

# Women's earnings and household inequality in OECD countries, 1973–2013

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## Abstract

This article shows that women's rising earnings contributed to reducing inequality in household earnings, with respect to couples. We use data from the Luxembourg Income Study (LIS) on 1,148,762 coupled households, covering 18 OECD countries and the period from 1973 to 2013. In this period, women's share of household earnings grew, spouses' earnings became more strongly and positively correlated in various countries, and inequality in women's earnings was reduced. Inequality in household earnings increased due to the rising correlation between spouses' earnings, but was reduced more by the decline of inequality in women's earnings. Had women's earnings remained unchanged since the 1970s and 1980s, inequality in household earnings would have been higher around 2010 in all observed OECD countries. Household inequality was reduced least by trends in women's earnings in countries with a long history of high female labor-force participation, such as Finland (3% reduction) and Sweden (5%), and most in countries that observed a stronger increase in female labor-force participation in recent decades such as Spain (31%) and the Netherlands (41%). As more countries are reaching a plateau in the growth of women's employment and earnings, the potential for further stimulating women's employment and earnings to counter both women's and household inequality seems to be increasingly limited.

## Keywords

Women's earnings, female labor-force participation, inequality, household, homogamy, incomplete revolution

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## Introduction

Women's earnings have been rising in OECD countries in recent decades because of increased employment rates, higher wages, longer working hours, and higher status positions (Costa, 2000). With their stronger position in the labor market, women have contributed more and more to the total earnings of households, albeit nowhere near as much as men (Blau and Kahn, 2000; Charles, 2011; Gregory, 2009). In the same period, inequality in household earnings has been rising (OECD, 2015). Scholars have often raised questions pertaining to how women's earnings affect household inequality. Because spouses' earnings tend to be positively correlated, and because the employment of women has been highly stratified by education, it was hypothesized that women's rising employment and earnings would increase inequality in household earnings. Notably, Esping-Andersen (2009: 59) wrote that "if labour supply is positively correlated with education, female employment will almost certainly enhance inequalities."

Empirically, however, there seems to be very little support for the hypothesis that women's earnings contribute to inequality in household earnings. Mincer (1962) showed that wives' and husbands' incomes in the United States in the 1960s were negatively correlated (see also Lam, 1997). Following the same reasoning as outlined above, he hypothesized that women's earnings in this case would have an equalizing effect on inequality in household earnings. Mincer found empirical support for this hypothesis in the 1960 census data, with household inequality observed to be lower than men's inequality. He attributed this difference between men's inequality and household inequality to women's earnings. Mincer argued that the "growth of the female labor force, while increasing the earnings inequality among all persons, has actually been a factor in the mild reduction of income inequality among families" (Mincer, 1974: 125). Later, Lam (1997) showed that the negative correlation between spouses' earnings turned from negative to positive in the United States. If Mincer's argument had been correct, increased women's earnings would have been associated with increasing household inequality. However, this was not the case. Lam (1997) showed that, despite the positive association between spouses' earnings, household inequality was still reduced in association with increased women's earnings. Many other scholars too have reported findings indicating that women's earnings reduce inequality in household earnings. This includes studies on single countries, such as Sweden (Björklund, 1992) and the United Kingdom (Harkness et al., 1996). A small number of studies on single countries evaluated trends. It was found that, in the United States, women's attenuating contribution to household inequality had become increasingly strong from 1968 to 1987 (Betson and Van der Gaag, 1984; Lam, 1997). Even though the correlation between spouses' earnings became increasingly positive in the United States, rising levels of women's earnings could not explain the trend towards more inequality (Cancian and Reed, 1999). This was also found in Ireland (Callan et al., 1998). Similarly, Breen and Salazar (2009) found that women's rising educational attainment – which, together with education homogamy, was thought to be a driver of the positive correlation between spouses' earnings – could not explain rising inequality in the United Kingdom. Mastekaasa and Birkelund (2011) reported that in Norway in the 1970s women's earnings had a minor exacerbating effect, but with rising women's employment rates their earnings reduced inequality in household earnings.

Other scholars compared the attenuating effect of women's earnings on household inequality across countries. In a wide range of industrialized societies, it was found that the earnings of women reduced household inequality, even though these countries differed markedly in the degree to which women contributed to total household earnings (Cancian and Schoeni, 1998; Pasqua, 2002). This attenuating effect of women's earnings was stronger in countries with high female employment, such as the Nordic countries, compared to southern European countries (Harkness, 2013). Gregory (2009) summarized research findings and claimed that the consensus in the literature is that women's earnings have an attenuating effect on household inequality.

The relationship between women's earnings and household inequality is rather complex and not always well understood. Lam famously argued that it is a "common misconception" (1997: 1026) that

a positive correlation between spouses' earnings is a *sufficient* condition for women's earnings to increase household inequality: the inequality between women's earnings and the total share of women's earnings played a role as well.

Although there is little doubt that women's earnings tend to reduce inequality in household earnings, most of the evidence pertains to single points in time and to a small number of country-specific longitudinal studies. It is therefore much less well understood how trends in women's earnings have affected household inequality *over time*, and how these trends have varied across countries. Understanding the impact of these trends is important, as trends in women's employment and earnings have been markedly different across OECD countries. Spain and the Netherlands have seen a huge surge of women into the labor market in recent decades. During the same period, women's employment in the Nordic countries was comparatively high, but with little increase over time. The United States initially showed an increase in women's employment, but this trend stagnated in the 1990s and may even have reversed after that (Boushey, 2008; Cotter et al., 2004; England, 2010).

Our contribution to the literature is threefold. The first and main contribution of this study is to present the associations of trends in women's earnings with trends in inequality in household earnings, and to compare these trends across 18 OECD countries. We answer:

**Question 1:** To what extent have trends in women's earnings been associated with inequality in household earnings in 18 OECD countries from 1973 to 2013?

Secondly, we not only present the total impact of women's earnings on household inequality, but also separate the impact of trends into: (a) the correlation between spouses' earnings; (b) women's earnings inequality; and (c) women's share of total household earnings. We present an analytical framework based on Lam (1997) that shows how these three factors affect household inequality. Based on this framework, it becomes clear how trends in women's earnings can attenuate household inequality, even while the correlation between spouses' earnings is positive. Empirically, we describe trends in each of these three factors and assess their impact on inequality in household earnings. We answer:

**Question 2:** To what extent can trends in the association between women's earnings and household inequality be attributed to changes in: (a) the correlation between spouses' earnings; (b) women's earnings inequality; and (c) women's share of total household earnings in 18 OECD countries from 1973 to 2013?

