ISER Working Paper Series

Single Mothers' Income in Twelve Rich Nations: Differences in Disadvantage Across the Distribution

Susan Harkness
University of Bristol

No. 2022-6
May 2022

INSTITUTE FOR SOCIAL & ECONOMIC RESEARCH

Economic and Social Research Council

University of Essex

www.iser.essex.ac.uk

Non-Technical summary

I examine how single motherhood affects income at different quantiles of the distribution in twelve rich countries. Using harmonised data from the Luxembourg Income Study, I show how the distribution of income for single-mother headed households differs to that of couple-headed households with children. Using unconditional quantile treatment effect models, I assess the influence of single motherhood on income at different points of the distribution. There are striking variations across countries in how single motherhood affects income at different points of the distribution. In some countries, such as the United Kingdom, single motherhood has a greater effect on income at the top of the distribution than the bottom. In others, such as the United States, effects are largest at the bottom of the distribution. I discuss the role of employment and social policies in driving differences in the income gradient associated with single motherhood across the distribution across countries.

Single mothers' income in twelve rich nations: differences in disadvantage across the distribution[1][2]

Susan Harkness*

Abstract

I examine how single motherhood affects income at different quantiles of the distribution in twelve rich countries. Using harmonised data from the Luxembourg Income Study, I show how the distribution of income for single-mother headed households differs to that of couple-headed households with children. Using unconditional quantile treatment effect models, I assess the influence of single motherhood on income at different points of the distribution. There are striking variations across countries in how single motherhood affects income at different points of the distribution. In some countries, such as the United Kingdom, single motherhood has a greater effect on income at the top of the distribution than the bottom. In others, such as the United States, effects are largest at the bottom of the distribution. I discuss the role of employment and social policies in driving differences in the income gradient associated with single motherhood across the distribution across countries.

*School for Policy Studies, University of Bristol, United Kingdom; telephone: +44-1173311082; email: s.harkness@bristol.ac.uk; ORCID id: https://orcid.org/0000-0001-8498-6847.

Keywords: single mothers; inequality; quantile treatment effects; tax and benefits; employment.

---

[1] Forthcoming in *the ANNALS of the American Academy of Social Science*.

[2] **Acknowledgements:** I thank Zach Parolin, Janet Gornick, and Amanda Sheely for helpful comments. This author gratefully acknowledges funding from the ESRC, United Kingdom, through the Research Centre on Micro-Social Change (MiSoC), grant number ES/S012486/1.

Previous research has shown single mothers to be less well-off and at higher risk of poverty than mothers in couples. While single mothers face a high risk of poverty across rich countries (Gornick & Jantii, 2010) those in the United States (US) are thought to be at greater risk than their peers in other advanced economies with the paucity of public transfers contributing to this difference (Brady, Finnigan & Hubgen, 2017; Rothwell & McEwen, 2019). In contrast, the same studies show that the United Kingdom (UK) stands out for its success in reducing single mother poverty, with the generosity of state benefits playing a critical role in its success.

While cross-national differences in single mother's risk of poverty have been widely studied much less is known about in their wider economic circumstances. Yet, single motherhood is likely to affect income across the distribution. Moreover, while public transfers may help alleviate poverty their influence further up the distribution may be limited, particularly if means tested. As a result, countries with low poverty 'penalties' to single motherhood, achieved via redistribution through the tax-benefit system, may at the same time have large income penalties; in other words, cross-country differences in poverty may tell us little about differences in single mothers' relative economic position.

One reason low rates of single-mother poverty may be accompanied by high income penalties is because generous state benefits, which protect single mothers from poverty, may come at the cost of reduced financial incentives for paid work. Evidence from the late 1980s and 1990s linked high rates of means testing to the relatively low economic status of single mothers because they were discouraged from working (Wong, Garfinkel, and McLanahan 1993; Dickens and Ellwood 2003). Since then, tax-credits, paid to those in employment on low-incomes, have become an increasingly prominent feature of the tax-benefit system in Anglo-European countries (Kenworthy 2015). While earning subsidies improve the incentives of those with low earnings potential to enter employment, they are frequently

accompanied by high marginal tax rates, reducing incentives to work longer hours or for greater pay (OECD 2018; Brewer and Hoynes 2019). At the extensive margin, these effects are large (Moffitt, 2022). Moreover, the more generous benefits are the greater the number of people drawn into means testing (Hoynes, Joyce and Waters, 2022). For example, in the UK, while generous government transfers have been crucial for reducing single-parent poverty few single parents escape means testing; in 2019/20, 84% of single parents were estimated to be entitled to the main means-tested benefit supporting low-income working-age families, Universal Credit (Waters and Wernham 2021).

These tensions in the tax-benefit system means that high benefit levels, which protect single parents from poverty, reduce the financial incentives of single mothers further up the income distribution for paid work. Consequently, in countries such as the UK, where the benefit system has been effective at reducing single-parent poverty, low levels of poverty may not translate into single mothers having higher relative economic status. Instead, generous means-tested benefits may be associated with a more compressed income distribution and, while single mothers may avoid poverty, their incomes may still fall far below those of couples with children. In comparison, in countries where non-means tested benefits are generous there will be fewer distortionary effects on employment and single mothers may have higher earnings and income (Wong, Garfinkel, and McLanahan 1993; Brady and Burroway 2012) although inequality between single mothers may be greater.

While national policies towards employment and taxes and benefits influence single mothers' employment, they are far from the only factors shaping patterns of paid work and care. Wider social processes play an important role in enabling mothers to combine paid work and family life, with countries differing greatly in the extent to which mothers participate in the labour force (Misra et al. 2012; Gonzalez 2004). Studies show that, net of characteristics such as education and age, single mothers' rates of employment resemble

those of partnered mothers (Destro and Brady 2011; Harkness 2016). However, earnings penalties to motherhood, which are a consequence of lower employment rates, paid hours, and wages, remain substantial across countries. Examining data for six rich countries, Kleven et. al. (2019) found annual earnings penalties to motherhood ranging from 21% in Denmark to 61% in Germany. These penalties, and cross-country differences between them, will have a substantial influence on single mothers' incomes (Harkness 2022) and the extent to which they are disadvantaged.

Mothers' position in the labor market and their treatment by the tax-benefit system are, moreover, interrelated. National welfare state policies are based on gendered assumptions about men and women's role in society. In countries where male breadwinning is the norm, fewer expectations of paid work typically have placed on single mothers (Lewis 1997). Past studies show single mothers to be particularly disadvantaged, and more reliant on social security benefits, in countries where caregiving is encouraged. Conversely, where single mothers are employed, their own earnings allow them to achieve incomes closer to the average (Misra et al. 2012). While the expectation that single mothers should be in paid work has grown as more mothers have entered the labor market (Millar, 2019) in many Anglo-European countries part-time employment is common limiting single mothers' capacity to provide for their families and avoid poverty (Misra et al. 2012; Horemans, Marx, and Nolan 2016; Lewis and Giullari 2005). The norm of part-time paid work also draws more more single mothers into means testing, with high marginal tax rates constraining their incomes further (Dickens and Ellwood 2003; OECD 2018).

In this study I investigate the extent to which single motherhood, which is now common across countries, remains associated with socio-economic disadvantage. Examining data from the Luxembourg Income Study (LIS), I compare the relative economic status of single mothers and couples in opposite-sex households in the late 2010s. The countries I

study cover a range of gendered labor-market institutions and welfare-state policies and include five English speaking countries (the US, Canada, Australia, UK, Ireland), three from Western Europe (France, Germany, Netherlands), two Nordic countries (Finland, Denmark), and two from Southern Europe (Italy and Spain). Unconditional quantile treatment effect (UQTE) models are used to estimate how single motherhood influences income at different points of the distribution. The patterns of disadvantage that emerge allow me to assess whether single motherhood acts an equaliser in some countries, because reductions in income associated with single motherhood are greatest at the top of the distribution, reducing inequality between single mothers but increasing their concentration at low levels of income, while in other countries single motherhood has a smaller influence on income at the top of the distribution meaning single mothers are more likely to be found among the middle class. I conclude by discussing how cross-country policy differences, which influence the sources of income on which single mothers draw, may affect their relative economic standing.

DATA AND METHODS

Data and sample

I use the most recently available data, from Wave X (2016-2017) or XI (2018-2019), of the LIS for twelve rich countries. The surveys are all large, nationally representative household surveys. LIS provides harmonised information on income, employment, earnings, and other socio-economic and demographic characteristics, including age, education, and partnership status, allowing cross-country comparative research. I restrict my sample to women who are household heads or spouses with dependent children 18 or under. To avoid including those still in full-time education or who have retired from the labour force I exclude those under 22 or over 59. Weights are used to ensure results are representative of the population. Table 1 shows the resulting sample sizes.

