How much does assortative mating, status exchange and being single contribute to household income inequality? The case of Finland, 1987–2014

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Abstract

Previous studies covering various developed countries suggest that changes in educational homogamy have contributed only a little to the changes in income inequality, opposite to the expectations of many. In this paper we consider two potential reasons for the zero effects: the growing proportion of single adult households and status exchange between own education and parental background in the partnership market. We study these assumptions using register data on household income inequalities, education and parental class background in Finland 1987–2014. We study men's and women's households separately and focus on individuals aged 35–40. We focus on income inequality as measured by the Theil index as it can be decomposed into within- and between-group inequality and perform various decompositions and counterfactual analyses. The results suggest that selection into partnership is an important factor behind income inequality, covering most of the contribution of educational assortative mating on income inequality. Partnership homogamy explains a growing proportion of the between-group inequality linked to educational assortative mating. Status exchange plays a role, but the overall assortative mating by family background seems to be a more important factor contributing to income inequality. Over time, its role in income inequality seems to have remained steady.

Introduction

During the recent decades many influential social scientists have expressed their concerns about growing social inequalities within and between societies (e.g. Piketty 2014, Therborn 2013, Milanovic 2016). The observations appear to signal for an important historical change. The early years of modernity were characterised by growing inequalities, but since the late 19th century the differences in various forms of wellbeing between key social groups had been steadily diminishing. This progress seems to have reversed again during the last few decades.

Many of the the studies considering the potential reasons for this change have focused on demographic and labor market changes. If one of the key issues in income distribution in a society is the redistribution taking place within families (between

family members), changes in family and employment compositions may have a major impact on inequality (Sweeney & Cancian 2004). Further, it has often been assumed that increasing assortative mating may have boosted inequalities, in particular with an increasing proportion of dual earner households (Fernandez & Rogerson 2005; Schwarz & Mare 2005; Blossfeld & Timm 2003). Contrary to expectations, however, the overall conclusion of the previous studies seems to be that partnership homogamy and assortative mating in general has contributed only little to the change in income inequality (e.g., Breen & Salazar 2010, Breen & Andersen 2012; Boertien & Permayer 2017).

In this paper, we consider two potential explanations for the null findings. First, while the conclusions about the overall trends in assortative mating seem to vary considerably from country to country, the opposite is not true for partnerships. The contemporary trends in cohabitation, prolonged childbirths, separations and divorces, as well the growing life expectancy of the widowed have lead to an increasing number of single adult households. It might be that the key issue behind the changing levels of inequality is not so much the selection between different types of partners, but to partnership in general.

Second, previous studies have not considered the importance of family background. The main overall finding of previous literature is that family background plays a decisive role in adult attainment in all societies, and we should thereby expect it to boost income inequality in the same manner as assortative mating. However, its contribution to the *change* in inequality may be more complicated. Unlike in the case of income and health inequality, the evidence suggests that the trend towards increasingly equal chances to socioeconomic attainment by family background, observed since the second world war, has not been reversed in the most of the developed societies (e.g. Breen & Luijkx 2004). Thus it may be that the increased equality of opportunity has buffered the growth of income inequality, and particularly so as regards to the contribution of assortative mating. This may be explained by the process of status exchange (Kalmijn 2010; Schwartz et al 2016), allowing a number of spouse candidates to compensate their low education with their more advantageous family background. This should reduce the overall inequality between households.

We study these assumptions using register data on household income inequalities, education and parental class background in Finland 1987–2014 by decomposing the Theil index of income inequality.

Background

Various studies have considered the importance of assortative mating over and above the changes in educational distributions of the given societies. The overall conclusion of these studies seems to be that while a link between assortative mating and income inequality can often be found, the changes in the former do not seem to contribute to the changes in the latter much (e.g. Schwarz 2013; Boertien & Permanyer 2017).

Other related factors seemed to be more decisive, although these factors seem to vary considerably from one context to another. For instance, Breen & Salazar (2010) found

that assortative mating between spouses has contributed little to the change in inequality in Britain from 1979 to 2000. Rather the key issue seems to be the change in the distribution of the family earnership types, thus whether families have dual earniership or single male or female earners. For the US, the same authors found that assortative mating actually *reduced* income inequality from the 1970s to 2000s, opposite to the common assumption (Breen & Salazar 2011). More recent analyses on the US by Zagel and Breen (forthcoming) suggest that women's improving education and changes in men's employment contributed to the changes in income inequality from the 1990s to the 2000s. Eika et al. (2014) concluded in their comparison of the US and Norway somewhat similarly that the growing returns from education and thereby increases in income inequality because of it were mitigated partly by the rising education of women.