Thirdly, we present estimates of how inequality in household earnings would have developed over time, in the scenario that women's earnings had not been rising in 18 OECD countries. This allows for an assessment of the impact of women's increasing earnings that is based on more realistic assumptions than previous research. As will be explained in detail below, the impact of women's earnings on inequality in household earnings is conventionally estimated by comparing the actual level of inequality to a counterfactual level of inequality that would have been observed if women had no earnings at all. Here we present the conventional estimates, and complement these with estimates that are based on the more realistic counterfactual scenario in which women's employment had not changed since the 1970s or 1980s. Thus, we answer:

**Question 3:** To what extent would household inequality be higher or lower in 18 OECD countries around 2010, if there had been no trends in recent decades in: (a) the correlation between spouses' earnings; (b) women's earnings inequality; and (c) women's share of total household earnings?

## Analytical framework and expectations

In this section, we present the framework in which the impact of women's rising earnings on trends in inequality in household earnings will be analyzed. This framework consists of three equations and follows Lam (1997). To facilitate the interpretation of these equations, we present a visualization of how women's earnings affect household inequality in different scenarios. Finally, we formulate expectations on how trends in women's earnings are associated with inequality in household earnings.

## Analytical framework

The measure of earnings inequality commonly used in this body of literature is the squared coefficient of variation, which is a measure of relative inequality (like the GINI coefficient), calculated as the variance of earnings divided by the square of the mean earnings:

Equation 1: squared coefficient of variation

$$C_h^2 = \frac{\sigma_h^2}{\mu_h^2}$$

In this equation,  $C_h^2$  is the squared coefficient of variation of household-level earnings, and  $\mu_h^2$  and  $\sigma_h^2$  are the squared mean and variance of household earnings, respectively. This measure represents the level of inequality independently from the average level of household earnings, which facilitates the comparison of this measure of inequality over time and across countries.

The contribution of women's earnings to household inequality ( $contrib_w$ ) is conventionally expressed as the percentage by which the household inequality would change in the counterfactual scenario in which women had no earnings at all. This percentage is calculated based on the difference between the men's earnings inequality ( $C_m^2$ ) and household inequality ( $C_h^2$ ):

Equation 2: contribution of women's earnings to household inequality

$$contrib_w = \frac{C_h^2 - C_m^2}{C_m^2} \times 100\%$$

The rationale behind this equation is that if women's earnings were set to 0, household earnings would be identical to men's earnings. The contribution of women to household inequality would thus also have been 0. If household inequality is double the size of men's inequality, the contribution of women to household inequality is +100% (to the inequality due to the earnings of men). If, on the contrary, household inequality is half the size of inequalities between men, the contribution of women to household inequality is -50%. This equation assumes only heterosexual couples, and that household earnings are the sum of the earnings of women and men. Furthermore, determining  $contrib_w$  essentially is an accounting exercise, as it is assumed that men do not alter their behavior in the counterfactual scenario in which women's earnings are set to 0.

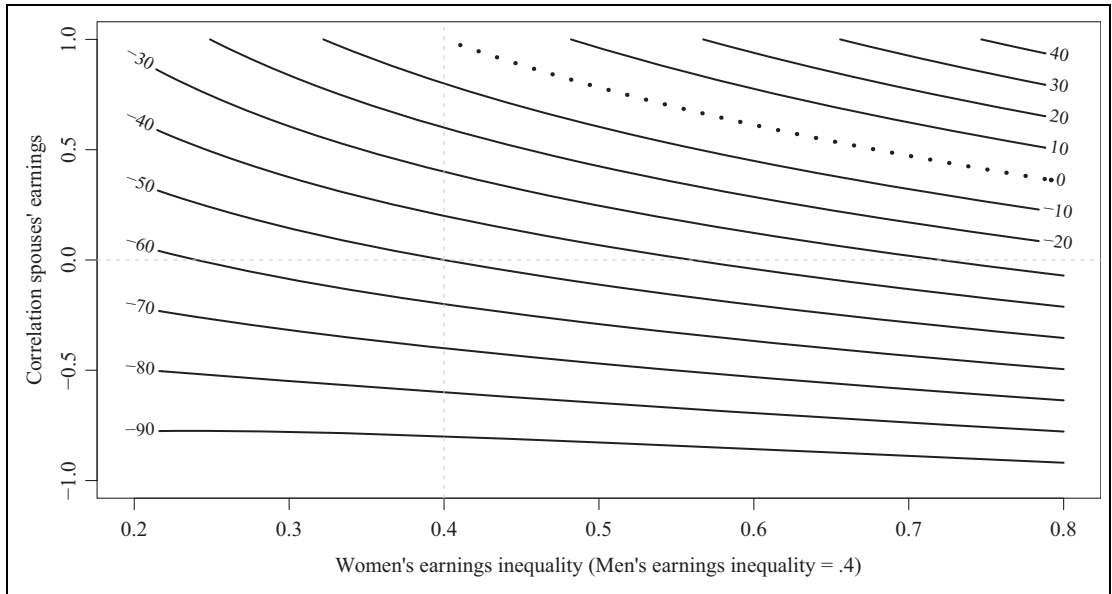
As a final step, to understand how women's earnings are related to household inequality, we follow Lam (1997) in rewriting the equation for the coefficient of variation (see also Harkness, 2013), which separates how women's earnings and men's earnings relate to household inequality:

Equation 3: decomposition of squared coefficient of variation

$$C_h^2 = C_w^2 s_w^2 + C_m^2 s_m^2 + 2\rho_{wm} s_w s_m C_w C_m$$

In this equation, which is based on standard properties of variance, inequality in household earnings ( $C_h^2$ ) is a function of (a) the share of women's earnings ( $s_w$ ) and men's earnings ( $s_m$ ) in total household earnings, of (b) women's ( $C_w^2$ ) and men's ( $C_m^2$ ) earnings inequality, and finally of (c) the correlation between spouses' earnings ( $\rho_{wm}$ ). In this equation  $s_w + s_m = 1$ . The equation shows that women's earnings are linked to household inequality by the share of women's earnings in total household earnings, by the inequality of the earnings between women, and (not just) by the correlation of their earnings with those of their spouses.

