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Demographic behaviour and earnings inequality across OECD countries

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Abstract
Many studies have focused on how demographic dynamics, such as changes in marriage patterns and the increasing share of households headed by a single adult, may contribute to rising earnings inequality. Here we instead ask how demographic differences between countries may underpin differences in household earnings inequality between them, concentrating on economic homogamy and the proportion of households headed by a single woman and by a single man. We use data on 28 OECD countries from the 2016 wave of the Luxembourg Income Study, and develop a new inequality decomposition approach based on half the squared coefficient of variation (HSCV). We find that variation between countries in the specified demographic factors can account for just over 40% of the variation between countries in inequality in household labour earnings, with the proportion of households headed by a single woman playing the largest role. The associations between labour earnings inequality and these demographic components are consistent across countries, with little variation in how each is related to overall inequality. Although by far the largest driver of cross-national inequality relates to the earnings of partnered men, counterfactual analysis suggests that relatively small changes in these demographic variables can indeed affect inequality.

Keywords Earnings inequality · Economic homogamy · Household structure · Inequality decompositions · OECD countries

1 Introduction

In recent decades, a substantial literature has examined how two key aspects of demographic behaviour reflected in how households are structured affect earnings inequality: the growing proportion of households headed by a single adult and increased assortative mating. For the most part this has focused on how demographic behaviours affect changes in earnings

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inequality over time, typically employing a decomposition method to address a counterfactual question such as "what would be the level of income inequality in the United States today if economic homogamy were at the same level as in 1979, *ceteris paribus?"* (Burtless 1999; Cancian and Reed 1998; Hyslop 2001; Breen and Salazar 2010, 2011). A few studies have extended this approach to trends in more than one country, but there is little research focusing on the related but different question of how these two demographic factors may contribute to differences in the level of earnings inequality across countries; that is the question addressed in this paper. This comparative approach is important as there is powerful cross-national variation in both inequality (Chancel et al. 2022) as well as in patterns of demographic behaviour such as single motherhood (Sobotka and Toulemon 2008) and economic homogamy (Kollmeyer 2013; Grotti and Scherer 2016), therefore providing a complementary source of variation to within-country changes.

We first examine the extent of variation across rich countries in the degree of earnings homogamy between partners and in the proportion of households headed by a single man and a single woman, using data from the 2016 wave of the Luxembourg Income Study (LIS) covering 28 OECD countries. We then employ a new decomposition approach based on half the squared coefficient of variation (HSCV), the summary inequality measure commonly known as Generalised Entropy GE (2), which can be decomposed into 11 parameters, including economic homogamy and the proportions of households headed by a single man and by a single woman. Decomposing HSCV allows us to directly change these key parameters of interest, thus assessing their counterfactual impact on household earnings inequality. We find that the proportion of households headed by a single woman has the strongest association with household earnings inequality, with which economic homogamy is less strongly associated and the share of single-male headed households is not associated. Counterfactuals that set these demographic components to the same values in all countries bring out how much they could potentially account for differences in inequality levels. Counterfactuals that instead reduce the observed levels of economic homogamy and proportions of households headed by a single woman and a single man in each country by only 10% are still seen to produce substantial reductions in inequality: while the cross-country average decline is -3.5%, in some countries the demographic counterfactuals produce similar (Estonia, Italy, Greece, Spain) or stronger (Colombia, Lithuania, Poland, Slovakia) reductions on inequality compared to the key economic predictor of inequality, the mean earnings of partnered men.

Previous research is briefly surveyed in the next section and against that background the analytical approach to be adopted here is set out. Section 3 describes the data employed. Section 4 sets out the decomposition of the HSCV summary measure on which our analysis then relies. Section 5 sets out the relationship between key aspects of demographic behaviour and inequality in household earnings across the set of countries being studied. Section 6 then assesses the extent to which the variation in household earnings inequality across countries can be explained by cross-national variation in these demographic variables. Section 7 highlights the core findings and discusses their implications including for policy.

2 Background and analytical approach

As part of efforts to tease out the forces underpinning rising household earnings inequality, researchers in economics, demography and sociology have paid a good deal of attention to the role that changing household structures may play. Homogamy (marriage/partnership between individuals with a similar level of education or earnings) and the extent to which

households are 'headed' by a couple versus a single adult have been a particular focus in research on rising inequality, especially in the US. As far as homogamy is concerned, if individuals increasingly match with others who are similar in their earnings or in their earnings potential that may lead inequality between households to increase (Gronau 1982). Several authors consider growing similarity in earnings between partners to be a key driver of the rise in income inequality (Cancian, Danziger, and Gottschalk 1993; Chevan and Stokes 2000; Gonalons-Pons and Schwartz 2017; Cancian and Reed 2009; Schwartz 2010). Some US-focused studies showed a strong, positive relationship between increasing homogamy and inequality in the 1980s and 1990s, accounting for a substantial proportion of the rise of income inequality there (Cancian, Gottschalk, and Danziger 1993; Karoly and Burtless 1995; Lee 2008; Cancian and Reed 2009; Schwartz 2010). Esping-Andersen (2007) reported that increasing economic homogamy contributed to rising inequality in Germany, Italy, and Spain in the 1990s. However, more recent studies find a much more limited role for economic homogamy in increasing household-level inequality in earnings or income, both in the US (Larrimore 2014; Greenwood et al. 2014) and comparatively (Albertini 2008; Peichl et al. 2012; Chen et al. 2014; Nieuwenhuis et al. 2017; Pestel 2017; Pareliussen and Robling 2018; Jònsson 2021). This literature has brought out in particular the centrality not just of 'who partners with whom' but of labour supply decisions by partners and trends in women's labour force participation and hours of work in particular (see for example Harkness 2013). Hryshko et al. (2017) find for the US that while wives' earnings played an important role in dampening the rise in inequality at the family level, marital sorting played little role. Yonzan (2020) finds that positive sorting over labor earnings did play a role in increasing labor earnings inequality among couples in the US between 1970 and 1990 but not over the 1990–2018 period; this variation across time may help to explain the conflicting results in the US-focused literature.

