Importance of family background for economic status – evidence from child evacuations

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Abstract

Interventions into children's rearing environment are motivated by concerns about persistence of intergenerational advantage. During World War II, some 50,000 Finnish children aged between one to ten years were evacuated to foster care in Sweden for an average duration of two years. We measure the impact of temporary family disruption on the importance of family background for economic status by using a population-based sample of family units from the 1950 Finnish census on evacuee cohorts born 1933-1944, including information on participation in the evacuation program. We estimate sibling correlations for pairs in which both, only one, or none were evacuated and estimate the change in importance of family background from the differences between these.

Our results show that an on-average two year disruption of the shared family background did have a large impact on intergenerational income persistence. The sibling correlation in income falls from 0.38 for the male sibling pairs born 1933-1944 with an intact family background to 0.27 for pairs in which both were separated from their rearing parents (and from each other) for on average two years. The sibling correlation of the pairs discordant for evacuation status lands between these two numbers, 0.31. The analysis is replicated for female sibling pairs. The disruption reduced the sibling correlation for women though less than for men; the sibling correlation is down to 0.32 for pairs in which both were separated from their rearing parents as compared to 0.34 for pairs with an intact family background.

JEL Classification:

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1 Introduction

Widespread interest in the intergenerational persistence of economic outcomes, and more generally, the importance of family background is driven in part by concerns for the equality of opportunity. One way to measure the importance of family background for economic outcomes is by using the sibling correlation, which captures the variance of factors shared by siblings relative to the overall variance of the trait and is thus like the R^2 of family background (Solon, 1999). While such estimates tell us family background matters a great deal – typically about a fifth to one half of the variance in long-run income, for instance, can be attributed to family background – it is often hard to tell why and in what ways family background matters. This is, in part, because children are as a rule observed growing up in only one family. While children are, at times, removed from their family environment, this is mostly highly selective, when children are given up for adoption or removed to foster care for reasons related to child protection. Such circumstances are unlikely to reveal the population-wide importance of family background, as the "treated" population is highly selected.

We explore the effect of disrupted family environments in a different context. During World War II, a substantial number of Finnish children were evacuated to Sweden, where they spent on average two years in foster care. Between 1941 and 1945, roughly 49,000 Finnish children, or 6 percent of all children in those birth cohorts, from the whole range of socioeconomic backgrounds aged between one and ten years were evacuated to Swedish foster families for an average duration of two years. The evacuations were conducted by a large-scale evacuation scheme with organized logistics on both sides of the border. The Finnish government stated in 1941 eligibility criteria to target the most exposed families. For example, children from displaced households, children at risk of air raids, children whose father had died in war, and children of mothers working full-time were prioritized. The appendix provides more detail on the evacuation policy, in particular on the historical background, the evacuation from Finland to Sweden, and the placement in foster families in Sweden. Santavirta (2012) shows that the assignment of Swedish foster families was as good as random when conditioning on gender and native language.

While this "treatment" was by no means random – families had to fulfill a number of criteria to be eligible to send their children to Sweden, if they chose to apply – it was, nonetheless, widespread. Moreover, as there are many families that chose to send some, but not all, of their children, we can compare the importance of family background among sibling pairs of whom neither, both, or one but not the other, were evacuated to Sweden. We thus believe this episode has the potential to inform us of the importance of family background for economic status.

In order to assess the impact of child evacuation on the importance of family background, we study cohorts of children born between 1933 and 1944. We use data from censuses for 1950 to identify families and 1970-1985 to measure our outcome, taxable income, along with wartime government records on evacuated children. We use these data to estimate sibling correlations in long-run income observed for four years at five-year intervals for ages 26-52 for closely spaced siblings born born

between 1933-1944.

The results certainly suggest that even a short-term disruption of the family environment had a substantial impact on the effect of family background. Sibling pairs both of whom were evacuated (to different foster families) and were thus separated from their biological parents and their siblings during the war had a 10 percentage points lower sibling correlation (0.27) than sibling pairs who remained with the biological family throughout the war (0.38).

This study contributes by providing insight into how much temporary switches (or disruptions) in family environment can alter the sibling correlations in long-run income. However, the expectation in outcomes has been shown not to differ between individuals who participated in the evacuation program and their siblings who remained with their families throughout the war (Santavirta and Santavirta, 2014; Santavirta, Santavirta, and Gilman, 2015).[1] While this seems to suggest that participation as such did not leave a strong footprint as compared to non-participation (or the non-participants might have been affected in similar ways by exposure to adversities of war), it does not address the question whether participation affected the family as such through altering the relationships between the family members and interactions. Using second moments of the probability distribution of outcomes enables us to pick up changes within the family that were induced by the family disruption.

This paper is structured as follows. The next section briefly discusses relevant literature, starting with a brief overview of programme to evacuate children to Sweden during World War II (which is expended upon in the appendix). We also discuss relevant economics and psychological literatures. Section 3 discusses our data, and Section 4 presents our methods. Our main results and some sensitivity analysis is shown in Section 5. We conclude in Section 6.

2 Literature review

2.1 A brief historical background of the Finnish evacuation policy

Finland fought two wars against the Soviet Union between 1939 and 1944. During these wars roughly 49,000 Finnish children aged one to ten (on average age five at evacuation) were evacuated to Sweden and spent on average two years in foster families.[2] The evacuations were conducted between 1941 and 1944 by a large scale evacuation scheme with organized logistics on both sides of the border. The evacuation scheme was funded primarily by the Finnish and Swedish governments but received large private donations. A first-come first-served policy was applied where the children were assigned a running number and processed accordingly. Each contingent of evacuees went through several stages

[1] Santavirta (2012) provides evidence of a strong causal effect of parental quality (father's occupation-based socioeconomic status) of foster families that the child was exposed to for on average of two years on schooling outcomes. Thus, we know that the foster family environment exposed to during the evacuation can make a footprint on the individual's human capacity formation even though the evacuation as such does not seem to have had an effect in the expectations of outcomes.

[2] The families did not receive any financial compensation for fostering.

before the final placement, each of which is supposed to have leveled out initial inequalities with respect to health, nutrition, and appearance. Re-groupings and the splitting of the contingents into smaller entities occurred along the way towards the final placement, a process that sharply limited the scope for selection into foster care based on background characteristics (a detailed description of the historical background and the evacuation scheme is provided in Appendix A). Santavirta (2012) provides empirical evidence against sorting of children into foster families based on socioeconomic background. The war caused adverse conditions for children who came from the whole range of pre-war socioeconomic backgrounds. The historical record makes clear that many professionals sent their children away (Santavirta, 2012). There was also a wide variation in the socioeconomic status of the foster families, given that families from all socioeconomic backgrounds were encouraged to become foster parents–44% were farmers, 27% were academic families, and 16% were working class families. As to the intra-familiy decision on which of the siblings to send away little documentation is available. The existing anecdotal evidence based on recollections of child evacuees does not suggest that any systematic bias would have governed those decisions (Kavén, 2011).

2.2 Literature review: Economics

Understanding the importance of family background on socioeconomic outcomes has been a central topic in labor economics during the last four decades. Beginning with Corcoran, Jencks, and Olneck (1976) researchers have estimated sibling correlations in outcomes in order to provide a summary statistic that captures the proportion of the variance in these outcome variables that can be attributed to both measured and unmeasured family and community background variables (e.g., neighborhood, school quality, peers).[3]

The sibling correlations in permanent economic status (for brevity we discuss here economic status only, in particular the permanent component of it) have estimated correlations of around 0.35 to 0.5 in life-time earnings for the U.S. using earnings data for multiple years (Björklund et al., 2002; Mazumder, 2008; Solon et al., 1991). The studies estimating sibling correlations in life-time earnings for the Nordic countries (Björklund et al., 2002) find sibling correlations of around 0.2 to 0.3 suggesting that intergenerational economic mobility is higher in the Nordic countries than in the U.S.

In order to better understand the causal mechanisms that underlie the sibling correlations researchers have tried to disentangle the component conferred independently of the environment (predetermined) and the component conferred by an individual's childhood environment, which further has been decomposed into family and neighborhood components.

Nature-nurture decompositions of life-time earnings suggest that genetic inheritance cannot be neglected in a comprehensive model of the impact of family background. Björklund, Jäntti, and Solon (2005) using Swedish data on nine sibling types of different genetic and environmental linkages to

[3]Aspects of the family background not captured by sibling correlations are the genetic factors not shared by siblings, sibling-specific parental investments, and time-specific community factors.

estimate the fractions of inequality in life-time earnings that can attributed to nature and shared childhood environment. In their least restrictive model they find both to be as good as equally important. Sacerdote (2007) in turn finds by comparing sibling correlations for adopted children and their non-adopted siblings for Korean adoptees in the U.S. that shared family environment explains 14 percent of the variance in family income while genetic factors explain 33 percent. Another design contributing to the nature/nurture debate is the regression based approach that uses information of both biological and adoptive parents. Björklund, Lindahl, and Plug (2006) find that adoptive fathers have a larger impact than biological fathers on earnings and income.

