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MECHANISMS BEHIND INTERGENERATIONAL EARNINGS CORRELATION IN FINLAND 1985–1995

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Abstract[1]

Recent research suggests that both family and community factors are important determinants of the income transmitting process across generations. Solon (forthcoming) formalizes the mechanisms behind intergenerational income correlation. The main purpose of this paper is to empirically clarify the mechanisms behind the intergenerational earnings correlation within this theoretical framework by using a Finnish sample of young men and women. The intergenerational correlation in earnings have been low in the 1980s and 1990s. The mechanisms behind the correlations have changed during this period, but the effects counteract each other, and consequently no significant change in the intergenerational correlation is found. This finding is perhaps surprising. However, the decomposition of the intergenerational correlation in the model actually predicts small changes in the correlation due to changes in the mechanisms, except for changes in heritability traits. Therefore, following this model, intergenerational correlation in a homogeneous country such as Finland must be low.

Keywords: Intergenerational correlation; Mechanisms behind; Earnings measures

JEL Classifications: J62; D31; D1

1 Introduction

There has been a rising interest in the study of intergenerational mobility among economists in the last 20 years. This interest has been founded on the availability of data sets suitable for these kinds of studies and by the advancement of statistical techniques. While it was earlier believed that the impact of family background was small, more recent research has led these beliefs to be revised.

The research now clearly suggests that family background matters for the economic outcomes of individuals. The impact is different in different countries, and might even be different in different time periods within a country. So far, we do not know why there are differences between countries and even within countries. If the mechanisms behind the intergenerational earnings correlation were known, differences in the importance of family background between countries or within countries could be explained.

The study of intergenerational earnings correlation also includes an equality aspect. If family background has a large impact on individuals' economic outcomes, individuals do not have equal opportunities. If family background, on the other hand, has only a small impact on economic outcomes, individual outcomes

[1]I would like to thank Markus Jäntti, and participants at the seminar at Turku Center for Welfare Studies in Turku, May 2003 for valuable comments. I also acknowledge research support from the Yrjö Jahnsson Foundation.

do not depend on their parents. Equality of opportunities, in the sense that outcomes do not depend on that of parents, is desirable, because children can not choose their parents. Hence, it is important to know the mechanisms behind the intergenerational correlation in order to be able to implement well targeted policies aimed at creating equal opportunities.

Solon (forthcoming) has introduced a theoretical model that offers explanations for at least some of the differences. The main purpose of this paper is to empirically clarify the mechanisms behind the intergenerational earnings correlation within this theoretical framework.

The paper proceeds as follows: in Section 2, the theoretical model is presented and in Section 3, previous research in this area is surveyed. In Section 4, the data set in the analyses is presented and in Section 5, the analyses and results are presented and commented upon in Section 6.

2 Theoretical Background

When estimating the intergenerational elasticity, β is estimated by OLS in the model:

$$\ln y_{it} = o + \beta \ln y_{i,t-1} + \epsilon_{it}, \tag{1}$$

where $\ln y_{it}$ is the logarithm of long-run economic status, or permanent earnings component of the grown up child at time t, and $\ln y_{i,t-1}$ is the same variable for the child's parent at time $t-1$. If the standard deviations of the earnings measures are equal for both generations, or is corrected for, the coefficient β equals the intergenerational correlation.

In Solon (forthcoming) a theoretical framework for the mechanisms behind variations in intergenerational correlation is offered. Solon modifies Becker & Tomes (1979) theoretical model of intergenerational mobility, and formalizes the mechanisms behind the intergenerational earnings correlation. The theoretical framework starts by assuming that the parent's lifetime after-tax earnings, $(1-\tau)y_{i,t-1}$, are allocated between own consumption, $C_{i,t-1}$, and investment in the child's human capital, $I_{i,t-1}$;

$$(1-\tau)y_{i,t-1} = C_{i,t-1} + I_{i,t-1}. \tag{2}$$

By assuming proportional taxes, the only redistributive government policy is represented by progressive public investments in children's human capital.

Assume that parental investments in their child at time $t-1$, $I_{i,t-1}$, together with the government's investment in the child, $G_{i,t-1}$, translates into the child's human capital at time t, h_{it}, according to

$$h_{it} = \theta \ln(I_{i,t-1} + G_{i,t-1}) + e_{it}, \tag{3}$$

where e_{it} is the human capital endowment that the child receives irrespective of the investment choices. The human capital endowment is influenced by both nature and nurture, and can be assumed to follow a first order process

$$e_{it} = \delta + \lambda e_{i,t-1} + v_{it}, \tag{4}$$

where $e_{i,t-1}$ is the parent's endowment and v_{it} can be seen as a white-noise error term. The logarithm of the child's earnings, $\ln y_{it}$, can then be illustrated by

$$\ln y_{it} = \mu + p h_{it}. \tag{5}$$

By formalizing parental behavior, the optimal choice of parental investments in the child's human capital can be found. Assume that the behavior of the parent can be characterized by a Cobb-Douglas utility function:

$$u_i = (1-\alpha) \ln C_{i,t-1} + \alpha \ln y_{it}, \tag{6}$$

where α is the altruism parameter. By substituting equations 2 to 5 into equation 6, and using the first order condition in order to solve for the optimal choice of investment in the child's human capital, I_{t-1}, we get:

$$I_{i,t-1} = \left[\frac{\alpha\theta p}{1-\alpha(1-\theta p)}\right](1-\tau) y_{i,t-1} - \left[\frac{1-\alpha}{1-\alpha(1-\theta p)}\right] G_{i,t-1}. \tag{7}$$

From this expression, we find some commonly known assumptions. Parents invest more in children when they are more altruistic, and when children's returns to human capital increase. But we can also see that if taxes are constant, public investments partly crowd out parents' investments in children's human capital.

By substituting equations 3 and 7 into equation 5, it can be approximately rewritten as:

$$\ln y_{it} \simeq \mu + \theta p \ln\left[\frac{\alpha\theta p(1-\tau)}{1-\alpha(1-\theta p)}\right] + \theta p \ln y_{i,t-1} + \theta p \left[\frac{G_{i,t-1}}{(1-\tau) y_{i,t-1}}\right] + p e_{it}, \tag{8}$$

where the connection between the child's and parent's earnings depends partly on the public investment in the child's human capital. Assume further that public investments in children can be characterized as:

$$\frac{G_{i,t-1}}{(1-\tau)y_{i,t-1}} \simeq \varphi - \gamma \ln y_{i,t-1}, \tag{9}$$

where γ represents the relative progressivity in public investment in children's human capital. When $\gamma > 0$, the ratio of public investment to parental after-tax income decreases with parental income. The more progressive the policy is, the higher the value of γ. By substituting equation 9 into equation 8, we get the expression:

$$\ln y_{it} \simeq \mu^* + [(1-\gamma)\theta p] \ln y_{i,t-1} + pe_{it}, \tag{10}$$

where μ^* includes μ and a set of the parameters from the earlier equations. In this equation, the error term, pe_{it}, is correlated with $\ln y_{i,t-1}$. By taking this into account, the intergenerational correlation, β, can be rewritten in steady state as

$$\beta = \frac{(1-\gamma)\theta p + \lambda}{1 + (1-\gamma)\theta p \lambda}. \tag{11}$$

Remembering that λ (from equation 4) is the heritability coefficient, θ (from equation 3) is the productivity of human capital investments, p (from equation 5) is the earnings return to human capital, and γ is progressivity in public investments (compare with equations 9 and 10). The magnitude of the intergenerational correlation depends on the influence of the factors in the decomposition. Differences in the estimate of β between countries and also within countries can consequently be explained by differences in the mechanisms behind the correlation.