Dependent and explanatory variables

My outcome variable is equivalised annual disposable (post-tax-post-transfer) household income. Income is equivalised by dividing by the square-root of household size. Because income is recorded at the household level the earnings of other adults, who are not household heads or their partners, is included. One limitation is that, except for Denmark, Finland and Norway, income data comes from household surveys and tends to be underreported below the 5th percentile and above the 95th percentile of the distribution.[3] Estimates at these points will therefore be imprecise. Single parents are defined as unpartnered household heads with dependent children under 18. A limitation of this measure is that it excludes single mothers who are not household heads, such as those living with their own parents, who may be particularly economically vulnerable (Moullin and Harkness 2021). However, it is not possibly to identify single mothers who are not household heads in all countries studied. Moreover, as we are only able to measure income at the level of the household, including non-heads would tend to overstate the economic position of single mothers.

The models, described below, include two sets of explanatory variables. First, I account for differences in single and partnered mothers' individual and family characteristics by conditioning on the age of mother (cubic), education (low, middle, or higher attainment), region of residence, number of children (dummy variables for two or three or more children), and age of youngest child (dummy variables for children under 5 and 5-11). The second set of controls adds controls for employment, with dummy variables for full and part-time employment. Full-time employment is defined as working full-time, full-year or, for the UK, over 30 hours a week. Part-time employment is defined as working part-time or part-year, or under 30 hours a week. Information on full-time employment is available for all countries except Norway. For Norway, a single dummy variable for employment is included. To

[3] For those on low incomes, benefits tend to be underreported (Parolin 2019). Those with high incomes are often missing from survey data and/or underreport income (Atkinson, Piketty, and Saez 2011).

account for heterogeneity in maternal employment by education, interactions between full-time employment and education are included.

Methods

UQTE models are used to illustrate how single motherhood affects the distribution of income vis-à-vis the distribution for couples with children. UQTE models compare the estimated potential income distribution of single mothers (the treated) and couples with children (the untreated). Inverse probability weights (IPW) are used to reshape the observed distributions so they resemble those which would be observed if the full sample were either treated or untreated. The weights are based on (i) demographic characteristics, and (ii) demographic and employment characteristics, described above. Comparing the resulting 'potential outcome' distributions for the treated (single-mother households) and untreated (two-parent households) gives the UQTE, or distributional treatment effects. To compare distributions, I estimate reweighted recentred-influence functions (RIF) and conduct RIF regression (Firpo, Fortin, and Lemieux 2018) using the *rifhdreg* command (Rios-Avila 2020). The variables used to reweight the distributions are included as controls in the RIF regressions. Reweighted estimates without controls give very similar results. Average treatment effects (ATE) are reported. The resulting 'distributional treatment effects' show how the distribution shifts in response to treatment (single motherhood). The appendix provides further details on the methods.

RESULTS

Descriptive results

Descriptive statistics for single mothers and mothers in two-parent households are reported in Table 1. In all countries single mothers have lower levels of education and fewer and older children than mothers in couples. Table 2 shows overall employment and full-time employment rates for single and partnered mothers and partnered fathers. Among couples,

maternal employment rates range from 56% in Italy to 84% in Denmark. Comparing single and partnered mothers, in Ireland, Australia, the Netherlands, and Denmark employment rates are 10- to 15-percentage points lower for single mothers than mothers in couples while in the US and Italy single mothers are more likely to be employed than partnered mothers. Gaps in full-time employment between mothers and fathers are larger, although some of this disparity reflects differences in the characteristics of single and married mothers which affect their propensity for paid work.

Mean single mother income penalties

Mean differences in the incomes of single mother and two-parent headed households are shown in Figure 1. Differences are shown without controls and after adjusting for characteristics. Adjusted gaps condition on: (i) mothers' age and education, the number and age of children in the family, and region of residence; (ii) adds controls for mothers' full and part-time employment. Model (iii) includes the same controls as (ii) but this time contrasts the characteristics of single-mother household heads with those of fathers in couples, who are typically the household head. After accounting for differences in the demographic characteristics of single and partnered mothers, average single-mother income penalties range from 31% in the UK to 46% in the US, with penalties of 34% in Denmark and Finland, 41% in Spain and other countries lying somewhere between. Accounting for differences in single and partnered mothers' employment has little influence on the size of these penalties although if single mothers' employment resembled that of partnered fathers the mean gap would fall. However, in all countries income gaps remain for two main reasons; first, pay penalties to motherhood mean that the earnings of single mothers are typically lower than those of fathers and, second, because of the absence of a (potential) second earner.

Differences in income across the distribution

Figure 2 shows kernel density estimates of the distribution of income for single mother and two-parent headed households. The distributions are weighted by their population share, with the sum of the distributions giving the overall distribution of income for couple and single mother headed families. The poverty lines, defined as 50% of median equivalised income, are also plotted. Everywhere the distribution of single mothers' income lies to the left of couples with children, but their incomes are particularly concentrated in the left tail of the couples' distribution in the UK, Ireland, the Netherlands, Germany, and the Nordic countries (Denmark, Norway, and Finland). Relatively low levels of income dispersion in the Nordic countries means that, although their incomes are notably lower than for couples, most single mothers are not in relative income poverty but are, nonetheless, concentrated at the bottom of the income distribution. In comparison, in the US, Canada, Australia, Italy, and Spain single mothers' incomes are more unequally distributed with more single mothers having incomes similar to those of middle-income couples. Differences in the incomes of single mother headed households and those headed by couples may reflect differences in characteristics; for example, older single mothers, those with better education, or with fewer or older children may be expected to have a higher standard of living. Cross-country variations in employment, which may reflect differences in support for single parents in the tax-benefit system, and differences in selection into single motherhood may also explain why income differences vary across the distribution in some countries but not in others. In the subsequent analysis I examine the extent to which differences in observable characteristics and employment influence the relative income of single mothers at different points of the distribution.

Results from the quantile treatment effect models

Results from the unconditional quantile treatment effect models without controls and with the three sets of controls described before are shown in Figure 3. Looking across the distribution,

I find single motherhood has a heterogenous effect on income at different points of the distribution, the shape of which varies across countries. In the US, Italy, and Spain income differences are largest at the bottom of the distribution and widest at the top while in the UK, Ireland, the Netherlands, and Denmark differences are smallest at the bottom of the distribution and greater at the top. In Canada, Australia, Germany, Norway, and Finland income differences are constant across the distribution. These patterns are observed in the raw data; after controlling for mother and family characteristics; and when further controls for mothers' full- or part-time employment are added. Although accounting for differences in mothers' personal, family, and employment characteristics typically reduces the income gaps associated with single motherhood changes in the estimates are small suggesting these differences play little part in explaining single mothers' disadvantage in any of the countries studied.

Conditioning on the characteristics of single mothers who are household heads and the characteristics of fathers in couples (who are frequently defined as the household head, see Moullin & Harkness, 2021) has a more substantial effect, leading to a fall in the estimated income gaps across the income distribution in all countries. However, there are notable differences in magnitude: while in the US, UK, Australia, and Germany single mother penalties would be considerably reduced, particularly at the bottom of the distribution because fathers are more likely to work, and to work full-time, than mothers (differences in other characteristics have little effect on the estimates). In the Nordic countries, the estimated treatment effects would be only slightly reduced if single mothers worked as much as fathers in couples, reflecting the relatively high levels of gender equality in employment between mothers and fathers in these countries. Nonetheless, even if single mothers worked as much as fathers in couples, earnings penalties associated with motherhood and the absence of a potential second earner mean that, in all countries, income differences would remain.

The overall treatment effect of single motherhood on the distribution of income, measured by the Gini coefficient, is reported in Table 4. The table shows the coefficients without controls for characteristics (column 2), after adjusting for individual and family characteristics (column 3), and employment (column 4). The results show single mother headed households' incomes are significantly more *equally* distributed than those of couples headed households in the UK, Ireland, the Netherlands, and Denmark. In contrast, in Norway, single mothers' incomes are significantly more unequally distributed. In Italy and Spain, the coefficients on single motherhood also suggest single mothers' incomes are more unequally distributed than those for couples but, although the coefficients are large, they are not statistically significant which may reflect relatively small sample sizes for these countries.