The growing proportion of households headed by a single adult has also been postulated as a potentially powerful driver of earnings inequality in a US context and more broadly (Karoly and Burtless 1995; Lerman 1996; Martin 2006). Looked at comparatively, Chen et al. (2014) assessed the role of both increasing proportions of single-headed households and increased earnings correlation among partners in couples for the evolution of household earnings inequality for 23 OECD countries from the mid-1980s to the mid-2000s. Their results suggest that marital sorting and household structure changes contributed, albeit moderately, to increasing household earnings inequality, while rising women's employment exerted a sizable equalising effect. The rising proportion of households with children headed by a single woman in particular has also received considerable attention in research on changes in the level and composition of poverty for households and children.

Our concern is not with the contribution of the demographic factors highlighted here to how inequality among households has been changing over time; we focus instead on the role they may play in the variation across rich countries in the level of inequality at a point in time. This variation is more usually discussed in terms of economic structures and institutional settings relating both to market incomes and to the extent and nature of redistribution via taxes and cash transfers, with relevant studies employing a variety of methodological approaches and a narrow or broader comparative range. The recent study by Sologon et al. (2021) includes demographic composition alongside labour market structures and returns and tax-benefit systems in seeking to account for differences in disposable income inequality between Ireland and the UK. Their analytical framework integrates micro-econometric and micro-simulation approaches in a decomposition analysis based on the EUROMOD tax-benefit simulation model. This builds on and extends the approach to accounting for differences across countries in household income distributions set out in Bourguignon et al. (2008), which developed a combination of parametric and non-parametric procedures

for generating counterfactual distributions suitable for comparing full household income distributions (as opposed to wage distributions) bringing changes in household composition into the fold.

Here we employ a more straightforward and limited but still illuminating approach based on decomposition and counterfactual analysis using a summary inequality measure. For this purpose we use half the squared coefficient of variation (HSCV), one of the Generalised Entropy class of measures and often termed GE(2). The coefficient of variation and its variants are widely used in the literature employing decomposition and counterfactuals to study inequality: among others, the CV is employed by Burtless (1999), Esping-Andersen (2007) and Harkness (2013); the Squared CV is employed by Cancian et al. (1993), Cancian and Schoeni (1998), and Nieuwenhuis et al. (2017), while HSCV is employed by Pasqua (2008). This measure is decomposable among mutually exclusive and exhaustive groups that are not hierarchically ordered on the basis of earnings and can accommodate zero or negative earnings (due for example to self-employment losses), which rules out the use of a number of other inequality measures including the Theil index and the Gini coefficient (Cowell 2000). Here we show how it can be decomposed to distinguish the specific demographic features we wish to study and assess their role in how inequality in earnings/labour income among households varies across rich countries.

We do this by first examining the variation across rich countries in the relevant parameters of this decomposition and how each of these parameters relates to the observed level of inequality in household earnings from labour (employee earnings together with self-employment earnings), the component of total earnings that dominates overall earnings inequality in all rich countries. We then implement a counterfactual analysis setting the relevant parameter for each of these demographic components to a common value in all countries. The level of inequality in labour earnings across households in each country is then recomputed and we can see how much variation across countries there would be in that instance. Finally, alternative counterfactuals are implemented that instead reduce the observed levels of economic homogamy and the proportions of households headed by a single woman and a single man in each country by 10%. These allow us to show what impact a more modest and realistic change in the demographic variables could have on the variation in inequality across the countries being studied.

Broadly, our approach belongs to one of the four groups of approaches typically employed in comparative counterfactual analysis of inequality, which we outline in Table 1.

Approaches 1 and 2 typically start by specifying a model for individual earnings (Y_i), and then engage in pairwise comparisons between countries for their counterfactual analyses, for instance through the DiNardo et al. (1996) method (Bourguignon et al. 2008; Bover 2010; Peichl et al. 2012; Cowell et al. 2018). Given the width of our geographic scope (28 countries), these approaches would not be easily tractable: in our case, the full pairwise comparisons would require 2268 = (28^2–28)*3 counterfactuals to assess the role of the three parameters, or alternatively we would arbitrarily select a benchmark country against which to compare the remaining 27. In contrast, our method combines approaches 3 and 4, as it starts by assessing how HSCV is affected by cross-national variation in its demographic and economic components at the country level, and subsequently engages in counterfactuals while keeping other parameters constant. Furthermore, this allows us to be agnostic about the specific earnings generating process.

Counterfactuals of this kind are staples of the literature on the relationship between demographic structures and income inequality (Fortin et al. 2011), starting from the approach developed by Lerman and Yitzhaki (1985), but they are much less commonly used in comparative studies. As with all such analyses, the counterfactuals are artificial, insofar as they

Table 1 HSCV Parameters

Approach Group N	Approach Type	Approach Functioning	Literature
1	Developments of Oaxaca-Blinder	Decompositions based on a linear regression model for log (Y_i) (individual earnings) as a function of individual predictors	Juhn et al. (1993), Fields and Yoo (2000), Fields (2003)
2	DiNardo, Fortin, and Lemieux (1997) approach	Simulating the entire distribution of Y, given a change in each parameter X, *ceteris paribus*	Bourguignon et al. (2008), Peichl et al. (2012), Cowell et al. (2018)
3	Inequality Measure Decomposition and Shift-Share	Identify an inequality summary measure I, and investigate how it reacts to changes in some of the parameters X, *ceteris paribus*	Mookherjee and Shorrocks (1982), Albertini (2008), Breen and Salazar (2011)
4	Macro-level regressions	Identify an inequality summary measure I, and regress it on macro-level predictors, for instance at the country level	Chevan and Stokes (2000), Brady and Leicht (2008), Kollmeyer (2013)

only vary some parameters while keeping everything else fixed—a condition that is unlikely to hold in reality. The usefulness of counterfactuals depends on the aim of the exercise, which is why we employ alternative approaches where this is more plausible or realistic.

