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Has the Gender Revolution Stalled?

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Abstract: We examine change in multiple indicators of gender inequality for the period of 1970 to 2018 for the United States, and post-1990 data on some of those indicators for the Republic of Ireland. We consider gender inequality and its trend over time in educational attainment, employment, fields of study in higher education, occupations, and earnings. We conclude that there has been dramatic progress in movement toward gender equality, but, in recent decades, change has slowed, and, on some indicators, stalled entirely. The slowdown on some indicators and stall on others suggests that further movement toward gender equality will only occur if there is substantial institutional and cultural change, such as an increase in men's participation in household and care work, governmental provision of childcare, and adoption by employers of policies that reduce gender discrimination and help both men and women combine jobs with family care responsibilities.

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I INTRODUCTION

Most affluent societies have seen such dramatic change in gender inequality in the last half century that it is sometimes called a "gender revolution". Women's employment increased dramatically, even for mothers of young children (Cotter *et al*., 2008; Russell *et al*., 2017; Mosca and Wright, 2020). Fertility fell, in part because of access to birth control, making education and employment more feasible (Goldin and Katz, 2002; Bailey, 2006; Russell *et al*., 2017). The proportion of women attending higher education and receiving degrees increased dramatically (DiPrete and Buchmann, 2013; England *et al*., 2007; Smyth, 1999; Bercholz and FitzGerald, 2016). Women rose as a proportion of those getting degrees in fields of study that have traditionally been dominated by men, such as management, accounting, and STEM (Science, Technology, Engineering, and Mathematics) fields (England and Li, 2006). Various women's movements emerged, and legislation made equal opportunity in employment a legal requirement, even if the reality fell short of this (Cassidy *et al*., 2002; Russell *et al*., 2017; Mosca and Wright, 2020). Because of new opportunities and aspirations, many women entered professional and managerial jobs previously filled almost exclusively by men (Weeden *et al*., 2018; Blau *et al*., 2013; Russell *et al*., 2017; Keane *et al*., 2017). Because of women's entry into higher paying male-dominated occupations, and women's more continuous employment experience, the gender gap in pay fell significantly (Institute for Women's Policy Research, 2020; Blau and Kahn, 2017; Central Statistics Office, 2017; Doris, 2019; Redmond and McGuinness, 2019). Attitudes about the proper roles for men and women became more gender egalitarian (Cotter *et al*., 2011; Scarborough *et al*., 2019; Russell *et al*., 2017), and men took on more childcare and housework, although women still do the lion's share of both (Russell *et al*., 2019; Bianchi *et al*., 2006).

While past research shows much progress toward gender equality in the last 50 years, much of it also shows a slowdown or even a stall in movement toward gender equality in recent decades (England, 2010; 2011; England *et al*., 2020). Here we review the evidence on trends for the US and show comparable analysis for the Republic of Ireland where data are available. We provide substantial evidence that change on a number of indicators has either slowed or stalled entirely. We conclude by discussing what may be necessary for further reductions in gender inequality to occur.

II DATA AND METHODS

2.1 United States Analysis

To analyse employment and earnings, we use data from Integrated Public Use Microdata Series (IPUMS) samples of the Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS), 1970 to 2018. For analyses of

employment and earnings, we included individuals between 25 and 54 years old (N = 3,371,391), an age range where few individuals are still in school or have retired yet. When presenting median or other percentiles of hourly earnings, we limit the sample to individuals employed full-time in the past week and further exclude individuals who are self-employed, in the armed forces, or who reported zero wage and salary earnings (resulting N = 1,979,268).

For employment, we use the CPS variable providing information on whether the individual reported being employed in the last week (full- or part-time). For earnings, we begin from annual earnings from wages or salaries reported by respondents. The Census Bureau top-codes annual earnings to provide confidentiality. Because CPS top-coding procedures vary from 1970 to 2018, we recoded any earnings above a given year's top-code threshold to the appropriate top-code threshold value. We then multiplied these top-coded income values for each sample by 1.5 (following Autor *et al*., 2008); this approximates what is achieved by assuming a Pareto distribution for values in high percentiles. We converted the resulting measure of annual earnings to constant 2018 US dollars using the US Consumer Price Index.[1] We then construct hourly wage using CPS information on weeks and hours of employment (see England *et al*., 2020 for details). Our analyses are descriptive and all employ CPS sample weights. In results not shown here we ascertained that the trends reported here are very close to those obtained by regression-adjusted trends to remove effects of compositional change in age and race/ethnicity (see England *et al*., 2020, online appendix, for details).

To show trends in men's and women's educational attainment we use data from the National Center for Education Statistics (NCES) on the number of men and women getting bachelor's and doctoral degrees in each academic year from 1970/1971 to 2015/2016. Doctoral degrees include PhD, MD, DDS, JD, and a few other doctoral-level professionally oriented degrees.

To assess the level of segregation by gender in fields of study, we use the NCES data that report the total number of men and women who received each of bachelor's and doctoral degrees in each academic year from 1970/1971 to 2015/2016 in the following 17 fields: agriculture and natural resources; architecture and related services; biological and biomedical sciences; business; communication, journalism, and related programmes and in communications technologies; computer and information sciences; education; engineering technologies; English language and literature/letters; foreign languages and literatures; health professions and related programmes; mathematics and statistics; physical sciences and science technologies; psychology; public administration and social services; social sciences and history; and visual and performing arts.

For both bachelor's and doctoral degrees, we compute the Index of Dissimilarity (D) (Duncan and Duncan, 1955) for each year.

[1] https://data.bls.gov/cgi-bin/cpicalc.pl.

