Income Mobility

Markus Jäntti[1] Stephen P. Jenkins[2]

[1]Swedish Institute for Social Research, Stockholm University

[2]Department of Social Policy, London School of Economics

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Outline

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. . . the mobility literature does not provide a unified discourse of analysis. This might be because the very notion of income mobility is not well-defined; different studies concentrate on different aspects of this multi-faceted concept. At any rate, it seems safe to say that a considerable degree of confusion confronts a newcomer to the field (Fields and Ok, 1999b, p. 557).

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- sometimes, study of a single (longitudinal) population can be informative...
- but as a rule, mobility is about *comparing* two populations A and B (two countries, two different periods, etc)

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  - relationship to equality of opportunity

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  - rank reversal ($a_{jk} > 0 \quad j = K, \ldots, 1, k = 1, \ldots, K$; all entries in transition matrix on the anti-diagonal)

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- measures: directional growth (gains vs. losses) as opposed to non-directional growth

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- inequality reduction from longitudinal averaging now re-interpreted as a measure of income risk (and has different normative implications

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- income risk: mobility bad

The social desirability of mobility as income risk

the presumption that individuals are indifferent between two income streams offering the same real present value. This might be true if capital markets were perfect (or if there was perfect substitutability of income between periods), but it seems likely that individuals are concerned with both the average rate of income receipts and the pattern of receipts over time. We may go further and suggest that individuals tend to prefer a constant income stream, or one which is growing steadily, to one which continually fluctuates (Shorrocks, 1978a, p. 392).

The social desirability of mobility as income risk

define for each individual a ‘constant income flow rate generating receipts which gives the same level of welfare as the income stream he currently faces’

> *[r]eplacing actual recorded incomes with this alternative income concept in the computation of inequality values introduces a new dimension into the discussion of mobility. No longer is mobility necessarily desirable. Changes in relative incomes still tend over time to equalise the distribution of total income receipts, and to this extent welfare is improved. But greater variability of incomes about the same average level is disliked by individuals who prefer a stable flow. So to the extent that mobility leads to more pronounced fluctuations and more uncertainty, it is not regarded as socially desirable. A more detailed examination of these two facets of mobility will provide a better understanding of the impact of income variability and the implications for social welfare (Shorrocks, 1978a, pp. 392–393).*

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- in two-period case, the utility-of-income function is $U(x, y)$, and weighted by the joint probability density $f(x, y)$:

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- increases in income in either period assumed desirable (so positive income growth raises utility): $U_1 \geq 0$ and $U_2 \geq 0$.

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- if $U(x, y)$ is a concave transformation of the sum of the per-period utilities, then $U_{12} < 0$

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- when $\rho = 0$ and perfect substitution of income between periods, one is only interested in the reduction of multi-period inequality

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  - poverty persistence

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- focus identical **x** and **y**, and $U()$ satisfies $U_1 \geq 0$, $U_2 \geq 0$, and $U_{12} < 0$
- a necessary and sufficient condition for $\Delta W \geq 0$ is that $\Delta F(x,y) \leq 0$ for all x and y (differences in the cumulative bivariate distribution are lower at each point – a first-order stochastic dominance condition)

Mobility dominance

- an example that would generate a welfare improvement is a 'correlation-reducing transformation' which leaves the marginal distributions unchanged but reduces the correlation between x and y (for $\eta, h, k > 0$):

$$\left\{\begin{array}{cc} x & x+h \\ y & \text{density reduced by } \eta \quad \text{density increased by } \eta \\ y+k & \text{density increased by } \eta \quad \text{density reduced by } \eta \end{array}\right\}$$

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- mobility dominance powerful in theory but not used much in practice – results apply to simplified situations (identical margins, homothetic preferences, positional mobility)
- Dardanoni (1993) provides an alternative approach to dominance (stochastic dominance results for mobility processes summarised by transition matrices with the same steady-state income distribution)

Mobility indices

- measures of bivariate association (intuitive indices)

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  - directionality
  - decomposability (by subgroup; structual/exchange; subperiod; change progressivity)

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- D'Agostino and Dardanoni (2009) provide an axiomatic characterisation of the Spearman rank correlation as an measure of exchange mobility

Immobility ratios and related measures

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- related: the normalized trace (and many, many other matrix-based indices)

Other measures

- income growth: for example, Fields and Ok (1999a)

$$D1 = c[\frac{1}{N}\sum_{i=1}^{N}(\log(y_i) - \log(x_i))] \tag{3}$$

(c is a normalizing constant; N is the population size)

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- income flux (e.g. Fields and Ok, 1996): per capita measure of absolute measure of absolute income movement is:

Measurement – examples

- ▸ Go to US transition matrices

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Outline

Intra-generational mobility: evidence

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Data and issues of empirical implementation

Three ‘W’ issues + comparability

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- and When (e.g., how long is the income measurement period, and how distant are period 1 and 2)
- comparisons across populations (trends over time or across countries) add the issue of comparability

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Inter-generational mobility – evidence

- the evidence on Betas *extremely* sensitive to obscure details of specifications: US estimates reported in a single table by Mazumder (2005a) encompass the majority of the estimates reported in Figure **??**, excluding only Peru at the top end and Canada, Finland, Norway and Denmark at the low end

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- intra-generational mobility: more evidence (with measures tied to concepts) across more countries and periods needed
- intergenerational mobility: more evidence based on positional movement, for both men and women, and for more inclusive income concepts; more sibling correlation estimates

Outline

Decile transition matrices: USA, (a) 1979–1988

Note: Income refers to equivalized real annual family disposable income, distributed among all individuals (adults and children). The decile groups are ordered from poorest (1) to richest (10). Source: Hungerford (2011, Tables 2 and 3), based on PSID data.

▸ Go back to mobility measurement

	Destination									
Origin	1	2	3	4	5	6	7	8	9	10
1979					**1988**					
1	44.3	18.3	12.4	9.2	7.1	3.0	1.8	2.0	0.7	1.3
2	18.1	25.3	21.0	11.7	7.5	5.4	4.7	3.2	1.9	1.1
3	10.6	18.2	15.3	16.8	11.6	9.0	8.8	4.9	3.1	1.7
4	7.2	8.9	14.0	14.0	14.7	15.7	12.0	5.6	6.0	2.1
5	6.1	9.2	10.9	12.8	13.3	16.9	12.3	7.5	7.7	3.4
6	4.1	5.2	8.8	10.3	11.8	10.0	14.2	16.9	12.6	6.2
7	3.5	6.5	6.9	8.6	10.4	13.4	13.3	16.8	13.4	7.2
8	3.1	4.6	3.2	7.7	12.3	9.5	12.6	15.7	17.7	13.6
9	1.2	2.2	4.8	6.3	6.9	10.2	12.2	14.7	18.0	23.5
10	2.1	1.5	2.8	2.5	4.2	7.0	8.5	12.8	18.6	40.0

Decile transition matrices: USA, (b) 1989–1998

Note: Income refers to equivalized real annual family disposable income, distributed among all individuals (adults and children). The decile groups are ordered from poorest (1) to richest (10). Source: Hungerford (2011, Tables 2 and 3), based on PSID data.

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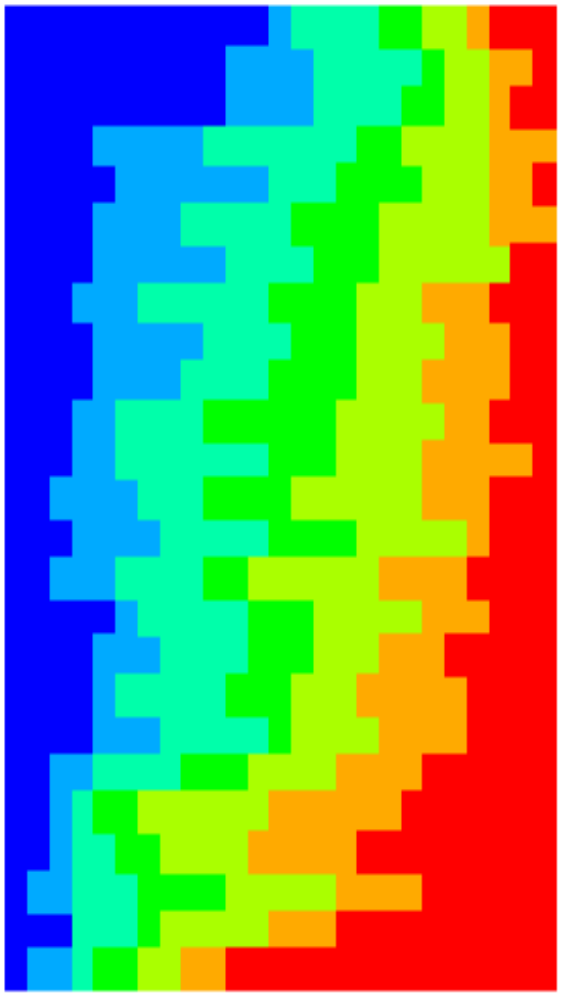
	Destination									
Origin	1	2	3	4	5	6	7	8	9	10
1989					**1998**					
1	41.9	21.6	13.7	7.0	4.6	3.7	2.7	2.2	1.9	0.7
2	20.4	22.5	15.4	11.6	11.0	8.1	4.0	4.0	1.7	1.2
3	12.5	20.8	17.1	16.4	10.9	10.3	5.2	3.2	1.7	1.9
4	6.9	11.6	15.5	16.9	14.5	11.4	10.1	7.7	2.3	3.1
5	4.8	6.2	12.2	13.8	16.0	14.2	12.4	7.1	7.5	5.8
6	3.2	3.7	9.1	11.6	16.0	14.4	15.7	11.7	7.7	6.9
7	3.2	4.5	7.6	9.3	8.7	12.2	16.3	15.6	16.8	5.8
8	3.0	4.7	5.2	5.4	7.9	12.1	17.2	17.0	19.3	8.3
9	2.5	3.1	4.0	4.9	7.5	7.1	10.7	18.2	21.8	20.3
10	1.7	1.0	0.4	3.2	3.0	6.3	6.0	13.1	19.3	46.1

