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## Women's earnings: Trends in earnings inequality within and between coupled households in 18 OECD countries, 1981-2005

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# LIS

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### **Women's Earnings: Trends in earnings inequality within and between coupled households in 18 OECD countries, 1981-2005**

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November 2013



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# Women's Earnings: Trends in earnings inequality within and between coupled households in 18 OECD countries, 1981-2005

Rense Nieuwenhuis,<sup>1</sup> Ariana Need<sup>2</sup>, Henk van der Kolk<sup>3</sup>

November 6, 2013

## Abstract

In this paper we show that women's earnings attenuate inequality between coupled households, even though the earnings of spouses are positively correlated. We use data from the Luxembourg Income Study (LIS, 2013) on 572,222 coupled households, covering the period from 1981 to 2005 in 18 OECD countries. Three trends are described. Firstly, over time women's earnings increasingly contributed to total household earnings, thereby increasing equality within households. Secondly, the positive correlation between spouses' earnings increased over time. Thirdly, earnings inequality among women declined. With a counter-factual decomposition technique on earnings inequality, we show that the combined effect of these trends was that women's earnings increasingly attenuated earnings inequality between households. The trend towards women's earnings increasingly attenuating the inequality between households was mainly driven by decreasing inequality among women. If inequality among women had not declined as it did in recent decades, inequality between households would have been 25% higher than it actually was in 2005.

## 1 Background and Research Questions

Women's earnings have been rising in OECD countries during recent decades, because of increased employment rates, higher wages, longer working hours,

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and higher status positions (Costa, 2000). Because of this stronger position in the labour market, women contributed increasingly large shares to the total earnings of households. Consequently, earnings inequality between men and women in general decreased (Blau & Kahn, 2000; Charles, 2011; Gregory, 2009), and so did earnings inequality between men and women *within* coupled households.

In the same period in which women's earnings were rising, earnings inequalities *between* households were rising as well, particularly after the 1980's (Esping-Andersen, 2009). Scholars have often raised questions pertaining to how women's earnings affected inequality between households. Scholars are interested in the relationship between women's earnings and inequality between households, because spouses' earnings tend to be correlated (Lam, 1997; Burtless, 2009). It has been hypothesised that if the correlation between the earnings of spouses is positive, increased earnings by women would increase inequality between households (Esping-Andersen, 2007, 2009). Similarly, educational homogamy was hypothesised to contribute to inequality (Burtless, 1999; Blossfeld & Drobnič, 2001), by boosting the positive correlation between spouses' earnings (Breen & Salazar, 2009; Esping-Andersen, 2009). Furthermore, the rise of women's employment was '*stratified*' (Esping-Andersen, 2009, p.53), with more educated women being much more likely to be employed than less educated women. Earnings inequality among women has been hypothesised to further exacerbate inequality between households as long as the correlation between spouses' earnings was positive (*ibid.*).

Empirical results, however, suggest that women's earnings have an attenuating, rather than an exacerbating, effect on earnings inequality between households. Mincer (1962) expected that a positive correlation between spouses' earnings would exacerbate inequality between households, while a negative correlation would attenuate inequality. After observing that wives' and husbands' incomes in the United States were negatively correlated, he thus hypothesized that wives' earnings would have an equalising effect on income inequalities between households. Later, Mincer found empirical support for this hypothesis in the 1960 census data, with inequalities between households observed to be lower than husbands' income inequalities (also see: Lam, 1997). This difference in inequality between men's earnings and inequality between households was to be attributed to wives' earnings, as Mincer argued that "*growth of the female labour force, while increasing the earnings inequality among all persons, has actually been a factor in the mild reduction of income inequality among families*" (1974, p. 125). Lam (1997) showed that while the negative correlation between spouses' incomes turned from negative to positive in the United States, women's earnings continued to have an attenuating effect on income inequalities between households.

Many other authors have reported the conclusion that women's earnings reduce inequality between households. This has been reported in studies on single countries, such as Sweden (Björklund, 1992), and the United Kingdom (Harkness et al., 1996; Machin & Waldfogel, 1994). Several 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 & Van der Gaag, 1984; Lam, 1997). Also in the United States, Cancian & Reed (1999) reported that even although the correlation between spouses' earnings became increasingly positive, rising levels of women's earnings could not explain the trend towards more inequality. This was also found in Ireland (Callan et al., 1998). Similarly, Breen & Salazar (2009) found that the increasing levels of educational homogamy could not explain rising inequality in the United Kingdom. Mastekaasa & Birkelund (2011) reported that in Norway in the 1970s women's earnings had a minor exacerbating effect, but with rising women's employment this effect changed towards women's earnings equalising between-household inequality.

Other authors have compared the attenuating effect of women's earnings on inequality between households across countries. Cancian and Schoeni (1998) compared 10 developed countries to find that the earnings of women reduced inequality between coupled households in all of those countries, even though these countries differed markedly in the degree to which women contributed to total household earnings. Harkness (2013) found that this attenuating effect was stronger in countries with high female employment, such as the Nordic countries compared to the southern European countries. Pasqua (2002) found that inequality in 14 European countries was lower among households with two earners than among households in which only the man was employed.

Gregory (2009) summarised research findings and claimed that the consensus in the literature is that women's earnings have an attenuating effect on household inequality, rather than exacerbating these inequalities. In this paper we improve upon this literature on two ways.

Firstly, studies on the contribution of women's earnings to between-household inequality have focused either on a single country and analysed how inequality and women's attenuating effect on this inequality has developed over time, or compared this attenuating effect across countries at a single moment of time. As such, little is known about how trends in the degree to which women's earnings attenuated between-household inequality have differed across countries. Hence, we raise our descriptive question:

**Descriptive Question** To what extent have women's earnings attenuated earnings inequalities *between* households in 18 OECD countries from

1981 to 2005?