By extending the argument of the decomposition of β in equation 11, we can see that the intergenerational correlation increases as the heritability of income generating traits, λ, is larger, the human capital investment in children, θ, is more productive, the rate of earnings return to human capital, p, is greater, and as public investment in children's human capital, γ, is less progressive. Furthermore, the model predicts that higher cross-sectional earnings inequality is connected to higher intergenerational earnings correlation. This is explained by the fact that higher rate of earnings return to human capital is connected to higher cross-sectional earnings inequality in a society, as shown in Juhn, Murphy & Brooks (1993).

Cross-sectional earnings inequality decreased in Finland in the 1970s, was stable and even decreasing in the 1980s and in the beginning of the 1990s. After the

mid-1990s the inequality started to increase (see e.g. Uusitalo (1989) and Jäntti & Ritakallio (1997)). The rate of earnings return to human capital investments decreased strongly in the 1970s and continued at a slower pace in the the mid-1980s. In the latter half of the 1980s, returns to human capital were stable and started to decrease again in the beginning of the 1990s (Asplund 1999). Public investments in human capital increased dramatically during this period. Finland became a welfare state in the 1960s, which expanded particularly in the 1980s. These factors all lead to the conclusion that the intergenerational earnings correlation should have decreased. However, the model also includes a heritability component and productivity of human capital, which have not been discussed yet. Before going into more detailed analyses, let us sum up previous empirical results in this area of research.

3 Summary of Previous Results

Estimates of the importance of family background on different earnings measures are plentiful (see e.g. Solon (1999) for an overview). Some report estimates of intergenerational income or earnings elasticities, while others report correlations. The latter estimate is based on the first, but corrected for differences in variances of the earnings measures of the two generations.

The estimates differ clearly between countries and to a certain extent within countries as well. As shown in Solon (1992) estimates are sensitive to measurement issues, but differences between countries can hardly be explained by variations in earnings measures, selection criteria or age ranges of the sample. Björklund & Jäntti (1997) use both Swedish and US data and find that intergenerational transmission of earnings is weaker in Sweden than in the US. They suggest that differences in the estimates between countries could be due to connections between cross-sectional and intergenerational inequality.

Estimates of intergenerational income elasticity in the US range between 0.4 and 0.6 for sons-fathers and for daughters-fathers around 0.4 (Solon 1992, Chadwick & Solon 2002, Mazumder 2001). Estimates for Great Britain are in the same range. Dearden, Machin & Reed (1997) estimates of intergenerational earnings elasticities are around 0.6 for both sons-fathers and of daughters-fathers.

Canadian estimates of the intergenerational income elasticity are around 0.2 for both pairs of sons-fathers and daughters-fathers (Fortin & Lefebvre 1998, Corak & Heisz 1999). Using Nordic data, the estimated earnings elasticities for both sons and daughters are close to the Canadian: Finnish are around 0.20

(Österbacka 2001) and Norwegian estimates are around 0.15 (Bratberg, Nielsen & Vaage 2002) and Swedish estimates range between 0.15 and 0.20 (Björklund & Jäntti 1997, Østerberg 2000, Lindahl 2002).

Recently, trends in intergenerational correlation have been estimated. Most estimates come from the US and the results diverge. Hauser (1998) estimates intergenerational persistence of occupational income and education in the US from the 1960s to the 1990s and finds no trend. Fertig (2002), on the other hand, estimates intergenerational elasticities in earnings for individuals born in the 1950s and 1960s. Children's earnings are taken from 1984 to 1992. The results show that intergenerational elasticities in earnings decrease over time for pairs of son-fathers, while no trend is found for others. The results by Mayer & Lopoo (forthcoming) also suggest that the intergenerational correlation in income decreases for sons born between 1949 and 1965. The sons' income is measured when they are 30 years old. The main explanation for the weakening correlation is that the connection between parental income and sons' educational attainment declined during the period. Public investments in children counteracted the differences in the investments parents made.

Levine (1999) uses income measures, and argues that the inheritance of economic status increases between the 1970s and 1990s. The main explanation for the trend is the strongly rising returns to education. Chadwick (2002) estimates trends in intergenerational earnings and income elasticities for both sons and daughters. She finds an increasing trend for daughters and possibly for sons as well. However, the most striking result is that the trends are very much dependent on which samples are taken from the PSID (Panel Study of Income Dynamics). Levine & Mazumder (2002) compare results using different datasets: the NLS (the National Longitudinal Survey), the PSID, and the GSS (General Social Survey). Different data sets give different results. Results from the NLS show that the intergenerational income elasticity increases between the 1980s and 1990s. The increase in the elasticity can not be explained by changes in observable human capital or rising returns to education. The results from the PSID and the GSS are statistically insignificant and of opposite sign.

Estimates for Great Britain suggest that the intergenerational income correlation increases over time. Blanden, Goodman, Gregg & Machin (forthcoming) compare individuals born in 1958 and 1970, taken from two different data sets, the NCDS (National Child Development Study) and the BCS (British Cohort Survey). The authors find evidence suggesting that the rising correlation can be explained partly by the fact that the educational upgrading, observed in cross sections, mostly occured among children with richer parents.

Canadian estimates show a lower intergenerational correlation in income for both men and women born between 1955-69 compared to those born 1935-45. The father's income measure is an estimate of his occupational income. The results can, to a large extent, be explained by an age effect, since there are only two observations of income over time. Older individuals have higher intergenerational correlation than younger. Other possible explanations for the trend are also offered; differences in the transmission process (increased access to higher education), and an increase in dispersion of income for younger cohorts (Fortin & Lefebvre 1998).

Norwegian results show that elasticities in earnings have decreased for sons born in the 1950s compared to those born in the 1960s. For daughters the trend is less clear. Stable and low income inequality in the 1980s and 1990s and increased educational attainment are explanations offered for the low and decreasing elasticities (Bratberg et al. 2002).

The estimates for the US are based on small samples. Different methods and different income measures are used when estimating trends. In the PSID, the earnings measure of the parents are taken directly from the parental questionnaire and it is possible to take an average of several years of observations. In the NLS, it is possible to use different datasets. Some fathers are asked directly about their earnings and it is possible to use several years of earnings. In other cases, the earnings measure of the fathers is reported by the sons and is then coded categorically. In the GSS, the respondents answer retrospectively during an interview about their family income at age 16, and the income measure is coded in five categories ranging from "far below average" to "far above average". Some of the estimates are, therefore, based on one-year observation of parental income and, in addition, some are based on categorical income measures and are therefore less precise. Furthermore, results seem to also depend on the samples. These facts most likely explain the different outcomes. Parental income measures are also based on one-year observations in the British and Canadian study, but the data sets are somewhat larger. The Norwegian data set is both large and the earnings measures are means of earnings from several years.

The explanations offered for the observed trends mentioned above are mainly based on changes in educational attainment and returns to education. No one has yet, to my knowledge, interpreted the trends according to the model offered by Solon (forthcoming). Therefore, the only possible conclusion from this survey is that both the family and the public sector are important determinants of the income transmitting process across generations. Let us continue with the analyses of the Finnish data according to the model by Solon (forthcoming). Before moving on

to the analyses, the data is briefly presented.

4 Data Set

The data used in this paper originate from the quinquennial censuses in Finland from 1970 to 1995. The samples in this study consists of three cohorts where the individuals are 29-31 years old in 1985, 1990 and 1995 respectively, and they have moved from their parents' house before their earnings are observed. Their parental earnings are observed in 1970-75, 1975-80, and 1980-85 respectively. Since censuses are household-based, the original data set contains information on social families. The head and spouse are considered to be the father and the mother of the children in the social family when the family is selected (in 1970, 1975 and 1980 respectively). Single-parent families are also included.