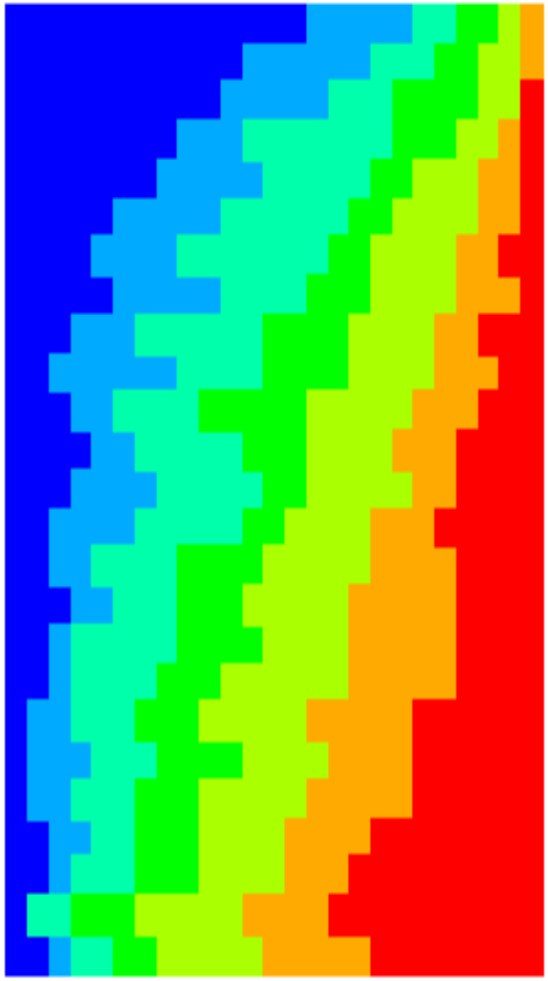
Transition colour plot examples

Source: Van Kerm (2011). ▸ Go back to mobility measurement

Western Germany
1985–1997



United States
1985–1997



Scatterplot example

Source: Jenkins (2011, Figure 1.2). ▸ Go back to mobility measurement

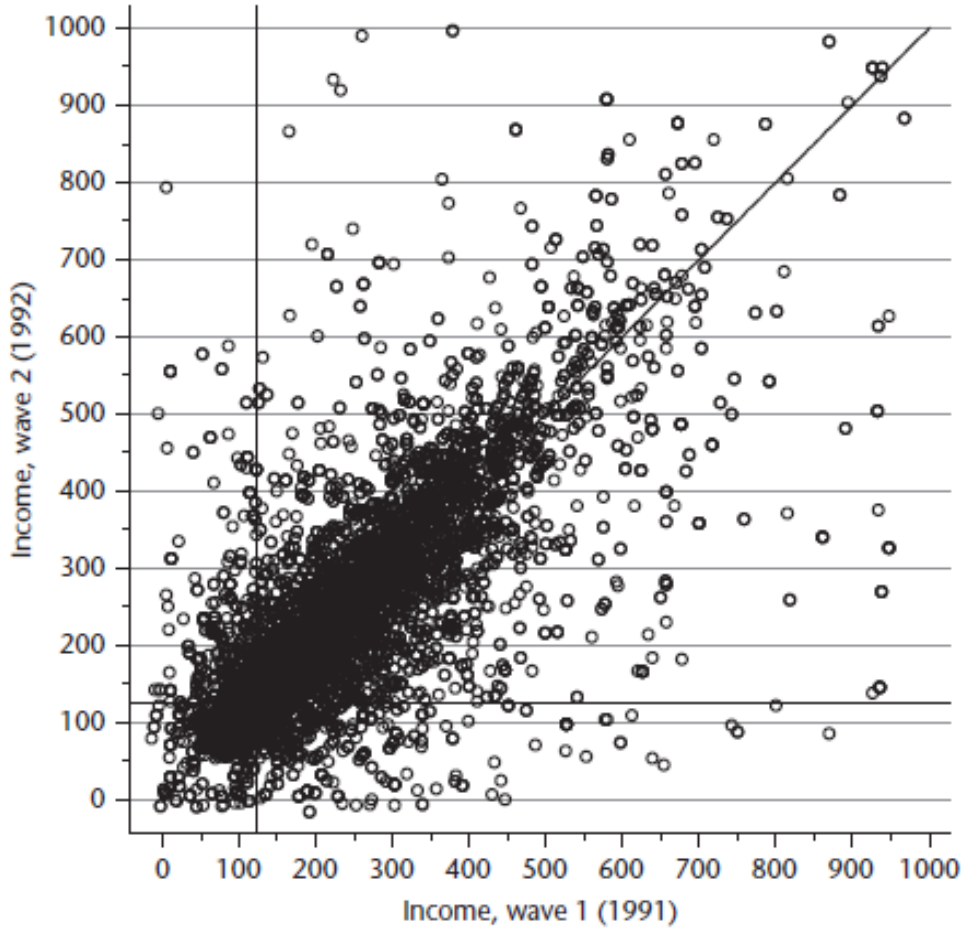


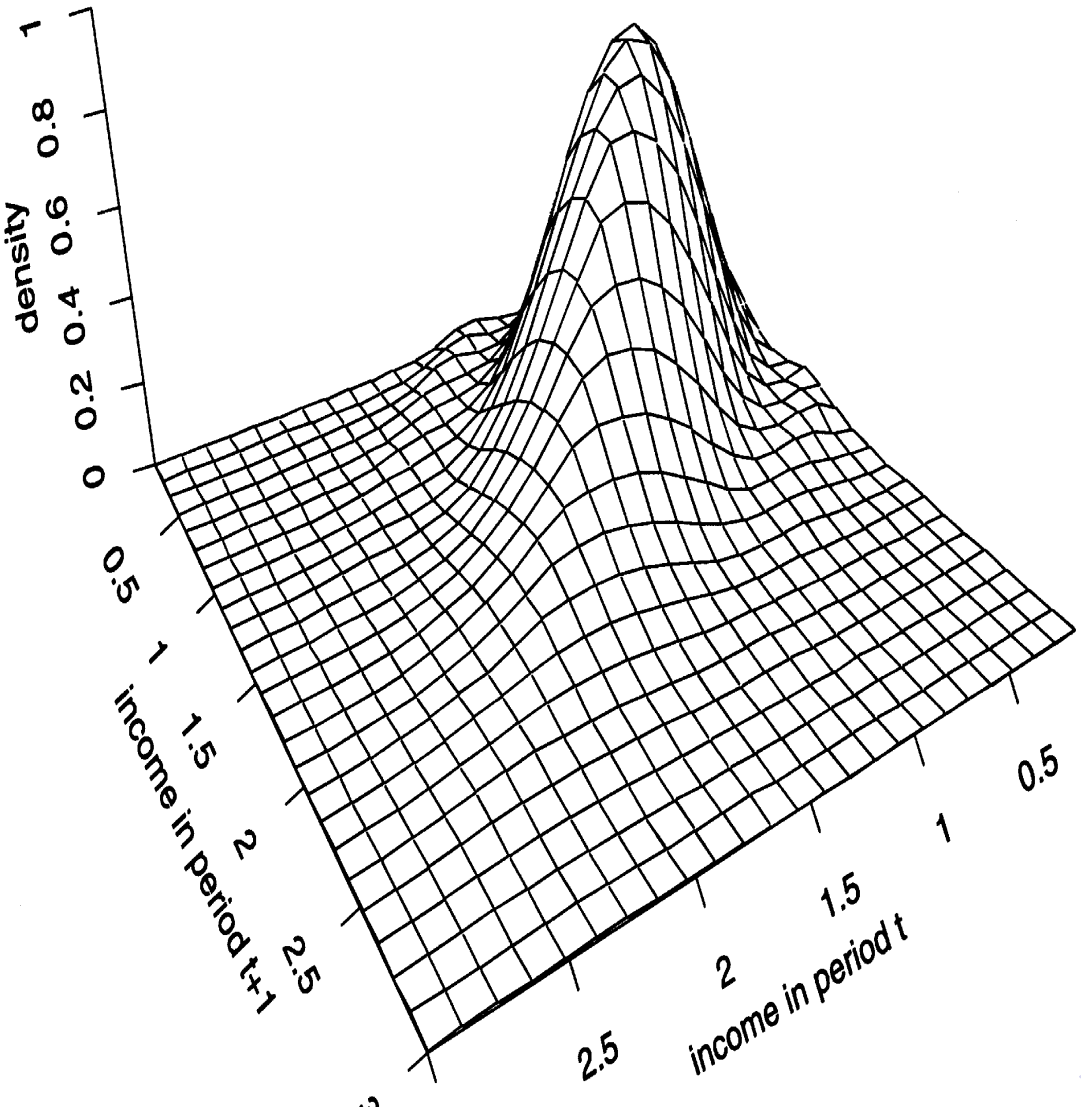
Figure 1.2. Scatter plot of 1991 and 1992 incomes

Notes: Sample of individuals (adults and children) present at BHPS waves 1 (1991) and 2 (1992) with incomes less than £1,000 per week. Each circle represents the incomes for the two years for each individual. The definition of income is given in the text (the adjustment for differences in household size and composition uses the Modified OECD equivalence scale). Incomes are expressed in pounds per week (January 2008 prices). The dark horizontal and vertical lines correspond to an income equal to 60% of contemporary median income (£123 per week for wave 1; £126 per week for wave 2).

Bivariate density plot example

Note: the charts shows a ‘typical’ kernel density estimate for incomes in two consecutive periods.Source: Schluter (1998, Figure 1).