To illustrate how these three elements of Equation 3 interact, Figure 1 visualizes  $contrib_w$  at different levels of women's earnings inequality ( $C_w^2$ ) on the x-axis (with men's inequality ( $C_m^2$ ) constant at .40), and at different levels of the correlation between spouses' earnings ( $\rho_{wm}$ ) on the y-axis. Women's share of household earnings is set to be equal to men's ( $s_w = s_m = .5$ ). The contour lines represent various levels of  $contrib_w$  at 10%-point intervals (shown to the end of each curved line).



**Figure 1.** Contour plot showing the contribution of women's earnings to household inequality, by women's earnings inequality and the correlation between spouses' earnings. Note: Women's share of household earnings is 50%.

First, we discuss the impact of changes in the correlation between spouses' earnings, which are visualized along the  $y$ -axis of Figure 1. The dashed vertical line represents scenarios in which women's inequality equals men's (at  $x=0.4$ ). At this same level of inequality, with a perfectly positive correlation between spouses' earnings ( $\gamma=1$ ), women's earnings do not affect household inequality. This is a feature of relative measures of inequality, in which a doubling of each income does not alter the level of inequality. The point where the two dashed lines cross ( $x=0.4$ ;  $y=0$ ), represents the absence of a correlation between spouses' earnings (with the same level of inequality for both women's and men's earnings). At this point, given that women's and men's share in household earnings were assumed to be equal, women's earnings reduce household inequality by 50%. In the empirically more realistic scenario that women contribute a smaller than equal share to total household earnings, this reduction would have been smaller.

The impact of an increase in the correlation between spouses' earnings can be seen in Figure 1 by moving upwards along the  $y$ -axis, which leads to larger values of  $contrib_w$  (i.e. closer to contour lines labeled with less negative or higher positive values). The same holds for an increase in the inequality of women's earnings (compared to inequality of men's earnings), which is shown by moving to the right along the  $x$ -axis. In other words, if the correlation between spouses' earnings rises, or if women's earnings become more unequal, women's earnings tend to reduce household inequality less or even contribute more to it.

The dotted contour line represents the scenarios in which women's earnings do not affect household inequality. It is at an angle, which represents the interaction between the inequality of women's earnings and the correlation between spouses' earnings: when women's earnings inequality is higher (compared to men's), a lower correlation is required for women's earnings to increase household inequality. The area below this dotted contour line represents the scenarios in which women's earnings reduce household inequality, and the area above the line represents women's earnings increasing household inequality. The relatively small area above the dotted contour line in this visualization demonstrates that for women's earnings to increase household inequality, women's earnings need to be substantially more unequal than men's, or the correlation between spouses' earnings needs to be quite strongly positive.

Finally, it was assumed in Figure 1 that women's share of household earnings was 50%. Other values were not shown for reasons of space, but if women's share of household earnings was smaller this would be reflected in Figure 1 by the contour lines being further apart and rotated towards a more horizontal position. This reflects that larger changes in correlation and women's inequality are required to observe the same (change in the) contribution of women's earnings to household inequality.

### *Expectations about women's earnings and household inequality*

Based on the analytical framework developed so far, we can formulate expectations regarding how trends in women's earnings have affected trends in household inequality in OECD countries, and do so separately regarding the correlation between spouses' earnings, women's inequality, and women's share of total household earnings.

The correlation between spouses' earnings has increased moderately over time in OECD countries, which was to a large extent driven by assortative mating (Blossfeld and Drobnič, 2001; Breen and Salazar, 2009; Callan et al., 1998; Cancian and Reed, 1999; Oppenheimer, 1988, 1994; Sweeney, 2004). This is also part of Esping-Andersen's (2007, 2009) "incomplete revolution" thesis. He argued that the rise in women's employment was partial and more common among the higher educated with (typically) higher-earning spouses. This contributes to a higher correlation between spouses' earnings, particularly in countries where the employment gap between lower and higher educated women is larger.

Secondly, various studies have shown that the increased labor-force participation of women in OECD countries during recent decades has resulted in a reduction of the number of women with zero earnings, which translated into lower women's earnings inequality (Cancian and Reed, 1999; Gregory, 2009). Following our analytical framework, this reduction in women's earnings inequality is expected to have reduced household inequality. Given the particularly marked rise of women's employment rates in, for instance, the Netherlands, Spain, and Luxembourg, we expect that in these countries the reduction of inequality has been particularly strong.

Thirdly, women's share of total household earnings has been rising in recent decades (Charles, 2011; Costa, 2000; Gregory, 2009). This is, of course, the result of female labor-force participation rising, but also of other factors such as the partial closing of the gender pay gap, women working longer hours or full-time more often, and women more commonly working in better-paying occupations. In addition, changes in taxation (e.g. from joint to individual taxation) may have affected women's contribution to disposable household incomes. As we argued above, how this trend in the size of women's share of household earnings affected household inequality depends on the correlation between spouses' earnings and women's inequality. Overall, the consensus is that the conditions are such that women's earnings decrease household inequality (Gregory, 2009), even though women's earnings were distributed more unequally than men's and spouses' earnings were positively correlated. The reason for this is that the correlation between spouses' earnings is typically rather low (Harkness (2013) reports correlations up to .26). Moreover, we expect the rising employment of women to bring down inequality in women's earnings. Therefore, it seems more likely that women's rising share of household earnings reduced household inequality, rather than increased it.

## **Data and method**

### *Data*

We analyzed data from the Luxembourg Income Study (LIS, 2016). LIS harmonizes household- and person-level surveys on income to a common template, to ensure comparability across countries and time. For the selected 18 OECD countries, we used all available datasets that provided the required variables. In total, 141 LIS datasets were used, and our sample included 1,148,762 coupled households covering the period from 1973 to 2013, although the coverage over time differs across countries.