In the empirical estimates of the intergenerational earnings correlations, I use both individual and family earnings measures. Individual earnings are defined as including wages, salaries, and income from self employment. In the analyses, the earnings measures are both included as such and equivalized. The equivalence scale I use is of the following form:

$$E = \frac{H}{(N_1 + \alpha N_2)^{\epsilon}}, \tag{12}$$

where H is total earnings (individual or household), N_1 is the number of adults, N_2 is the number of children. The parameter α equals 0.7 and ϵ equals 0.85.

The children's permanent earnings can not be observed as the panel is too short. Families are selected in the first three waves of the panel when the children are 14-16 years of age. Younger children would be too young when their own earnings are observed 15 years later. Older children, on the other hand, could have left their homes already, and thereby would not be observed. Since the first wave of the data set is in 1970 and the latest available is in 1995, the earnings of the "child" is observed only once. Since individual earnings are observed during a single year, family earnings are a more stable measure of permanent earnings than individual earnings. Family earnings are also a better estimate of an individual's actual economic status. Since women's earnings are lower than men's on average, these facts are especially important when studying the economic situation of women.

In Table 1, descriptive statistics are shown for the three cohorts. The mean of yearly earnings increased between 1985 and 1990, but decreased between 1990

and 1995. The depression in the early 1990s in Finland actually decreased the level of disposable earnings and the unemployment rate was extremely high, especially among young individuals. Women's individual earnings are much lower on average than men's, and their equivalent family earnings are also slightly lower than men's. These women are in their prime years for child bearing and quite many are probably on maternity leave during some part of the year, i.e. low yearly earnings which can not be controlled for. They have also larger families on average, which contributes to the slightly lower equivalent family earnings. The economic status of their own family is therefore highly relevant for the economic status of the individual.

An individual is selected if he/she has left his/her parental home before the age of 29–31. Daughters seem to leave earlier, since the sample size of women is larger than the sample size of men. The mean age of the samples increases over the years, implying that children leave their parental homes at a somewhat younger age in the earlier cohorts than in the later. Women also have children at a younger age than men. The number of children in their families is larger for women than for men.

The level of education increases over the years. Womens' educational attainment in particular show an increase. In 1995, women have a remarkably high educational achievement. Almost 54 percent of the women have a degree on the tertiary level, compared to 42 percent of the men.

In Table 2, descriptive statistics for the parents of the three cohorts are shown. The mean age for the fathers is about 46 and for the mothers about 43 in all three cohorts. Mean family size decreases quite dramatically during these years, from 5.7 on average in 1970, to 4.7 on average in 1980. The average number of children in the families decreases from 3.7 in 1970, to 2.7 in 1980, and at the same time the number of single mothers increases.

The mothers are more likely to have only compulsory education or education at a secondary level compared to the fathers. During this period, parental education increases, especially among the mothers.

Parents' earnings in their 40s are lower than their children's earnings in their early 30s, and the variation is higher among parents. Mean earnings increased in the 1970s and 1980s at the same time as the inequality in earnings decreased in the 1970s and remained low in the 1980s, but increased again in the middle of the 1990s. The individual mean earnings of the mothers are substantially lower than mean earnings of the fathers. The mean of equivalent family earnings of mothers and fathers are quite similar (differs with 8-11 log percent in the three cohorts). Most of the parents are living together, and have the same equivalent

Table 1: Descriptive statistics for the sample

Variable	Cohort 1 observed in 1985 Mean	Std Dev	N	Cohort 2 observed in 1990 Mean	Std Dev	N	Cohort 3 observed in 1995 Mean	Std Dev	N
				Men					
Age	29.88	(.88)	5755	30.01	(.82)	5600	30.18	(.89)	5219
Ln individual earnings	11.35	(.70)	5648	11.49	(.74)	5360	11.24	(1.01)	4772
Ln eq. fam. earnings	10.98	(.65)	5696	11.13	(.74)	5441	10.89	(.96)	4935
Family size	2.97	(1.26)	5755	2.82	(1.30)	5600	2.71	(1.36)	5219
Adults in the family	1.84	(.36)	5755	1.82	(.39)	5600	1.77	(.42)	5219
Children in the family	1.12	(1.06)	5755	1.00	(1.09)	5600	0.94	(1.12)	5219
Only compulsory education %	26.2		1509	18.8		1051	17.8		926
Secondary education %	44.6		2569	49.7		2783	40.2		2094
Tertiary education %	29.1		1677	31.5		1756	42.1		2195
				Women					
Age	29.88	(.87)	6448	30.00	(.81)	6132	30.19	(.90)	5791
Ln individual earnings	10.77	(.96)	5922	10.88	(1.01)	5555	10.70	(1.21)	4742
Ln eq. fam. earnings	10.90	(.68)	6376	11.02	(.76)	5958	10.81	(.98)	5486
Family size	3.23	(1.27)	6448	3.14	(1.36)	6132	3.01	(1.37)	5791
Adults in the family	1.83	(.37)	6448	1.81	(.39)	6132	1.76	(.43)	5791
Children in the family	1.40	(1.09)	6448	1.33	(1.17)	6132	1.24	(1.18)	5791
Only compulsory education %	26.3		1699	15.4		943	12.7		736
Secondary education %	41.5		2678	47.0		2879	33.6		1943
Tertiary education %	32.1		2071	37.7		2309	53.7		3111

Note: All earnings are in 1990 FIM.

earnings. Among mothers there are more single parents than among men, and single mothers have low earnings on average.

5 Analyses and Results

5.1 Intergenerational Correlation across Time

Intergenerational earnings correlation are estimated using equation 1, where parental age and age squared are included. Since the children are aged 29–31, their own ages are not controlled for. Both individual and equivalent family earnings are used as earnings measures. The earnings measures are corrected for differences in variances and the estimated correlations are shown in Table 3. The estimated elasticities are shown in Table 8 in the Appendix.

Earlier estimates of intergenerational earnings correlation in Finland show that when using individual earnings as the dependent variable, estimates are lower for daughters and parents than for sons and parents. When a measure of both parents' earnings is used as the independent variable, the estimates are higher than using either father's or mother's earnings separately (Österbacka 2001). We can see the same patterns in Table 3. This result is an interesting contrast to Blanden et al. (forthcoming), who find that the use of family income rather than fathers' earnings as the independent variable results in lower estimates of the intergenerational correlation in earnings for both men and women. This difference could be due to lower labor force participation among mothers in Great Britain than in Finland.

The estimates in the present study, when using individual earnings as the dependent variable, are lower than that found in the previous Finnish study. The exceptions are the estimates of sons-mothers in 1990, and for all of the estimates of daughters-mothers, which are higher than in the previous study. The sample in this study is younger and the "children's" earnings measures are based on a single year of observation. Younger individuals usually have lower intergenerational correlation than older, since the observed earnings include more of a transitory component for younger individuals.