The studies that decompose sibling correlations in earings into a component conferred by shared family characteristics and a component conferred by shared neighborhood characteristics generally find that neighborhood plays a small role as compared to the role of family (Bingley, Cappellari, and Tatsiramos, 2014; Page and Solon, 2003; Raaum, Sörensen, and Salvanes, 2005). However, the difficulty of non-random sorting of families into neighborhoods is recognized in these studies and thus the modest neighborhood covariance in earnings is considered to provide an upper bound on the explanatory power of neighborhood background. Evidence from social experiments aimed at improving the neighborbood quality of deprived families suggests that neighborhood quality has little impact on economic outcomes; Oreopolous (2003) finds a zero influence of neighborhood quality in the total variance of income and wages for a subgroup of families in Toronto randomly assigned to neighborhoods (i.e., when sorting plays no role) and upper-bound neighborhood covariance estimates of 0.041 in earnings (0.028 in income) for the whole population of Toronto. Also the evidence from the Moving to Opportunity (MTO) social experiment in the U.S. suggests that changes in neighborhood quality has little impact on economic outcomes (e.g. Ludwig et al., 2012). It may not come as a surprise that the family environment net of genetic factors in adoption studies have larger explanatory power on the variance in income than neighbourhood net of family factors as adoption shifts all the aspects of family environment including neighbourhood, school quality, peers, parental income and education, and parenting quality, as opposed to e.g., the MTO experiment shifting the children from one neighbourhood to another (in early adolescence).

Causal studies exploiting natural experiments that isolate income shocks in order to identify causation in intergenerational mobility do not show convincing evidence on a causal effect of family income on child outcomes (Akee et al., 2010; Løken, 2010; Oreopoulos, Page, and Stevens, 2008; Rege, Telle, and Votruba, 2011).

Studies looking at the causal relationship between parent's and child's education find between little evidence of a causal relationship (Black, Devereux, and Salvanes, 2005) and causal effects that account for less than half of the descriptive patterns gauged by sibling correlations in schooling (Holmlund, Lindahl, and Plug, 2011).[4] Further, a study by Justman and Gilboa (2012) comparing origin-dependence in education among children who grew up in Kibbutzim (with a redistributive policy aiming at equal

[4]See Black and Devereux (2011) , and Björklund and Jäntti (2009), and Björklund and Salvanes (2011) for comprehensive reviews of the causal evidence of the intergenerational earnings and schooling transmission.

sharing) to population estimates of origin-dependence shows that origin-dependence is reduced by half in the Kibbutzim. Nevertheless, the fact that origin-dependence still prevails serves as evidence for the relative importance of non-pecuniary channels of parental influence on education.

Overall, the family and what goes on within it, in particular factors beyond those captured by parental income and education seem to play the most crucial role in determining the social mobility captured by sibling correlations in outcomes.

2.3 Literature review: War and family disruption

Both earlier studies of children in war-time (Betancourt, de la Soudière, and Williamson, 2011; Freud and Burlingham, 1943; Panter-Brick, Grimon, and Eggerman, 2014), and contemporary studies of parental loss and separation in the general population (Gilman et al., 2003; Kendler et al., 1992; Morgan et al., 2007), show that these exposures increase the risk of mental health problems including mood, anxiety, and substance use disorders. Santavirta, Santavirta, and Gilman (2015) document that participation in the Finnish evacuation policy was not associated with a heightened risk of psychiatric hospitalization during adulthood. Santavirta and Santavirta (2014) arrive to similar results when examining whether the program carried psychological harms in terms of adult depression. Further, Santavirta (2014) documents a zero association between the evacuation scheme and adult all-cause mortality. The most probable explanation to the null finding is that the net psychiatric effect of this policy could be either protective or adverse depending on which of the two conflicting needs outweighs the other: closeness to biological parents or protection from war adversities.

3 Data

The analysis is based on a ten percent sample of households drawn from the full 1950 Finnish Census of Population (the first full census implemented in Finland). Statistics Finland drew this sample[5] (1950 census sample) in 1997 and matched it to the Population Register based on all three first names, last name, and date and place of birth, in order to link the social security number (issued towards the end of the 1960s) of each individual to the data. Thus, the individual had to be alive as of 1970 and reside in Finland in order to make it to the matched 1950 census sample that was linkable to more recent censuses and other register data based on the social security number. We linked it to census records beginning with the 1971 census through the 1985 census to extract tax records. The data records both the mother and the father of the child so information on parenthood is accurate for both. By use of the Finnish National Archive's complete register of all children who were evacuated to foster care in Sweden during World War II we identified 2,245 as having been evacuated to foster care during World War II among the

[5]The original draw resulted in 411,629 individuals from 114,000 households in 392 municipalities.

Table 1 Cohort and outcome years

Outcome year	Birth year											
	33	34	35	36	37	38	39	40	41	42	43	44
1970	37	36	35	34	33	32	31	30	29	28	27	26
1975	42	41	40	39	38	37	36	35	34	33	32	31
1980	47	46	45	44	43	42	41	40	39	38	37	36
1985	52	51	50	49	48	47	46	45	44	43	42	41

71,788 individuals belonging to the 1933-1944 cohorts in the 1950 census sample.[6] We identified all sibling pairs in the sample by use of the family and household identifiers. The individuals in the sample were also linked to their parents and siblings born before the oldest cohort included in the sample by use of the family identifier combined with a variable for family status of each member in the family, in order to construct family background covariates. Of the 71,788 individuals in the base population we dropped the individuals whose family identifier was missing (n =1,136) and those who had either died or emigrated before the 1970 census ($n = 4,037$). Our analytic sample consists of 66,615 individuals of which 2,009 are child evacuees.

Our income variable is total income (`svatv`) from all sources of income, or pre-tax total factor income. This variable is available in censuses 1971, 1975, 1980, and 1985. We inflation-adjusted total income to 1975 prices.

We know from Haider and Solon (2006) and Böhlmark and Lindquist (2006) that measuring lifetime income at different ages may involve complicated biases. Moreover, Nybom and Stuhler (2011) suggest the biases in intergenerational income elasticities may be quite substantial (which may have implications for sibling correlations as well). While we can not do much about these issues, it is useful be clear about the ages at which measurements are taken. Table 1 shows the ages of our birth cohorts in the four outcome years. For most cohorts, our ages of measurement appear reasonable. Note also that we are mainly interested in contrasts between different groups of individuals who are observed at the same ages. On the assumption that differences in lifecycle biases are similar across the groups, biases in the differences in variance components and the sibling correlation may be less of an issue.

Table 2 gives information on sample sizes in our data. As we use contrasts within child evacuee families of pairs of children of whom neither, both, or only one as evacuated, we report these separately. While we do not have massive numbers of child evacuees, there are several hundred pairs to be used and, we shall see, in most (but not all) cases, estimates are reasonably precise.

We are interested in the importance of family background as captured by the sibling correlation. The idea is that it picks up both parental (and community) influences as well as sibling interactions. If

[6]The matching procedure of the 1950 census sample to the child evacuee registry of the National Archives of Finland was conducted based on all three first names, last name and exact birth date. It turned out to be surprisingly successful with only 87 ambiguous cases of which 71 were more likely to be due to errors of spelling (a character missing in the name, one of the first names spelled differently or the birth date varying by 1-2 days while names were matching).

