# A multi-country study of inter-generational educational mobility

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## Abstract

This paper analyses intergenerational educational mobility using survey data for twenty countries. We find a number of interesting patterns emerge. Estimating a measure of mobility as movement and an index of mobility as equality of opportunity we that while these two measures are positively correlated the correlation is less than perfect. Examining the link with educational inequality we find evidence which suggests an inverse relationship consistent with egalitarian theory. The relationship between mobility appears to be weak, high returns to education do not depress mobility, as human capital theory would suggest. Mobility appears to be somewhat higher for men whereas equality is much the same for both sexes. There is evidence that mobility as equality of opportunity has risen consistent with modernization theory. The increased penalty between cohorts to having poorly educated parents is consistent with the socialist transformation hypothesis. Estimates of marginal mobility are quite different from average mobility.

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## 7 Tables and Figures 2-12

```
Table 1     Correlation of the four indices

     n=20    |     Bart    Ml     Gini     Cov
------------+-----------------------------------
     Bart |   1.0000
       Ml |   0.3138   1.0000
     Gini |  -0.2816  -0.3936   1.0000
      Cov |  -0.4662  -0.5820   0.6133   1.0000
```

Table 2     Tests of rank correlation: Kendall's tau

|          | **Gini**  | **Cov**   |
|----------|-----------|-----------|
| **Bart** | **-0.3766** | **-0.1948** |
|          | (0.0153)  | (0.2147)  |
| **Ml**   | **-0.2000** | **-0.3579** |
|          | (0.2300)  | (0.0297)  |

The number in parentheses is the p value of a test for independence under the null.

Table 3 Descriptive Statistics by sex
Males

```
            |     Obs      Mean   Std. Dev.      Min        Max
------------+-------------------------------------------------
     Bart |      20   .9305866   .1511479   .6557019   1.095383
       Ml |      20   .6877705   .1015067    .489484   .8927329
     Gini |      20    .164585    .034248    .12669     .27383
      Cov |      20   .3651245   .1119309    .24068     .63526
```

(B) Females

```
            |     Obs      Mean   Std. Dev.      Min        Max
------------+-------------------------------------------------
     Bart |      20   .8999896   .1429455   .5458524   1.065197
    Mlnew |      20   .6715682   .0799508   .5361774   .8882126
     gini |      20    .158682   .0337476    .11496     .24873
      cov |      20    .360218    .12513     .21164      .6961
```

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Table 4 Tests for rank correlations between indices by sex

**Males**

|       | Gini    | Cov     |
|-------|---------|---------|
| **Bart** | **-0.0842** | **0.0316** |
|       | 0.6265  | 0.8711  |
| **Ml** | **-0.0947** | **-0.4211** |
|       | 0.5813  | 0.0104  |

**Females**

|       | Gini    | Cov     |
|-------|---------|---------|
| **Bart** | **-0.2526** | **-0.1474** |
|       | 0.1273  | 0.3810  |
| **Ml2** | **-0.0947** | **-0.2000** |
|       | 0.5813  | 0.2300  |

The number in parentheses is the p value of a test for independence under the null.

Table 5 Descriptive Statistics by cohort :
Respondents less than 46 years

|       | Obs | Mean     | Std. Dev. | Min      | Max      |
|-------|-----|----------|-----------|----------|----------|
| Bart  | 20  | .910367  | .1583675  | .6176969 | 1.113651 |
| Ml    | 20  | .7439613 | .1014402  | .5401903 | .9450729 |
| Gini  | 20  | .149516  | .0302514  | .10501   | .21094   |
| Cov   | 20  | .4036205 | .173401   | .20126   | .79009   |

(B) Respondents 46 years or older

|       | Obs | Mean     | Std. Dev. | Min      | Max      |
|-------|-----|----------|-----------|----------|----------|
| Bart  | 20  | .8853067 | .156903   | .6318393 | 1.081848 |
| Ml    | 20  | .5587668 | .094902   | .4024441 | .7572153 |
| Gini  | 20  | .216768  | .0654647  | .13376   | .40472   |
| Cov   | 20  | .5693485 | .2188528  | .30411   | 1.02258  |

Table 6 Correlations of changes in indices  between cohorts

|       | $\Delta$Bart | $\Delta$Ml | $\Delta$Gini | $\Delta$Cov |
|-------|--------------|------------|--------------|-------------|
| $\Delta$Bart | 1.0000 |        |        |        |
| $\Delta$Ml   | 0.4252 | 1.0000 |        |        |
| $\Delta$Gini | 0.0738 | -0.3490 | 1.0000 |        |
| $\Delta$Cov  | 0.1428 | -0.1329 | 0.7339 | 1.0000 |

Table 7: Paternal educational effect on the probability of obtaining education level 4 or above – Men

