Intergenerational income correlation and the expansion of secondary education: Evidence from the Finnish comprehensive school reform*

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Abstract

Many authors have recently suggested that the heterogeneity in the quality of early education may be one of the key mechanisms underlying the intergenerational persistence of earnings. This paper estimates the effect of a major educational reform on the intergenerational income mobility in Finland. The Finnish comprehensive school reform of 1972-1977 shifted the tracking age in secondary education from age 10 to 16 and imposed a uniform academic curriculum on entire cohorts until the end of lower secondary school. We estimate the effect of the reform on the correlation between son's earnings in 2000 and father's average earnings during 1970-1990 using a representative sample of males born during 1960-1966. The identification strategy relies on a difference-in-differences approach and exploits the fact that the reform was implemented gradually across municipalities during a six-year period. The results indicate that the reform reduced the intergenerational income correlation by six percentage points.

1 Introduction

In the study of economic inequality, one of the key questions of interest is the degree to which the economic status is transferred from parents to their children. It is often argued that high cross-sectional income inequality is socially more sustainable if it is accompanied with high intergenerational mobility. In a highly mobile society, each incoming generation is met with equal opportunities to climb up the income distribution and neither wealth nor poverty is necessarily passed from one generation to another.

The most common approach to study intergenerational income mobility is to estimate correlations of fathers' and their sons' lifetime earnings. More than a decade of research on this correlation has shown that there are large differences across countries: in the countries such as United States and United Kingdom the correlation is relatively high (around 0.4) while in Canada, Finland, and Sweden it is considerably lower (around 0.2).[1] Recent research also indicates that whereas the intergenerational correlation has been increasing in the United States over the last two decades, in Finland it has followed a steady downward trend.[2] Moreover, studies that use data on adoptees, such as Björklund

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[1]See Solon (1992) on United States, Dearden, Machin, and Reed (1997) on United Kingdom, Corak and Heisz (1999) on Canada, Björklund and Jäntti (1997) on Sweden, and Jäntti and Österbacka (1996) on Finland.

[2]See Aaronson and Mazumder (2005) on United States and Lucas and Pekkala (2005) on Finland.

et al (2005), have shown that the income of children is more strongly correlated with the income of the adoptive rather than biological parents.

Apart from these facts, however, little is known about the mechanisms underlying the intergenerational income correlations. Most importantly, there is little information on the effects of feasible policy instruments on the intergenerational income mobility. In this paper, we estimate the effect of a major educational reform on intergenerational income correlation. The Finnish comprehensive school reform of 1972-1977 thoroughly changed the structure and the content of Finnish primary and secondary education. As a result of this reform, the tracking into academic and vocational secondary schools was postponed from the age of 11 to 16 and a uniform academic curriculum was imposed on entire cohorts until the age of 16. The reform thus significantly decreased the heterogeneity of the quality of primary and secondary education and increased their academic content. The reform was adopted gradually by municipalities so that we observe individuals within cohorts born between 1961-1965 in both the pre- and post- reform systems. This gradual adoption of the new system allows us to treat the reform as a quasi-experiment and to estimate the effect of the reform on intergenerational income mobility using difference-in-differences approach.

Recently, many authors have stressed the importance of primary and secondary education in shaping lifetime earnings and intergenerational income mobility. First of all, there is a growing body of evidence, surveyed by Carneiro and Heckman (2003) as well as Cunha et al (2005), suggesting that most efficient policy interventions to reduce cross-sectional inequality are done at an early age when individual's cognitive and non-cognitive skills are still malleable. According to this literature, the heterogeneity in the quality of primary and secondary education is a fundamental cause of inequality and policies that focus on higher levels of education are unlikely to be successful in reducing inequality. Second, a number of authors have stressed the importance of the sequential nature of education and especially the role of tracking in secondary education. This line of research views education as a process that proceeds in stages. If important educational career decisions, such as tracking, are done at a very early age, these decisions are likely to be heavily affected by parental background. Dustmann (2004), for example, argues that high intergenerational income correlation in Germany, which is close to American and British levels, is at least partly due to the German educational system where pupils are tracked to academic and vocational secondary education at the age of 10. In line with this argument, Meghir and Palme (2004) demonstrate that an educational reform that shifted the tracking age in Sweden from the age of 10 to 16 had a particularly strong positive effect on the education of high ability pupils from low education parental background. Finally, there is a theoretical literature, starting from Becker and Tomes (1986) and developed by Solon (2005), that emphaiszes the role of educational investments in shaping the intergenerational income mobility. More recently, Restuccia and Urrutia (2004) have presented a model of intergenerational persistence of earnings where they distinguish between early and late education and argue that about half of the intergenerational correlation in earnings is accounted for by parental investment in early education.