There is also some evidence on changing assortative mating contributing to the change in income inequality. For Denmark, Breen and Andersen (2012) found that the changes in assortative mating from 1987 to 2006 contributed to the increase in income inequality of up to 7 % of the Theil index. The strengthening association between income inequality and assortative mating was entirely attributed to the changes in men's and women's marginal distributions of education. The authors argue that due to the welfare state and regulated labor market, there might be less within educational group variation in social democratic welfare states, which then makes educational inequality more tightly connected to income inequality. If indeed these factors are decisive, similar patterns may also be observed in Finland.

The link between assortative mating and income inequality seems rather obvious and the null findings unexpected. Schwartz (2013) speculates on three potential reasons for the results: first, that the changes in assortative mating have been too small to observe the effect; second, that homogamy varies too much across the levels of education to be shown as observed effects on overall inequality; and third, the finding might result from the weak association between women's education and earnings. The first of these assumptions seems to be refuted by more recent findings. Based on their simulations on 21 counties in the LIS database, Boertien & Permanyer (2017) conclude that even if homogamy were maximized, it could not contribute much to income inequalities in the included countries. The second reason, on the other hand, rests mostly on the above cited evidence in Denmark.

But why should we consider the two other factors considered here, the growth of single headed households and family background, as potentially important? Let us consider first the importance of the growth of the single headed households. Previous studies have already established that the growing proportion of single households has contributed to income inequality (Burtless 1999; Kollmeyer 2013; Bloome 2017). When this is the case, the trends in assortative mating may be overshadowed by this development. The selection into partnerships and separations may be more decisive for income inequality than the sorting by types of spouses among those who manage to partner and stay so.

Some studies have also touched upon the potential importance of increasing single headed households for the changes in the income distribution. The analysis of Breen

and Andersen (2012) already hinted at the importance of this change; the change of the distributions of singles only contributed to income inequality much more than the change in assortative mating among those who partnered. Yet the authors concluded that this was mainly driven by the overall change in educational distributions. Further, for West Germany, Zagel and Breen (forthcoming) concluded that family demographic changes, indicated by the number of single and double headed households with or without children, contributed to the change in the income inequality. The authors did not consider the importance of being single alone. Both studies nonetheless lead us to expect that the selection into partnerships alone may have contributed to income inequality also in Finland.

The importance of family background on income inequality is well and widely established in the literature (e.g., Aaberge et al. 2002; Sirniö et al 2013). Yet its relation to the the association between assortative mating and income distribution has not been studied previously, although sometimes discussed (e.g., Schwartz 2010). While stronger importance of family background may be assumed to lead to greater inequality as such, part of that effect can be mediated by assortative mating. It may be expected that status exchange, a relative disadvantage in one domain exchanged to a relative advantage in another domain (Kalmijn 2010; Schwartz et al. 2016), plays such a big role in mating that potential advantages in income disappear. This may be particularly relevant as regards to parental background. In open societies, the chances of a lower status children to have higher status parents are relatively high.

The country context

The covered period, 1987–2014, fits the analysis well. As shown in Figure 1, the period includes growth of income inequality until 2000 and then a slowly diminishing trend towards 2014, in our target population especially since 2008. The steep economic crisis of the early 1990s (1991–1995) hardly shows in the development of income differences. In the Finnish literature, the growth in income inequality during the 1990s has been mainly attributed to weakening redistribution rather than changes in, for example, earnings (Sulström et al 2010, Blomgren et al 2014). Despite the increase in the 1990s, income inequality in Finland has remained at a comparatively low level throughout the period.

<figure 1>

Figure 2 shows the changes in some other characteristics of the data. Interestingly, the period as a whole is characterised by continuous educational expansion, affecting the proportion of highly educated particularly in the second half of the period. Educational expansion has taken place especially among women: 48 % of women in our target population had tertiary education in the end of our follow-up, as contrasted to 32 % of men. In 1987 men were still better educated than women (14 % vs. 12 %). The key factor behind the rapid change has been the introduction of polytechics in the mid-1990s, providing Bachelor level degrees and replacing the prior post-secondary schools in popular fields of education (such as engineering and nursing). Parental class background also improved over the whole period, the proportion of those with service class parents more than doubling during the period. As expected, the non-partnered

population grew as well, but only over the first half of the period, and then remained steady. Interestingly, the pattern of its change resembles the change in inequality the most of all these indicators.

<figure 2>

Finally, the figure also reports the proportion of the non-employed. While Finland went through a severe economic crisis during 1992–1995, the growth in non-employment in this age group had begun already earlier. The level of non-employment never returned to the post-recession level, and in fact was reduced during the global economic recession that began in 2008. The changes in non-employment do not seem to be reflected in similar changes in income inequality.