Table 2 Differences in Evacuation Status Among Siblings According to Sibship Size

Evacuee status	All ($n = 43,665$ pairs)	Two siblings ($n = 9,957$ pairs)	Three siblings ($n = 13,590$ pairs)	Four siblings ($n = 10,806$ pairs)	Five or more siblings ($n = 9,346$ pairs)
Both nonevacuees	41,790	9,482	12,932	10,341	8,969
Evac. vs. nonevac.	1,321	295	458	348	220
Evac. vs. evac.	554	180	200	117	57

Table 3 Regressing the mean of the natural logarithm of residualized annual earnings on evacuee status (OLS and Within-sibling FE)

	Pooled sample		Women		Men	
Characteristic	Cohort	Within sibling	Cohort	Within sibling	Cohort	Within sibling
Evacuee	0.016	0.052	0.041	0.099	-0.003	0.016
	(0.023)	(0.054)	(0.034)	(0.070)	(0.030)	(0.065)
N	44,943	44,943	44,943	44,943	44,943	44,943

Note: The dependent variable is the individual mean of the annual residuals from regression: $\log(y) = x'\beta + \varepsilon$, where y is the total taxable annual income and x includes cohort dummies, year dummies for 1975, 1980, and 1985 and interactions of each of these dummies with gender. Standard errors are reported in parentheses. Impacts by gender were derived from one model by including an interaction with evacuee status. The sample used in the within sibling analysis includes only those individuals of the analysis sample who had at least one full sibling within the relevant cohorts ($n = 44,943$), gender composition in the sample reported in the table and the number of sibling pairs discordant for exposure is 1,321. The cohort analysis adjusted for gender and its interaction with evacuee status, parental education, native language, number of children in 1940, five categorical variables for SES in 1939 and county of residence in 1939, interaction terms between gender and each of the five categorical SES variables, age (birth cohort), birth order, region of residence (1939) (The pooled results in the first two columns omit the interaction terms with gender). All family background covariates–parental education, native language, number of children in 1940, five categorical variables for SES in 1939 and county of residence in 1939–cancel out in the within sibling analysis.

family life is disrupted, as is the case with child evacuation to a greater degree, we hypothesize, than experiencing war at home, we expect the importance of family background to be less.

Note, however, that there are two distinct ways (which, moreover, are not mutually exclusive) for the sibling correlation to be different due to child evacuation. We hypothesize that disrupted family interactions lead to a lower shared component in income due to largely unobserved experience or rather lack thereof. However, it is also possible that all of those who were evacuated suffered from lower incomes as adults. This would mean that pairs of siblings who were not evacuated exhibit a higher family components than those who were. But this would be due to the effect on the conditional mean of income, not the presence of greater interaction within the family. To examine this issue, we report in Table 3 results from regressions of income on child evacuation status, both "naively" and also using sibling differences. There is little evidence of an effect on the conditional mean of income from child evacuation.

4 Methods

Our measure of the importance of family background for long-run earnings is the proportion of the variance in long-run income that can be attributed to family background. We are, in particular, interested in how this share varies with respect to child evacuee status.

Our approach to estimating the share of long-run income attributable to family background is to estimate *sibling correlations*, based on a simple variance components model. Suppose that the income in year t of an individual j in family i can be written as

$$y_{ijt} = x'_{ijt}\beta + a_i + b_{ij} + e_{ijt}, a \perp b \perp e. \tag{1}$$

The covariates x include age and year indicators. The family and individual components a and b, which are orthogonal by construction, have variances σ_a^2 and σ_b^2, respectively. The deviation of annual from long-run income e is assumed to be well behaved but is allowed to be auto-correlated (AR[1]).

The key statistic we compare across groups, the sibling correlation or the share of long-run income attributable to family background is then

$$\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2}. \tag{2}$$

This would coincide with the correlation coefficient of long-run income in a sample of pairs of siblings, which is why we call ρ the sibling correlation.

The variance parameters needed for the sibling correlation can be estimated by restricted maximum likelihood applied to equation 1. In practice, this would rely on a, b and e being conditionally normally distributed. Rather than impose this assumption, we follow Björklund, Jäntti, and Lindquist (2009) and estimate ρ using minimum-distance estimation on the empirical autocovariance matrices of sibling pairs.

For the appropriately defined population, we proceed as follows. We regress annual income in 1971, 1975, 1980 and 1985 on fully interacted birthyear and outcome year indicator variables – i.e., this is the "fixed" equation 1. We then take the residuals from that regression, and form for all pairs of siblings the autocovariance matrix of their residuals on those $T = 4$ years to get an autocovariance matrix with $8 * 9/2 = 36$ unique elements.

This matrix is the estimated sibling-pair autocovariance matrix. Its expectation, which we denote by S, consists of three distinct regions: the within-person main diagonal (where $s = t$ and $j = l$), with $\sigma_a^2 + \sigma_b^2 + \sigma_v^2$, the within-person off diagonal (where $i = k$ and $j = l$ but $t \neq s$, which is $\sigma_a^2 + \sigma_b^2 + \lambda^{|t-s|}\sigma_v^2$

and the between brother terms, all of which are σ_a^2:

$$S = \left[\begin{array}{c|cc|cc|c} \multicolumn{3}{c|}{\text{Brother A}} & \multicolumn{3}{c}{\text{Brother B}} \\ \hline \text{A} & \text{age}=t & \text{age}=s & & & \\ t & \sigma_a^2+\sigma_b^2+\sigma_v^2 & \sigma_a^2+\sigma_b^2+\lambda^{|t-s|}\sigma_v^2 & \multicolumn{3}{c}{\sigma_a^2} \\ s & \sigma_a^2+\sigma_b^2+\lambda^{|t-s|}\sigma_v^2 & \sigma_a^2+\sigma_b^2+\sigma_v^2 & & & \\ \hline & & & \text{age}=t & \text{age}=s & \text{B} \\ \multicolumn{2}{c}{\multirow{2}{*}{σ_a^2}} & & \sigma_a^2+\sigma_b^2+\sigma_v^2 & \sigma_a^2+\sigma_b^2+\lambda^{|t-s|}\sigma_v^2 & t \\ & & & \sigma_a^2+\sigma_b^2+\lambda^{|t-s|}\sigma_v^2 & \sigma_a^2+\sigma_b^2+\sigma_v^2 & s \end{array}\right] \tag{3}$$

Note that we assume an AR[1] structure to the errors e with parameter λ; setting to $\lambda = 0$ the errors are white noise.[7] Note that forming all pairs of siblings gives greater weight to large families, an issue discussed e.g. by Solon, Page, and Duncan (2000, p. 388). Björklund, Jäntti, and Lindquist (2009), who use Swedish data, found the choice of weighting scheme made little difference. We use the inverse of the total number of pairs contributed by each family i, $w_i = [1/2n_i(n_i-1)]^{-1}$, which gives equal weight to each family.

To estimate standard errors for our parameters, we need to estimate the variance matrix of the unique elements of the $2T \times 2T$ matrix S,

$$S := \mathrm{E}[(e_A|e_B)'(e_A|e_B)]. \tag{4}$$

This has $T(2T+1)$ unique elements (i.e., the main diagonal and lower triangular elements); call those γ and their estimator $\widehat{\gamma}$. To be able to perform statistical inference on the MD estimates of the variance components and sibling correlation, we further need an estimate of the variance matrix of $\widehat{\gamma}$. Let u_i be the unique elements in the cross-product of the residuals for a pair of brothers, $(e_{A,i}|e_{B,i})'(e_{A,i}|e_{B,i})$. The variance-covariance matrix of the estimator of the unique elements in S is then estimated by

$$\widehat{B} = (u'u - \bar{u}'\bar{u}) \cdot N^{-1}, \tag{5}$$

where $\cdot N^{-1}$ denotes element-by-element division by the number of observations used to estimate the covariance corresponding to each element of $\widehat{B}$.

We use the well-known estimated asymptotic variance matrix of the MD estimator to estimate the standard errors of the variance components and a first-order Taylor expansion to estimate the standard errors of the estimated sibling correlation (see Wooldridge, 2002, ch. 14). The fitting is done by non-linear least squares, using a diagonal weighting matrix that has the inverse of the sample size of each of the estimated covariances on the main diagonal. The use of the sample sizes rather than the higher-order moments in the weight matrix is intended to avoid finite sample bias from using the estimated

[7] The AR(1) is probably too simple and at least an ARMA[1,1] would probably be preferable but with only 4 observations, a richer time series structure is hard to support.

variance-covariance matrix of the autocovariances (Altonji and Segal, 1996).

We then use the estimated covariance matrices to estimate the variance parameters of the individual and family components in equation 1 for each of our groups. When relevant, we include singletons in estimation to increase the statistical precision of ours estimates. Standard errors for the variance parameters follow directly from the GMM estimation and the standard error for the sibling correlation is derived using the delta method.

We show the estimated autocovariance matrices in Table 4. The main diagonal and lower triangle show autocovariances with the associated standard errors, the above diagonal elements show the implied correlations. As exptected, the main diagonal elements are large and there is support for a decline in the within-person autocovariances across time (supporting the notion the within-person annual deviations from long-run income are not white noise). Comparing the child-evacuee to non-child-evacuee matrices, the across-siblings autocovariances (the south-west quadrant in each matrix) are clearly lower, suggesting a smaller family component. We proceed to estimate the variance components and the sibling correlation next.