| | Dad education missing | Dad Lev 1 | Dad Lev 2 | Dad Lev 3 | Dad Lev 4 |
|---|---|---|---|---|---|
| Belgium | -0.173 | -0.216 | -0.155 | -0.109 | 0.004 |
| | *-2.04* | *-2.54* | *-2.02* | *-1.39* | *-0.04* |
| Canada(Eng) | -0.4 | -0.416 | -0.389 | -0.37 | -0.259 |
| | *-6.67* | *-5.61* | *-6.42* | *-5.4* | *-3.53* |
| Canada(Fr) | -0.634 | -0.884 | -0.47 | -0.406 | -0.376 |
| | *-5.95* | *-4.56* | *-4.59* | *-2.52* | *-3.39* |
| Chile | -0.149 | -0.151 | -0.068 | -0.005 | -0.187 |
| | *-3.12* | *-2.54* | *-1.35* | *-0.09* | *-1.6* |
| Czech | -0.133 | -0.125 | -0.138 | -0.066 | -0.021 |
| | *-3.35* | *-3.4* | *-3.7* | *-1.88* | *-0.19* |
| Denmark | -0.259 | -0.195 | -0.205 | -0.172 | -0.092 |
| | *-3.74* | *-3.28* | *-4.1* | *-3.54* | *-1.2* |
| Finland | -0.104 | -0.198 | -0.063 | -0.085 | -0.064 |
| | *-1.55* | *-2.83* | *-0.91* | *-1.34* | *-0.81* |
| Great Britain | -0.262 | -0.207 | -0.301 | -0.128 | -0.071 |
| | *-4.91* | *-3.95* | *-4.16* | *-2.03* | *-0.75* |
| Germany | -0.205 | -0.185 | -0.506 | -0.182 | -0.088 |
| | *-2.64* | *-2.17* | *-5.09* | *-3.23* | *-0.66* |
| Hungary. | -0.133 | -0.216 | -0.148 | -0.133 | -0.053 |
| | *-3.78* | *-5.27* | *-3.97* | *-3.61* | *-0.36* |
| Ireland | -0.171 | -0.293 | -0.155 | -0.105 | -0.11 |
| | *-3.5* | *-3.38* | *-3.23* | *-1.89* | *-1.54* |
| Italy | -0.084 | -0.267 | -0.068 | -0.05 | -0.053 |
| | *-2.76* | *-4.89* | *-2.33* | *-1.69* | *-1.02* |
| Netherlands. | -0.174 | -0.25 | -0.137 | -0.102 | |
| | *-3.37* | *-5.7* | *-3.35* | *-2.43* | |
| N'Ireland | -0.175 | -0.243 | -0.208 | -0.115 | -0.111 |
| | *-3.13* | *-3.62* | *-3.55* | *-2.25* | *-1.9* |
| Norway | -0.185 | -0.189 | -0.211 | -0.087 | -0.022 |
| | *-2.9* | *-2.29* | *-4.56* | *-1.97* | *-0.33* |
| N Zealand | -0.269 | -0.227 | -0.219 | -0.132 | -0.011 |
| | *-4.32* | *-3.64* | *-3.38* | *-1.97* | *-0.14* |
| Poland | -0.103 | -0.247 | -0.112 | -0.075 | -0.069 |
| | *-3.37* | *-4.53* | *-3.65* | *-2.36* | *-1.35* |
| Slovenia | -0.154 | -0.149 | -0.192 | -0.147 | -0.03 |
| | *-4.13* | *-3.59* | *-4.1* | *-3.34* | *-0.45* |
| Sweden. | -0.189 | -0.208 | -0.041 | -0.039 | -0.031 |
| | *-2.47* | *-2.78* | *-0.47* | *-0.54* | *-0.35* |
| Switz. (Fr) | -0.16 | -0.274 | -0.148 | -0.143 | -0.016 |
| | *-1.21* | *-3.02* | *-1.55* | *-1.66* | *-0.14* |
| Switz. (G) | -0.173 | -0.256 | -0.308 | -0.292 | -0.186 |
| | *-1.15* | *-2.61* | *-3.53* | *-3.03* | *-1.97* |
| USA | -0.445 | -0.337 | -0.392 | -0.294 | -0.101 |
| | *-6.52* | *-4.71* | *-5.66* | *-4.5* | *-1.01* |

Note: Model estimated by probit. The full specification also includes dummies for maternal education, whether child language is the official language of the country, whether currently living in a rural area and a quadratic in age at the time of the survey. The population is reweighted to be nationally representative. Marginal effects are reported in the first line for each country while T-statistics are reported in *italic*.

Table 8 : Paternal educational effect on the probability of obtaining
education level 4 or above – Women

| | Dad education missing | Dad Lev 1 | Dad Lev 2 | Dad Lev 3 | Dad Lev 4 |
|---|---|---|---|---|---|
| Belgium | -0.173 | -0.239 | -0.127 | -0.079 | -0.105 |
| | *-2.54* | *-2.95* | *-1.82* | *-1.06* | *-0.97* |
| Canada (Eng) | -0.355 | -0.414 | -0.251 | -0.212 | -0.103 |
| | *-6.33* | *-6.96* | *-4.24* | *-3.52* | *-1.25* |
| Canada. (Fr) | -0.24 | -0.161 | -0.188 | -0.148 | -0.167 |
| | *-2.49* | *-1.33* | *-1.9* | *-1.07* | *-1.47* |
| Chile | -0.12 | -0.207 | -0.113 | -0.094 | -0.045 |
| | *-3.63* | *-4.96* | *-3.96* | *-3.1* | *-0.69* |
| Czech | -0.066 | -0.088 | -0.087 | -0.036 | -0.004 |
| | *-3.11* | *-4.43* | *-4.23* | *-2.03* | *-0.1* |
| Denmark. | -0.233 | -0.263 | -0.265 | -0.217 | -0.124 |
| | *-4.12* | *-5.64* | *-5.75* | *-4.83* | *-1.68* |
| Finland | -0.138 | -0.131 | -0.112 | -0.002 | -0.034 |
| | *-2.48* | *-2.04* | *-1.97* | *-0.04* | *-0.5* |
| Great Britain | -0.172 | -0.153 | -0.212 | -0.006 | -0.048 |
| | *-4.29* | *-3.88* | *-4.05* | *-0.09* | *-0.8* |
| Germany. | -0.15 | -0.034 | -0.341 | -0.138 | -0.121 |
| | *-3.48* | *-0.2* | *-5.88* | *-4.71* | *-1.06* |
| Hungary | -0.202 | -0.258 | -0.208 | -0.173 | -0.097 |
| | *-5.39* | *-5.62* | *-4.84* | *-4.21* | *-1.17* |
| Ireland | -0.113 | -0.156 | -0.07 | -0.024 | -0.009 |
| | *-2.36* | *-2.57* | *-1.5* | *-0.45* | *-0.09* |
| Italy | -0.041 | -0.173 | -0.044 | -0.039 | -0.049 |
| | *-1.57* | *-4.41* | *-2.34* | *-2.15* | *-1.52* |
| Netherland | -0.153 | -0.237 | -0.147 | -0.102 | |
| | *-5.86* | *-7.74* | *-5.28* | *-3.72* | |
| N'Ireland | -0.195 | -0.177 | -0.164 | -0.075 | -0.139 |
| | *-3.87* | *-2.76* | *-2.74* | *-1.02* | *-1.95* |
| Norway | -0.233 | -0.243 | -0.361 | -0.237 | -0.147 |
| | *-5.19* | *-3.12* | *-7.57* | *-5.31* | *-2.71* |
| New Zealand | -0.257 | -0.203 | -0.241 | -0.143 | -0.125 |
| | *-6.18* | *-4.81* | *-5.14* | *-3.29* | *-2.72* |
| Poland | -0.142 | -0.247 | -0.117 | -0.058 | -0.105 |
| | *-3.92* | *-3.81* | *-2.79* | *-1.23* | *-1.81* |
| Slovenia | -0.178 | -0.234 | -0.291 | -0.192 | -0.122 |
| | *-4.2* | *-5.51* | *-4.99* | *-3.56* | *-2.26* |
| Sweden. | -0.223 | -0.24 | -0.12 | -0.088 | -0.13 |
| | *-2.74* | *-3.08* | *-1.43* | *-1.2* | *-1.5* |
| Switz. (Fr) | -0.092 | -0.097 | -0.072 | -0.088 | -0.04 |
| | *-2.25* | *-2.44* | *-1.89* | *-2.38* | *-0.94* |
| Switz. (G) | -0.022 | -0.045 | -0.096 | -0.135 | -0.057 |
| | *-0.29* | *-0.73* | *-2.43* | *-2.87* | *-1.42* |
| USA | -0.348 | -0.298 | -0.27 | -0.215 | -0.001 |
| | *-6.41* | *-5.45* | *-4.75* | *-4.33* | *-0.01* |