Outside the information provided by the figures above, there are some interesting issues to note in the changes in the associations related to assortative mating. The data shows that Pearson correlation between education levels was around 0,49 at the end of the 1980s and declined steadily to about 0,42. The proportion of educationally homogamous couples (at the same level of education, five levels described below) remained steady at about 40%; the proportion of educationally homogamous couples (looser definition) declined from about 66% to 53% and in the last years rose again to about 56%. At the same time, the correlation between own income and spouse's income was extremely small and in some years negative in our sample.

Data & Methods

We use a register-based *Finnish Growth Environment* dataset. It is based on a 10 % sample of the Finnish population of 1980 that is matched with their children. The children are matched with all their cohabiting and married spouses across their lifecourses, and all the spouses are matched with their parents. The annual tax register data on income are available from 1987 onwards. This allows us to follow how income inequality changes among the households of 35–40 year old Finns between 1987–2014. Each annual dataset includes information from 48,000–78,000 men and women.

The data provides yearly information on all taxable gross income families have acquired during the period. The coverage is generally considered as very good, but excludes certain nontaxable income sources such as last resort social security benefits and child support payments. We use square root equivalence scaling (OECD 2008) of the annual family income to compute individual incomes that are comparable across the family types. We include information from both partners in married and cohabiting couples.

The level of education has five levels: 1) compulsory schooling, 2) vocational secondary, 3) general secondary, post-secondary and short cycle tertiary education, 4) bachelor degrees and 5) master's degrees or higher. The information on the highest degree acquired is updated annually.

The status of the parents (of both the ego and the spouse) is measured as five levels of EGP classes: I higher service; II lower service; IIIa+V&VI high grade routine non-manual, manual supervisors and skilled workers; IV the self-employed; and IIIb+VII low-grade

routine non-manual and unskilled workers. We use the dominance principle to choose between mother's and father's class from the latest year this information is available from.

We use the Theil index to analyse our assumptions about the factors contributing to income inequality. It is less sensitive to the changes at the top and bottom than many of the other alternative income inequality measures. Despite the relative robustness of the measurement and fairly sizable data, we needed to drop the top one percentile of the income distribution to provide consistent estimates. Perhaps the greatest advantage of the index, however, is that it can be decomposed into between and within inequality across the population subgroups.

The equation for the Theil index is:

$$T = \frac{1}{n} \Sigma_{i=1}^{n} \frac{x_i}{\bar{x}} ln(\frac{x_i}{\bar{x}}) \tag{1}$$

In our case, this stands for the average ratio of income of an individual x_i to mean income $\bar{x}$, multiplied by the log of the same quantity, with n denoting the number of individuals.

The index decomposes into between and within group inequality:

$$T = \Sigma_j p_j \frac{\bar{x}_j}{\bar{x}} ln(\frac{\bar{x}_j}{\bar{x}}) + \Sigma_j p_j \frac{\bar{x}_j}{\bar{x}} T_j \tag{2}$$

Population subgroups are indexed by j, $\bar{x}_j$ stands for the mean income of a subgroup and p_j is the proportion of individuals in a subgroup. According to the first part of the equation between-group inequality can be measured as a logarithm of the ratio of the subgroup j mean income to the overall mean income. According to the second part, within-group inequality is based on the summed Theil indices of each subgroup, T_j, each weighted by the group's proportional size and the group's share of income.

We first compare the changes in Theil between four years with counterfactual analyses: from 1987 to 2000 (the period of growing income inequality), and from 2008 to 2014 (the period of reducing income inequality). We do this following the standard procedure where we compute counterfactuals based on the changes in the three components required for the overall Theil index: mean income within groups $\bar{x}_j$, group Theil indices T_j and the distribution of groups p_j. For instance, in order to analyse the importance of the changes in the mean income of the household types for the changes in income inequality, we run a simulation where the mean incomes of the various household types are set to the values of 2000, while keeping the two other quantities at their 1987 levels.

As already pointed out above, a large part of the changes in income inequality in Finland during the covered period have been attributed to the changes in income redistribution, shown as within-group inequality. That is why in the second step of analyses we focus on the contribution of different factors to the between-group inequality. We conduct the analyses in two parts: first, by considering the between-group inequality while taking into account both the selective partnering and assortative mating by education and

parental background (thus including a category of singles in addition to the groups of spouses with specific education or parents-in-law with specific occupational class status), then by considering more specific patterns of assortative mating while focusing only on those in partnerships.