**Table 1.** Number of observations on coupled households, datasets, and time-span coverage for 18 OECD countries.

Country	First observed year	Last observed year	Number of years	Number of observations
Australia	1981	2010	8	40,480
Austria	1994	2004	4	6,155
Belgium	1985	2000	6	12,912
Canada	1981	2010	10	106,967
Denmark	1987	2010	7	153,878
Finland	1987	2010	7	40,903
France	1978	2010	7	36,602
Germany	1973	2010	10	113,076
Greece	1995	2010	5	11,141
Ireland	1994	2010	7	11,236
Italy	1986	2010	11	43,322
Luxembourg	1985	2010	8	12,149
Netherlands	1983	2010	8	27,082
Norway	1979	2010	8	96,383
Spain	1990	2013	7	38,481
Sweden	1975	2005	7	42,482
United Kingdom	1974	2010	10	67,194
United States	1974	2013	11	288,319
Total	1973	2013	141	1,148,762

Our sample was limited to coupled households, defined as two spouses living together, married, or in a consensual union. Households were included irrespective of their employment status. The sample was further limited to couples where both spouses were aged between 18 and 59 at the time of interview. Same-sex couples were removed from the data. These restrictions on the data were required to allow for the decomposition of earnings inequalities between households, and correspond to those made in similar studies (e.g. Harkness, 2013), ensuring comparability of the results. Missing values were removed listwise. Sampling weights were applied. Table 1 presents, per country, the time-coverage, the number of datasets used, and the number of observed coupled households.

LIS income variables were reported either net or gross of taxes and social security contributions. These measures cannot be compared without accounting for the fact that net and gross earnings are different constructs. Where available, earnings net of taxes and social security contributions were used and when necessary net earnings were calculated by subtracting taxes and social security contributions from gross earnings. Procedures for doing this are described in detail by Nieuwenhuis et al. (2016).

The key variable of interest was “earnings,” defined as the monetary returns to paid employment. By focusing on net earnings, our results are not affected by changes in social assistance policies, while our findings do include the effects of changes in, for instance, taxation policies. Negative earnings were recoded to 0, and earnings were trimmed at the level of the 99th percentile. We measured earnings for both spouses in the coupled households. Household-level earnings were defined as the sum of the earnings of two spouses, even when either or both spouses had no earnings. Earnings were not equivalized for household size, as our primary interest is in measuring the (effects of) differences of earnings between spouses and households, without making inferences to the economic wellbeing of these households.

## Method

As a first step in the analysis, we calculated the six variables that constitute Equation 3 for each country-year: (1) inequality in household earnings ( $C_h^2$ ); (2) women's earnings inequality ( $C_w^2$ ); (3) men's

earnings inequality ( $C_m^2$ ); (4) women's share ( $s_w$ ) and (5) men's share ( $s_m$ ) of total household earnings; and (6) the correlation between spouses' earnings ( $\rho_{wm}$ ). In the second step we calculated, based on Equation 2, the degree to which women's earnings contribute to household inequality ( $contrib_w$ ) compared to the counterfactual scenario in which women had no earnings at all.

In Equation 3, we decomposed the inequality in household earnings into three aspects of women's earnings. This decomposition allows us to use counterfactuals in which specific aspects of women's earnings are kept stable over time using a realistic starting point. This is the third step in our analysis. We calculate, for example, what would have happened to household inequality in a country where the contribution of women to household income and inequality between women had followed the observed trends, but the correlation between household incomes had remained stable at the level of the first year in the analysis. This type of counterfactual analysis allows us to better understand the contribution of the various contributing factors to household inequality.

## Results

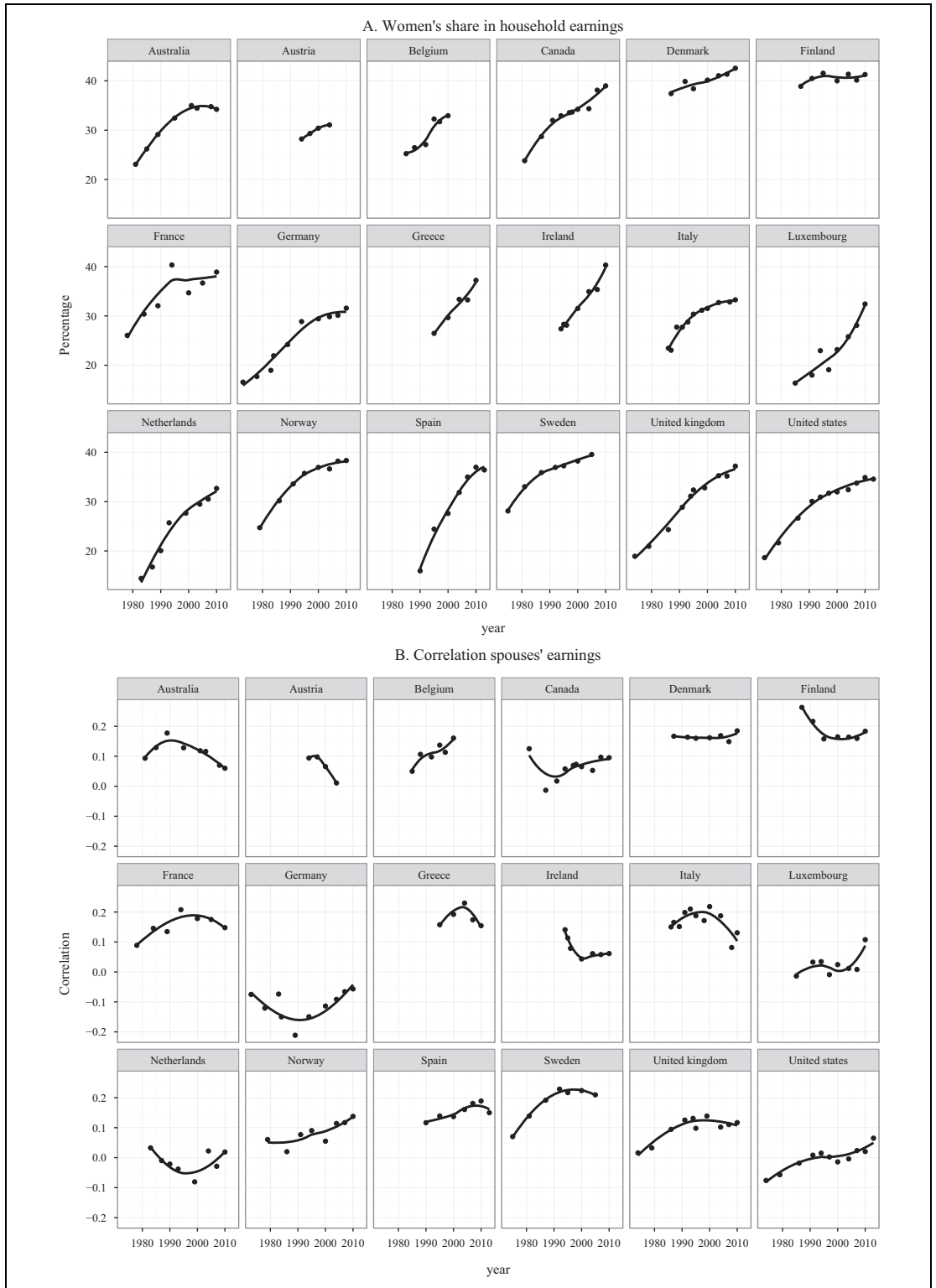
The first step in our analyses is to present a graphical description of observed trends in women's share ( $s_w$ ) of total household earnings, and the correlation between spouses' earnings ( $\rho_{wm}$ ). Panel A in Figure 2 shows the trends in women's share of household earnings across 18 OECD countries. The lines represent locally weighted average trends (LOESS curves). Not surprisingly, in all countries we found an increase in women's share of household earnings. Yet, these trends varied across countries. Very low shares of women's earnings were initially observed in the Netherlands and Germany in the 1980s, and in Spain in the 1990s, followed by very strong trends toward a more equal share in household earnings. In Denmark and Finland, women contributed comparatively large shares to household earnings (but still not higher than approximately 40%). In these countries, the increase in women's share was very small during the period we observed. Finally, we notice that in many countries an initial increase in women's share of household earnings leveled off, for instance in Australia, Norway, Sweden, and the United States. Panel B shows trends in the correlation between spouses' earnings. In most countries, but certainly not all, this correlation trended slightly upwards, suggesting that higher-earning individuals became more likely to live together. Exceptions include Austria, Finland, and Ireland. The most important conclusion about this panel, however, is that these correlations tend to be very low: up to .25 in Finland in the late 1980s and Sweden after the 1990s.

