on a full set of indicators for birth years of children and parents and year of adoption for the adoptees. The size of the circle represents the number of children within each bin. The slope is 0.0854, corresponding to the estimate in the first column of the first panel of Table 4.

In a simple OLS regression of child wealth on parent wealth, the estimate of β will capture any effect which operates through assignment to wealthier parents, including direct transfers of wealth, parental investments in children's human capital, or learning of attitudes and traits. To help understand the mechanisms underlying the effects of being raised by wealthier parents, we can add family characteristics other than wealth to x. For instance, we will examine how the child-parent wealth elasticity change when we control for parent's financial risk taking, education and household income and children's sibship size and place of residence in childhood. By changing the dependent variable in equation (1), we can also examine how family background affects outcomes other than wealth accumulation. For example, we will consider how being raised in one type of family versus another affect children's stock market participation and portfolio risk as adults.

4.2 Main results

Table 4 presents intergenerational associations in wealth accumulation and investor

behavior. Each column reports estimates from equation (1), including a full set of indicators for year of adoption and birth years of the adoptees and their adoptive parents. The first three columns present the associations between the adoptive parents and their Korean-Norwegian adoptive children, removing the genetic connection between children and the parents raising them. The last column presents the associations between these adoptive parents and their own-birth children, maintaining the genetic link between children and the parents raising them.

The first panel of Table 4 presents intergenerational links in wealth accumulation, regressing the (log of) financial wealth of the adoptee on the (log of) financial wealth of the adoptive family. In the first column, we find an age-adjusted intergenerational wealth elasticity of .085, implying that adoptees raised by parents with a wealth level that is 10 percent above the mean of the parent generation can expect to obtain a wealth level that is almost 1 percent above the mean of the child generation. The second and third column investigate whether the association between parent and child wealth is not really due to wealth per se, but to the effect of parent's stock market participation and portfolio risk. Our estimates show that if we control for these variables, the child-parent wealth elasticity falls but not by a lot. Holding parental wealth constant, it is also clear that adoptees tend to be wealthier if they were raised by parents who invested a larger proportion of the financial wealth in risky assets.

Table 4. Intergenerational links in wealth and investor behavior

	Korean-Norwegian adoptees			Non-adopted siblings
A. Dep. variable: Child (log) financial wealth				
Parental:				
(log) financial wealth	0.0854	0.0711	0.0690	0.1238
	(0.0179)***	(0.0188)***	(0.0186)***	(0.0327)***
participation		-0.0666	-0.0651	0.1258
		(0.1039)	(0.1034)	(0.1935)
risky share		0.5911	0.6092	0.3311
		(0.2285)***	(0.2274)***	(0.3729)
B. Dep. variable: Child participation				
Parental:				
(log) financial wealth	0.0155	0.0069	0.0069	0.0081
	(0.0051)***	(0.0052)	(0.0052)	(0.0131)
participation		0.0455	0.0454	0.1212
		(0.0293)	(0.0293)	(0.0640)*
risky share		0.1289	0.1299	0.0739
		(0.0627)**	(0.0626)**	(0.1264)
C. Dep. variable: Child risky share				
Parental:				
(log) financial wealth	0.0079	0.0035	0.0035	0.0072
	(0.0024)***	(0.0022)	(0.0022)	(0.0063)
participation		0.0019	0.0015	0.0230
		(0.0138)	(0.0138)	(0.0354)
risky share		0.1241	0.1250	0.1228
		(0.0377)***	(0.0376)***	(0.0732)*
Additional controls:				
Gender and age at adoption			✓	✓
Number of children		2 265		630

Notes: Every column of each panel is a separate regressions of children's outcomes as adults on family background variables and a full set of indicators for birth years of children and parents (and year of adoption for the Korean-Norwegian adoptees). Columns 1-3 use the sample of Korean-Norwegian adoptees (see Table 1 for further details), while column 4 considers the non-adopted siblings of the Korean-Norwegian adoptees. Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

The second and third panel turn to intergenerational links in investor behavior, as measured by stock market participation and the proportion of financial wealth

invested in risky assets. The first column shows that adoptees' stock market participation and risky share are increasing in adoptive parents' wealth. However, these associations are relatively weak, and as evident from the second column, other aspects of family background play a significant role for children's asset allocation and the riskiness of chosen portfolios. In particular, an adoptee's financial risk taking is increasing significantly in the proportion of financial wealth that their adoptive parents invested in risky assets.

To help interpret the magnitude of the intergenerational causal links in wealth accumulation and investor behavior, the fourth column reports the intergenerational associations for the non-adopted siblings. This enables us to compare the predictive influence of family background when there is and is not a genetic link between children and the parents raising them. We find that wealth shows less transmission from parents to adoptees (elasticity of .069) as compared to non-adoptees (elasticity of .124), whereas the magnitude of parental transmission of financial risk taking (as measured by risky share) does not depend on a genetic connection to the child.

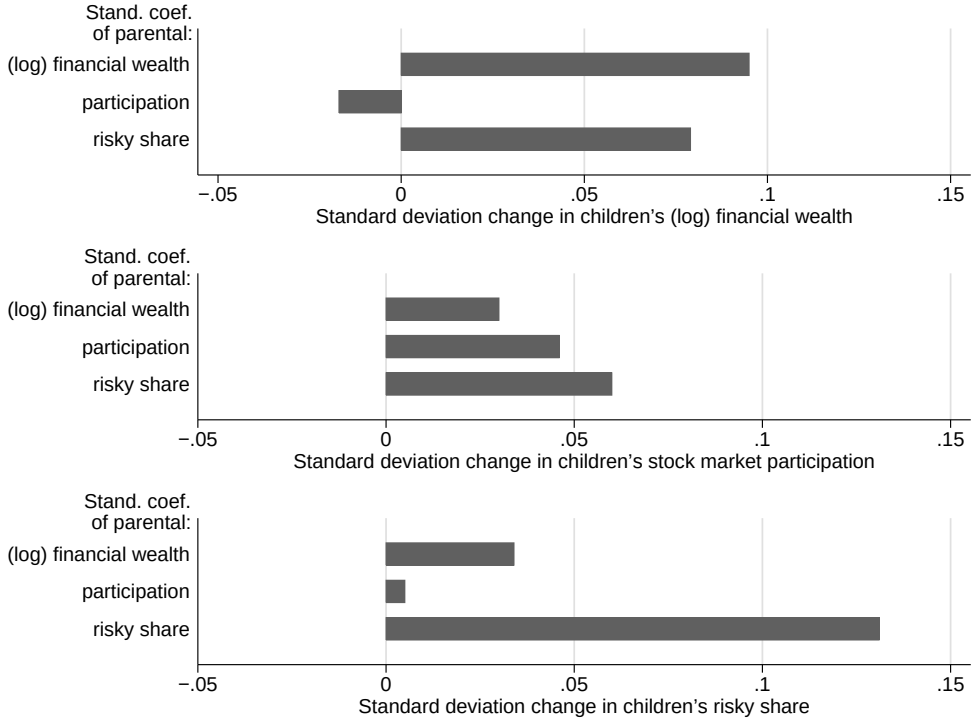
Since the variables in Table 4 are measured in different units, it is difficult to directly compare the magnitude of the coefficients. In Figures 3 and 4, we assess the relative importance of the different aspects of family background for the adoptees. These figures point to the importance of parental wealth for children's accumulation of wealth, and indicate that children's financial decision making is relatively strongly affected by parents' financial risk taking.