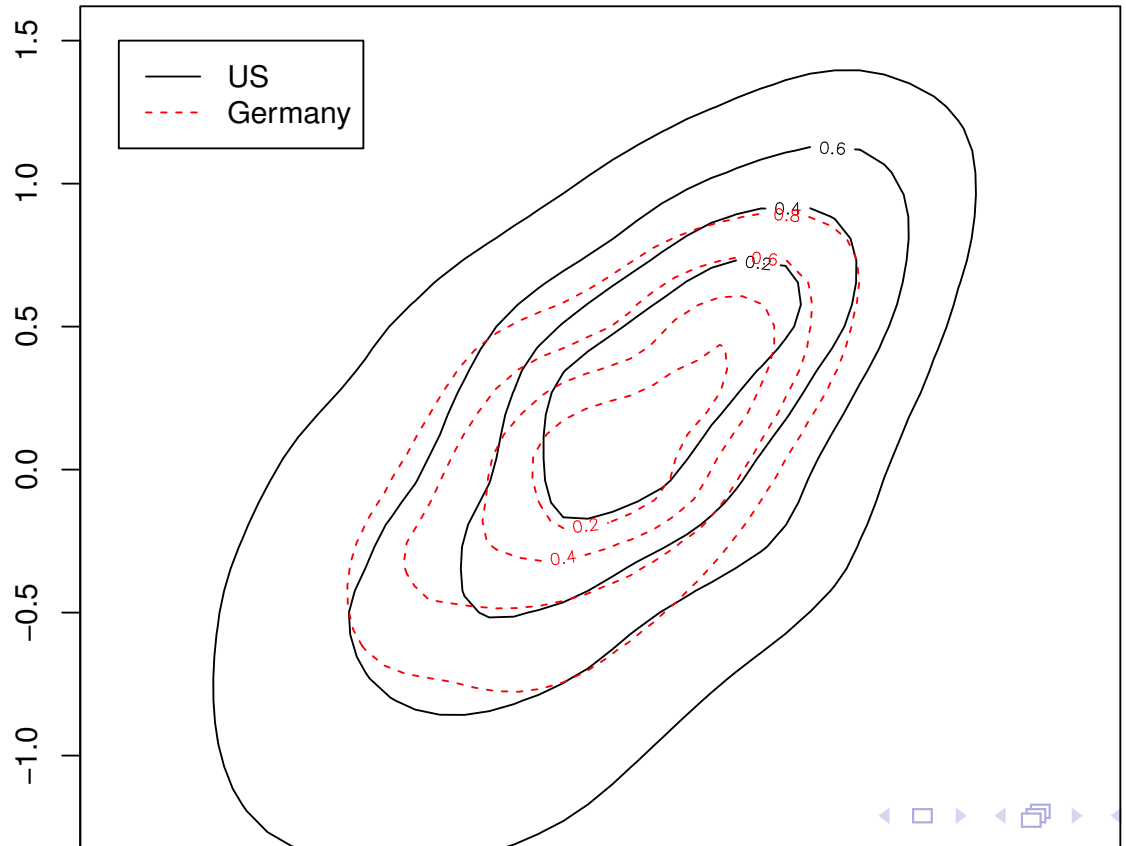
▸ Go back to mobility measurement



Contour plot example

Note: the chart shows the kernel-smoothed joint density of income in 1984 and 1993 for the USA and West Germany, where income is post-tax post-transfer family income equivalised by the PSID equivalence scale, and income for each year is expressed as a deviation from the year-specific mean. Source: Gottschalk and Spolaore (2002, Figure 1), redrawn by the authors.

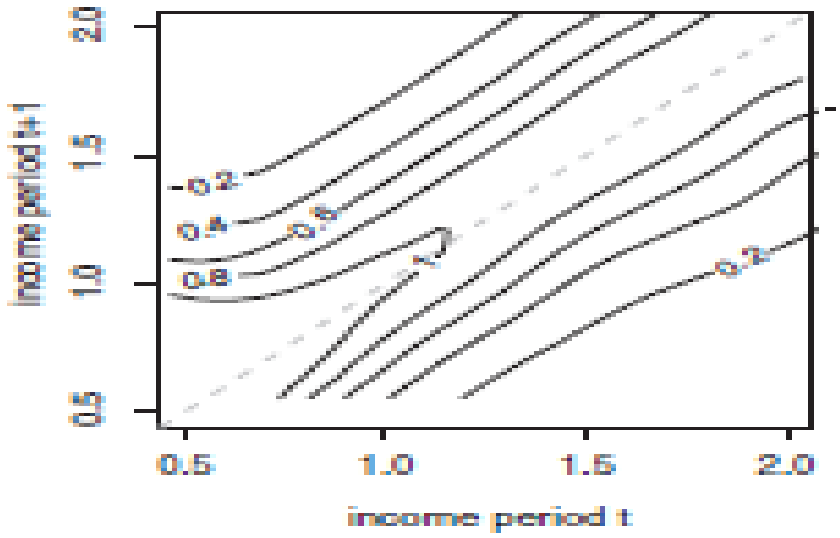
▸ Go back to mobility measurement

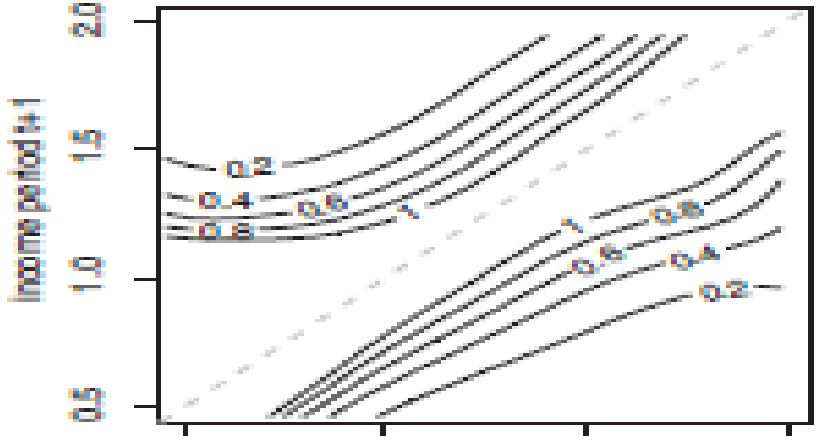


Conditional density plot example

Note: Year t refers to 1987; year $t+1$ refers to 1988. The top chart refers to the USA; the bottom chart to Western Germany.Source: Schluter and Van de gaer (2011, Figure 2).

▸ Go back to mobility measurement

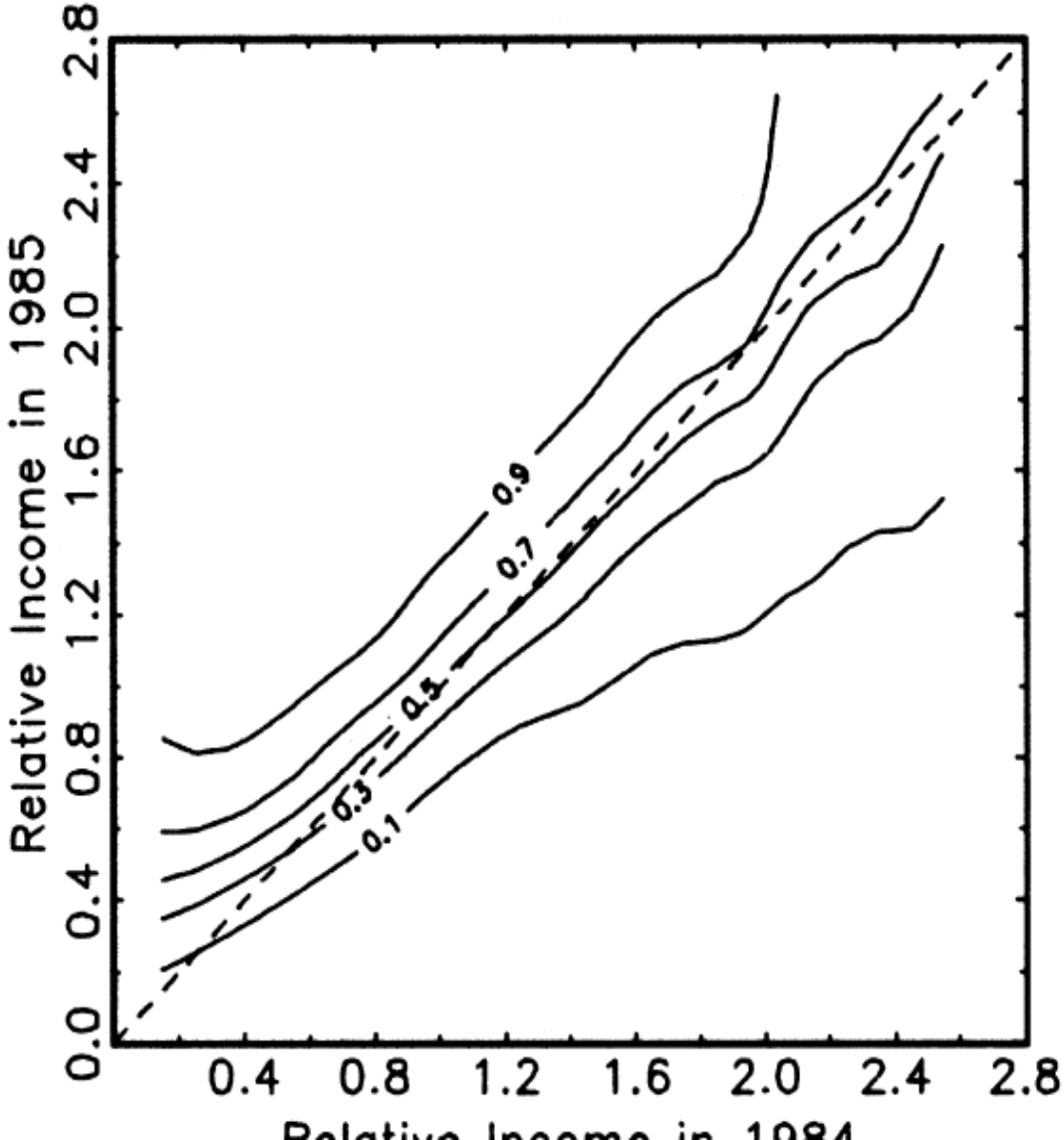




Non-parametric transition probability plot example.