POLICIES, INCOME SOURCES AND SINGLE MOTHERS' INCOME

Since 2000, strategies towards supplementing the incomes of low-income families, including single parents, have shifted considerably with an increasing number of Anglo-European countries introducing earnings supplements for low-wage workers, with the aim of increasing employment and income and reducing poverty (Kenworthy 2015). However, there are substantial differences in how earnings supplements operate with differences in generosity, phase-out rates (and, hence, marginal effective tax rates), conditions of receipt, and targeting. In the US, there is support for those on low-middle income but little for those with the lowest incomes (McCabe and Popp Berman 2016; Moffitt and Garlow 2018). In contrast, in the UK awards are generous for those with the lowest incomes but withdrawn rapidly as income rises (Brewer and Hoynes 2019). Canada, Ireland, the Netherlands, and Denmark also offer in-work supplements to single parents on low incomes which are more generous than in the US, particularly for those with the lowest incomes, but less substantial than in the UK. In Australia, the Netherlands, the UK, and Ireland eligibility for in-work credits is conditional on single mothers being in part-time employment. In Australia, family tax benefits are paid to

families with children who have only a single earner and single parents receive an additional supplement which is phased out at relatively high levels of income (OECD 2019). In addition to in-work support, most countries have child benefits with supplements paid to single parents in Norway, Denmark, Finland, and Germany. In Australia, 'parenting payments' are also made to parents with children under six, or to single parents with children under eight. In Italy and Spain income supplements are more restricted, with limited child benefit and few additional payments to single parents or low earners (OECD 2019; Van Lancker, Ghysels, and Cantillon 2012).

Policy differences affect the sources of income on which single-mother households depend. Figure 4 shows the average share of disposable income received by single mother headed households from earnings (post-tax), public benefits (means-tested assistance benefits, insurance benefits, and universal benefits), maintenance payments, and other sources (pensions and investments) in each country. In the US, Italy, and Spain single-mother households are particularly dependent on earnings, which account for around three-quarters of disposable income. In contrast, earnings make up less than half of single-mother households' disposable income in the UK, where almost 40% of income coming from means-tested benefits. In Ireland the pattern resembles that in the UK. The same analysis of gross income is similar, reflecting the fact that, because single-mother households typically have low-income levels, they frequently face an average effective tax rate close to zero (OECD 2019). These country differences are not just driven by employment; among those in employment, there are also substantial variations in single mothers' income sources, shown in Figure 5. For employed single-mothers, means-tested benefits substantially supplement earnings in the US, Canada, the UK, Ireland, and the Netherlands, accounting for 14% of income in the US and up to a quarter of income in the UK. In contrast, in Australia, Germany, Finland, and Denmark universal benefits are an important source of income, with

few in employment receiving income from means-tested benefits. Public insurance benefits provide an important income supplement for employed single-mother households in Norway. In Italy and Spain, single mothers in paid work receive minimal additional financial support from public benefits of any kind.

Differences in the income packages of single mothers are consistent with the gradients in income gaps between the distribution of income in single-mother household and that of couples previously found. On the one hand, greater reliance on earnings in the US, Italy and Spain allows some single-mother households to achieve higher income levels but leaves others at risk of very low income. In the UK, Ireland and the Netherlands means-tested benefits comprise an important part of single-mother households' incomes and are effective at lifting the incomes of those at the bottom of the distribution. In these countries, single mothers' incomes are more equally distributed than for couples, but single mothers are concentrated in the lower end of the income distribution. In Australia and Germany, universal transfers provide important supplements to earnings, accounting for 22% and 15% of income respectively. However, because in Germany single mothers are concentrated in low-paid sectors (Zagel and Van Lancker 2022), differences in relative income remain large. In Nordic countries, single mothers' earnings are supplemented by a package of public universal, assistance, and insurance transfers which, in Denmark and Finland, tend to reduce income gaps more at the bottom of the distribution than the top.

DISCUSSION

While numerous recent studies have examined the link between single motherhood and poverty fewer have looked at their broader economic circumstances. In this paper, I assessed the relationship between single motherhood and income, and the extent to which it varies across the income distribution, in twelve rich countries. I found single motherhood to be associated with reduced income everywhere. In line with studies on single-parent poverty,

after taking account of characteristics, the US once again stood out as having a particularly large average income penalty, at 46%, while in the UK the penalty, at 31%, was relatively small. In other countries, penalties sat between 35% and 40%. Single mothers' characteristics made little contribution towards explaining differences in the incomes of single and partnered mothers: even if single mothers were of the same age, had the same level of education, number and age of children, and lived in the same region as partnered mothers their income, and its' distribution, would be little changed. These findings echo those of previous research showing single mothers' characteristics, and in particular education, play little part in explaining cross-country differences in poverty (Härkönen 2018). Going one step further and adjusting single mothers' employment patterns so they resemble those of partnered mothers would similarly lead to little change in income in most countries. However, in the US, Italy, and, to a lesser extent, Spain single mothers' income would be lower at all points of the distribution if their employment patterns resembled those of partnered mothers, because single mothers are more likely to be employed. To raise their incomes single mothers would instead need to adopt the same pattern of employment (and in particular full-time employment) as fathers in couples. The potential income gains from single mothers acting more like fathers in couples would be greatest in the UK, Germany, and the Netherlands, countries where gender differences in parental employment are largest. Yet, even matching the full- and part-time employment rates of fathers' patterns would be insufficient to eliminate single mother income penalties in countries where full-time maternal and paternal employment is the norm, as data for the Nordic countries shows. Although higher rates of employment raise income, single mothers' incomes would still fall behind those of dual, full-time earner couple households (Alm, Nelson, and Nieuwenhuis 2019). This is in part because of mechanistic adjustments to income, which assume couples benefit from economies of

scale.[4] Moreover, motherhood earnings penalties, which are substantial across countries, are a further, important reason for single mothers' disadvantage (Harkness 2022).

I also found striking cross-country variations in how single motherhood affected income at different points of the distribution. In both the US and the UK, income gaps were strongly graded by income, but in opposite directions. In the US, single motherhood has the most negatively effect on income at the bottom of the distribution and a more moderate effect at higher levels of income. In the UK, the opposite is true with single motherhood having a smaller influence at the bottom of the income distribution and a greater effect at the top. In line with past studies, this suggests that social policies may be particularly successful at protecting single mothers most at risk of poverty in the UK but much less effective in the US (Rothwell and McEwen 2017; Brady, Finnigan, and Hübgen 2017; Zagel and Van Lancker 2022). Looking across countries, Ireland, the Netherlands, and Denmark exhibit a close resemblance to the UK, with income gaps being smaller at the bottom of the income distribution than the top. In each of these countries, single mothers' incomes are more equally distributed than for couples with children and their incomes are concentrated at the bottom of the distribution. This is consistent with Kenworthy's study (2015) showing work-conditional benefits to no more effective for raising incomes than other institutional configurations. Italy and Spain bear closer resemblance to the US, with income differences larger at the bottom of the distribution than the top. In Canada, Australia, Germany, Finland, and Norway differences in the incomes of single-mother headed and two-parent families are large but vary less with income.

What can we conclude from these findings? Past research, using data from the 1980s and 1990s, found that in countries where caregiving was encouraged and means testing was

[4] For example, if families rely solely on their own earnings, a single mother with one child employed full-time at the median wage would have needs adjusted income 29% lower than a couple with two children both employed full-time on the median wage.

common single mothers' incomes were relatively low (Wong, Garfinkel, and McLanahan 1993; Misra et al. 2012). Since then, the policy landscape has changed considerably with more mothers, including single mothers, entering the labor force. While many single mothers are now in paid work, part-time employment remains common and this places single mothers at heightened risk of poverty (Horemans, Marx, and Nolan 2016; Lewis and Giullari 2005). While generous means-tested earnings supplements raise income at the bottom of the distribution, their impact further up is more limited (Dickens and Ellwood 2003; Brewer and Hoynes 2019).

These disincentives in the tax-benefit system, alongside large earnings penalties to motherhood, means that in countries including the UK, Ireland, and the Netherlands single motherhood acts as an equaliser, compressing single mothers' incomes so that most single mothers having relatively low income, regardless of their characteristics or employment. In contrast, while means-tested benefits play an important role in lifting the income of single mothers with the lowest earnings potential in some countries, in others, such as the US, low levels of support are associated with a high risk of poverty (Brady, Finnigan, and Hübgen 2017). In these countries, single mothers are particularly dependent on their own earnings, and their incomes are unequally distributed, with some at risk of having very low incomes but more reaching the middle of the distribution. In Nordic countries, despite relatively high rates of employment and generous single-parent benefits, single mothers' incomes are lower than for those with partners. In these countries, the norm of dual-earner households (Alm, Nelson, and Nieuwenhuis 2019) and the persistence of motherhood pay gaps (Kleven et al 2019) means single mothers remain disadvantaged across the income distribution.

While this study is descriptive and has not directly tested how specific policies influence the economic opportunities of single mothers the results nonetheless shed light on how the experience of single mothers varies across countries and policy context. One

limitation is that, because only includes single mothers who are household heads are included, it does not capture the situation of single mothers who co-reside with other adults, including their parents, if those other adults are defined as the household head. While in some countries, generous welfare provision and housing support enable single mothers to live independently, in countries where welfare support is limited, including the US, Spain, and Italy, co-residence is likely to be more common and a response to adverse economic circumstances (Pilkauskas and Cross 2018). Because I look only at single mothers who live independently, the disadvantages associated with single motherhood are likely to be underestimated where co-residence is common. Further, while I have discussed the influence that public transfers may have on single mothers' relative economic position, I have not explored the role income tax plays in influencing their relative standing despite its importance in shaping the distribution of income.

