Not All Transitions are Equal

The distribution of education and the contribution of each transition to inequality of educational opportunity

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Outline

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- Mare(1981) showed that overall IEO depended on the transition probabilities, and
- that patrial IEO, as measured by odds ratios, do not.
- As a consequence the relation between partial and over IEO has largely been treated as a black box by:
  - Estimating both partial and overall IEOs and just noticing that they show different trends.
  - Showing the equation: $\sum_{k=1}^{K} \sum_{j=1}^{k} \lambda_j p_j (1 - p_j) \prod_{l \neq j}^{k} p_l$.
  - Using simulations.

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  1. Differences in overall IEO are interesting in their own right.
  2. Partial IEOs (looking at the process) and overall IEO (looking at the end result) are natural complements.
  3. The fact that partial IEOs do not depend on the distribution of education is both a strong *and* a weak point.

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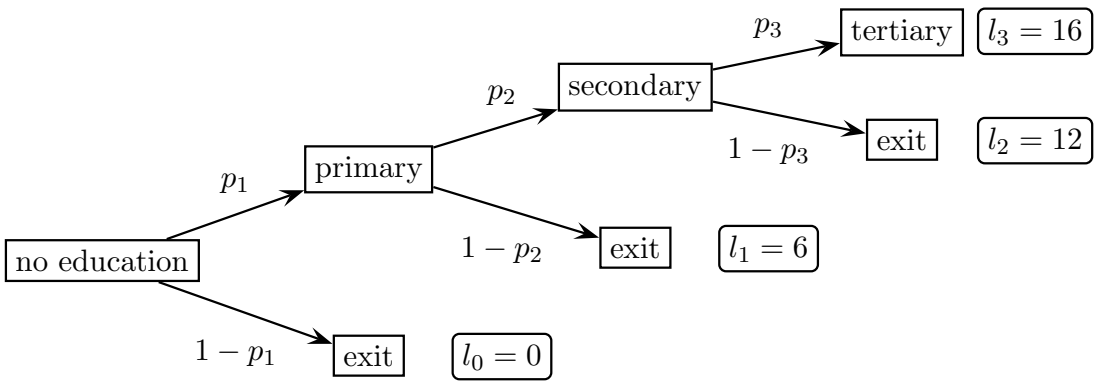
- These are all functions of the transition probabilities.
- These transition probabilities have change over time, differ between men and women, ethnic groups, countries, etc.
- So, differences in overall IEO are in part caused by differences in transition probabilities.

Example

Figure: Hypothetical educational system



Modeling transition probabilities and the expected level of education

$$p_{ki} = \frac{\exp(\alpha_k + \lambda_k SES_i)}{1 + \exp(\alpha_k + \lambda_k SES_i)} \quad \text{if} \quad y_{k-1\,i} = 1$$

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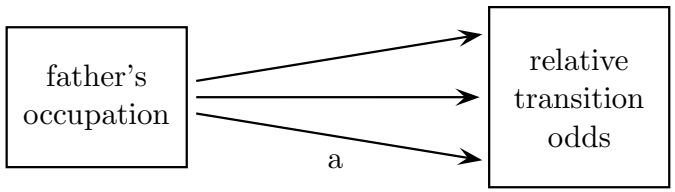
Differences in overall IEO between groups

Figure: Direct and indirect effect of cohort on status IEO



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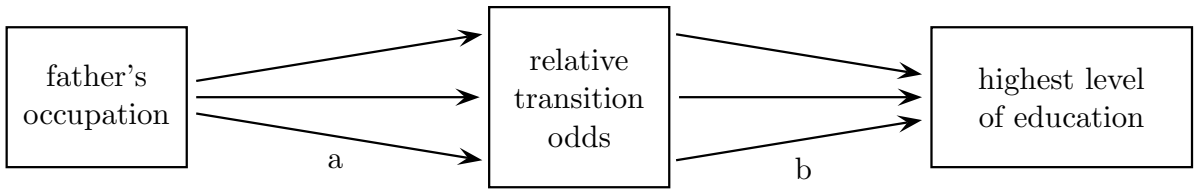

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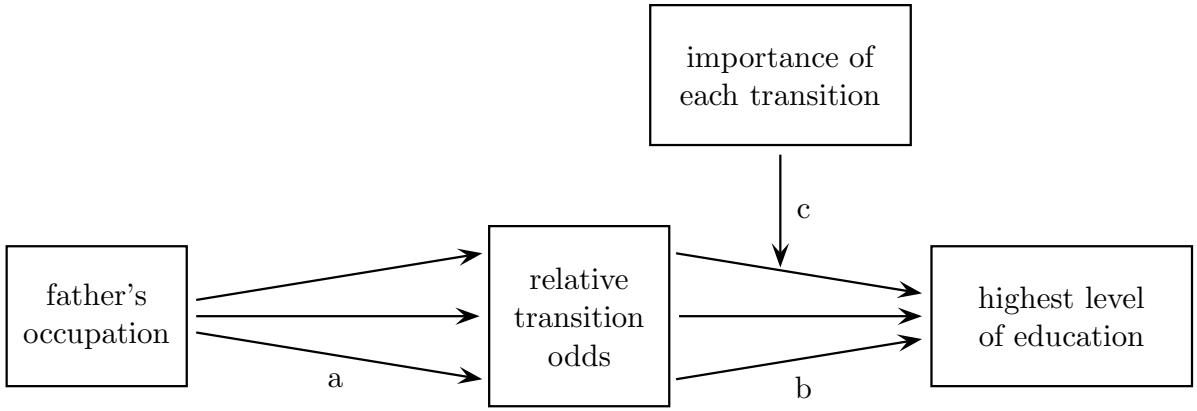

