Online appendix to "The evolution of social mobility: Norway over the 20th century"

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A1 Tables

Tables A1 and A2: Age at measuring income

Tables A1 and A2 report estimates for rank-rank slopes and intergenerational income elasticities when measuring fathers' and sons' earnings at different ages. For reference, the first row of panels A shows the estimates reported in the main paper, while the remaining rows report estimates corresponding to different ages for measuring son's earnings. Since our earnings data start in 1967 and ends in 2010, we do not observe sons' earnings before age 35 for the early cohorts nor earnings after age 35 for the late cohorts. Panels B reports similar estimates, but now measuring fathers' earnings at age 45–54. Using age 45–54 earnings does not allow us to measure rank-rank-correlations for the cohorts born before 1945. The estimates for rank-rank slopes are quite insensitive to the age at which son's or father's income is measured. Measuring son's income over longer periods yields somewhat somewhat larger estimates than when using a single year, while measuring fathers' income at age 45–54 tends to yield slightly smaller estimates than when using income at age 55–64. However, all these differences are quite small and, most importantly, all measures show similar trends. The estimates for intergenerational income elasticity are, again, not largely affected by the time when we measure son's income. However, elasticity estimates using fathers' income at age 44–54 are 64–94% larger than estimates

Table A3: Imputation vs. observed father's income

In order to examine the quality of the imputed income measures, we compare fathers' observed and imputed income among those individuals for whom our data contain both measures. Table A3 reports results from regressions:

$$P_{i,obs} = \alpha + \beta P_{i,imp} + \epsilon_i \tag{A1}$$

where $P_{i,obs}$ is the observed father's income rank (from the tax register) at age 55-64 for individual i, $P_{i,imp}$ is the imputed father's income rank, and ϵ_i is an error term.

The first column examines sons born between 1932–33. For this cohort, we can use the military records to construct imputed father's income rank for 33,100 individuals, while the actual father's income rank at age 55–64 is observed only for 4,086 individuals. Both measures are available for 4,008 men. They are highly correlated, but by no means identical. The R-squared from regressing father's observed income on his imputed income

is 0.14. This relatively low R-squared reflects both measurement error inherent in our imputations and changes in the true income rank of the father's between early 1950s and the time when they were 55–64 years old. The remaining columns report similar analysis for the later cohorts. The point estimate and R-squared are largest among the 1935–39 birth cohort and smallest among the 1950–54 birth cohort. This pattern is consistent with an increasing measurement error over birth cohorts.

Tables A4–A6: Son's expected outcomes by father's imputed income

Tables A4 and A5 replicate tables 5 and 8 of the main paper using father's imputed income (instead of father's observed income at age 55–64).

Table A7: Transition matrices

Table A7 presents quintile transition matrices for four birth cohots. Each entry in a matrix corresponds to the probability that a son of father in a given quintile (columns) ends up in a quintile in the son income distribution (rows). For instance, 39.7% of sons growing up in the top quintile in the 1935–39 birth cohort were themselves in the top quintile at age 35.

A2 Figures

Figures A1-A3: Shape of the father-son income associations

Figure A1 shows the relationship between father's and son's log income. It is constructed by dividing father's log income (x-axis) into 100 percentile bins and plotting the mean son log income for each bin (y-axis). The figure also includes a linear fit corresponding to intergenerational income elasticity estimates reported in table 4 of the main paper.

Figure A2 reports the association between son's and father's income ranks for all birth cohorts in our data using the procedure described in section 5.3 of the main paper. Figure A3 shows the corresponding analysis when using father's imputed income.

Figure A4: Log income on years of education

In table 5 of the main paper, we report estimates from regressing income at 35 on years of education. Figure A4 shows that these regression coefficients provide a reasonable characterisation of the relationship between income and education, i.e. that the relationship is approximately linear. Figure A4 also plots the distribution of years of education for the birth cohorts included in our data.

Table A1: Sensitivity to the age at measuring income: Rank-rank slopes

	Son's birth cohort								
	1932 –33	1935 –39	1940 –44	1945 –49	1950 –54	1955 –59	1960 –64	1965 –69	1970 –74
	A: Father's average income percentile at age 55–64								
Sons' income rank at age 35	0.280	0.252	0.198	0.192	0.190	0.196	0.195	0.194	0.192
	(0.015)	(0.006)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Sons' income rank at age 30–34	.	.	0.212	0.194	0.183	0.199	0.195	0.189	0.179
			(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Sons' income rank at age 35–39	0.294	0.264	0.217	0.216	0.208	0.209	0.207	0.206	.
	(0.015)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	
Sons' income rank at age 40–44	0.283	0.268	0.230	0.225	0.203	0.206	0.204	.	.
	(0.015)	(0.006)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)		
	B: Father's average income percentile at age 45–54								
Sons' income rank at age 35	.	.	0.194	0.214	0.211	0.217	0.218	0.216	0.207
			(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Sons' income rank at age 30–34	.	.	0.211	0.215	0.205	0.224	0.217	0.213	0.197
			(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Sons' income rank at age 35–39	.	.	0.212	0.240	0.230	0.229	0.230	0.227	.
			(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	
Sons' income rank at age 40–44	.	.	0.222	0.242	0.221	0.224	0.223	.	.
			(0.005)	(0.003)	(0.003)	(0.003)	(0.003)		

Table A2: Sensitivity to the age at measuring income: Intergenerational income elasticity

	Son's birth cohort								
	1932 –33	1935 –39	1940 –44	1945 –49	1950 –54	1955 –59	1960 –64	1965 –69	1970 –74
				A: Father's average log income at age 55–64					
Sons' log income at age 35	0.121	0.109	0.069	0.064	0.067	0.068	0.064	0.062	0.060
	(0.011)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sons' log income at age 30–34	.	.	0.069	0.055	0.058	0.068	0.068	0.067	0.062
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sons' log income at age 35–39	0.126	0.112	0.071	0.075	0.082	0.085	0.078	0.070	0.065
	(0.012)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sons' log income at age 40–44	0.126	0.109	0.090	0.094	0.094	0.094	0.079	.	.
	(0.013)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)		
				B: Father's average log income at age 45–54					
Sons' log income at age 35	.	.	0.114	0.117	0.124	0.127	0.126	0.106	0.097
			(0.006)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Sons' log income at age 30–34	.	.	0.120	0.098	0.111	0.127	0.132	0.117	0.099
			(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Sons' log income at age 35–39	.	.	0.120	0.139	0.150	0.153	0.145	0.122	0.107
			(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Sons' log income at age 40–44	.	.	0.160	0.162	0.174	0.164	0.147	.	.
			(0.008)	(0.006)	(0.005)	(0.004)	(0.004)		

Table A3: Associations between fathers' observed and imputed income

	Son's birth cohort				
	1932–33	1935–39	1940–44	1945–49	1950–54
	A: Earnings rank				
Father's imputed earnings rank	0.38	0.44	0.37	0.30	0.25
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Constant	0.31	0.26	0.31	0.35	0.38
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
R^2	0.14	0.18	0.13	0.09	0.06
Observations	3,855	30,529	74,843	126,225	138,614
	B: Log earnings				
Father's imputed log earnings	0.55	0.63	0.56	0.51	0.45
	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	5.40	4.59	5.48	6.13	6.75
	(0.34)	(0.13)	(0.09)	(0.07)	(0.07)
R^2	0.08	0.10	0.07	0.05	0.04
Observations	3,736	29,922	72,790	120,649	129,106

Note: Estimates and robust standard errors (in paratheses) from regressing father's observed income on his imputed rank. In panel A, the outcome variable is father's observed income rank at age 55–64 and the dependent variable is father's imputed income rank. In panel B, the outcome variable is father's observed log earnings at age 55–64 and the dependent variable is father's imputed income rank.