To examine trends in occupational gender segregation, we use data from IPUMS decennial Census samples for 1970, 1980, 1990 and 2000, and American Community Survey (ACS) samples for 2001 through 2016. For Census and ACS samples, IPUMS provides a harmonised occupation variable, OCC1990, which reflects a modified version of the Census Bureau's 1990 three-digit (detailed) occupational classification scheme. Because some occupations in this scheme did not exist as classification possibilities for some particular years, and we wanted to compute indices of segregation over consistent categories for each year, we collapsed OCC1990 into Weeden and Grusky's 82-category occupational microclass scheme (Jonsson, *et al*., 2009, Table A2). Using all employed respondents who report an occupation (N=25,369,733), and detailed occupations collapsed into the 82 categories described above, we deleted five categories, leaving 77 of Weeden and Grusky's microclasses, because only these have at least one observation in each sample year. Using these constant 77 occupational categories, we calculate the Index of Dissimilarity, the same measure we use to examine segregation of fields of study and described above, to assess change in occupational sex segregation.

2.2 Irish Analysis

To measure the percentage of women and men (age 25-54) employed in Ireland, we use Eurostat's employment rate as captured by the European Union Labour Force Survey (EU-LFS) (series labelled "llfsa_ergan"). This rate relies on the ILO definition of employment: a person who during the reference week worked for at least one hour for pay or profit or family gain, unless they have a job from which they were temporarily absent.

To measure the earnings of Irish men and women, we use two sources of data: 1) the National Employment Survey (2003-2009), and 2) Ireland's Labour Force Survey, with additional linked data from the CSO's project titled "Earnings Analysis using Administrative Data Sources"[2] (2011-2018). Summary statistics from the National Employment Survey were provided by the CSO, while summary statistics from the linked LFS and EAADS dataset were calculated by the authors with support from the CSO. Earnings are calculated on a sample of men and women aged between 25 to 54 years. Both datasets only consider working individuals, with the linked LFS and EAADS dataset (N=139,003) focusing only on those who pay PAYE (although a portion of these employees may hold a second job where they are self-employed), and the NES sampling workers through employers. Importantly, the NES considers enterprises in all economic sectors employing 3+ persons. These enterprises are in NACE Sectors C to O only, and so this source omits most public

[2] Further details about the project titled Earnings Analysis from Administrative Data can be found here https://www.cso.ie/en/releasesandpublications/ep/p-eaads/earningsanalysisusingadministrativedata sources2018.

sector jobs, as well as those in Agriculture, forestry, and fishing (NACE Sector A), and Mining and quarrying (NACE Sector B). Further, the EAADS omits sectors A (Agriculture), T (Household Activities) and U (Activities of Extra Territorial Organisations) but considers all other sectors.

For earnings, we present the CSO's summary statistics of NES for 2006-2009. For the remaining years we consider gross weekly earnings recorded by the EAADS. We construct a measure for hourly wages using usual weekly working time as recorded by the LFS. As our analyses are descriptive we use grossing factor weights provided by the CSO.[3] Lastly, we convert both measures of wages to constant 2018 prices using the CSO's Consumer Price Index.[4]

For men's and women's attainment of degrees we use data from the Higher Education Authority's (HEA) Annual Graduate Survey. The measure for bachelor's degrees considers both Honours and Ordinary Degree Graduates recorded in a given year. The measure for doctoral degrees considers all Level 10 graduates on Ireland's National Framework of Qualifications recorded each year.[5]

When measuring the level of segregation of men and women in the fields of study in which they receive bachelor's or doctoral (PhD) degrees, we consider graduate respondents from nine fields: education; humanities and arts; social science, business, and law; science, mathematics, and computing; engineering, manufacturing and construction; agriculture and veterinary studies; health and welfare; services; and a final group for combined or general fields of study (this group is listed separately in HEA statistics). For both bachelor's and doctoral degrees, we compute the Index of Dissimilarity (D) (Duncan and Duncan, 1955) for each year. For the bachelor's (but not the doctoral) analysis, we drop graduates from the "Combined group" category when calculating the Duncan index, as the category was exceedingly uncommon.

To examine trends in occupational gender segregation, we use CSO's Census data from 1991-2016. We calculate the Dissimilarity Index (D) for 25 occupational groups which were harmonised by the CSO.[3] Our findings can be compared to those of Keane *et al*. (2017) who calculated D from 1991-2011 using both two-digit and three-digit occupational categories. The three-digit categories were unavailable for 2016 data, so we used the two-digit categories for all available years. Our method differs from that of Keane *et al.* (2017) in one important way. When

[3] The LFS grossing factor was calibrated to the EAADS population using parameters for both: 1) Gender, Public/Private sector status and Age class. 2) Gender and NACE Sector.

[4] https://www.cso.ie/en/statistics/prices/consumerpriceindex.

[5] One way in which the US and Irish analyses of the segregation of fields of study among doctoral degree recipients are not comparable is that the US analyses include as doctorates, not only PhDs, but also MDs (medical doctors) and JDs (the law degree that allows one to be a lawyer). The Irish analyses includes only PhDs (just those with Level 10 qualifications in the National Qualification Framework).

[6] For example see this publication of the Irish Central Statistics Office (Census 2006 Volume 8 Table 5: https://www.cso.ie/en/media/csoie/census/census2006results/volume8/volume_8_occupations_entire_volume.pdf).

considering the residual group marked "other occupations", we cannot exclude respondents whose occupation is missing in the survey. In this way we calculate the rate with reference to respondents in all occupations, including those with missing values for occupation. Both the level of D and its trend in our analysis are similar to those found by Keane *et al.* (2017) for the years our analysis overlaps theirs.