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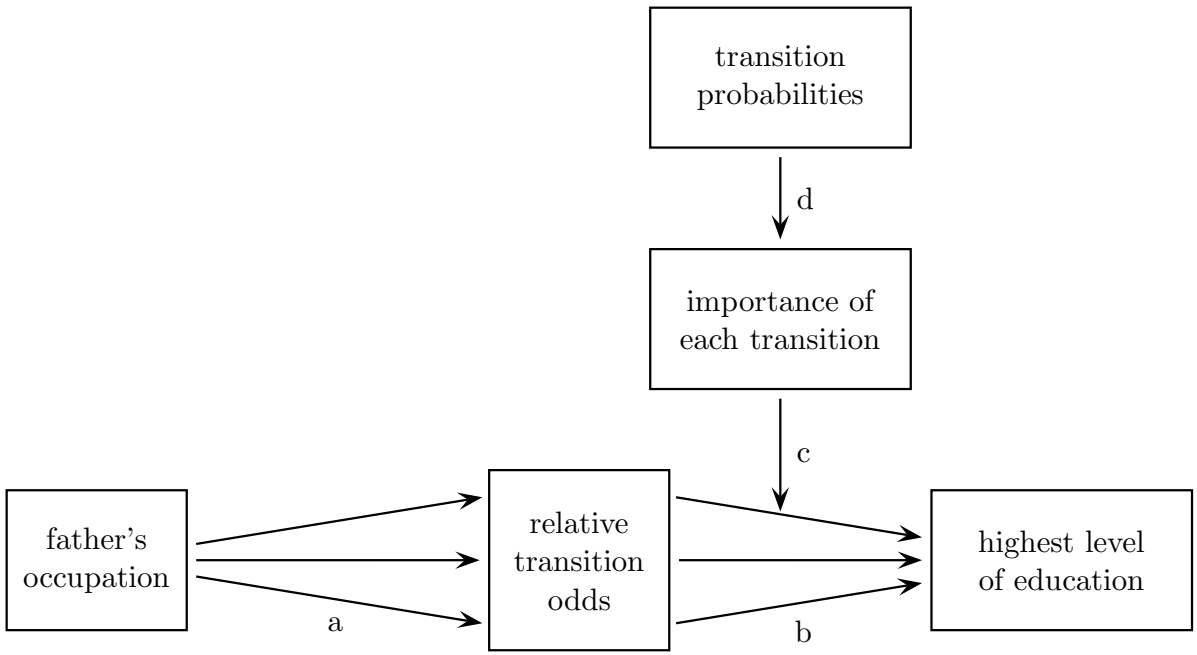

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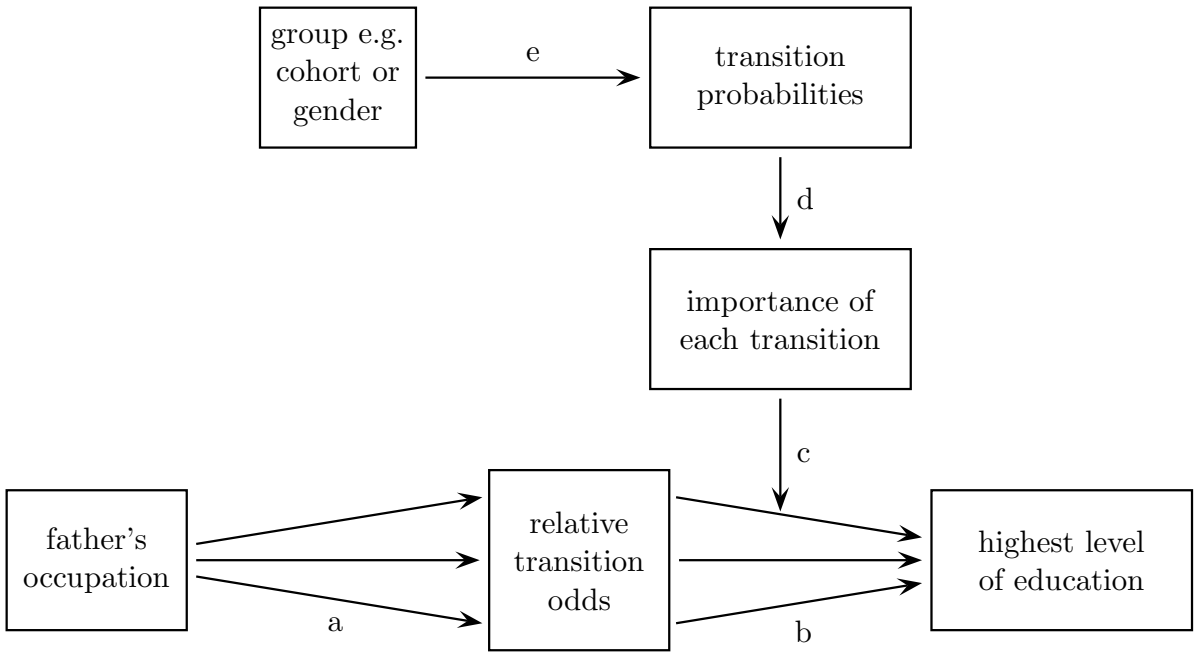

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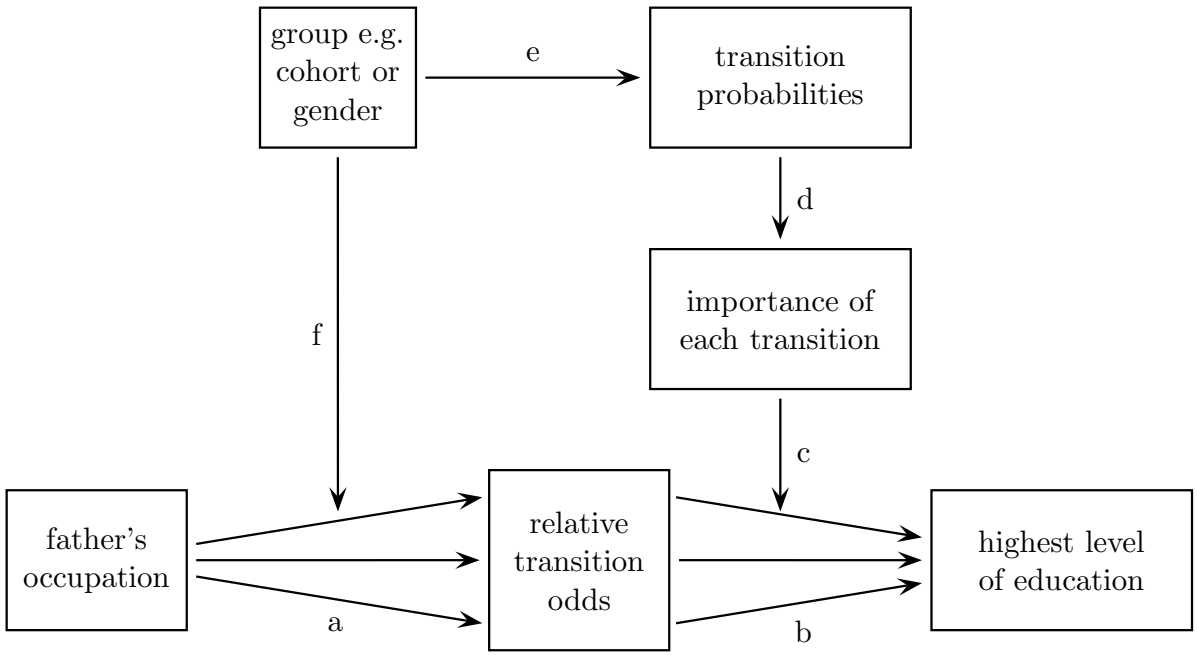
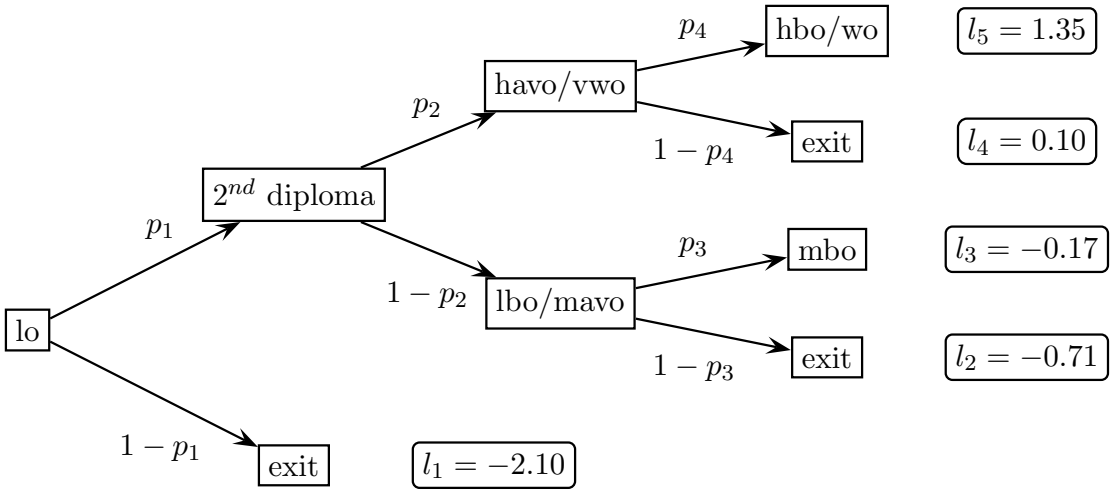