Figure 3 displays standardized coefficients for the regression models of column 3 in Table 4. Each variable (outcomes and regressors) is standardized by subtracting its mean from each of its values and then dividing these new values by the standard deviation of the variable. The standardized coefficients show how many standard deviations the outcome variable of the child is expected to change, per standard deviation change in the characteristic of the parents. We find that a one standard deviation change in parental wealth produces more of a change in children's wealth levels than a one standard deviation change in parental risky share or stock market participation. By comparison, a one standard deviation change in parental risky share is estimated to have a stronger impact on children's financial risk taking as compared to a one standard deviation change in parental wealth or stock market participation.

Figure 4 complements by comparing the explanatory power of parental financial wealth, stock market participation, and risky share from the regressions reported in column 3 of Table 4; we normalize the partial R-squared values to sum to one, so the reported values can be directly interpreted as the fraction of the explained

variability that is attributable to an observable aspect of family background. We find that parental wealth is most important in explaining the variation in adoptees' accumulation of wealth. By comparison, parents' risky share accounts for most of the explained variability in the financial decision making of the adoptees.

Figure 3. Standardized regression coefficients



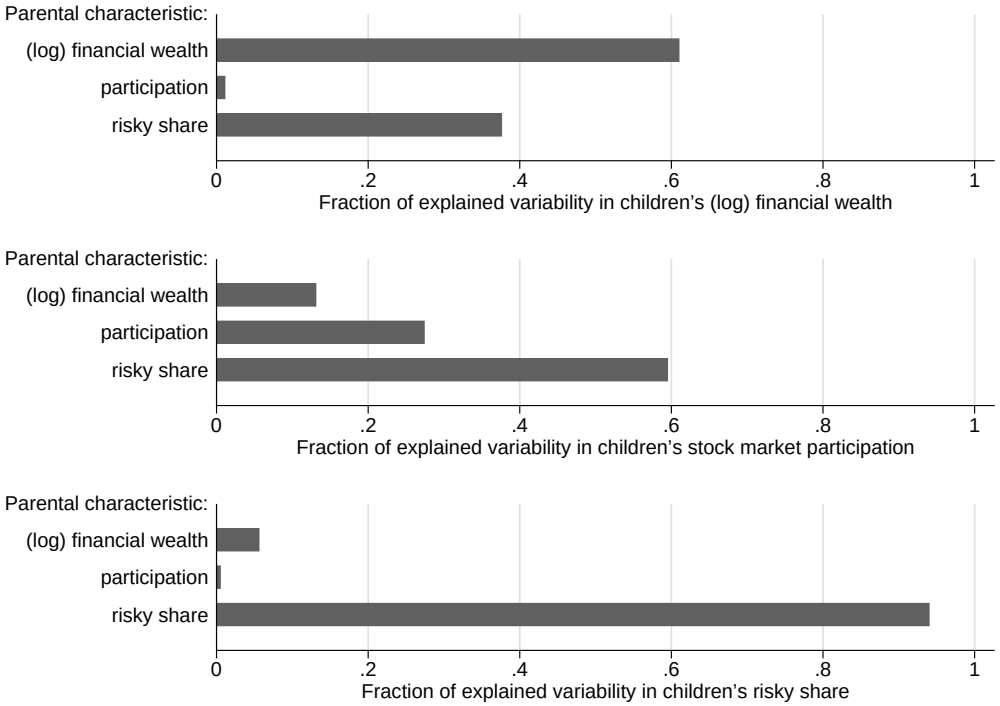
Notes: This figure displays standardized coefficients for the three regression models of column 3 in Table 4, where both outcome variables and regressors are standardized with a mean of 0 and a standard deviation of 1. Each bar shows how many standard deviations the outcome variable of the child is expected to change, per standard deviation change in the characteristic of the parents (holding the other regressors fixed).

4.3 Specification checks

Before turning to the interpretation of our findings, we present results from several specification checks, all of which are reported in Appendix B.

To address concerns about measurement error, Table 4 focused on financial wealth. A natural question is whether the child-parent elasticity in financial wealth generalizes to other measures of wealth. In Appendix Table B.2, we perform sensitivity checks to using measures of gross wealth (net worth), defined as the sum of financial wealth and real estate (net of debt). Columns 1-3 show that the child-parent wealth elasticity changes little if we use measures of gross wealth instead

Figure 4. Fraction of explained variability in children's outcomes that is attributable to specific parental characteristics



Notes: This figure displays the partial R-squared for the regressors parental financial wealth, parental participation, and parental risky share, based on the three regression models of column 3 in Table 4. For each outcome variable, we normalize the partial R-squared values to sum to one. Each bar shows the fraction of explained variability in the outcome that is attributable to a specific parental characteristic (holding the other regressors fixed).

of financial wealth. In column 4, we find a significant association between the net worth of children and parents. While financial and gross wealth are positive for all households, net worth is sometimes negative. Instead of taking logs, we therefore used a linear specification in net worth. However, when comparing the estimates in columns 1 and 4, it is clear that the marginal effect on child wealth of another dollar of parental wealth is robust to whether we use measures of net worth (marginal effect of .0801) or financial wealth (marginal effect of .069).

Another way to handle observations with zero or negative net worth is to use a rank-rank specification. For each child, we compute the rank in the population distribution of child wealth for individuals born in the same year (with maximum rank normalized to 100). Next, we do the same for parental wealth based on the average birth year of the parents. Then, we separately estimate the rank correlations across generations in net worth, for the Korean-Norwegian adoptees and for the non-adopted siblings. We find a rank correlation in net worth of .079 (with a

standard error of .022) for the Korean-Norwegian adoptees. Thus, on average, a ten percentile increase in the position of the adoptive parents in the wealth distribution is associated with a .8 percentile increase in the average position of the adoptees. By comparison, the rank-rank correlation in net worth is .12 (with a standard error of .046) for the non-adopted siblings. This suggests that genetic factor may strengthen the relationship between wealth ranks of children and parents, in line with our main findings from the log-log specification.

In Appendix Table B.2, we present results from additional specification checks. Column 5 performs a median regression which is less sensitive to extreme values. We estimate that effects on the median are significant and somewhat larger than those on the mean. In columns 6-7, we show that our estimates barely move if we measure parental wealth around the time of adoption instead of in 1993 -1995. This specification also addresses potential concerns of simultaneity bias from measuring parental wealth after the adoptive parents observe the quality and behavior of their adoptive children.