Secondly, the explanation of trends and cross-country variation in the degree to which women's earnings attenuated inequality between households, is very limited. It has, however, been established that the contribution of women's earnings to between-household inequality not only depends on the correlation between spouses' earnings, but on three factors: (a.) the correlation between spouses' earnings, (b.) women's share in total household earnings and the earnings inequality among women (relative to that of men), and (c.) women's share in total household earnings (Lam, 1997; Shorrocks, 1983). How these three aspects of women's earnings determine the degree to which women's earnings affect inequality between households will be specified in the next section of this paper. It has not been empirically examined how and to what extent trends in these aspects of women's earnings can explain trends in the attenuating contribution of women's earnings to between-household inequality. We therefore raise the explanatory question:

**Explanatory Question** To what extent have changes in (a.) the correlation between spouses' earnings, (b.) earnings inequality among women, and (c.) women's share in total household earnings, affected the degree to which women's earnings attenuate household-level inequality in OECD countries between 1981 and 2005?

## 2 Theory and Hypotheses

The degree to which women's earnings attenuate (or exacerbate) the inequality of earnings between households, depends on three aspects of women's earnings:

- A. Correlation between spouses' earnings** Women with higher earnings tend to have higher earning spouses. The degree to which this is the case is reflected in the strength of the correlation between spouses' earnings. If the correlation between spouses' earnings is highly positive, women's earnings have a stronger tendency to increase inequality between households (Breen & Salazar, 2009).
- B. Earnings inequality among women (relative to men)** If the level of earnings inequality among all women in a country is higher than it is among men, women's earnings have a stronger tendency to increase inequality between households.

**C. Women’s share in total household earnings** Women’s share in total household earnings, by itself, does not determine whether women’s earnings attenuate or exacerbate inequality between households. That is determined by the combination of (A.) the correlation between spouses earnings, and (B.) inequality among women compared to that among men. However, given (A.) and (B.), a larger share of women’s earnings in total household earnings increases the magnitude of the impact of women’s earnings on between-household inequality.

In the next section the mathematical relationship between these components and earnings inequality between households will be detailed.

## 2.1 Decomposition of Inequality Between Households

To determine the extent to which women’s earnings affect between-household inequality, the squared coefficient of variation is commonly used, as a measure of *relative* inequality.<sup>1</sup> The squared coefficient of variation indicating the inequality between households in a country ( $CV_h^2$ ) is calculated as the variance of household earnings in that country ( $Y_h$ ) divided by twice the average household earnings, as follows:

$$CV_h^2 = \frac{\sigma_{Y_h}^2}{2 \times \bar{Y}_h^2} \quad (1)$$

Next, this inequality is decomposed into aspects of women’s earnings and men’s earnings. To do this, Lam (1997) suggested re-writing the squared coefficient of variation at the household level as:

$$CV_h^2 = CV_m^2 \alpha_m^2 + CV_w^2 \alpha_w^2 + 2\rho_{mw} CV_m CV_w \alpha_m \alpha_w \quad (2)$$

In this equation (2), the squared coefficient of variation at the household level ( $CV_h^2$ ) is a function of:

- The correlation between men’s and women’s earnings within households ( $\rho_{mw}$ ).
- The squared coefficient of variation in women’s earnings ( $CV_w^2$ ) and men’s earnings ( $CV_m^2$ ). Inequality of earnings amongst women and

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<sup>1</sup>It has been shown that for all standard inequality indexes, including both the (squared) coefficient of variation and the GINI coefficient (Gini, 1912), the total between-household inequality can be decomposed using a single formula (Jenkins & Van Kerm, 2009; Shorrocks, 1983). Using different measures of relative inequality leads to similar conclusions (also see: Gronau, 1982; Harkness, 2013).

amongst men are separate terms in this equation. The more unequal women’s earnings are compared to men’s, the more likely women’s earnings are to increase inequality between households.

- The (squared) share of women’s earnings ( $\alpha_w^2$ ) and men’s earnings ( $\alpha_m^2$ ) in total household earnings. As total household earnings are assumed to be the sum of her and his earnings only, both shares sum to 1.

Once the inequality between households is broken down into different components, it can be determined to what extent the earnings of women attenuate or exacerbate inequality between households. The contribution of women’s earnings to between-household inequality ( $contrib_w$ ) is expressed as the percentage by which the household inequality would change in a (counterfactual) scenario where women had no earning at all. This percentage is calculated based on the difference between men’s inequalities and household inequalities (Lam, 1997):

$$contrib_w = \frac{CV_h^2 - CV_m^2}{CV_m^2} \times 100\% \quad (3)$$

It is a “*common misconception*” (Lam, 1997, p. 1026) that a positive correlation between spouses’ earnings  $\rho_{mw}$  is a sufficient condition for women’s earnings to increase the level of earnings inequality between households ( $contrib_w > 0$ ).

For women’s earnings to increase inequality between households, it is *necessary* but not *sufficient* that the inequality amongst women’s earnings is *greater* than that amongst men. Even when this condition is met, women’s earnings only increase inequality between households if the correlation between spouses’ earnings is positive and strong. When the correlation is below 1, women’s earnings are more likely to attenuate earnings inequality between households. This is because the weaker the correlation, the less likely extremely high (or low earnings) are to be matched by equally extreme earnings.<sup>2</sup>

## 2.2 Visualisation of Inequality Decomposition

Figure 1 illustrates<sup>3</sup> that in order for women’s earnings to exacerbate between-household earnings inequality, earnings inequality between women must exceed earnings inequality among men. The lines in the graphic represent the

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<sup>2</sup>This is similar to the principle of regression to the mean, a phenomenon originally observed by Galton (1886).

<sup>3</sup>See Gronau (1982) for an alternative visualisation.



contribution of women's earnings to between-household inequality ( $contrib_w$ ) for different values of (a.) the correlation between spouses' earnings ( $\rho_{mw}$ ) on the y-axis and (b.) the ratio between the earnings inequality of women compared to men ( $CV_w/CV_m$ ) on the x-axis. The y-axis covers all possible values for  $\rho_{mw}$  and thus ranges from -1 to +1. The x-axis ranges from the earnings inequality among women being half that of the inequality among men ( $CV_w/CV_m = .5$ ) to women's earnings being twice as unequal as men's ( $CV_w/CV_m = 2$ ). These values were filled into Equation 2 to calculate the household inequality associated with these values, and then Equation 3 was used to calculate the contribution of women's earnings to between-household inequality ( $contrib_w$ ). It was also assumed that women and men have the same average earnings, or in other words that women's share of total household earnings ( $\alpha_w^2$ ) was .5.