Findings

Table 1 shows the results of our counterfactual analyses. It can be seen that from 1987 to 2000, the main driver of income inequality was the within group change that was was not attributed to changes in education, partnerships, assortative mating according to partner education or family background. For instance, among the men, changing within-group Theil alone would have resulted in an overall Theil of 0.160, while the true change was to 0.153. In each case, the change of within-group Theil covered alone almost all of the change. For the between-group inequality during the period, for women the main reason of the change was the changing mean income by education and to some extent by family background. In both cases the between-group income inequality would have been even greater if only mean income would have changed as much as it did (for education, 0.0221 vs. 0.0215; for education and family background, 0.0588 vs. 0.0529). For men, it was the changing population shares by education and family background. Again in both cases, income inequality would have been greater if only those proportions had changed.

<table 1>

In the case of the period 2008–2014, the reasons for the reduced income inequality were not that obvious. In none of the cases does within-group Theil, mean income or population share alone seem to be behind the change in inequality. For the between group inequality, perhaps the changes in mean income by education were the strongest contributors to the reducing income inequality, as show in the simulations where only mean income was changed from the 2008 to the 2014 level (for men, 0.0291 for the simulated between-group inequality vs. 0.0279 real level in 2014; for women, 0.0438 for the simulated between-group inequality vs. 0.0415 for real level of inequality). Because similar differences are not that visible in the subsequent analyses, it seems that the effect of changing mean incomes was actually buffered by the changes in income by assortative mating and family background.

The two panels of Figure 3 show the contribution of education, family background, partnerships and status exchange on between-group inequality across time. If compared to the change described in Figure 1, it seems that the changes in inequality among women have been more important than those among men. It can also be seen that family background contributes relatively little, although somewhat more among men. In both cases most of the variation seems to be attributed to own and spouse's education. For women, it was both that have contributed to the change, whereas for men, the changes were only related to own education.

<figure 3>

In order to study the role of status exchange, we regrouped the categories of own education and parental background as described in Figure 4. The auxiliary, unreported analyses showed us that the main division in the importance of family background in predicting adult income was between the self-employed (mostly farmers) and the unskilled worker parents versus the others. Thus we assumed that having parents from classes I, II, IIIb or V-VI was able to provide an advantage that is described by the status exchange mechanism, thus providing a slightly better-off background that can compensate for one's slightly weaker education (though not within all educational levels). The assumption was that if status exchange was a sufficiently important factor, taking it into account together with partnering would be as efficient a way of explaining inequality as it would be if we only knew everyone's education. This seems to be the case, as the trendlines for status exchange, own education and partnership as well as own education, partnership and own family origin almost overlap. The overlap seems to be even greater among women in the middle of the follow-up.

<figure 4>

We next take assortative mating into account by distinguishing the different levels of education of partners (indicated in the figure as the lines for "both education") as well as the assortative mating by family background (the lines titled "full"). It is interesting that the additional explanatory power of assortative mating is relatively modest in addition to what we would predict by only having information on partnerships, especially for men. For men, assortative mating by family background appears to contribute as much to income inequality as assortative mating by partner's education.

As a final part of our analysis, we focus on the partnered. Figure 5 shows between-group inequality across the combinations of education, partnership and parental background, contrasted with the contribution of own education only, which according to the previous analyses seemed to explain most of the change for the between-group inequality. In addition to what was presented before, in this case we also present inequality contributed by partnership homogamy alone, instead of taking into account all the combinations of assortative mating as described in the figure by the line "Both education". For both men and women, homogamy alone seems to explain about half of the contribution of educational assortative mating. However, that pattern changes especially for men from 2008 onwards. It seems that the growing importance of assortative mating during the period is explained by the increasing role of educational homogamy. If compared to Figure 4, it can be seen that this was the period when the contribution of education only was diminishing. Among women, the importance of the assortative mating by education seems to be slowly diminishing over time. However, this does not seem to be the case if we only focus on homogamous partnerships. For both men and women, the contribution of assortative mating by family background seems to remain largely unaltered over time. This is surprising as we nonetheless observe changes in educational assortative mating. Further, already Figure 2 indicated that family background had become substantially much more advantageous during the covered period.

Further analyses to be added: counterfactuals changing the marginal distributions of partnership, education, and parental backgrounds. Assessing the role of the welfare state by considering earnings versus income.

Conclusions & discussion

In this paper we have considered the importance of the changes in partnering and family background on income inequality. We studied the topic by analysing changes in income inequality of Finnish 35–40 year old men and women from 1987 to 2014. During the period, income inequality first rose until 2000, then remained steady to 2008, and after that diminished. The level of education in the target age group grew substantially and family background also became more advantageous during the period.