In the estimates of Table 4, the ages at which children's wealth are measured vary across cohorts. Appendix Figure B.1 complements these results by estimating the child-parent wealth elasticity separately for adoptees of different age. In each age group, the elasticity is significant and it ranges from .06 among the youngest children (25-30) to .10 among the oldest children (37-46). Appendix Figure B.1 also presents age-specific estimates of the child-parent wealth elasticity for non-adoptees. The age profile of the non-adoptees mirrors closely the age profile of the adoptees, suggesting that comparisons across the two groups in parental transmission of wealth do not hinge on the age at which child wealth is measured.

Our last set of specification checks examine the sensitivity of the results to whether children's financial wealth and their stock market participation and risky share are measured at the household or the individual level. As shown in Appendix Table B.3, the intergenerational links in wealth and investor behavior do not differ appreciably depending on whether we use measures of individual versus household wealth.

5 Interpretation of results

This section explores mechanisms, examines the generalizability of the lessons from adoptees, and compares our findings to results from behavioral genetics decompositions.

5.1 Possible mechanisms

Standard models of wealth accumulation suggest that wealth levels depend on individuals' income profiles, their propensity to save and choice of investment portfolio, and the amount and timing of gifts and bequests. These models point to several reasons why parent and child wealth would be similar, even after removing the genetic connection between children and the parents raising them: Wealthy parents may invest more in children's human capital, raising their income levels or shifting their income trajectories; wealthy parents may directly transfer wealth, inter vivos or through inheritance; and wealthy parents may shape the attitudes or traits that influence children's savings propensity or portfolio choices. To investigate the relative importance of these channels, we add controls to equation (1). To the extent that these controls lower the estimates of β, we can say they account for the influence of parental wealth or investor behavior.

Table 5. Determinants of intergenerational links

	Dep. variable: Child (log) financial wealth			
Parental:				
(log) financial wealth	0.0690	0.0685	0.0597	0.0587
	(0.0186)***	(0.0183)***	(0.0175)***	(0.0159)***
participation	-0.0651	-0.0566	-0.0736	-0.0363
	(0.1034)	(0.1054)	(0.1045)	(0.0980)
risky share	0.6092	0.6009	0.4970	0.4432
	(0.2274)***	(0.2285)***	(0.2232)**	(0.2100)**
	Dep. variable: Child participation			
Parental:				
(log) financial wealth	0.0069	0.0079	0.0077	0.0081
	(0.0052)	(0.0053)	(0.0053)	(0.0054)
participation	0.0454	0.0513	0.0508	0.0561
	(0.0293)	(0.0296)*	(0.0297)*	(0.0285)**
risky share	0.1299	0.1329	0.1304	0.1227
	(0.0626)**	(0.0631)**	(0.0633)**	(0.0614)**
	Dep. variable: Child risky share			
Parental:				
(log) financial wealth	0.0035	0.0042	0.0036	0.0038
	(0.0022)	(0.0022)*	(0.0022)	(0.0023)*
participation	0.0015	0.0046	0.0032	0.0043
	(0.0138)	(0.0139)	(0.0138)	(0.0137)
risky share	0.1250	0.1247	0.1174	0.1160
	(0.0376)***	(0.0375)***	(0.0371)***	(0.0370)***
Additional controls:				
Gender and age at adoption	✓	✓	✓	✓
Parental education, family income, # of siblings, and childhood region		✓	✓	✓
Direct wealth transfers			✓	✓
Child education, income, and financial literacy				✓

Notes: Every column of each panel uses the sample of 2 265 Korean-Norwegian adoptees (see Table 1 for further details) to estimate separate regressions of children's outcomes as adults on family background variables and a full set of indicators for birth years of children and parents and year of adoption. Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

The first column of Table 5 repeats the baseline estimates from column three of Table 4. The second column of Table 5 adds a range of controls for other observable characteristics of the childhood rearing environment. We include controls for parental income and education, as a large literature documents that these

variables are correlated between parents and their children; we control for number of siblings (at time of adoption), so that we only exploit the variation within families of a given size; and we condition on children's place of residence in childhood, accounting for determinants of wealth that are fixed at the region level. Our estimates suggest the effect of being raised by wealthier parents is not operating through parents' education and household income or children's sibship size and place of residence in childhood. It is also evident that the intergenerational links in investor behavior cannot be accounted for by these variables.

In the two last columns of Table 5, we condition on child variables that are expected to determine wealth accumulation and financial risk taking, including direct transfers of wealth, children's education and income, and a proxy for their financial literacy. Since these variables may be directly affected by parent's wealth and investor behavior, we are reluctant to giving the regression results a strict causal interpretation. Instead, we think of them as describing how the predictive influence of parental wealth and investor behavior change when we hold constant certain determinants of children's wealth accumulation and financial risk taking.

Using population level data from 1995-2011, we construct measures of direct transfers of wealth over this time period. In each year, we observe both gifts and bequests (in cash or in kind) from friends, parents and other family members.[13] Our measures of gifts and bequests include any transfer to an individual, either directly or indirectly, where full consideration (measured in money or money's worth) is not received in return. The general rule is that both the donor and the recipient must report any gift or bequest to the tax administration (even in cases where it is not taxable).[14] Child education is measured as years of schooling, child income is measured as the average over the years 2009-2011, and we proxy financial literacy with a dummy variable for whether the child has a college degree in finance, business or economics.

The estimates reported in column 3 suggest the predictive influence of parental wealth and investor behavior are not driven primarily by gifts or bequests. When controlling for direct transfers of wealth, the child-parent wealth elasticity falls but not by a lot, and the similarity in investor behavior between parents and children

[13]Norwegian law states that in kind transfers are counted at the full fair market value, which is the price at which the property would change hands between a willing buyer and a willing seller. The law also limits the possibilities of parents to differentiate between children (own-birth or adopted) through bequests, as only a certain fraction can be transferred according to parents' preferences. The remainder is reserved for equal sharing between children. The same regulations apply to gifts that are advancements of inheritance.

[14]There are exceptions to this rule. For instance, individuals do not have to report gifts or bequests if their value, in total, do not exceed a relatively low annual threshold.

do not change appreciably. Column 4 adds controls for children's education, income and the proxy for financial literacy. The estimates barely move when we control for these variables, suggesting that they do not account for the influence of parental wealth or investor behavior.