Outline

Simplified model of Dutch educational system



Generalizing the Mare model

The expected level of education is now:

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- the weights are still a product of
  - the proportion at risk,
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- This result can be generalized to
  - multiple branching points, or
  - branching points with more than two categories.

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- 67,000 respondents aged between 27 and 65 have complete information on father's occupation, child's education, year of birth, and gender.
- Number of cases are unequally distributed over cohorts.

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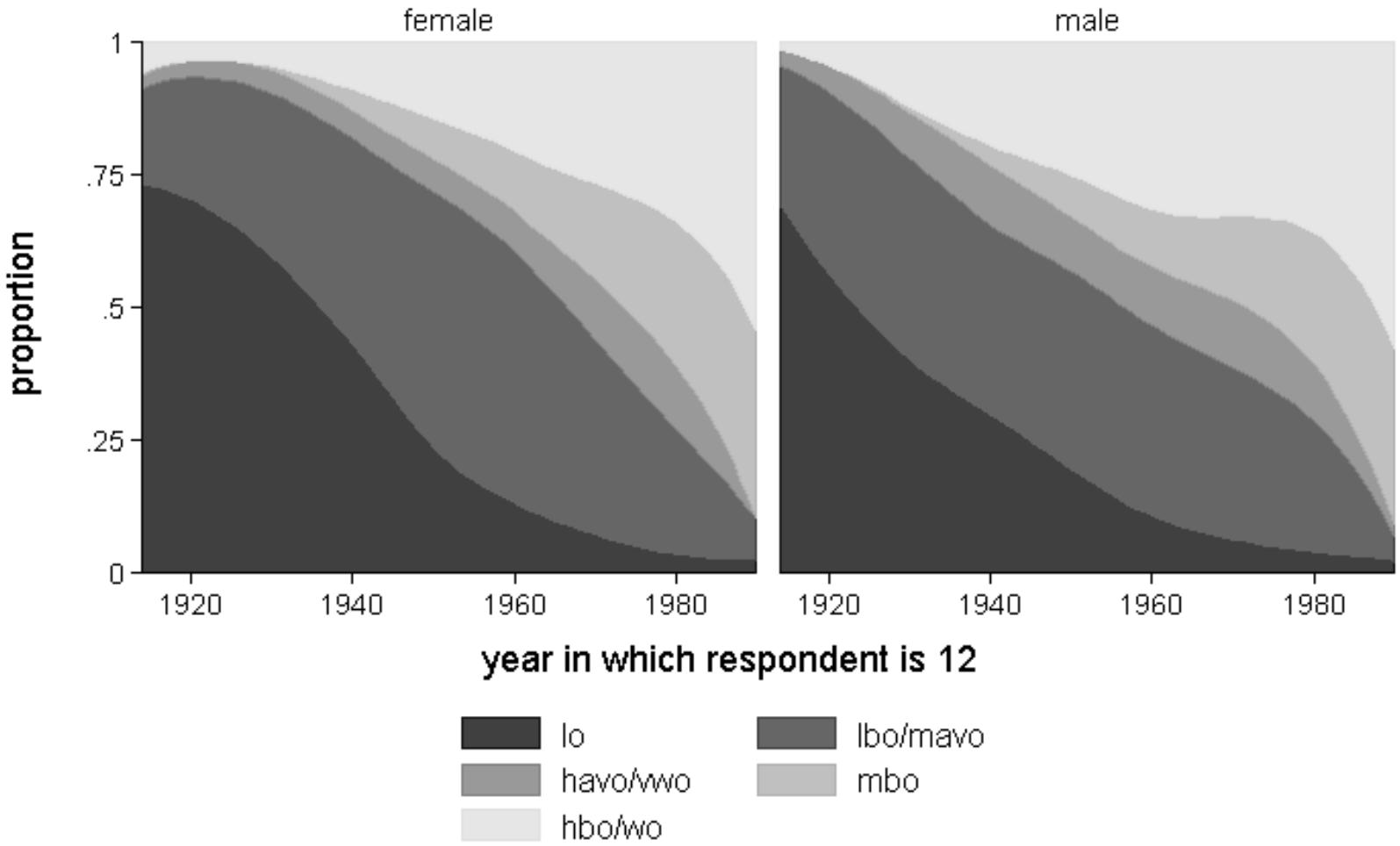
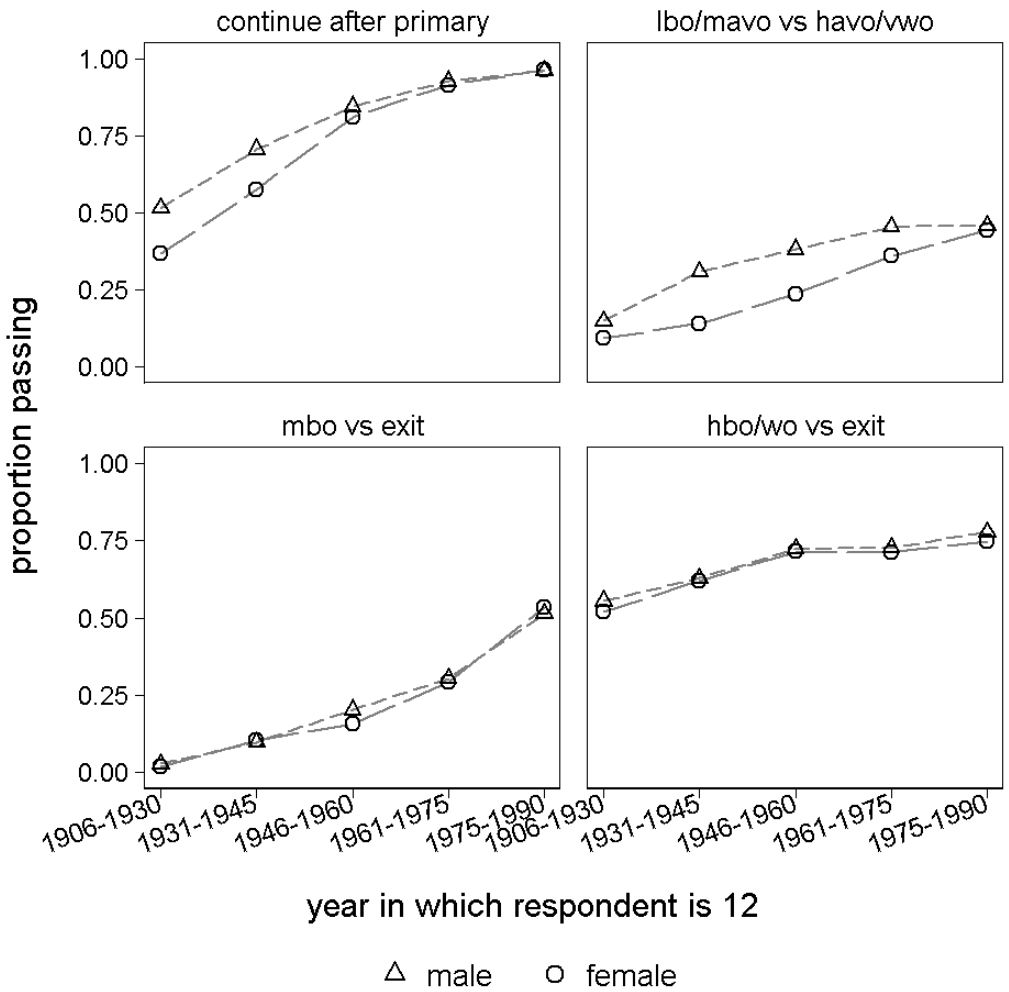
- it is standardized.
- Five cohorts: 1906–1930, 1931–1945, 1946–1960, 1961–1975, 1975–1990.