All in all, most of the between-group inequality seems to be explained by changes in education, and for women, also the changes in partnerships alone. For both men and women, educational assortative mating appeared to play a limited role as contrasted to being partnered vs. single. Its role in income inequality was slowly increasing for men and decreasing for women The effect of educational assortative mating on income inequality seemed to be increasingly linked to homogamous partnerships in general but particularly so for men during period 2008–2014.

Status exchange between family background and own education appeared to be a contributor to income inequality. However, all in all assortative mating by family background seemed to increase income inequality, making the importance of status exchange as an equalizer rather limited. In the beginning of the follow-up, the contribution of assortative mating by family background on income inequality was as strong as the role of sorting by education. Unlike in the case of educational assortative mating, the importance of selection by family background did not change much over time.

The overall conclusion of previous studies on assortative mating and income inequality has been that the changes in educational sorting of the spouses has contributed only a little to income inequality. However, it seems that this discussion has missed two important points. First, the selection into partnering in general may be changing more than sorting between partners. Second, assortative mating occurs not only in terms of educational sorting, but also according to other stratifying factors. Ignoring these factors can easily lead to false conclusions about key issues creating social inequalities in societies.

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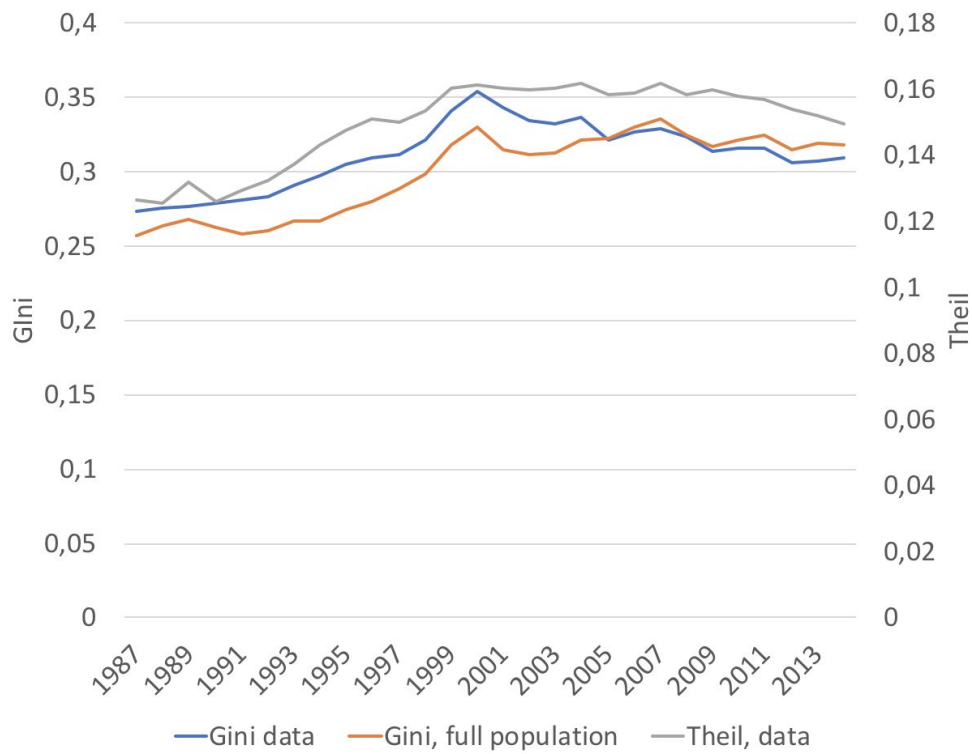Therborn, G. (2013). The Killing Fields of Inequality. John Wiley & Sons.

Figure 1. Income inequality in Finland, 1987-2014. Gini & Theil from data (population age 35-40, gross income) and for full population from Statistics Finland

Figure 2. Proportion of tertiary educated, singles, non-employed and those with service class parents (EGP I-II).

Table 1. Counterfactual analysis of the change in income inequality between 1987-2000 and 2008-2014.