In interpreting these results, it is important to recognize that wealth transfers could be more important in other samples where fewer parents are still alive, but at least this channel does not seem to explain our estimates which are informative about intergenerational links over the majority of children's lives. Because we cannot follow children over an even longer period of time, we are prevented from measuring pre- and post-inheritance wealth levels of all children. The same data limitations apply to Charles and Hurst (2003) and Boserup et al. (2014). By comparison, Adermon, Lindahl, and Waldenstrom (2015) use historical data from Sweden on child and parental wealth when they are alive (wealth tax returns) and at death (estate records), and find suggestive evidence of the wealth transmission being lower when measuring wealth at death than during the lifetime.

Taken together, Table 5 provides suggestive evidence that being raised in one type of family versus another creates heterogeneity in wealth and portfolio choices even among individuals with similar economic resources. One way to interpret this finding is that two individuals facing similar budget sets might make very different decisions to save and invest depending of childhood rearing environment. This interpretation points to the importance of other factors that are unobservable to us, but matter for wealth accumulation and investor behavior, such as attitudes to savings or risk taking that adoptive parents may transmit to their adoptive children. Consistent with such a mechanism, Sacerdote (2007) finds that adoptees' risky behavior are sensitive to the family in which they are raised.

Motivated by these results, we examine the role of family background in determining risky behavior in contexts other than financial decision making, including car driving (proxied by speeding tickets) and sectoral choice (private versus public sector).[15] Our information on speeding tickets come from police records covering all automated speeding cameras over the years 1995-2011. The data on sectoral choice comes from employer-employee registers for the period 1995-2011. In Norway, there is much more churning and wage variability in private sector firms as compared to

[15]Looking at these contexts is motivated by previous research and data availability. Bonin, Dohmen, Falk, Huffman, and Sunde (2007) use survey data to show that individuals who are willing to take more risk tend to sort into occupations with higher cross-sectional earnings variability. Dohmen, Falk, Huffman, Sunde, Schupp, and Wagner (2011) show that survey measures of risky attitudes are strong predictors of financial risk taking and sectoral choice. Grinblatt and Keloharju (2009) document a strong correlation between individuals' financial risk taking and the chance they earn a speeding ticket.

the public sector. When looking at these measures of (or proxies for) risky taking, we use the same sample and model specification as in columns 1 and 4 of Table 5, except the outcome variables are different. In Appendix Table B.4, the outcome variable is an indicator variable for whether the child earned a speeding ticket. The outcome variable in Appendix Table B.5 is an indicator variable that is equal to one if the child worked in the public sector.

We find that parental financial risk taking (as measured by the proportion of financial wealth invested in risky assets) reduces the likelihood the adoptee is working in the public sector and increases the chance of earning a speeding ticket. The estimated effects are significant at conventional levels and robust to controlling for parents' education and household income as well as children's sibship size, place of residence in childhood, education, income and financial literacy. On top of this, the estimates do not change appreciably if we control for parental sectoral choice or whether the parents received a speeding ticket. Additionally, the effect on earning a speeding ticket become stronger if we restrict attention to the subsample of adoptees who own a car.[16] Taken together, these results suggest being raised by parents who take more financial risk makes the adoptees engage in more risky behavior also in contexts other than financial decision making.

5.2 External validity

The quasi-random assignment of adoptees to pre-approved adoptive families provides a unique opportunity to identify the effects of large scale changes in family environment on children's outcomes. At the same time, the specificity of the setting raises questions about whether the effects we identify are unique to adoptive parents and their adopted children, or if they are likely to generalize to a larger population of parents and children. As discussed in Holmlund et al. (2011), there are three possible reasons why the external validity of adoption results may be limited: Adoptive parents may be different from other parents; adoptive parents may treat their children differently; and adoptees may be different from other children. Using the rich Norwegian data, we try to infer whether any of these differences are empirically important in our setting with Korean-born children who were adopted at infancy.

A natural first step is to compare adoptive parents and their adopted children to other parents and children. As documented in Table 1 and Figure 1, the outcomes and characteristics of the Korean-Norwegian adoptees are broadly similar to that

[16]One might be concerned that parental financial risk taking is correlated with the likelihood of owning a car. However, we find no evidence of significant correlations between these variables, suggesting that endogenous selection into the subsample of column 4 in Tables B.4 is not a major concern.

of other children. At the same time, the adoptive parents tend to have somewhat higher income and financial wealth than parents who do not adopt. However, these differences are to a large extent because the adoptive parents in our sample tend to be somewhat older than the parents of the non-adoptees. As shown in Appendix Table B.6, the socio-economic characteristics of the adoptive parents are quite comparable to those of other parents once we condition on their year birth years. Indeed, the Korean-Norwegian adoptees become even more similar to the non-adoptees if we adjust for differences that are attributable to birth years of parents and child (see Appendix Table B.7). By way of comparison, native-born adoptees and their adoptive parents are much less comparable to other parents and children, as shown in the final column of Appendix Tables B.6 and B.7.

Another check of whether adoptive parents differ in important ways from other parents is to compare intergenerational OLS estimates based on parents and own-birth children raised in families with and without Korean born adoptees. For example, if adoptive parents invest (or transfer) more resources in their children, we would expect parental transmission of wealth to be stronger for own-birth children with an adopted sibling as compared to own-birth children without an adopted sibling. The first (second) row of panel A in Table 6 presents OLS estimates of the child-parent wealth elasticity for the sample without (with) an adopted sibling. The strong similarity in the child-parent wealth elasticity suggests that adoptive parents do not differ significantly from other parents when it comes to wealth transmission to own-birth children. The last two panels of Table 6 complement by comparing intergenerational OLS estimates based on adoptees with and without a non-adopted sibling. This comparison is motivated by the possibility that parental investments in adoptees may depend on whether or not they have own-birth children. For instance, adoptive parents might favor own-birth children, shifting resources away from adoptive children and towards biological children. However, the child-parent wealth elasticity do not differ appreciably depending on whether the adoptee has an adopted or non-adopted sibling.

Table 6. OLS estimates of child-parent wealth elasticity in different types of families

	Child-parent wealth elasticity		
	A. Own birth children		
With non-adopted sibling	0.1773	0.1482	0.1315
(N=968 924)	(0.0014)***	(0.0014)***	(0.0014)***
With adopted sibling	0.1531	0.1329	0.1239
(N=630)	(0.0320)***	(0.0333)***	(0.0328)***
	B. Adopted children		
With non-adopted sibling	0.1114	0.1141	0.1135
(N=464)	(0.0293)***	(0.0329)***	(0.0324)***
With adopted sibling	0.1150	0.0950	0.1057
(N=801)	(0.0331)***	(0.0345)***	(0.0332)***
Additional controls:			
Parental participation and risky share		✓	✓
Gender and age at adoption			✓
Parental education, family income, # of siblings, and childhood region			✓