3 Data and measures

The focus of our analysis is on inequality in the distribution of earnings among households, and how that is affected by the make-up of households and the earnings accruing to its adult members. We follow common practice in this literature in restricting our analysis to the household 'reference person' and their spouse/partner if any (including same-sex partnerships), ignoring the presence of any other adults in the household. The household for our purposes thus comprises either a single adult or a couple (children do not feature in our analysis), and household earnings are those accruing to the single adult or the aggregate of the individual earnings of the two partners in a couple. Both the household and the individual adult are employed as units of analysis: as will become clear when our decomposition approach is described below, this features both earnings and household composition which are household-level variables but also incorporates the earnings of adults at the individual level and the relationship between the individual earnings of spouses/partners.

We restrict the sample to households where both the 'reference person' and spouse/partner if any is aged 20 to 65 inclusive.[1] This serves to focus attention on the working-age population, excluding ages mostly outside the labour force; some studies use a narrower age range such as 25–60 for this purpose, but at the cost of excluding the substantial numbers who are in the workforce between 20–24 and 61–65. For further accuracy, we exclude those reporting being enrolled in education from the sample. We use data from the Luxembourg Income Study (LIS), which contains the information required on household and person-level earnings as well as socio-demographic information and labour market participation. We focus on 28 OECD countries across North America and Europe, further including Australia, Colombia, and Japan, substantially extending the analysis geographically beyond the previous literature. We rely on the 2016 wave of the LIS, or on the closest year if 2016 data is not available.[2] Sample weights are employed throughout the analysis.

For each individual, we use the following variables: labour earnings (including from self-employment), marital status, relationship to household reference person (self or spouse/partner), self-reported sex, type of main job (full-time vs. part-time), if any. Labour earnings (LIS variable pilabour) includes "cash payments and services received from dependent employment, as well as profits/losses and value of goods from self-employment, including own consumption." (LIS User Guide 2019, p.10); pilabour is almost always expressed in gross terms, *i.e.* before tax, and we excluded from our sample countries where this is not the case (Chile, Hungary, Slovenia). We transform all earnings to 2017 US$ in terms of

[1] In households where one partner is within this age range and the other is outside it, the latter is mostly aged over 65 and retired/not working. Including these would add about 15% to the number of households included on average and modestly increase the dispersion in earnings across households. For purposes of robustness, we replicate the analysis with this Expanded Age Rage (Appendix Figures A5-A8). Results are substantially similar, if not slightly larger in magnitude on average for the counterfactuals (Figure A8).

[2] Countries for which data is not related to 2016 are: Australia (2014), Switzerland (2013), Estonia (2013), France (2010, Ireland (2010), Iceland (2010), Japan (2013), Luxembourg (2013), Netherlands (2013), Norway (2010), Sweden (2005), Slovakia (2013). It should be noted that timing in the case of Sweden is particularly problematic in preceding the global financial crisis, but LIS has not been able to add further Swedish data since 2005.

Purchasing Power Parity (PPP) using the PPPs provided by the Luxembourg Income Study, which mitigates the temporal differences between countries documented above. We aggregate the labour earnings of the reference person and spouse/partner where present to arrive at what we will for convenience term 'household earnings'. Given the sensitivity of inequality measures to high values in the distribution, we exclude from the analysis the top 1% of households in terms of household earnings in each country. This common approach, reflecting uncertainty about how accurately incomes at the very top are captured, is particularly important here in light of the sensitivity of the summary inequality measure that plays the central role in our analysis – described in the next section—to dispersion at the top.[3]

Finally, we have the issue of whether to equivalize labour incomes to take household size and composition into account, to reflect the fact that while two persons need more income than one to reach the same standard of living there are economies of scale in consumption. This is conventionally done when household incomes are being employed to capture purchasing power and living standards and it is inequality in those terms that is the central focus, as it most often is. In seeking to investigate how household incomes are made up of the incomes or earnings of individual members, though, it is less obvious that equivalization, and in particular equivalizing individual as well as household labour incomes, is appropriate or helpful. Previous studies on the topic have made different choices in this regard.[4] With the decomposition approach we employ here, for reasons that become obvious as we set it out fully in the next section, equivalization has to be applied either to both individual and household-level earnings or to neither. To see whether this choice matters for our main results we present those without equivalization in the main text, but include the corresponding results with equivalization in the Appendix and include them in the discussion below.

4 Decomposition of HSCV

Half the squared coefficient of variation can be decomposed into within and between group inequality as follows. Assume that the population of households is divided into I mutually exclusive and exhaustive groups, denoted $i = 1, \ldots, I$. Let π_i be the proportion of households in group i, μ is overall mean household earnings, μ_i is mean earnings in group i and σ_i^2 is the variance of earnings in group i. Then we have

$$HSCV = \frac{1}{2\mu^2} \sum\nolimits_i \pi_i \sigma_i^2 + \frac{1}{2\mu^2} \sum\nolimits_i \pi_i (\mu_i - \mu)^2 \tag{1}$$

The first term on the right-hand side is the inequality within groups and the second is the inequality between them. We can decompose the terms in Eq. (1) in a meaningful way.

[3] We report in Appendix Table A1 the comparison of HSCV measures without and with this top-coding, highlighting that its impact varies across countries. If top-coding was implemented at the individual rather than household level (to exclude cases where either partner had earnings in the top 1% of persons) then more than 1% of households would be affected, but the household-level approach employed here is much more common.

[4] For example, Niewenhuis et al. (2017) do not employ equivalisation on the basis that their 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, whereas Harkness (2013) equivalises using the square root of household size scale.

Define.