While single motherhood has become increasingly common across rich countries it remains strongly associated with disadvantage. Recent research has paid a great deal of attention to the link between single motherhood and poverty. Far less has been written about single mothers' wider economic circumstances. Yet, as the experience of single motherhood continues to grow, it is important to understand to what extent single mothers, even if not poor, remain disadvantaged. I show that anti-poverty strategies may still result in wide gulfs in equality between single-mother and two-parent households. For example, although the UK has been lauded for its success in reducing single-mother poverty, low hours of paid work and earnings, encouraged by the design of the system of in-work financial support, continues to hold back their incomes with few single mothers reaching the middle of the income distribution. In the UK then, while the state has provided single mothers with financial security, this has not been accompanied by economic opportunity. In contrast, in the US single mothers are more likely to be represented among those on middle incomes, even as

those with the lowest income potential remain highly disadvantaged. In the case of the US, opportunities for some single mothers have not been accompanied by security for all. Future research should focus on understanding how policy can achieve both.

REFERENCES

Alm, Susanne, Kenneth Nelson, and Rense Nieuwenhuis. 2019. "The Diminishing Power of One? Welfare State Retrenchment and Rising Poverty of Single-Adult Households in Sweden 1988–2011." *European Sociological Review* 36(2):198-217.

Atkinson, Anthony, Thomas Piketty, and Emmanuel Saez. 2011. "Top incomes in the long run of history." *Journal of economic literature* 49(1):3-71.

Belfield, Chris, Jonathan Cribb, Andrew Hood, and Robert Joyce. 2014. *Living standards, poverty and inequality in the UK: 2014*. Vol. R96: IFS Report.

Brady, David, and Rebecca Burroway. 2012. "Targeting, universalism, and single-mother poverty: a multilevel analysis across 18 affluent democracies." *Demography* 49(2):719-46.

Brady, David, Ryan Finnigan, and Sabine Hübgen. 2017. "Rethinking the risks of poverty: A framework for analyzing prevalences and penalties." *American Journal of Sociology* 123(3):740-786.

Brewer, Mike, and Hilary Hoynes. 2019. "In-Work Credits in the UK and the US." *Fiscal Studies* 40(4):519-560.

Destro, Lane, and David Brady. 2011. "Does European-Style Welfare Generosity Discourage Single-Mother Employment?" In *Comparing European Workers Part B: Policies and Institutions*. Emerald Publishing.

Dickens, Richard, and David Ellwood. 2003. "Child poverty in Britain and the US." *The Economic Journal* 113(488):F219-F239.

Firpo, Sergio. 2007. "Efficient semiparametric estimation of quantile treatment effects." *Econometrica* 75(1):259-276.

Firpo, Sergio, Nicole Fortin, and Thomas Lemieux. 2018. "Decomposing wage distributions using recentered influence function regressions." *Econometrics* 6(2):28.

Gonzalez, Libertad. 2004. "Single mothers and work." *Socio-Economic Review* 2(2):285-313.

Harkness, Susan. 2022. "The accumulation of economic disadvantage: the influence of childbirth and relationship breakdown on married and single mothers' income and poverty risk " *Demography*.

Harkness, Susan. 2016. "The effect of motherhood and lone motherhood on the employment and earnings of British women: A lifecycle approach." *European Sociological Review* 32(6):850-863.

Härkönen, Juho. 2018. "Single-mother poverty: How much do educational differences in single motherhood matter." *The Triple Bind of Single-Parent Families: Resources, Employment and Policies to Improve Wellbeing*:31-50.

Horemans, Jeroen, Ive Marx, and Brian Nolan. 2016. "Hanging in, but only just: part-time employment and in-work poverty throughout the crisis." *IZA Journal of European Labor Studies* 1(5):1-19.

Hoynes, Hilary, Robert Joyce and Tom Waters (forthcoming). "The Transfer System." *The Deaton Review of Inequality.*

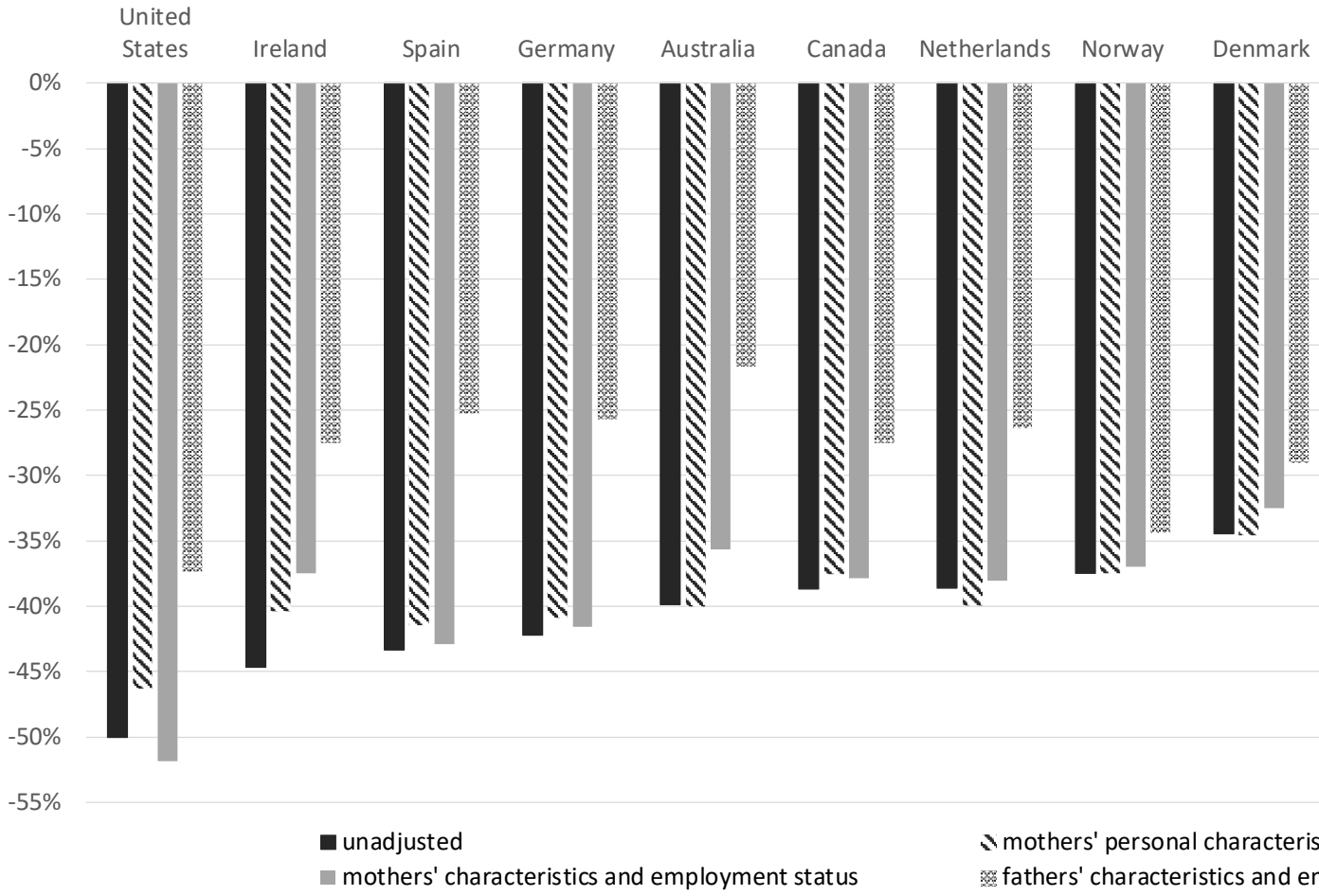
Kenworthy, Lane. 2015. *Do employment-conditional earnings subsidies work?* Herman Deleeck Centre for Social Policy, University of Antwerp.

Kleven, Henrik, Camille Landais, Johanna Posch, Andreas Steinhauer, and Josef Zweimüller. 2019. "Child Penalties across Countries: Evidence and Explanations." *AEA Papers and Proceedings* 109:122-126.

Lewis, Jane. 1997. *Lone mothers in European welfare regimes: Shifting policy logics*. Jessica Kingsley.