The point in Figure 1 where the two straight (and dashed) lines cross, represents equal earnings inequality for men and women ( $x=1$ ) and no correlation between spouses earnings ( $y=0$ ). The curved line that crosses this point represents the value of women's earnings to between-household inequality ( $contrib_w$ ) of -50%, as indicated by the numbers on the right. This means that with identical earnings inequality among men and women and no correlation between spouses' earnings, women's earnings halve the inequality between households. Relative to this point ( $x=1, y=0$ ) in Figure 1, we describe two scenarios.

Firstly, moving upwards along the vertical straight line represents a higher correlation between spouses' earnings (values of y exceeding 0). With a stronger positive correlation between spouses' earnings, women's attenuating contribution to between-household inequality becomes weaker and equals 0 with a perfect correlation between spouses' earnings. In other words, if men's and women's earnings have the same inequality and spouses' earnings are perfectly correlated, the earnings of women do not affect inequality between households.

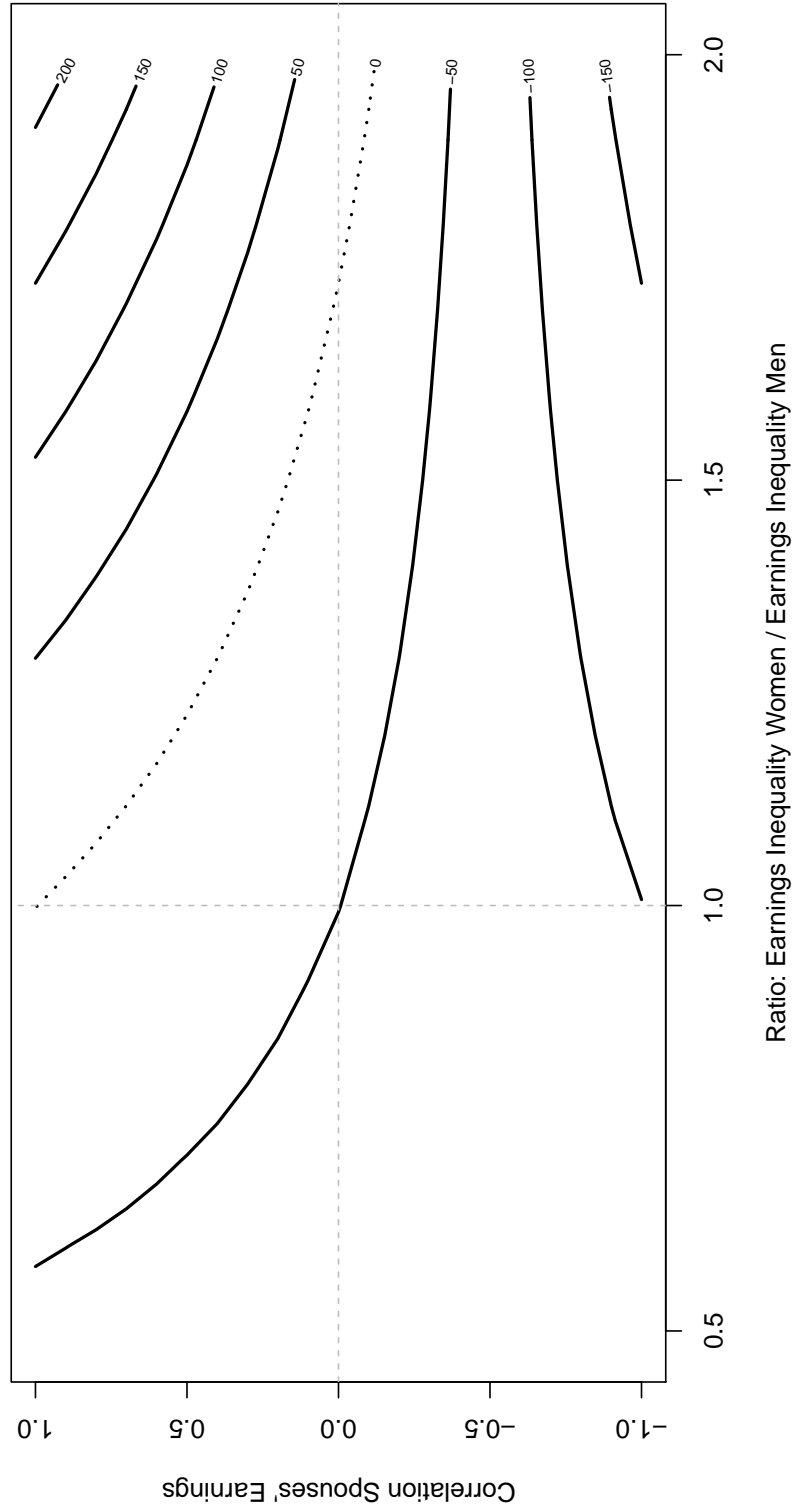
Secondly, moving to the right along the horizontal straight line represents women's earnings being distributed more unequally than men's (values of x exceeding 1). With higher inequality among women than men, women's attenuating contribution to inequality between households becomes weaker. When there is no correlation between spouses' earnings ( $y=0$ ) and women's earnings are twice as unequal as men's ( $x=2$ ), women's contribution is positive, meaning that women's earnings exacerbate inequality between households.

The dotted curve in Figure 1 represents scenarios in which women's earnings do not affect between-household inequality. The area under this curved line shows that even when the correlation between spouses' earnings is posi-

Figure 1: Contribution of Women's Earnings to Between-Household Inequality, by Correlation Between Spouses' Earnings and Earnings Inequality Among Women.

The lines represent the contribution of women's earnings to between-household inequality ( $contrib_w$ ), percentages indicated by the numbers on the right.

Source: Data simulated by authors. Women's share to total household earnings ( $\alpha_w^2$ ) was .5.



tive ( $y_i^0$ ), the inequality among women's earnings needs to be substantially higher than among men for women's earnings to exacerbate inequality between households.