The relationship with lower correlations for daughters than for sons changes when equivalent family earnings are used as the dependent variable. The correlations in equivalent family earnings between daughters-parents and between sons-parents are at the same level, and higher than when earnings measures are not equivalized. This implies that due to the choice of partner, the earnings of the family of these young men and women are more highly correlated to the earnings

Table 2: Descriptive statistics for the parents

	Cohort 1 observed in 1970			Cohort 2 observed in 1975			Cohort 3 observed in 1980		
Variable	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N
				Fathers					
Age	46.32	(7.14)	10821	46.20	(7.17)	10084	45.78	(7.25)	9150
Mean ln individual earnings*	11.13	(.94)	6664	11.23	(.96)	6599	11.21	(1.00)	7429
Mean ln eq. ind. earnings*	9.88	(.98)	6664	10.03	(1.00)	6599	10.11	(1.02)	7429
Mean ln family earnings*	11.70	(.62)	9138	11.84	(.62)	8459	11.90	(.62)	8554
Mean ln eq. fam. earnings*	10.52	(.61)	9138	10.68	(.61)	8459	10.82	(.60)	8554
Family size	5.68	(1.88)	10821	5.14	(1.59)	10084	4.67	(1.35)	9150
Adults in the family	1.98	(.13)	10821	1.98	(.14)	10084	1.97	(.16)	9150
Children in the family	3.69	(1.97)	10821	3.16	(1.58)	10084	2.70	(1.33)	9150
Single fathers %	1.64		178	2.11		213	2.78		254
Only compulsory education %	78.9		8538	72.8		7345	63.3		5795
Secondary education %	9.7		1051	12.7		1283	17.9		1635
Tertiary education %	11.4		1232	14.4		1456	18.8		1720
				Mothers					
Age	43.60	(6.31)	11689	43.72	(6.46)	11143	43.33	(6.56)	10407
Mean ln individual earnings*	9.97	(1.42)	6445	10.25	(1.27)	7555	10.59	(1.10)	8442
Mean ln eq. ind. earnings*	8.85	(1.48)	6445	9.10	(1.31)	7555	9.53	(1.14)	8442
Mean ln family earnings*	11.65	(.65)	9838	11.78	(.67)	9244	11.82	(.68)	9692
Mean ln eq. fam. earnings*	10.49	(.64)	9838	10.64	(.64)	9244	10.77	(.63)	9692
Family size	5.58	(1.91)	11689	5.02	(1.62)	11143	4.53	(1.40)	10407
Adults in the family	1.91	(.29)	11689	1.89	(.32)	11143	1.85	(.35)	10407
Children in the family	3.67	(1.87)	11689	3.14	(1.57)	11143	2.68	(1.33)	10407
Single mothers %	8.95		1046	11.4		1272	14.5		1511
Only compulsory education %	83.8		9790	77.1		8595	67.6		7035
Secondary education %	10.9		1274	14.5		1615	20.5		2132
Tertiary education %	5.3		625	8.4		933	11.9		1240

Note: All earnings are in 1990 FIM.

Note: *) Mean earnings are from 1970 and 75 when parents are observed in 1970, from 1975 and 80 when observed in 1975, and from 1980 and 85 when observed in 1980.

of their original family than their individual earnings.

The correlation in equivalent family earnings seems to decrease during the time period studied. When individual earnings are used as earnings measures, there is perhaps a decreasing trend for men, but not for women. However, by comparing these results with the elasticities in Table 8, it is possible to find increasing trends, but the main impression is that elasticities fluctuate over the years. To test whether the trends are statistically significant, the following model is estimated:

$$\ln y_{it} = o + \beta \ln y_{i,t-1} + \psi(\ln y_{i,t-1} \times \text{year}_{it}) + \omega \text{ year}_{it} + \epsilon_{it}, \qquad (13)$$

where year_{it} is a dummy variable for the observed years. The coefficient ω tells us whether earnings have changed over time, and the coefficient ψ tells us whether the effect of parental earnings has changed over the years, i.e. the trend effect. The estimated intergenerational elasticities and the trends are presented in Table 4.[2] Few coefficients for the trend effects are significant. An F-test for significant trends shows that the only significant trend on the 1%-level is found in the elasticities between sons' equivalent family earnings and family equivalent earnings and in this case, the elasticities are significantly lower in 1990, and higher in 1995. In the elasticities between daughters' earnings measures and family earnings measures, the F-test suggests that the trends are significant on the 5%-level. The elasticities are higher in 1995. However, no overall noticeable trend in the intergenerational correlation is found in the studied time period.[3]

One model for the mechanisms behind the intergenerational correlation is presented in equation 11. All of the four coefficients, or some of them, might have changed, which would imply changes in the correlation over time. Since there is no observed significant trend, the mechanisms behind the correlation might affect the correlation in different directions. It is possible to investigate the different components in a time perspective, and thereby receive insight into the mechanisms behind the intergenerational correlation. Some of the changes in the mechanisms behind the intergenerational correlation can be tested empirically.

[2]The trend effect is estimated on elasticities since this is econometrically easier. Estimations on correlations should take differences in standard deviations over the years into consideration.

[3]When the same estimates are (erroneously) done for trends in correlation, two significant negative trends are found in 12 possible trends. Results are not shown here, but available upon request.

Table 3: Intergenerational correlation (standard error), [Number of observations]

Child's Earnings Measure	Independent earnings measure: 1985 Family	1985 Father's	1985 Mother's	1990 Family	1990 Father's	1990 Mother's	1995 Family	1995 Father's	1995 Mother's
Sons									
Individual earnings measures									
Individual	0.120	0.111	0.055	0.133	0.131	0.100	0.119	0.086	0.040
	(.015)	(.017)	(.018)	(.016)	(.017)	(.017)	(.018)	(.019)	(.016)
	[5,051]	[4,223]	[2,860]	[4,950]	[3,967]	[3,928]	[4,558]	[3,583]	[3,932]
Equivalent earnings measures									
Equivalent Family	0.188	0.163	0.119	0.146	0.148	0.104	0.166	0.130	0.064
	(.015)	(.016)	(.019)	(.016)	(.017)	(.017)	(.017)	(.018)	(.016)
	[5,094]	[4,256]	[2,880]	[5,025]	[4,031]	[3,988]	[4,710]	[3,687]	[4,060]
Daughters									
Individual earnings measures									
Individual	0.111	0.066	0.089	0.093	0.053	0.084	0.128	0.071	0.081
	(.015)	(.020)	(.017)	(.016)	(.020)	(.016)	(.017)	(.019)	(.017)
	[5,066]	[2,645]	[3,638]	[4,700]	[2,848]	[3,883]	[4,465]	[3,297]	[3,841]
Equivalent earnings measures									
Equivalent Family	0.188	0.184	0.110	0.198	0.136	0.120	0.178	0.109	0.086
	(.014)	(.020)	(.016)	(.015)	(.019)	(.016)	(.015)	(.017)	(.015)
	[5,460]	[2,821]	[3,923]	[5,038]	[3,028]	[4,150]	[5,172]	[3,793]	[4,434]

Note: All earnings are in 1990 FIM.

Table 4: Test for trend in intergenerational elasticity (standard error)

Independent variables	Sons' dependent earnings measure		Daughters' dependent earnings measure	
	Eq. family	Individual	Eq. family	Individual
Also included	Age and age squared of the father			
Eq. family earnings	0.194		0.212	
	(.018)		(.018)	
Family earnings		0.135		0.167
		(.019)		(.024)
Trend 90	-0.030	0.014	0.014	-0.026
	(.025)	(.026)	(.026)	(.033)
Trend 95	0.052	0.034	0.064	0.060
	(.026)	(.026)	(.026)	(.034)
N observations	14,829	14,559	15,670	14,231
F-test for both	5.103	0.827	3.176	3.269
trends=0 [p-value]	[.006]	[.437]	[.042]	[.038]
Also included	Age and age squared of the father			
Father's eq. earnings	0.105		0.134	
	(.012)		(.016)	
Father's earnings		0.080		0.068
		(.014)		(.023)
Trend 90	-0.002	0.016	-0.029	-0.006
	(.017)	(.019)	(.022)	(.031)
Trend 95	0.022	0.013	-0.031	0.016
	(.018)	(.020)	(.021)	(.029)
N observations	11,974	11,773	9,642	8,790
F-test for both	1.166	0.399	1.261	0.300
trends=0 [p-value]	[.312]	[.671]	[.284]	[.741]
Also included	Age and age squared of the mother			
Mother's eq. earnings	0.048		0.056	
	(.009)		(.010)	
Mother's earnings		0.024		0.068
		(.010)		(.013)
Trend 90	0.006	0.030	0.014	-0.001
	(.013)	(.014)	(.014)	(.019)
Trend 95	0.010	0.016	0.018	0.022
	(.014)	(.015)	(.015)	(.021)
N observations	10,928	10,720	12,507	11,362
F-test for both	0.257	2.110	0.912	0.734
trends=0 [p-value]	[.774]	[.121]	[.402]	[.480]

Note: All earnings are in 1990 FIM.