In Figure 3, we show the observed levels of inequality in household earnings ( $C_h^2$ ), women's earnings inequality ( $C_w^2$ ), and men's earnings inequality ( $C_m^2$ ). In most countries women's inequality declined substantially, with the exception of the Nordic countries and particularly Denmark and Finland. In these countries, women's inequality has been low throughout the observed period, and declined very little. In the United States, a period of declining women's inequality was followed by an increase after 2000.

Men's inequality was consistently lower than women's inequality. This is likely due to the larger number of women with zero earnings, which boosts their earnings inequality. Men's inequality rose in, for instance, Australia, Canada, Sweden, the United Kingdom, and the United States, but overall showed much less change than women's inequality. Household inequality, finally, showed patterns that were similar to men's inequality (reflecting their larger share in household earnings). However, household inequality was noticeably lower than men's inequality.

Our second step in the analysis was to establish the contribution of women to household inequality. In Figure 4, the thick black lines labeled "Full counterfactual" show the trends in the contribution of women's earnings to household inequality (i.e.  $contrib_w$  as defined in Equation 2). This is expressed as the percentage by which household inequality is changed by the inclusion of women's earnings. Compared to women having no earnings at all, women's earnings typically reduced household inequality by about 10% to 20% in the 1980s. In all countries but Finland, the equalizing contribution of women's earnings grew over time, reaching an equalizing effect of over 30% in most countries. In several countries, such as Germany, Sweden, and the United States, the trends towards a stronger equalizing