### 2.3 Trends in Contribution Women's of Earnings to Household Inequality

Up to this point, we have explained how different aspects of women's earnings relate to inequality between households. Women's earnings tend to exacerbate earnings inequality between households when the correlation between spouses' earnings is strongly positive and when earnings inequality among women is high relative to inequality among men. When women earn a large share of total household earnings, this increases the impact of women's earnings on the inequality between households, but whether this impact is attenuating or exacerbating depends on the correlation between spouses' earnings and the inequality of earnings among women. This theory needs to be combined with expectations about (A.) the correlation between spouses' earnings, (B.) the earnings inequality among women, and (C.) women's share in total household earnings to be able to derive hypotheses that answer our explanatory Question 6.

Regarding (A.), the correlation between spouses' earnings, it has been suggested by other studies (Breen & Salazar, 2009; Callan et al., 1998; Cancian & Reed, 1999; Oppenheimer, 1994, 1988; Sweeney, 2004) that this correlation has increased moderately over time in OECD countries. We thus expect that the correlation between spouses' earnings increased between 1981 and 2005. As a higher correlation between spouses' earnings results in women's earnings exacerbating inequality between households, we hypothesise that if the trend towards a stronger positive correlation had not taken place, the inequality between households would have risen *less* than it actually has between 1981 and 2005.

Regarding (B.), earnings inequality among women, various studies have shown that the increased labour force participation of women in OECD countries during recent decades has resulted in a reduction in the number of women with zero earnings, and consequently substantially lower earnings inequality among women (Cancian & Reed, 1999; Gregory, 2009). We argued above that higher inequality in earnings among women contributes to larger inequalities between households. The opposite also holds: with lower earnings inequality among women, women's earnings have a stronger attenuating contribution to between-household inequality. We thus expect a trend towards lower earnings inequality between women, and hypothesise that if this

trend had not taken place, inequality between households would have risen *more* than it actually has between 1981 and 2005.

Regarding (C.), women’s share in total household earnings, it has been found that women’s share has increased over time (Charles, 2011; Costa, 2000; Gregory, 2009). It has been argued by itself that this factor does not affect between-household inequality, but the size of the share women contributed affects the *degree to which* between-household inequalities are affected by women’s earnings. The consensus is that women’s earnings attenuate inequality between households (Gregory, 2009), even though women’s earnings were distributed more unequally than men’s and spouses’ earnings were positively correlated. Given this, we hypothesise that if the trend towards women’s earnings being a larger share of total household earnings had not taken place, inequality between households would have risen *more* than it actually has between 1981 and 2005.

To summarise this discussion, we hypothesise:

**Women’s earnings hypothesis** Between 1981 and 2005 in OECD countries (A.) the positive correlation between spouses’ earnings increased, (B.) earnings inequality among women’s earnings decreased, and (C.) the share of women’s earnings in total household earnings increased.

**Attenuation hypothesis** The trend in OECD countries between 1981 and 2005 towards higher inequality between households would have been less steep if (A.) the correlation between spouses’ earnings had not risen, and more steep if (B.) inequality among women had not risen and if (C.) women’s share in total household earnings had not risen.

## 3 Data and Method

### 3.1 Data From the Luxembourg Income Study

Our hypotheses were tested using data from the Luxembourg Income Study (LIS, 2013). LIS provides country-comparative household- and person-level surveys on income, organised in waves. We have used data from LIS waves 1 through 6 for 18 OECD countries (listed in Table 1), covering the period from 1981 to 2005. In total, 99 LIS datasets were used. By using sampling weights these LIS datasets provided representative samples of the respective countries’ populations. Our sample was limited to coupled households, defined as two spouses living together who are married or in a consensual union. 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

Table 1: Number of observations on coupled households, datasets, and time-span covered for 18 OECD countries

Source: Data from the Luxembourg Income Study (LIS, 2013).

Country	First Year	Last Year	N. Years	N. Obs.
Australia	1985	2003	5	13,619
Austria	1994	2004	4	5561
Belgium	1985	2000	6	11,067
Canada	1981	2004	8	74,215
Denmark	1987	2004	5	95,707
Finland	1987	2004	5	27,155
France	1989	2005	4	18,205
Germany	1981	2004	7	32,512
Greece	1995	2004	3	6518
Ireland	1994	2004	5	7375
Italy	1986	2004	9	36,043
Luxembourg	1985	2004	6	7585
Netherlands	1983	2004	6	14,144
Norway	1991	2004	4	19,132
Spain	1990	2004	4	23,321
Sweden	1981	2005	6	32,413
United Kingdom	1986	2004	6	28,242
United States	1986	2004	6	119,408
Total	1981	2005	99	572,222

the data. These restrictions on the data were required to allow for the decomposition of earnings inequalities between households, and were necessary to determine the (influence of the changing) correlation between spouses' earnings. These decisions correspond to those made in similar studies (e.g. Harkness, 2013), ensuring comparability of the results. The total number of coupled households per country in our data are presented in Table 1.

The key variable observed in the data was earnings, defined as the monetary returns from paid employment. Negative earnings were recoded to 0, and earnings were trimmed at the level of the 99th percentile. We measured earnings for both of the spouses in the coupled households, and at the level of the household. Household earnings were defined as the sum of the earnings of two spouses, even when either or both spouses had no earnings. Based on these measurements, for each country-year we calculated the following measures:

**Inequality between households** Calculated as the coefficient of variation

(defined in Equation 1) of the total household earnings:  $CV_h$ .

**Inequality among women** Calculated as the coefficient of variation of the earnings of women:  $CV_w$ .

**Inequality among men** Calculated as the coefficient of variation of men's earnings:  $CV_m$ .

**Women's share in total household earnings** Women's earnings as a proportion of total household earnings:  $\alpha_w$ .

**Correlation of Spouses' Earnings** Pearson's correlation coefficient between spouses' earnings:  $\rho_{mw}$ .

### 3.2 Comparability of Net and Gross Datasets With LIS

LIS income variables were reported either net of taxes and social security contributions, 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 contribution from gross earnings. The procedures we developed for doing this are described in detail by Nieuwenhuis et al. (2013).

### 3.3 Statistical Method: The Role of Counter-Factuals

The contribution of the earnings of women to inequality between households ( $contrib_w$ ) cannot be directly observed, but can be inferred by comparing actual inequality between households with what the inequality would have been if women did not have any earnings (see Equation 3), or if women's earnings were different in another way. Thus, any assessment of women's contribution to between-household inequality is always based on a counter-factual scenario. In this paper we use two counter-factuals.