Table 4 Estimated sibling autocovariance matrices by Child Evacuee status

A. Men

Sibling pair: Not CE

	A.1970	A.1975	A.1980	A.1985	B.1970	B.1975	B.1980	B.1985
A.1970	0.716 (0.027)	0.519	0.438	0.378	0.200	0.166	0.166	0.146
A.1975	0.343 (0.013)	0.611 (0.012)	0.578	0.477	0.173	0.173	0.159	0.148
A.1980	0.321 (0.022)	0.391 (0.023)	0.751 (0.009)	0.527	0.166	0.168	0.174	0.152
A.1985	0.246 (0.014)	0.287 (0.010)	0.352 (0.008)	0.593 (0.010)	0.147	0.143	0.149	0.167
B.1970	0.145 (0.015)	0.115 (0.008)	0.123 (0.008)	0.097 (0.008)	0.730 (0.014)	0.584	0.512	0.449
B.1975	0.112 (0.030)	0.108 (0.009)	0.116 (0.007)	0.088 (0.010)	0.397 (0.024)	0.635 (0.008)	0.619	0.527
B.1980	0.120 (0.010)	0.106 (0.007)	0.129 (0.013)	0.098 (0.007)	0.373 (0.008)	0.421 (0.007)	0.730 (0.009)	0.619
B.1985	0.093 (0.010)	0.087 (0.025)	0.099 (0.020)	0.096 (0.012)	0.288 (0.007)	0.315 (0.009)	0.396 (0.011)	0.562 (0.019)

Sibling pair: In CE

	A.1970	A.1975	A.1980	A.1985	B.1970	B.1975	B.1980	B.1985
A.1970	0.669 (0.149)	0.190	0.534	0.314	0.150	0.078	0.121	0.096
A.1975	0.183 (0.122)	1.380 (0.057)	0.196	0.248	0.083	−0.053	0.130	−0.022
A.1980	0.354 (0.515)	0.187 (0.447)	0.659 (0.036)	0.444	0.106	0.155	0.198	0.115
A.1985	0.261 (0.098)	0.297 (0.048)	0.367 (0.083)	1.038 (0.039)	0.115	0.067	0.096	0.059
B.1970	0.082 (0.074)	0.065 (0.041)	0.058 (0.036)	0.079 (0.107)	0.449 (0.087)	0.416	0.261	0.287
B.1975	0.042 (0.150)	−0.041 (0.043)	0.083 (0.031)	0.045 (0.059)	0.184 (0.352)	0.436 (0.051)	0.555	0.258
B.1980	0.107 (0.044)	0.166 (0.029)	0.173 (0.067)	0.106 (0.074)	0.189 (0.058)	0.397 (0.057)	1.170 (0.047)	0.432
B.1985	0.091 (0.173)	−0.030 (0.097)	0.107 (0.079)	0.069 (0.066)	0.222 (0.075)	0.196 (0.050)	0.539 (0.188)	1.327 (0.458)

B. Women

Sibling pair: Not CE

	A.1970	A.1975	A.1980	A.1985	B.1970	B.1975	B.1980	B.1985
A.1970	1.259 (0.041)	0.348	0.277	0.232	0.059	0.071	0.059	0.098
A.1975	0.459 (0.018)	1.375 (0.017)	0.394	0.339	0.078	0.113	0.095	0.104
A.1980	0.303 (0.041)	0.451 (0.030)	0.950 (0.019)	0.511	0.065	0.070	0.093	0.094
A.1985	0.223 (0.015)	0.340 (0.020)	0.426 (0.020)	0.730 (0.015)	0.080	0.069	0.094	0.114
B.1970	0.082 (0.016)	0.113 (0.019)	0.078 (0.014)	0.085 (0.014)	1.522 (0.020)	0.405	0.329	0.282
B.1975	0.104 (0.034)	0.173 (0.016)	0.089 (0.012)	0.078 (0.011)	0.652 (0.034)	1.708 (0.010)	0.447	0.368
B.1980	0.067 (0.012)	0.113 (0.013)	0.091 (0.027)	0.081 (0.010)	0.409 (0.014)	0.589 (0.009)	1.018 (0.014)	0.557
B.1985	0.095 (0.013)	0.105 (0.049)	0.079 (0.048)	0.084 (0.018)	0.300 (0.012)	0.415 (0.014)	0.485 (0.016)	0.745 (0.030)

Sibling pair: In CE

	A.1970	A.1975	A.1980	A.1985	B.1970	B.1975	B.1980	B.1985
A.1970	1.304 (0.333)	0.428	0.394	0.199	0.245	0.219	0.002	−0.102
A.1975	0.467 (0.165)	0.910 (0.110)	0.473	0.356	0.157	0.114	0.020	0.124
A.1980	0.431 (0.226)	0.433 (0.134)	0.921 (0.217)	0.599	0.213	0.228	0.024	0.026
A.1985	0.163 (0.259)	0.243 (0.260)	0.412 (0.138)	0.514 (0.082)	−0.058	0.085	0.022	−0.024
B.1970	0.295 (0.147)	0.158 (0.151)	0.216 (0.198)	−0.044 (0.074)	1.116 (0.195)	0.507	0.389	0.590
B.1975	0.279 (0.272)	0.122 (0.197)	0.244 (0.093)	0.068 (0.077)	0.598 (0.312)	1.244 (0.071)	0.591	0.521
B.1980	0.003 (0.081)	0.020 (0.105)	0.024 (0.174)	0.017 (0.085)	0.440 (0.074)	0.706 (0.076)	1.146 (0.105)	0.654
B.1985	−0.088 (0.059)	0.089 (0.213)	0.019 (0.321)	−0.013 (0.114)	0.468 (0.079)	0.436 (0.144)	0.526 (0.096)	0.564 (0.113)

Note:
Source: Authors' estimations.

Table 5 Estimated variance components and sibling correlations in Finland

Group	Variance component			Autocorrelation	Sibling correlation
	Family σ_a^2	Individual σ_b^2	Error σ_v^2	λ	ρ
Men					
all	0.1067	0.1774	0.3835	0.7693	0.3756
	(0.0056)	(0.0056)	(0.0048)	(0.0063)	(0.0085)
notce	0.1082	0.1767	0.3803	0.7736	0.3798
	(0.0058)	(0.0056)	(0.0047)	(0.0063)	(0.0085)
ce	0.0752	0.2037	0.5252	0.6524	0.2695
	(0.0335)	(0.0786)	(0.0673)	(0.1350)	(0.1277)
mixed	0.0794	0.1757	0.3939	0.7161	0.3112
	(0.0155)	(0.0274)	(0.0274)	(0.0254)	(0.0452)
Women					
all	0.0940	0.1837	0.8738	0.7812	0.3386
	(0.0073)	(0.0082)	(0.0084)	(0.0042)	(0.0129)
notce	0.0947	0.1844	0.8792	0.7802	0.3392
	(0.0075)	(0.0084)	(0.0085)	(0.0043)	(0.0132)
ce	0.0881	0.1904	0.6336	0.7885	0.3163
	(0.0630)	(0.0392)	(0.0761)	(0.0399)	(0.0643)
mixed	0.0612	0.1544	0.7396	0.8002	0.2837
	(0.0281)	(0.0487)	(0.0599)	(0.0311)	(0.0891)
Both					
all	0.0802	0.2503	0.6431	0.7870	0.2426
	(0.0032)	(0.0055)	(0.0049)	(0.0039)	(0.0084)
notce	0.0809	0.2508	0.6461	0.7876	0.2440
	(0.0034)	(0.0056)	(0.0050)	(0.0040)	(0.0085)
ce	0.0618	0.2539	0.5675	0.7510	0.1957
	(0.0230)	(0.0408)	(0.0409)	(0.0429)	(0.0656)
mixed	0.0483	0.2442	0.5497	0.7644	0.1651
	(0.0120)	(0.0249)	(0.0309)	(0.0336)	(0.0423)

Note: Standard errors in parenthesis. See Section 4 for definitions of the terms and their estimation.