Notes: Every column of each panel is a separate regressions of child (log) financial wealth on parental (log) financial wealth and a full set of indicators for birth years of children and parents (and year of adoption for the adoptees). Columns 2 adds controls for parental participation and risky share, and column 3 adds controls for parental education and family income and children's gender, sibship size and place of residence in childhood (and age at adoption for the adoptees). Panel A presents OLS estimates based on parents and own-birth children raises in families i) with a non-adopted sibling but no adopted sibling, or ii) with a Korean born adopted sibling. Panel B presents OLS estimates based on parents and the Korean-Norwegian adoptees raised in families i) with a non-adopted sibling but no adopted sibling, or ii) with a Korean-born adopted sibling. Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

5.3 Behavioral genetics decomposition

To directly compare what we find to previous evidence, this section provides an interpretation of our data on the Korean-Norwegian adoptees through the lens of a behavioral genetics decomposition. Our analysis follows much of the previous literature in applying a restrictive but commonly used ACE model, which decomposes child outcome into a linear and additive combination of genetic factors, shared family environment, and unexplained factors.[17] We refer to Appendix A for details about the ACE model that we use. Table 7 presents the decomposition results for

[17]Appendix Table B.8 supplements the estimates from the standard ACE model by conditioning on parents' education and household income and children's sibship size and place of residence in childhood. The estimates do not change appreciably.

children's wealth accumulation and investor behavior as adults. To compare with and benchmark to our decomposition results, this table also presents results for an outcome (education) used in existing adoption studies.

In the ACE model, the contribution of shared family environment depends on how much adoptive and non-adoptive siblings resemble each other. The first row of Table 7 shows significant correlations in financial wealth, stock market participation, risky share and years of schooling across adoptees from Korea and their siblings (i.e. sibling pairs with one Korean-Norwegian adoptee and one non-adoptee). The fourth row of Table 7 translates the sibling correlations into ACE estimates of the contribution from shared family environment. The results suggest that shared family environment explains a fairly similar portion of the variation in wealth accumulation, stock market participation and human capital acquisition, accounting for about 10 to 12.5 percent of the variation in these outcomes. By comparison, nearly 21 percent of the variation in risky share can be accounted for by shared family environment.

The contribution of genetic factors depends on how much more biological siblings (i.e. two non-adopted siblings) resemble each other relative to adoptive siblings (i.e. one Korean-Norwegian adoptee and one non-adoptee). By comparing the first and second row of Table 7, we can see that biological siblings have considerably stronger correlations in financial wealth and education than adoptive siblings. The correlation in stock market participation is twice as large for biological siblings as compared to adoptees from Korea and their siblings, whereas the correlation in risky share does not get stronger with a genetic connection between the siblings. As shown in the third row of Table 7, the ACE model interprets these correlations as suggesting that genetic factors explain a bigger portion of the variation in wealth accumulation and human capital acquisition than in stock market participation, and that genes account for little if anything of the variation in risky share. These findings are consistent with the results in Table 4, showing less wealth transmission from parents to adoptees as compared to non-adoptees and that parental transmission of financial risk taking does not depend on a genetic connection to the child.

In terms of relative contribution of genetic factors and shared family environment, the ACE model suggests that family environment is more importance than genes in explaining the variation in children's financial risk taking as measured by risky share. When looking at wealth accumulation and educational levels, genetic factors account for much more of the variation across children than shared family environment. By way of comparison, the results on education are close to the American study of Korean adoptees by Sacerdote (2007), who finds that 9 percent of the variation in years of schooling can be explained by shared environment while 60 percent is

attributable to genes.

How do the decomposition results reported in Table 7 compare to existing research? Much of the recent evidence on the determinants of individuals' investor and savings behavior comes from ACE models based on identical and fraternal twins (see Cesarini et al., 2010; Barnea et al., 2010; Cronqvist and Siegel, 2015). The results from these studies point to a substantial genetic component, while shared family environment seems to play little if any role. For example, Barnea et al. (2010) use Swedish data on twins and find that genetic factors explain about 28 percent of the variation in stock market participation and risky share; the contribution from shared environmental factors is estimated to be close to zero for these measures of investor behavior.

What can explain the differences between our ACE results from adoption data and the recent evidence from twin studies?[18] Sacerdote (2010) discusses one possible explanation: A key assumption of the standard ACE model is that sibling pairs raised by the same parents have the same correlation in family or common environment. As a consequence, any factors that make outcomes for identical twins more similar than outcomes for fraternal twins are attributed to genetic factors. If identical twins face more similar environment, the model overestimates the genetic effects and understates the importance of shared family environment. For instance, parents or teachers may be more likely to expect or demand similar behavior from siblings who are identical twins; or identical twins may interact or affect each other's environment more than fraternal twins.

A few recent studies lend support to the concern that ACE estimates based on twins may overestimate the genetic pre-determination of individual behavior at the expense of family environment. Calvet and Sodini (2014) find that communication and social interactions between twins have a strong influence on estimates of the genetic component of financial risk taking. Further, Barnea et al. (2010) show that the genetic component is significantly lower in the sample of identical twins that communicate less frequently. Björklund, Jäntti, and Solon (2005) find that allowing different types of sibling pairs to have different amounts of correlation in family environment greatly lowers the estimated genetic effect and raises the estimated impact of family environment.

[18]The disconnect between the twin and adoption literature is not specific to financial decision making. Sacerdote (2010) reviews the literatures, showing systematic differences regarding the importance of family environment and genes for several outcomes.

Table 7. Sibling correlations and ACE estimates

	Child outcomes: Risky share	Participation	Fin. Wealth	Schooling	Number of sibling pairs
Correlation between:					
Adoptive and non-adoptive siblings	0.2076	0.0966	0.1251	0.1106	596
	[0.0504]***	[0.0442]**	[0.0716]*	[0.0442]**	
Two non-adoptive siblings	0.1883	0.1792	0.3024	0.3991	675 288
	[0.0016]***	[0.0012]	[0.0029]***	[0.0010]***	
ACE estimates:					
Genetic factors	-0.0387	0.1371	0.3547	0.5770	
	[0.1011]	[0.0633]**	[0.1437]**	[0.0885]***	
Shared environment	0.2076	0.1026	0.1251	0.1106	
	[0.0504]***	[0.0314] ***	[0.0716]*	[0.0442]**	
Unexplained factors	0.8310	0.7602	0.5202	0.3125	
	[0.0507]***	[0.0323]***	[0.0722]***	[0.0443]***	

Notes: This table decomposes the residuals from regressions of child outcome on a full set of indicators for birth years of children and parents and gender of child (and year of adoption for the adoptees). The first row reports the correlation in outcomes between sibling pairs where one is a Korean-Norwegian adoptee and the other is non-adopted. The second row reports the correlation in outcomes between sibling pairs where both are non-adopted. As described in Appendix A, the last three rows translate the sibling correlations into estimates of the contribution from genetic factors, shared environment and unexplained factors.