The first counter-factual is the scenario that all women had zero earnings, while the distribution of men's earnings remained unaltered. Thus, in Equation 3, a comparison is made between earnings inequality in the observed scenario in which household-earnings are the sum of both spouses' earnings and earnings inequality in the counter-factual scenario in which household-earnings are only comprised of men's earnings. If the latter level of inequality is higher, thus if the observed inequality between men is higher

than the observed inequality between households, women’s earnings are argued to have attenuated the inequality between households compared to the (counter-factual) scenario in which women had no earnings at all. This procedure is commonly applied (Folbre et al., 2013; Gronau, 1982; Harkness, 2013; Lam, 1997).

The second counter-factual is the scenario that aspects of women’s earnings (A. correlation between spouses’ earnings, B. earnings inequality among women, and C. women’s share in total household earnings) had not changed during the period in which countries were observed in this study. Thus, for instance, Table 1 shows that we observed Australia for the first time in 1985 and the last in 2003. To assess the extent to which changes in women’s earnings during that period affected the attenuating effect of women’s earnings on between-household inequality, we calculated the between-household inequality in 2003 based on aspects of women’s earnings (correlation, inequality, and share) as observed in 1985. We did this for each country separately and averaged the results which will be reported in Table 4.

Counter-factual statistics do not allow for an interpretation in causal terms (Cartwright, 2007), but are useful in determining the role of different aspects of women’s earnings in the trend towards higher inequality of earnings between households. The results of this paper should thus be interpreted as a retrospective description of trends between 1981 and 2005, and not as model-based generalisable results.

## 4 Results

### 4.1 Factual Descriptions

The first step in our analysis is to present a (factual) graphical description of trends in (A.) the correlation between spouses’ earnings (Figure 2), (B.) the earnings inequality among women (Figure 3) and (C.) women’s share in total household earnings (Figure 4). The black lines in the panels of Figures 2, 3, and 4 show the linear trends per country. These figures show that the correlation between spouses’ earnings increased in about half of the observed countries, and confirm that earnings inequality among women decreased in several countries. The share of women’s earnings as a percentage of total household earnings increased over time, with women’s share rising towards 50%. These findings are in line with our women’s earnings hypothesis.

Before continuing, it should be pointed out that in these descriptive statistics a few outliers are present. This is most clear in the case of inequality among women’s earnings in the Netherlands. The first two observations show

substantially higher inequality than later observations, most likely overly influencing the linear trend. Nevertheless, overall the linear trends in the Figures fit the data reasonably well.

## 4.2 Counter-factual Decomposition

In this section, we answer our research questions. Our descriptive question pertained to describing the degree to which women’s earnings attenuated earnings inequalities between households in 18 OECD countries from 1981 to 2005. In Table 2 we present the attenuating contribution of women’s earnings for a cross-section of 18 OECD countries. For each country, Table 2 presents earnings inequality among men, among women, and between households. For instance, in Australia, the inequality among women exceeds that among men, but inequality between households is lower than inequality between men. In the counter-factual scenario where women had zero earnings, inequality between households would have been equal to inequality among men. Following Equation 3, in Australia in 2003 women’s earnings attenuated between-household inequality by  $(.18 - .26)/.26 * 100 = -29.66$  percent.

The remainder of the results presented in Table 2 lead to a similar answer to our descriptive question: inequality among women’s earnings is larger than among men’s (with the exception of Italy), and inequality between households is lower than inequality among either men’s earnings or women’s earnings. Again following Equation 3, women’s earnings attenuated between-household inequality in the 18 OECD countries in our data. This is presented in the final column of Table 2. In the counter-factual scenario of women having zero earnings, inequality between households would have been substantially higher in OECD countries in around 2004 compared to the observed actual inequality.

Next, we determine trends in the degree to which women’s earnings have attenuated inequality between households in OECD countries. The percentages presented in Table 3 are identical to those reported in the column labelled *contrib<sub>w</sub>* in Table 2, but cover a longer period of time. What stands out, as the answer to our descriptive Question 5, is that the degree to which women’s earnings attenuate between-household inequality increased between 1981 and 2005 in the 18 OECD countries covered in this study. The rate of change, however, varied by country. A strong increase in the attenuating effect of women’s earnings was observed in, for instance, Canada (from -13 to -38), and Italy (from -7 to -42), while a smaller change was observed in the Nordic countries Denmark (from -33 to -35), Finland (from -33 to -36) and Sweden (from -26 to -27). These latter countries have frequently been



Figure 2: Correlation Between Spouses' Earnings, 18 OECD countries 1981 - 2005  
 Source: Data from the Luxembourg Income Study (LIS, 2013).