Table A4: Son's expected income percentile by father's imputed income percentile

	Son's expected percentile by birth cohort				
Father's percentile:	1932 –33	1935 –39	1940 –44	1945 –49	1950 –54
95th	0.643	0.605	0.590	0.577	0.569
	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)
90th	0.614	0.581	0.565	0.554	0.544
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
75th	0.563	0.550	0.548	0.532	0.529
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
50th	0.488	0.478	0.505	0.506	0.501
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
25th	0.442	0.432	0.466	0.471	0.476
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
10th	0.414	0.414	0.434	0.434	0.435
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
5th	0.401	0.417	0.436	0.436	0.436
	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)

Table A5: Son's expected years of education by father's imputed income percentile

	Son's expected percentile by birth cohort				
Father's percentile:	1932 –33	1935 –39	1940 –44	1945 –49	1950 –54
95th	12.0	12.3	12.7	12.9	13.1
	(0.06)	(0.05)	(0.03)	(0.03)	(0.03)
90th	11.0	11.4	11.7	11.8	12.1
	(0.05)	(0.04)	(0.03)	(0.03)	(0.02)
75th	10.7	11.3	11.7	11.7	12.0
	(0.05)	(0.04)	(0.03)	(0.03)	(0.02)
50th	9.7	10.4	11.0	11.3	11.7
	(0.04)	(0.04)	(0.03)	(0.03)	(0.02)
25th	9.3	9.9	10.6	11.1	11.6
	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)
10th	9.1	9.7	10.3	10.8	11.3
	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)
5th	9.0	9.7	10.3	10.7	11.1
	(0.05)	(0.04)	(0.03)	(0.03)	(0.02)

Table A6: Son's expected college degree by father's imputed income percentile

	Son's expected percentile by birth cohort				
Father's percentile:	1932 –33	1935 –39	1940 –44	1945 –49	1950 –54
95th	0.34	0.37	0.42	0.43	0.46
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
90th	0.21	0.26	0.28	0.29	0.32
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
75th	0.20	0.26	0.30	0.29	0.29
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
50th	0.12	0.16	0.21	0.25	0.25
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
25th	0.09	0.11	0.17	0.20	0.23
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
10th	0.06	0.10	0.14	0.17	0.19
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
5th	0.06	0.10	0.14	0.15	0.18
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table A7: Quintile transition matrices

(a) 1935–39

Child	Father quintile				
quintile	1	2	3	4	5
1	27.1%	23.7%	16.6%	14.0%	13.1%
2	25.3%	24.6%	24.1%	19.8%	11.1%
3	19.3%	19.5%	22.4%	23.5%	14.8%
4	15.7%	17.8%	20.0%	22.4%	21.3%
5	12.6%	14.3%	16.9%	20.3%	39.7%

(b) 1950–53

Child	Father quintile				
quintile	1	2	3	4	5
1	25.9%	22.3%	18.1%	15.4%	14.3%
2	22.3%	22.8%	22.9%	19.2%	12.6%
3	19.3%	20.7%	21.4%	21.8%	17.3%
4	17.7%	18.5%	20.3%	22.9%	22.2%
5	14.9%	15.8%	17.3%	20.8%	33.6%

(c) 1960–64

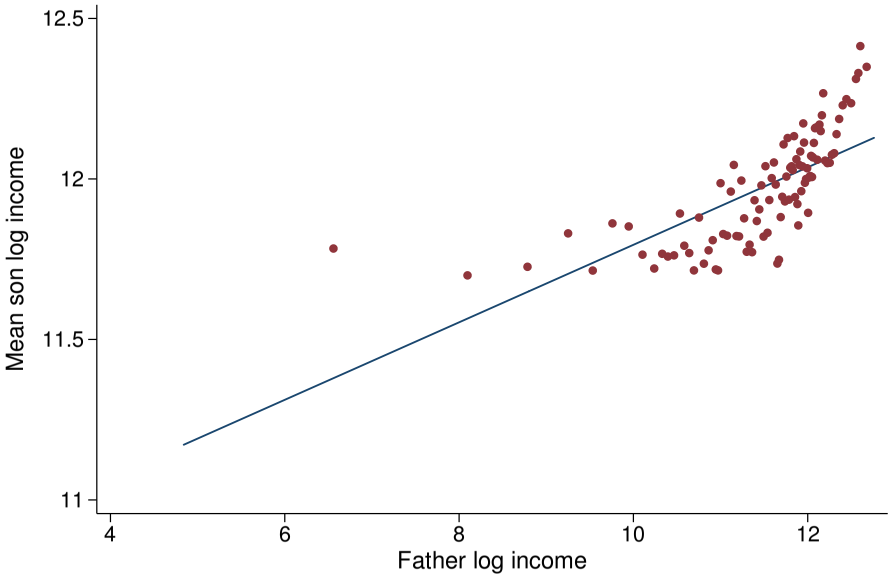
Child	Father quintile				
quintile	1	2	3	4	5
1	25.6%	21.5%	17.3%	15.1%	14.9%
2	22.9%	23.6%	22.5%	19.1%	12.8%
3	19.9%	20.7%	22.2%	22.0%	16.5%
4	17.6%	19.1%	20.7%	22.4%	21.7%
5	14.0%	15.1%	17.2%	21.4%	34.2%

(d) 1970–74

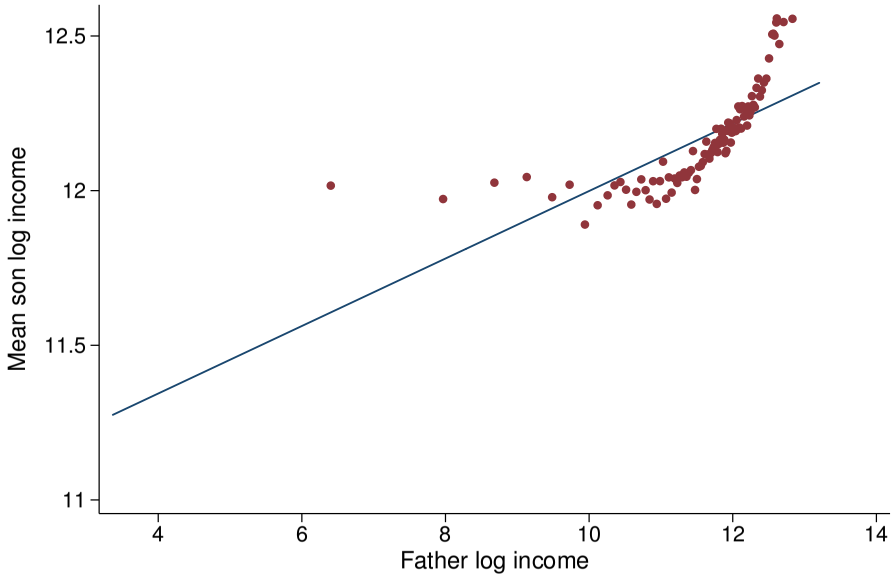
Child	Father quintile				
quintile	1	2	3	4	5
1	29.1%	21.1%	16.9%	15.9%	15.7%
2	22.4%	22.8%	22.1%	19.2%	13.7%
3	18.5%	20.9%	21.8%	21.6%	17.6%
4	16.5%	19.3%	21.0%	21.6%	22.0%
5	13.5%	16.0%	18.3%	21.8%	31.0%