6 Conclusion

This paper provides novel evidence on intergenerational links in wealth accumulation and investor behavior in a setting where we can credibly control for genetic transmission of abilities and preferences. The key to our research design is that we can link Korean-born children who were adopted at infancy by Norwegian parents to a population panel data set with detailed information on disaggregated wealth portfolios and socio-economic characteristics. The mechanism by which these adoptees were assigned to adoptive families is known and effectively random. We use the quasi-random assignment to estimate the causal effects from an adoptee being raised in one type of family versus another.

We find that family background matters significantly for children's accumulation of wealth and investor behavior as adults, even when removing the genetic connection between children and the parents raising them. In particular, adoptees raised by wealthy parents are more likely to be well off themselves, whereas adoptees' stock market participation and portfolio risk are increasing in the financial risk taking of their adoptive parents. These intergenerational causal links are not driven primarily by inter vivos transfers or bequests. Instead, we find suggestive evidence that differences in childhood rearing environment create wealth inequality, in part, by shaping the savings behaviors of individuals with similar economic resources. However, it is important to emphasize that our estimates come from a sample in which many parents are still alive, and direct wealth transfers could play a more important role when children reach their 50s or 60s. Evidence from other settings or populations would be useful to assess the generalizability of our findings.

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A Appendix

A. ACE model

Our description of the ACE model draws on Sacerdote (2007; 2010) and Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace (2010). We consider an ACE model in which child outcome (Y) is produced by a linear and additive combination of genetic factors (A), shared family environment (C) and unexplained factors (E):

$$Y = A + C + E \tag{2}$$

The unexplained factors are often referred to as the non-shared environment, but E is by definition a residual term which is uncorrelated with A and C. In the standard version of the model, one further assumes that A and C are uncorrelated for a given child. On the surface, this seems like a strong assumption and one that could be defended for randomly assigned adoptees but not for children being raised by biological parents. An alternative interpretation is that C represents the environment that is not correlated with genes, while A represents both the contribution from genetic factors and gene-environment correlations.

With an assumption of no correlation between A, C and E, taking the variance of both sides of equation (2) and dividing each side by the variance of the outcome gives:

$$1 = a^2 + c^2 + e^2$$

where a^2, c^2, and e^2 represent the normalized variances of A, C, and E, respectively. From this starting point, a variety of variance and covariances can be expressed as functions of a, c and e. By standardizing Y, A, C and E to have zero mean and unit variance, the correlation in outcomes between adoptive and non-adoptive siblings is:

$$Corr(Y_1, Y_2) = Cov(C_1, C_2) = Var(C_1) = c^2 \tag{3}$$

Assuming that biological siblings share half of the same genetic endowment and the same shared environment, the correlation in outcomes between two biological siblings is:

$$Corr(Y_1, Y_2) = Cov(A_1 + C_1, A_2 + C_2) = Cov(A_1 + C_1, \tfrac{1}{2}A_1 + C_1) = \tfrac{1}{2}a^2 + c^2 \tag{4}$$

Taken together, equations (3) and (4) show how the ACE model can be used to estimate the full variance breakdown of genetic factors, shared environment, and

unexplained factors from just the correlations in outcomes among biological and adoptive siblings.

Since stock market participation is a binary variable, we follow Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace (2010) in estimating a so-called threshold model to derive the variance of A, C and E. In a threshold model, choices are assumed to be determined by crossing certain threshold values of an underlying distribution of the variable. For each sibling pair the covariance matrices are specified as below:

$$a^2 \begin{bmatrix} 1 & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} + c^2 \begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix} + e^2 \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The covariance of A can be rewritten to:

$$a^2 \begin{bmatrix} 1 & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \frac{a^2}{2} \begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} + \frac{a^2}{2} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

which gives the following expression (which is the one we use to derive the components, $a^2, c^2$and e^2):

$$\frac{a^2}{2} \begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} + c^2 \begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix} + (e^2 + \frac{a^2}{2}) \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Table B.1. Details about the data sources and each of the variables

Variable:	Description:
Assets and income	Source: Tax, Income, and Wealth Registers, available since 1993 unless otherwise stated
Gross Wealth	Tax value of household wealth, available since 1967
Pensionable Income	All incomes and transfers counting towards old age pensions, available since 1967
Financial Wealth	The sum of stocks, mutual funds, money market funds, bank deposits, bonds
Risky Assets	The sum of stocks and mutual funds
Risky Share	The ratio of risky assets to financial wealth
Participation	Indicator variable for holding a positive amount of Risky Assets
Debt	All debt, including mortgage, car loans and student loans
Net Worth	The sum of all assets, including the market value of real estate, minus all debt
Business Income	Income from own businesses
Car Owner	Indicator variable for household car ownership
Education	Source: Norwegian Educational Database, available since 1964
Education length	Years of schooling
Education type	Primary field of study (college major) at the post-secondary level
Financial Education	Indicator variable for college degree in finance, business or economics
Adoption	Source: Adoption Register, available since 1965
Adoption date	Date of adoption
Adoption age	Age at time of adoption
Date of birth	Date of birth
Country of origin	Country of birth
Population and family	Source: The Central Population Register, available since 1964
Region	Region of residence at the end of the year
Birth date	Date of birth

Variable:	Description:
Gender	Indicator variable for female
Marital status	Indicator variable for married
Spousal ID	Unique individual identifier of spouse
Mother ID	Unique individual identifier of mother
Father ID	Unique individual identifier of father
# of Siblings	Number of siblings at time of birth
Employer information	Source: Employer-Employee register, available since 1995
Firm ID	Unique firm identifier
Public sector	Indicator variable for working in the public sector
Risky Behavior	Source: Register of Criminal Statistics, available since 1995
Speeding ticket	Indicator variable for earning at least one speeding ticket (from automated speeding cameras) over the period 1995-2011
Wealth transfers	Source: Register of gifts, transfers and inheritances, available since 1995
Wealth transfers	Sum of gifts, inter vivos transfers and inheritances

Table B.2. Specification checks: Measurement of wealth

	Baseline OLS	**OLS**		**OLS**	**Median regression**	**OLS**	
Dependent variable:	**Child**	**Child**		**Child**	**Child**	**Child**	
	(log) fin. wealth	**(log) gross wealth**		**net worth**	**(log) fin. wealth**	**(log) fin. wealth**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Parental:							
(log) financial wealth	0.0690	0.0615			0.1125		
	(0.0186)***	(0.0216)***			(0.0215)***		
net worth wealth				0.0807			
				(0.0356)**			
(log) gross wealth			0.0914			0.1374	
			(0.0563)*			(0.0493)***	
(log) gross wealth							0.1378
in childhood							(0.0457)***