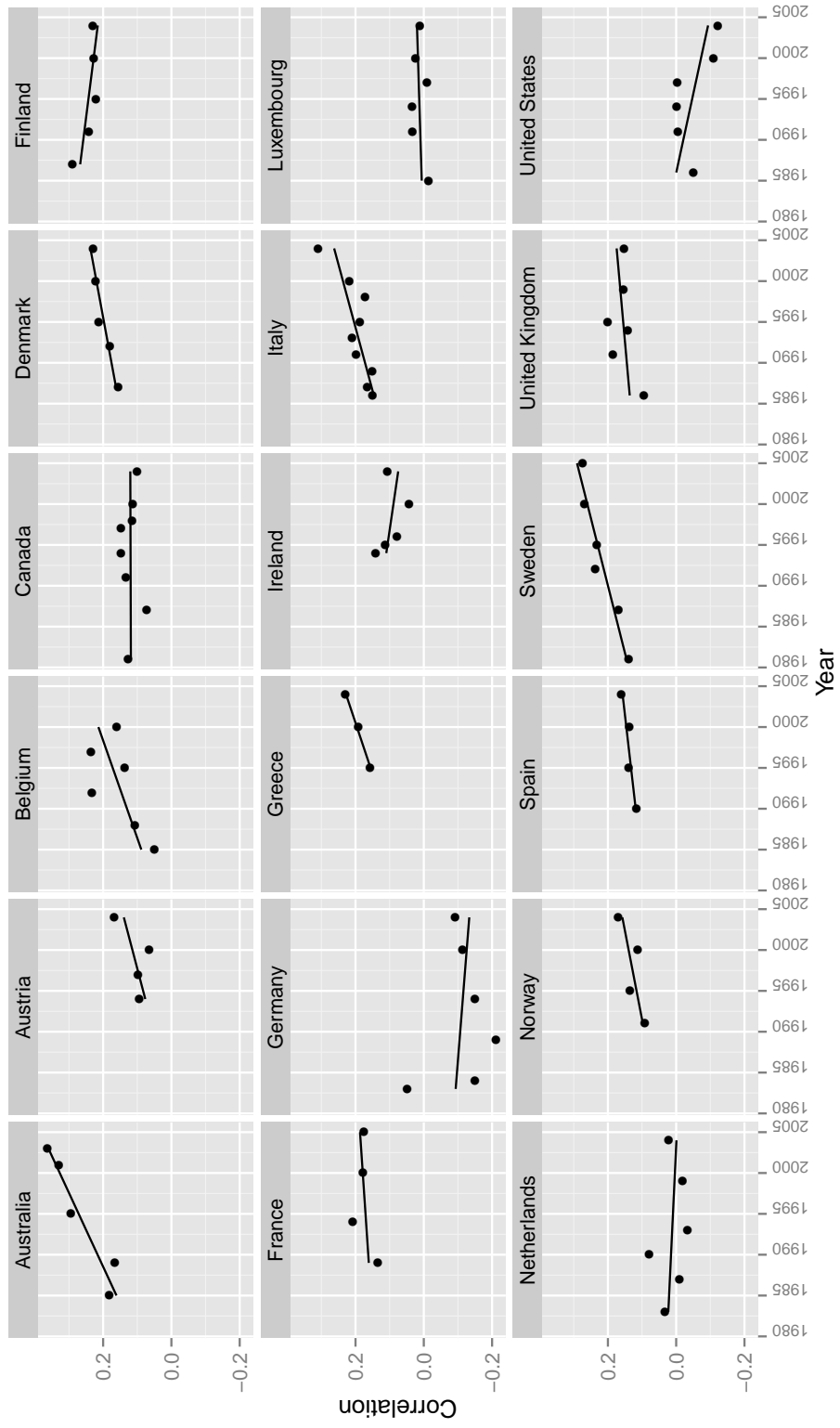


Figure 3: Earnings Inequality Among Women, 18 OECD countries 1981 - 2005  
 Source: Data from the Luxembourg Income Study (LIS, 2013).

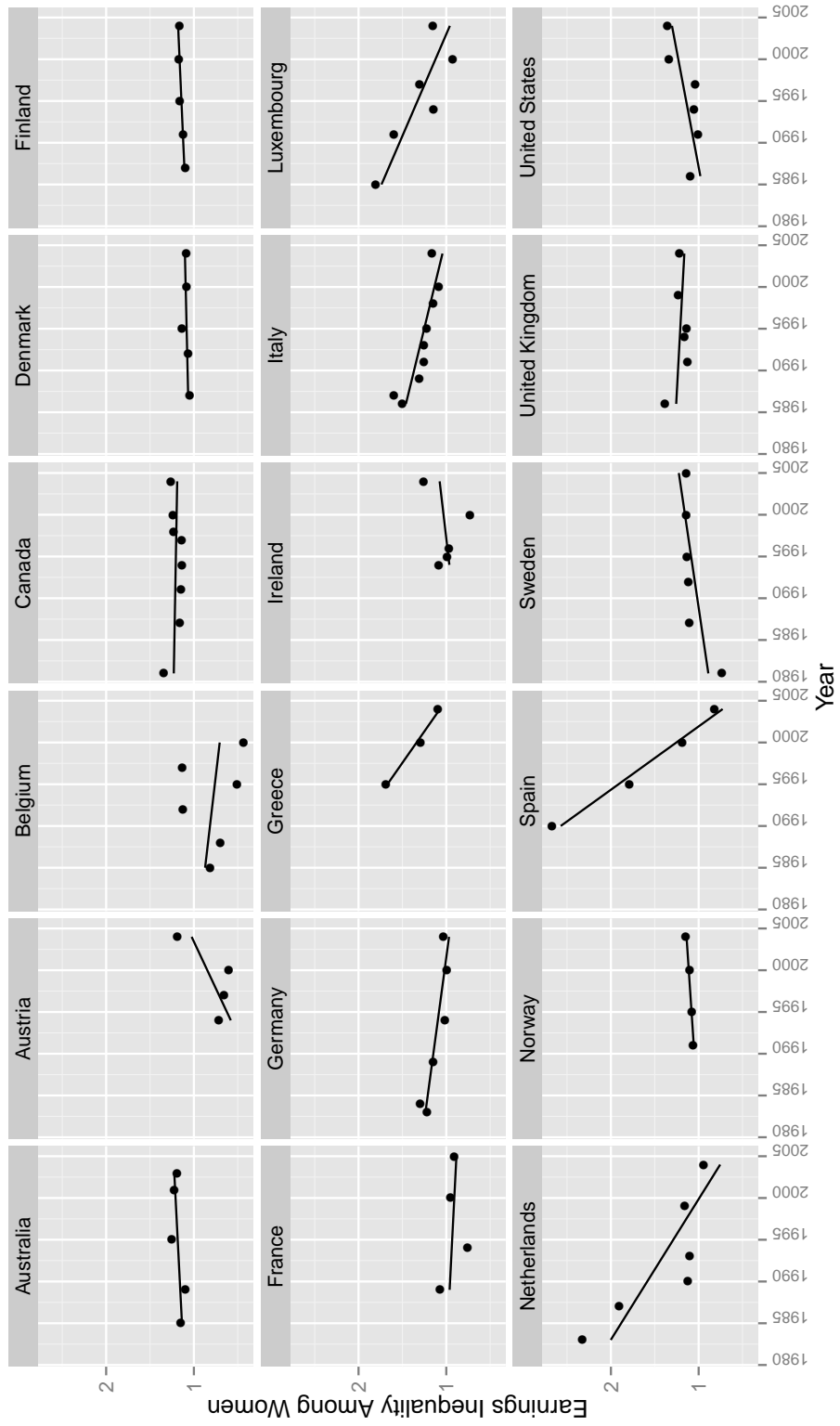


Figure 4: Women's Share in Total Household Earnings, 18 OECD countries 1981 - 2005  
 Source: Data from the Luxembourg Income Study (LIS, 2013).