5.2 Heritability

The first possible test is to check whether there has been any changes in heritability of income generating traits, which is represented by λ in equations 4 and 11. If parents become more alike, i.e. if the mating process displays greater homogeneity, heritability traits becomes stronger. Since the studied time period is so short, there is unlikely to be any changes in heritability. However, let us test for changes.

An individual's human capital is influenced by nature and nurture (compare with equations 3 and 4), and an individual's productivity is based on his/her human capital. The individual's human capital, therefore, corresponds to his/her earnings, (compare with equation 5). Education is an important measure for the human capital of an individual and in this case, education of the parents serves as a proxy for their human capital. Education is also one measure of assortative mating.

In Table 5, a cross tabulation of parents' education is shown. It is clear that parents choose their partners from the same educational level. However, the fraction of parents on the diagonal are constant over the years, about 50 percent of the parents have the same educational level in all years. In this respect, there has not been any change. However, the educational level of parents increases, especially the level of education of the mother. The sum of elements in the upper triangle increases from 15.2 in 1970, to 29.7 in 1975, and to 30.1 in 1980. If the educational level of the mother is important for children, there has been a shift during this period. At least US studies show that higher educated mothers spend more time with their children (playing with them, reading to them or helping with their home work). These activities by the mothers are connected to fewer behavioral problems of the children and higher grades in school (Zick, Bryant & Österbacka 2001).

We can control for the effect of parental education on the intergenerational earnings correlation, and whether the effect has changed. Equation 13 can be extended, by including parental education, $\text{educ}_{i,t-1}$, and a trend for that variable

$$\begin{aligned} \ln y_{it} &= o + \beta \ln y_{i,t-1} + \psi(\ln y_{i,t-1} \times \text{year}_{it}) + \zeta\ \text{educ}_{i,t-1} + \\ &\quad \eta(\text{educ}_{i,t-1} \times \text{year}_{it}) + \omega\ \text{year}_{it} + \epsilon_{it}, \end{aligned} \tag{14}$$

where the coefficient ζ tells us the effect of parental education, and the coefficient η tells us whether the effect of parental education has changed.

The results are presented in Table 9 in the Appendix. Parental education has a positive effect on children's earnings and affects daughters and sons somewhat differently. This result is in line with earlier Finnish studies (Lilja 1995). The trend effects are both positive and negative, and the only statistically significant trends, are the trends for mother's education when sons' individual earnings is

Table 5: Cross table of educational level among fathers and mothers where both parents present the year they are selected

	Mother's education			
Father's education	Compulsory education	Education at 2nd level	Education at 3rd level	Row %
	In 1970, N = 10,643 and χ^2=2312.9			
Compulsory %	89.9	8.4	1.7	78.8
2nd level %	72.0	22.8	5.1	9.7
3rd level %	48.3	19.4	32.4	11.4
Column %	83.4	11.1	5.5	100
	In 1975, N = 9,871 and χ^2=2377.8			
Compulsory %	85.6	11.8	2.6	72.8
2nd level %	66.2	25.5	8.3	12.7
3rd level %	40.6	19.9	39.6	14.5
Column %	76.6	14.8	8.7	100
	In 1980, N = 8,896 and χ^2=2038.6			
Compulsory %	78.3	17.3	4.4	63.2
2nd level %	62.0	29.6	8.4	17.9
3rd level %	34.0	23.5	42.5	18.9
Column %	67.0	20.7	12.3	100

Note: $\chi^2_{1\%}$ with 4 degrees of freedom is 13.3. A larger value of the χ^2 indicates non-randomness in the contingency table.

the independent variable. It is therefore hard to draw any stronger conclusions in this respect. These results can be compared with Korupp, Ganzeboom & van der Lippe (2002). They clarify which model best captures parents' influence on children's educational attainment by using data from the Netherlands, West Germany and the US. They find that both the mother's and the father's educational and occupational status have considerable effects on children's educational attainment. Furthermore, they find that the historical trend of parental influence on children's education has been the same for the mother and father.

Another possible way of explaining changes in income generating traits, λ, is that abilities differ between different groups of the population. If these abilities are appreciated differently on the labor market, or even discriminated against, the economic outcomes of different groups might differ. Support for this hypothesis can be found in e.g. Björklund, Eriksson, Jäntti, Raaum & Österbacka (2002), where the brother correlation in the US is estimated at 0.43, but decreases to 0.32 when afro-americans are excluded. Finland has been and still is a very homogeneous society, and is unlikely to be affected by this hypothesis.

Considering this and the estimates presented previously, the heritability of income generating traits have not changed during the time period studied. Consequently, there should not be any effect on the earnings correlation either.

5.3 Earnings Return to Human Capital

The other obvious test that needs to be done, is to check whether earnings return to human capital has changed, which is represented by p in equations 5 and 11. Education serves as a proxy for the level of human capital in this test as well. Asplund (1999) sums up the trend in the returns to education in Finland. The average return to education declined in the first half of the 1980s, and remained constant or even increased at the highest educational level in the second half of the 1980s. In the beginning of the 1990s the average return to education declined again due to the recession in the Finnish economy.

By including individual's level of education, educ_{it}, as an explanatory variable in an earnings equation and dummies for years, changes in returns to human capital can be detected. The following model is estimated:

$$\ln y_{it} = o + \xi\ \text{educ}_{it} + \varpi(\text{educ}_{it} \times \text{year}_{it}) + \omega\ \text{year}_{it} + \epsilon_{it}, \qquad (15)$$

where the coefficient ϖ shows whether the returns to education have changed.

The results are shown in Table 6, where two different models are estimated for men and women. The first model includes only education and in the second model, both education and socio-economic status are included.

The R^2's are at the same level when only education is included in the model for both men and women, but increases more for men than for women when socio-economic status is included. However, the standard deviation of earnings is higher among women than among men. Education is consequently a more important characteristic for women's earnings while socio-economic status is a more important characteristic for men's earnings.

Usually the estimated coefficients for educational attainment are reduced by almost one half when socio-economic status is included into the models. The socio-economic classification relies on the acquired education to a large extent, and a "good" education leads to a "good" job and "good" earnings (Asplund 1999, Asplund 2001). In the present estimates, the coefficients for educational attainment decrease only slightly when socio-economic status is included. These young individuals are only at the beginning of their career, and have not reached a position with "good" earnings yet.

Returns to education at the secondary level have increased for men. The trends are positive and clearly significant, but the coefficients are small. In the second model, the trend coefficients for education at a tertiary level are negative, significant and quite substantial. For women, the only significant trends are in the second model, where the trend coefficients for education at a tertiary level are negative and quite substantial. In the first model, the coefficients are also negative, but not significant.

Education at a secondary level has become more rewarding for these young men, while education at a tertiary level has become less rewarding for both men and women in this sample. As many as 40 percent of the men in this sample have education at a secondary level, so one can not conclude that returns to education have decreased for men. Returns to education for women have decreased, while the returns to higher education for men have compressed. The conclusion from this exercise is that at least for women, the intergenerational correlation should decrease, because of changes in returns to human capital.