Figure A1: Son's log income at 35 on father's log income at 55–64

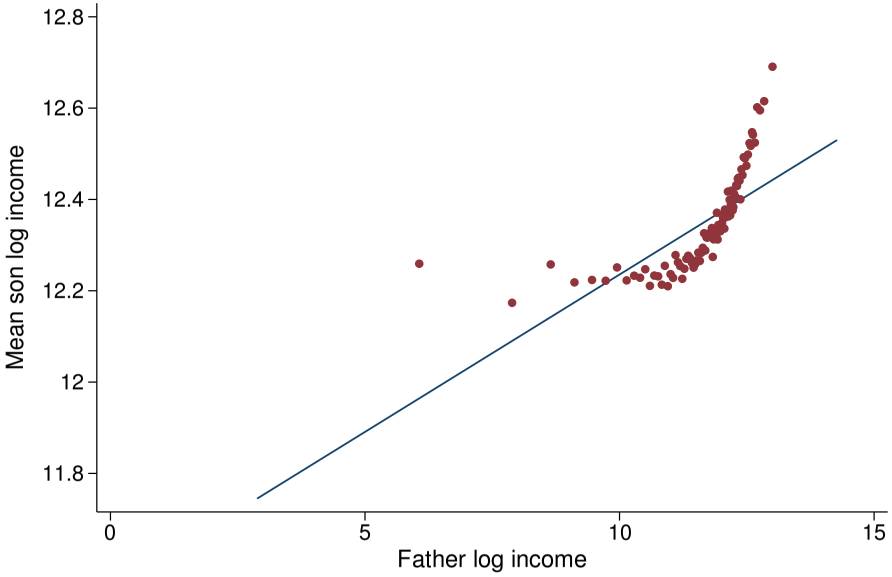
(a) 1932–33



(b) 1935–39



(c) 1940–44



(d) 1945–49

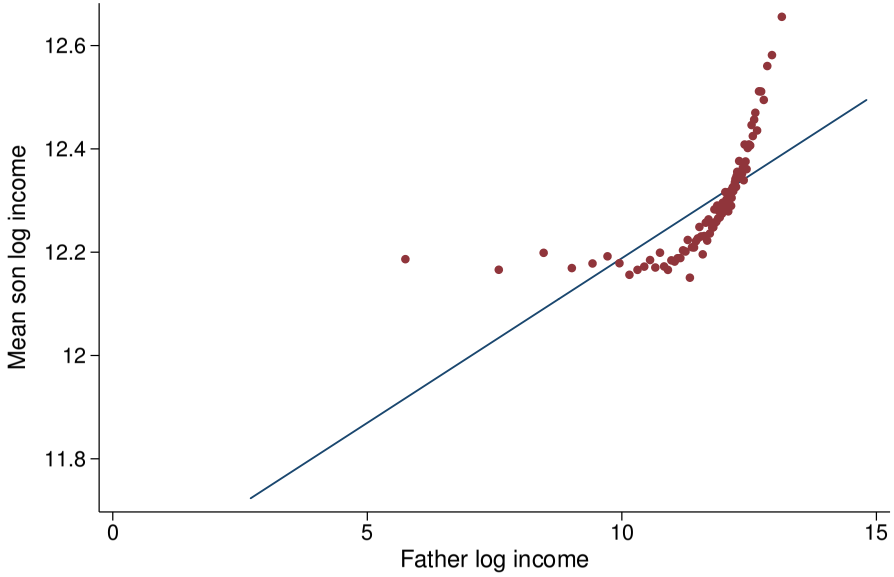
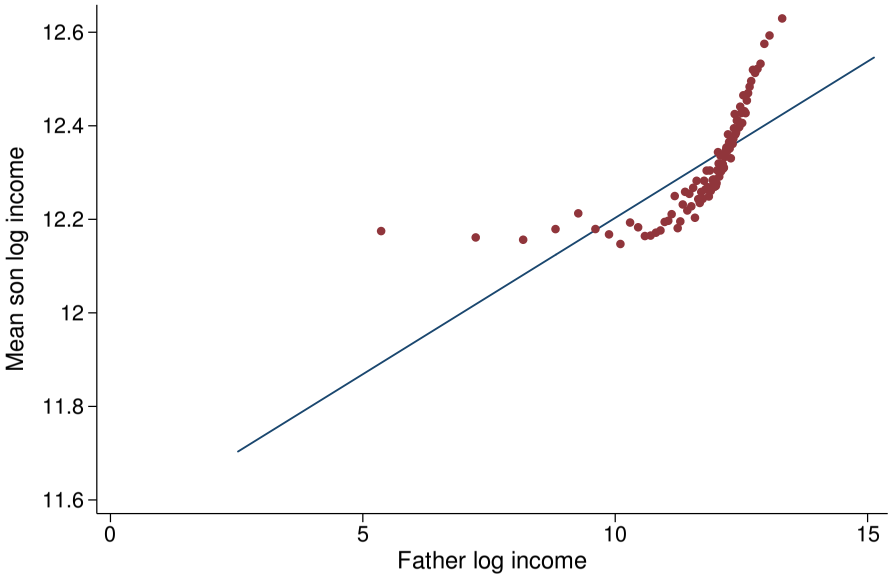
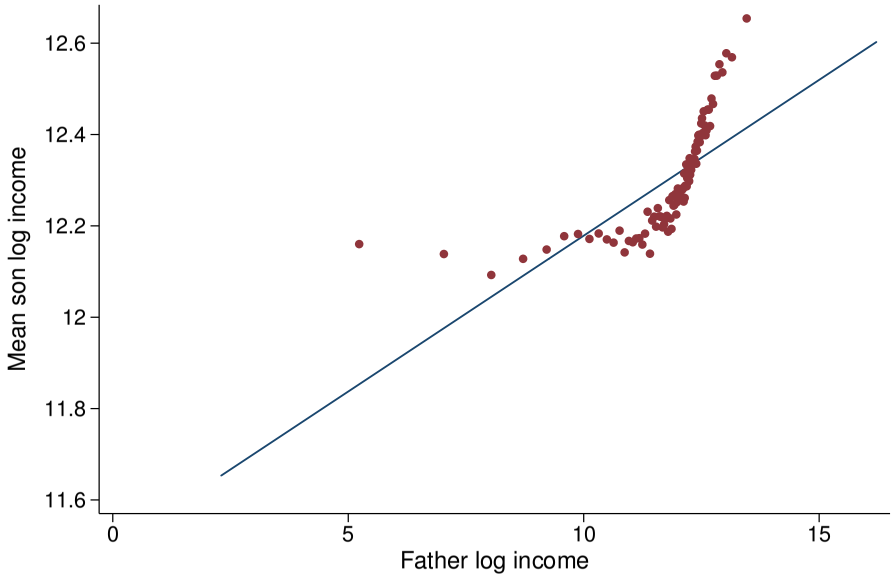