π_w	the proportion of women-only headed households.
π_m	the proportion of men-only headed households.
$\overline{x}_w$	the mean earnings of women in women-only households.
$\overline{x}_m$	the mean earnings of men in men-only households.
$\overline{x}_{wc}$	the mean earnings of women in couple households.
$\overline{x}_{mc}$	the mean earnings of men in couple households.
$\overline{x}_c$	the mean earnings in couple households (this is equal to $\overline{x}_{wc} + \overline{x}_{mc}$).
σ_w	the standard deviation of earnings in women-only households.
σ_m	the standard deviation of earnings in men-only households.
σ_{wc}	the standard deviation of women's earnings in couple households.
σ_{mc}	the standard deviation of men's earnings in couple households.
σ_c	the standard deviation of earnings in couple households.
cor(m,w)	the correlation of women's and men's earnings only in couple households.

We can write:

$$\mu = \pi_m \overline{x}_m + \pi_w \overline{x}_w + (1 - \pi_m - \pi_w)\left[\overline{x}_{wc} + \overline{x}_{mc}\right] \tag{2}$$

and HSCV as:

$$\text{HSCV} = \frac{\pi_m \sigma_m^2 + \pi_w \sigma_w^2 + (1 - \pi_m - \pi_w)\sigma_c^2}{2\mu^2} + \frac{\pi_m [\overline{x}_m - \mu]^2 + \pi_w [\overline{x}_w - \mu]^2 + (1 - \pi_m - \pi_w)[\overline{x}_c - \mu]^2}{2\mu^2} \tag{3}$$

The first term is the within-household type inequality, the second is the between household type inequality. We can then expand this, using (3):

$$\text{HSCV} = \left[\frac{1}{2(\pi_m \overline{x}_m + \pi_w \overline{x}_w + (1-\pi_m-\pi_w)[\overline{x}_{wc} + \overline{x}_{mc}])^2}\right] \times \left[\pi_m \sigma_m^2 + \pi_w \sigma_w^2 + \left(1 - \pi_m - \pi_w\right)\sigma_c^2 + \pi_m [\overline{x}_m - \mu]^2 + \pi_w [\overline{x}_w - \mu]^2 + (1 - \pi_m - \pi_w)[\overline{x}_c - \mu]^2\right] \tag{4}$$

Then we can rewrite σ_c^2 in full:

$$\text{HSCV} = \left[\frac{1}{2(\pi_m \overline{x}_m + \pi_w \overline{x}_w + (1-\pi_m-\pi_w)[\overline{x}_{wc} + \overline{x}_{mc}])^2}\right] \times \left[\pi_m \sigma_m^2 + \pi_w \sigma_w^2 + \left(1 - \pi_m - \pi_w\right)\{\sigma_{mc}^2 + \sigma_{wc}^2 + 2cor(m,w)\sigma_{mc}\sigma_{wc}\} + \pi_m [\overline{x}_m - \mu]^2 + \pi_w [\overline{x}_w - \mu]^2 + (1 - \pi_m - \pi_w)[\overline{x}_c - \mu]^2\right] \tag{5}$$

From this last Eq. (5) we can see that HSCV depends on the 11 parameters listed: the proportions of men and women who are the head of single-adult households, the mean earnings of single men and women and of coupled men and women, the corresponding variances, and the correlation between the earnings of men and women in coupled households. If the earnings of the household and individuals were to be equivalized throughout the decomposition continues to hold, but note that if only household but not individual earnings are equivalized this is not the case.

5 The relationship between demographic behaviour and cross-national inequality

The parameters of the HSCV decomposition set out in the previous section for each country are reported in Table 2. We see first that overall inequality in labour earnings among households varies widely across the countries in our sample, with HSCV ranging from 0.14 in Japan to 0.48 in Ireland, with a mean of 0.31. Economic homogamy measured as the correlation in the earnings of partners (whether they are working or not) ranges from -0.30 in Japan to 0.22 in Luxembourg with a mean of 0.08. The proportion of households 'headed' by a single woman ranges from 0.07 in Japan to 0.20 in Austria, with a mean of 0.14. The corresponding proportion for single men ranges from 0.05 in Israel to 0.23 in Denmark, with a mean of 0.12.

Figures 1 plots each country's HSCV against its economic homogamy, measured as the correlation in the earnings of wives and husbands (regardless of whether they are working or not). The regression line shown in Fig. 1 suggests a strong relationship, with greater economic homogamy being associated with more inequality. The regression itself is reported in column 1 of Table 3, showing an estimated and statistically significant coefficient of 0.32. Some of the countries in which homogamy is below average (or even negative), notably Switzerland and the Netherlands, make extensive use of the "one-and-a-half breadwinner" model where one member of the couple is working full-time and the other is working part-time, influenced by generous tax treatment of part-time workers (McGinnity and McManus 2007). If these countries are excluded, no statistically significant relationship between inequality and economic homogamy is then seen.

Figure 2 plots inequality against the proportion of households headed by a single woman. On average, 14% of households are headed by a single woman, but this ranges from 7% (Japan) to 20% (Austria). The figure shows a strong relationship with inequality: column 2 of Table 3 reports the estimated regression coefficient of 0.10 (s.e. = 0.005). This contrasts with the results for the proportion of households headed by a single man. On average these households make up 12% of the total, but this varies between 5% in Israel and 23% in Denmark. The estimated regression coefficient of -0.004 shown in Table 3 is not statistically significant and Fig. 3 shows considerable variation in inequality among countries with roughly the same proportion of households headed by a single man.

Column 4 of Table 3 reports the results of regressing HSCV on all three demographic components. The relationships between the three demographic components and inequality are all significant at the $p < 0.05$ threshold, with the relationship between the proportion of households headed by men and inequality being negative. Together the demographic components account for around 43% of the variance in inequality across countries.

Column 5 of Table 3 shows the results when we regress HSCV on the other eight components of the measure, which we take to be 'economic' as opposed to 'demographic'. The findings are in line with the literature, with inequality being primarily determined by the mean in the earnings of partnered men, and with the adjusted-R^2 being 0.71.