Note: Model estimated by probit. The full specification also includes
dummies for maternal education, whether child language is the
official language of the country, whether currently living in a rural
area and a quadratic in age at the time of the survey. The population
is reweighted to be nationally representative. Marginal effects are
reported in the first line for each country while T-statistics are
reported in *italic*.

Table 9 : Ranking of Equality of opportunities in Education

| | Men | | Women | | Combined |
| --- | --- | --- | --- | --- | --- |
| | Rank 1 | Rank 2 | Rank 1 | Rank 2 | rank |
| Belgium (Fl.) | 10 | 9 | 8 | 10 | 9 |
| Canada. (Eng) | 22 | 22 | 20 | 19 | 22 |
| Canada. (Fr) | 23 | 23 | 17 | 23 | 23 |
| Chile | 1 | 21 | 11 | 8 | 10 |
| Czech | 4 | 1 | 4 | 3 | 1 |
| Denmark | 17 | 16 | 22 | 21 | 20 |
| Finland | 6 | 2 | 1 | 5 | 2 |
| Great Britian | 12 | 15 | 2 | 14 | 11 |
| Germany | 18 | 17 | 15 | 16 | 19 |
| Hungary. | 14 | 4 | 18 | 17 | 14 |
| Ireland | 9 | 9 | 3 | 6 | 5 |
| Italy | 3 | 7 | 5 | 7 | 3 |
| Netherlands | 8 | 6 | 13 | 9 | 7 |
| North' Ireland | 11 | 12 | 7 | 13 | 11 |
| Norway | 7 | 13 | 23 | 22 | 18 |
| N Zealand | 13 | 14 | 16 | 15 | 17 |
| Poland. | 5 | 5 | 6 | 12 | 6 |
| Slovenia. | 16 | 11 | 19 | 18 | 15 |
| Sweden. | 2 | 3 | 9 | 11 | 4 |
| Switz. (Fr) | 15 | 8 | 9 | 4 | 7 |
| Switz. (G) | 20 | 19 | 14 | 1 | 15 |
| | | | | | |
| USA | 21 | 18 | 21 | 20 | 21 |
| Rank Correlation, Pr(independent) | | 0.0001 | | 0.0007 | |

Note: Rank 1 is based on the estimate of the penalty associated with having a father with secondary education rather than the highest level of education. Rank 2 is based on the paternal educational level associated with a reduction of 15 percentage points in the probability of getting college education. Draws are separated by the estimate associated with this paternal level of education. The probability of independence of the two distributions of rank is calculated using the Kendall score.

## Figure 2 Eigen value index against Gini coefficient of schooling



Lowess smoother, bandwidth = .8
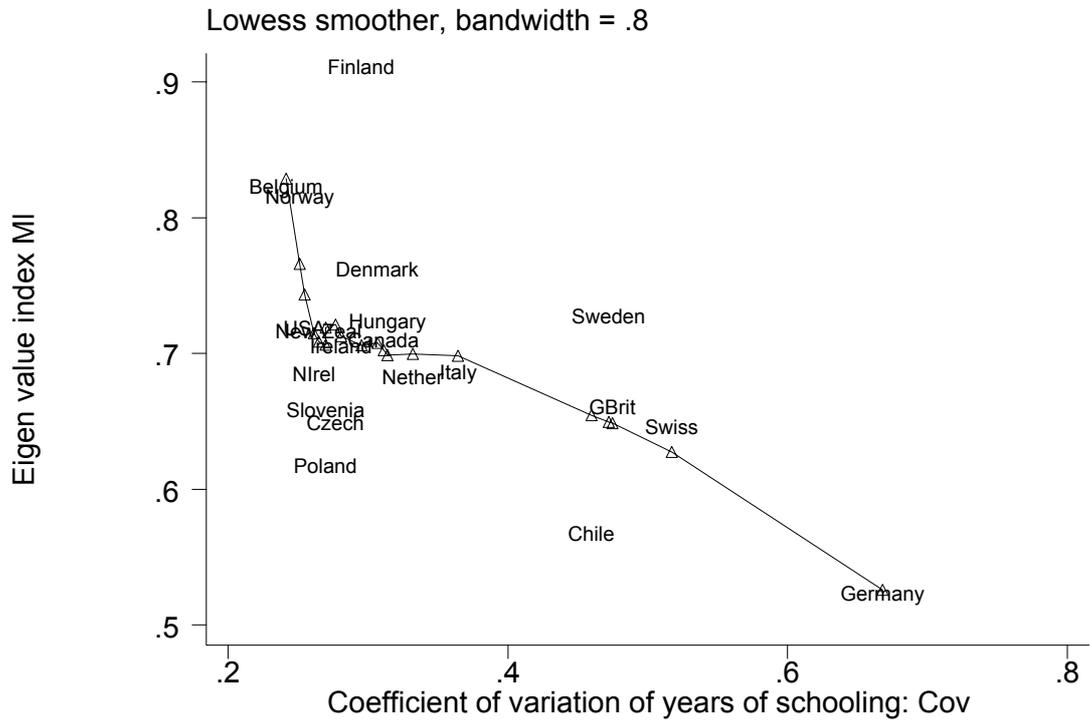
## Figure 3 Bartholomew Index against Gini coefficient of schooling