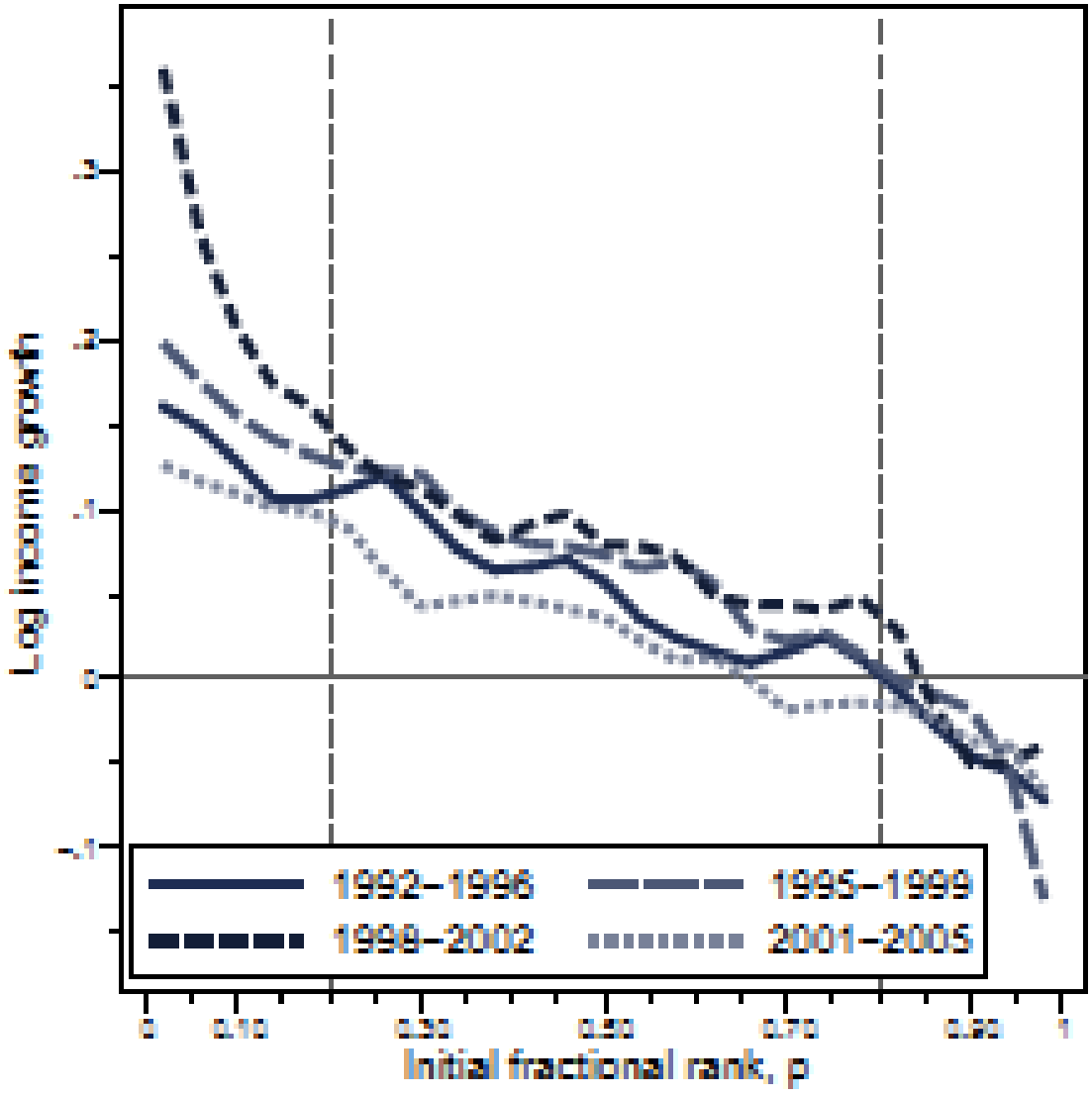
Note: Relative income in each year equal to income divided by the 1984 median income.Source: Trede (1998, Figure 1).

▸ Go back to mobility measurement



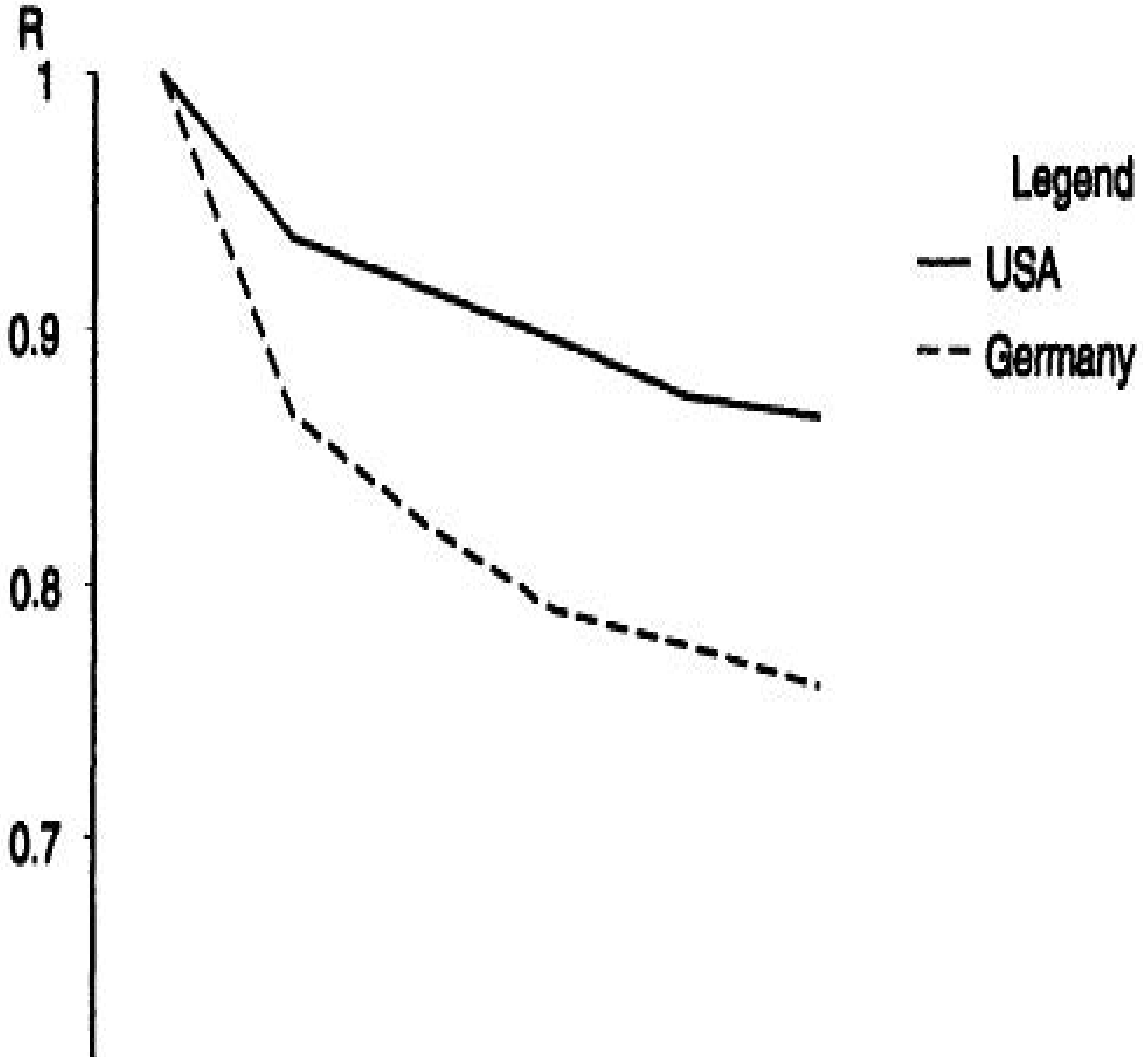
Individual income growth and mobility profiles

Source: Jenkins and Van Kerm (2011). ▸ Go back to mobility measurement



Income rigidity (longer-term inequality expressed as a fraction of total inequality) falls as the time period is lengthened

Source: Burkhauser and Poupore (1997, Figure 2). Go back to mobility measurement



Differences in cumulative density: USA, 1979–1988 versus 1989–1998

Source: Authors' calculations from (Hungerford, 2011, Tables 2 and 3), based on PSID data.

▸ Go back to Intra-generational evidence

	Destination group							
Origin group	1	2	3	4	5	6	7	8
1	0.2	–0.1	–0.2	0.0	0.3	0.2	0.1	0.1
2	0.0	0.0	0.4	0.6	0.5	0.2	0.2	0.1
3	–0.2	–0.5	–0.2	0.0	0.0	–0.5	–0.1	–0.1
4	–0.2	–0.7	–0.6	–0.6	–0.7	–0.7	–0.2	–0.3
5	0.0	–0.3	–0.3	–0.5	–0.7	–0.5	0.0	–0.1
6	0.1	–0.1	–0.1	–0.4	–1.1	–1.3	–0.9	–0.5
7	0.1	0.2	0.0	–0.3	–0.8	–0.9	–0.8	–0.3
8	0.1	0.2	–0.2	–0.2	–0.3	–0.7	–1.1	–0.7
9	0.0	–0.1	–0.3	–0.2	–0.4	–0.4	–0.7	–0.6
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Selected mobility indices (%): USA, 1979–1988 versus 1989–1998

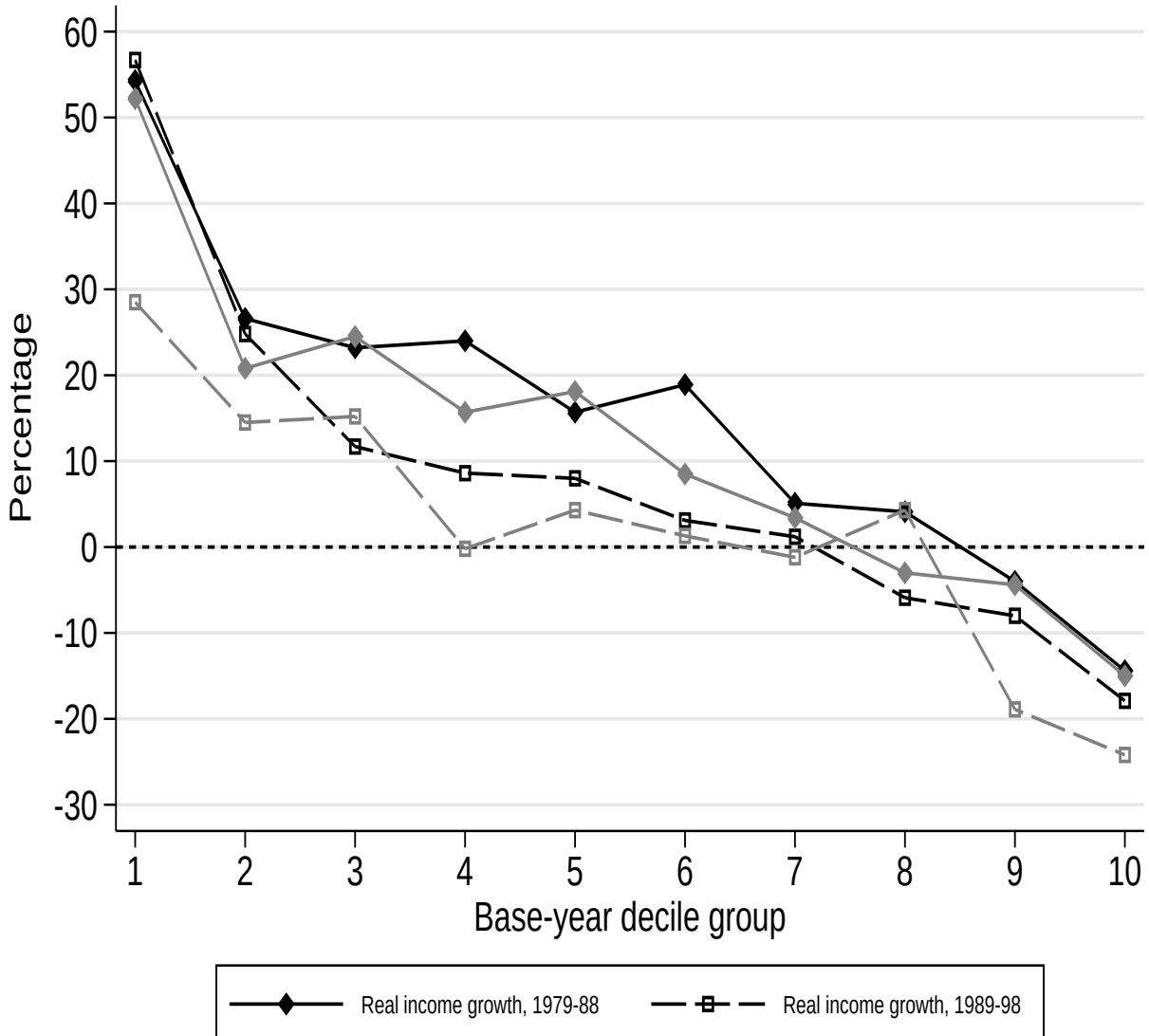
Source: Authors' calculations from Hungerford (2011, Tables 4 and 8, and p. 97), based on PSID data. ▸ Go back to Intra-generational evidence