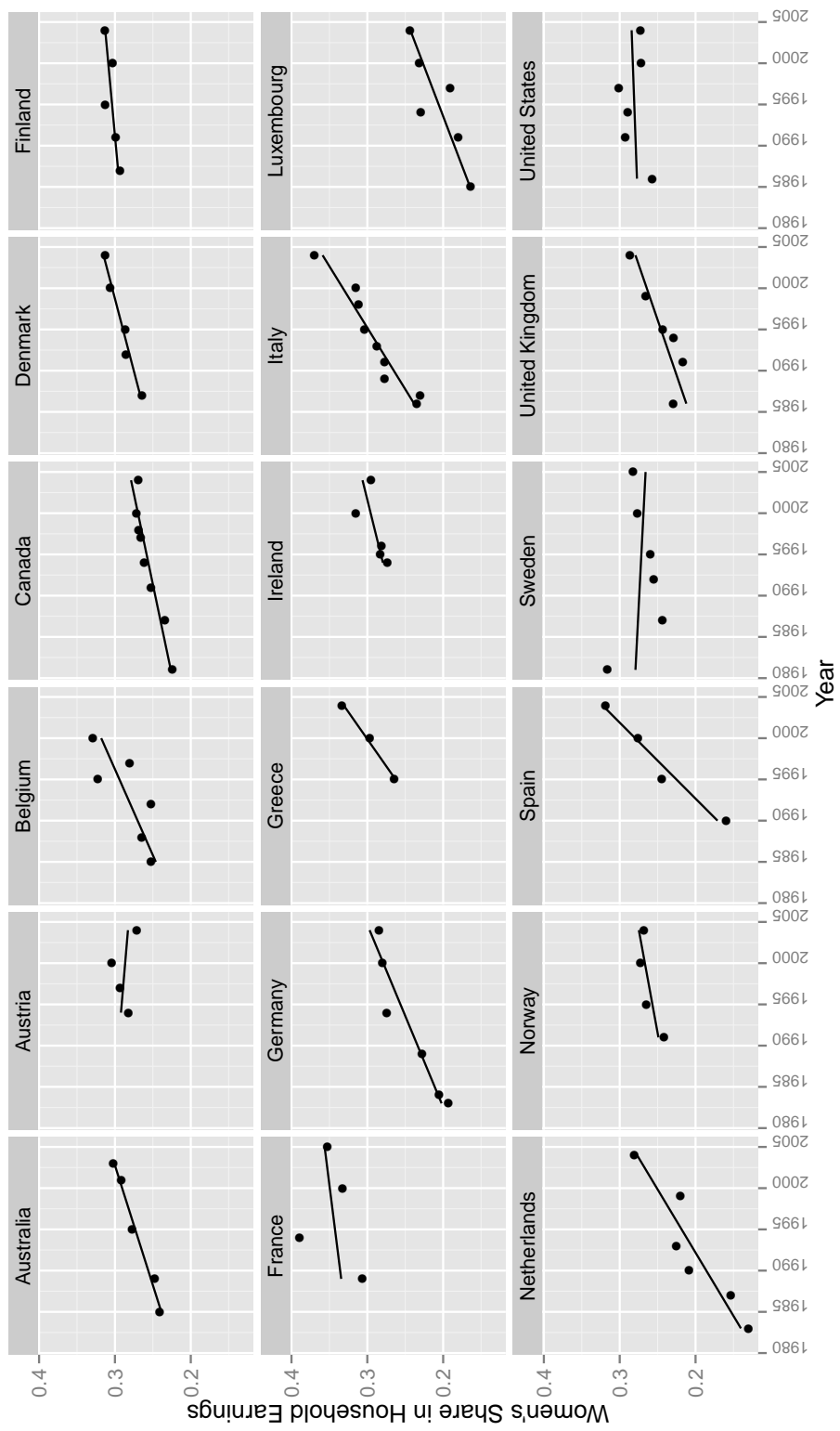


Table 2: Attenuating Contribution of Women’s Earnings to Between-Household Earnings Inequality in 18 OECD Countries

Source: Data from the Luxembourg Income Study (LIS, 2013).

Country	Year	Earnings Inequality Between:			<i>contrib<sub>w</sub></i> (%)
		Men	Women	Households	
Australia	2003	0.26	0.28	0.18	−29.66
Austria	2004	0.25	0.27	0.15	−37.42
Belgium	2000	0.21	0.43	0.16	−22.73
Canada	2004	0.28	0.35	0.17	−38.32
Denmark	2004	0.15	0.17	0.10	−35.03
Finland	2004	0.23	0.25	0.15	−36.09
France	2005	0.29	0.45	0.21	−29.33
Germany	2004	0.25	0.57	0.16	−36.29
Greece	2004	0.51	1.10	0.42	−16.74
Ireland	2004	0.31	0.34	0.18	−41.07
Italy	2004	0.32	0.25	0.19	−41.57
Luxembourg	2004	0.21	0.69	0.16	−21.92
Netherlands	2004	0.21	0.48	0.15	−28.63
Norway	2004	0.19	0.23	0.12	−34.80
Spain	2004	0.32	0.82	0.27	−15.97
Sweden	2005	0.17	0.23	0.12	−27.28
United Kingdom	2004	0.29	0.30	0.17	−39.90
United States	2004	0.37	0.44	0.18	−51.03

observed to have had high levels of women’s earnings throughout the period covered by this study (see Figure 4). The findings reported in Table 3 suggest that women’s earnings have a stronger attenuating effect on household inequalities in those countries with strong female labour force participation, and that an increasing attenuating effect has been associated with women’s increasing participation in other countries. This will be examined next.

To analyse the impact of women’s changing earnings over time on inequality between households, the final step in our analysis is based on the counter-factual scenario that women’s earnings did not change within countries over time (since the first observation in our data of that country). These counter-factual analyses are presented in Table 4 and used to test our attenuation hypothesis. Because we did not observe each country in our data in exactly the same years or for the same period of time, we have clustered the presentation of these results by wave in the LIS data.