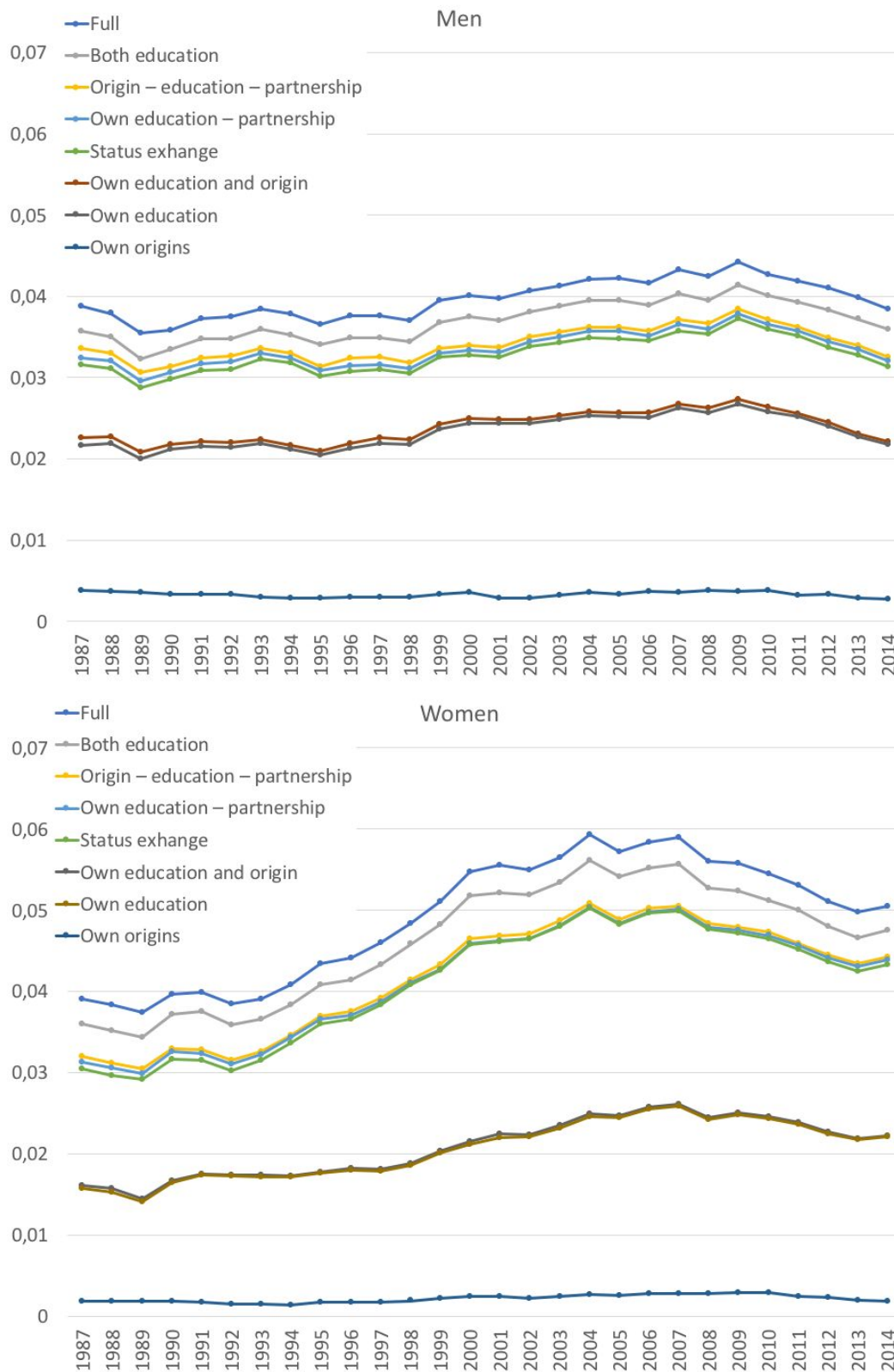| BY OWN EDUCATION	Men			Women		
	Theil	Between	Within	Theil	Between	Within
Observed 1987	0,1211	0,0214	0,0997	0,1088	0,0159	0,0930
Change within-group Theil	0,1601	0,0214	0,1387	0,1645	0,0159	0,1487
Change mean earnings	0,1251	0,0262	0,0989	0,1144	0,0221	0,0923
Change population shares	0,1144	0,0211	0,0933	0,1033	0,0171	0,0862
Observed 2000	0,1533	0,0241	0,1292	0,1536	0,0215	0,1321
Observed 2008	0,1452	0,0241	0,1211	0,1473	0,0241	0,1232
Change within-group Theil	0,1475	0,0241	0,1234	0,1485	0,0241	0,1245
Change mean earnings	0,1418	0,0207	0,1212	0,1456	0,0226	0,1231
Change population shares	0,1396	0,0240	0,1156	0,1416	0,0238	0,1177
Observed 2014	0,1362	0,0200	0,1163	0,1367	0,0215	0,1151
BY OWN EDUCATION AND PARTNERSHIP	Men			Women		
	Theil	Between	Within	Theil	Between	Within
Observed 1987	0,1211	0,0312	0,0899	0,1088	0,0302	0,0786
Change within-group Theil	0,1477	0,0312	0,1165	0,1434	0,0302	0,1132
Change mean earnings	0,1216	0,0314	0,0902	0,1162	0,0386	0,0776
Change population shares	0,1288	0,0333	0,0955	0,1114	0,0355	0,0758
Observed 2000	0,1533	0,0318	0,1215	0,1536	0,0440	0,1096
Observed 2008	0,1452	0,0320	0,1132	0,1473	0,0455	0,1018
Change within-group Theil	0,1447	0,0320	0,1127	0,1454	0,0455	0,0999
Change mean earnings	0,1419	0,0291	0,1128	0,1454	0,0438	0,1015
Change population shares	0,1416	0,0314	0,1102	0,1434	0,0446	0,0988
Observed 2014	0,1362	0,0279	0,1084	0,1367	0,0415	0,0952