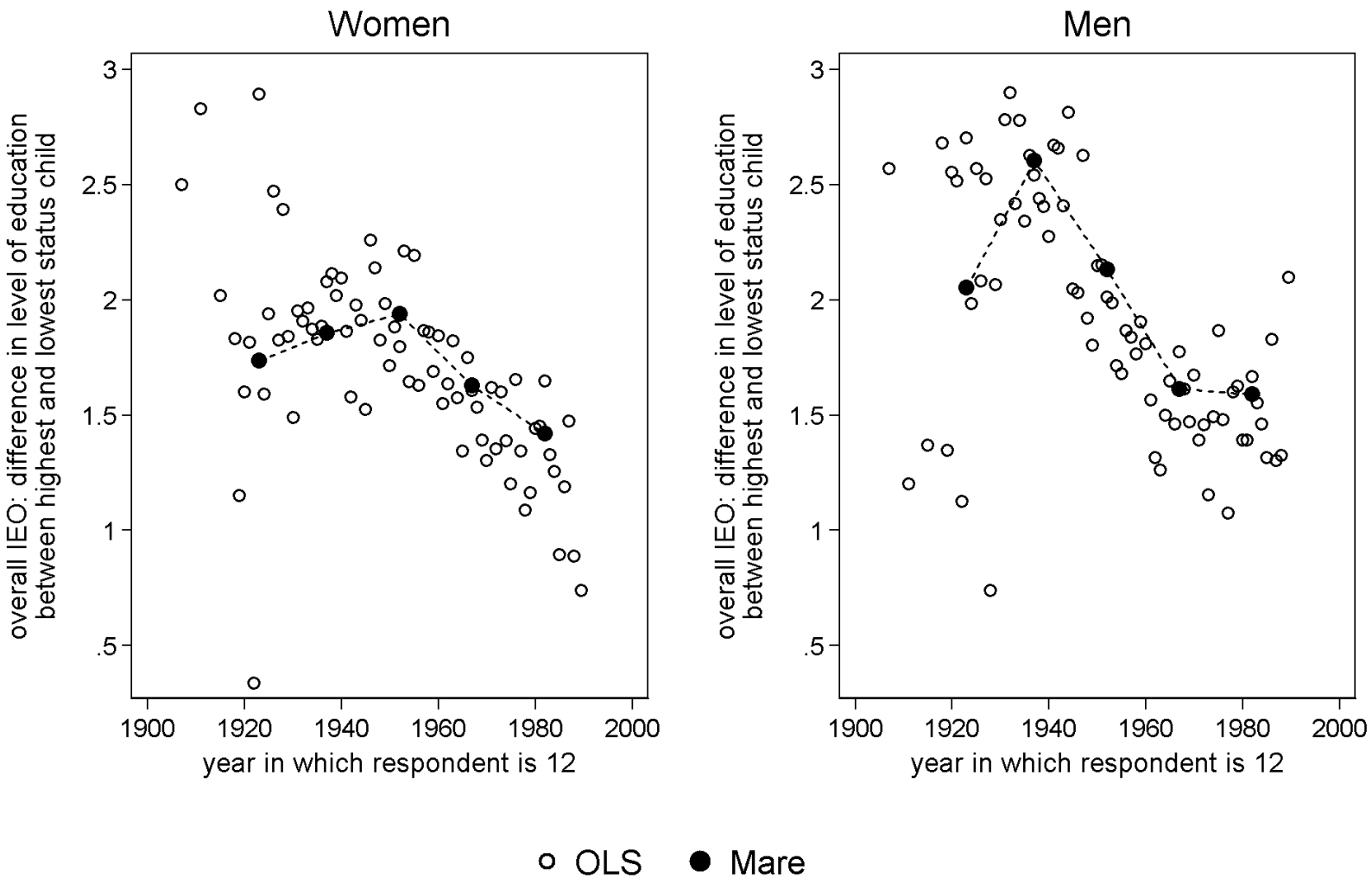
Distribution of highest achieved level of education