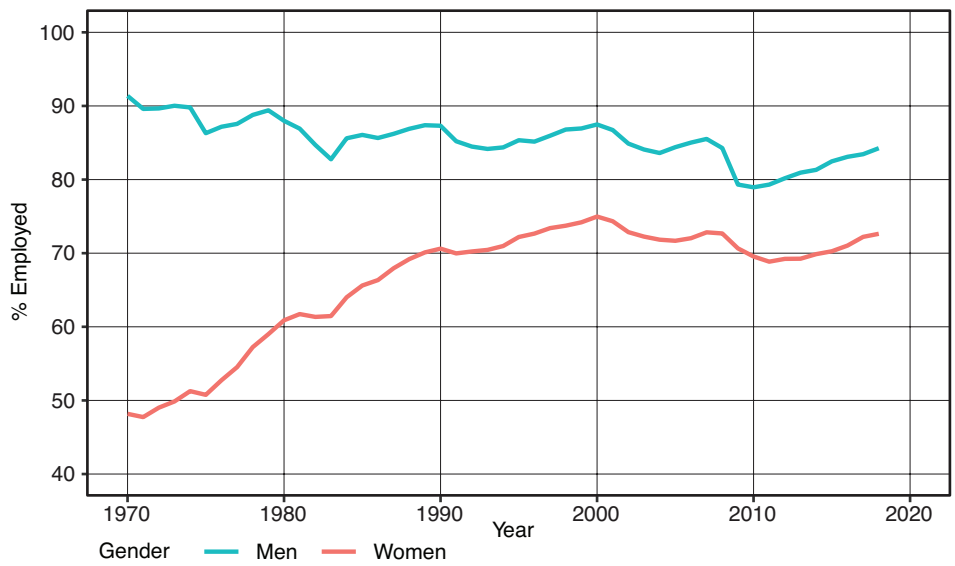
III EMPIRICAL FINDINGS

3.1 Employment

The increase in US women's employment has been dramatic, but has stalled, as Figure 1 shows. Women's employment rose almost steadily from 1970 to 2000, moving from 48 per cent employed in 1970 to 75 per cent employed in 2000. It then declined, plateaued, declined more in the Great Recession, reaching a bottom of 69 per cent, and rebounded to 73 per cent in 2018. Despite the rebound after the Recession, in 2018 it was no higher than its level in 1996, and all the changes since then have been small and in the range between 70 per cent and 75 per cent.

Men have a higher level of employment than women at each year, and their employment goes up and down more than women's with business cycles, including the Great Recession. The long-term trend for men has been slowly downward, from 91 per cent in 1970 to 84 per cent in 2018 (Figure 1). Given that we are only looking at ages 25 to 54, this is not because of earlier retirement or longer schooling; most

Figure 1: Percentage of US Women and Men, Age 25–54, Employed in the Last Week, 1970 to 2018

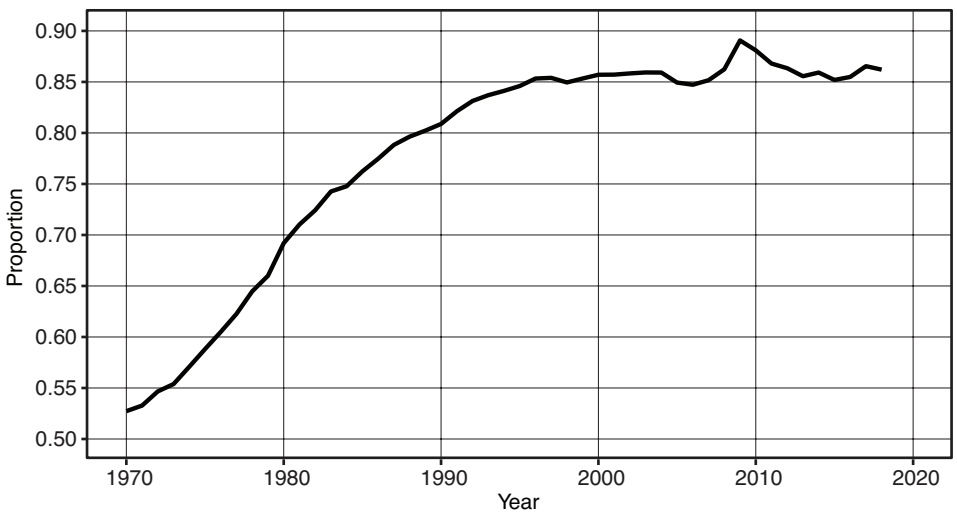


Source: England *et al.,* 2020.

commentators believe it reflects increased difficulty that men, especially those without a university degree, have finding employment (US White House, 2016).

To assess the US trend in the gender gap in employment, Figure 2 shows the ratio of women's percentage employed to men's percentage employed. The progress toward equality was steepest from 1970 to 1995 as women's employment went up dramatically and men's employment decreased modestly. Thereafter the ratio has been quite flat except for a rise and then decline of several points reflecting that the Great Recession and recovery both affected men more than women. The flattening of this ratio tells us that since approximately 1995 the decrease in gender inequality in employment has stalled.

Figure 2: Ratio of Percentage of US Women to Men Employed in the Last Week Age 25–54, 1970 to 2018

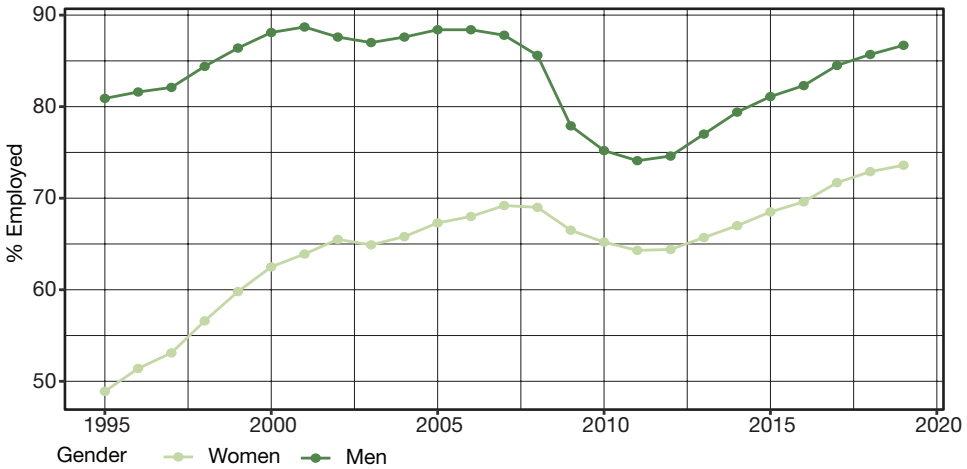


Source: England *et al.,* 2020.