BY OWN AND PARTNER'S EDUCATION (AND PARTNERSHIP)	Men			Women		
	Theil	Between	Within	Theil	Between	Within
Observed 1987	0,1211	0,0344	0,0867	0,1088	0,0350	0,0738
Change within-group Theil	0,1507	0,0344	0,1162	0,1441	0,0350	0,1091
Change mean earnings	0,1218	0,0339	0,0878	0,1200	0,0475	0,0725
Change population shares	0,1292	0,0390	0,0902	0,1092	0,0378	0,0714
Observed 2000	0,1533	0,0360	0,1173	0,1536	0,0499	0,1037
Observed 2008	0,1452	0,0355	0,1097	0,1473	0,0503	0,0970
Change within-group Theil	0,1468	0,0355	0,1113	0,1473	0,0503	0,0970
Change mean earnings	0,1425	0,0330	0,1095	0,1444	0,0478	0,0967
Change population shares	0,1407	0,0350	0,1057	0,1430	0,0494	0,0937
Observed 2014	0,1362	0,0318	0,1045	0,1367	0,0451	0,0915
BY OWN AND PARTNER'S EDUCATION AND ORIGINS	Men			Women		
	Theil	Between	Within	Theil	Between	Within
Observed 1987	0,1211	0,0375	0,0836	0,1088	0,0380	0,0708
Change within-group Theil	0,1497	0,0375	0,1122	0,1476	0,0380	0,1096
Change mean earnings	0,1280	0,0424	0,0856	0,1288	0,0588	0,0700
Change population shares	0,1347	0,0473	0,0874	0,1156	0,0483	0,0673
Observed 2000	0,1533	0,0386	0,1147	0,1536	0,0529	0,1007
Observed 2008	0,1452	0,0385	0,1067	0,1473	0,0535	0,0938
Change within-group Theil	0,1457	0,0385	0,1072	0,1459	0,0535	0,0924
Change mean earnings	0,1453	0,0387	0,1066	0,1474	0,0537	0,0938
Change population shares	0,1426	0,0400	0,1025	0,1453	0,0553	0,0900
Observed 2014	0,1362	0,0342	0,1020	0,1367	0,0480	0,0887