Lowess smoother, bandwidth = .8
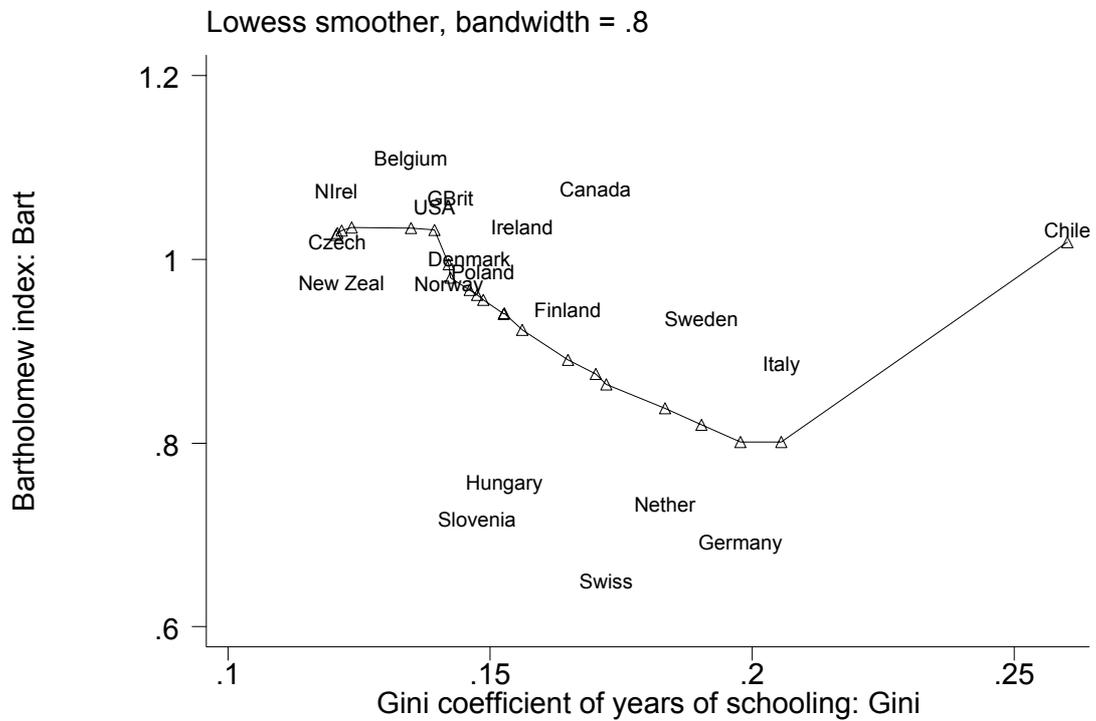
**Figure 4 Estimated Return to schooling against Eigen value index (Ml) : Males**