Figure A1: (cont') Son's log income at 35 on father's log income at 55–64

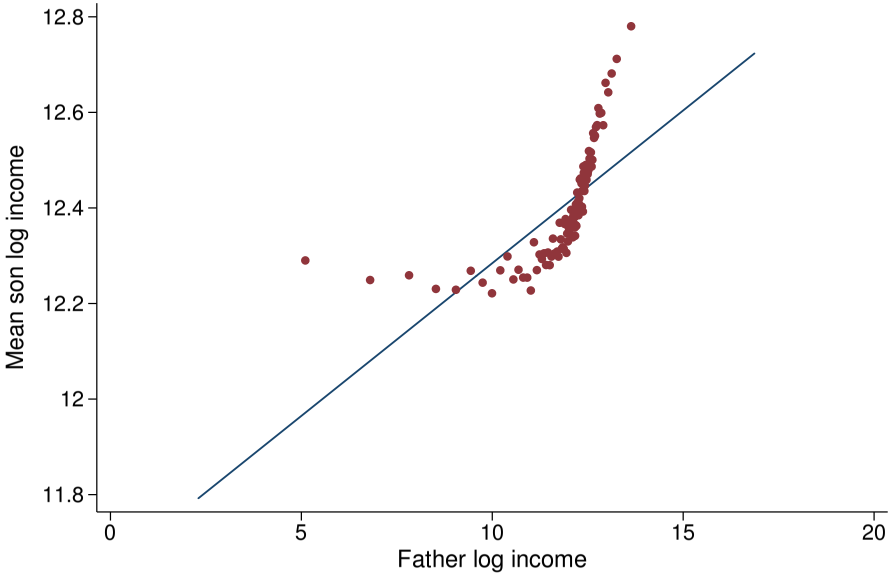
(e) 1950–54



(f) 1955–59



(g) 1960–64



(h) 1965–69

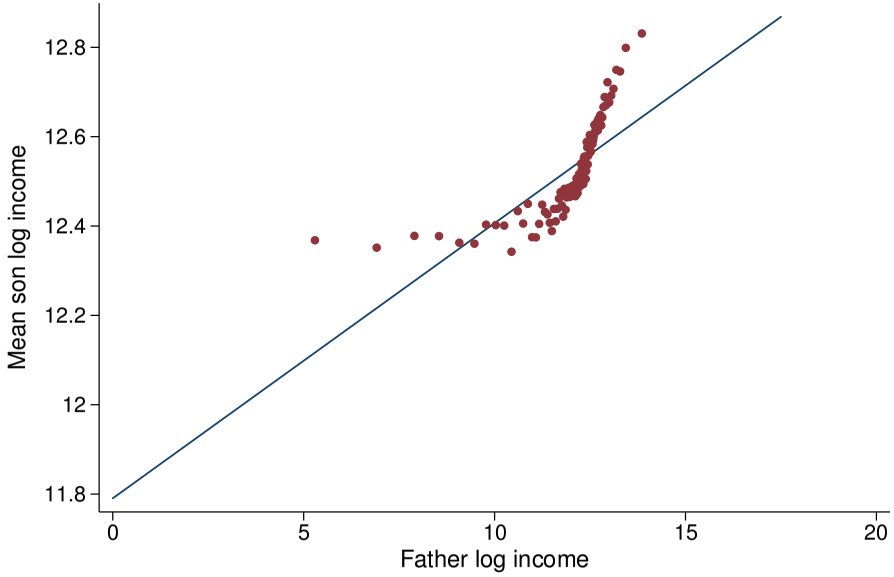


Figure A1: (cont') Son's log income at 35 on father's log income at 55–64

(i) 1970–74

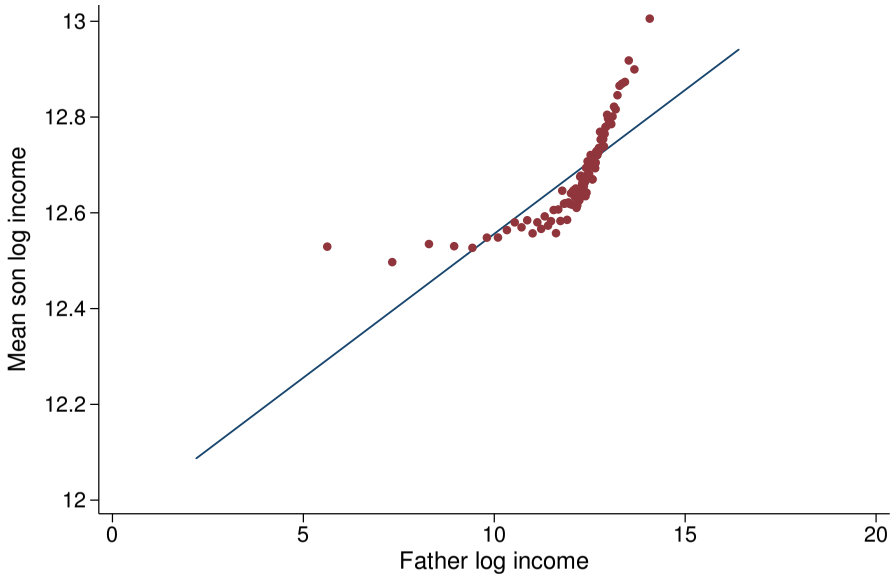
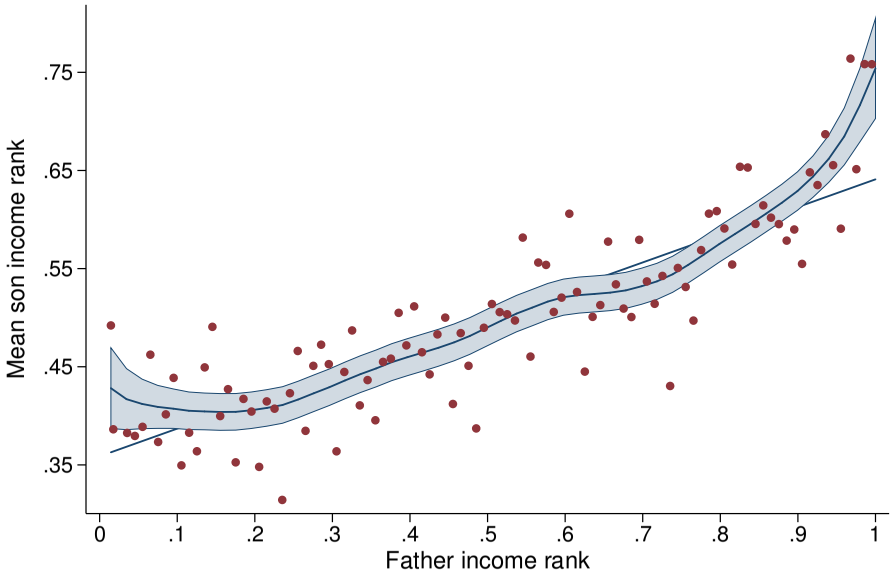
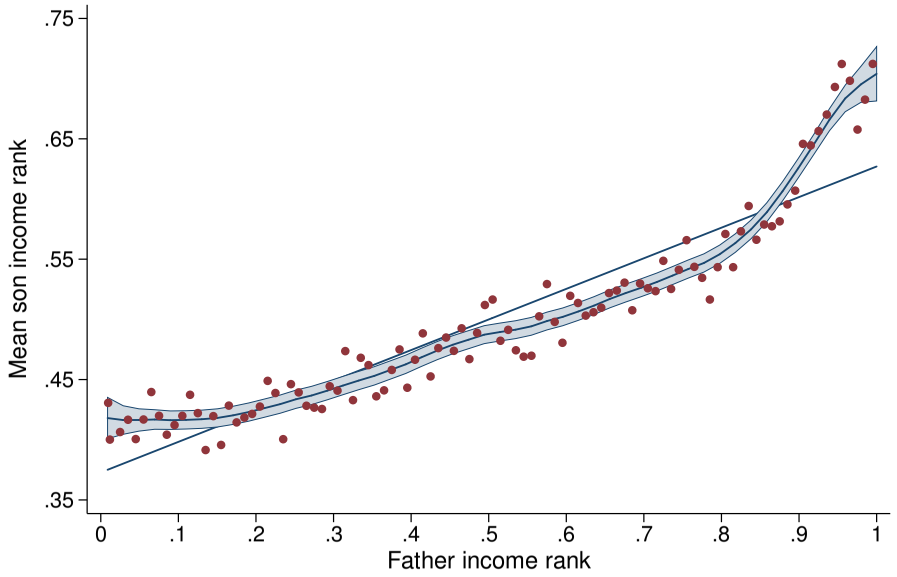


Figure A2: Son's income percentile at 35 on father's income percentile at 55–64

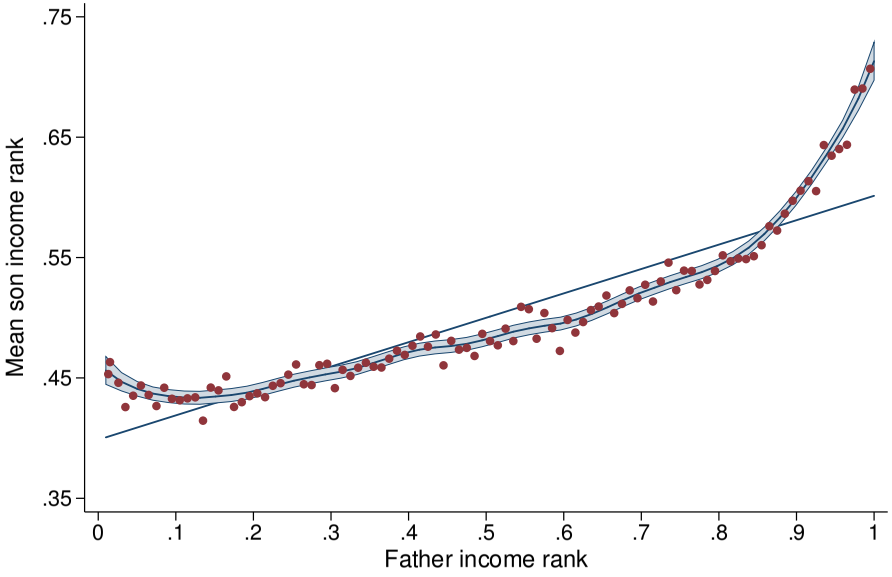
(a) 1932–33



(b) 1935–39



(c) 1940–44



(d) 1945–49

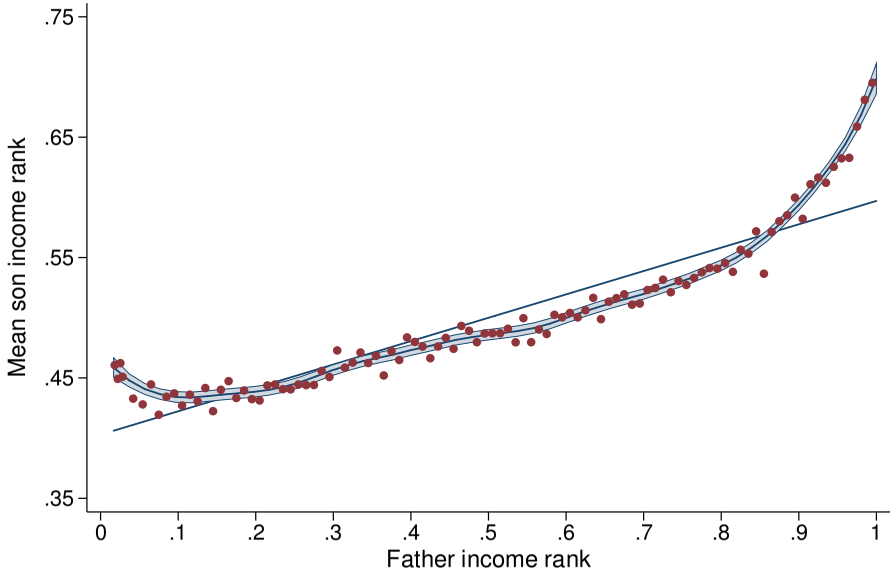
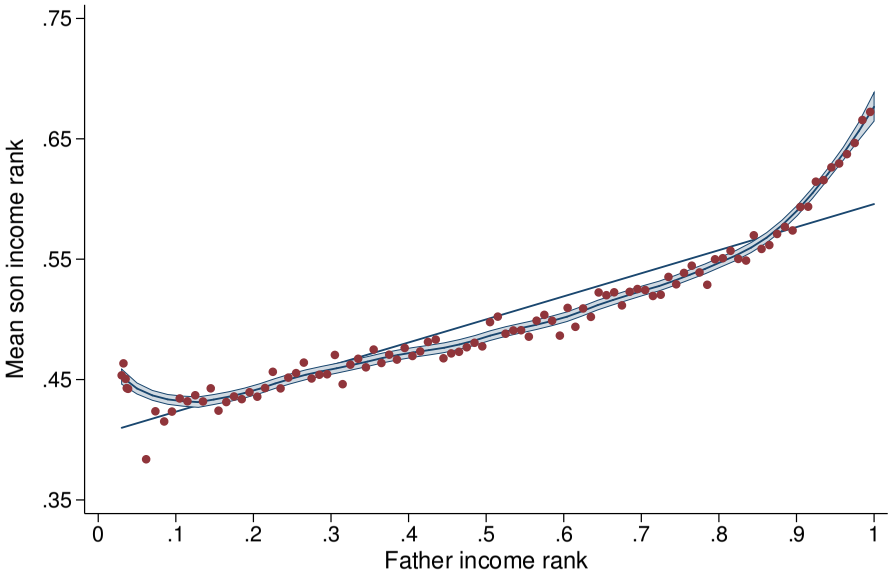
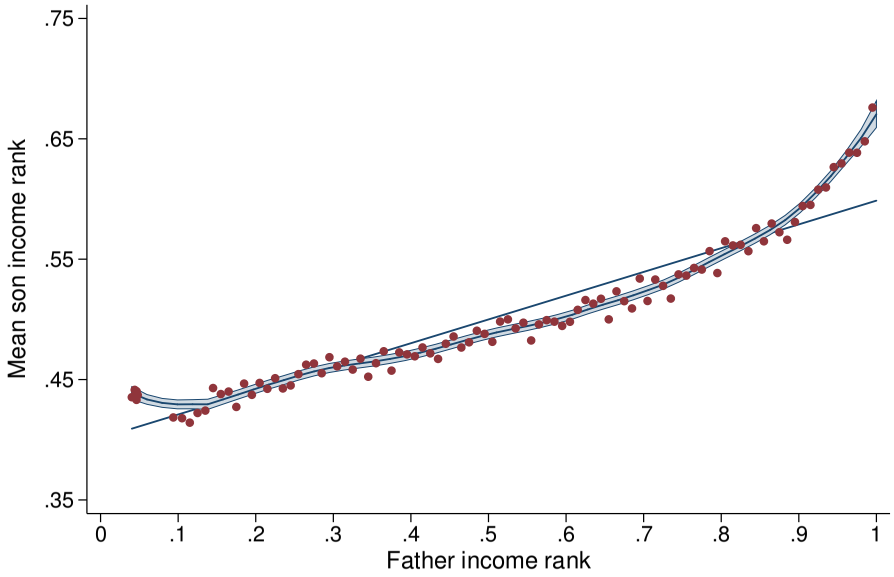