6 Demographic behaviour and the variation in inequality across countries

How far can the variation in inequality across countries be explained by cross-national variation in demographic behaviour? Drawing on the results in Table 3, the standard deviation in HSCV across countries is 0.086. By taking into account variation in homogamy, we can explain 18% of this (the value of the adjusted-R^2), so reducing the variance in inequality

Table 2 HSCV Parameters

Country	Actual HSCV	**ρ** (Earnings Corr. Coeff.)	Π(Men)	Π(Women)	μ_{MC}	σ_{MC}	μ_{M}	$\boldsymbol{\sigma_{M}}$	μ_{WC}	σ_{WC}	μ_{W}	σ_{W}
AT	0.30	0.0425	0.1463	0.1968	52,974	41,737	45,159	36,995	22,844	24,909	30,353	31,141
AU	0.34	0.0489	0.0975	0.1304	45,007	39,798	33,253	35,536	22,744	25,453	22,648	27,468
BE	0.30	0.2264	0.1773	0.1777	42,610	33,123	38,473	31,429	26,100	23,657	27,839	28,335
CA	0.31	0.0811	0.11	0.1251	42,995	36,613	34,349	32,811	24,447	26,260	26,007	26,721
CH	0.16	-0.2067	0.1226	0.1309	75,249	46,246	61,880	37,982	28,248	27,607	43,312	33,095
CO	0.48	0.0661	0.0648	0.1659	8793	8604	8462	9077	3843	6791	5650	8053
CZ	0.22	0.0854	0.1605	0.1152	25,359	17,287	22,810	14,932	13,159	12,134	15,003	13,581
DE	0.32	0.0702	0.1092	0.1543	46,766	38,300	34,137	35,278	21,221	24,092	27,405	27,056
DK	0.25	0.2252	0.2368	0.1373	52,702	33,762	37,879	30,535	35,379	25,158	29,211	26,661
EE	0.37	0.042	0.1692	0.1712	16,884	17,720	19,554	17,615	10,288	11,274	14,219	13,325
ES	0.34	0.1712	0.0763	0.106	30,118	25,967	22,929	24,535	17,088	20,410	20,362	23,104
FI	0.28	0.1928	0.151	0.1109	40,380	33,086	32,947	27,987	28,901	24,722	27,892	24,564
FR	0.36	0.1537	0.1872	0.1276	33,381	31,652	28,571	24,313	19,455	20,093	21,304	21,501
GR	0.40	0.1291	0.0816	0.0914	18,844	17,490	16,266	15,957	9000	13,042	11,886	15,188
IE	0.48	0.0635	0.1148	0.157	34,722	35,344	21,243	27,137	18,085	24,243	16,573	23,859
IL	0.32	0.1527	0.0463	0.0993	35,233	30,359	28,572	29,469	17,219	19,353	17,972	21,977
IS	0.16	-0.051	0.1311	0.0991	44,853	27,412	33,000	26,633	25,703	17,976	26,045	18,903
IT	0.40	0.1177	0.111	0.1428	28,492	26,385	24,950	23,503	12,380	18,123	19,132	21,114
JP	0.14	-0.3017	0.0751	0.0691	43,639	25,727	26,542	19,797	10,400	14,040	22,151	16,015
LT	0.32	0.0859	0.1023	0.1839	18,671	16,910	16,416	17,308	13,415	13,010	14,467	13,750
LU	0.32	0.2279	0.0861	0.1207	49,653	42,069	53,400	43,300	29,546	33,194	38,229	38,981
NL	0.20	-0.0954	0.125	0.1199	55,974	37,959	44,960	34,601	24,733	23,619	30,534	26,705
NO	0.25	0.0835	0.227	0.1663	53,291	35,861	42,046	32,248	30,833	24,031	29,682	25,094
PL	0.32	0.1291	0.0755	0.1036	13,344	11,798	12,685	10,648	7283	8547	9561	10,231
SE	0.24	0.1628	0.2031	0.1345	32,902	24,124	29,771	19,959	20,279	16,156	21,795	17,797
SK	0.26	0.1497	0.0534	0.1428	14,478	11,152	12,911	10,962	8462	7919	8862	8851
UK	0.36	0.0635	0.0908	0.1488	36,224	31,965	23,781	28,393	19,798	21,672	17,027	21,723
US	0.37	0.0345	0.1186	0.1543	62,351	55,767	43,178	45,711	32,339	38,539	31,572	36,305

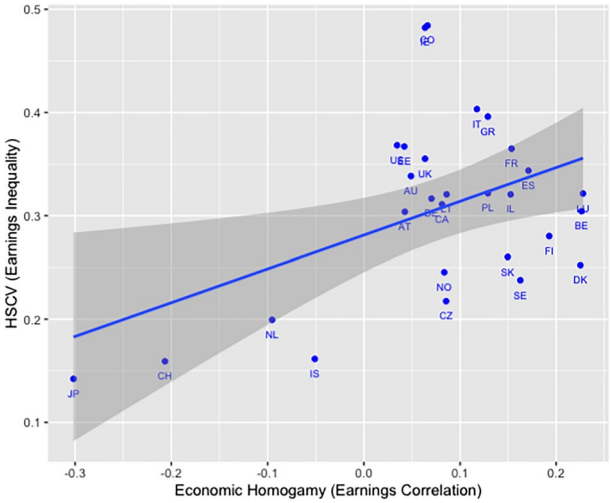

Fig. 1 HSCV and Economic Homogamy, across Countries

to 0.078. The share of households headed by a single woman accounts for 10.5% of the variance in HSCV; controlling for this reduces the standard deviation between countries in inequality to 0.081. The share of households headed by a single man, on its own, has no significant effect on reducing the variation in inequality. Taken together, these three demographic components account for 43% of the variance in HSCV. Controlling for them all reduces the standard deviation from 0.086 to 0.065. That is to say, if all 28 countries had the same level of economic homogamy, the same share of households headed by a single woman, and the same share of households headed by a single man, cross-national variation in household earnings inequality would be almost 43% lower than it is.