We now turn to women's employment in Ireland, where we show data for 1995 to 2019. Figure 3 shows that Irish women's employment was increasing continuously and dramatically, moving from 49 per cent in 1995 to just under 70 per cent in 2007, a period during which US women's employment was relatively flat. Then, probably in response to the Great Recession, Irish women's employment fell to 64 per cent in 2011 but has resumed a climb since. While Irish women's employment was dramatically less than US women's in 1995, it is approximately the same in 2018, and continued to rise in a more recent period than was true for US women. As for Irish men, unlike the case of US men, Figure 3 shows no long-term decline in employment. However, similar to the US case, Irish men's employment fell more than women's during the Great Recession starting about 2008 and rebounded more strongly afterwards. Although our data series is limited, we know from previous

research that gender differences in employment have diminished substantially in Ireland. For example, the 1966 Census reported an employment rate for women aged 15-64 of 34 per cent, with a major divide between single women (75 per cent) and married women (6 per cent) (Russell *et al*., 2017; Walsh, 1971). Since then, women's employment has risen steadily in Ireland (Mosca and Wright, 2020).

Figure 3: Percentage of Women and Men Employed, Age 25–54, Ireland, 1995 to 2019



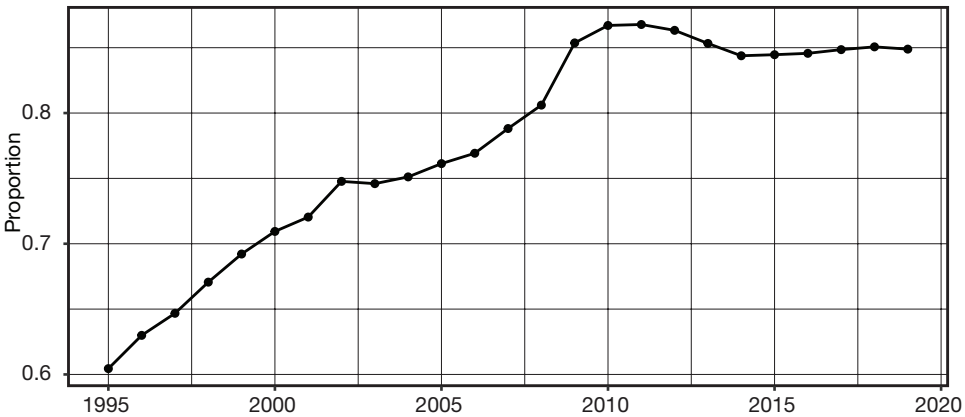
Source: Eurostat, Labour Force Survey, series "lfs_ergan"

What about the trend in gender inequality in employment in Ireland? Figure 4 shows that the ratio of the percentage of women to the percentage of men employed climbed steadily from 1995 to 2010, but thereafter has been flat or slightly declining. Women were gaining on men before the Great Recession. As men's employment fell more steeply than women's during the recession, the ratio rose. But since 2010 men's and women's employment have risen in parallel, so the ratio has been flat. Thus, for about a decade there has been a stall closing the gender gap in employment in Ireland.

3.2 Educational Attainment

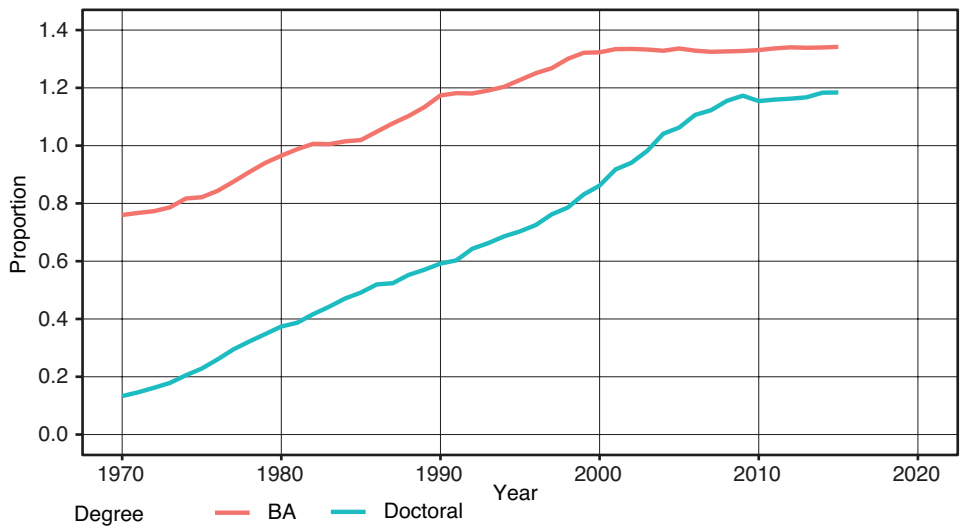
Because educational attainment affects earnings, gender differences in education affect the gender gap in pay. Figure 5 shows the ratio of women's to men's bachelor's and doctoral degrees in the US. Since women are approximately 50 per cent of the population, if equal proportions of women and men secured degrees, the ratio would be approximately 1. As the figure shows, US women earned fewer bachelor's degrees than men until the mid-1980s but have secured more degrees every year since. After 2000, women passed men in attaining doctorates as well. Both ratios have stabilised at above 1 recently; women are no longer gaining on

Figure 4: Ratio of Percentage of Women to Men Employed, Age 25–54, Ireland 1995 to 2019



Source: Eurostat, Labour Force Survey, series "lfs_ergan"

Figure 5: Ratio of US Women to Men Receiving Bachelor's and Doctoral Degrees, 1970 to 2015