We estimate the effect of the reform on the correlation between son's earnings in 2000 and father's average earnings during 1970-1990 using a representative sample of males born between 1960-1966. The identification strategy relies on a difference-in-differences approach and exploits the fact that the reform was implemented gradually across municipalities during a six-year period. The overall intergenerational income correlation in this sample is close to the previous estimates of income mobility in Finland. The effect of the reform was to decrease the intergenerational income correlation by approximately six percentage points. This amounts to a 18 % decrease in the correlation.

The paper is organized as follows. In the following section, we describe the Finnish

comprehensive school reform in detail. We then discuss the measurement of the effect of the reform on the intergenerational income correlation. In the fourth section we present the sample from the Finnish Longitudinal Census Data Files and in the fifth section we discuss the results. The sixth section concludes.

2 The Finnish comprehensive school reform 1972-1977

The Finnish pre-reform and post-reform educational systems are depicted in table 1. Finland followed the rest of the Nordic countries in the 1970's and implemented a thorough reform of her secondary education system. The Swedish and Norwegian reforms are described in detail in Meghir and Palme (2004) and Aakvik et al (2003) respectively. These reforms were influenced by the expansion of secondary schooling in the United States. The aim of the reforms was to extend the average years of schooling to same levels as in other industrialised countries and to widen the access to academic secondary education.

The Finnish pre-reform educational system dated back to 1921. Compulsory education in this system was provided by six year long folk school. Pupils entered the folk school at the age of 7 and in the fourth grade, at the age of 10-11, they could apply to the lower academic secondary school which provided eligibility for the upper academic secondary school and subsequently to academic tertiary education. The access to the academic secondary education was based on the pupil's school achievement. The pupils who chose not to apply or failed to qualify remained in folk school for two more years after which the compulsory education was finished. After this, the folk school students could still continue at civic school, which offered a two- or three-year education. After civic school, it was possible to move up to vocational school.

The school system was reformed in the 1970s. This reform introduced a new curriculum and changed the structure of the educational system. The new curriculum increased the academic content of education compared to the old folk school curriculum by increasing the share of mathematics and science and imposing a compulsory foreign language on all the pupils. The structure of the educational system changed so that the previous folk school, civic school and lower secondary school were replaced by a nine-year comprehensive school offering basic general education. After the reform, all the pupils followed the same curriculum in the same establishments and the tracking into general and vocational tracks was postponed until the age of 16. At the same time, upper secondary school was separated from secondary school to form a distinct form of institution. In addition to these fundamental changes, the reform also imposed a centrailzed control on schools at the national level and more or less abolished the extensive network of private schools that had run secondary schools in many parts of the country by placing them under municipal ownership.

The reform was not adopted simultaneously in all the Finnish municipalities. There was a considerable amount of resistance to the reform and as a compromise it was agreed to carry out the transition into the comprehensive school gradually by municipalities. This gradual adoption of the new system was supposed to allow for the smooth transition to the new system. The transition took place between 1972 and 1977 so that in each municipality that adopted the reform, the pupils from the first to the fifth grade (i.e. pupils aged 7-11) in the folk school were immediately affected by the reform.

Table 2 illustrates how the reform affected cohorts born between 1960-1966 in different municipalities. The shaded areas in the table indicate cells that were enrolled in the post-reform educational system. Since the individuals born in 1960 were in the sixth grade in 1972, the year the reform started, the members of this cohort were not affected by the reform. However, the 1961 cohort was in the fifth grade in year 1972 and individuals

living in the municipalities that adopted the reform that year were enrolled in the new system. Similarly, in the 1962 cohort the individuals in the municipalities that adopted the reform in 1972 and 1973 were enrolled in the system. Table 3 conveniently illustrates the difference-in-differences setting that we will use in our analysis below. More specifically, within cohorts 1961-1965 we have variation in the educational system across municipalities that adopted the reform between 1972-1977 and within municipalities there is variation in across cohorts 1960-1966.