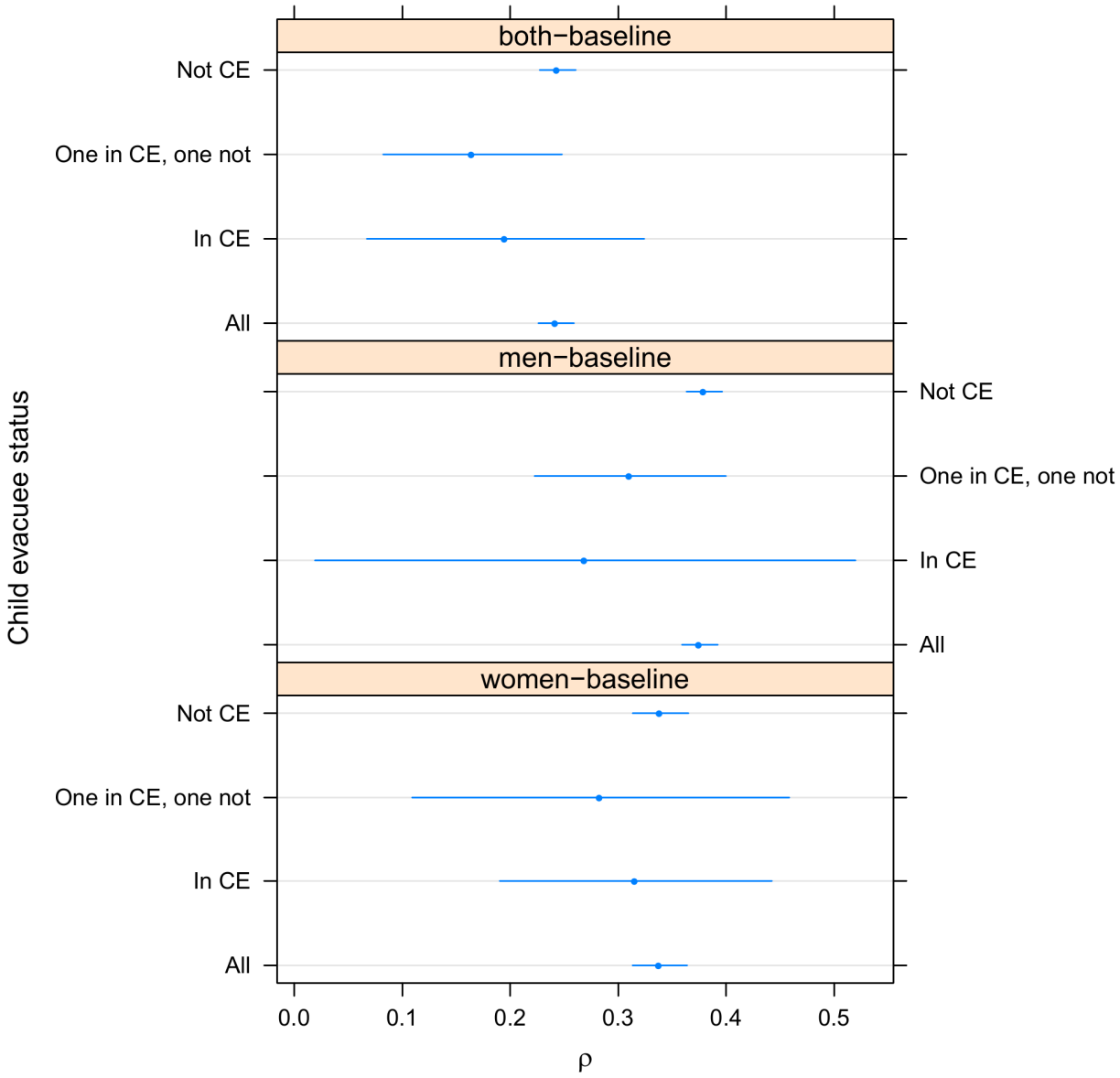
5 Analysis

In this section, we present our main results. We estimate the variance components and the sibling correlation as defined in Section 4 for 4 groups: all sibling pairs, for pairs where neither was evacuated, both were evacuated, and pairs where one was and one was not evacuated. It should be noted that these are not mutually exclusive groups of pairs, so in comparing estimates, independence can not be assumed.[8] Our baseline includes all data. We later conduct sensitivity analysis using only those families that had evacuated at least one child. We also re-estimate all parameters using "shaved data", i.e., data where we discard the bottom and top 5 percent of the income distribution in each year.

Table 5 presents the results for our baseline case that includes all individuals who have positive earnings in at least one year. Starting with men (the first panel), we find the highest correlation for the

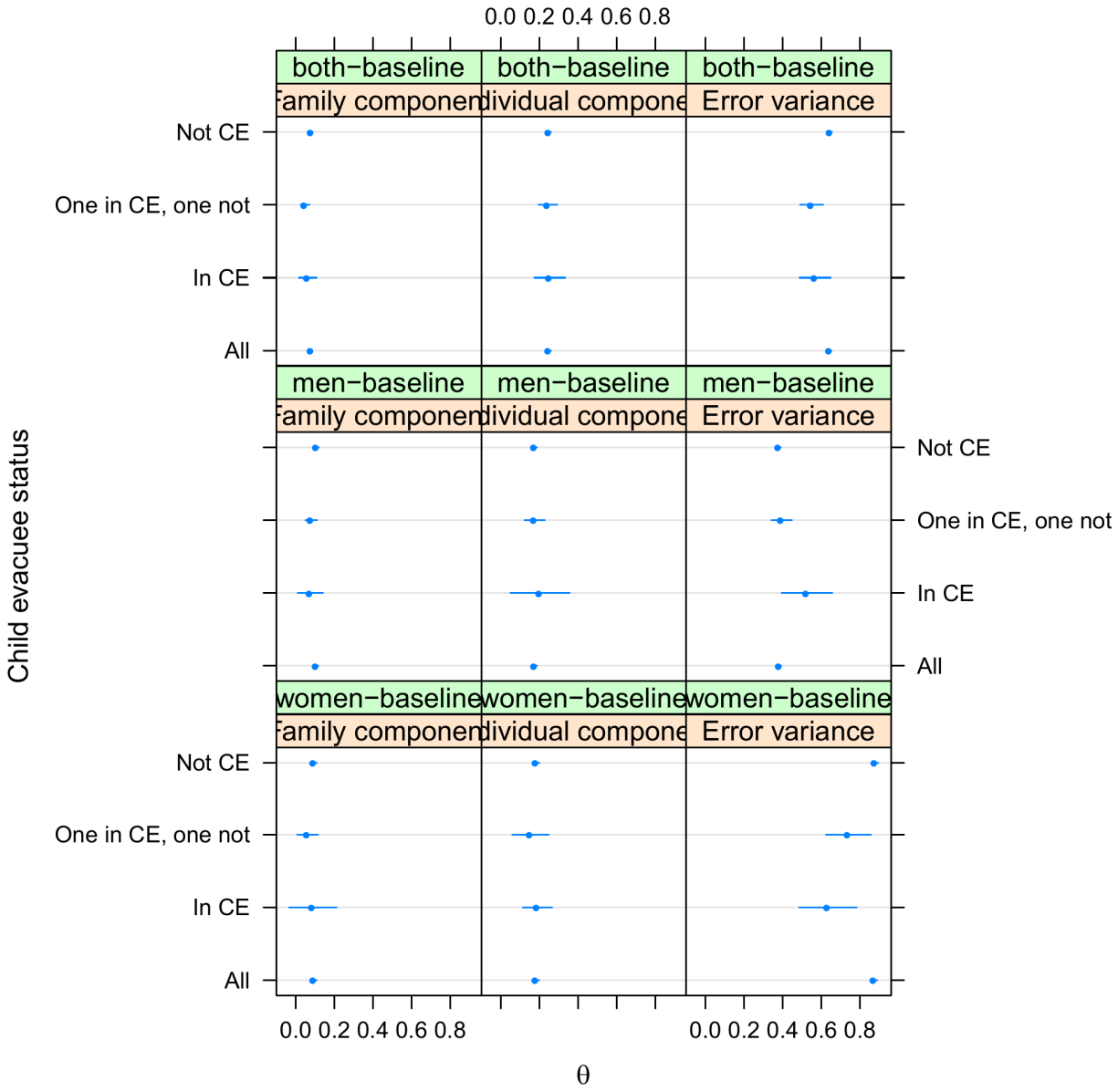
[8] We will work on statistical testing in future versions.

Figure 1 Estimated siblings correlation in Finland – overall level and effect of by child evacuee status



Note: Graph shows point estimate and the 95% confidence interval. Results are based on all persons (including singletons) and allow the within-person residuals to follow an AR(1) process. Variances and covariances estimated using a first-stage regression that includes birthyear controls.