This does not mean that inequality would be 43% lower in all countries, since whether a country's inequality would counterfactually increase or decrease, and by how much, depends on the values at which we fix the demographic components and the values that exist in each country. We can see this if we engage in a counterfactual exercise in which we calculate each country's hypothetical HSCV using the regression coefficients from model 4 in Table 3. We set the demographic components equal to their mean values (that is, we set homogamy in all countries at 0.077, the share of households headed by a single woman at 0.14, and the share of households headed by a single man at 0.12) and, using the coefficients from model 4, we calculate the fitted value of HSCV for each country, then add to these the residuals from that model. Comparing this counterfactual HSCV with each country's actual HSCV we find that inequality hypothetically declines in 14 out of 28 countries and increases in the other half. The average decline in inequality is -7% while the average increase is 9%. But these figures would differ if we fixed the demographic variables at values other than their means.

It is also helpful to compute the elasticity of HSCV with respect to each of the demographic components (by taking the derivative of HSCV with respect to the key parameter, multiplied by the ratios of the means). By way of comparison, we also calculated the elasticity for the most important economic predictor of HSCV, the mean earnings of men in couples. These are shown in Table 4 and Fig. 4, and their average over the 28 countries is also reported. As we should have expected, among the demographic features the elasticity of the share of households headed by a single woman is largest, with its average being more than thrice as large as the elasticity for homogamy. All the elasticities are positive with a few

Table 3 HSCV Regressed on Demographic and Economic Components

	Dependent Variable				
	Half Squad Coefficient of Variation (HSCV)—Earnings				
	(1)	(2)	(3)	(4)	(5)
ρ—Econ. Homogamy	0.327** $p=0.014$			0.326*** $p=0.006$	
π_W—% Single Women		0.010* $p=0.052$		0.012** $p=0.011$	
π_M—% Single Men			–0.004 $p=0.191$	–0.008*** $p=0.005$	
μ_{WC} – Mean Earnings, Partnered Women					0.00000 $p=0.990$
μ_{MC} – Mean Earnings, Partnered Men					–0.00001* $p=0.069$
μ_W – Mean Earnings, Single Women					–0.00001 $p=0.180$
μ_W – Mean Earnings, Single Men					–0.00000 $p=0.900$
σ_{WC} – Sd. Earnings, Partnered Women					–0.00000 $p=0.848$
σ_{MC} – Sd. Earnings, Partnered Men					0.00001 $p=0.205$
σ_W – Sd. Earnings, Single Women					0.00002* $p=0.094$
σ_M – Sd. Earnings, Single Men					–0.00001 $p=0.277$
Constant	0.281*** $p=0.000$	0.165** $p=0.029$	0.360*** $p=0.000$	0.218*** $p=0.002$	0.330*** $p=0.000$

Table 3 (continued)

	Dependent Variable				
	Half Squad Coefficient of Variation (HSCV)—Earnings				
	(1)	(2)	(3)	(4)	(5)
Observations	28	28	28	28	28
R^2	0.212	0.138	0.065	0.494	0.801
Adjusted R^2	0.181	0.105	0.029	0.431	0.717
Residual Std. Error	0.078 (df = 26)	0.081 (df = 26)	0.085 (df = 26)	0.065 (df = 24)	0.046 (df = 19)
F. Statistic	6.979** (df = 1; 26)	4.161* (df = 1; 26)	1.803 (df = 1; 26)	7.823*** (df = 3; 24)	9.563*** (df = 8; 19)

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

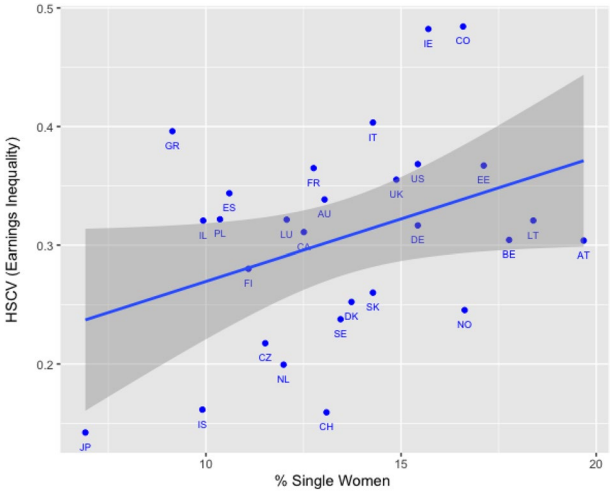

Fig. 2 HSCV and Single Women in the Population, across Countries

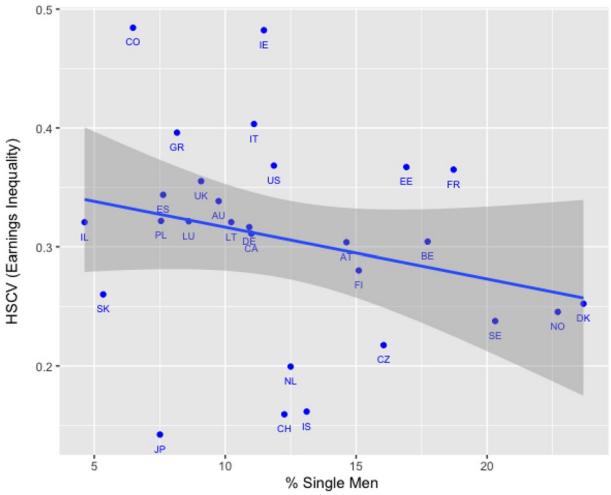

Fig. 3 HSCV and Single Men in the Population, across Countries

exceptions. Economic homogamy is negatively related to inequality in Switzerland, Japan, Iceland, and the Netherlands. With these exceptions, Fig. 4 shows for the most part a relative lack of cross-country variation in any of the elasticities. In other words, although countries vary substantially in their inequality levels and their proportions of households headed by a single man or a single woman and in their degree of economic homogamy, all these aspects of demography are related to inequality in very similar ways in all countries. This acts to reinforce the result of our counterfactual reported at the end of the previous section. Comparing these elasticities with that for the mean earnings of men in couples we see that the latter is much larger, by a factor of more than 5, than for all three demographic factors, reflecting the greater importance of mean earnings of men in couples as a driver of inequality.