Table 6: Test for trend in returns to educational level (standard error)

Independent variables	Dependent earnings variable			
	Men's earnings		Women's earnings	
Constant	11.25	11.27	10.63	10.61
	(.021)	(.019)	(.027)	(.025)
Education at 2nd level	0.016	0.013	-0.001	-0.006
	(.026)	(.023)	(.034)	(.032)
Trend 1990	0.042	0.019	-0.013	-0.003
	(.040)	(.036)	(.054)	(.051)
Trend 1995	0.021	0.103	0.061	0.062
	(.043)	(.039)	(.064)	(.060)
Education at 3rd level	0.323	0.309	0.423	0.367
	(.029)	(.027)	(.036)	(.034)
Trend 1990	0.063	-0.124	-0.048	-0.166
	(.043)	(.045)	(.056)	(.054)
Trend 1995	0.074	-0.187	-0.029	-0.157
	(.044)	(.043)	(.062)	(.060)
Self employed		-0.530		0.074
		(.146)		(.344)
Higher white collar		0.175		0.613
		(.061)		(.088)
Lower white collar		0.047		0.503
		(.062)		(.055)
Farmer		-0.171		0.460
		(.153)		(.397)
Unknown status		-1.170		-0.298
		(.087)		(.149)
Also included		trends for soc.ec. status		trends for soc.ec. status
Dummy for 1990	0.086	0.220	0.113	0.143
	(.033)	(.032)	(.046)	(.048)
Dummy for 1995	-0.267	0.086	-0.172	0.029
	(.036)	(.035)	(.054)	(.057)
F-test for trends in educ. at 2nd level=0	11.926	3.562	0.630	0.623
	[0.0001]	[0.0284]	[0.5327]	[0.5366]
F-test for trends in educ. at 3rd level=0	1.721	10.085	0.390	5.983
	[0.1789]	[0.0001]	[0.6773]	[0.0025]
N	15,780	15,780	16,219	16,219
R^2	0.0466	0.2168	0.0364	0.1587

Note: All earnings are in 1990 FIM.
Note: Numbers in [ ] represent p-values.

5.4 Productivity of Human Capital and Progressivity in Public Investments

There are no obvious tests for checking whether human capital investments in children have become more productive, represented by θ in equations 3 and 11, or whether the progressivity in public investments in children's human capital has changed, represented by γ in equations 9, 10 and 11. However, these two facts are likely to be related. Finland has a long tradition of a school system financed by the public sector. There was already legislation about compulsory basic education in 1866. After that, the educational system has changed and developed.

In 1958, the compulsory basic education became eight years long in the whole country. In that system, children began school the year they turned seven. After three to five years of education, children had to chose if they wanted to continue with a higher and more theoretical education in order to get a matriculation exam (graduate from the gymnasium or receive the matriculation exam, which is similar to graduation from senior high school[4]), or to complete the compulsory eight years of education and eventually continue with some vocational education. After choosing, pupils were separated and received a somewhat different education during the rest of the compulsory school system. Those who had chosen the more theoretical route, continued on to the gymnasium after the eight compulsory years and almost all continued on to university. The gymnasiums were quite few, and not all pupils could live with their parents during the semesters. The expenses for sending a pupil far away from home was not possible for many families. The choice for a child's education was highly dependent on where the family lived and on their economic situation (Lampinen 2000).

In the 1960s, the lack of equality in the educational system was widely debated. The consequences of the debate was partly that the number of gymnasiums increased sharply in the 1960s and 1970s and partly that the compulsory education was reorganized completely in 1972-77. The compulsory education system became the same for everyone and lasted for nine years. After these nine years of basic education, pupils were able to chose between leaving school, some kind of vocational education, or the gymnasium. The only possibility of being accepted into the universities was by passing the matriculation exam. Vocational education at higher levels developed and the possibility of being accepted into these establishments was either a completed vocational education at a lower level, or the matriculation exam (Lampinen 2000).

[4]I will refer to "the gymnasium" later on in the text

Both the number of gymnasiums and universities expanded greatly in the 1960s and 1970s. The number of students with matriculation exams increased as did the number of students at universities. However, the ratio of students with a matriculation exam to new university students decreased. In 1960, 81 percent of those who received a matriculation exam were admitted to the university. In 1965, this number decreased to 77 percent, in 1970 to 55 percent, in 1975 to 50 percent and in 1980 and 1985 to 39 percent. Even though admission into universities became more competitive, the 1960s was the period when studying at universities became available for everyone. The expansion of the gymnasiums and universities implied that the matriculation exam and university studies became an option for all social groups (Blomster 2000).

These changes affected the different cohorts in this study differently. The oldest cohort completed their compulsory education before the reorganization of the compulsory education. Their decision on further education was made when they were about 11 years old (mid-1960s) before the large increase in the number of gymnasiums and universities. Their decision was, therefore, largely determined by their parents. The new school system applied to the youngest cohort and they decided upon their further education, at the age of 15, in the beginning of the 1980s, when higher education was available for everyone. The middle cohort could belong to both of the systems of compulsory education, since the reorganization was applied earlier in some regions and was completed finally in 1977 when the youngest of the middle cohort finished their compulsory education. Their early school years were also in the midst of the expansion period for higher education. The youngest cohort had more equal opportunities in the educational system than the oldest cohort, and their educational decisions could be based on their individual abilities to a large extent.

Another reform that affected the cohorts differently was the system of study grants and loans guaranteed by the state. In 1969, a financial aid system was introduced. This system was based on study loans granted by banks but subsidized and guaranteed by the state. In 1976, the banks reduced the number of loans granted. Study grants were introduced in 1972, and after 1976, the grant was raised slightly every year and an accommodation allowance was introduced as a complement to the grant. In the 1970s, the loan covered about half of the average student's income needs. Individual earnings covered on average about 30 percent, while the share of parents' contribution was around 10 percent (in the 1960s this share was 30–40 percent). Study grants covered only a small proportion of the average student's income need. In the 1980s, the loan covered about 20 percent of the average student's income needs, while individual earnings covered closer to

Table 7: Development of the educational system

	Cohort 1 observed in 1985	Cohort 2 observed in 1990	Cohort 3 observed in 1995
Born	1954-56	1959-61	1964-66
Compulsory education started	1961-63	1966-69	1971-73
Lasted for	8 years	8/9 years	9 years
The old system	Choice between gymnasium or only compulsory education at 3rd, 4th or 5th grade.		
Reorganization in 1972-77		Compulsory education the same for everybody in 9 years.	
Compulsory education ended	1969-72	1974-77	1980-82
Education at secondary level	Possible if not received matriculation exam	Choice between vocational education or gymnasium.	
Education at tertiary level	If received matriculation exam and was admitted to an university. Education at higher vocational level expanded during the period		
Study loans introduced in 1969	No effect on educational choice.	Possible effect on educational choice	Effected educational choice.
Study grants introduced in 1972	No effect on educational choice.	Possible effect on educational choice	Effected educational choice.

50 percent. Parents' contribution was still about 10 percent, and study grants still covered only a small proportion of the average student's income needs (Blomster 2000).

When the oldest cohort made their educational choice in the mid 1960s, they had to rely on their parents' economic situation to a large extent, since the study grants and loan systems were not developed yet. When the youngest cohort made their decision about their further education in the early 1980s, they were less dependent on their parents. Even if study grants and loans covered only a small proportion of the average student's income needs at that time, the system existed and formed a safety net.