Index	1979–88	1989–98
Decile mobility	79.1	77.0
Normalized trace	87.9	85.6
Gini mobility	36.2	34.4
Equalization (Shorrocks, Gini-based)	10.9	11.1
Equalization (Fields, Gini-based)	2.1	8.2
Average of absolute income changes ($D1$)	11,368	13,878
Average of absolute income share changes	0.421	0.459

Median real income growth, by base-year decile group: USA, by period

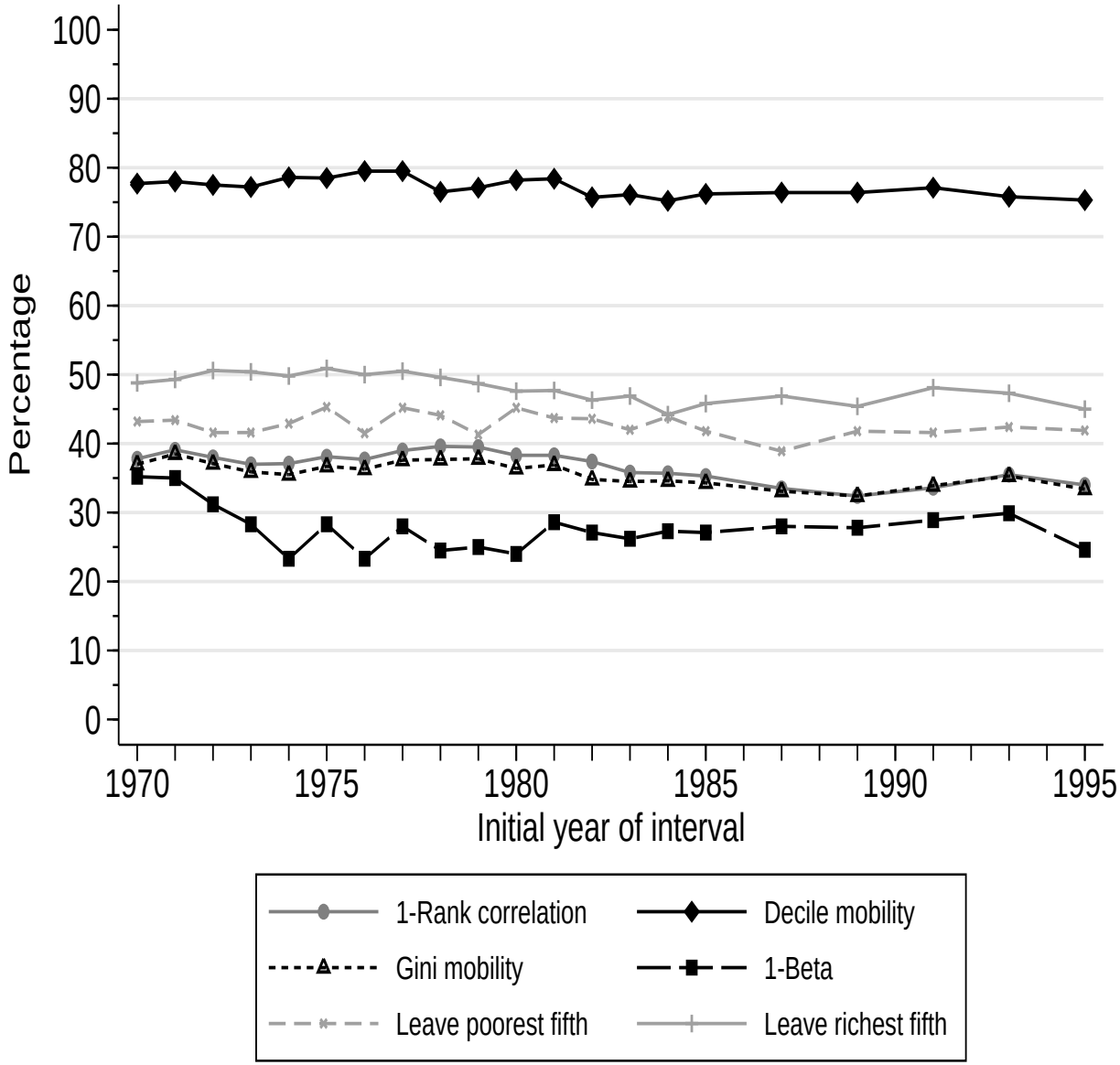
Source: Hungerford (1993, Figure 9) and Hungerford (2011, Figures 5 and 6).

▸ Go back to Intra-generational evidence



Indices of positional income mobility: USA, 1970–1995

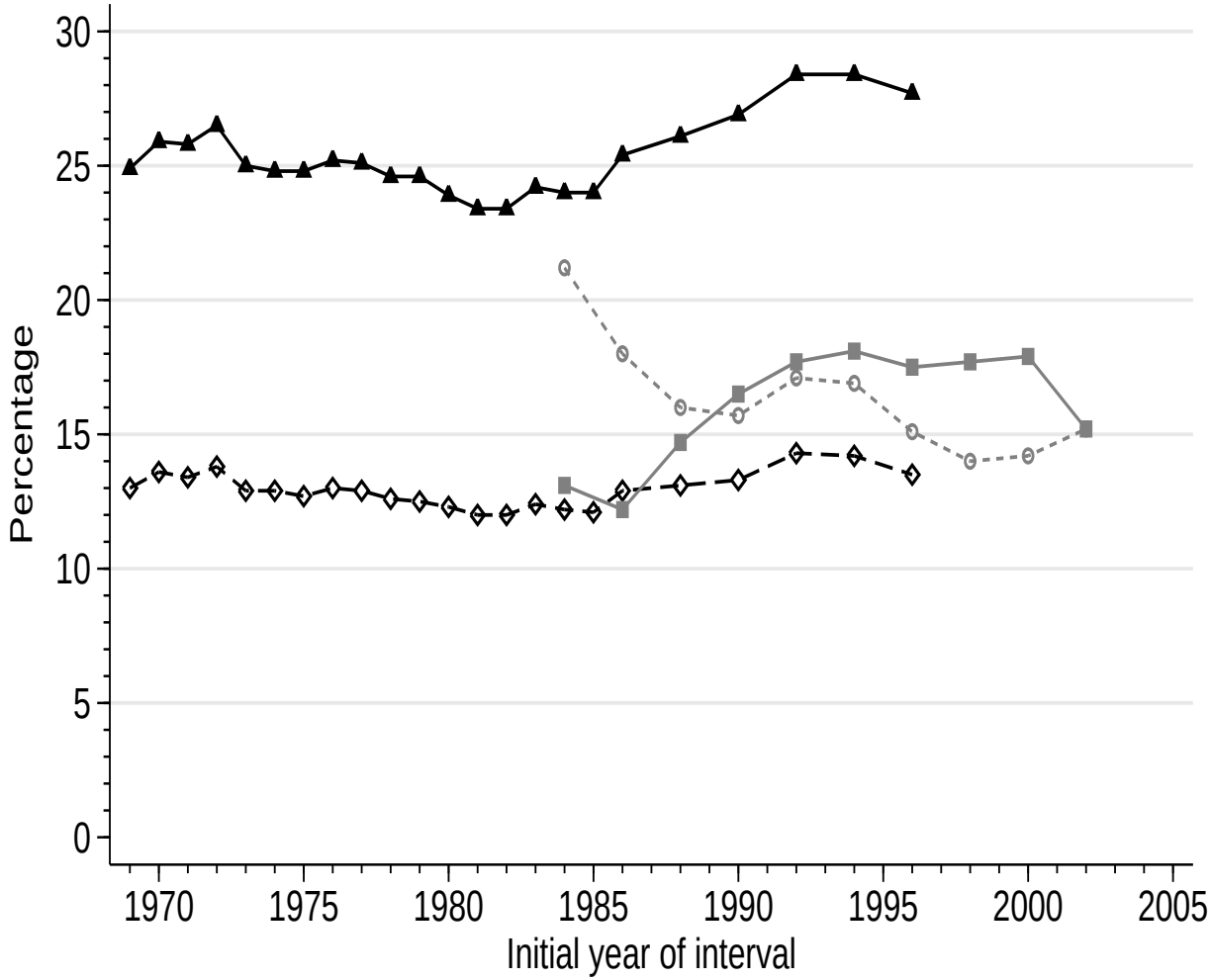
Source: Bradbury (2011, Figures 2 and 3). ▸ Go back to Intra-generational evidence



Mobility as longer-term income inequality reduction: USA, 1970–1995

Sources: Bradbury (2011, Figure 4) for the series shown in black and Bayaz-Ozturk, Burkhauser, and Couch (2013, Figure A1) for the series shown in gray. Both use PSID (CNEF) data.