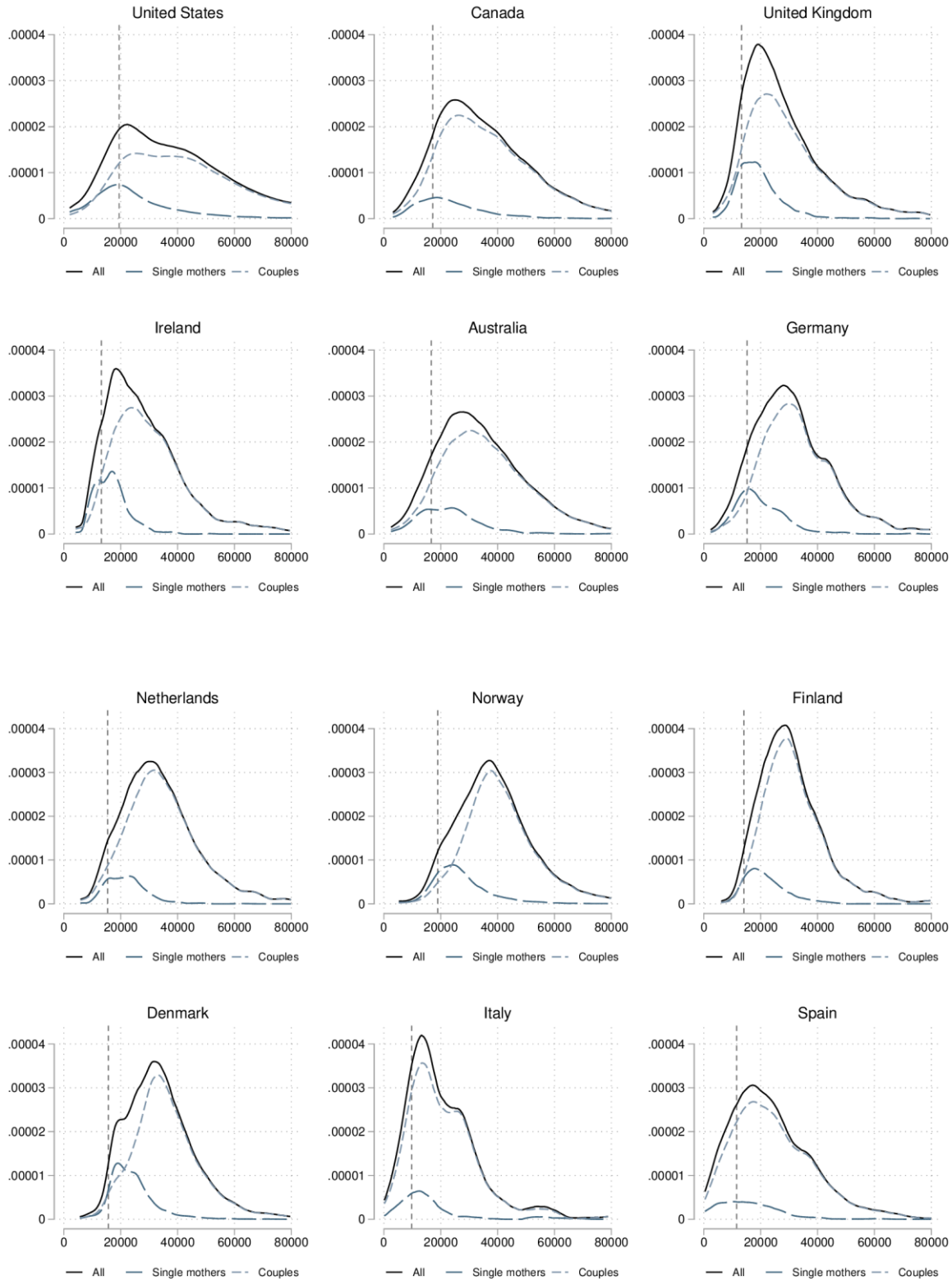
Lewis, Jane, and Susanna Giullari. 2005. "The adult worker model family, gender equality and care: the search for new policy principles and the possibilities and problems of a capabilities approach." *Economy and society* 34(1):76-104.
Luxembourg Income Study Database (LIS), http://www.lisdatacenter.org (multiple countries; March 2022). Luxembourg:LIS.
McCabe, Joshua, and Elizabeth Berman. 2016. "American exceptionalism revisited: Tax relief, poverty reduction, and the politics of child tax credits." *Sociological science* 3:540-567.
Millar, Jane. 2019. Self-Responsibility and Activation for Lone Mothers in the United Kingdom. American Behavioral Scientist, 63(1),85–99. https://doi.org/10.1177/0002764218816804
Misra, Joya, Stephanie Moller, Eiko Strader, and Elizabeth Wemlinger. 2012. "Family policies, employment and poverty among partnered and single mothers." *Research in Social Stratification and Mobility* 30(1):113-128.
Moffit, Robert. (forthcoming). "Transfers, Tax and Tax Credits at the Bottom: Deaton Review Commentary." *Deaton Review of Inequalities.*
Moffitt, Robert, and Stephanie Garlow. 2018. "Did welfare reform increase employment and reduce poverty?" *Pathways*:17-21.
Moullin, Sophie, and Susan Harkness. 2021. "The Single Motherhood Penalty as a Gender Penalty. ." *American Journal of Sociology*.
OECD. 2017. *Effective age of labour market exit*.
---. 2018. *Special feature: Differences in the disposable incomes of households with and without children*.
---. 2019. *Taxing Wages 2019*.
Parolin, Zachary. 2019. "The effect of benefit underreporting on estimates of poverty in the US." *Social Indicators Research* 144(2):869-898.
Pilkauskas, Natasha, and Christina Cross. 2018. "Beyond the nuclear family: Trends in children living in shared households." *Demography* 55(6):2283-2297.
Rios-Avila, Fernando. 2020. "Recentered influence functions (RIFs) in Stata: RIF regression and RIF decomposition." *The Stata Journal* 20(1):51-94.
Rothwell, David, and Annie McEwen. 2017. "Comparing child poverty risk by family structure during the 2008 recession." *Journal of Marriage and Family* 79(5):1224-1240.
Van Lancker, Wim, Joris Ghysels, and Bea Cantillon. 2012. *An international comparison of the impact of child benefits on poverty outcomes for single mothers.*
Waters, Tom, and Thomas Wernham. 2021. "Budget measures bring number of families entitled to Universal Credit to 7 million." *Observation, Institute for Fiscal Studies*.
Wong, Yin-ling Irene, Irwin Garfinkel, and Sara McLanahan. 1993. "Single-mother families in eight countries: Economic status and social policy." *Social Service Review* 67(2):177-197.
Zagel, Hannah, and Wim Van Lancker. 2022. "Family policies' long-term effects on poverty: a comparative analysis of single and partnered mothers." *Journal of European Social Policy*.

Figure 1: Mean single mother income gaps across countries



Note: Data is from the Luxembourg Income Study and is for years between 2016 and 2018. Gaps in equivalised income between single and partnered mothers. Plots are for (i) raw income gaps; (ii) adjusted for mothers' characteristics; (iii) adjusting for mothers' characteristics and rates of full- and part-time employment; (iv) adjusting for single mothers' and partnered fathers' characteristics and full-and part-time employment.

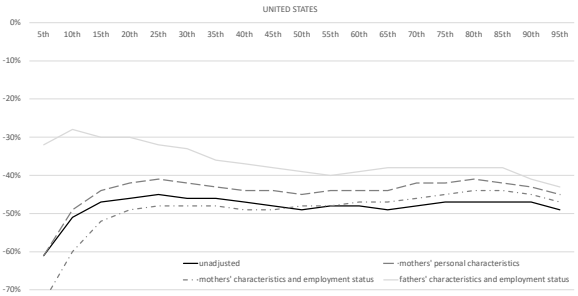
Figure 2: Kernel density estimates of equivalised household income: all, single and partnered mothers

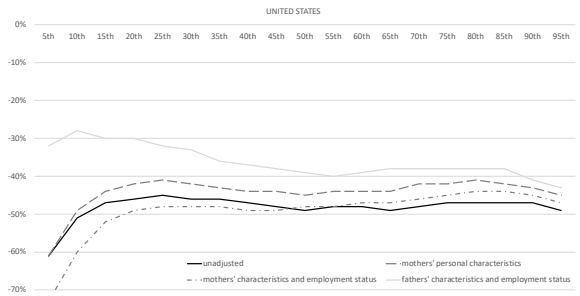


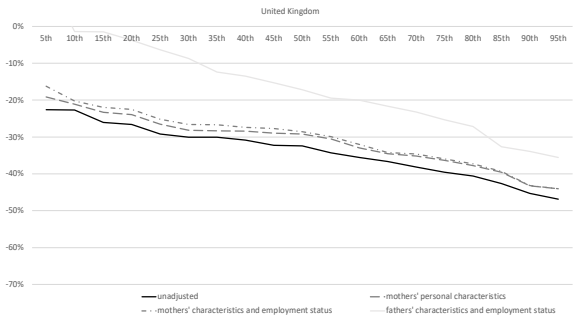
Notes: Data is from the Luxembourg Income Study and is for years between 2016 and 2018. Densities for single mother and two-parent households are weighted by their share of households. The density for all households is the sum of the weighted densities.