Figure 2 Estimated variance parameters



Note: Graph shows point estimate and the 95% confidence interval.

brother pairs whose family background remained intact throughout the war (0.3798), whereas substantially lower correlations are found for the brother pairs both or one of whom were evacuated to foster care during World War II. The estimate for nonevacuee brothers is in the same ballpark as Swedish estimates (0.3647) on brother correlations for the same cohorts using the same AR(1) structure of the earnings process (Björklund, Jäntti, and Lindquist, 2009). The correlation for male sibling pairs both of whose rearing family background was disrupted for an average period of two years and who, except for rare cases, were placed apart in Sweden was 0.2695. For male sibling pairs for whom the shared family background was disrupted do to the evacuation of one sibling, the correlation was somewhat higher (0.3112). The decline from the intact family case to the case where neither brother had an intact background and the shared family background was disrupted for an average of two years is from 0.3647 to 0.2695. Thus ,the evacuation to foster care decreased the fraction of income inequality attributable to family and community factors by 9.52 percentage points (26.1 percent). The standard errors of the estimates are small, delivering narrow 95% confidence intervals (CIs).[9]

For women (second panel), the pattern is not as pronounced although the earnings correlation for sisters of whom both were evacuated (0.3163) was lower than the correlation of sister pairs with an intact background (0.3392). The lowest sister correlation was however found for sister pairs of whom one was evacuated and the other remained with the rearing family throughout the war (0.2837). Thus the sister correlations in earnings estimated for sister pairs with an intact background were 5.55 percentage points (16.3 percent), higher than for sisters pairs of which one was evacuated and the other not. Also for women the standard errors of the estimates were small, hence 95% CIs narrow.

The last panel of of Table 5 pools women and men together and estimates sibling correlations in earnings for our four sibling pair combinations: all sibling pairs, sibling pairs of nonevacuees, one evacuee and one nonevacuee sibling (mixed), and both evacuee sibligs (evacuee). A similar pattern is found for siblings as for sisters; the nonevacuee sibling pairs have the highest earnings correlation (0.2440), followed by the evacuee sibling pairs (0.1957), and the lowest correlation is found for the mixed sibling pairs (0.1651). Once again, the standard errors are reassuringly low, hence 95% CIs narrow.

The variance components underlying the estimated sibling correlation are reported in the first three columns of Table 5. They tell quite a consistent story in all three panels; the family component decreased markedly moving from sibling pairs with an intact shared background to the cases where the background was disrupted by the temporary placement in foster care of either one or both siblings while the individual component remained more stable.

Overall, our baseline results show that sibling correlations are substantially lower for sibling pairs of which one or both of the siblings were evacuated to foster care during childhood. The lower sibling correlation for these pairs as compared to correlation coefficients for the whole population is caused by

[9]However, as we discuss in the appendix, the fact that the confidence intervals for our estimates are narrow does not necessarily mean the differences between groups are statistically significant. Indeed, in most cases, they are not. See Figure 4.

lower variance for the family component in these pairs.

Taken at face value, our baseline results suggest that a rather short intevervention into children's rearing environment can shift the importance of family background substantially. These results deserve scrutiny, in our following analyses we examine to what extent the sensitivity our our baseline results are dependent on selection of evacuee families. Table 6 replicates the anlyses of Table 5 using a subsample of families where at least one child was evacuated (evacuee families). Since we know that the evacuee families are a selected group of families, our concern is that the sibling correlation of nonevacuees differs in these families from that of the whole population of nonevacuees. In this case, it would be misleading to contrast the correlation of evacuee sibling pairs within evacuee families to nonevacuee pairs in the entire population. The brother correlation in nonevacuee pairs seems to be substantially higher in evacuee families than in the whole population, further accentuating our findings of an impact of the evacuation program on family background. Nevertheless, our sample size of nonevacuee sibling pairs in evacuee families is small for both genders and does not allow us to estimate the sister correlation.[10]

Table 7 shows the parameter estimates when data have been shaved. For men, these results support the notion that disruption of family interactions leads to a lower importance of family background. For women, the results are much harder to interpret; indeed, one interpretation is that for women the main results may largely be driven by the very low and high values.

6 Concluding comments

To what extent does family disruption during childhood alter the importance of family background for economic status? In this study, we present results from a large-scale evacuation program during World War II well suited to address this question. The participating families often decided against sending all their children away for multiple reasons. This generated discordance between siblings with respect to shared family background. The acquired population-based data on evacuation and long-run earnings are unique in terms of using accurate data on age at and duration of evacuation from historical records and its long follow-up spanning 40 to 45 years after evacuation and hence enabling the construction of long-run income.

Even though the whole distribution of pre-war socioeconomic backgrounds were represented among the participants, the findings may not generalize to all families of the population; the participating families were particularly exposed to war adversities. Further, even though all evacuated children in our data were healthy and anecdotal evidence lacks signs of parental differentiation based on child-specific endowments, we cannot rule out systematic patterns of sending away the particularly resilient (or particularly vulnerable).

Keeping these caveats in mind, we find that the sibling correlations are substantially lower for sibling pairs of which one or both of the siblings were evacuated to foster care during childhood. We

[10]Sample sizes here for sisters are very small and the estimates turn negative; we have chosen not to restrict the variance parameters to be positive as free estimates should result in sensible values.

Table 6 Estimated variance components and sibling correlations – Only CE Families

Group	Variance component			Sibling correlation
	Family σ_a^2	Individual σ_b^2	Error σ_v^2	ρ
men-CEFamilies				
all	0.0836 (0.0150)	0.2316 (0.0118)	0.4142 (0.0065)	0.2653 (0.0185)
notce	0.0970 (0.0442)	0.2593 (*NaN*)	0.4736 (*NaN*)	0.2723 (0.0107)
ce	0.0752 (0.0335)	0.2373 (0.0164)	0.4916 (*NaN*)	0.2405 (0.0269)
mixed	0.0794 (0.0155)	0.2179 (0.0115)	0.3517 (0.0176)	0.2670 (0.0185)
women-CEFamilies				
all	0.1102 (0.0327)	0.2874 (*NaN*)	0.6365 (0.0182)	0.2771 (*NaN*)
notce	0.2175 (0.1112)	0.2229 (*NaN*)	0.8680 (0.0564)	0.4938 (*NaN*)
ce	0.0881 (0.0630)	0.3094 (*NaN*)	0.5148 (0.0066)	0.2216 (*NaN*)
mixed	0.0612 (0.0281)	0.3063 (*NaN*)	0.5883 (0.0196)	0.1665 (*NaN*)
both-CEFamilies				
all	0.0622 (0.0115)	0.3368 (0.0160)	0.4976 (0.0122)	0.1559 (0.0235)
notce	*NA* (*NA*)	*NA* (*NA*)	*NA* (*NA*)	*NA* (*NA*)
ce	0.0618 (0.0230)	0.3336 (0.0130)	0.4881 (0.0049)	0.1562 (0.0200)
mixed	0.0483 (0.0120)	0.3299 (0.0155)	0.4643 (0.0133)	0.1277 (0.0237)

Note: Standard errors in parenthesis. See Section 4 for definitions of the terms and their estimation. Note that for this case, we model the error as white noise as the estimation algorithm failed to generate all positive variance components.

Table 7 Estimated variance components and sibling correlations – No outliers

Group	Variance component			Autocorrelation	Sibling correlation
	Family σ_a^2	Individual σ_b^2	Error σ_v^2	λ	ρ
men-no.outliers					
all	0.0331	0.0727	0.1099	0.7144	0.3131
	(0.0012)	(0.0008)	(0.0006)	(0.0043)	(0.0020)
notce	0.0333	0.0728	0.1100	0.7152	0.3138
	(0.0012)	(0.0008)	(0.0007)	(0.0044)	(0.0021)
ce	0.0188	0.0735	0.1051	0.7430	0.2034
	(0.0082)	(0.0041)	(0.0041)	(0.0260)	(0.0120)
mixed	0.0340	0.0709	0.1023	0.6417	0.3241
	(0.0070)	(0.0039)	(0.0024)	(0.0288)	(0.0101)
women-no.outliers					
all	0.0390	0.0906	0.3124	0.7881	0.3010
	(0.0024)	(0.0025)	(0.0026)	(0.0032)	(0.0059)
notce	0.0384	0.0919	0.3140	0.7881	0.2946
	(0.0025)	(0.0026)	(0.0026)	(0.0032)	(0.0060)
ce	0.0313	0.0682	0.2729	0.8064	0.3147
	(0.0220)	(0.0199)	(0.0167)	(0.0121)	(0.0525)
mixed	0.0583	0.0537	0.2625	0.7686	0.5206
	(0.0139)	(0.0151)	(0.0150)	(0.0277)	(0.0314)
both-no.outliers					
all	0.0325	0.1098	0.1878	0.7864	0.2283
	(0.0010)	(0.0012)	(0.0010)	(0.0024)	(0.0029)
notce	0.0327	0.1099	0.1888	0.7872	0.2294
	(0.0010)	(0.0013)	(0.0010)	(0.0024)	(0.0030)
ce	0.0190	0.1052	0.1671	0.7634	0.1533
	(0.0070)	(0.0066)	(0.0063)	(0.0177)	(0.0173)
mixed	0.0254	0.1088	0.1611	0.7587	0.1890
	(0.0048)	(0.0062)	(0.0058)	(0.0166)	(0.0153)

Note: Standard errors in parenthesis. See Section 4 for definitions of the terms and their estimation.

confirm by looking at the association between evacuation and long-run income, as well as relying on previous evidence by Santavirta and Santavirta (2014) and Santavirta, Santavirta, and Gilman (2015), that participation in the evacuee program does not seem to have affected long-run income levels. This mixed pattern of the evacuation program suggests that the lower shared component of income within participating families is due to less interation and shared experience among siblings in those families as opposed to the evacuation as such having an effect on the conditional mean of income.