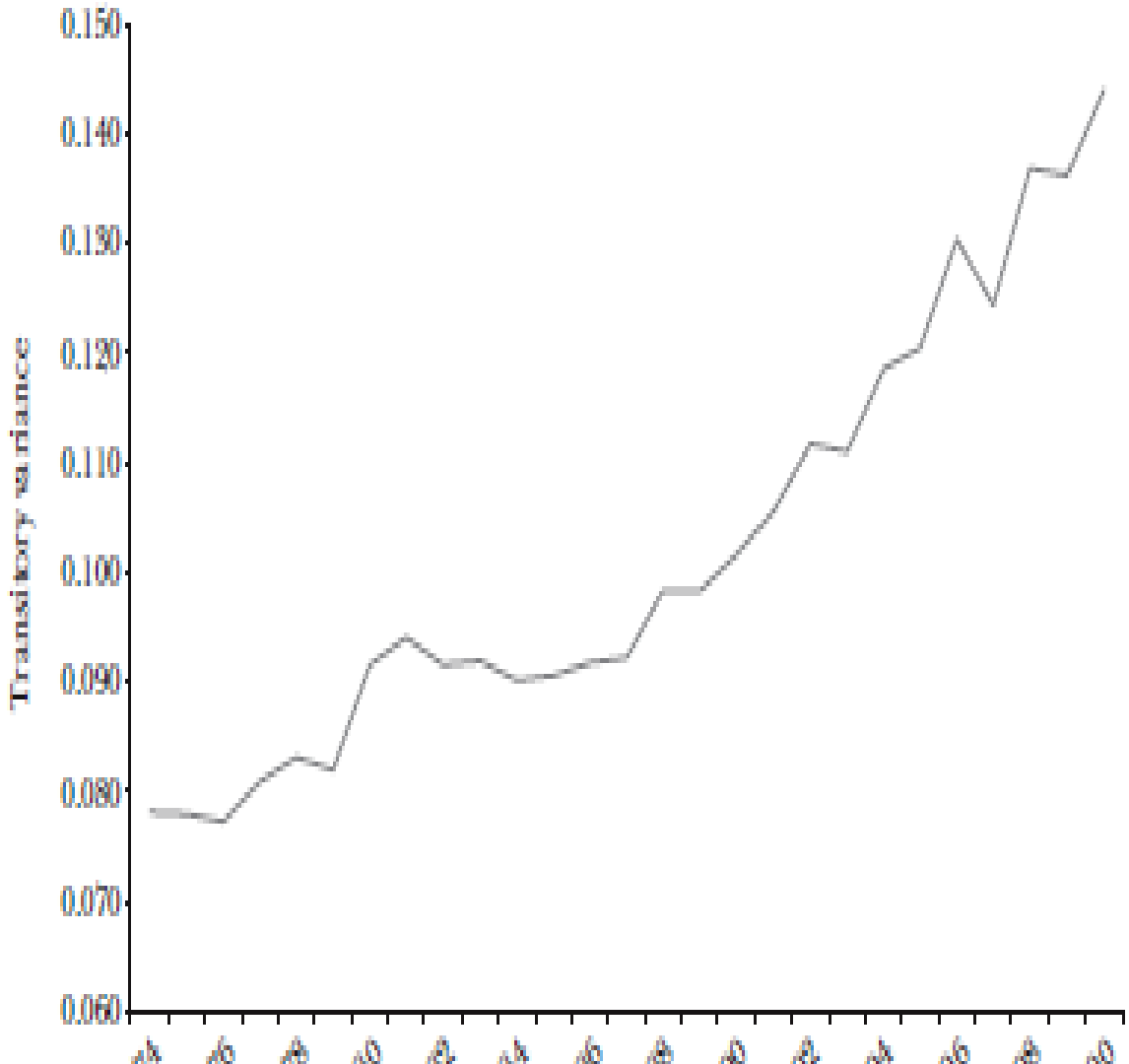
▸ Go back to Intra-generational evidence



Transitory variance of log annual family income: USA, 1974–2000

Source: Gottschalk and Moffitt (2009, Figure 5), based on PSID data.

▸ Go back to Intra-generational evidence



Studies comparing household income mobility in the USA and Western Germany (WG)

▸ Go back to Intra-generational evidence

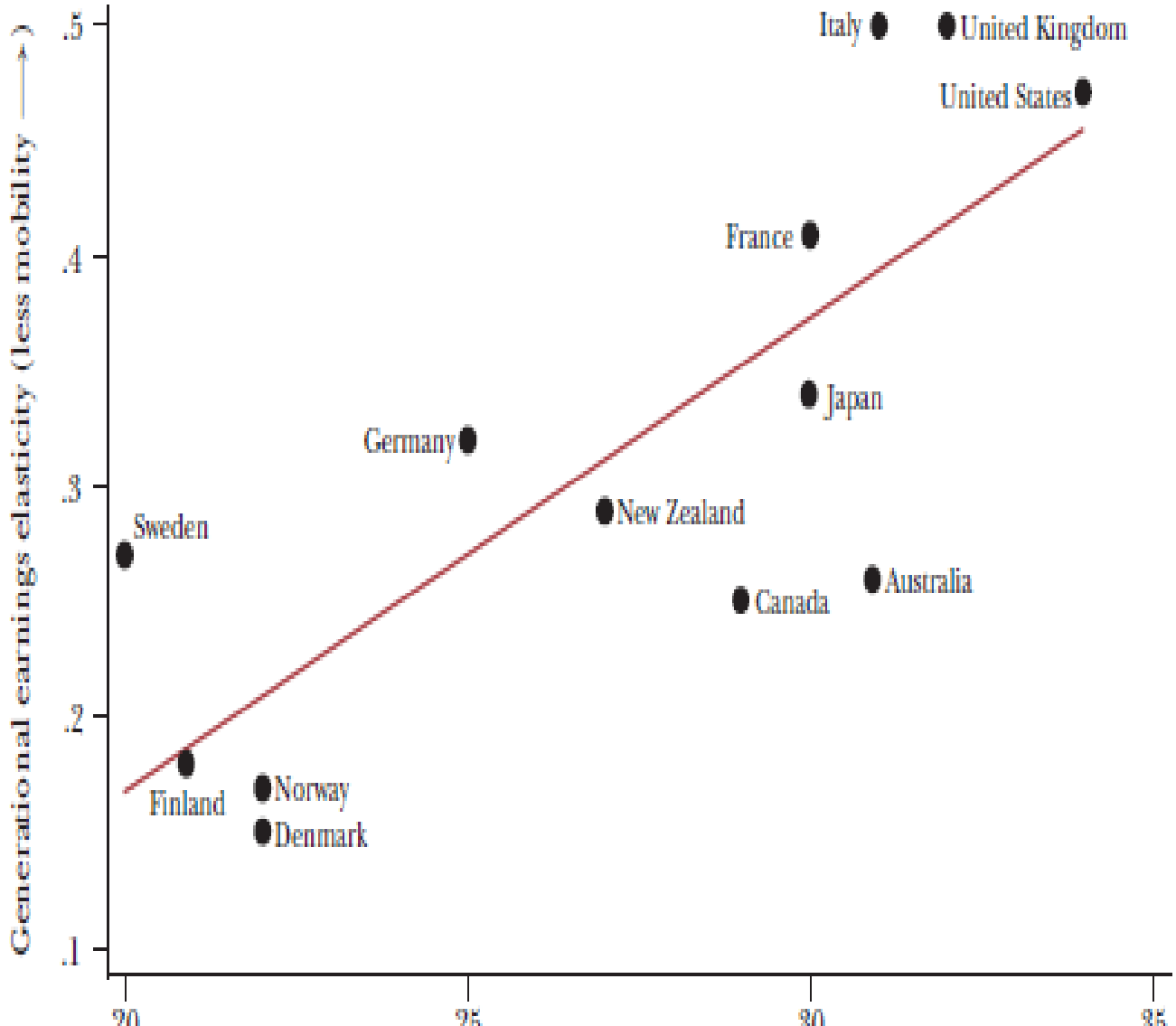
Study	Time period covered	(Im)mobility measure(s)	Remarks
Burkhauser and Poupore (1997)	1983–88	Shorrocks R	First finding that mobility greater in WG than in USA
Burkhauser, Eakin, and Rhody (1998)	Year pairs $t, t+\tau$, $\tau = 1, \ldots, 5$, 1983–88	Quintile transition matrices	Slightly more income mobility in WG
Maasoumi and Trede (2001)	1984-89	Maasoumi-Shorrocks R	Greater mobility in WG; statistically significant
Gottschalk and Spolaore (2002)	1983, 1993	SWF-based indices	WG–USA difference depends on index parameters

The Great Gatsby curve

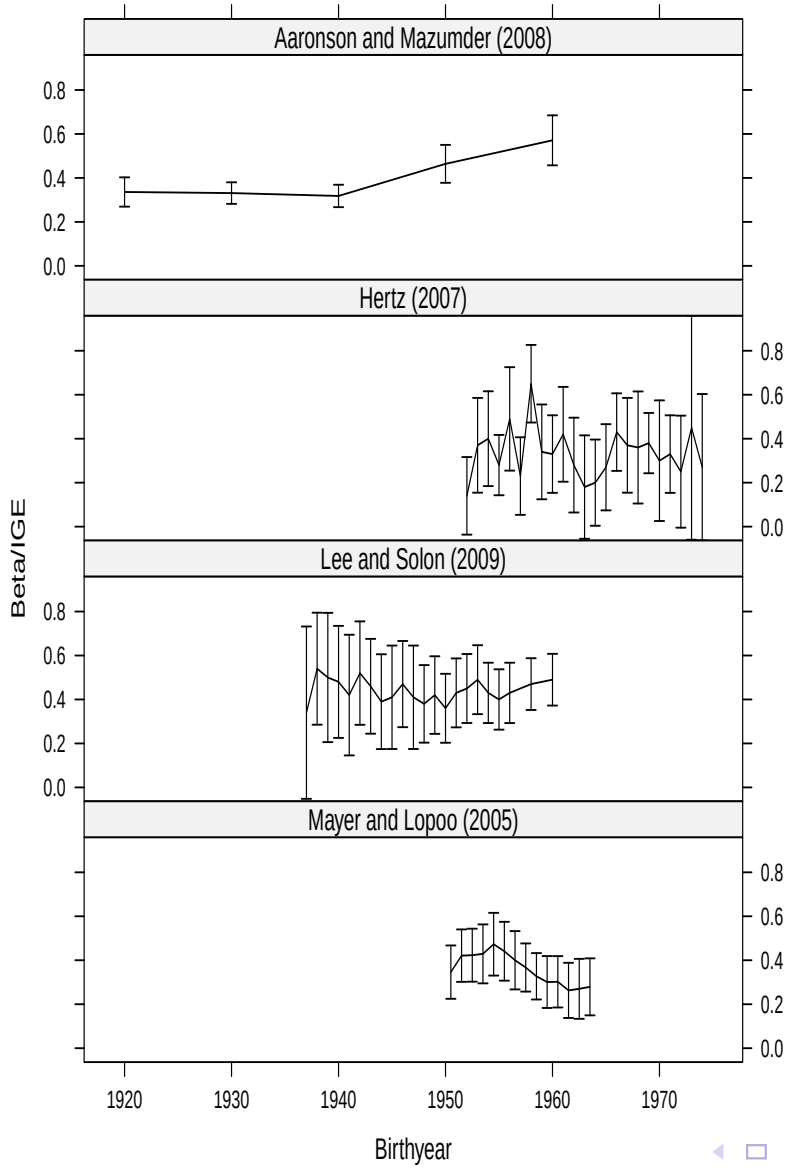
the relationship between intergenerational earnings persistence and cross-sectional income inequality; Source: Corak (2013a, Figure 1).