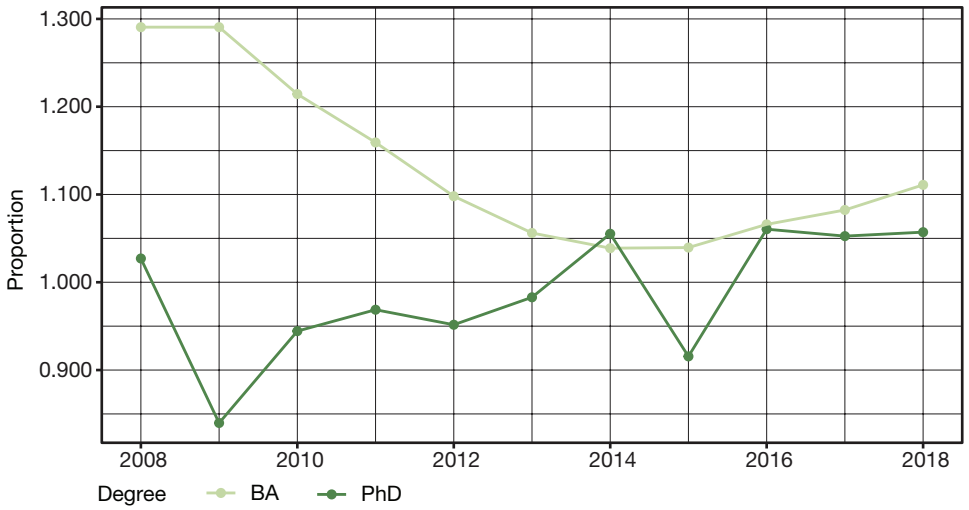
Source: England *et al.,* 2020.

men, but women having more education than men seems destined to be a permanent feature in many modern societies.

We show Irish data on the ratio of women to men getting bachelor's and doctoral degrees between 2008 and 2018 in Figure 6. Ratios hovered slightly above or below 1.0 for doctoral degrees in all these years.[7] As for bachelor's degrees in

[7] In most years since 2018, women's and men's numbers getting doctoral degrees in Ireland move closely together, as Figure A1 in the online Appendix shows. Both trended up from approximately 600 in 2010 to approximately 900 in 2014 and have come down to around 700 since.

Figure 6: Ratio of Women to Men Receiving bachelor's and Doctoral Degrees, Ireland 2008 to 2018



Source: Higher Education Authority's Annual Graduate Survey.

Ireland, the Figure shows women ahead of men in all years shown, 2008-2018; as we saw above, women earned more degrees than men in the US as well in these years. One difference between the two countries is that, in Ireland, women's lead over men declined between 2009 and 2014. The explanation for this is suggested by Figure 7, which shows the raw numbers of women and men getting bachelor's degrees for these years. There was a substantial increase in the number of men getting bachelor's degrees after the beginning of the Great Recession, and it is this increase (not a decrease in women's receipt) that explains the decline in women's lead in degree receipt between 2009 and 2014. We believe that the increase of men in third-level education, leading to bachelor's degrees, may reflect the fact that, during the recession, young men were not confident in a payoff to vocational schools, so more of them entered third-level education. Consistent with this notion, data from Eurostat[8] shows men's enrolment in vocational schools plummeted from 43,000 in 2005 to 25,000 in 2014.

3.3 Segregation of Fields of Study

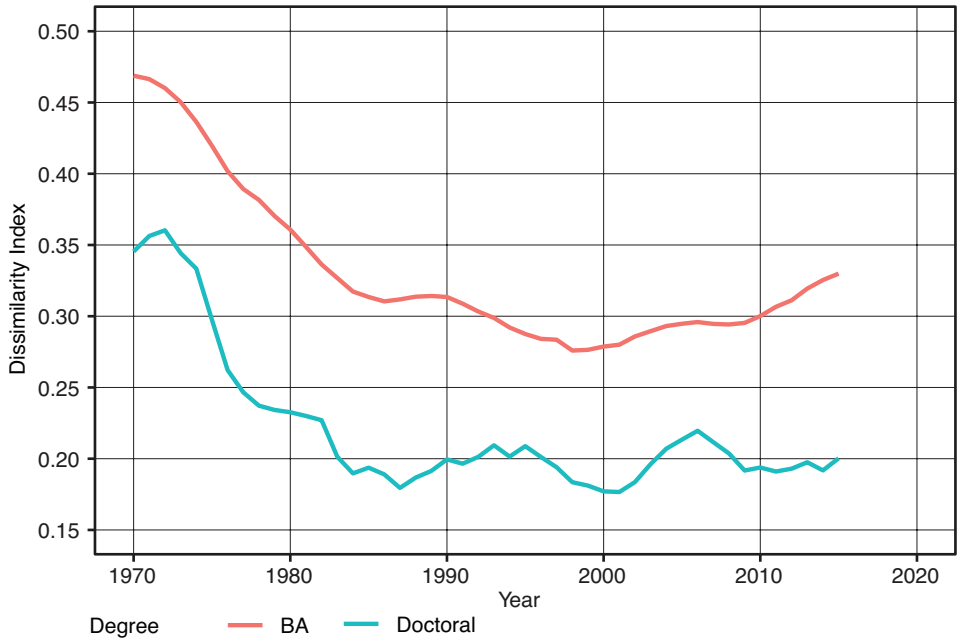
Approximately 40 per cent of the US and the Irish paid workforce have at least a bachelor's degree (results not shown, calculated by authors). Among these university-educated workers, one determinant of how segregated occupations are, and thus of the gender pay gap, is the degree to which men and women obtain degrees in different fields of study. To examine how segregation changed among those being awarded bachelor's and doctoral degrees, Figure 8 presents trends in

[8] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ_uoe_enrs07.

Figure 7: Number of Women and Men Receiving Bachelor's Degrees, Ireland 2008 to 2018

Source: Higher Education Authority's Annual Graduate Survey.