Figure A2: (cont') Son's income at 35 on father's income at 55–64

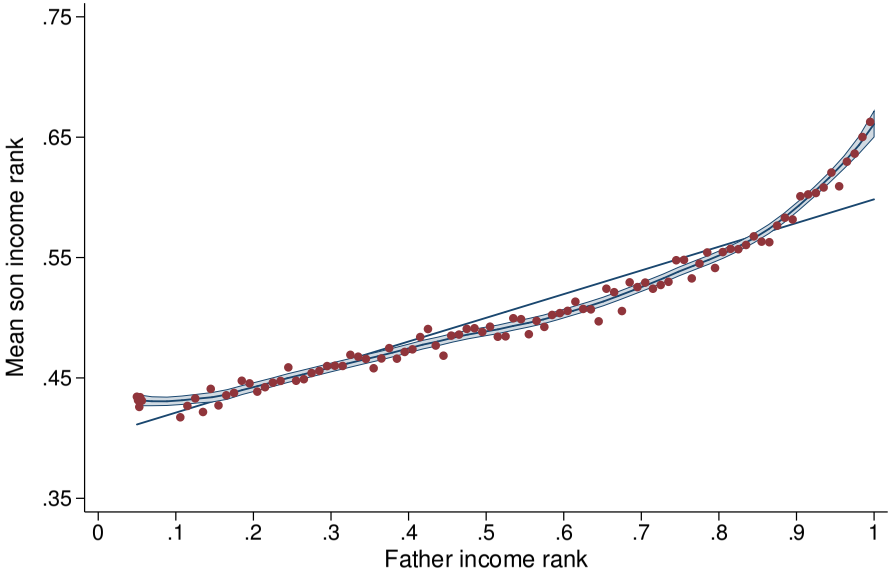
(e) 1950–54



(f) 1955–59



(g) 1960–64



(h) 1965–69

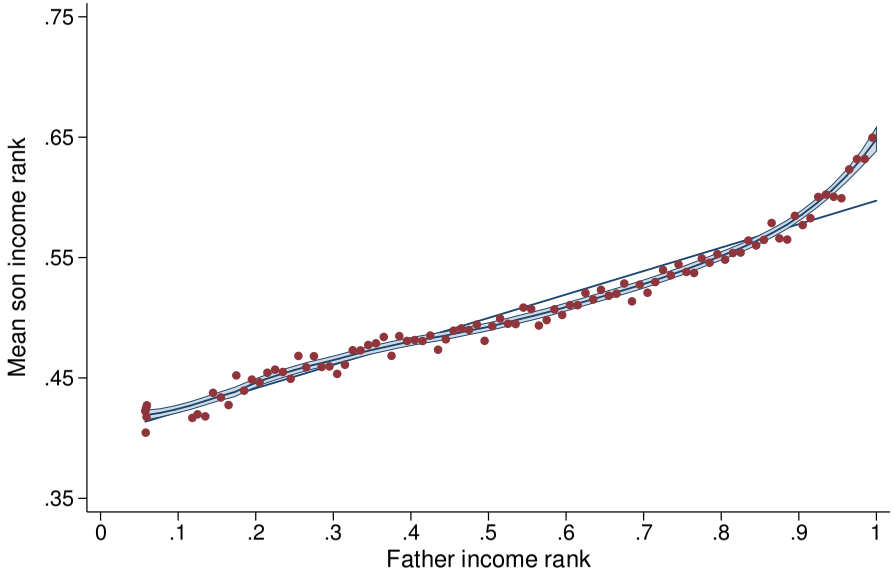


Figure A2: (cont') Son's income at 35 on father's income at 55–64

(i) 1970–74

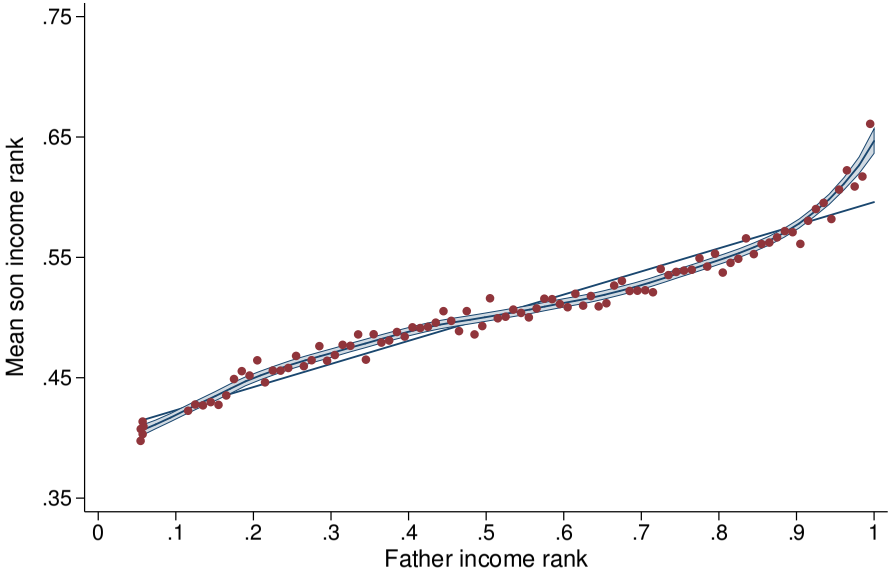
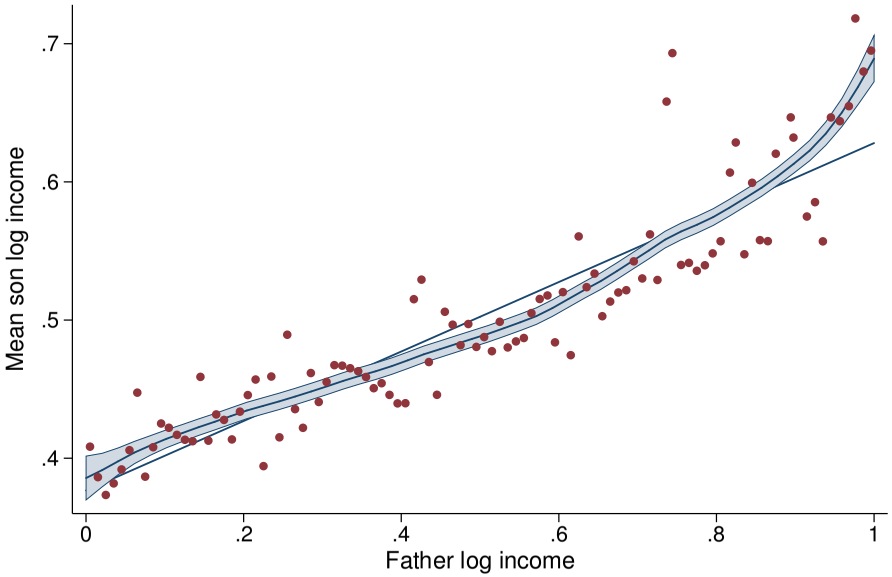
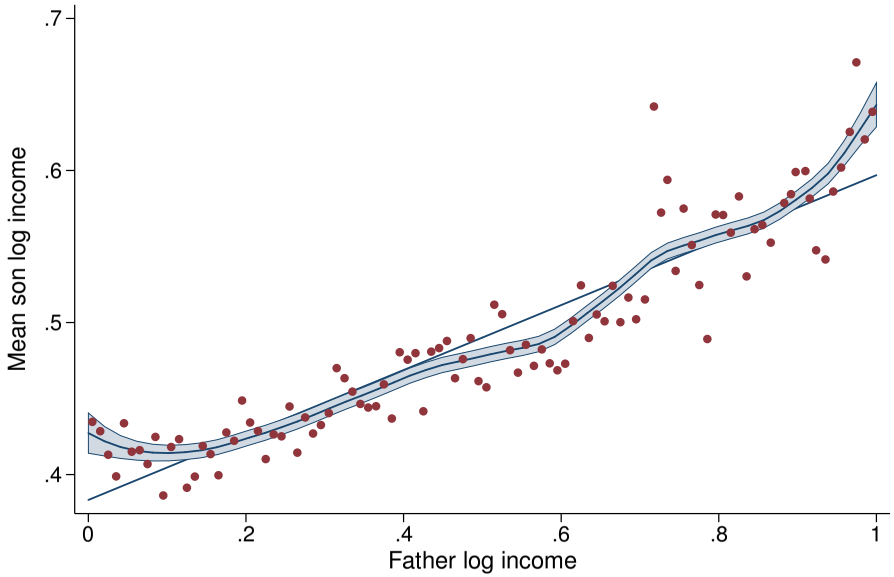