Males
Lowess smoother, bandwidth=0.8
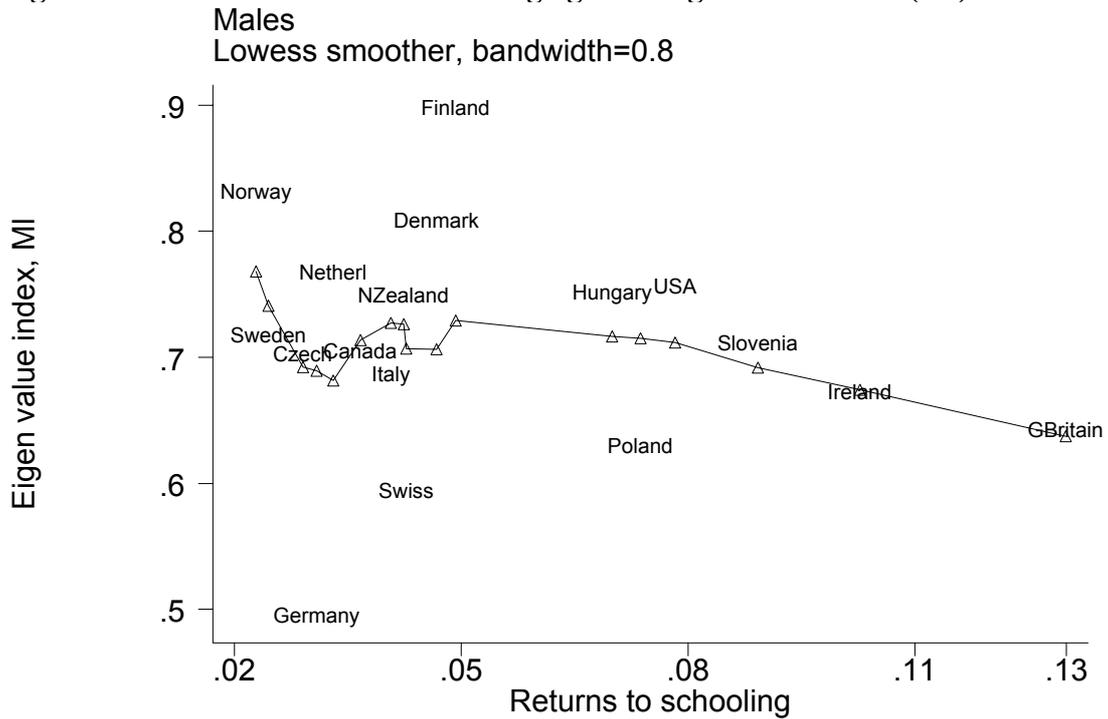


**Figure 5 Estimated Return to schooling against Eigen value index (Ml) : Females**

Females
Lowess smoother, bandwidth=0.8
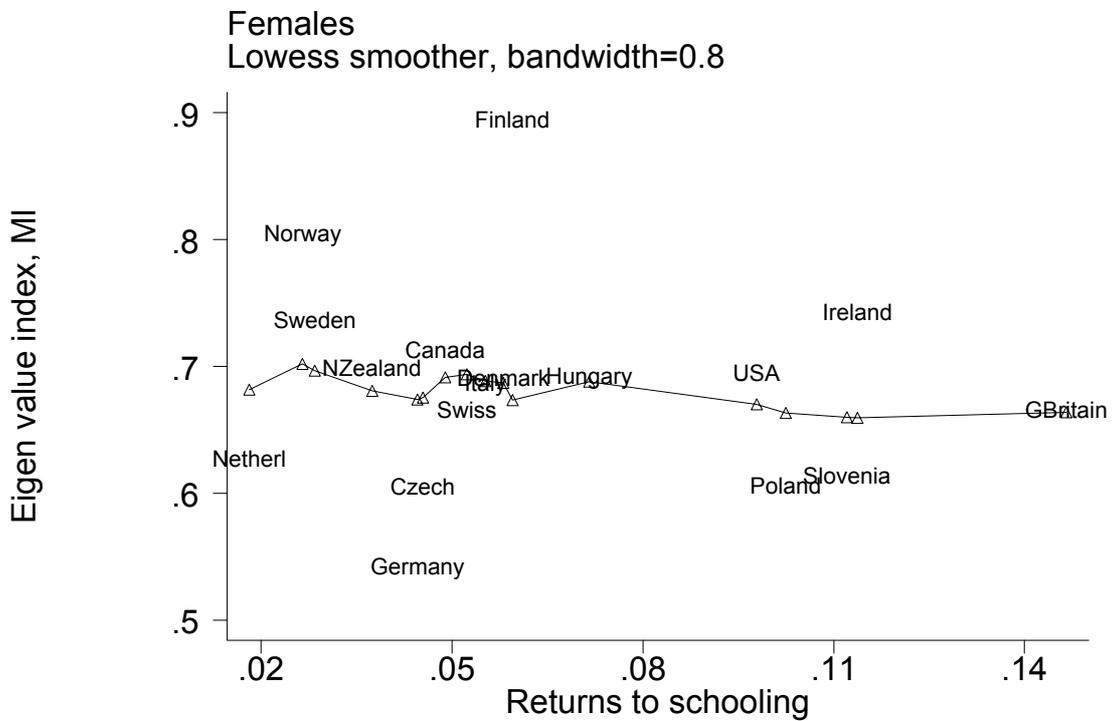
**Figure 6 Estimated returns to schooling against Bartholomew index : Males**