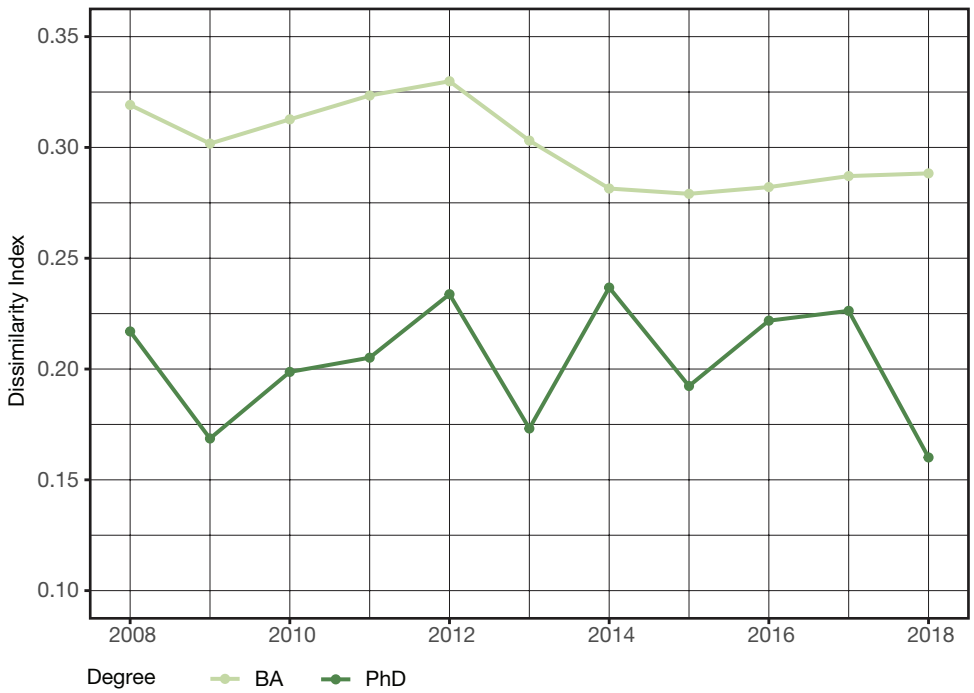
Figure 8: Segregation Index (D) for US Bachelor's and Doctoral Degree Recipients' Fields of Study, 1970 to 2015



Source: England *et al.,* 2020.

the US and Figure 9 for Ireland. Both figures show the score each year on D, the index of dissimilarity, which can take on values between 0 and 1.[9] In the US, where we have data from 1970[10] to 2015, for bachelor's degrees D dropped until about 1998, and since then has risen slightly, implying no desegregation for over 20 years. For Ireland we have data for 2008 to 2018, which show a small decline. For doctoral degrees, US data show a sharp decline in segregation in the 1970s and early 1980s, and thereafter no more decline. In Ireland doctoral field segregation has not shown any monotonic trend since 2008, the only years for which we have data. Thus, in recent years there has been little decline in segregation of fields of study in either nation at either the bachelor's or doctoral level. (We do not suggest comparing the US and Irish numbers because we used an aggregation of all fields of study into 17 categories in the US and only 9 in Ireland, and generally more categories reveal more segregation; trends, however, should be comparable.)

Figure 9: Trends in Dissimilarity Index for Bachelor's and Doctoral Recipients, Ireland 2008 to 2018



Source: Higher Education Authority's Annual Graduate Survey.

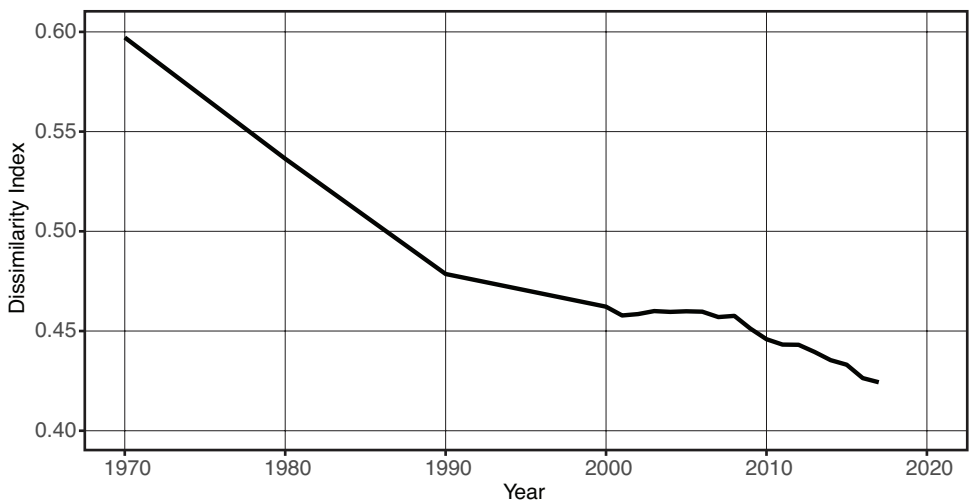
[9] On this scale, D, 0 indicates no segregation, a situation where the proportion of women in all fields combined getting a bachelor's degree in a given year is the same as the proportion in each field. A score of 1 indicates complete segregation—that every field is either all male or all female.

[10] For brevity, we refer to degrees granted in academic year 1970/1971 as 1970, and so forth.

3.4 Occupational Segregation

Many occupations are filled largely with one gender. Unfortunately for women, the occupations into which they are segregated tend to be lower paying, partly because men have historically tried to keep women out of lucrative occupations, and partly because employers have responded to the fact of a job being predominantly female by seeing it as less valuable and assigning a lower wage (Blau and Kahn, 2017; Petersen and Morgan, 1995; Levanon *et al*., 2009). Since occupational segregation is a key cause of the gender pay gap, it is important to examine trends in how segregated occupations are. To do this, we use D, the same measure used above to assess the segregation of fields of study. As Figure 10 shows, in the US, the degree of segregation of occupations has fallen steadily since 1970. However, it moved much faster in the 1970s and 1980s than it has since 1990; segregation dropped by 0.12 in the 20-year period after 1970, but by a much smaller 0.05 in the longer 26-year period after 1990.