The adoption of the reform was, in principle, dictated by the geographical location of the municipality. Figure 1 illustrates how the reform spread through the Finnish municipalities during 1972-1977. The first municipalities that adopted the reform in 1972 were predominantly situated in the province of Lapland, the extreme north of the country. In 1973 the reform was mostly adopted in the north-eastern regions. From thereon the reform spread so that it was adopted in 1974 in the northwest, in 1975 in south-east, in 1976 in the south-west and finally in 1977 in the capital Helsinki and its surrounding suburbs.

One would expect a reform like this to have an effect on the intergenerational income correlation for the following reasons. First, the reform postponed the tracking of pupils from age 10 and 16. It has often been argued that earlier decisions are more heavily affected by parental background. If this is the case and the effect of the low income parental background on children's educational attainment is negative, the postponement of tracking should decrease the negative effect of the low income parental background and correspondingly decrease the intergenerational income correlation. Second, the curriculum of the comprehensive school was dramatically more academic in nature than that of the vocational school. If this kind of academic content has a positive effect on the lifetime earnings of children from low income families that would have otherwise gone to vocational education, the reform should also reduce intergenerational income correlation through this curriculum effect.

3 Estimation methods

Our goal is to estimate the changes in the father-son income correlation due to the comprehensive school reform. The identification strategy relies on a difference-in-differences approach and exploits the fact that the reform was implemented gradually across municipalities during a six-year period.

A fixed effect model for the effect of reform on father-son income correlation can be written as follows

$$\rho_{ct} = \rho_0 + \delta R_{ct} + \Psi D_t + \Omega D_c + \varepsilon_{ct} \tag{1}$$

where ρ_{ct} is the father-son correlation in municipality c for the birth cohort t, R_{ct} is a dummy variable equal to 1 if the reform had taken place in the municipality by the time when the son was in the relevant age, D_t is a set of cohort dummies, and D_c the full set of municipality fixed effects. Including full sets of cohort and municipality fixed-effects allows the father-son correlation to change over time and to vary across municipalities. The parameter δ identifies the effect of the reform on the father-son correlation.

In principle, one can estimate the above equation easily using a two-step approach by first estimating the father-son correlation separately in the each municipality-cohort cell and the regressing the estimated correlations on the reform dummy, and the time and municipality dummies. However, practical problems arise due to small cell sizes when one divides the data into multiple cells. A more straightforward way is to assume that the variances of the earnings of fathers and sons are approximately the same. If this is the case, the father-son income correlation is conveniently estimated by regressing the son's

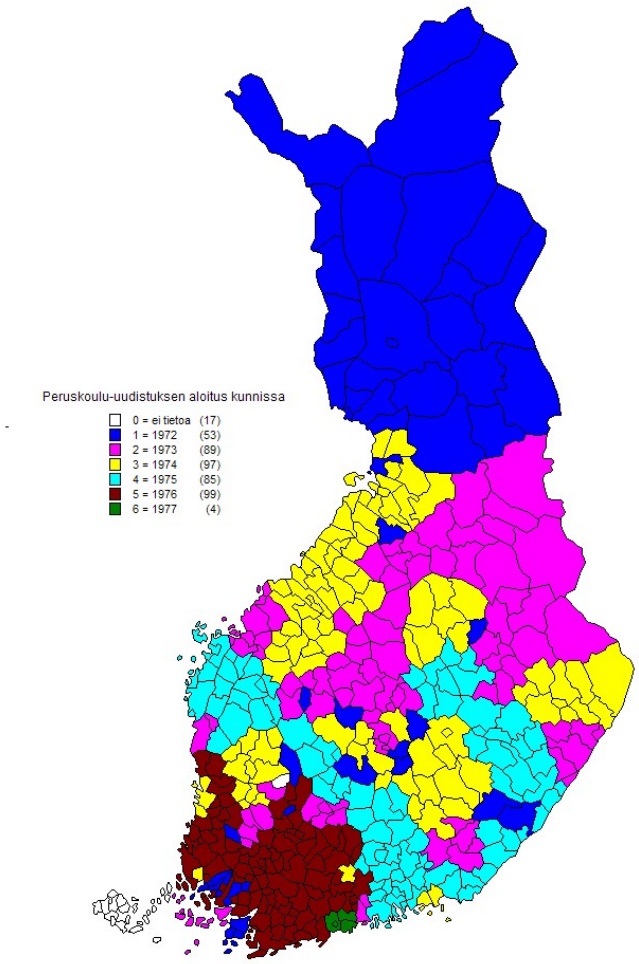

Figure 1: The adoption of the comprehensive school reform by the municipalities, 1972-1977.