There is little doubt that all children who experienced World War II in Finland were to some extent affected by it. It might be argued that the experiencing war on the home front as opposed to being evacuated to a foreign land are different traumatizing experiences. Be that as it may, the combination of little or no effect on income levels, and a substantially lower sibling correlation for the evacuated children, suggests that a removal from the family setting for even a relatively short period has a big impact on share of family factors in long-run inequality.

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A The Evacuation Policy

A.1 Historical Background

The chief part of the documents that this section is based on are available in the Files for The Child Evacuation Scheme during World War II at The National Archives of Finland (NAF). When not specifically mentioned, we refer to Lomu (1974), who constructs a detailed report on the evacuation scheme based on the documents of NAF.

Finland fought two wars against the Soviet Union between 1939 and 1944 during World War II. Despite Finnish collaboration with the Axis Powers during World War II, Finland's resistance against Stalin's Red Army received moral support from many Western countries. Food and material aid was received from international organizations and credit was granted by several countries.

In June 1941, a plan for a large scale operation of evacuating Finnish children to Sweden emerged. A nationwide volunteer organization was established in Sweden to care for the placement of the children and a large scale network of volunteer foster families was mobilized.[11] In Finland the evacuations were organized by a nationwide organization, under the auspices of the Ministry of Social Affairs relying on the nationwide civilian service logistic infrastructure including local offices and staff. These two organizations designed the evacuation scheme and carried out the major part of the evacuations and placements in foster families made between 1941 and 1945.[12]

The official motives for a mass evacuation of children were, as stated by the Ministry of Social Affairs, that children who were particularly exposed to the various adversities of war should be given a better rearing environment. At first, each Finnish county was granted a quota of evacuees, but restricting the selection of participants to the stated quotas proved difficult as fear for air raids spread among the urban population and food became scarce. The original eligibility criteria were the following: 1. Children of relocated Karelian families[13] 2. Children whose fathers were wounded in battle 3. Children who had lost their home in bombings 4. Children whose father's had died in war or who had lost their parents in bombings. In January 1942, the criteria were expanded to comprise children from large families, and children whose mothers were working full time; also children who resided in towns that were potential targets for air raids. This latter criterion applied, in practice, to most eastern and southern towns of Finland, where hence most children were considered eligible. At first the objective was to send preschoolers. A strict age criterion was however not applied in practice due, for instance, to the difficulty to age-discriminate between siblings. Statistics show that roughly half of the children

[11] No financial compensation for accommodating Finnish children was ever promised to the families, and none was ever going to be rewarded either for that matter. In other words, the accommodating of evacuees was based purely on philanthropic grounds.

[12] Most evacuations were made in the winter between 1941 and 1942 and in 1944.

[13] Being the border region between Finland and the Soviet Union, Karelia was the region most adversely affected by the war. Roughly 400,000 people, virtually the whole Karelian population, had to be displaced to other regions of Finland already in 1940 as a consequence of the Moscow Peace Treaty between the Soviet Union and Finland, which handed Karelia to the Soviet Union. Figure A presents the ceded part of Karelia on a map of Finland.

were past school starting age by the time of evacuation.

In total 48,628 children were evacuated to Sweden through the described evacuation scheme and an additional roughly 20,000 children were sent to Sweden independently from the official evacuation program to relatives and friends. In total, it is estimated that roughly 65,000 children spent from a couple of months up to five years (on average two years) in foster care in Swedish families during World War II. The total amount of evacuees equals the size of one Finnish cohort during the 1930s.

A.2 The Evacuation from Finland to Sweden

A large organization, called the Evacuation Committee, was set up on the foundations of the existing war time civilian support organization to execute the evacuations with the help from numerous volunteers.[14] The organization made itself known through nationwide broadcasting and advertising in local newspapers. Headquarters were established in Helsinki, employing a large administrative staff. The Evacuation Committee set up and funded regional subsidiary offices that were largely run by volunteers such as local nurses. After the evacuations began, in September 1941, the county offices were converted into evacuation centers handling the selection process, transportation arrangements, documentation, accounting, correspondence between the evacuees and their families, and advertising of the evacuation scheme in the local media. Absorption centers were set up near the ports of Turku and Vaasa, from where the evacuees were shipped to Sweden and in the border towns of Tornio and Kemi, from where the evacuees crossed the border by railway. All travel expenses were covered by the Evacuation Committee.

Parents who had learned about the evacuation program through mass media or local authorities first filed an application to the local evacuation office. In the application the parents had to account for the reasons for applying to the program and list their status on each of the eligibility criteria. Families with more than one child could opt for including all their children in the application or decide to evacuate only some of their children (this was quite a usual strategy in large families where malnutrition was a common reason for participation). Even though the family background (eligibility criteria) of each evacuee was well documented through the screening process neither the child evacuee registry nor historical accounts has much to say about selective behavior within families that evacuated only some of their children; the actual evacuation decision was considered to be a family matter (Kavén, 2011). When the application was approved, a health check at the local hospital followed and an identification document including a photograph was issued. The documents were sent to the local evacuation office where the child's file was put into a queue awaiting information on the region's quota for the following evacuation round. As soon as the headquarters of the organization gave information of each region's quota for the next round, the county office gathered the children - according to the ordered date of application approval - to the nearest railway station from where they were sent to the absorption centers.

[14]The Civilian Service of Finland contributed with an already existing network of volunteers. This organization was founded in 1939 for the purpose of distributing aid packages received from foreign oragnizations.

The children were not allowed to carry any money and their ration cards (most grocery products were rationed in Finland during the war) needed to be handed in before departure.[15] The children brought with them a franked envelope, which the foster parents that would be assigned in Sweden, were urged to post to the Finnish county office with notification of the child's arrival and their name and address, to enable correspondence between the biological parents and their child. Upon arrival at the absorption center, a brief health check was conducted and information on the children was entered into an evacuee register. Each child was assigned a running number according to arrival order and given an identification plate to carry around her neck.

Based on the above description of the evacuation, it is plausible that the evacuation created randomness in the order in which the children were transported to Sweden. The strongest arguments in favor of random order of evacuation with respect to any background characteristics are that the children were processed according to a running number upon the arrival to the absorption centers (and boarded the vehicle of transportation accordingly).

A.3 The Placement to Foster Families in Sweden

In Sweden, the structure of the Placement Committee was literally a mirror image of the Evacuation Committee on the Finnish side. Its main office was located in Stockholm and each county had its own local organization led by an authorized representative who was in charge of the placement of the children into families. In practice, large local volunteer organizations conducted the major part of the placement operations, and the provincial offices handled registries of children and other administrative issues. Quarantine centers were established in geographically strategic Swedish towns, usually the capital of the county.

At first, as the contingents arrived in Swedish territory, they were taken to sanitary centers, which were located in the near proximity of the arrival port or station (Stockholm, Umeåand Haparanda), where brief health checks were conducted. At the sanitary centers, the contingents were split into smaller groups which were placed in quarantine centers for a week. They went through careful health checks before being assigned a county of destination and eventually a foster family to confirm that they were not carrying any contagious diseases. Although medical issues were of first priority, much weight was put on nutrition and inventory of the children's luggage. Clothes were provided to poorly equipped children, and all children were cleaned thoroughly. When leaving the quarantine centers, the children were separated into smaller groups and transported via the county offices - where the group would be re-shuffled into smaller units - to their final destinations.

Little is documented about the final stage of the evacuation, that is, the placement in foster families, and thus one is principally referred to anecdotal evidence as recalled or retold by the evacuees.[16] Regarding the different stages of the journey until the local Swedish provincial offices, anecdotal evidence

[15]This made any form of bribing of the officials difficult for the children.