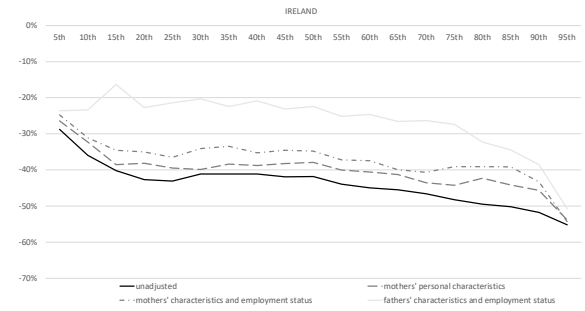
Figure 3: Single mother inequality treatment effects in twelve countries (% change in income, equivalised income)

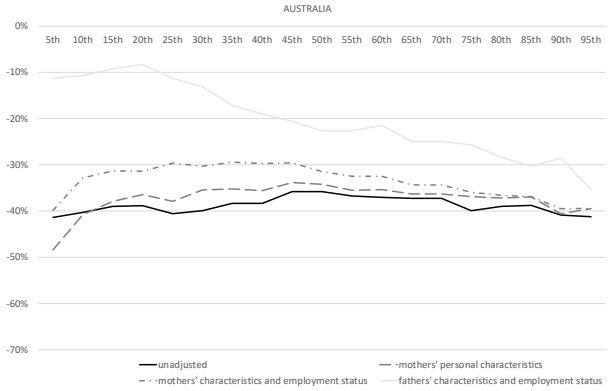
(i) Anglo-American countries



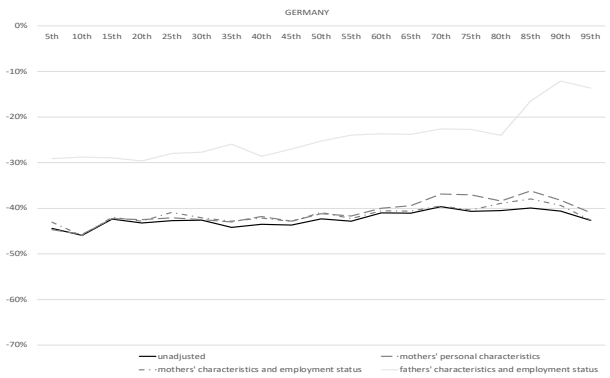


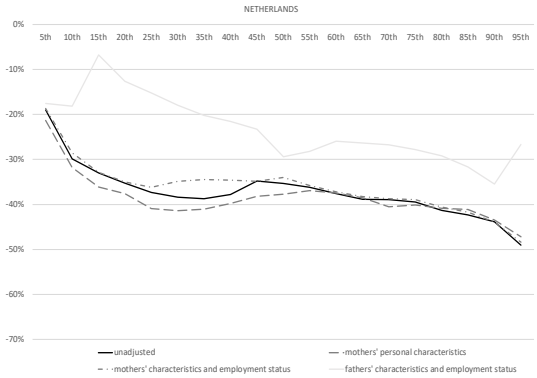




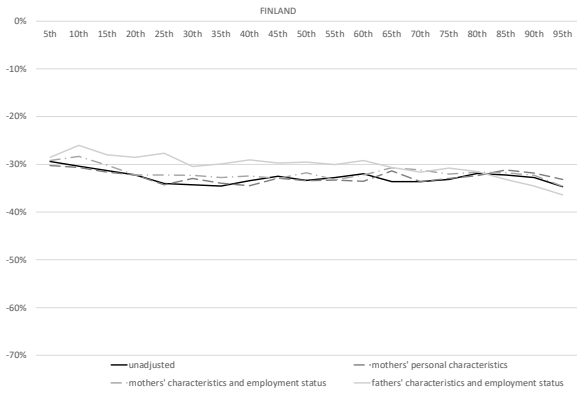


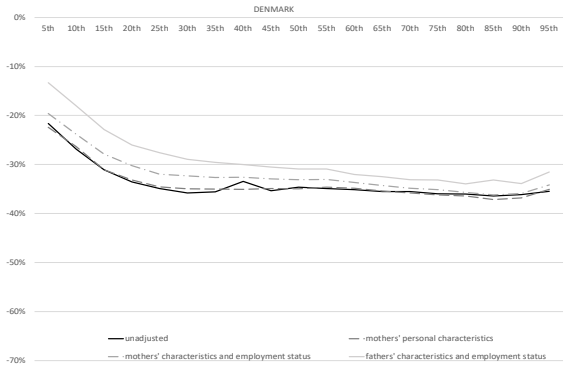
(ii) Northern European countries

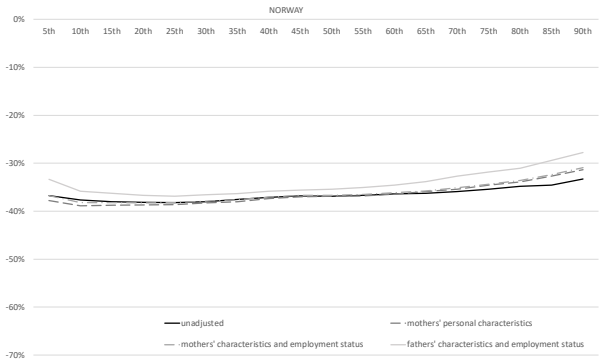




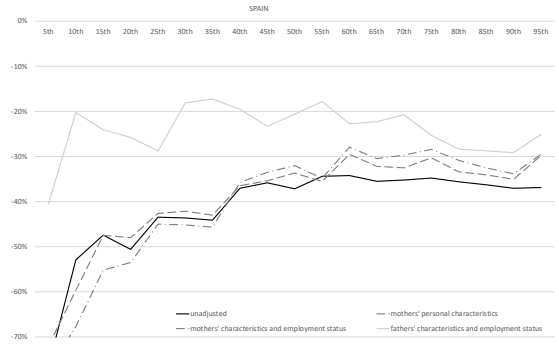
(iii) Nordic countries

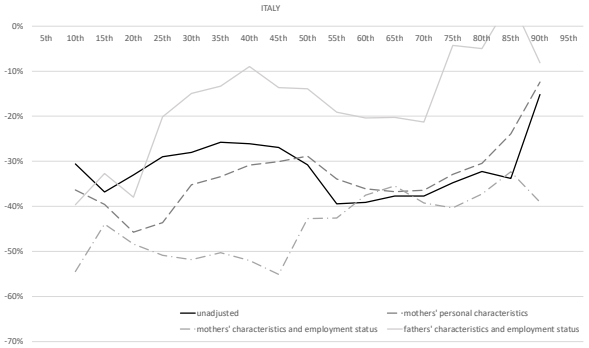






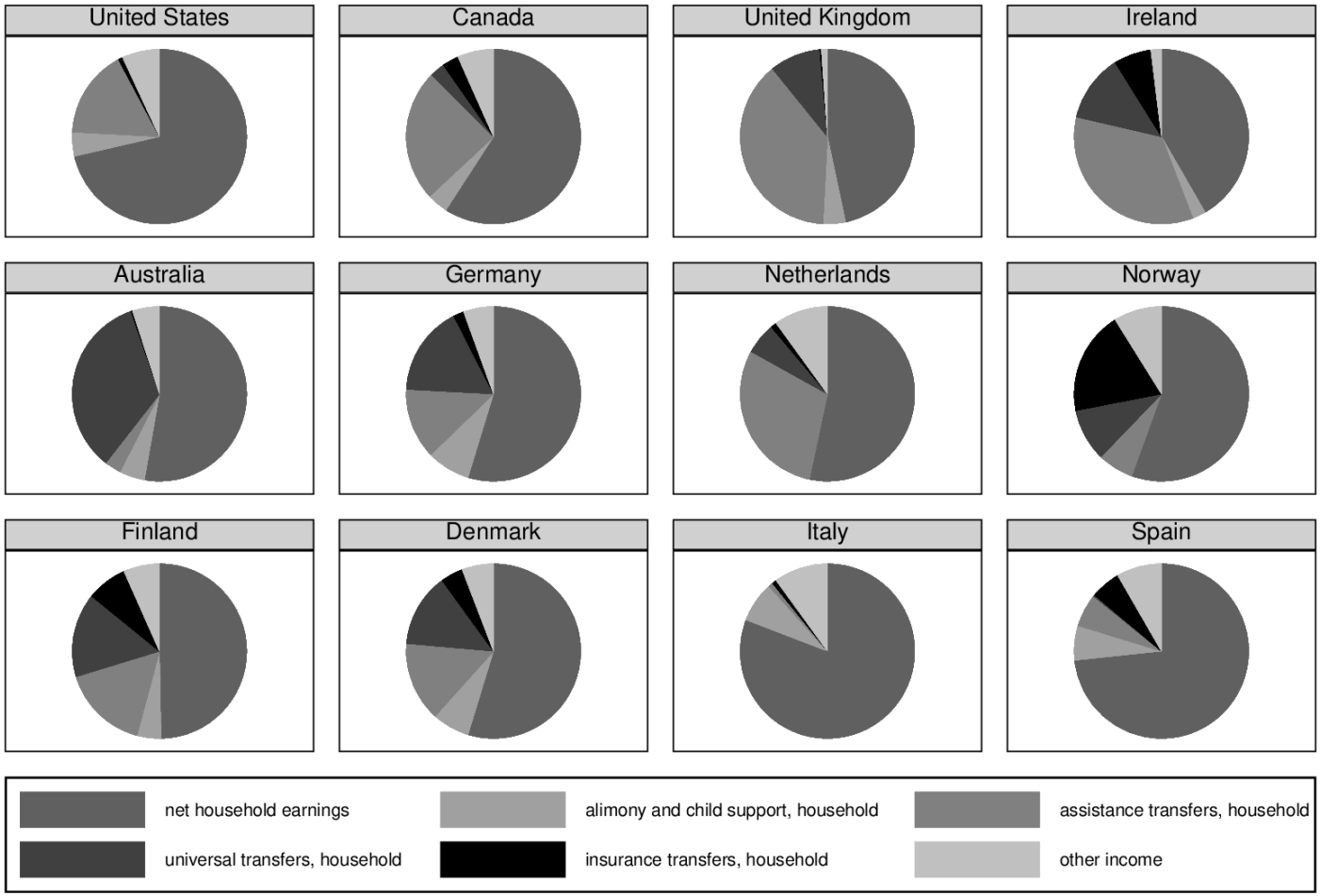
(iv) Southern European countries





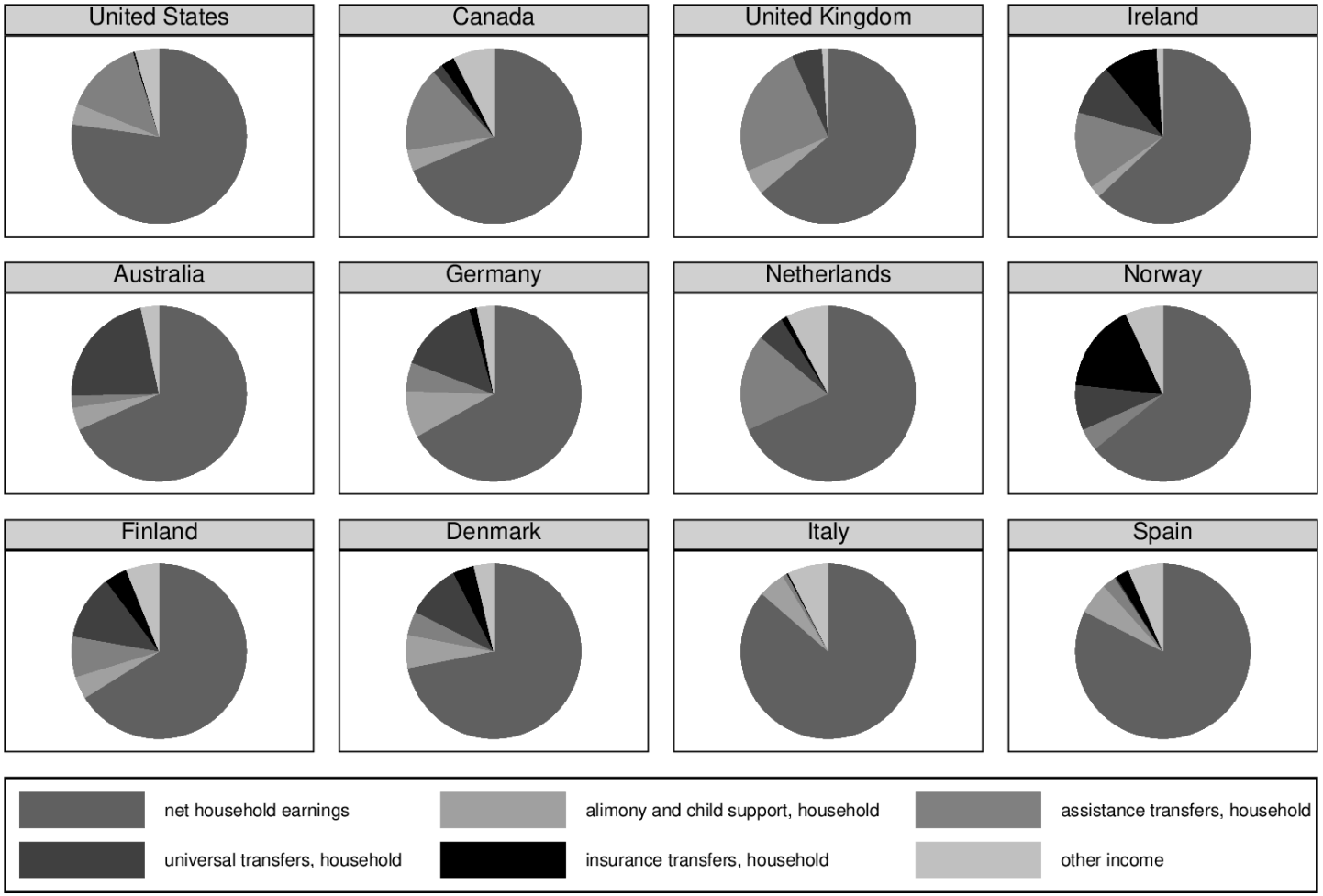
Notes: Data is from the Luxembourg Income Study and is for years between 2016 and 2018. Average treatment effects reported. The first set of adjustments, used to derive IPW and as controls, are for age, education, number and age of children, region. Maternal employment (full and part-time) interacted with education are added to the second set of controls. The third set of controls include controls for characteristics of single mothers' vis-a-vis partnered fathers, including employment controls.

Figure 4: Single mother headed households' income sources in twelve countries



Notes: Data is from the Luxembourg Income Study and is for years between 2016 and 2018. The figure shows income from different sources as a share of net household income.