Figure A3: Son's income at 35 on father's imputed income

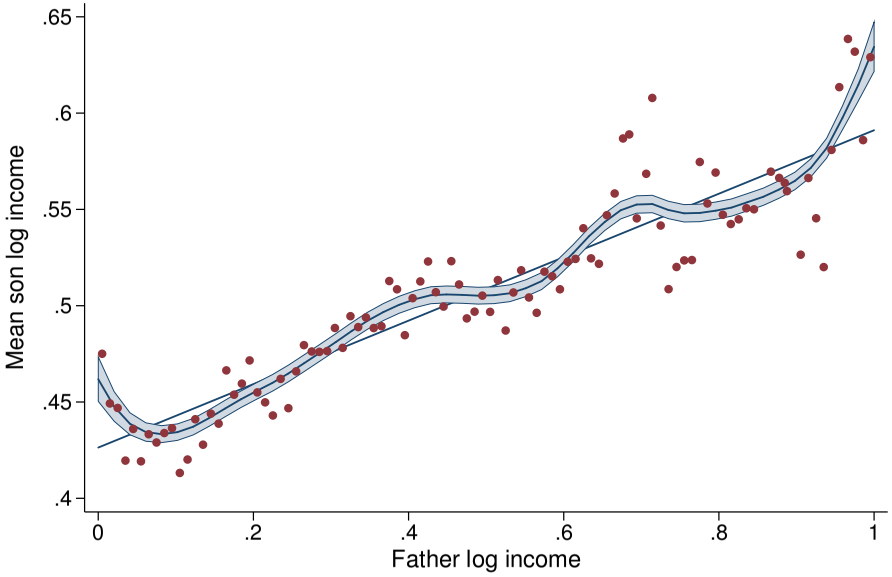
(a) 1932–33



(b) 1935–39



(c) 1940–44



(d) 1945–49

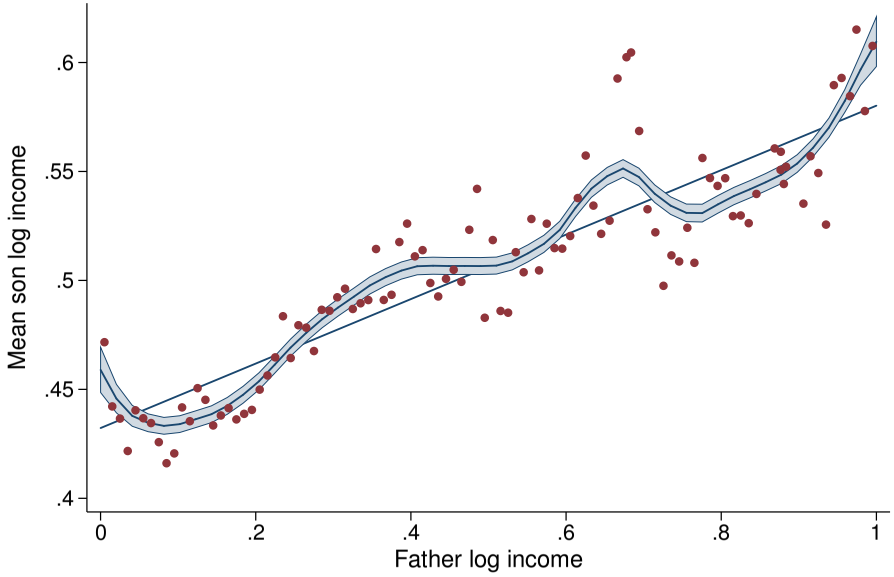
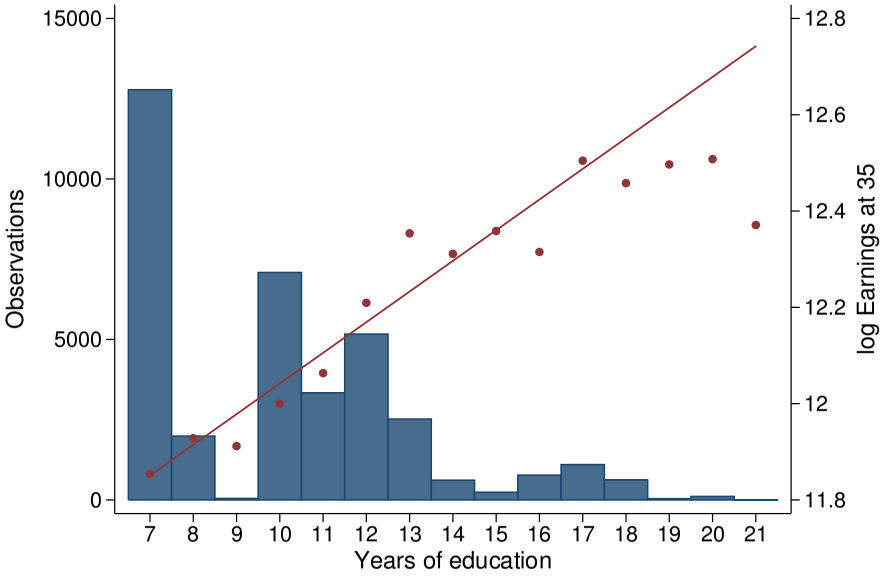
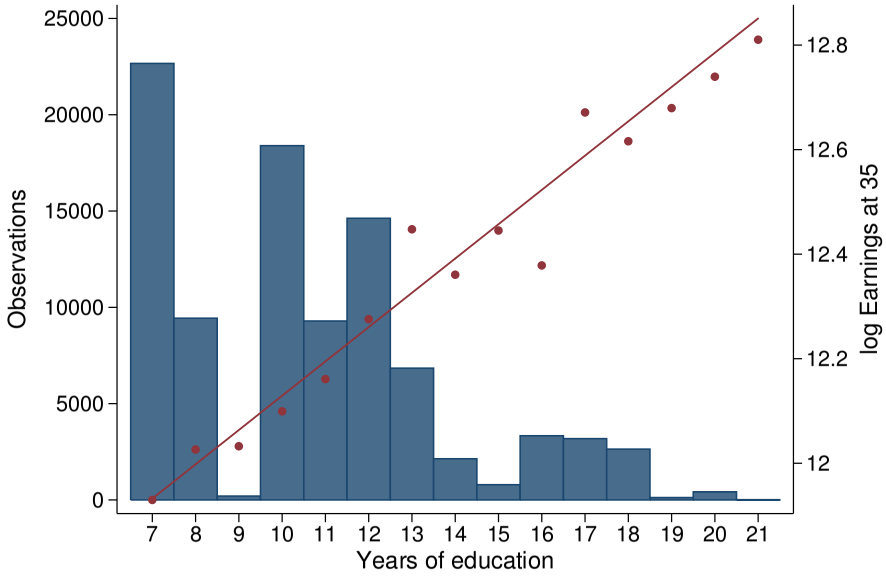