Males
Lowess smoother, bandwidth=0.8
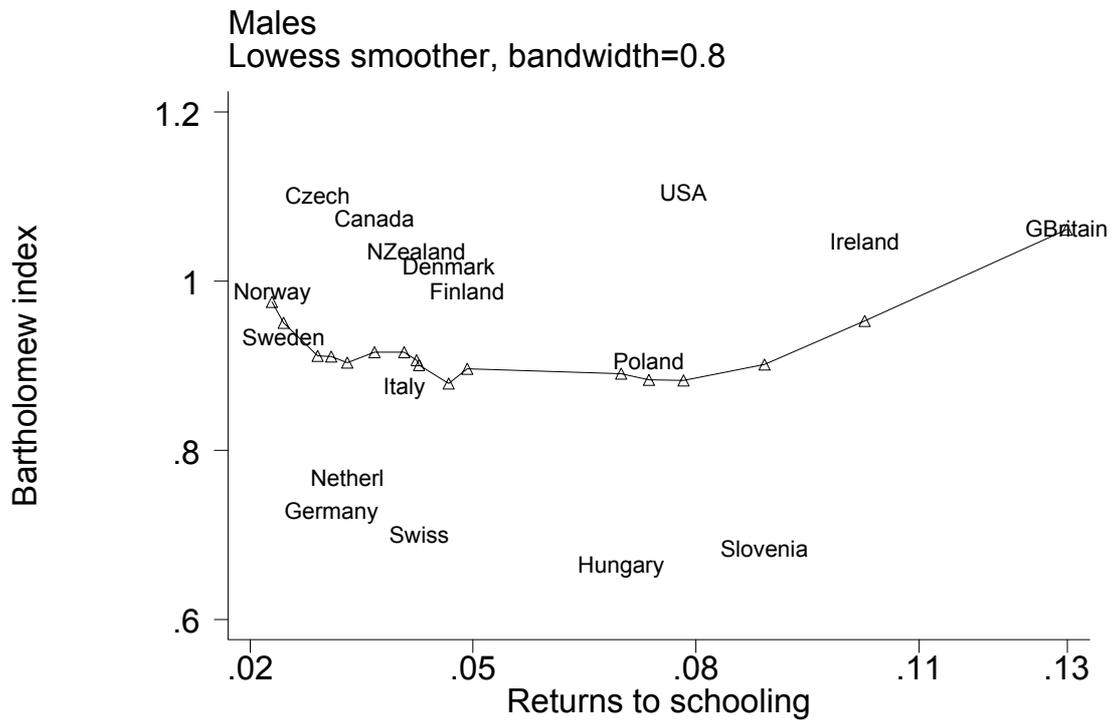


**Figure 7 Estimated returns to schooling against Bartholomew index : Females**

Females
Lowess smoother, bandwidth=0.8



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**Figure 8**



Changes in Eigen value index (MI) between cohorts

**Figure 9**



Changes in Bartholomew index (Bart) between cohorts
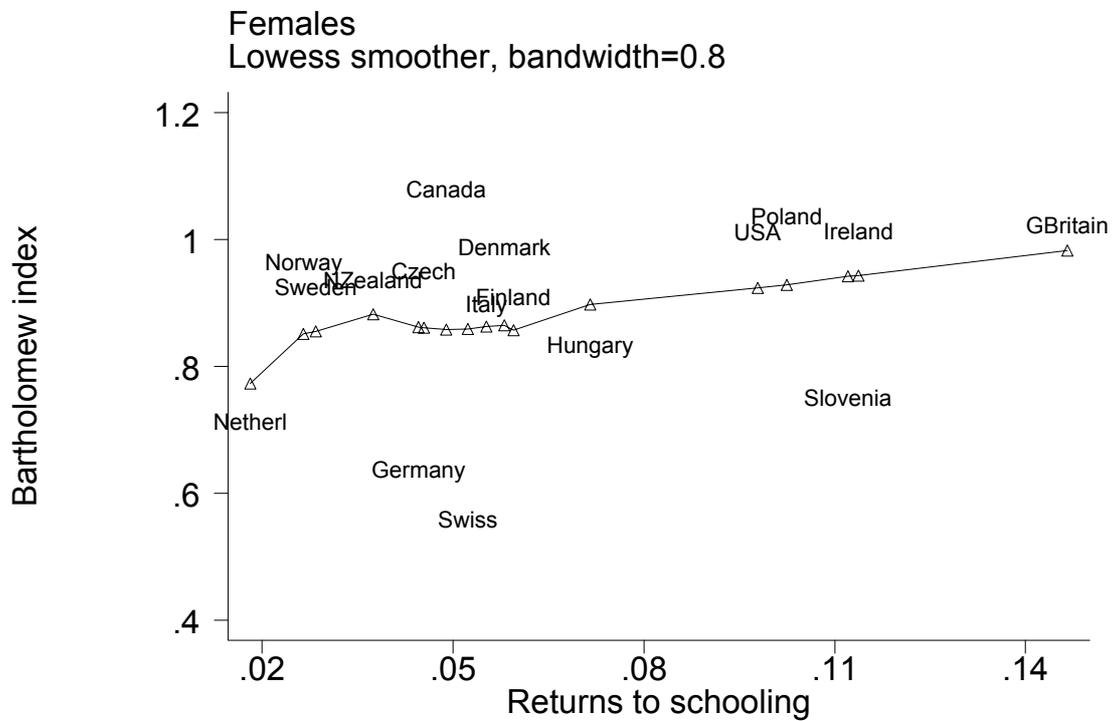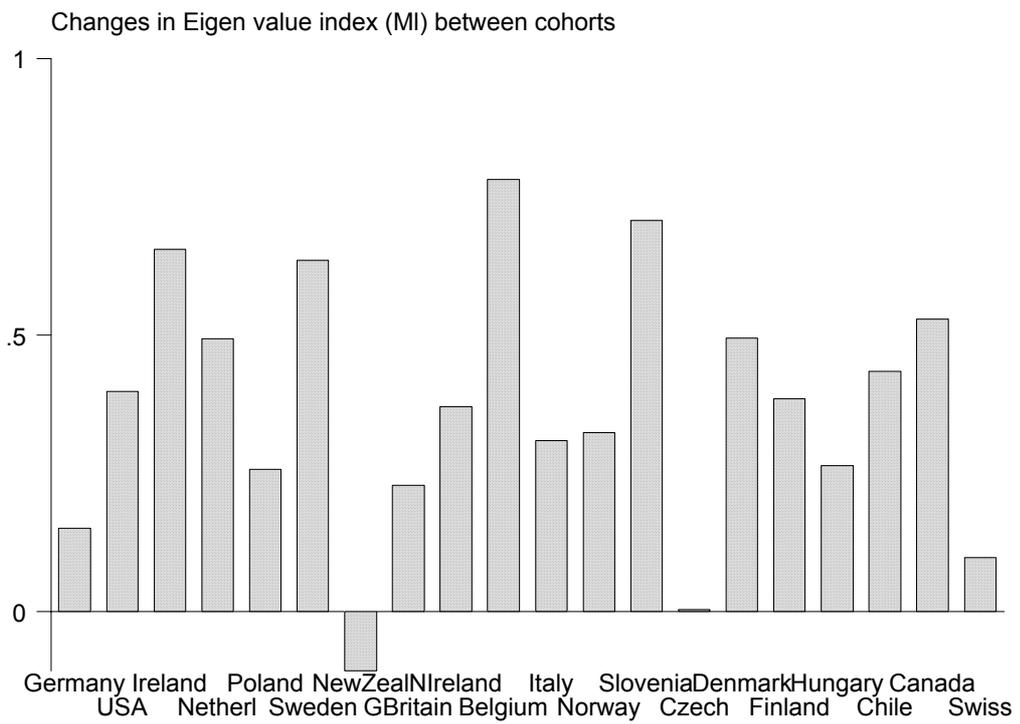
9
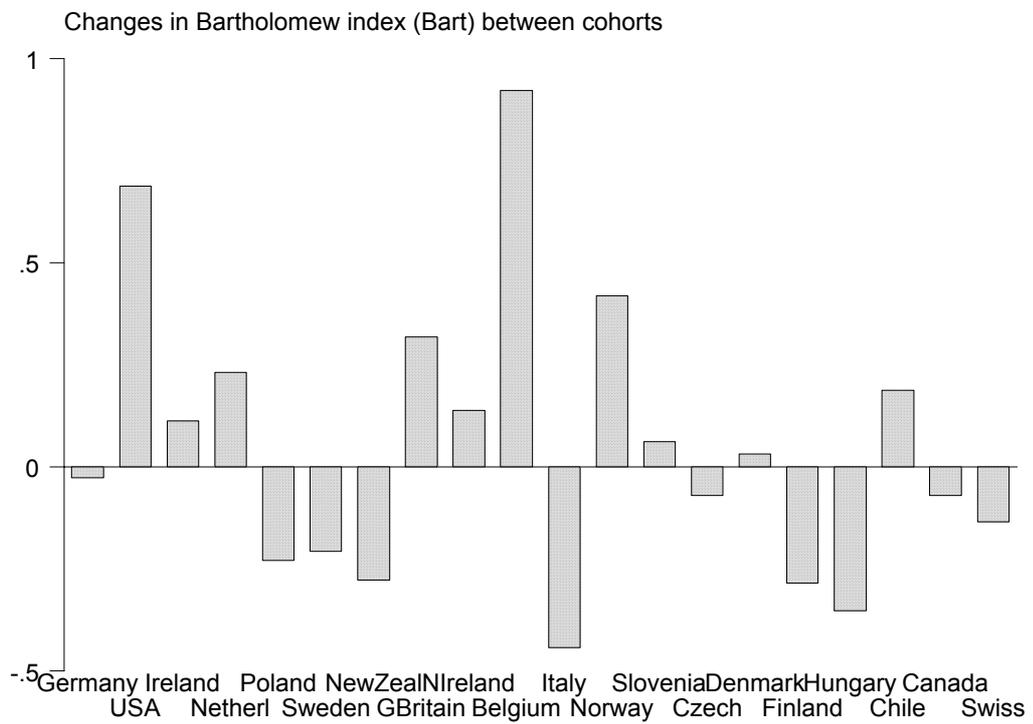
**Figure 10 Changes in Eigen vale index (Ml) against initial level**