Figure 3. Between-group inequality across the combinations of education, partnership and parental background
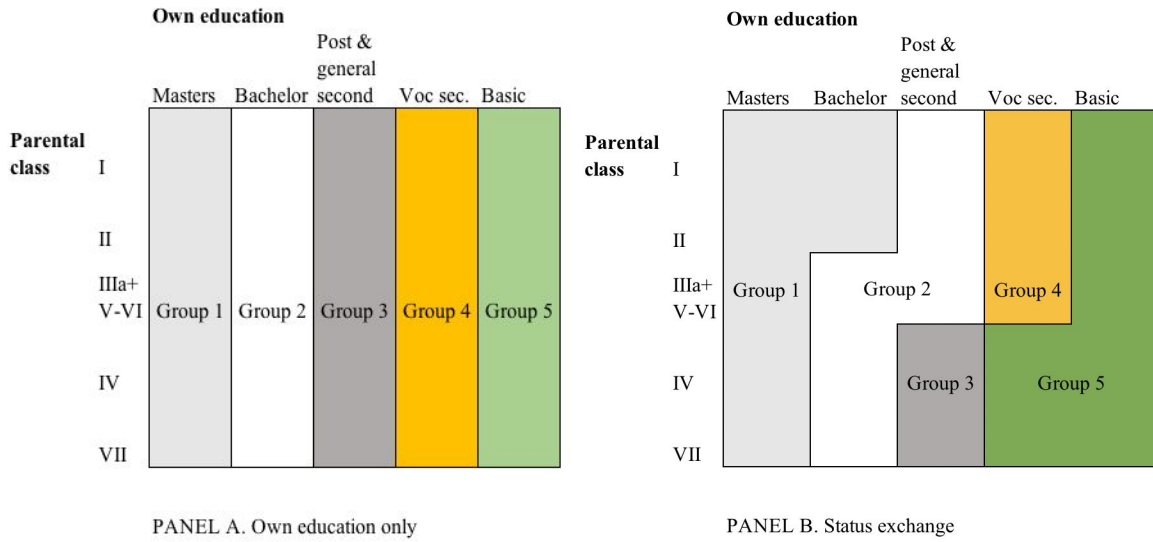
Figure 4. Re-grouping of own education and parental background in the case of status exchange.
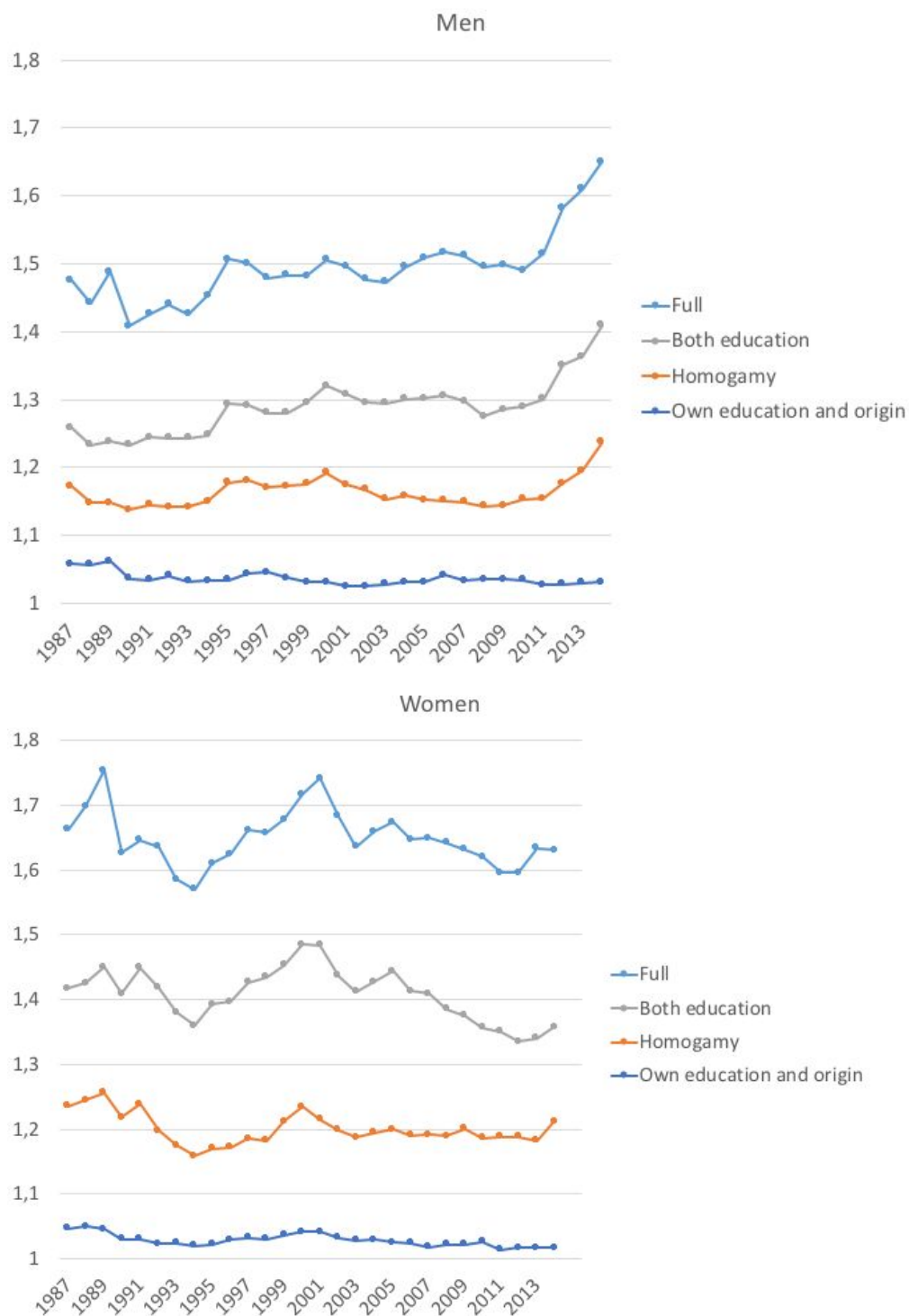
Figure 5. Between-group inequality among the partnered across the combinations of education, partnership and parental background, contrasted with the contribution of own education only.