earnings (y_1) on father's earnings (y_2).

$$y_1 = a + by_2 + \Phi D_t + \Pi D_c + e \tag{2}$$

where we introduce a full set of cohort and municipality dummies to control for municipal and cohort main effects.

The regression coefficient b provides an estimate of the father-son correlation. In order to examine how the reform affected father-son correlations, we can write the regression coefficient as

$$b_{ct} = \rho_0 + \delta R_{ct} + \Psi D_t + \Omega D_c + \varepsilon_{ct} \tag{3}$$

Inserting this back into the regression (2) produces

$$y_1 = a + \rho_2 y_2 + \delta(y_2 * R_{ct}) + \Psi(y_2 * D_t) + \Omega(y_2 * D_c) + \Phi D_t + \Pi D_c + y_2 * \varepsilon_{ct} + e \tag{4}$$

Estimating the effect of the comprehensive school reform on father-son income correlation, therefore, reduces to a model where the son's lifetime earnings are regressed on the father's lifetime earnings interacted with the reform dummy, and a full set of interactions between municipality and the cohort dummies and the father's lifetime earnings.

Estimating the equation (4) involves a large number of parameters. In addition to over 400 municipality dummies one needs to add the interactions of the municipality dummies and father's earnings. This is likely to lead to intractable results. To reduce the number of parameters, it should be noted that it is not necessary to include all the municipality dummies in the equation. To begin with, the only reason to include the municipality dummies is that one can be worried that the reform took place first in non-randomly selected municipalities and that father-son correlation may be different in these municipalities. However, this is only a problem if the reform dummy is correlated with the municipality fixed effects. This correlation can also be removed by aggregating municipalities to different "treatment" groups defined by year of the reform in the municipality. In practice this means that instead of having fixed effects for each municipality, it is sufficient to include a fixed effect for each group of municipalities, where the groups are defined by the reform year. In what follows we call these groups of municipalities "reform regions".

4 Data

The data that we use in this paper come from the Finnish Longitudinal Census Data Files (FLCD). FLCD are a data source provided by the Statistics Finland that in principle contains information on all the 6.3 million individuals who had legal residence in Finland at the time of the censuses that were conducted every five years between 1970-2000. Finnish censuses are register-based and are made possible by the system of personal identity codes. These codes enable Statistics Finland to access information on individuals across different administrative registers. Furthermore, the codes also enable matching individuals across censuses and to their family members. As these data are based on administrative registers, the only reasons for the individual not to appear in the data are death or migration. Hence, these data do not have the attrition problems that are common in the study of intergenerational income correlations.

We have access to all the census observations of a 10% sample of the male cohorts born in 1960-1966. This is a representative sample of the individuals born in Finland during these years. We chose to restrict the analysis to these cohorts to have two cohorts, 1960 and 1966, with individuals only in pre- and post-reform systems and five cohorts, 1961-1965, with individuals in both systems. The original sample contained information on 24 249 male individuals born between 1960-1966. Out of these individuals 1 245 either

died or moved out of the country before year 2000. We also dropped from this sample 322 individuals whose treatment status could not be identified and 279 individuals who didn't have positive earnings in 2000 as well as 1 620 individuals for whom we didn't have information on father's earnings at any point during 1970-1990. The final sample, thus, contains information on 20 788 individuals.

As an income measure of the sons we use all taxable income that individuals earned during year 2000. Fathers' lifetime earnings are measured with the average taxable income during 1970-1990 in year 2000 prices. The information on the individual's birthday and the municipality of residence were used to determine whether the individuals was affected by the comprehensive school reform or not. The criterion to be classified as affected by the reform was to be in a fifth grade or below at the year when the municipality adopted the reform. Altogether 9 373 individuals (47%) in our data fall into the treatment group.