**Figure 2.** Trends in (a) women's share of household earnings and (b) correlation between spouses' earnings.

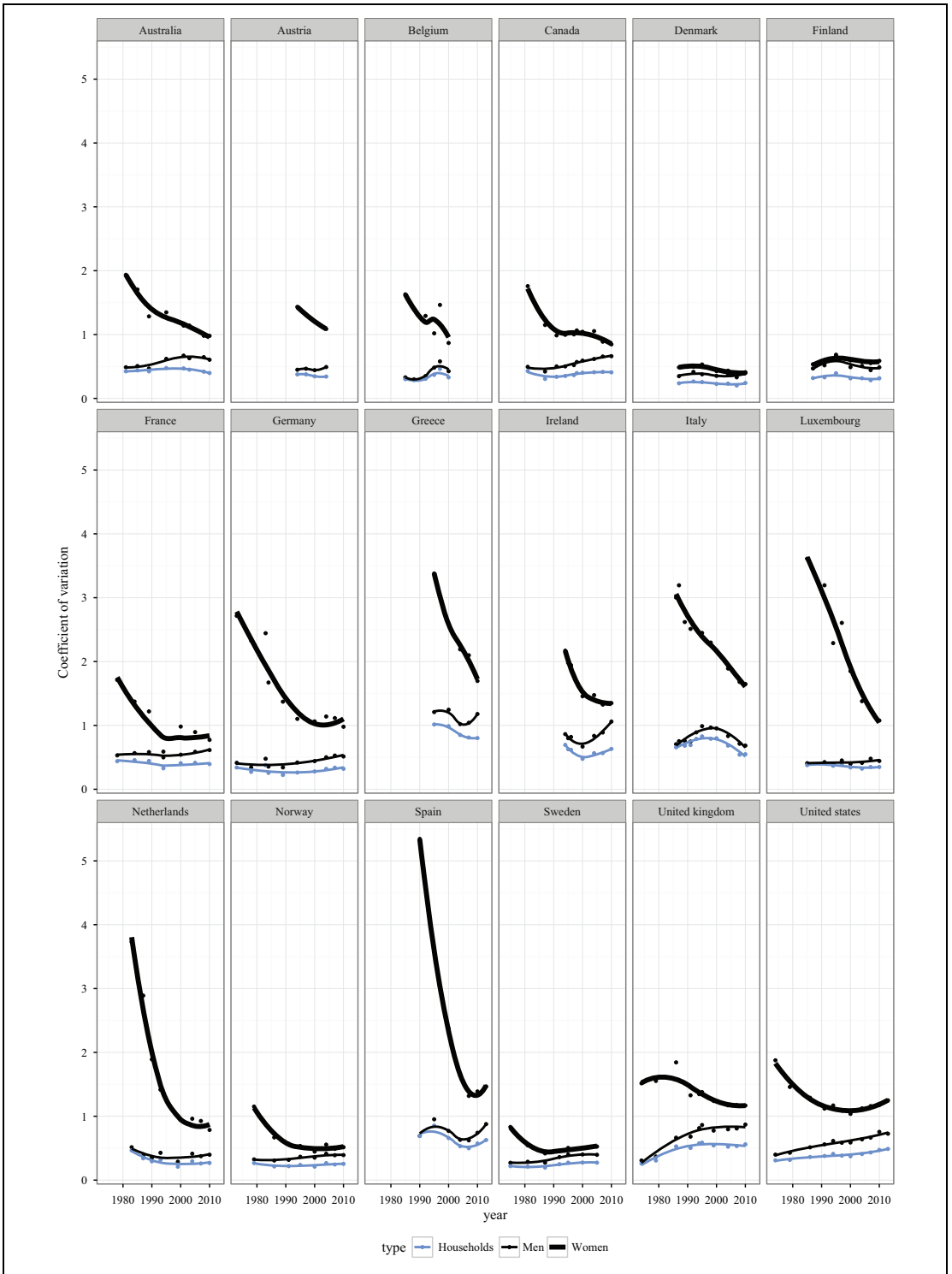
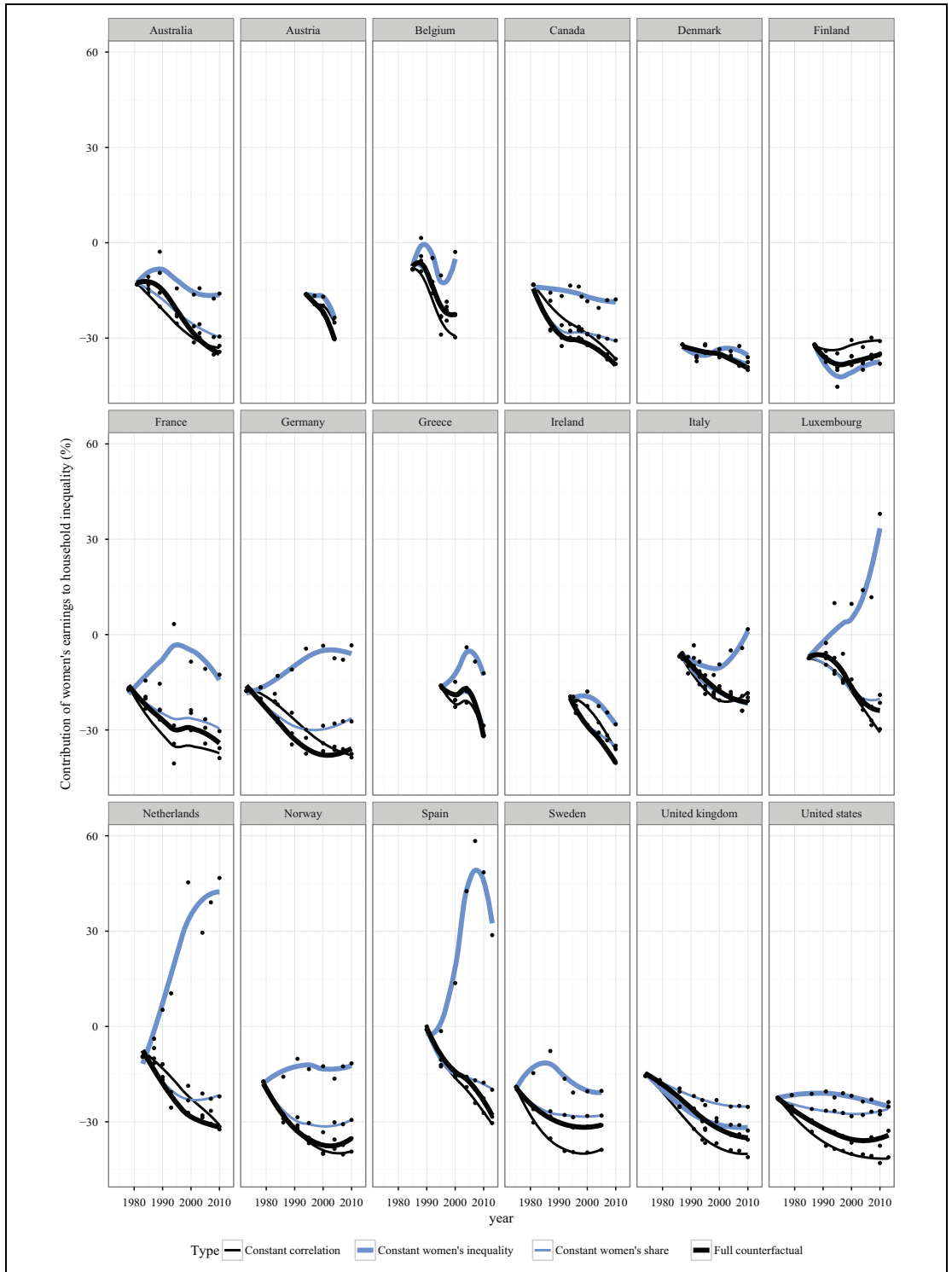


Figure 3. Trends in women's, men's, and household inequality.



**Figure 4.** Trends in the contribution of women's earnings to household inequality in four counterfactual scenarios.

effect leveled off in the 1990s. In Denmark, and particularly Finland, no clear trend was observed in the degree to which women's earnings reduce inequality between households.

In the third step of the analysis, we show to what extent the inequality-reducing effect of women's earnings was determined by trends in the correlation between spouses' earnings, women's earnings inequality, or the contribution of women to household earnings. The other lines in Figure 4 represent counterfactual scenarios in which we kept one aspect of women's earnings constant over time – at the level at which we observed the respective country for the first time. The line for the correlation represents the effect women's earnings would have had on household inequality, if the correlation between spouses' earnings had not changed over time. In Panel B of Figure 2 we saw that this correlation increased in many countries. Without that trend, the equalizing effect of women's earnings would have been stronger in Belgium, France, Sweden, the United Kingdom, and the United States. In these countries, the line labeled “Constant correlation” is clearly below the line for the total effect of women's earnings. In Finland, Germany, Ireland, and the Netherlands, on the other hand, we observed that the correlation between spouses became weaker or more negative. Had that not happened, household inequality would have been (slightly) higher – at least during part of the observed period.