Remembering that equation 7 implies that the parents' role in the investment decision in human capital can more or less be crowded out by the investments done by the public sector. This has happened during the studied time period. The educational decision of the oldest cohort depended to a large extent on the size of their parents' means, irrespective of the child's ability. The youngest cohort could base their decision more on their own ability, since the educational system was reorganized and higher education was made available for everyone. Therefore, the human capital investments in children have become more productive. We can find similar arguments in Aghion, Caroli & Carcía-Peñalosa (1999), where they argue that redistribution of income from rich to those who are poor increases growth in society. Those who are poorly endowed with human capital, have high returns to educational investments. Increasing educational investments among poorly endowed therefore favor growth in the society.

The arguments in this section are summed up in Table 7. The conclusions from this reasoning are that human capital investments in children have become more productive (θ in equation 3 has increased) and public investments in children's human capital have become more progressive (γ in equations 9 and 10 has increased) during the period studied. The first increases while the second decreases the intergenerational correlation.

5.5 The Importance of the Magnitude of the Different Components in the Decomposition

It is possible to do an experiment with the components of the decomposition in order to get a clearer picture of the mechanisms behind the intergenerational correlation. The intergenerational correlation in earnings is around 0.2 in Finland (Österbacka 2001). Assume that the four components in the decomposition range

between 0 and 1. In equation 5, individual earnings has a base level, μ, and a component consisting of returns to human capital, p. Assume this p is the same as returns to education. In Finland, earnings return to one year of education is around 0.07 and therefore a plausible value of p is 0.07. In equation 3, θ represents the marginal product for human capital investment. A plausible value for θ is 0.5. A plausible value for γ, the progressivity of public investment in children's human capital, is 0.5. A plausible value for the heritability coefficient, λ, could then be 0.2. Compare this with equation 4, where all children have a level of endowments, δ, irrespective of their parents, receive a share of their parents' endowments, λ, and have an individual component, v_{it}, as well. Then, the values of the components are decided to match a correlation close to 0.2. If $\lambda = 0.2$, $p = 0.07$, $\theta = 0.5$, and $\gamma = 0.5$, the correlation is 0.217. By letting the different components change from 0 to 1 and letting the others be constant, we can see how the correlation changes due to changes in the different components. The results of this experiment can be seen in Figure 1.

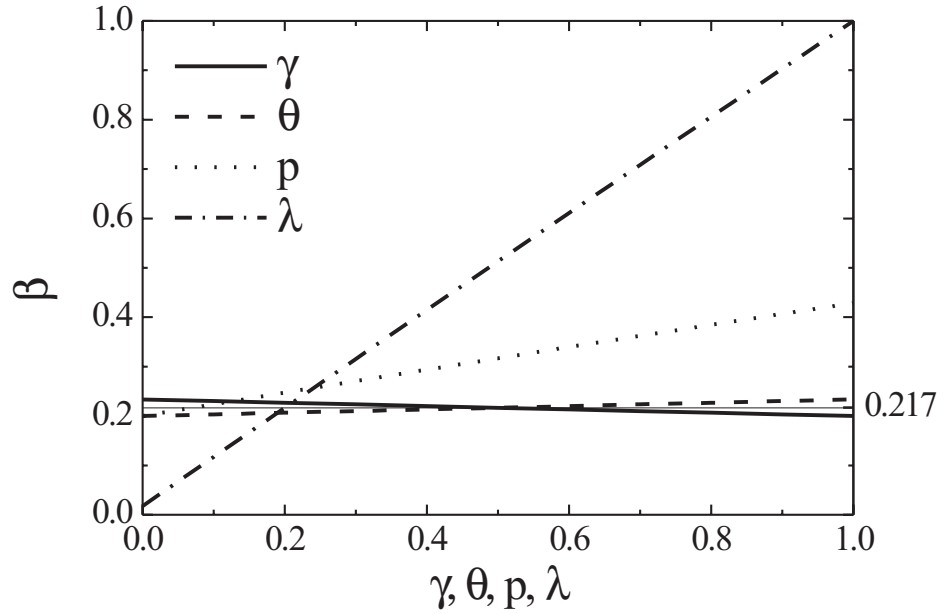
We can see that changes in the heritability component, λ, has the largest impact on the correlation. In fact, by using the above mentioned components in the decomposition, the magnitude of λ corresponds almost directly to the magnitude of β. Changes in the earnings return to human capital, p, clearly affects the magnitude of the correlation, but the effect is smaller. Both changes in the productivity of human capital, θ, and progressivity in public investments, γ, have only small effects on the correlation. This experiment demonstrates that the nonexistent trend in the intergenerational correlation during the observed period should, in fact, be expected.

6 Concluding Remarks

The estimated intergenerational correlation in individual earnings are lower for pairs of daughters-parents than for sons-parents. This relationship changes when equivalent family earnings are used as the earnings measure. The correlations in equivalent family earnings are higher, and at the same level for both daughters-parents and sons-parents. This implies that the choice of partner is an important factor in determining the economic status of these young men and women. Individual earnings reflects the individual's position on the labor market, while family earnings better reflects the economic status of the individual.

No significant trend in the intergenerational correlation could be found during the studied time period. The decomposition of the correlation show the mecha-

Figure 1: The importance of the magnitude of the different components in the decomposition



Note: Different values of the four components are compared to the plausible values, the thin solid line where $\beta = 0.217$, ($\lambda = 0.2$, $p = 0.07$, $\theta = 0.5$, and $\gamma = 0.5$).
Source: Author's calculations.

nisms behind the correlation. The different components, I argue, have changed somewhat during the studied time period in Finland, but their effects counteract each other.

The heritability of income generating traits is unlikely to have changed significantly during the studied period. When the educational level is used as a proxy for human capital, earnings return to human capital has decreased, at least for women. Public investments in children's human capital have become more progressive. These findings should lead to a decrease in the earnings correlation. A counteracting mechanism can be found in more productive human capital investment in children during the time period studied.

The decrease in earnings return to human capital is quite substantial. The earnings return to education at a secondary level has increased somewhat for men. The earnings return to education at a tertiary level has decreased by a third to almost a half for men and almost by a half for women. However, since the sample is young, the absolute value of the returns to education at a tertiary level were not high to begin with, and the effect on the intergenerational earnings correlation has therefore to be small.

The changes in the public sector and especially in the educational system did not have any larger effects on the intergenerational earnings correlation. The expected decrease in the earnings correlation due to increasing progressivity in public investments was counteracted by the increase in productivity of children's human capital. During the time period studied, children have had the possibility to build up their human capital by means of the investments by the public sector. But at the same time, the children's own ability has become more important when deciding upon their level of education, instead of relying on their parents economic situation.

This effect seems to apply particularly for children from families with low earnings. In Österbacka (2001), intergenerational earnings elasticities are conditioned on parental earnings quintiles. Children whose parents are in the lowest earnings quintile have low intergenerational elasticity in earnings, while children whose parents are wealthier have higher earnings elasticities. Let us put this in relation to the parameter γ, that shows how progressive public investments in children are (compare with equation 9). The magnitude of the progressivity does not imply anything about the absolute values of public investments, only that the ratio of public investments to parental after-tax income increases when parental income decreases. Assume that a certain level of investments in a child's human capital has to be offered in order to actually increase the level of the child's human capital. If that critical level of investment is exceeded by the public investments,

particularly children from families with low earnings benefit. If progressive taxes are included in the model, this effect would be even greater.

Since the changes in the welfare state did not have any clear effects on the intergenerational correlation, there might be other factors that have reduced the effect of the expanding welfare state that are not included into the model. An obvious example of this is that the human capital theory does not apply completely for the Finnish wage-setting system. Unions have been very strong in Finland. Labor market organizations, together with the government, have been influential when central negotiations about wages have been made. During the time period studied, equality has been an important goal in these central negotiations. Because of that, the link between human capital and earnings is not that large in Finland.