Finally, we can ask what might happen to inequality within countries if each of the demographic parameters were to change by a small amount. Setting each of the demographic components to 90% of their observed value and implementing the procedure described in the

Table 4 Estimated elasticities of inequality with respect to economic homogamy and the proportion of households headed by single women and single men

Country	Elasticity of HSCV to:			
	ρ	π_W	π_M	μ_{MC}
AT	0.02	0.23	0.08	-0.72
AU	0.03	0.18	0.09	-0.91
BE	0.12	0.21	0.11	-0.62
CA	0.06	0.15	0.09	-0.85
CH	-0.15	0.21	0.1	-0.68
CO	0.05	0.16	0.03	-1.05
CZ	0.05	0.17	0.09	-0.7
DE	0.04	0.17	0.1	-0.87
DK	0.1	0.22	0.28	-0.41
EE	0.03	0.1	0.05	-0.75
ES	0.12	0.11	0.07	-0.97
FI	0.12	0.12	0.14	-0.7
FR	0.09	0.12	0.1	-0.76
GR	0.1	0.09	0.04	-1.08
IE	0.04	0.2	0.12	-0.9
IL	0.1	0.14	0.04	-1.07
IS	-0.03	0.18	0.2	-0.6
IT	0.08	0.11	0.05	-0.98
JP	-0.26	0.12	0.11	-1.05
LT	0.06	0.17	0.1	-0.71
LU	0.15	0.1	0.03	-0.92
NL	-0.07	0.19	0.12	-0.75
NO	0.04	0.24	0.21	-0.42
PL	0.09	0.1	0.03	-0.99
SE	0.09	0.16	0.12	-0.56
SK	0.1	0.19	0.04	-0.87
UK	0.04	0.22	0.11	-0.86
US	0.02	0.2	0.11	-0.84

previous section (using the estimated regression coefficients and residuals), we find that inequality declines in 24 out of 28 countries, with an average decline of -3.5% (the range being -7% to+7%). We carried out the same simulation but this time using the regression involving the economic components (reported in column 5 of Table 3) and setting the mean earnings of men in couples to 110% of its actual value in each country. This reduces inequality in all 28 countries by 9% on average, with a range of 1% to 33%. Figure 5 reports the results for both counterfactuals for each country. It shows the greater impact of the economic factor but nevertheless shows a consistent, and non-negligible, reduction in inequality under the demographic counterfactual. Notably, in four countries the demographic counterfactual actually produces a stronger reduction in inequality than the economic counterfactual (Colombia, Lithuania, Poland, Slovakia), and in further four the demographic counterfactual reduction is more than two thirds of the economic counterfactual (Estonia, Italy, Greece, Spain).

As made clear above, counterfactuals of this kind are staples of the literature but subject to the limitation that varying some parameters while keeping others fixed may not be seen as plausible or informative. Hypothetically moving each country's demographic values to

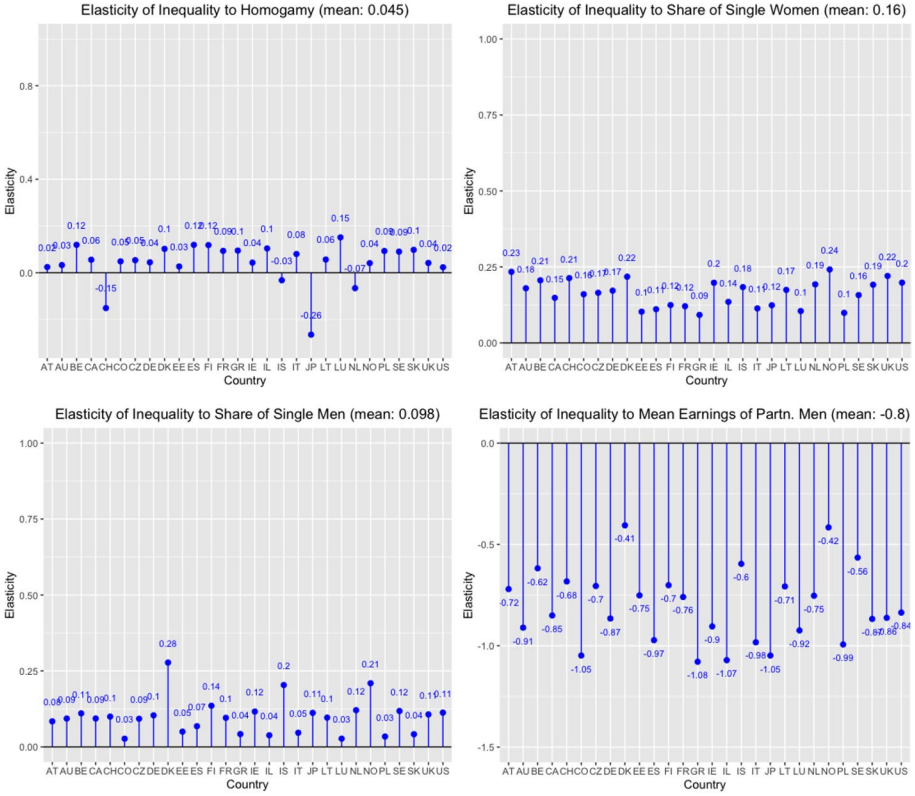

Fig. 4 Elasticity of Inequality to Demographic Components and Mean Earnings of Partnered Men, by Country