Figure A4: Log earnings and years of education

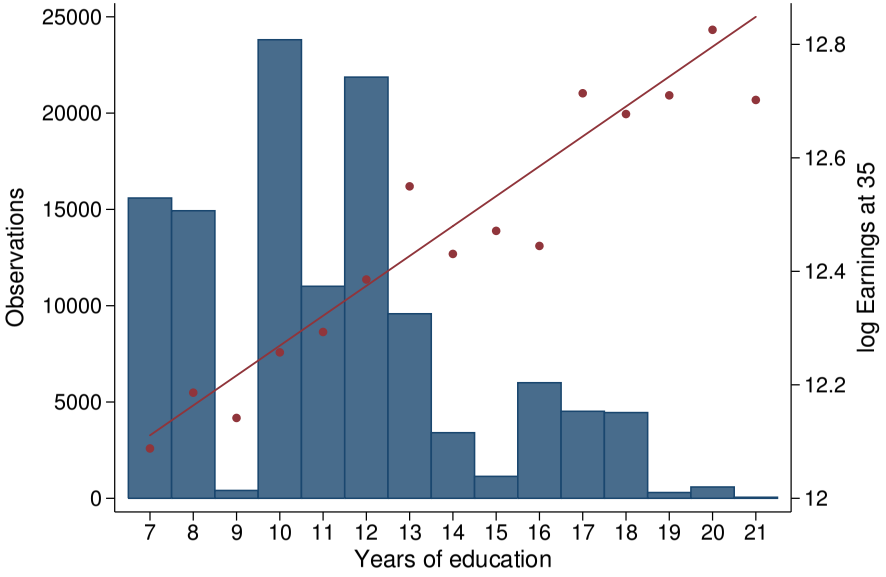
(a) 1932–33



(b) 1935–39



(c) 1940–44



(d) 1945–49

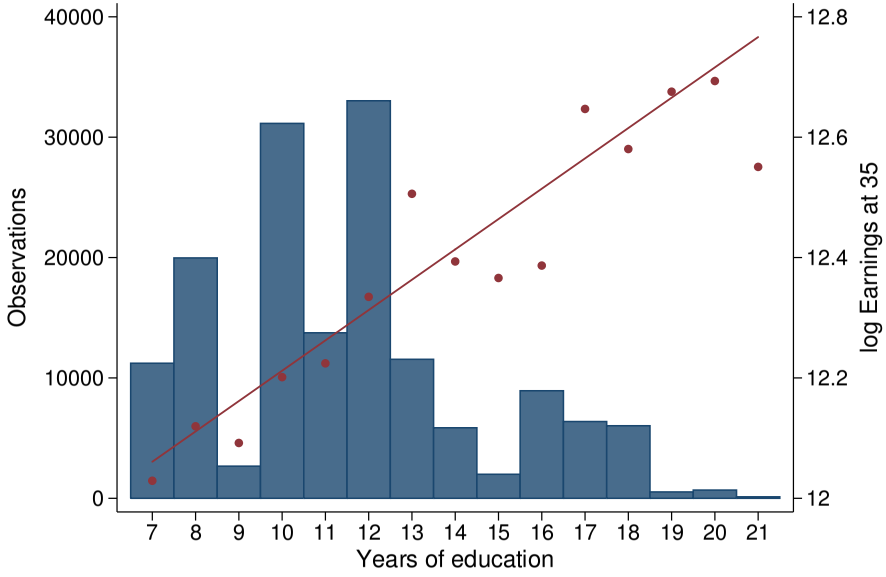
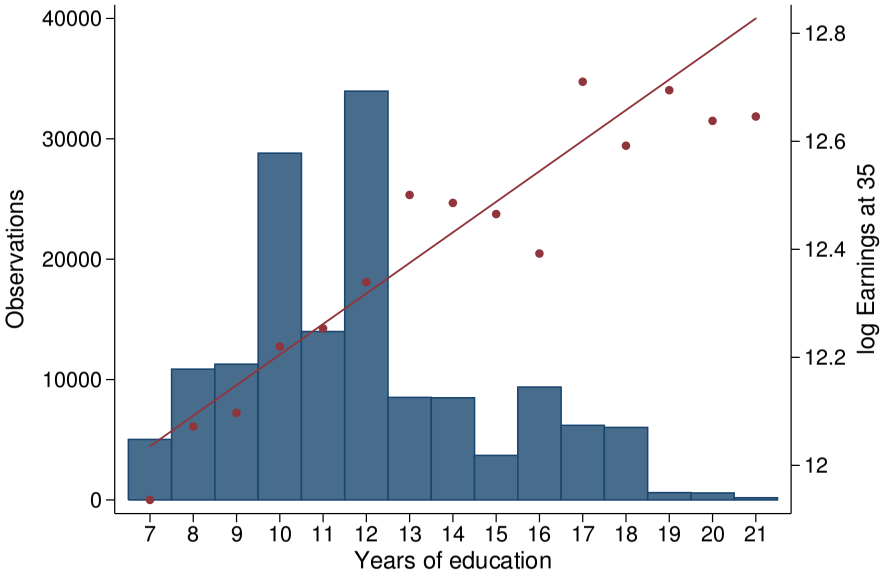
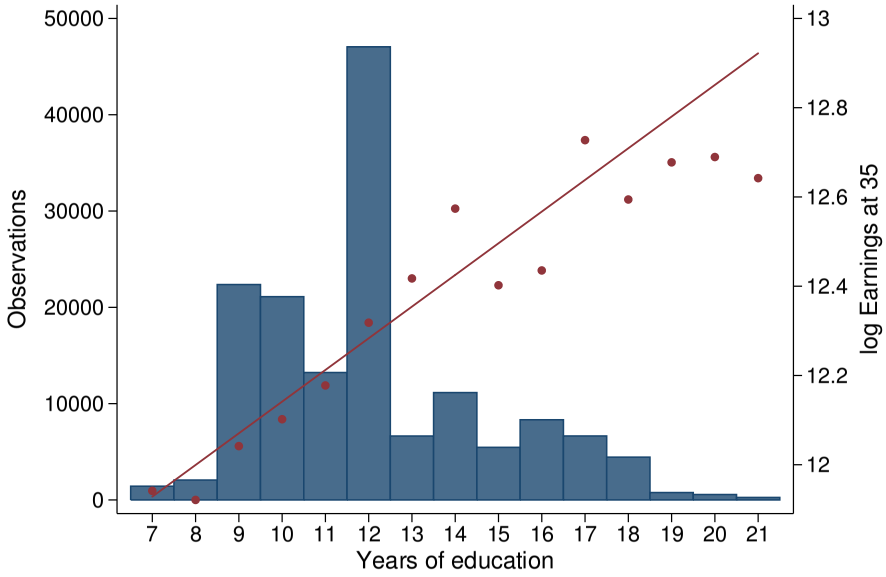