Figure 5: Employed single mother headed households' income sources in twelve countries



Notes: As figure 5.

Table 1: Descriptive statistics, single mother and two-parent headed household

	% single	Age youngest child		Number kids		Education: Low			Education: middle			Education: high			Sample
	mothers	Single	Couple	Single	Couple	Single mothers	Couple, mother	Couple, father	Single	Couple, mother	Couple, father	Single	Couple, mother	Couple, father	size
United States	20%	8.8	7.1	1.8	2.0	12%	8%	10%	49%	34%	40%	39%	58%	51%	21,091
Canada	11%	6.9	5.1	1.7	2.0	9%	6%	7%	25%	18%	20%	67%	77%	74%	9,072
United Kingdom	21%	8.2	6.4	1.7	1.8	28%	15%	18%	36%	33%	33%	36%	52%	49%	5,024
Ireland	19%	9.4	7.4	1.8	1.9	24%	10%	17%	38%	28%	25%	38%	62%	58%	1,409
Austalia	15%	0.1	6.3	1.9	1.9	25%	13%	10%	34%	29%	44%	41%	58%	46%	3,855
Germany	17%	9.3	7.0	1.5	1.7	21%	14%	11%	56%	53%	47%	23%	33%	42%	5,254
Netherlands	11%	9.6	6.9	1.6	1.9	21%	14%	14%	56%	53%	39%	23%	33%	47%	2,777
Norway	17%	9.2	6.9	1.5	1.8	21%	14%	14%	47%	36%	45%	32%	50%	41%	54,999
Finland	13%	8.9	6.7	1.6	1.9	16%	9%	14%	45%	37%	48%	39%	54%	38%	2,761
Denmark	19%	8.9	6.9	1.5	1.8	21%	11%	13%	40%	37%	46%	39%	52%	41%	20,445
Italy	11%	10.3	8.3	1.4	1.6	36%	29%	38%	45%	48%	45%	19%	23%	17%	1,074
Spain	11%	10.6	7.5	1.4	1.5	41%	30%	37%	27%	37%	23%	32%	33%	40%	3,424

Note: Data is from the Luxembourg Income Study and is for years between 2016 and 2018. The share of single mother headed household is reported as a percentage of all households age 22-59 with dependent children (16 and under).