▸ Go back to Start of section

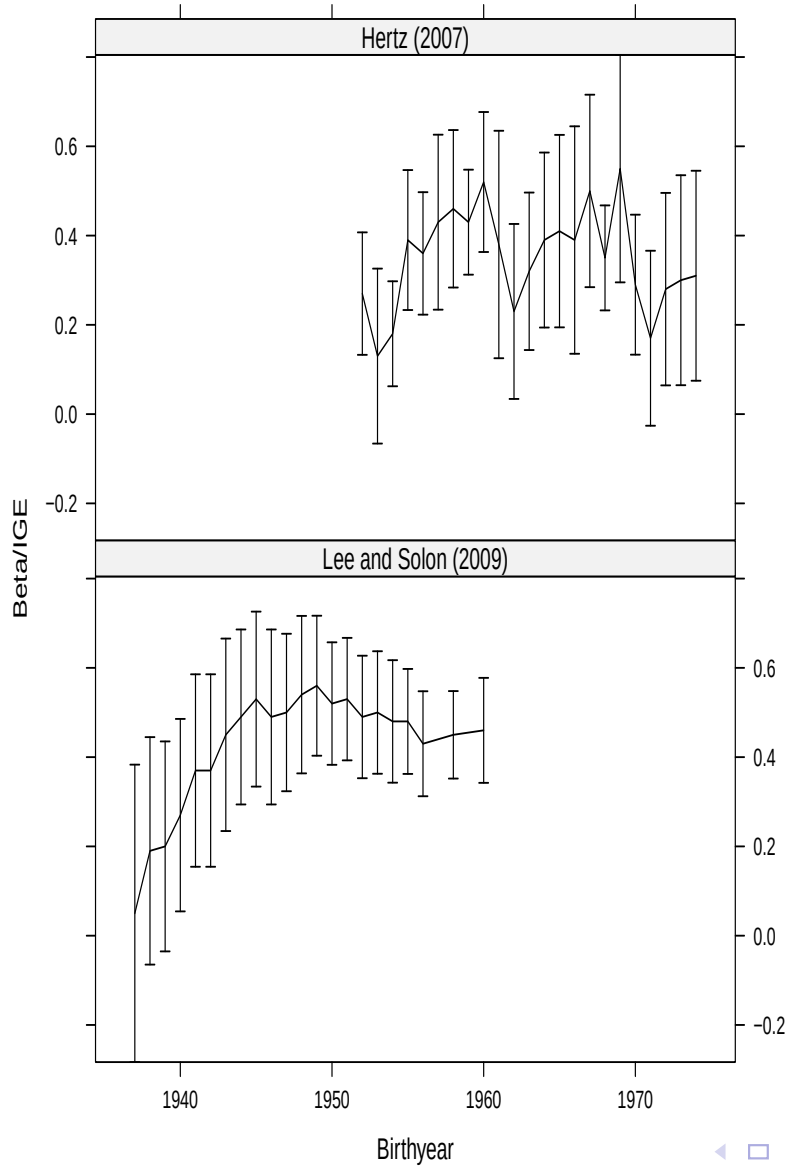
▸ Go back to Inter-generational evidence



Trends in US intergenerational income persistence – men



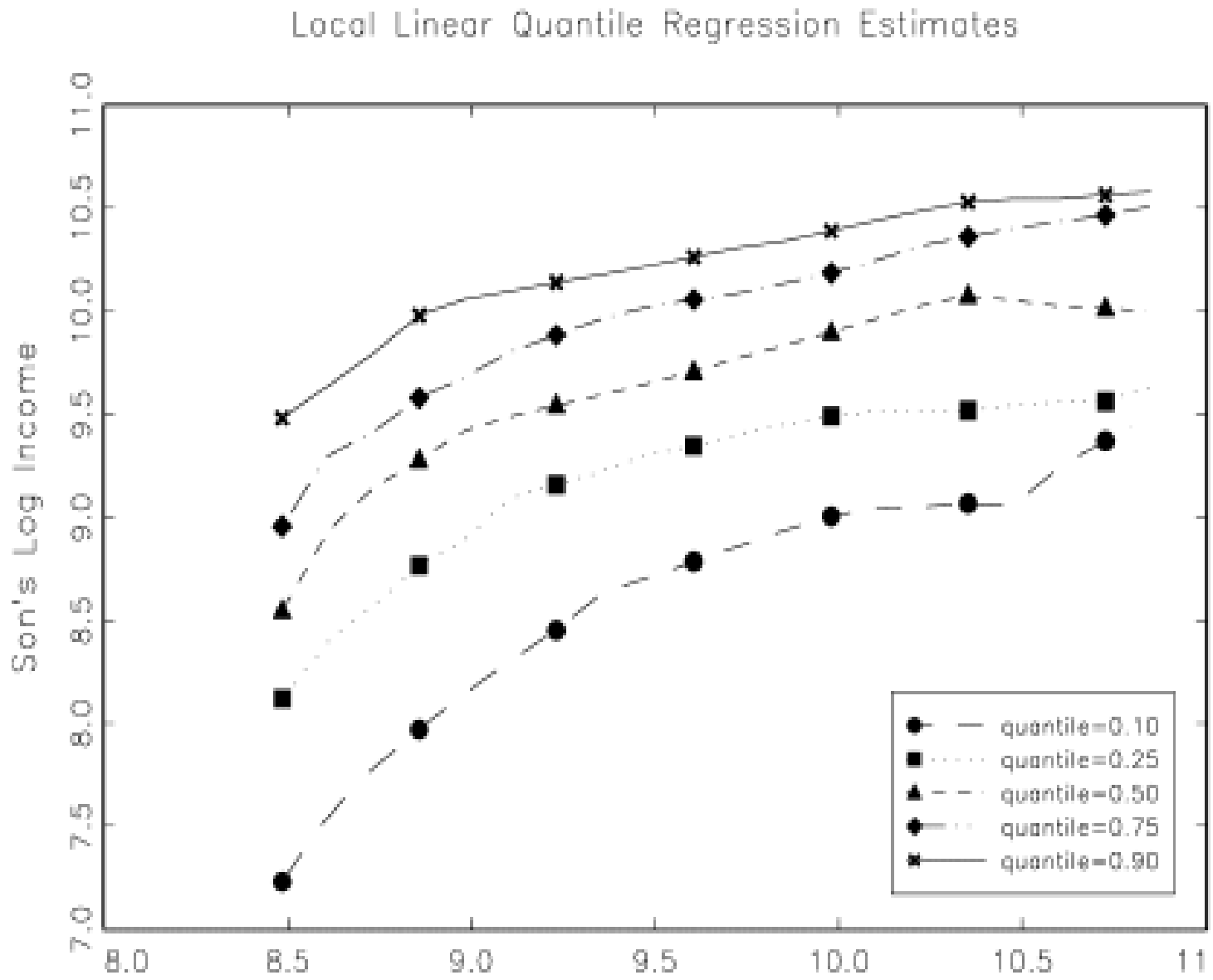
Trends in US intergenerational income persistence – women



Intergenerational income persistence: non-parametric quantile regression for US father-son pairs

Source: Lee, Linton, and Whang (2009, Figure 1).

▸ Go back to Inter-generational evidence



Intergenerational decile transition matrices for earnings, father-son pairs – the USA

Source: Mazumder (2005b, Table 2.2) and Corak and Heisz (1999, Table 6).

▸ Go back to Inter-generational evidence

	Son									
	1	2	3	4	5	6	7	8	9	10
Father										
1	22	18	10	10	11	11	5	5	2	7
2	9	15	16	15	9	9	9	5	9	5
3	9	10	12	17	15	9	9	7	7	5
4	17	9	10	12	3	15	9	11	7	7
5	12	7	12	6	14	9	12	10	12	8
6	7	11	6	10	11	13	13	11	7	11
7	8	7	12	9	11	9	16	13	9	5
8	8	8	8	11	10	7	11	15	13	8
9	4	8	8	5	9	11	7	9	20	19
10	3	8	6	7	7	5	10	16	11	26

Intergenerational decile transition matrices for earnings, father-son pairs – Canada

Source: Mazumder (2005b, Table 2.2) and Corak and Heisz (1999, Table 6).

▸ Go back to Inter-generational evidence

	Son									
	1	2	3	4	5	6	7	8	9	10
Father										
1	16	14	12	11	10	9	8	7	7	7
2	13	13	12	12	11	10	9	8	7	6
3	11	11	12	12	12	11	10	8	8	7
4	10	10	11	11	11	11	11	10	8	7
5	9	10	10	10	11	10	11	11	10	8
6	9	9	10	10	10	11	11	11	10	9
7	8	9	9	9	10	10	11	11	11	11
8	8	8	8	9	9	10	11	12	12	12
9	8	8	8	8	8	10	10	12	13	15
10	8	8	8	8	8	9	10	11	13	18

Intergenerational earnings mobility in Canada, Sweden and the USA: Beta, *r*, and the rank correlation