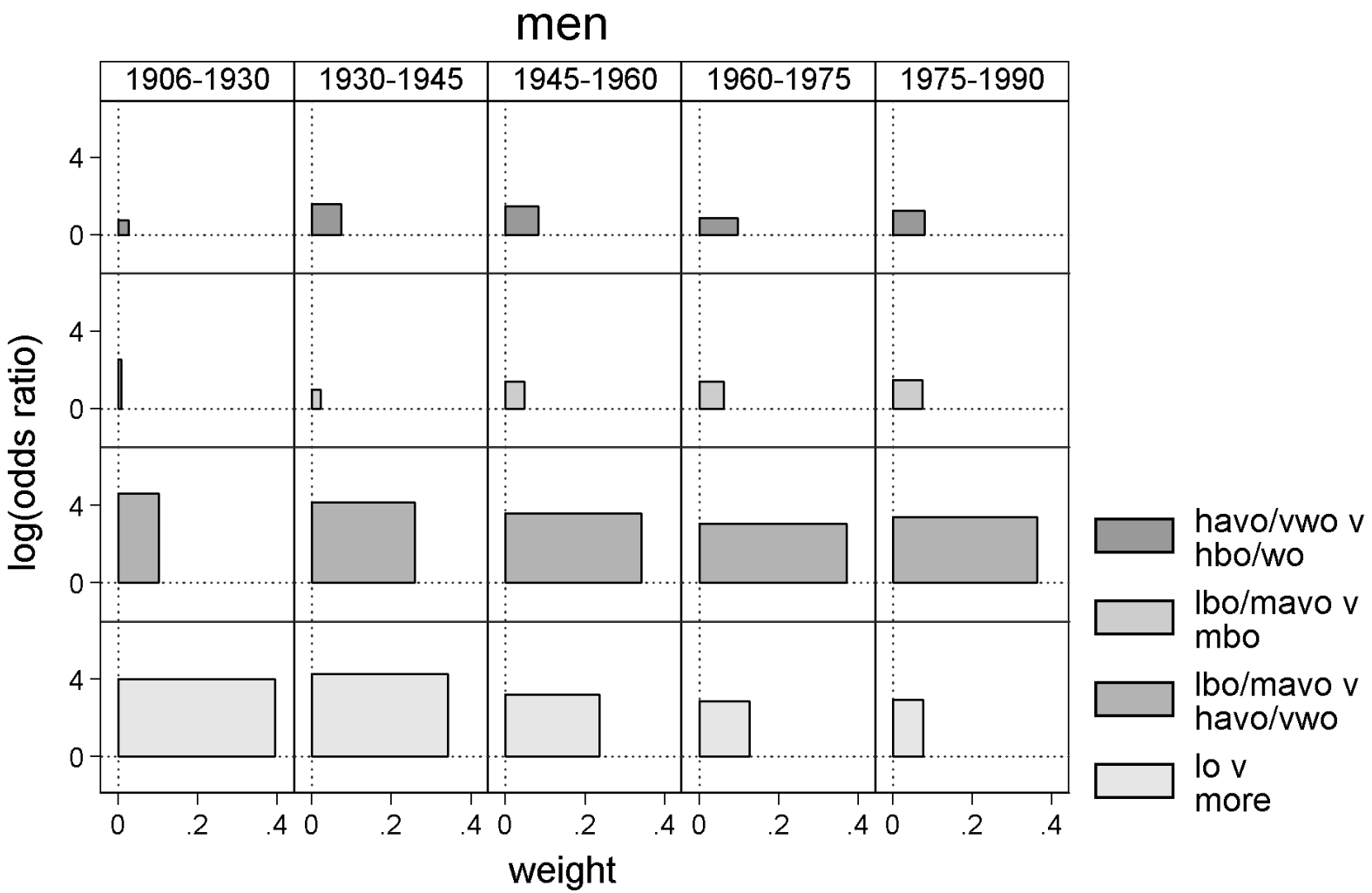
Proportions passing transitions



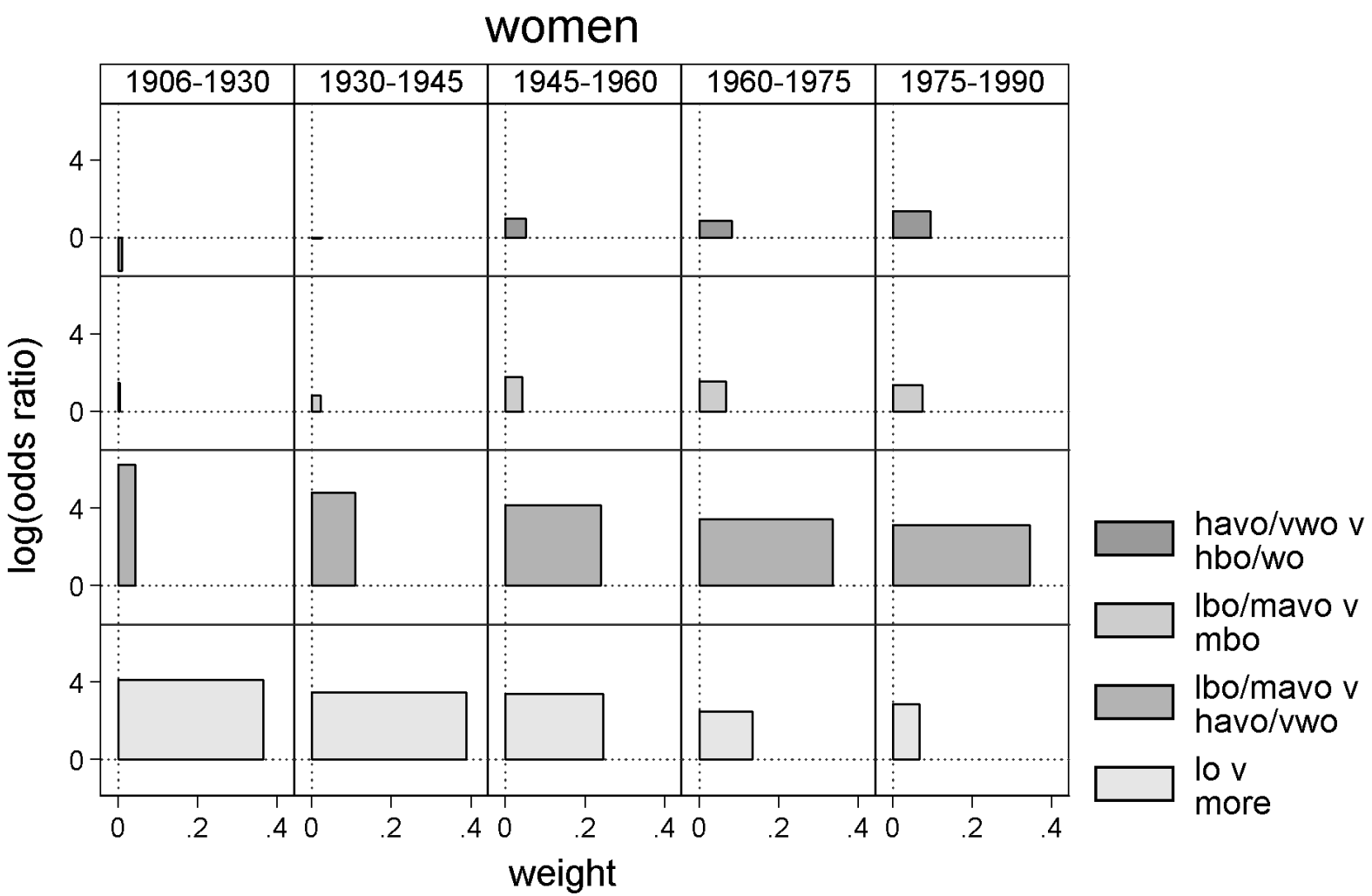
The pattern that needs to be explained



Partial IEOs and their weights for men



Partial IEOs and their weights for women