Lowess smoother, bandwidth = .8
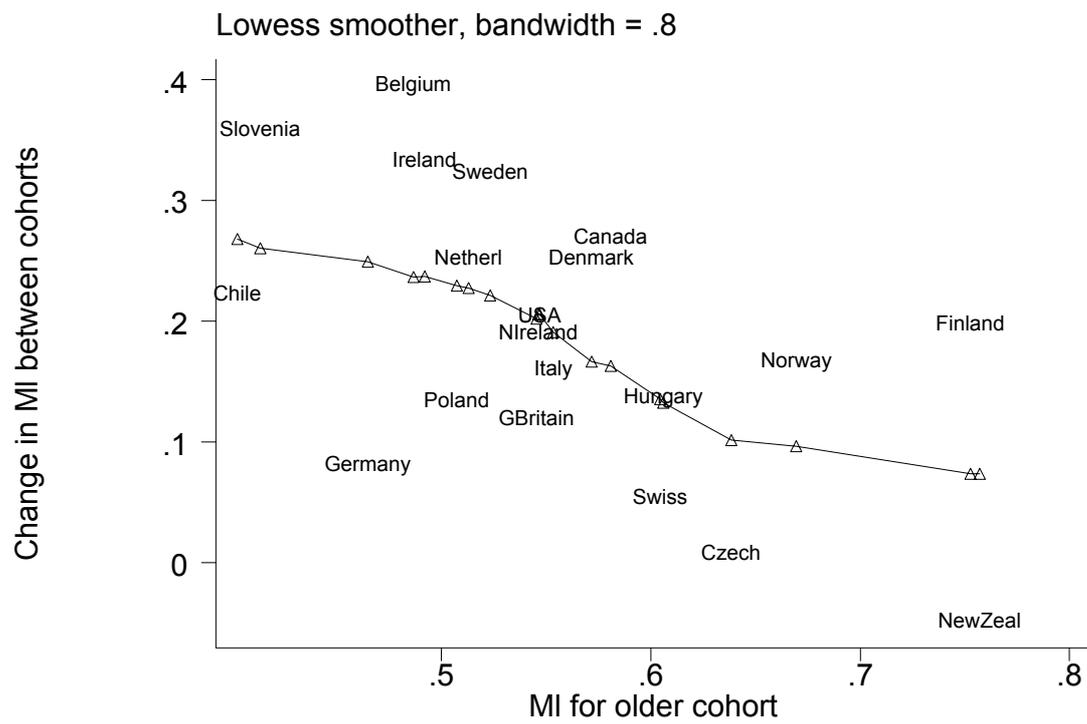
**Figure 11 Non parametric densities of Eigen value index, young & old**
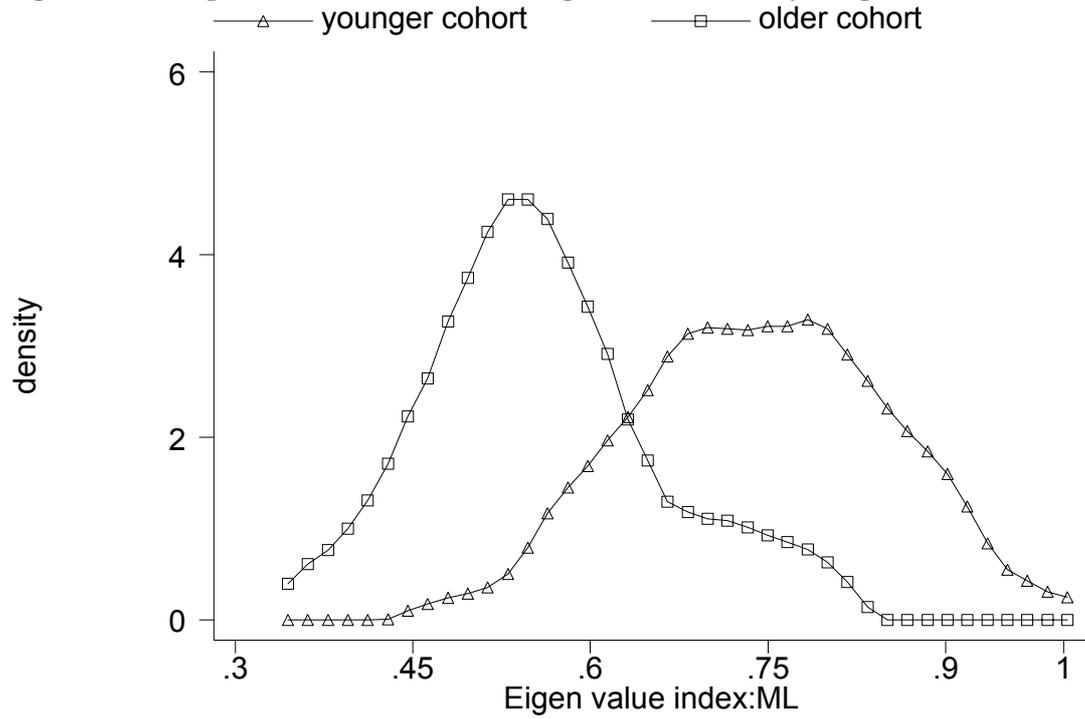