Notes: Every column is a separate regressions of child wealth on parent wealth and a full set of indicators for birth years of children and parents, year of adoption, age at adoption, gender of adoptee, and parental participation and risky share. The sample consists of the 2 265 Korean-Norwegian adoptees (see Table 1 for further details). Column 1 repeats the regression results from column 3 in Table 4. Column 2 uses the same specification as in column 1, except that child (log) wealth is now measured as the (log of the) three year average of gross wealth instead of financial wealth (over the period 2009-2011). Column 3 uses the same specification as the second column, except that parent (log) wealth is now measured as the (log of the) three year average of gross wealth instead of financial wealth (over the period 1993-1995). Column 4 measures child and parent wealth as net worth (over the period 2009-2011 and 1993-1995, respectively). Column 5 uses the same specification as in column 1, except that we now run a median regression of child (log) financial wealth on parental (log) financial wealth. Columns 6 and 7 measure parental (log) wealth as the (log of the) three year average of gross wealth in 1993-1995 and around the time of adoption, respectively. In these two columns, we have not converted the tax value of real estate to market value. The reason is that prior to 1993 we do not have disaggregate portfolio data and only observe the tax value of gross wealth. Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

Table B.3. Specification check: Measuring child wealth at the level of the household versus the individual

	Korean-Norwegian adoptees	
	Household level	**Individual level**
A. Dep. variable: Child (log) financial wealth		
Parental:		
(log) financial wealth	0.0690	0.0786
	(0.0186)***	(0.0199)***
participation	-0.0651	-0.0435
	(0.1034)	(0.1068)
risky share	0.6092	0.5919
	(0.2274)***	(0.2340)**
B. Dep. variable: Child participation		
Parental:		
(log) financial wealth	0.0069	0.0067
	(0.0052)	(0.0052)
participation	0.0454	0.0564
	(0.0293)	(0.0284)**
risky share	0.1299	0.1298
	(0.0626)**	(0.0615)**
C. Dep. variable: Child risky share		
Parental:		
(log) financial wealth	0.0035	0.0016
	(0.0022)	(0.0026)
participation	0.0015	0.0056
	(0.0138)	(0.0135)
risky share	0.1250	0.1135
	(0.0376)***	(0.0370)***

Notes: Every column of each panel uses the sample of 2 265 Korean-Norwegian adoptees (see Table 1 for further details) to estimate separate regressions of children's outcomes as adults on family background variables and a full set of indicators for birth years of children and parents, year of adoption, age of adoption, and gender of adoptee. The first (second) column measures the dependent variable at the household (individual) level. Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

Table B.4. Effects of family background on the probability of earning a speeding ticket

	Dep. variable: Earning a speeding ticket			
	Full sample			**Car owners**
Parental:				
(log) financial wealth	0.0000	0.0015	0.0017	-0.0011
	(0.0040)	(0.0041)	(0.0041)	(0.0058)
participation	-0.0406	-0.0440	-0.0437	-0.0785
	(0.0236)*	(0.0236)*	(0.0236)*	(0.0321)**
risky share	0.0966	0.1113	0.1070	0.1832
	(0.0482)**	(0.0487)**	(0.0490)**	(0.0661)***
Additional controls:				
Parental education, family income, # of siblings, and childhood region		✓	✓	✓
Direct wealth transfers		✓	✓	✓
Child education, income, and financial literacy		✓	✓	✓
Speeding tickets of parents			✓	✓
Number of children	2 265	2 265	2 265	1 444

Notes: Every column of each panel is a separate regressions of children's outcomes as adults on family background variables and a full set of indicators for birth years of children and parents and year of adoption. Columns 1-3 use the full sample of Korean-Norwegian adoptees (see Table 1 for further details), while column 4 considers the subsample of Korean-Norwegian adoptees who own a car. Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

Table B.5. Effects of family background characteristics on sectoral choice

	Dep. variable: Public sector employment		
Parental:			
(log) financial wealth	0.0012	-0.0010	-0.0011
	(0.0043)	(0.0041)	(0.0041)
participation	0.0363	0.0335	0.0334
	(0.0256)	(0.0249)	(0.0251)
risky share	-0.0889	-0.1032	-0.1059
	(0.0534)*	(0.0512)**	(0.0518)**
Additional controls:			
Parental education, family income, # of siblings, and childhood region		✓	✓
Direct wealth transfers		✓	✓
Child education, income, and financial literacy		✓	✓
Sectoral choices of parents			✓

Notes: Every column of each panel is a separate regressions of children's outcomes as adults on family background variables and a full set of indicators for birth years of children and parents, year of adoption, age at adoption, and gender of adoptee. The sample consists of 2 265 Korean-Norwegian adoptees (see Table 1 for further details). Public sector employment is an indicator variable taking the value of one if the child is working in the public sector (and zero otherwise). Standard errors (in parentheses) are clustered at the mother. ***p<.01, **p<.05, *p<.10.

Table B.6. Comparison of socio-economic characteristics between parents who adopt and parents who do not adopt, conditional on their birth year

	Parents of		Differences between parents of	
Variable	**Korean-Norwegian adoptees**	**Norwegian non-adoptees**	**Norwegian non-adoptees Korean-Norwegian adoptees**	**Norwegian non-adoptees Native-born adoptees**
Mother's years of schooling, 2011:	12.4	12.0	-0.4	-0.7
			(0.05)***	(0.05)***
Father's years of schooling, 2011:	13.1	12.5	-0.6	-1.4
			(0.06)***	(0.06)***
Mean income, 1993-1995	86 794	75 533	-11 261	-14 549
			(901)***	(875)***
Mean financial wealth, 1993-1995	46 205	39 336	-6 869	-16 567
			(1445)***	(1405)***
Risky assets, 1993-1995:				
Participation	0.442	0.385	-0.057	-0.123
			(0.010)***	(0.010)***
Share	0.128	0.118	-0.010	-0.054
			(0.005)**	(0.005)***
Number of children	2 265	1 204 386		

Notes: The Korean-Norwegian adoptees are born in South Korea between 1965 and 1986, and adopted at infancy by Norwegian parents. The non-adoptees are born in Norway between 1965 and 1986, and raised by their biological parents. The native-born adoptees are born in Norway between 1965 and 1986 and adopted by Norwegian parents. All monetary values are measured in USD, 2011 prices. Income and wealth are measured at the household level. Risky assets are defined as the sum of mutual funds with a stock component and directly held stocks. Risky share is measured as the proportion of the financial wealth invested in risky assets over the three year period. Stock market participation is an indicator variable taking the value one if at least some fraction of financial wealth is invested in risky assets over the three year period.