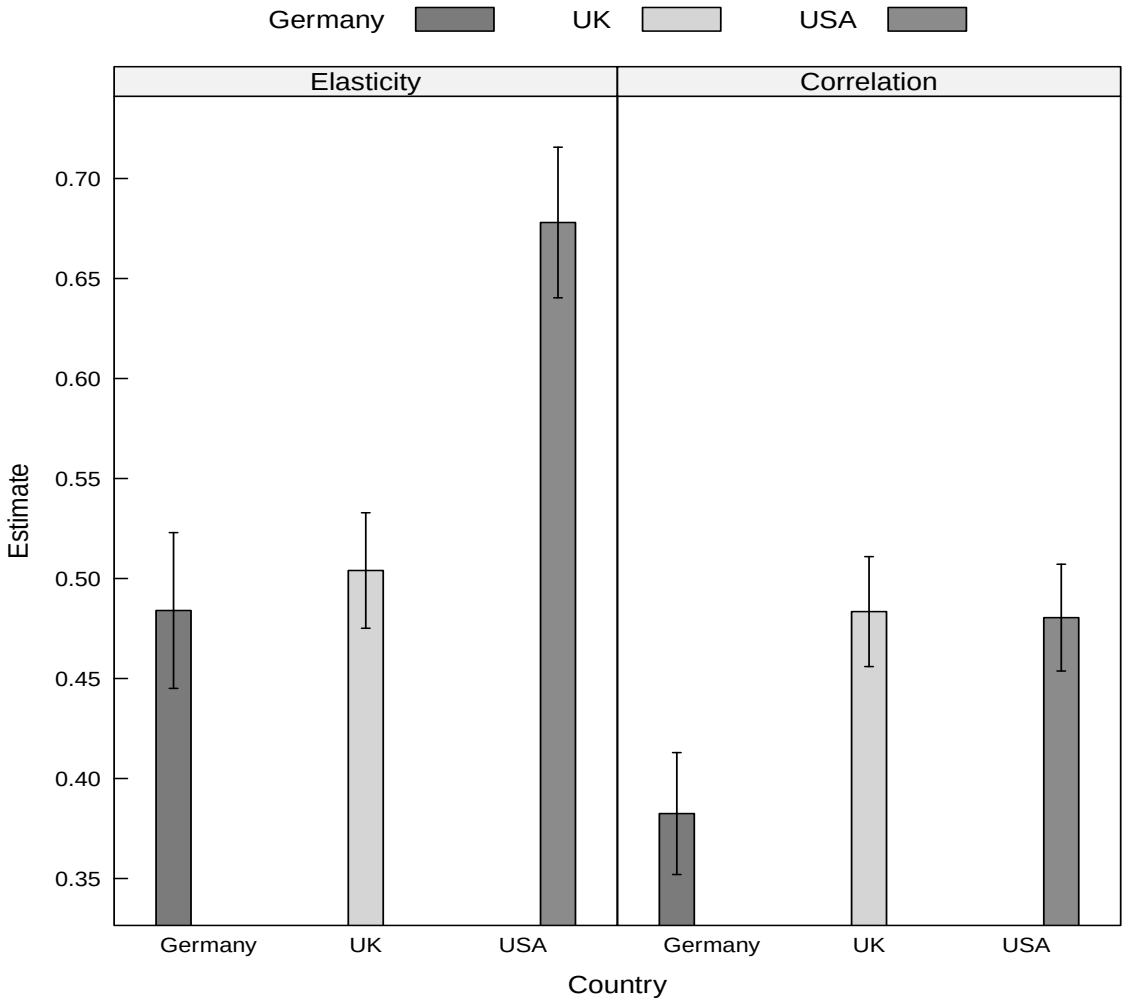
Source: Corak, Lindquist, and Mazumder (2013, pp. 10–11).

Country	Beta		*r*		Rank correlation	
	Estimate	Rank	Estimate	Rank	Estimate	Rank
Canada	0.26	(2)	0.23	(2)	0.24	(1)
Sweden	0.25	(1)	0.21	(1)	0.30	(2)
USA	0.40	(3)	0.26	(3)	0.30	(2)

▸ Go back to Inter-generational evidence

Intergenerational persistence of disposable income: elasticities versus correlations

Source: Eberharter (2013, Tables 1, 2). Go back to Inter-generational evidence



Cumulated differences in intergenerational mobility frames across earnings decile groups for father-son pairs in Canada and the USA (USA-CAN)

Source: Authors' derivations using transition matrices shown in Table 63 from Mazumder (2005b) and Corak and Heisz (1999). ▸ Go back to Inter-generational evidence

	Son									
	1	2	3	4	5	6	7	8	9	10
Father										
1	6	10	9	8	9	11	8	6	1	1
2	2	9	11	13	12	14	11	6	3	2
3	1	6	8	16	18	18	15	8	4	2
4	8	11	13	21	16	20	15	10	4	2
5	10	12	15	19	17	19	15	9	7	4
6	9	12	11	15	14	19	17	11	5	4
7	8	9	12	15	15	18	22	18	10	3
8	8	9	11	17	17	17	21	21	13	2
9	4	5	7	9	10	12	12	9	9	2
10	−1	0	0	2	2	0	0	2	−1	0

Cumulated differences in intergenerational transition matrices in disposable income among all persons for Germany, the UK and the USA

Source: Authors' calculations from Eberharter (2013, Table 3).

▸ Go back to Inter-generational evidence

A. USA – Germany

	Offspring				
	1	2	3	4	5
Father					
1	3	5	5	1	0
2	9	11	4	2	0
3	9	18	6	2	0
4	9	18	9	9	0
5	4	13	1	2	0

B. USA – UK

	Offspring				
	1	2	3	4	5
Father					
1	−10	−1	−1	0	0
2	−11	−5	−2	−6	0
3	−11	1	−4	−9	0
4	−8	−3	−12	−10	−1
5	−10	−11	−21	−20	−1

Brother correlations in earnings and income

Source: Schnitzlein (2013) and authors' compilation from sources listed in last column.

Denmark	0.23	1951–1968	ANOVA	Björklund et al. (2002)
Denmark	0.20	1958-1971	REML	Schnitzlein (2013)
China	0.57	Not reported	REML	Eriksson and Zhang (2012)
Finland	0.26	1953–1965	ANOVA	Björklund et al. (2002)
Finland	0.26	1950–1960	ANOVA	Österbacka (2001)
Finland	0.24	1955–1965	ANOVA	Björklund et al. (2004)
Germany	0.43	1958-1971	REML	Schnitzlein (2013)
Norway	0.14	1950–1970	ANOVA	Björklund et al. (2002)
Norway	0.14	1953–1969	ANOVA	Björklund et al. (2004)
Sweden	0.37	1962–1968	GMM	Björklund, Jäntti, and Lindquist (2009
Sweden	0.25	1953	REML	Björklund, Lindahl, and Lindquist (20
Sweden	0.25	1948–1965	ANOVA	Björklund et al. (2002)
Sweden	0.22	1962–1968	REML	Björklund, Jäntti, and Lindquist (2007
Sweden	0.19	1951–1968	ANOVA	Björklund et al. (2004)
USA	0.49	1947–1955	REML	Mazumder (2008)
USA	0.45	1944–1952	REML	Levine and Mazumder (2007)
USA	0.45	1951–1958	ANOVA	Solon et al. (1991)
USA	0.43	1951–1967	ANOVA	Björklund et al. (2002)
USA	0.45	1958-1971	REML	Schnitzlein (2013)

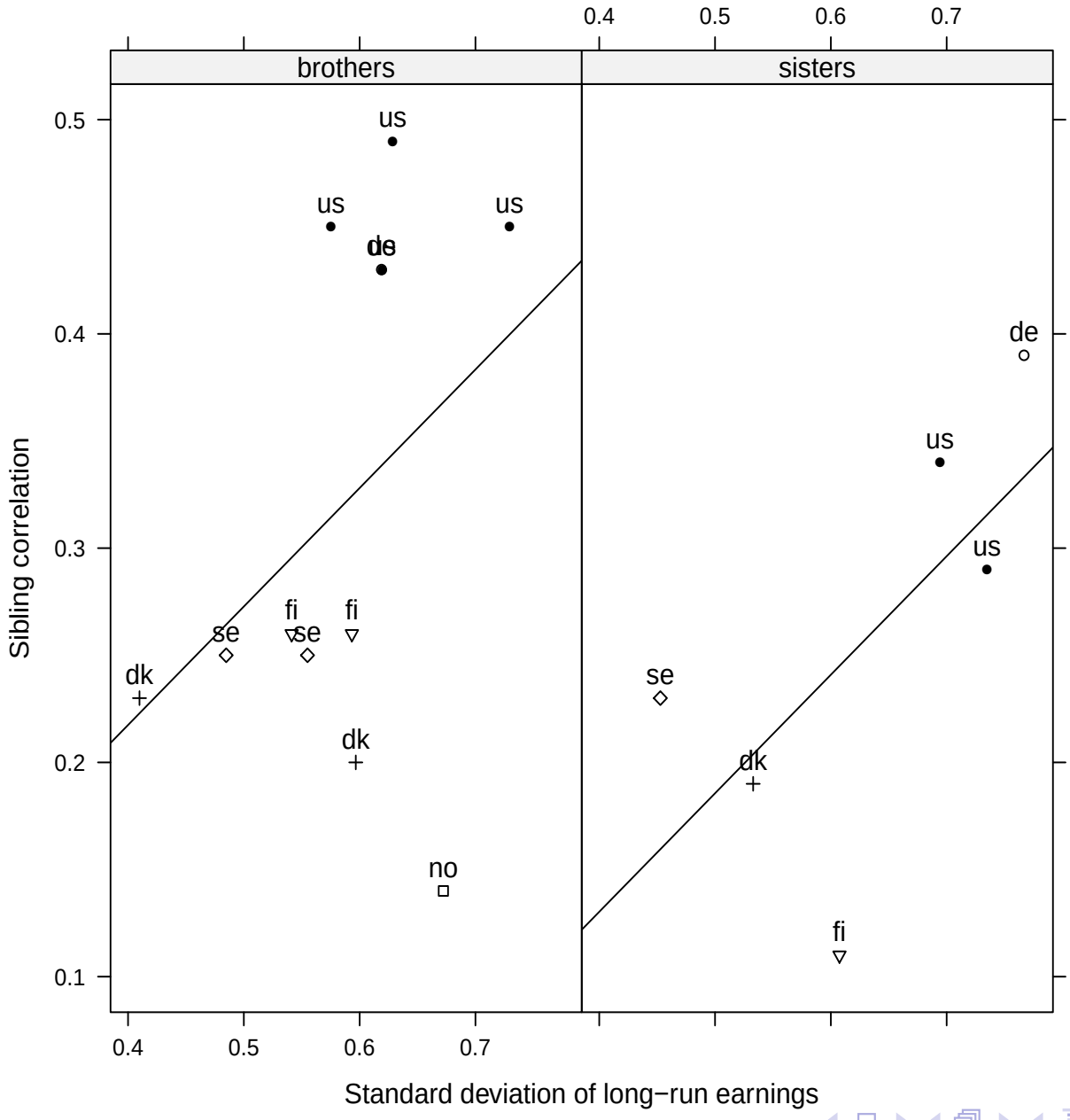
Sister correlations in earnings and income

Source: Schnitzlein (2013) and authors' compilation from sources listed in last column.

Denmark	0.19	1958-1971	REML	Schnitzlein (2013)
Finland	0.13	1950–1960	ANOVA	Österbacka (2001)
Finland	0.11	1955–1965	ANOVA	Björklund et al. (2004)
Germany	0.39	1958-1971	REML	Schnitzlein (2013)
Sweden	0.15	1951–1968	ANOVA	Björklund et al. (2004)
Sweden	0.23	1953	REML	Björklund, Lindahl, and Lindquist (201
Norway	0.12	1953–1969	ANOVA	Björklund et al. (2004)
USA	0.34	1947–1955	REML	Mazumder (2008)
USA	0.28	1951–1958	ANOVA	Solon et al. (1991)
USA	0.29	1958-1971	REML	Schnitzlein (2013)

▸ Go back to Inter-generational evidence

Sibling correlation and long-run earnings inequality



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