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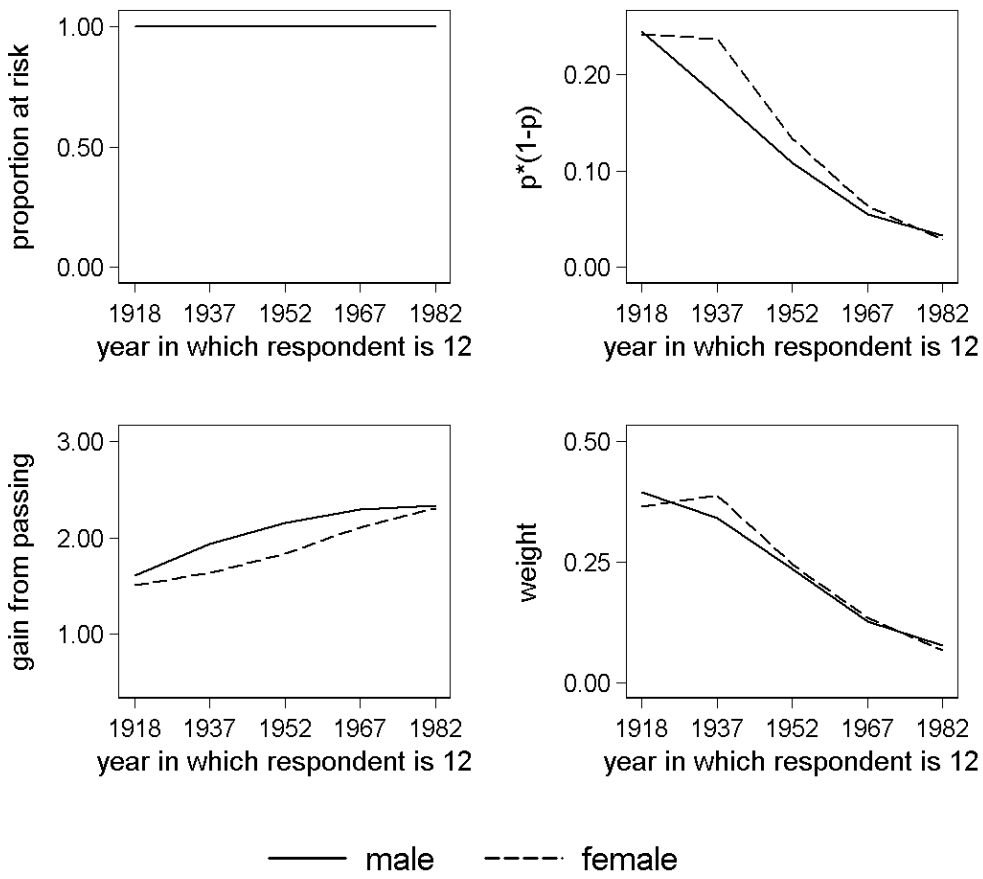
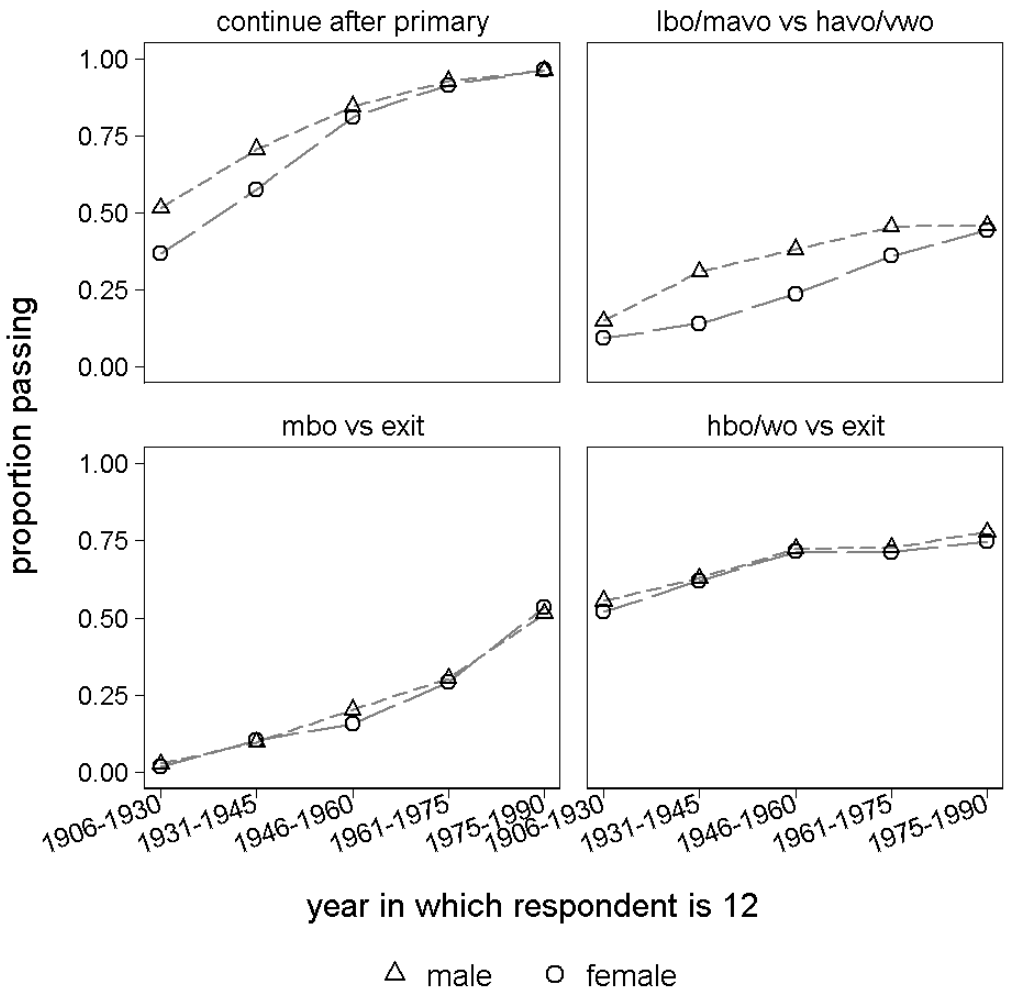
- This happened more slowly for women, and
- for women the increase and decrease partially canceled each other out.