Table B.7. Comparison of socio-economic characteristics between adoptees and non-adoptees, conditional on child and parental birth year

			Differences between	
Variable	**Korean-Norwegian adoptees**	**Norwegian non-adoptees**	**Norwegian non-adoptees Korean-Norwegian adoptees**	**Norwegian non-adoptees Native-born adoptees**
Years of schooling, 2011	14.5	14.1	-0.4	0.6
			(0.063)***	(0.061)***
Mean income, 2009-2011	108 752	113 717	4 965	17 024
			(1500)**	(1456)***
Mean financial wealth, 2009-2011	50 454	54 866	4 412	7 860
			(2449)*	(2379)**
Risky assets, 2009-2011:				
Participation	0.447	0.465	0.018	0.058
			(0.010)*	(0.010)***
Share	0.139	0.149	0.010	0.009
			(0.005)**	(0.005)*
Number of observations	2 265	1 204 386		

Notes: The Korean-Norwegian adoptees are born in South Korea between 1965 and 1986, and adopted at infancy by Norwegian parents. The non-adoptees are born in Norway between 1965 and 1986, and raised by their biological parents. The native-born adoptees are born in Norway between 1965 and 1986 and adopted by Norwegian parents. All monetary values are measured in USD, 2011 prices. Income and wealth are measured at the household level. Risky assets are defined as the sum of mutual funds with a stock component and directly held stocks. Risky share is measured as the proportion of the financial wealth invested in risky assets over the three year period. Stock market participation is an indicator variable taking the value one if at least some fraction of financial wealth is invested in risky assets over the three year period.

Table B.8. ACE estimates with additional controls for parental background

	Child outcomes:				
	Risky share	**Participation**	**Fin. Wealth**	**Schooling**	**Number of sibling pairs**
Correlation between:					
Adoptive and non-adoptive siblings	0.2056	0.0576	0.1292	0.0923	596
	[0.0496]***	[0.0413]	[0.0677]*	[0.0397]**	
Two non-adoptive siblings	0.1839	0.1348	0.2893	0.2667	675 288
	[0.0048]***	[0.0036]***	[0.0098]***	[0.0045]***	
ACE estimates:					
Genetic factors	-0.0434	0.1030	0.3201	0.3488	
	[0.0996]	[0.0603]*	[0.1377]**	[0.0800]***	
Shared environment	0.2056	0.0810	0.1292	0.0923	
	[0.0496]***	[0.0299]**	[0.0677]*	[0.0397]**	
Unexplained factors	0.8378	0.8160	0.5507	0.5588	
	[0.0505]***	[0.0308]***	[0.0713]***	[0.0408]***	

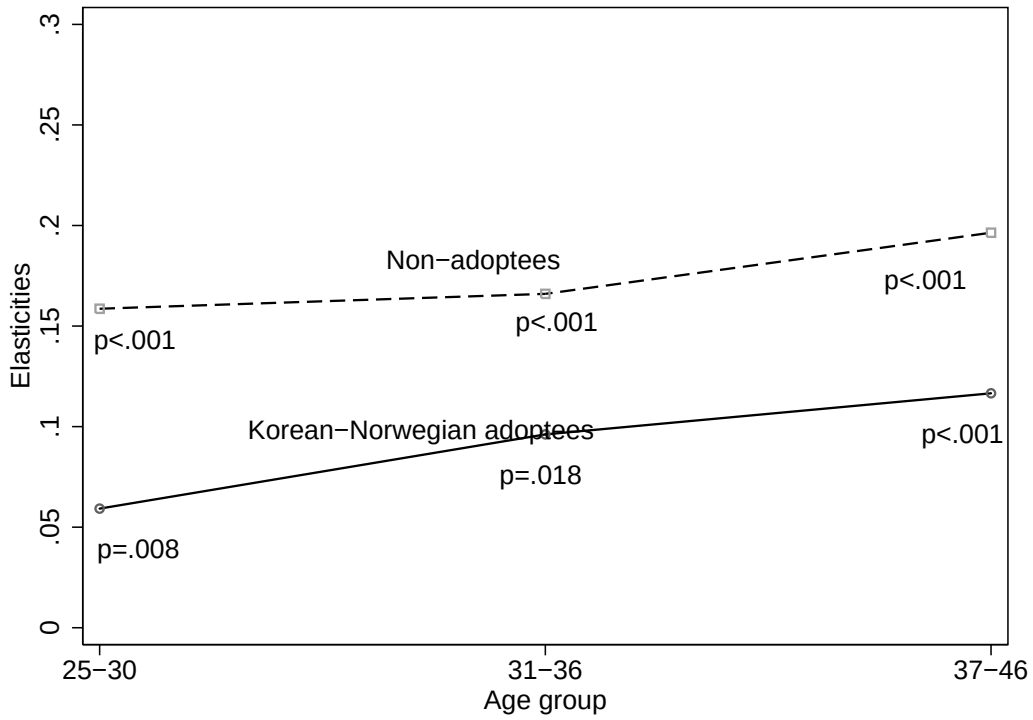
Notes: Notes: This table decomposes the residuals from regressions of child outcome on a full set of indicators for birth years of children and parents and gender of child (and year of adoption for the adoptees). The first row reports the correlation in outcomes between sibling pairs where one is a Korean-Norwegian adoptee and the other is non-adopted. The second row reports the correlation in outcomes between sibling pairs where both are non-adopted. See Table 1 for further details. As described in Appendix A, the last three rows translate the sibling correlations into estimates of the contribution from genetic factors, shared environment and unexplained factors.

Table B.9. Comparing with existing studies

Study:	Specification:	Intergen. assoc. in net worth
A. Fagereng et al. (2015)	Rank-rank in net worth (within cohort)	0.18
Data: Norwegian tax records		(0.00)
	Log-log in net worth (age adjusted)	0.20
		(0.01)
B. Charles and Hurst (2003)	Log-log in net worth (age adjusted)	0.37
Data: PSID		(0.03)
C. Boserup et al. (2014)	Rank-rank in net worth (within cohort)	0.26
Data: Danish tax records		(0.00)
	Log-log in net worth (age adjusted)	0.27
		(0.00)

Notes: The table compares estimates of intergenerational association in net worth. Panel A reports results from log-log and rank-rank specifications based on our sample of Norwegian non-adoptees. Panel B reports results from the log-log specification used in Column 1 of Table 4 in Charles and Hurst (2003). Panel C reports results from the log-log and rank-rank specifications used in Column 7 of Table 2 in Boserud et al. (2014). Each specification adjusts for age differences by controlling for parental and child birth years. In Charles and Hurst (2003), parental wealth is measured in 1984 or 1989, whereas child wealth is measured in 1999. In Boserud et al. (2014) and panel A, parental and child wealth are measured in the years 2009-2011. In every specification of each panel, wealth is measured as net worth. All log-log specifications exclude observations with zero or negative net worth (for parent or child).

Figure B.1. Age-specific child-parent wealth elasticities for the Korean-Norwegian adoptees and the Norwegian non-adoptees



Notes: Separately for each age group, we regress child (log) financial wealth on parental (log) financial wealth and controls for a full set of indicators for birth years of children and parents, and gender of child (and, in the adoption sample, year and age of adoption). The regressions are run separately for the Korean-Norwegian adoptees and the Norwegian non-adoptees. The p-values are for the null hypothesis of a child-parent wealth elasticity equal to zero.