In table 3, we report some summary statistics on the age and annual earnings of our sample of individuals and their fathers. As these individuals are born during 1960-1966, they are from 34 to 40 year old in 2000. The fact that sons' mean earnings are considerably higher than fathers' mean earnings reflects the increase in real wages across these generations.

5 Results

We start by examining the overall intergenerational income correlation in our sample. Regressing the son's log earnings in 2000 on a father's average log earnings during 1970-1990 and a full set of cohort and regional dummies yields a coefficient of 0.26. This is broadly in line with the earlier results on intergenerational income mobility in Finland. Jäntti and Österbacka (1996) obtain an estimate of 0.22 using a representative sample of the Finnish population and Lucas and Pekkala (2005) obtain an estimate of 0.19 when regressing the earnings of the sample of cohorts 1960-1964 at the age of 30 on father's average earnings.

In table 4, we report the estimated intergenerational income correlations across birth cohorts and reform regions. There is some indication of downward trend in panel a of table 4. The correlations fall from 0.28 in the 1960 birth cohort to 0.24 in the 1966 cohort. This drop in the correlations may reflect the real downward trend or the fact that intergenerational income correlations tend to increase with age. Regional differences are of similar magnitude as the differences across cohorts. The highest estimated intergenerational income correlation, 0.31, is in the region that implemented reform in 1977.

Intergenerational income correlations are also decomposed across the reform status within birth cohorts and reform regions. As was explained above, within cohorts the reform status varies by regions and within regions by cohorts. In all the birth cohorts apart from cohort 1961, the estimated intergenerational income correlation is lower in the post-reform regions than in the pre-reform regions. These differences, however, are hardly ever significant. Similarly within regions, correlations tend to be lower among post-reform cohorts the only exception being the region that implemented the reform in 1977. In the whole sample, the intergenerational income correlation is 0.29 among the pre-reform individuals and 0.23 among the post-reform individuals. The difference, -0.06, is clearly statistically significant.

In table 5, we report the results from the estimation of equation (4). Table is organized so that each column brings in a new cohort in the regression. Hence, in column 1 we only use cohorts 1960-1961 where only the municipalities that implemented the reform in 1972 fall into the treatment group and the rest of the country acts as a control group. In column 2, cohort 1962 is brought into the analysis and also municipalities that implemented the

reform in 1973 go into the treatment group and so on until column 6 where we use all the data and the treatment and control groups are distributed as in table 2.

It is easy to see that the effect of the reform on intergenerational income mobility is negative in all the columns. The lowest estimated effect is -0.02 and the highest -0.10. The effect of the reform also becomes significant as soon as we use three cohorts or more. Using the whole sample in column 6, the estimated effect of the reform on intergenerational income correlation is -0.06 which is close to the raw difference reported in table 4. This corresponds to 18% drop in the base-line intergenerational correlation 0.33. These results thus clearly indicate that the reform reduced the intergenerational income correlation between fathers and sons.

Table 6 repeats the same analysis by reform regions. Apart from the first column, where only regions that adopted the reform in 1972 and 1973 are included, the effect of the reform on intergenerational income correlation is negative. Indeed, as soon as the region that adopted the reform in 1975 is taken in the regression.

6 Conclusions

Even though the knowledge about intergenerational income correlations and their differences across countries has quickly accumulated over the last ten or so years, the understanding about the mechanisms underlying these correlations is weak. Many authors have emphasized the potential role of educational institutions in shaping the intergenerational income mobility. Especially the role of heterogeneity in the quality early education has received a lot of attention. Yet, there is little direct evidence on the effect of educational institutions on intergenerational income mobility.

In this paper we estimate the effect of a major educational reform on intergenerational income correlation. The Finnish comprehensive school reform completely transformed the structure and the content of the secondary education in Finland. As a result of this reform, the tracking to academic and vocational secondary education was postponed from the age 11 to 16 and a uniform academic curriculum was imposed on entire cohorts until the 9th grade. The reform was adopted gradually by municipalities which allows us to treat this reform as a quasi-experiment.

We find that the comprehensive school reform reduced the correlation of fathers' and sons' earnings by six percentage points. This amounts to a 18% drop in the intergenerational income correlation. These results suggest that policies that expand the access to academic secondary education may significantly enhance intergenerational income mobility.