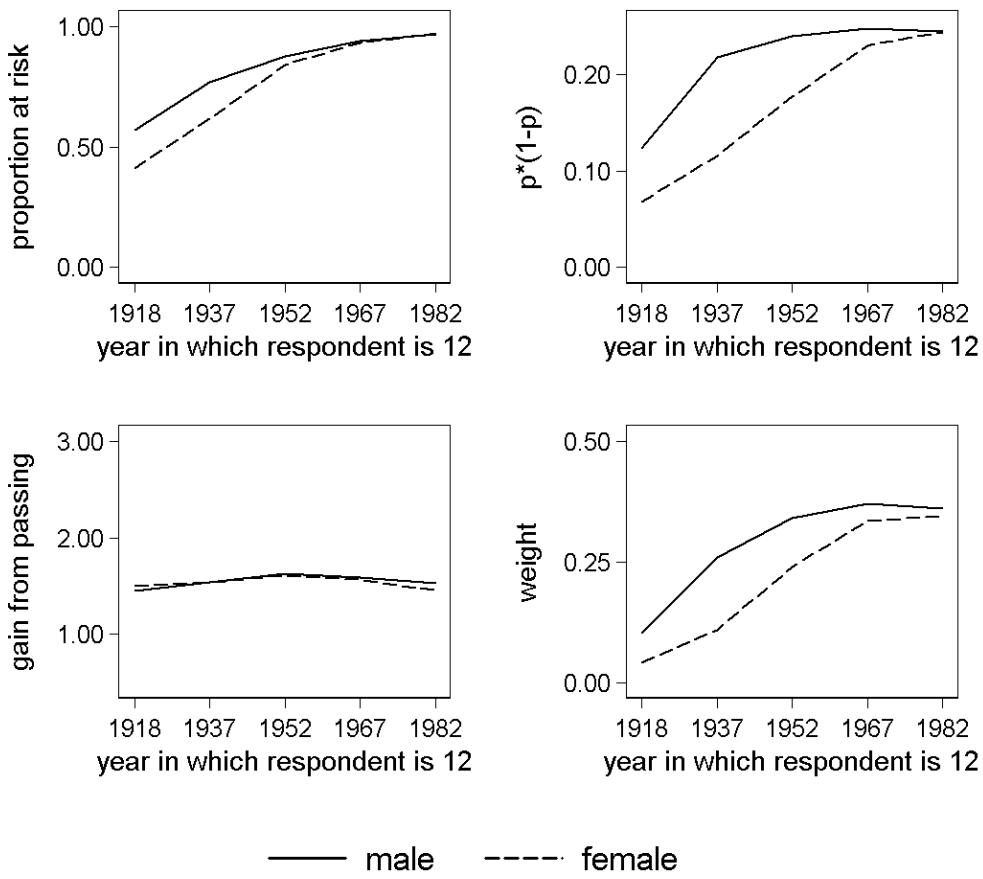
Weight for transition continue after primary