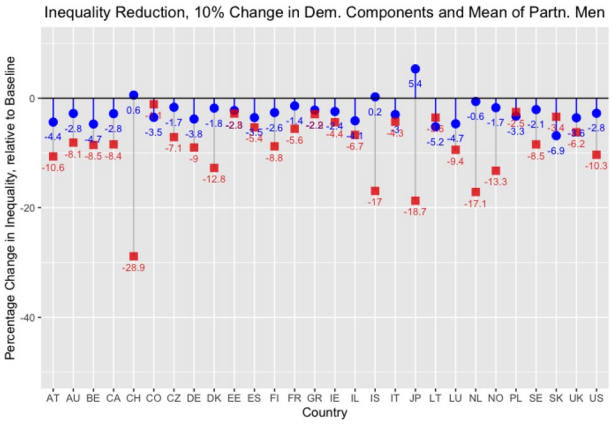

Fig. 5 Relative Change in Inequality, driven by a 10% Change in Demographic Components and in the Mean Earnings of Partnered Men

the international means, given the small degree of variation in these parameters to begin with, places our counterfactuals at the more plausible end of the range but also makes their impact on each individual country relatively small, despite the large effect it has on the degree of international variation in inequality. Assuming a small change in each country in these values seems to us to be even more plausible and perhaps provides a better demonstration of the extent to which such changes might influence inequality in practice.

Finally, we noted earlier that the question of whether one should equivalize to take household size into account raises complex issues in the current context, especially since the analytical approach we employ would require us to equivalize individual as well as household earnings. The results we have presented take the more straightforward approach of not employing equivalization. However, we also carried out the same analyses applying equivalization to both household and individual earnings (with the square root scale applied to the adults included in the analysis only, ignoring other adults or children in these households), in order to assess the sensitivity of the results. The results incorporating equivalization are presented in the appendix and are very similar in pattern to those without equivalization, showing slightly smaller effects in the simulations but with very much the same variation across countries and roles for the different factors examined.

7 Discussion and conclusions

How much can cross-national differences in demographic behavior potentially account for the variation in levels of inequality across rich countries? By developing a new approach to decompose HSCV into economic and demographic components, and regressing the former on the latter across the 28 countries of the study, we find that the strongest predictor of HSCV is singlehood among women. This is in line with the literature on single women and especially single mothers, whose proportion in the population is associated with higher inequality in the US (Martin 2006; Breen and Salazar 2011), but also in a broader set of countries, even after considering the role of the welfare state and labour market institutions (Kollmeyer 2013). We also find that higher levels of economic homogamy tend to be associated with higher inequality, although this is only statistically significant when countries that extensively feature a one and a half breadwinner model are included. This mixed relationship between homogamy and inequality across countries mirrors the debate in the literature on the relationship between them *over time*: powerful (Esping-Andersen 2007; Schwartz 2013; Nieuwenhuis et al. 2017) vs. negligible (Western et al. 2008; Greenwood et al. 2014; Grotti and Scherer 2016). In particular, while the negative inequality impact driven by the rise in homogamy has been compensated by the increase in women's labour force participation (Kollmeyer 2013; Boertien and Permanyer 2019), this may not hold in the future for countries where women's labour force participation has substantially reached men's, as in the Nordic countries (Nieuwenhuis et al. 2017). This is particularly salient as homogamy has increased over time in Denmark, Norway, and Sweden, even if its effect on inequality has so far been neutral or negative (Pareliussen and Robling 2018).

We find that the relationship between the three demographic components within countries is very similar almost everywhere. Differences between countries in demographic behaviour account for just over 40% of the variation in HSCV, with the proportion of households headed by a single woman being responsible for most of that. This implies that if, counterfactually, all countries had the same levels of economic homogamy, the same proportion of households headed by a single woman and the same proportion of households headed by a single man, country differences in inequality would narrow considerably, though the direction and

magnitude of the counterfactual change in inequality in any specific country would depend on the common values of the demographic variables that we picked. Alternatively, if we assume that the values of each country's demographic variables changed by a small amount, this could have a larger impact on inequality within countries even though it did not have a large effect on the differences between countries. Reducing all the demographic variables' values by 10% brought about a hypothetical (but, we argue, not implausible) reduction in inequality, in 24 out of 28 countries, of around 3.5%. This is less than the reduction brought about by changing the main economic predictor of HSCV, the mean earnings of men in couples: across countries, this change brings about an average reduction in inequality that is substantially larger than that caused by changing demography. But, as Fig. 5 shows, this varies between countries: in Spain and Italy, for example, the demographic and economic counterfactuals produce very similar reductions in inequality, whereas in Switzerland and Japan they are very different.

Economic variables can account for around 70% of the cross-national variation in inequality, with the mean earnings of partnered men being by far the most important. This is not a surprising result, but it should not detract from the finding that demographic factors, particularly with respect to economic homogamy and single female headed households, have some, albeit limited, potential to mitigate or exacerbate earnings inequality across rich countries, even when economic factors in a given country are held constant. These findings demonstrate the value of a demographic perspective in deepening our understanding of earnings inequality, and, whereas previous research has overwhelmingly taken an over-time perspective, our study is one of very few that explore cross-national differences. We highlight which countries could potentially reduce inequalities the most by targeting policies to specific demographic groups (*e.g.*, single mothers), perhaps through policies concerning early childhood education and care and the design of non-offsetting taxes and transfers to single parents (Bradshaw et al. 2018; EU Directorate-General for Internal Policies 2020; OECD 2022). Considering the centrality of singlehood among women for inequality, policies targeted to improving the economic conditions of single-led households and single parents may be instrumental in pursuing two important societal goals at the same time. Further research might usefully investigate which labour market characteristics are associated with lower economic homogamy and fewer households headed by a single woman. Focusing on differences in inequality across space from joint demographic and labour market perspectives may illuminate new pathways to address rising inequalities, a central challenge for contemporary societies.

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Declarations

Conflict of Interest The authors have no conflict of interest.

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