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Table 1 Finnish educational systems

The pre-reform system

Age

7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Folk school				General secondary school								Universities						
						Civic school			Vocational schools									

The post reform-system

Age

7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Comprehensive school									General secondary school			Universities						
									Vocational school			Higher vocational education						

Table 2 The adoption of the reform by cohorts

	The reform year					
Birth cohort	1972	1973	1974	1975	1976	1977
1960	6th grade	-	-	-	-	-
	N=606	N=905	N=1,262	N=1,401	N=1,334	N=804
1961	5th grade	6th grade	7th grade	8th grade	9th grade	-
	N=577	N=969	N=1,362	N=1,283	N=1,401	N=816
1962	4th grade	5th grade	6th grade	7th grade	8th grade	9th grade
	N=645	N=939	N=1,339	N=1,331	N=1,431	N=791
1963	3rd grade	4th grade	5th grade	6th grade	7th grade	8th grade
	N=645	N=913	N=1,297	N=1,409	N=1,485	N=819
1964	2nd grade	3rd grade	4th grade	5th grade	6th grade	7th grade
	N=592	N=907	N=1,299	N=1,352	N=1,481	N=854
1965	1st grade	2nd grade	3rd grade	4th grade	5th grade	6th grade
	N=553	N=872	N=1,234	N=1,349	N=1,338	N=868
1966	-	1st grade	2nd grade	3rd grade	4th grade	5th grade
	N=550	N=771	N=1,204	N=1,267	N=1,409	N=844

Note: The shaded areas indicate cells that adopted the post-reform educational system. N refers to the sample size in each cell in the data that are used in the analysis.

Table 3 Summary statistics

Variable	Mean	Std. Dev.	Min	Max
Son's age in 2000	37.03	1.98	34	40
Son's earnings in 2000	29 785	110 633	200	14 916 700
Father's average earnings during 1970-1990	18 678	11 822	77	69 008

Note: Summary statistics for 20 786 individuals in our sample and their fathers. Earnings refer to all taxable income in 2000 prices converted to euros.

Table 4 Intergenerational income correlations across birth cohorts and reform regions

a) Birth cohorts

Birth cohort	Average	Pre-reform	Post-reform	Difference
1960	0.293	0.293		
	(0.020)	(0.020)		
1961	0.286	0.281	0.339	0.058
	(0.020)	(0.021)	(0.062)	(0.066)
1962	0.281	0.283	0.258	-0.025
	(0.020)	(0.024)	(0.040)	(0.047)
1963	0.245	0.307	0.158	-0.149
	(0.021)	(0.030)	(0.030)	(0.043)
1964	0.252	0.248	0.235	-0.013
	(0.021)	(0.038)	(0.027)	(0.047)
1965	0.264	0.378	0.234	-0.145
	(0.022)	(0.069)	(0.024)	(0.070)
1966	0.247		0.247	
	(0.023)		(0.023)	

b) Reform regions

Region	Average	Pre-reform	Post-reform	Difference
1972	0.271	0.358	0.254	-0.104
	(0.025)	(0.066)	(0.027)	(0.068)
1973	0.216	0.266	0.196	-0.071
	(0.020)	(0.034)	(0.025)	(0.042)
1974	0.244	0.277	0.217	-0.060
	(0.018)	(0.026)	(0.024)	(0.035)
1975	0.246	0.264	0.228	-0.037
	(0.018)	(0.024)	(0.028)	(0.038)
1976	0.251	0.266	0.210	-0.056
	(0.018)	(0.021)	(0.038)	(0.043)
1977	0.313	0.305	0.390	0.085
	(0.027)	(0.029)	(0.085)	(0.084)
Total	0.265	0.288	0.230	-0.057
	(0.008)	(0.011)	(0.012)	(0.016)

Note: Numbers in the cells are coefficients of the father's earnings in the regressions where son's earnings are refressed on father's earnings alone. Standard errors are reported in parentheses.