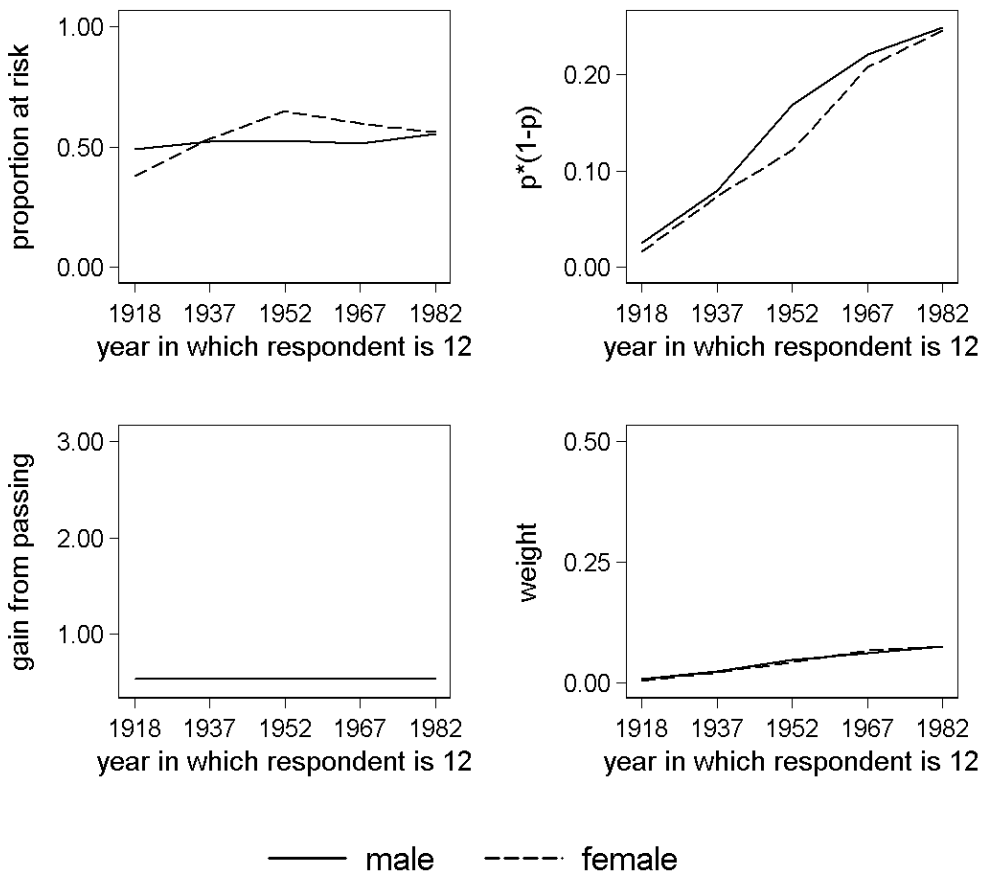
Proportions passing transitions



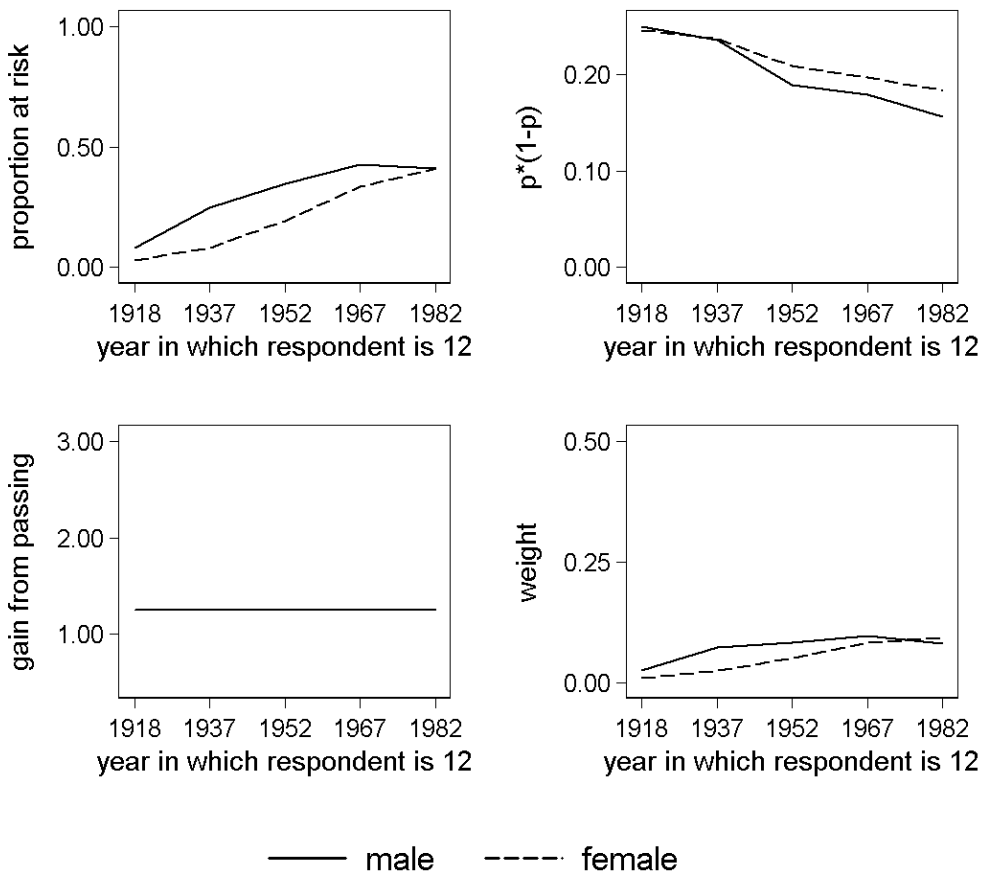
Weight for transition high track v. low track



Weight for transition continue in low track



Weight for transition continue in high track



differences in weights and differences in transition proportions

- Differences between men and women were primarily caused by:
  - the later increase in the proportion of women that continued after primary, and
  - the later increase in the proportion of women that went to the higher track.

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  - the proportion at risk increases,
  - the proportion that passes is closer to .50,
  - the expected increase in level of education increases

Conclusion

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- This relationship can be used to:
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  - Partial and overall IEO can be related to one another
  - to explain differences in overall IEO with well documented phenomena like educational expansion or the decreased disadvantaged position of women in education.

References

Robert D. Mare.
Change and Stability in Educational Stratification.
American Sociological Review, 46(1):72–87, 1981.

levels of education

English name	before 1968	after 1968	years†	ISCED
primary	LO	lo	6	1
extended primary	VGLO	-	7	1
junior vocational	LTS / ambachtschool	lbo	10	2C
junior vocational	LHNO / huishoudschool	lbo	10	2C
junior general secondary	ULO / MULO	mavo	9 / 10	2B‡
senior secondary vocational	MTS	mbo	14	3C
senior general secondary	MMS	havo	11	3B‡
pre-university	HBS	vwo	12	3A‡
pre-university	lyceum	vwo	12	3A
pre-university	gymnasium	vwo	12	3A
higher professional	HTS	hbo	15	5B
university	universiteit	wo	16	5A

† Years refer to the situation after 1968 except VGLO.

‡ These levels were originally intended to be terminal levels of education for most students (so 2C or 3C) but evolved into levels that primarily grant access to subsequent levels of education.

Mare and OLS


men
women
expected level of education
father's occupational status in isei scores
1
0
-1
-2
20
40
60
80
1912-1930
1930-1945
1945-1960
1960-1975
1975-1988

Scaling of education

$$\ln(inc) = \beta_0 + \underbrace{\beta_1}_{0} lo + \beta_2 lbo\_mavo + \beta_3 havo\_vwo + \beta_4 mbo + \beta_5 hbo\_wo + \cdots$$

Scaling of education

$$\ln(inc) = \beta_0 + \underbrace{\beta_1}_{0} lo + \beta_2 lbo\_mavo + \beta_3 havo\_vwo + \beta_4 mbo + \beta_5 hbo\_wo + \cdots$$

$$ed = \underbrace{\alpha_1}_{0} lo + \alpha_2 lbo\_mavo + \alpha_3 havo\_vwo + \alpha_4 mbo + \underbrace{\alpha_5}_{1} hbo\_wo$$

Scaling of education

$$\ln(inc) = \beta_0 + \underbrace{\beta_1}_{0} lo + \beta_2 lbo\_mavo + \beta_3 havo\_vwo + \beta_4 mbo + \beta_5 hbo\_wo + \cdots$$

$$ed = \underbrace{\alpha_1}_{0} lo + \alpha_2 lbo\_mavo + \alpha_3 havo\_vwo + \alpha_4 mbo + \underbrace{\alpha_5}_{1} hbo\_wo$$

$$\begin{aligned} \ln(inc) &= \beta_0 + \gamma_1 ed + \cdots \\ &= \beta_0 + \gamma_1 (\underbrace{\alpha_1}_{0} lo + \alpha_2 lbo\_mavo + \alpha_3 havo\_vwo + \\ &\quad \alpha_4 mbo + \underbrace{\alpha_5}_{1} hbo\_wo) + \cdots \end{aligned}$$

Scaling of education

$$
\begin{aligned}
\gamma_1 &= \beta_5 \\
\alpha_1 &= 0 \\
\alpha_2 &= \frac{\beta_2}{\beta_5} \\
\alpha_3 &= \frac{\beta_3}{\beta_5} \\
\alpha_4 &= \frac{\beta_4}{\beta_5} \\
\alpha_5 &= 1
\end{aligned}
$$

Scaling of education

		b	se
α			
	lo	0	.
	lbo/mavo	.391	.017
	mbo	.562	.023
	havo/vwo	.659	.022
	hbo/wo	1	.
γ			
	1958-1975	.060	.050
	1975-1990	-.166	.025
	1990-2005	.192	.027
	constant	.474	.074
other			
	1958-1975	.865	.034
	1975-1990	.347	.019
	1990-2005	.161	.022
	fisei	.496	.125
	1958-1975Xfisei	-.077	.086
	1975-1990Xfisei	-.132	.044
	1990-2005Xfisei	.073	.042
	age	.115	.004
	age2	-.071	.003
	constant	4.88	.049