Table 2: Employment of fathers and mothers by partnership status

	Employment			Diff mothers v	Diff. single v	FT employment			Diff mothers v	Diff. single v
	Father, couple	Mother, couple	Mother, single	fathers, couples	partnered mothers	Father, couple	Mother, couple	Mother, single	fathers, couples	partnered mothers
United States	93%	68%	78%	-26%	11%	82%	47%	56%	-36%	10%
Canada	91%	71%	69%	-20%	-2%	77%	50%	50%	-27%	0%
United Kingdom	93%	69%	63%	-24%	-6%	89%	39%	32%	-50%	-7%
Ireland	88%	68%	54%	-20%	-14%	78%	39%	25%	-39%	-14%
Austalia	93%	75%	60%	-18%	-15%	88%	42%	35%	-46%	-6%
Germany	93%	73%	70%	-21%	-2%	79%	15%	27%	-64%	12%
Netherlands	95%	83%	71%	-12%	-12%	71%	12%	11%	-59%	-1%
Norway	91%	82%	78%	-9%	-4%	-	-	-	-	-
Finland	89%	72%	65%	-17%	-7%	59%	45%	39%	-14%	-6%
Denmark	92%	84%	69%	-8%	-15%	69%	53%	46%	-16%	-7%
Italy	93%	56%	83%	-37%	27%	87%	38%	61%	-49%	23%
Spain	89%	66%	69%	-23%	3%	79%	48%	46%	-31%	-2%

Note: Data is from the Luxembourg Income Study and is for years between 2016 and 2018. The share of single mother headed household is expressed as a percentage of all households age 22-59 with children. No information on full-time employment is given for Norway. For all other countries full-time employment is defined as employed full-time, full year, or where this information is not available, employed for more than 30 hours a week.

Table 3: Estimation of overall treatment effect of single motherhood on inequality (Gini Coefficient * 100)

	Sample mean	(i) no controls	(ii) control for characteristics	(iii) adds employment controls
United States	34.8	-0.1	0.1	-0.1
Canada	28.6	-0.6	0.2	-0.7
United Kingdom	28.0	-6.6**	-5.7**	-7.0**
Ireland	25.8	-3.8**	-4.3**	-6.2**
Austalia	28.0	-1.1	0.0	-2.2
Germany	25.2	-0.5	2.1	1.2
Netherlands	22.7	-5.3*	0.2	0.0
Norway	20.6	1.1**	3.6**	3.3**
Finland	21.0	-1.9	-0.9	-2.1
Denmark	20.0	-1.9**	0.0	-1.8
Italy	33.4	4.7	4.7	5.1
Spain	34.2	2.5	1.5	1.0

Notes: ** denotes statistical significance at 1%, * significance at 5%. The sample includes all single mother and couple headed households where the mother is age 22-59. Controls for characteristics (ii) include age (cubic) and dummy variables for education (low, medium, high), region, number of children (2 and 3+ children) and age of youngest child (under 5, 5-11); (iii) adds controls for full and part-time employment, interacted with education. For Norway, information on full-time employment is not given. Samples sizes are in Appendix Table A1.

Appendix 1: Quantile Treatment Effect Models

Unconditional quantile treatment effect (QTE) models are used to illustrate how single motherhood affects relative income at different points of the distribution (S. Firpo 2007; S. Firpo and Pinto 2016; Powell 2016). QTE models allow the estimation of inequality treatment effects even when the variable of interest is binary (S. Firpo 2007; S. Firpo and Pinto 2016; Rios-Avila and Maroto 2020). If all potential outcomes could be observed for the population, then quantile treatment effects can be found by comparing the distribution of the treated (y_1) and the untreated (y_0) at different quantiles (τ):

$$(1) \qquad \mathrm{QTE}^{\tau} = \mathrm{Q}^{\tau}_{y1} - \mathrm{Q}^{\tau}_{y0}$$

However, potential outcomes are not fully observed. To account for this, treatment is assumed to depend on a set of observed characteristics, Z. Under the assumption that the potential outcomes are independent of the treatment after conditioning on Z, QTE are estimated using the two-step procedure proposed by Firpo (2007), and Firpo and Pinto (2016). First, propensity scores, $\hat{p}(z)$, which indicate the probability of an observation belonging to the treated group, are estimated using logit models, such that:

$$(2)\ \mathrm{SM_i} = \mathrm{f(Z_i)}$$

where SM_i is a dummy variable for being a single mother. From the propensity scores, inverse probability weights (IPW) are constructed, which match the distribution of characteristics (Z) of the treated and untreated samples. The weights are given by ω_0 for the untreated, and ω_1 for treated, where:

$$(3) \qquad \omega_o = \frac{1-\overline{SM}}{1-\hat{\mathrm{p}}(\mathrm{z})}; \quad \omega_1 = \frac{\overline{SM}}{\hat{\mathrm{p}}(\mathrm{z})}$$

Applying IPW reshapes the observed distribution of outcomes for the treated (or untreated) so that it resembles that which would be observed for the full sample, allowing me to compare potential outcomes.

what the distribution of single mothers' income would look like if they: (i) had the same demographic characteristics as partnered mothers; (ii) had the same demographic and employment characteristics as partnered mothers; and (iii) had the same demographic and employment (full- and part-time) characteristics as partnered fathers.

The second step involves estimating QTE, by comparing the weighted distributions for the treated and untreated. Different methods have been proposed for comparing distributions.[5] I follow the method proposed by Rios-Avila (2020), comparing distributions by estimating the reweighted recentred-influence functions (RIF) and conducting RIF regression (Firpo, Fortin and Lemieux 2018).

RIFs capture changes in distributional statistics when there is a marginal change in the underlying variable's distribution. For the p-th quantile of variable y, $\mathrm{q_y(p)}$, is given by:

$$\text{(3)} \qquad \mathrm{RIF\big(y, q_y(p)\big) = q_Y(p) + \frac{p - 1(y \le q_y(p))}{f(q_y(p))}}$$

where $q_y(p)$is p-th percentile of the income distribution. In QTE models, the RIF is weighted by ω_0 to obtain the expected distribution for the untreated, v_0, and by ω_1 for the treated, v_1. The re-weighted expected distribution can be written:

$$\text{(4)} \qquad v_0 = E(RIF\left(y_i; v\left(F_y^0\right)\right); \qquad v_1 = E(RIF\left(y_i; v\left(F_y^1\right)\right);$$

Unconditional treatment effects, at different percentiles of the distribution, are then given by:

$$\text{(5)} \quad v_c = \; v_1 - \; v_0$$

Finally, regressing v_c on a set of characteristics, X, captures the partial impact of a unit change in the explanatory variables on the unconditional QTE. The specification takes the form:

$$\text{(4)} \qquad \mathrm{v_c^p = \beta^p Z_i + \varepsilon_i}$$

In this case, $\mathrm{Z_i}$ is the same vector of characteristics used to reweight the distribution. Further details on the methods are described in Rios-Avila and Marato (2020).

[5] Alternative methods of estimation include weighted quantile regression (S. Firpo 2007)

I use the *rifhdreg* command described by Rios-Avila (2020). As IPW estimates are sensitive to values close to 0 or 1, I follow Rios-Avila and Maroto (2020) and exclude observations with predicted propensity scores of less than 0.025 and above 0.975. The resulting 'distributional treatment effects' show how distribution of the outcome shifts in response to treatment.[6] Interpretation of the estimates depend on whether they are estimated for the whole population (the average treatment effect, ATE); for the treated (ATT), or the untreated (ATU). In this paper, as is common in the literature, I report the ATE. The estimates for the ATT, which may also be of interest, give similar results.

REFERENCES (APPENDIX)

Firpo, Sergio. 2007. "Efficient semiparametric estimation of quantile treatment effects." *Econometrica* 75 (1): 259-276.

Firpo, Sergio P, Nicole M Fortin, and Thomas Lemieux. 2018. "Decomposing wage distributions using recentered influence function regressions." *Econometrics* 6 (2): 28.

Firpo, Sergio, and Cristine Pinto. 2016. "Identification and estimation of distributional impacts of interventions using changes in inequality measures." *Journal of Applied Econometrics* 31 (3): 457-486.

Powell, David. 2016. "Quantile regression with nonadditive fixed effects." *Quantile Treatment Effects* 1 (28).

Rios-Avila, Fernando. 2020. "Recentered influence functions (RIFs) in Stata: RIF regression and RIF decomposition." *The Stata Journal* 20 (1): 51-94.

Rios-Avila, Fernando, and Michelle Maroto. 2020. "Moving Beyond Linear Regression: Implementing and Interpreting Quantile Regression Models with Fixed Effects."

[6] Note the models estimate 'distributional treatment effects.' These are not the same as the 'distribution of individual treatment effects,' which requires further assumptions to be made about where individuals would lie in the distribution if they were (or were not) treated. A commonly made assumption is of rank preservation between the potential outcome distribution, regardless of treatment status (i.e. that individuals have a certain "proneness" to being located at a certain point of the distribution that does not change with the treatment) with estimates obtained using instrumental variables (Melly & Wüthrich, 2016; Firpo & Ridder, 2019).