Table 5 Difference-in-difference analysis of the effect of the reform by birth cohorts

	(1) -1961	(2) -1962	(3)-1963	(4) -1964	(5) -1965	(6) -1966
Father's earnings	0.358	0.354	0.376	0.320	0.326	0.327
	(0.000)	(0.006)	(0.017)	(0.021)	(0.025)	(0.023)
Father's earnings x Reform	-0.017	-0.039	-0.102	-0.053	-0.068	-0.064
	(0.031)	(0.026)	(0.028)	(0.020)	(0.023)	(0.020)
Father's earnings x Cohort 1961	-0.001	-0.003	0.004	-0.001	0.001	-0.001
	(0.031)	(0.030)	(0.029)	(0.027)	(0.026)	(0.027)
Father's earnings x Cohort 1962		-0.004	0.012	0.002	0.005	0.003
		(0.033)	(0.027)	(0.025)	(0.023)	(0.023)
Father's earnings x Cohort 1963			-0.004	-0.024	-0.018	-0.021
			(0.024)	(0.021)	(0.023)	(0.019)
Father's earnings x Cohort 1964				-0.008	0.001	-0.003
				(0.031)	(0.029)	(0.030)
Father's earnings x Cohort 1965					0.028	0.024
					(0.038)	(0.034)
Father's earnings x Cohort 1966						0.016
						(0.022)
Father's earnings x Region 1973	-0.091	-0.086	-0.103	-0.059	-0.073	-0.067
	(0.015)	(0.009)	(0.008)	(0.005)	(0.006)	(0.004)
Father's earnings x Region 1974	-0.088	-0.075	-0.113	-0.050	-0.044	-0.047
	(0.016)	(0.017)	(0.014)	(0.009)	(0.009)	(0.007)
Father's earnings x Region 1975	-0.099	-0.085	-0.114	-0.037	-0.043	-0.054
	(0.015)	(0.015)	(0.021)	(0.012)	(0.012)	(0.010)
Father's earnings x Region 1976	-0.093	-0.103	-0.116	-0.047	-0.065	-0.060
	(0.016)	(0.017)	(0.021)	(0.016)	(0.016)	(0.012)
Father's earnings x Region 1977	-0.060	-0.043	-0.058	-0.023	-0.024	-0.008
	(0.016)	(0.017)	(0.020)	(0.016)	(0.019)	(0.015)
Region 1973	0.080	0.011	-0.003	0.010	0.011	0.008
	(0.010)	(0.018)	(0.008)	(0.005)	(0.004)	(0.003)
Region 1974	0.014	-0.020	-0.038	0.007	0.016	0.019
	(0.010)	(0.036)	(0.016)	(0.010)	(0.007)	(0.006)
Region 1975	0.034	-0.001	-0.011	0.021	0.025	0.009
	(0.009)	(0.035)	(0.024)	(0.015)	(0.011)	(0.009)
Region 1976	0.141	0.062	0.036	0.066	0.069	0.062
	(0.010)	(0.036)	(0.024)	(0.021)	(0.015)	(0.012)
Region 1977	0.096	0.044	0.023	0.075	0.079	0.059
	(0.010)	(0.035)	(0.023)	(0.020)	(0.018)	(0.016)
Cohort 1961	0.012	0.022	0.022	0.021	0.021	0.022
	(0.019)	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)
Cohort 1962		-0.014	-0.015	-0.017	-0.017	-0.015
		(0.034)	(0.034)	(0.033)	(0.033)	(0.033)
Cohort 1963			-0.028	-0.033	-0.032	-0.029
			(0.031)	(0.030)	(0.029)	(0.029)
Cohort 1964				-0.040	-0.040	-0.035
				(0.037)	(0.035)	(0.037)
Cohort 1965					-0.065	-0.058
					(0.035)	(0.035)
Cohort 1966						-0.046
						(0.035)
Reform	0.108	-0.007	-0.017	0.001	-0.003	-0.010
	(0.019)	(0.053)	(0.032)	(0.026)	(0.022)	(0.021)
Constant	5.374	5.422	5.437	5.406	5.402	5.409
	(0.000)	(0.032)	(0.021)	(0.018)	(0.018)	(0.017)
Observations	5953	8882	12031	15094	17985	20788
R-squared	0.07	0.07	0.06	0.06	0.06	0.05

Note: The dependent variable is son's log earnings in 2000 and father's earnings are measured with average log earnings during 1970-1990. Reform refers to the comprehensive school reform dummy. Cohorts are cohort dummies and regions are region dummies. Standard errors, reported within parentheses, are robust to clustering at the regional level.