All estimates are done for the means, and there might be different effects at the ends of the income distribution. Further studies in this area would probably give more insight into the mechanisms behind the intergenerational correlation.

Finally, these results should be expected. An experiment with the components in the decomposition of the intergenerational correlation in equation 11, where one component changes from 0 to 1 while the others are on a plausible constant level, show that some components affect the correlation more than others. Both changes in the returns to human capital investments, θ, and changes in progressivity in public investments, γ, have exceptionally small effects on the intergenerational correlation. Changes in returns to human capital, p, affects the intergenerational correlation to a certain extent, while changes in the heritability coefficient, λ, has a greater impact on the intergenerational correlation.

Considering this numerical experiment, it is possible to explain the high estimates of intergenerational correlation in the US and in Great Britain, compared with the low estimates in the Nordic countries. The heritability of income generating traits is partly genetic and partly connected with social behavior. Finnish society is homogeneous, and the social behavior is probably similar across different families. The Nordic countries have historically been homogeneous, while the US and Great Britain have been multi-cultural and the ethnic differences have been notable. Immigration to Finland is still at a low level, while immigration has increased in the other Nordic countries since the 1970s. There is also evidence of discrimination on the labor market due to ethnicity, particularly in countries with longer experience of immigration. Social behavior has a great impact on both the labor market and the intergenerational earnings correlation. This implies that neither the welfare state nor the relatively low earnings inequality per se are necessarily important factors for the low intergenerational correlation in Finland. However, this area needs to be studied further.

7 Appendix

Table 8: Intergenerational elasticity (standard error), [Number of observations]

Child's Earnings Measure	Independent earnings measure: 1985 Family	1985 Father's	1985 Mother's	1990 Family	1990 Father's	1990 Mother's	1995 Family	1995 Father's	1995 Mother's
Sons									
Individual earnings measures									
Individual	0.128	0.081	0.025	0.149	0.100	0.057	0.175	0.086	0.036
	(.016)	(.012)	(.008)	(.018)	(.013)	(.010)	(.026)	(.019)	(.015)
	[5,051]	[4,223]	[2,860]	[4,950]	[3,967]	[3,928]	[4,558]	[3,583]	[3,932]
Equivalent earnings measures									
Equivalent Family	0.188	0.106	0.048	0.167	0.109	0.057	0.246	0.119	0.052
	(.015)	(.011)	(.008)	(.018)	(.012)	(.009)	(.024)	(.016)	(.013)
	[5,094]	[4,256]	[2,880]	[5,025]	[4,031]	[3,988]	[4,710]	[3,687]	[4,060]
Daughters									
Individual earnings measures									
Individual	0.164	0.069	0.065	0.141	0.057	0.069	0.230	0.087	0.093
	(.023)	(.021)	(.012)	(.025)	(.021)	(.013)	(.031)	(.023)	(.019)
	[5,066]	[2,645]	[3,638]	[4,700]	[2,848]	[3,883]	[4,465]	[3,297]	[3,841]
Equivalent earnings measures									
Equivalent Family	0.203	0.129	0.054	0.237	0.105	0.072	0.279	0.106	0.077
	(.015)	(.014)	(.008)	(.018)	(.015)	(.010)	(.024)	(.017)	(.014)
	[5,460]	[2,821]	[3,923]	[5,038]	[3,028]	[4,150]	[5,172]	[3,793]	[4,434]

Note: All earnings are in 1990 FIM.

Table 9: Test for trend in the effect parental education (standard error)

Independent variables	Sons' dependent earnings measure		Daughters' dependent earnings measure	
	Eq. family	Individual	Eq. family	Individual
Also included	Family earnings and its trends, age and age squared of the father and year dummies			
Father's education at 2nd level	0.110	0.075	0.145	0.187
	(.037)	(.039)	(.040)	(.054)
Trend 90	-0.039	0.029	-0.113	-0.099
	(.050)	(.053)	(.055)	(.074)
Trend 95	-0.012	-0.063	-0.089	-0.104
	(.048)	(.051)	(.052)	(.071)
Father's education at 3rd level	0.073	0.023	0.081	0.113
	(.041)	(.044)	(.041)	(.056)
Trend 90	0.044	0.084	0.044	0.006
	(.056)	(.059)	(.058)	(.078)
Trend 95	0.011	0.013	0.054	0.011
	(.054)	(.058)	(.055)	(.076)
Mother's education at 2nd level	0.079	0.040	0.041	0.014
	(.035)	(.037)	(.037)	(.050)
Trend 90	-0.033	0.008	0.012	-0.051
	(.047)	(.049)	(.050)	(.067)
Trend 95	-0.089	-0.025	-0.040	-0.040
	(.045)	(.048)	(.047)	(.064)
Mother's education at 3rd level	0.085	0.149	0.110	0.075
	(.055)	(.058)	(.054)	(.074)
Trend 90	-0.011	-0.074	-0.062	-0.075
	(.071)	(.075)	(.072)	(.097)
Trend 95	-0.118	-0.243	-0.015	-0.013
	(.068)	(.072)	(.068)	(.093)
N observations	14,829	14,559	15,670	14,231
F-test for trends in father's educ=0 [p-value]	0.422	1.392	1.654	0.688
	[.793]	[.234]	[.158]	[.600]
F-test for trends in mother's educ=0 [p-value]	1.823	3.412	0.708	0.320
	[.121]	[.009]	[.586]	[.865]

table continues

Independent variables	Sons' dependent earnings measure		Daughters' dependent earnings measure	
	Eq. family	Individual	Eq. family	Individual
table continues				
Also included	Father's earnings and its trends, age and age squared of the father and year dummies			
Father's education at 2nd level	0.112	0.069	0.104	0.158
	(.039)	(.041)	(.051)	(.067)
Trend 90	-0.043	0.036	-0.027	-0.000
	(.053)	(.056)	(.067)	(.089)
Trend 95	0.033	-0.024	-0.024	-0.034
	(.052)	(.055)	(.062)	(.083)
Father's education at 3rd level	0.110	0.053	0.063	0.098
	(.040)	(.043)	(.047)	(.063)
Trend 90	0.025	0.067	0.094	0.064
	(.055)	(.058)	(.065)	(.085)
Trend 95	0.006	-0.018	0.170	0.106
	(.054)	(.058)	(.060)	(.081)
N observations	11,974	11,773	9,642	8,790
F-test for trends in father's educ=0 [p-value]	0.754	0.803	2.241	0.578
	[.555]	[.523]	[.062]	[.678]
Also included	Mother's earnings and its trend, age and age squared of the mother and year dummies			
Mother's education at 2nd level	0.112	0.064	0.073	0.105
	(.044)	(.046)	(.043)	(.057)
Trend 90	-0.067	-0.013	0.001	-0.135
	(.056)	(.058)	(.056)	(.074)
Trend 95	-0.068	-0.018	-0.028	-0.087
	(.054)	(.056)	(.053)	(.071)
Mother's education at 3rd level	0.124	0.149	0.210	0.140
	(.057)	(.060)	(.055)	(.074)
Trend 90	0.043	-0.004	-0.059	-0.085
	(.073)	(.076)	(.071)	(.096)
Trend 95	-0.051	-0.184	0.041	0.096
	(.070)	(.073)	(.068)	(.092)
N observations	10,928	10,720	12,507	11,362
F-test for trends in mother's educ=0 [p-value]	1.083	2.719	0.909	1.994
	[.363]	[.029]	[.458]	[.093]

Note: All earnings are in 1990 FIM.

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