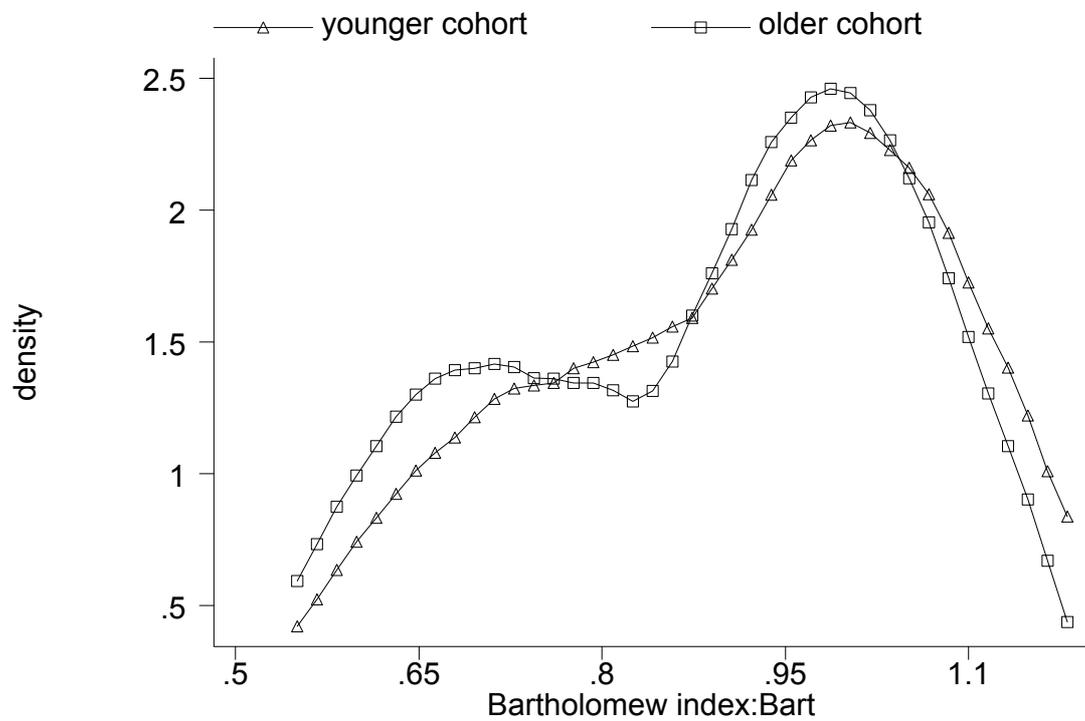**Figure 12 Non parametric densities of Bartholomew index, young & old**



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**Figure 13: Proportion of individuals with education at level 4 or above**
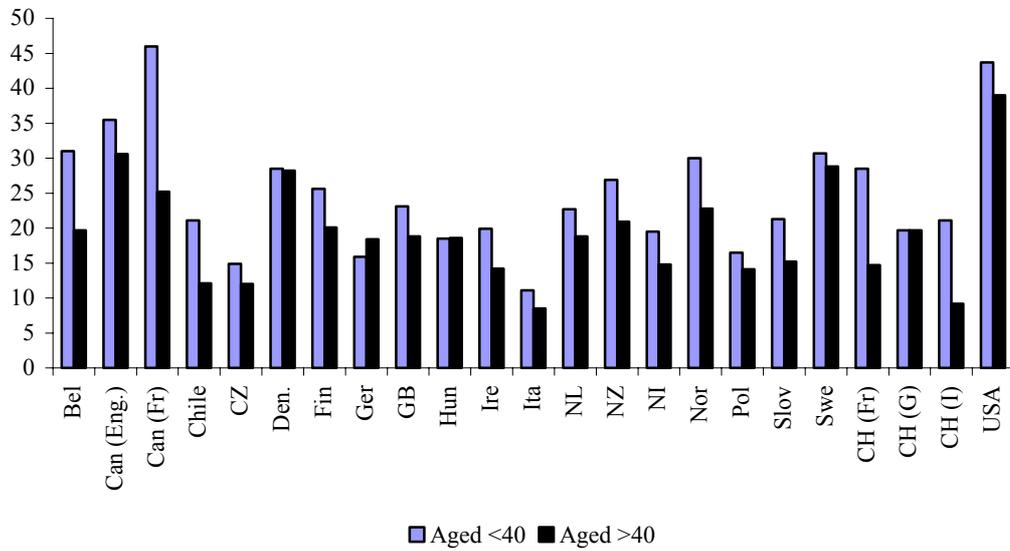


Aged <40  Aged >40

**Figure 14: Penalty in having a father with secondary education relative to university in the probability of obtaining more than secondary education**



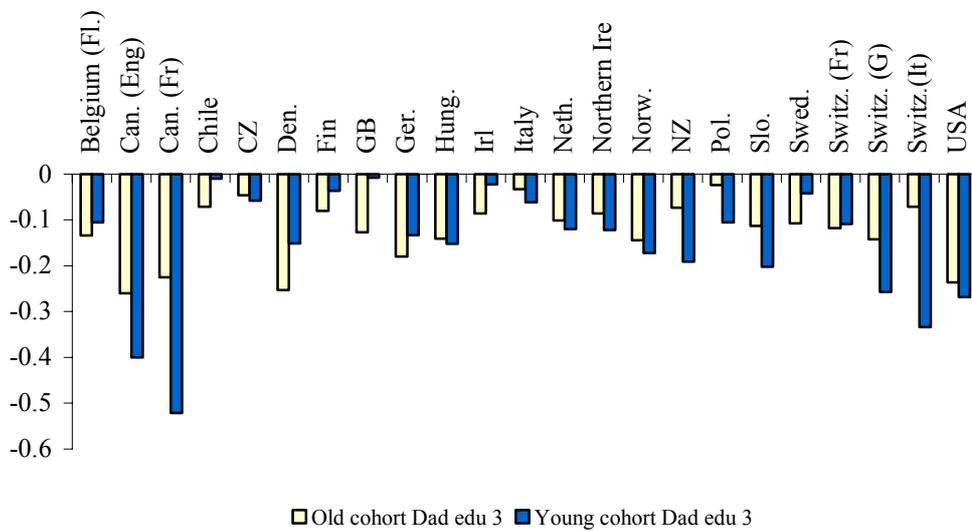Old cohort Dad edu 3  Young cohort Dad edu 3

# Figure 15: Evolution in proportion with tertiary education and paternal effect

Running mean smoother, bandwidth = .4