[16]We make use of a compilation of 135 short stories of recollections by the evacuees edited by Leila Lehtiranta (1996.

conforms unusually well with the information in official documents. The final stage of the trip to the eventual placement seems to have been completed in three different ways: 1. when several children arrived at the same time in a community, the distribution of children to foster families would take place at some temporary lodging, e.g. the local parish house or school premises, according to a first-come first-served process,[17] 2. in sparsely populated areas, or in areas where only one family was awaiting a child, the assigned family would receive the child on a bus stop or train station without any possibilities to affect the choice of child, 3. in some cases the local ombudsman for the placement committee, often the local priest or school principal, assigned the children to families at their arrival on the train or bus station.

The description of the events during the journey to the final destination suggests that the children were processed anonymously according to the information provided on an identification plate hanging around their neck, i.e., an assigned running number, name and gender, and sorted randomly at several stages of the journey. By the time the children reached the last leg of their transportation, the inequalities in clothing, cleanness, and nutrition are supposed to have been leveled out, and thus to have made any inference of social background based on appearance difficult.

B Statistical inference

It is important to ask if parameter estimates for different types of sibling pairs shown in the result tables, such as Table 5 and especially, because of small sample size, Table 6, are different in the sense of the differences being statistically significant. For instance, the difference in the estimated brother correlation for brother pairs where neither had been evacuated is .3798 and that for child evacuees is 0.1108. If the two estimators were uncorrelated, the standard errors imply a standard error of that difference of $\sqrt{.0085^2 + .1277^2} = .1280$, implying a z-statistic of 0.87, which indicates the difference is statistically insignificant. The estimators, however, are not uncorrelated, so this is not the correct test. The problem is that it is very difficult to estimate that correlation, given how the estimation procedure has been set up.

To explore whether the difference in any given comparison is statistically significant, we do the following. A z-statistic is a function of the point estimates $\widehat{\rho}_j$, their standard errors σ_j, and the correlation between the estimates r_j; we have all other pieces but do not know the correlation so

$$z(r) = \frac{\widehat{\rho}_1 - \widehat{\rho}_2}{\sqrt{\sigma_1^2 + \sigma_2^2 + r\sigma_1\sigma_2}}, \tag{6}$$

[17] Pirkko Bergman, a one time child evacuee, recalls "... we (the children) were taken to a room and were told to sit on chairs with the identification plates visibly displayed. A group of people rushed in and among the first ones was a tall man who examined me, wrote something indicating 'reserved' on the parcel I was carrying and continued to examine others. Others showed interest in me but noticed the reservation sign on the package. The tall man, who turned out to be the priest of the village of Åsunden, Gösta Rosen, returned to pick me up together with another child, whom, I found out upon our arrival in the village, he had chosen for himself, I was assigned to a neighbouring family" (Lehtiranta, 1996).

Figure 3 Map of Finland including the area of Karelia ceded to Soviet Union in 1940 (shaded area)

so the significance level of the pairwise test, assuming asymptotic normality, is

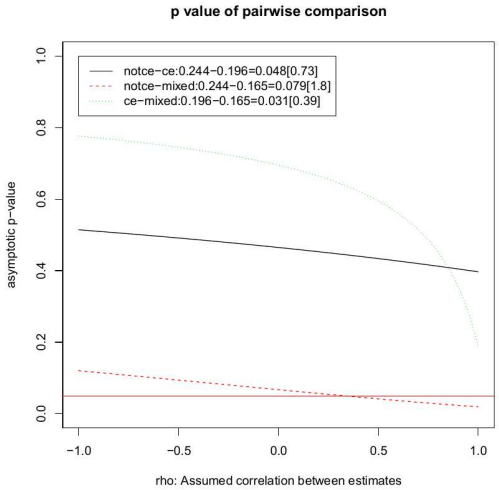
$$\alpha(r) = 2(1 - \Phi[|z(r)|]). \tag{7}$$

If, for all levels of $r \in (-1, 1)$, $\alpha > .05$, we can deduce the difference is statistically insignificant. Likewise, if $\alpha < .05$ for all r, we could reject the null that the difference is zero regardless of the actual, unknown correlation between the estimates. When the function crosses the .05 line, we know the unknown correlation matters. The results for this exercise for our baseline (Table 5) and the case of child evacuee families only (Table 6) are shown in Figure 4. As we can see, in general the pairwise differences are statistically insignificant for all values of r.

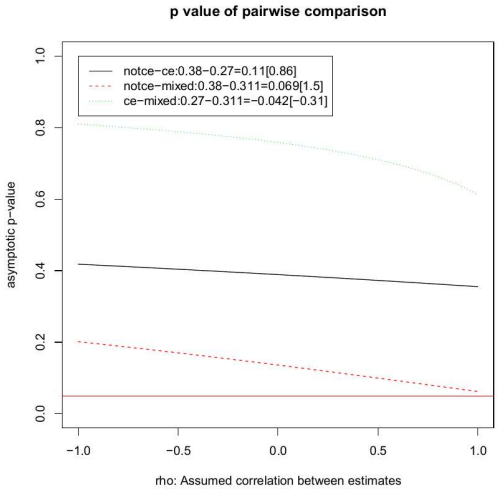
Figure 4 Asymptotic *p*-values of pairwise comparisons of sibling correlations as a function of the unknown correlation between estimates

I. Baseline

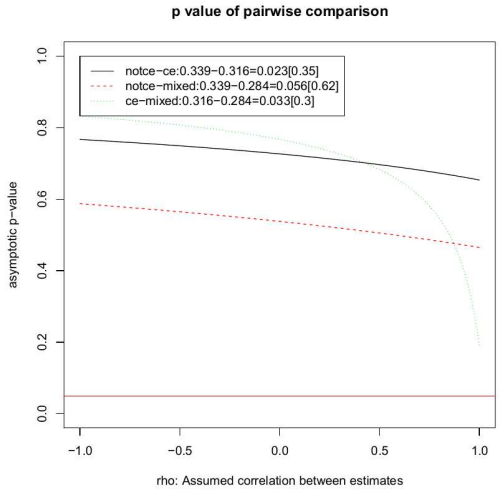
A. Men and women



B. Men

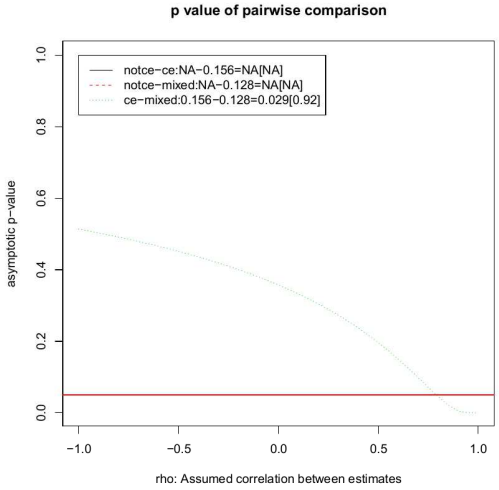


Women

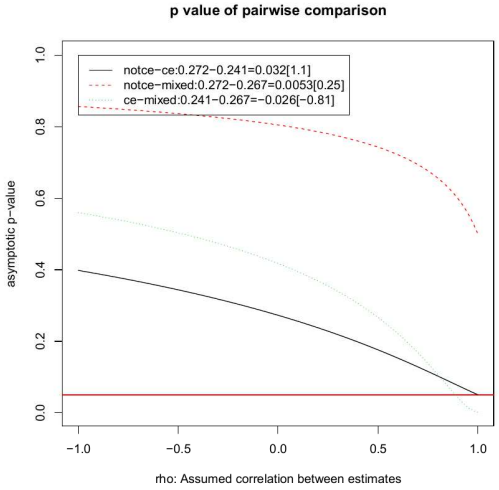


II. Child-evacuee families

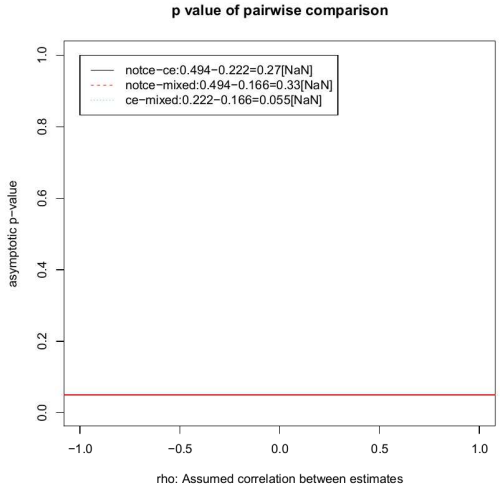
A. Men and women



B. Men



Women



Note: Graphs show the asymptotic p-value of each pairwise comparison of sibling correlations based on point estimates and standard errors as a function of the (unknown) correlation. The horizontal line is drawn at the conventional $\alpha = .05$. The legend in each figure shows the point estimates, their difference, and the asymptotic z value of the difference assuming a zero correlation.