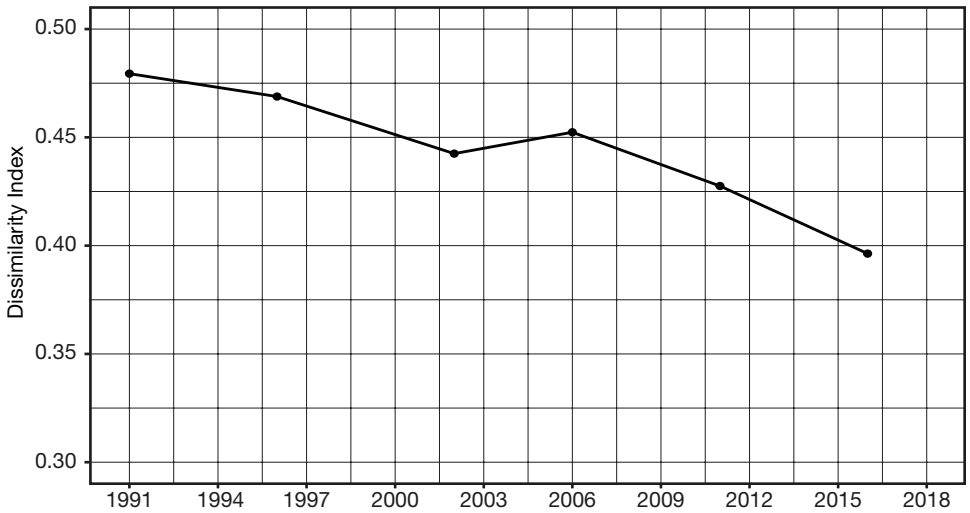
Figure 10: Segregation Index (D) for US Occupations, 1970 to 2017



Source: England *et al.,* 2020.

In Ireland, where we have data for 1991 to 2016, segregation in occupations also fell, moving from 0.48 to 0.40 (Figure 11). We warn readers not to read much into a comparison of the US and Irish *levels* of segregation, because the Irish analysis collapsed all occupations into 25 aggregated categories, whereas the US analysis collapsed to 77 categories, and more categories are likely to reveal more segregation. The trends can be compared, however, and we see that in both nations there has been a modest decline since the 1990s. In the US this is a slowdown of what had been a steeper trend. In Ireland, although we do not have more recent data, we know from previous research that Irish occupations were particularly

Figure 11: Trends in Dissimilarity Index for 25 Occupational Categories, Ireland 1991 to 2016



Source: CSO Census data for 1991-2016. Updated using data from Keane, Russell, and Smith (2017).

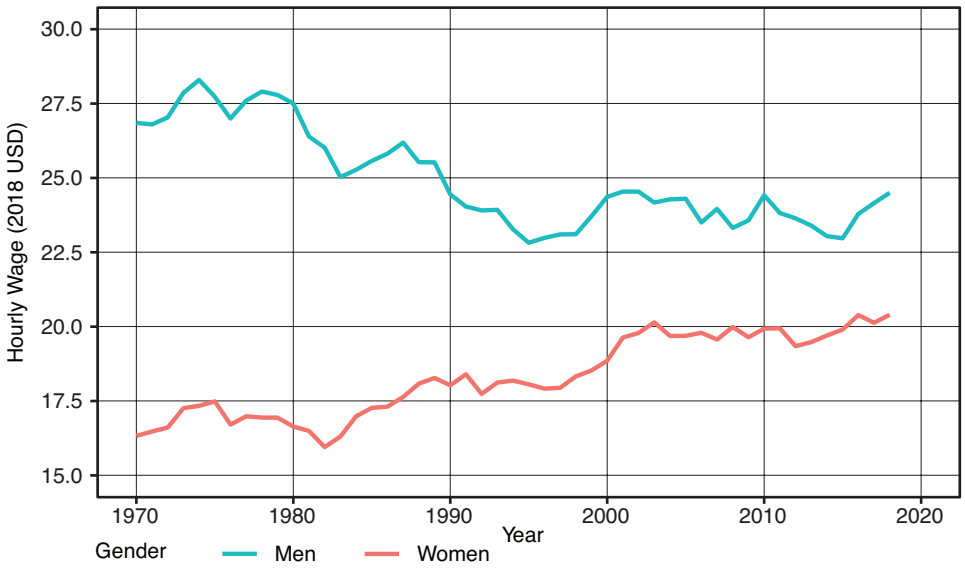
segregated in 1962, when a quarter of all women held jobs in occupations that were at least 90 per cent female, while 80 per cent of all men held jobs in occupations that were at least 90 per cent male (Russell *et al*., 2017; Walsh, 1971). Thus, our conjecture is that in Ireland, like the US, there was a steeper decline initially, and more recent declines are less dramatic.

3.5 Earnings

A key indicator of gender inequality is the pay gap. We focus here on hourly earnings of full-time workers, expressed in CPI-adjusted 2018 dollars (US) or euros (Ireland). For the US, we show trends for men's and women's median hourly earnings for 1970 to 2018 in Figure 12 and the ratio of women's to men's median wages in Figure 13. The big picture is that men's median wages declined much of the period before the late 1990s while women's rose; since 2000 both have changed little except for a drop then rebound associated with the Great Recession beginning in 2009. To examine gender inequality in pay for the US, Figure 13 shows the trend in the ratio of women's to men's median hourly earning among full-time workers, which was fairly stable at slightly above 0.60 in the 1970s, then rose dramatically to 0.74 by 1990. It has continued to rise each decade since 1990 but at a much slower rate than was observed in the 1980s.