The line “Constant women's inequality” represents what would have happened to household inequality if women's earnings inequality had remained at the level of the first year each country was observed. In Figure 3 we already observed that women's earnings inequality dropped markedly in many countries. Figure 4 shows that without this drop in women's inequality, the equalizing effect of women's earnings would have been much smaller than what was observed. In Australia in 2010, for instance, it would have been a reduction of only 16% compared to the observed 34%. In the United States in 2013, it would have been 24% instead of the observed 33%. In a few countries, trends in women's earnings would even have increased household inequality if women's inequality had not fallen. This was the case in Luxembourg, the Netherlands, and Spain.

The final counterfactual scenario is one in which women's share of household earnings remained unchanged, while correlation and women's inequality did change as observed. This is represented by the “Constant women's share” lines in Figure 4. Typically, the results indicate that if women's share of household earnings had not been rising, household inequality would have been higher.

Finally, in Table 2, we assess levels of household inequality across countries, in the most recent year of observation. We compare these observed levels of inequality with the same scenarios on which Figure 4 was based. But, to assess the impact of women's earnings on household inequality, we compare observed household inequality to the counterfactual scenarios in which aspects of women's earnings had not changed since the first observed year.

The first column presents the observed levels of inequality in household earnings in the most recent year the country was observed. The columns labeled “Scenario 1” show how high household inequality would have been if the correlation between spouses' earnings had not changed over time. In various countries inequality would have been lower, such as in the United States (–12%), Sweden (–11%), and Luxembourg (–11%), whereas without a decrease in this correlation, inequality would have been higher in, for instance, Austria (8%) and Finland (7%).

The columns labeled “Scenario 2” show how high household inequality would have been if women's earnings inequality had not changed over time. In Figure 3 we saw that women's inequality declined. Had women's inequality not been declining, inequality in household earnings would have more than doubled in the Netherlands (117%) and almost doubled in Spain (80%). However, it should be noted that the very high levels of women's inequality observed in these countries in the 1980s and 1990s were linked to the small shares of household earnings earned by women. We return to this issue in our discussion. Finland is the only country in which household inequality would have been lower without the trend in women's earnings inequality, because in that country women's inequality increased.

The columns labeled “Scenario 3” show how high household inequality would have been if women's share of household earnings had not been rising in recent decades, given the observed developments in

**Table 2.** Inequality in household earnings, observed and in four counterfactual scenarios.

Country	Observed household	Scenario 1: Constant correlation		Scenario 2: Constant women's inequality		Scenario 3: Constant women's share of household earnings		Scenario 4: Constant women's earnings (all aspects)	
	Inequality ( $C_h^2$ )	Inequality ( $C_h^2$ )	$\Delta(\%)$	Inequality ( $C_h^2$ )	$\Delta(\%)$	Inequality ( $C_h^2$ )	$\Delta(\%)$	Inequality ( $C_h^2$ )	$\Delta(\%)$
	Australia (1981–2010)	0.40	0.41	3	0.51	28	0.43	7	0.50
Austria (1994–2004)	0.34	0.37	8	0.38	10	0.34	0	0.40	17
Belgium (1985–2000)	0.33	0.30	–9	0.41	26	0.33	0	0.36	9
Canada (1981–2010)	0.41	0.42	3	0.54	33	0.46	12	0.53	30
Denmark (1987–2010)	0.24	0.24	–1	0.25	5	0.25	3	0.26	7
Finland (1987–2010)	0.32	0.34	7	0.30	–4	0.32	1	0.33	3
France (1978–2010)	0.39	0.38	–5	0.54	36	0.43	8	0.49	23
Germany (1973–2010)	0.32	0.31	–2	0.50	55	0.37	16	0.41	27
Greece (1995–2010)	0.80	0.80	0	1.03	29	0.84	5	1.00	24
Ireland (1994–2010)	0.63	0.68	7	0.76	20	0.69	9	0.81	28
Italy (1986–2010)	0.55	0.56	2	0.70	27	0.54	–1	0.64	17
Luxembourg (1985–2010)	0.35	0.31	–11	0.61	76	0.36	3	0.40	16
Netherlands (1983–2010)	0.27	0.27	1	0.58	117	0.31	15	0.38	41
Norway (1979–2010)	0.25	0.24	–6	0.35	36	0.28	9	0.31	21
Spain (1990–2013)	0.63	0.61	–3	1.13	80	0.70	12	0.82	31
Sweden (1975–2005)	0.27	0.24	–11	0.32	16	0.29	4	0.29	5
United Kingdom (1974–2010)	0.56	0.51	–9	0.58	5	0.65	16	0.63	13
United States (1974–2013)	0.49	0.43	–12	0.55	13	0.54	11	0.52	6

the correlation between spouses' earnings and the women's earnings inequality. The numbers show that, with the exception of Italy, the level of household inequality would have been higher in OECD countries, had women's share of household earnings not been rising.

Finally, the columns labeled "Scenario 4" indicate how high household inequality would have been if the correlation between spouses' earnings, women's inequality, and women's share of household earnings had all remained unchanged since the first year we observed the country. This reflects the scenario in which only men's inequality changed. Had, for instance, all aspects of women's earnings not changed since 1981 in Australia, household inequality in 2010 would have been .50 (instead of the observed .40), a 25% increase. Table 2 shows that the reduction in inequality was highest in countries in which women's earnings rose strongly, such as the Netherlands (41%), Canada (30%), Ireland (28%), and Germany (27%). The Nordic countries, with the exception of Norway, show very small reductions of inequality due to the small rise in women's earnings in these countries.

## Conclusion and discussion

In this study we found that, in all countries, increased women's earnings reduced household inequality, and that this equalizing effect became stronger over time in all countries but Finland. We have also shown the extent to which women's share of household earnings increased, inequality between women decreased, and the correlation between spouses' earnings became stronger. All three were consequential for inequality in household earnings. Inequality in household earnings increased due to the rising

correlation between spouses' earnings, but was reduced more by the decline of inequality among women's earnings.