Figure A4: (con't) Log earnings and years of education

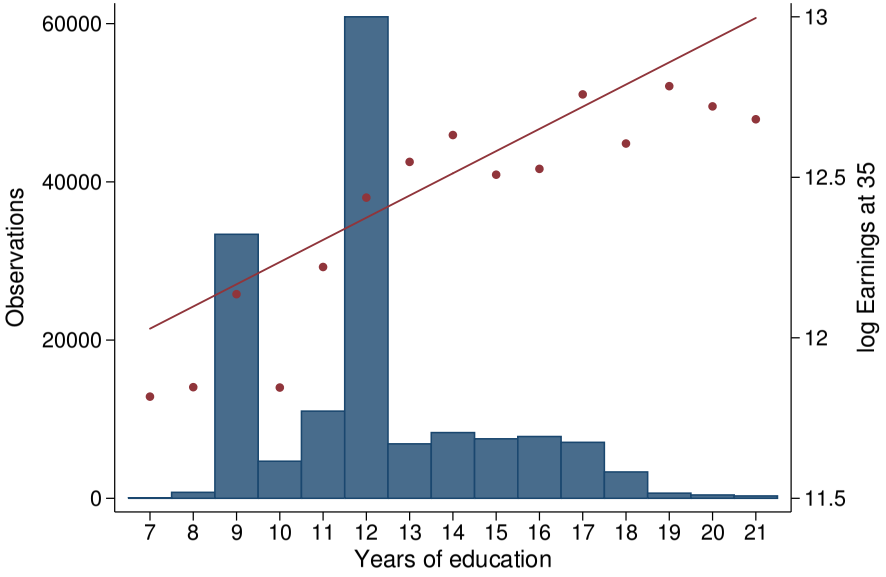
(e) 1950–54



(f) 1955–59



(g) 1960–64



(h) 1965–69

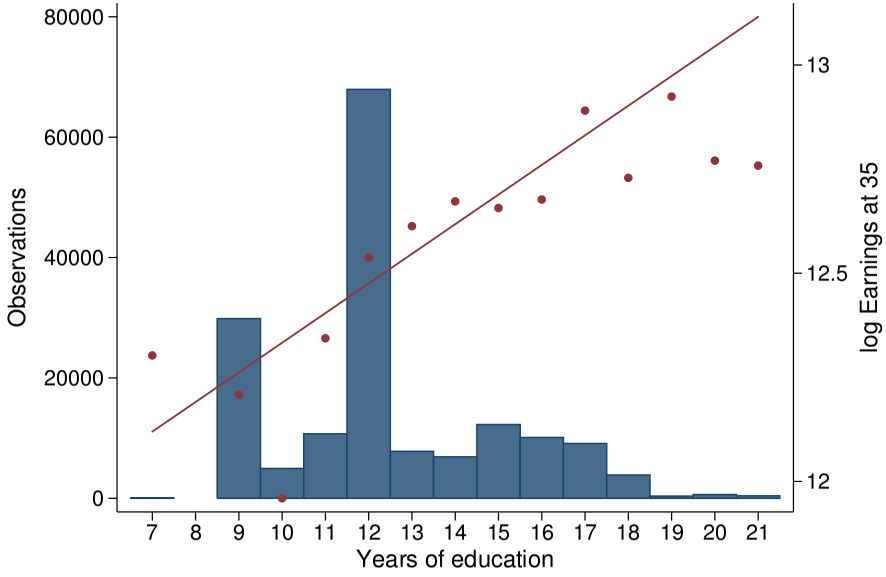


Figure A4: (cont') Log earnings and years of education

(i) 1970–74

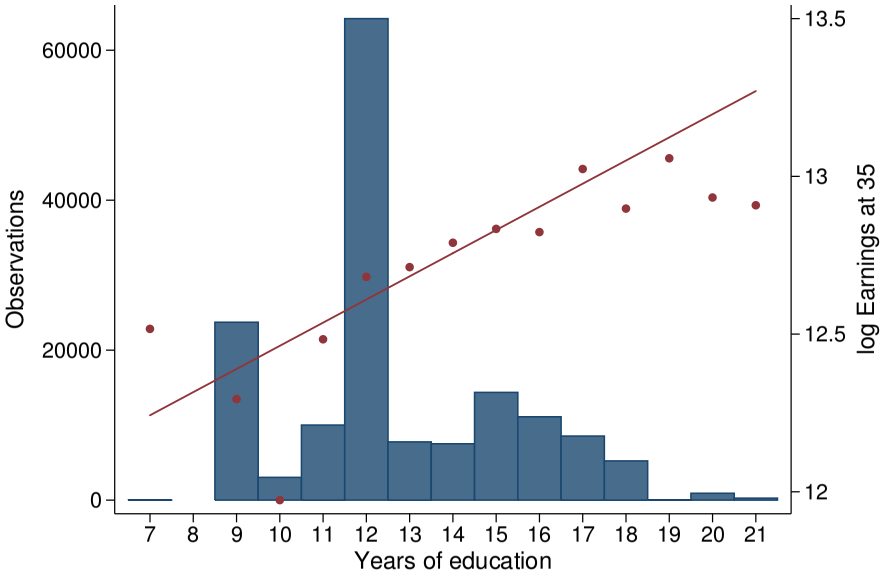
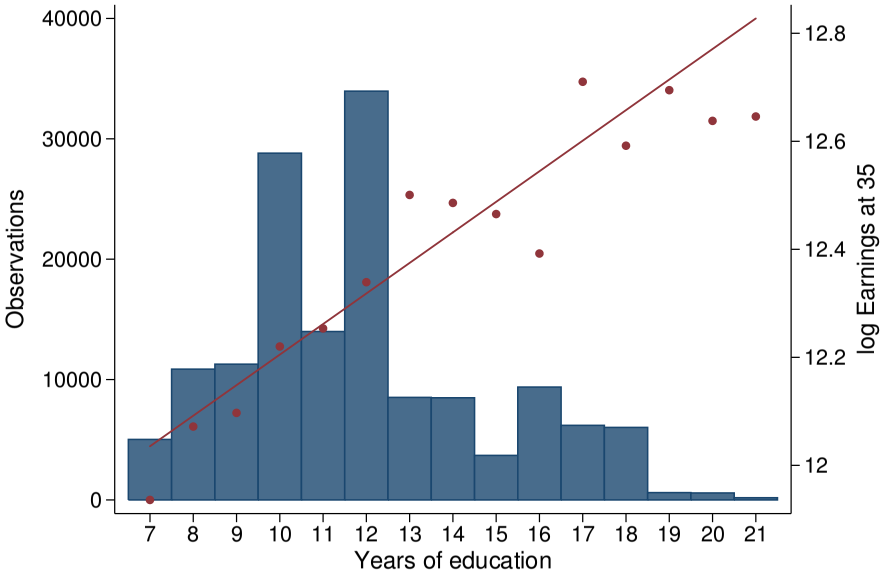
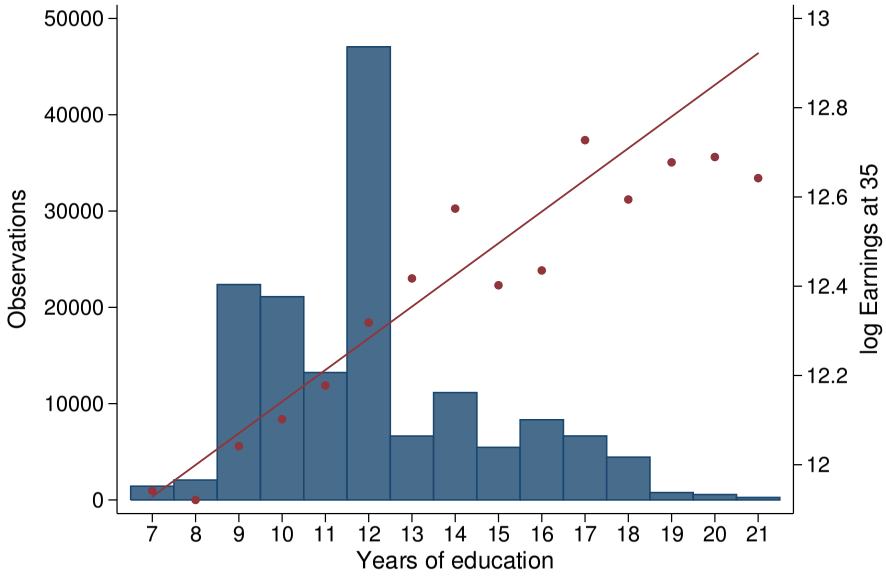


Figure A4: (con't) Log earnings and years of education

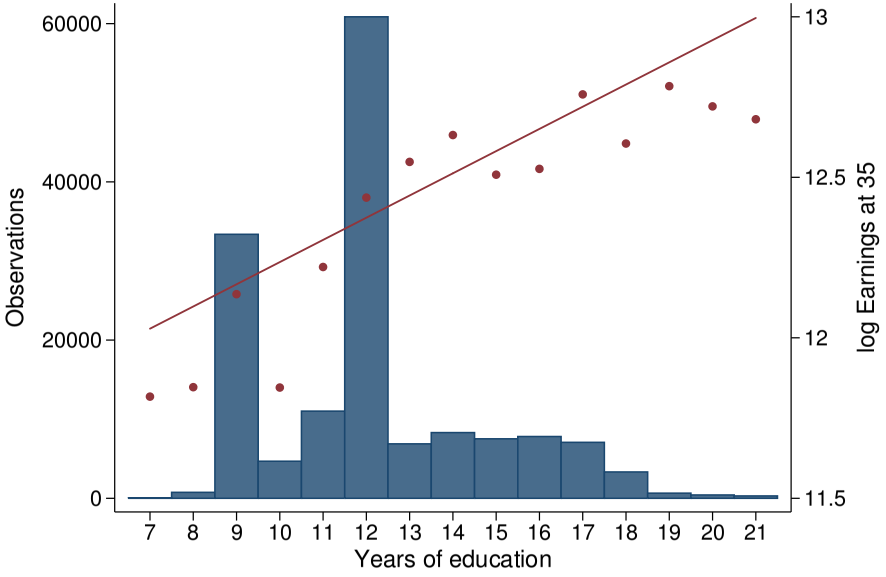
(e) 1950–54



(f) 1955–59



(g) 1960–64



(h) 1965–69

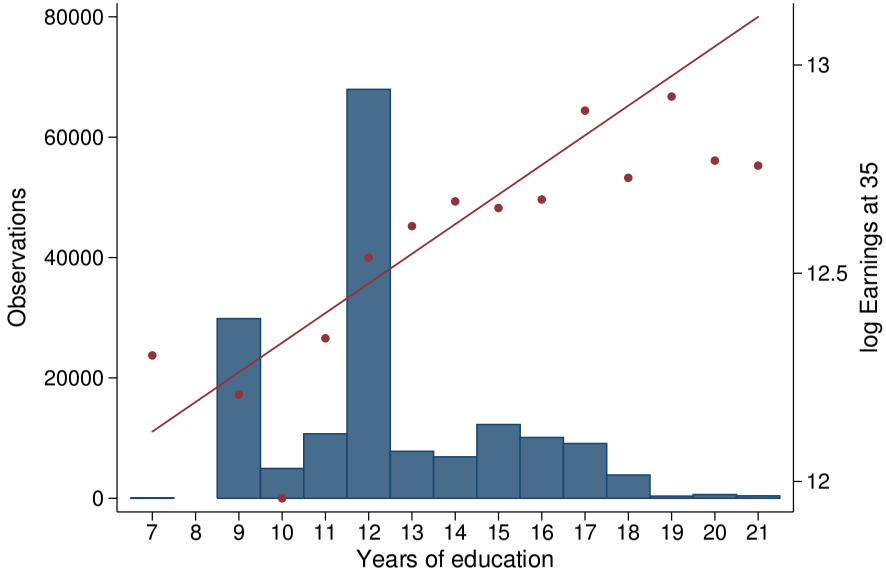


Figure A4: (cont') Log earnings and years of education

(i) 1970–74