The top row of Table 4 presents the trend in earnings inequality between households, clustered by LIS wave of (approximately) every five years. These

Table 3: Trends in Attenuating Contribution of Women's Earnings to Between-Household Earnings Inequality in 18 OECD Countries  
 Values represent  $contrib_w$  (%)  
 Source: Data from the Luxembourg Income Study (LIS, 2013).

Year	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Norway	Spain	Sweden	United Kingdom	United States
1981				-13												-26		
1982																		
1983								-29					-10					
1984								-28										
1985	-19		-8									-7						
1986										-7								-32
1987						-33				-6								-26
1988			-4															
1989	-23						-24	-35										
1990																		
1991						-36												
1992																		
1993																		
1994																		
1995	-27																	
1996																		
1997																		
1998																		
1999																		
2000																		
2001	-29																	
2002																		
2003	-30																	
2004																		
2005																		

are calculated based on the measurements of inequality between households presented in Table 3, but averaged over the available countries per LIS wave. Over time, from Wave 1 (around 1980) to Wave 6 (around 2004), inequality between households has increased from .16 to .21. Our explanatory question (number 6) pertained to the extent to which this trend would have been different if women’s earnings had not changed since around 1980. We calculated this counter-factual by keeping aspects of women’s earnings constant and by using Equation 2.

Firstly, we calculated the counter-factual that the correlation between spouses’ earnings had not changed over time, with all other aspects of women’s earnings (inequality and share in total household earnings) as well as men’s earnings remaining as observed in the data. The results in the row labelled “*A. Correlation Spouses’ Earnings*” in Table 4 suggest that in this counter-factual scenario the inequality between households would have been virtually the same as observed. With respect to the counter-factual scenario in which the inequality of women’s earnings had not decreased (presented in the row labelled “*B. Earnings Inequality Among Women*”), the results show that inequality between households would have been higher than actually observed, from around 1995 onwards. In this counter-factual scenario, between-household inequality would have been .26, which is about 25% higher than the observed inequality of .21. The same result was obtained for the counter-factual of no change in women’s share in total household earnings (row labelled “*C. Share Women’s Earnings in Total Household Earnings*”), although in this case the impact was  $(.22-.21)/.21 = 5\%$ . Finally, if all aspects of women’s earnings had remained the same, i.e. the correlation between spouses’ earnings, earnings inequality among women, and women’s share in total household earnings, then between-household inequality would have been moderately higher than was actually observed in 2004  $([.23-.21]/.21=10\%)$ . Combined, these results corroborate our attenuation hypothesis that although the correlation between spouses’ earnings, increased over time, the effect of that trend was offset by decreasing earnings inequalities among women, and as a result the rising share of women’s earnings in the total earnings of households increasingly attenuated between-household inequalities in OECD countries between 1981 and 2005.

## 5 Conclusion and Discussion

Women’s earnings attenuate earnings inequality between households. This had been observed before (Gregory, 2009; Lam, 1997), but studies typically observed only a single country over a longer period of time, or a number

Table 4: Counter-factual Trends in Between-Household Inequalities  
 Values represent inequality between households, in 4 Counter-factual Scenarios  
 : Data from the Luxembourg Income Study (LIS, 2013).

Scenario	Wave 1 (1980)	Wave 2 (1985)	Wave 3 (1990)	Wave 4 (1995)	Wave 5 (2000)	Wave 6 (2004)
Observed Inequality Between Households	0.16	0.16	0.16	0.18	0.19	0.21
<i>counter-factual. No change in:</i>						
(A.) Correlation Spouses' Earnings	0.16	0.17	0.16	0.18	0.20	0.21
(B.) Earnings Inequality Among Women	0.16	0.15	0.16	0.19	0.21	0.26
(C.) Share Women' Earnings in Total Household Earnings	0.16	0.16	0.16	0.18	0.20	0.22
All of the Above	0.16	0.16	0.16	0.19	0.20	0.23

of countries cross-sectionally. We answered the descriptive question of to what extent women’s earnings have attenuated earnings inequalities *within* households and *between* households in OECD countries from 1981 to 2005. Over time, women’s earnings contributed a larger share of total household earnings, the correlation between spouses’ earnings increased, and earnings inequality among women decreased. The combined effect of these trends was that the attenuating effect of women’s earnings on between-household earnings increased over time in all 18 OECD countries observed in this study. This contribution of women’s earnings was decomposed using the observed trends in (A.) the correlation between spouses’ earnings, (B.) earnings inequality among women, and (C.) women’s share in total household earnings have affected the degree to which women’s earnings attenuated earnings inequality between households in OECD countries from 1981 to 2005. If the inequality between women’s earnings had not decreased as it did between 1981 and 2005, the inequality between households would have been approximately 25% higher in 2005. If all of the above-mentioned aspects of women’s earnings had not changed between 1981 and 2005, inequality between households would also have been higher in 2005.

The results based on counter-factual scenarios in this paper cannot be interpreted in causal terms (Cartwright, 2007). Thus, the observed trends cannot be used to make predictions. These findings apply only to coupled households, and same-sex couples were excluded from the analysis. These restrictions were required for the decomposition analyses performed here, and are typical in the literature on the contribution of women’s earnings to between-household inequality. The consequence of limiting our analyses to coupled households is that the increasing prevalence of single households was not taken into account. Thus, the findings reported in this paper cannot be generalised to the full populations of the OECD countries observed in this study. We were able to show that even while spouses’ earnings became increasingly positively correlated, women’s earnings attenuated between-household earnings inequality and have increasingly done so between 1981 and 2005 in 18 OECD countries.

Our findings contradict a commonly held intuition that as long as the correlation between spouses’ earnings is positive, any increase in women’s earnings contribute to inequality between households. Esping-Andersen argued that for women’s earnings to attenuate inequality between households would require unrealistically low inequality among women and stated that “*the conditions required for an equalizing effect are quite steep*” (2007, p. 646). We showed that the correlation between spouses’ earnings would need to be very high, much higher than it actually is, for women’s earnings to exacerbate inequality between households. We thus conclude that the con-



ditions for women's earnings to have a *de-equalising* effect are quite steep: high women's earnings have a strong tendency to reduce inequality between households.

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