Although the findings presented here are pretty robust, they only apply to coupled heterosexual households; same-sex couples and single-parent households were excluded from the analysis. A consequence is that no inferences can be made to inequality in the whole population of these OECD countries. In this perspective, the importance of single-parent households should be addressed. The rise of single parenthood was found to be a driver of inequality (Kollmeyer, 2013). Earnings from employment were found to reduce poverty among single-parent families in OECD countries, and to reduce inequality between single-parent and two-parent families, but even among those single parents who were employed, poverty rates were found to be high (Maldonado and Nieuwenhuis, 2015). Also, we only focused on earnings from paid employment, ignoring, for instance, income from capital. Income from capital is distributed more unequally and biased towards higher income households, but only a small proportion of households receive income from capital. The same holds for wealth (Jäntti et al., 2013). To the extent that capital and wealth are jointly owned by both spouses, their effects might be similar to those studied here; this should be studied in future work, as the distribution of wealth and capital plays an increasingly large role in shaping household inequality (Milanovic, 2016). The restrictions made to our sample and earnings variable were required for the decomposition analyses performed here, and are typical in the literature to which we contribute.

The results based on counterfactual scenarios in this article should not be interpreted in causal terms (Cartwright, 2007). In many ways, such a counterfactual analysis is an accounting exercise that is strongly descriptive in nature. Most importantly, the counterfactual scenarios have strong *ceteris-paribus* assumptions that are not likely to hold in reality. For instance, the commonly applied counterfactual of women having zero earnings assumes that men would not adjust their earnings. In the analyses where we compared various counterfactual scenarios, we assumed that the correlation between spouses' earnings, women's inequality, and women's share of household earnings were independent from each other. That they are not was best seen in the marked drop in women's earnings inequality in, for instance, the Netherlands and Spain. This drop in inequality was likely to a large extent due to more women entering the labor market. The counterfactual scenario presented in Table 2 of women's rising share in household earnings while women's inequality remained unchanged therefore seems implausible. Nevertheless, these analyses have proven informative about the relative importance of observed and possible trends in different aspects of women's earnings for household inequality. Across the board, and not just in the aforementioned extreme cases, our analyses showed that trends in women's inequality were more important in reducing household inequality than the increased correlation between spouses' earnings was in increasing inequality.

Our findings contradict the commonly held intuition that as long as the correlation between spouses' earnings is positive, any increase in women's earnings will increase household inequality. It was argued that for women's earnings to reduce household inequality, unrealistically low levels of women's inequality would be required: "the conditions required for an equalizing effect are quite steep" (Esping-Andersen, 2007: 646). We showed that the correlation between spouses' earnings would need to be very high, much higher than it actually is, for rising women's earnings to increase household inequality. We rather conclude that the conditions for women's earnings to have an *exacerbating* effect on inequality are quite steep: rising women's earnings have a strong tendency to reduce relative household inequality.

This is not to say that there are no important differences across OECD countries. We discuss the implications of three. First, we found that the correlation between spouses' earnings increased in the majority of countries, but not in all, and was comparatively high in the Nordic countries. This highlights an important part of the "incomplete revolution" thesis (Esping-Andersen, 2007, 2009), with respect to the argument that trends towards higher women's employment rates are "incomplete," resulting in a gap in employment among higher and lower educated women. This not only increases the inequality of women's earnings, but also the positive correlation between spouses' earnings, as these women are more likely to have higher-educated and higher-earning spouses. Thus, for women's earnings to reduce

household inequality, women's employment rates that are close to universal would be required, like in the Nordic countries (Esping-Andersen, 2007: 646). While our findings are clearly in line with the notion that women's earnings inequality is lower when more women are employed, we also showed that the correlation between spouses' earnings was often higher with higher women's employment and earnings – and particularly so in the Nordic countries. This has the implication that, to the extent that homogamy of earnings continues to become more important in the future, women's earnings could potentially develop into a factor increasing household inequality particularly in countries in which the “revolution” towards higher female labor-force participation rates is closer to “completion.” In these countries, trends towards higher homogamy could drive inequality upwards, while the potential for further reducing women's earnings inequality through higher women's employment rates has been diminished.

Second, although we found marked reductions in women's earnings inequality in most countries, these levels of inequality varied across countries (even) in recent years. The rise and rates of female labor-force participation undoubtedly played an important role in this, with higher rates reducing the number of women without earnings, but factors among those who are employed could play a role as well. For instance, we found that women's earnings inequality was comparatively high in the Netherlands, even though women's employment rates in the Netherlands are high (OECD, 2011). A likely explanation would be the high share of part-time employment in the Netherlands, which increases inequality in earnings between full-time and part-time working women. In the Nordic countries we found very low levels of women's inequality, which seems related to high rates of typically full-time women's employment in these countries. This is partially facilitated by the generous family policies that facilitate the combination of work and family, as well as by more gender-egalitarian public opinion, closing the employment gap between women with and without children (Andringa et al., 2015; Korpi et al., 2013; Nieuwenhuis et al., 2012), thus reducing women's earnings inequality. An alternative explanation was formulated as the trade-off hypothesis by Mandel and Semyonov (2006), who argued that the high rates of women's employment in the Nordic countries had resulted in fewer women working at the top. This compressed the wage distribution (Albrecht et al., 2003; Grönlund and Magnusson, 2016), reducing women's earnings inequality.

Finally, our findings suggest that inequality in OECD countries would have been rising more than it has (OECD, 2015) if this trend had not been compensated by the growth in women's employment in recent decades. Yet, there seems to be a limit to compensating inequality by means of the further growth of women's employment. In Denmark and Finland, we observed women earning a large share of household incomes and women's inequality being very low. However, these countries showed almost no further growth in the degree to which women's earnings reduced household inequality. In other countries, including Germany, Sweden, and the United States, we found that after an initial period of increase, the inequality-reducing effect of women's earnings leveled off. In the United States, where a plateau or even decline in female labor-force participation has been well documented (Boushey, 2008; Cotter et al., 2004; England, 2010), we even found that in recent years women's inequality was on the rise, contributing to more household inequality. As women's employment rates, as well as women's share of total household earnings, are reaching plateaus in a growing number of countries, the potential for further stimulating women's employment and earnings to help reduce earnings inequality seems to be increasingly limited. This imposes an additional challenge on governments seeking to curb rising inequality in OECD countries.

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