Table 6 Differences-in-differences analysis of the effect of the reform by reform regions

	(2)- 1973	(3) -1974	(4) -1975	(5) -1976	(6) -1977
Father's earnings	0.346	0.316	0.314	0.333	0.327
	(0.010)	(0.027)	(0.011)	(0.021)	(0.023)
Father's earnings x Reform	0.046	-0.014	-0.061	-0.065	-0.064
	(0.003)	(0.019)	(0.031)	(0.021)	(0.020)
Father's earnings x Cohort 1961	-0.053	0.005	0.021	-0.004	-0.001
	(0.007)	(0.038)	(0.027)	(0.033)	(0.027)
Father's earnings x Cohort 1962	-0.108	-0.002	0.033	-0.005	0.003
	(0.004)	(0.048)	(0.026)	(0.035)	(0.023)
Father's earnings x Cohort 1963	-0.180	-0.113	-0.040	-0.035	-0.021
	(0.010)	(0.029)	(0.042)	(0.023)	(0.019)
Father's earnings x Cohort 1964	-0.184	-0.055	0.024	0.009	-0.003
	(0.069)	(0.080)	(0.076)	(0.044)	(0.030)
Father's earnings x Cohort 1965	-0.164	-0.025	0.036	0.009	0.024
	(0.040)	(0.085)	(0.071)	(0.057)	(0.034)
Father's earnings x Cohort 1966	-0.086	-0.027	0.002	0.000	0.016
	(0.016)	(0.025)	(0.031)	(0.023)	(0.022)
Father’s earnings x Region 1973	-0.051	-0.059	-0.066	-0.067	-0.067
	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)
Father’s earnings x Region 1974		-0.032	-0.045	-0.047	-0.047
		(0.005)	(0.008)	(0.007)	(0.007)
Father’s earnings x Region 1975			-0.051	-0.054	-0.054
			(0.013)	(0.010)	(0.010)
Father’s earnings x Region 1976				-0.060	-0.060
				(0.012)	(0.012)
Father’s earnings x Region 1977					-0.008
					(0.015)
Region 1973	0.016	0.014	0.007	0.010	0.008
	(0.001)	(0.006)	(0.006)	(0.004)	(0.003)
Region 1974		0.028	0.016	0.022	0.019
		(0.012)	(0.012)	(0.007)	(0.006)
Region 1975			0.005	0.015	0.009
			(0.018)	(0.011)	(0.009)
Region 1976				0.069	0.062
				(0.014)	(0.012)
Region 1977					0.059
					(0.016)
Cohort 1961	0.040	0.027	0.019	0.007	0.022
	(0.029)	(0.016)	(0.019)	(0.014)	(0.022)
Cohort 1962	-0.076	-0.014	0.013	-0.028	-0.015
	(0.044)	(0.036)	(0.018)	(0.038)	(0.033)
Cohort 1963	-0.065	-0.057	-0.010	-0.045	-0.029
	(0.051)	(0.019)	(0.017)	(0.028)	(0.029)
Cohort 1964	-0.152	-0.057	-0.014	-0.056	-0.035
	(0.015)	(0.067)	(0.056)	(0.041)	(0.037)
Cohort 1965	-0.144	-0.085	-0.040	-0.083	-0.058
	(0.024)	(0.045)	(0.045)	(0.040)	(0.035)
Cohort 1966	-0.088	-0.034	-0.027	-0.064	-0.046
	(0.034)	(0.040)	(0.046)	(0.039)	(0.035)
Reform	0.042	0.023	-0.020	0.003	-0.010
	(0.001)	(0.042)	(0.040)	(0.024)	(0.021)
Constant	5.412	5.389	5.402	5.413	5.409
	(0.030)	(0.029)	(0.022)	(0.018)	(0.017)
Observations	4866	9185	13502	18175	20788
R-squared	0.05	0.05	0.05	0.05	0.05

Note: The dependent variable is son’s log earnings in 2000 and father’s earnings are measured with average log earnings during 1970-1990. Reform refers to the comprehensive school reform dummy. Cohorts are cohort dummies and regions are region dummies. Standard errors, reported within parentheses, are robust to clustering at the regional level.