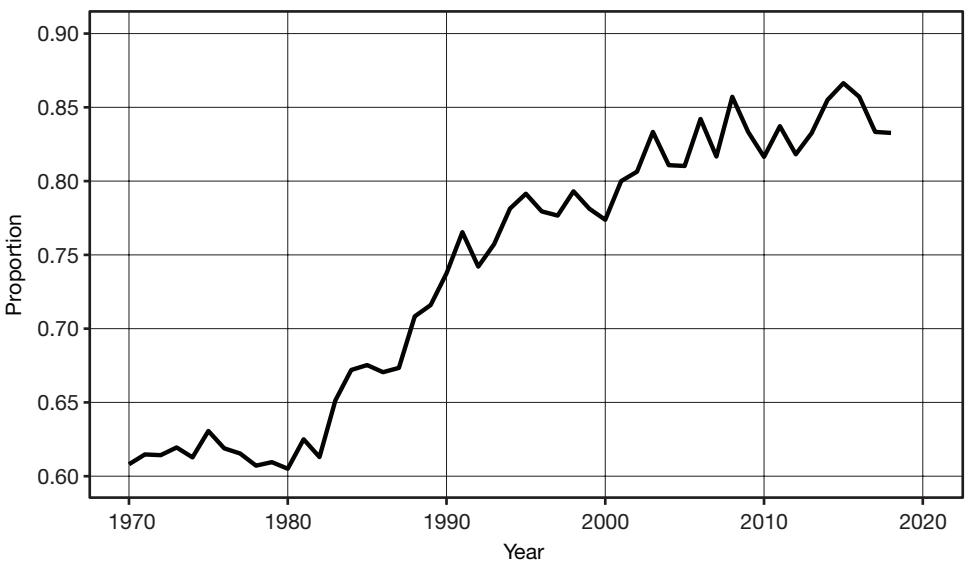
In Ireland we have data on earnings from two sources that differ somewhat in coverage; the series for 2003-2008 omits some public sector jobs that are covered by the series from 2011-2018. As Figure 14 shows, Irish men's and women's pay

Figure 12: Median Hourly Wage for US Full-Time Working Women and Men, Age 25–54, Employed the the Last Week, 1970 to 2018



Source: England *et al.,* 2020.

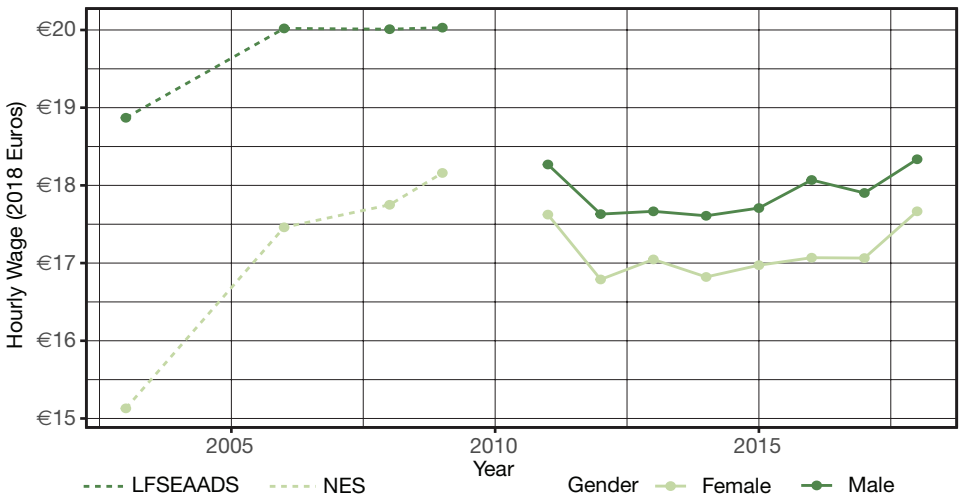
Figure 13: Ratio of US Women's to Men's Median Hourly Wage Among Full-Time Workers Employed in the Last Week, Age 25–54, 1970 to 2018



Source: England *et al.,* 2020.

rose between 2003 and 2008. Using a different data series shows that, starting in 2011, wage levels fell for both men and women, possibly reflecting the tail end of the Great Recession. Focusing on the trend in the ratio of Irish women's to men's earnings, Figure 15 shows that women's relative pay increased between 2003 and 2008 but changed little from 2011 to 2018.

Figure 14: Median Hourly Wage of Working Women and Men, Aged 25–54, Ireland 2003 to 2018

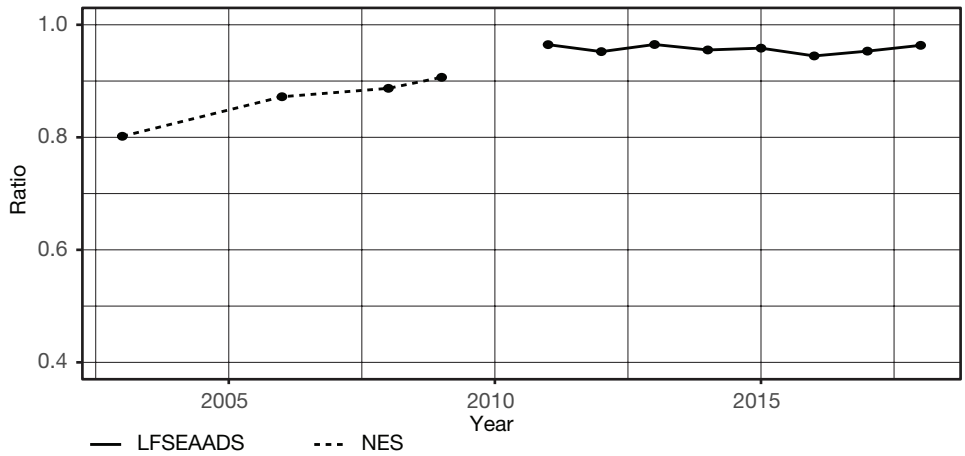


Source: Data for 2003-2008 is from the CSO's National Employment Survey (omits some public sector jobs). Data for 2011-2018 is from a combined version of the Labour Force Survey and the CSO's EAADS.

To summarise regarding the pay gap, the US shows a long-term convergence of women's and men's pay since 1980, which has slowed although not entirely stalled in recent years. In Ireland, with that caveat that we are using two different data series, and we are only looking at more recent figures, we show a convergence in the early 2000s, but a complete stall after 2011.

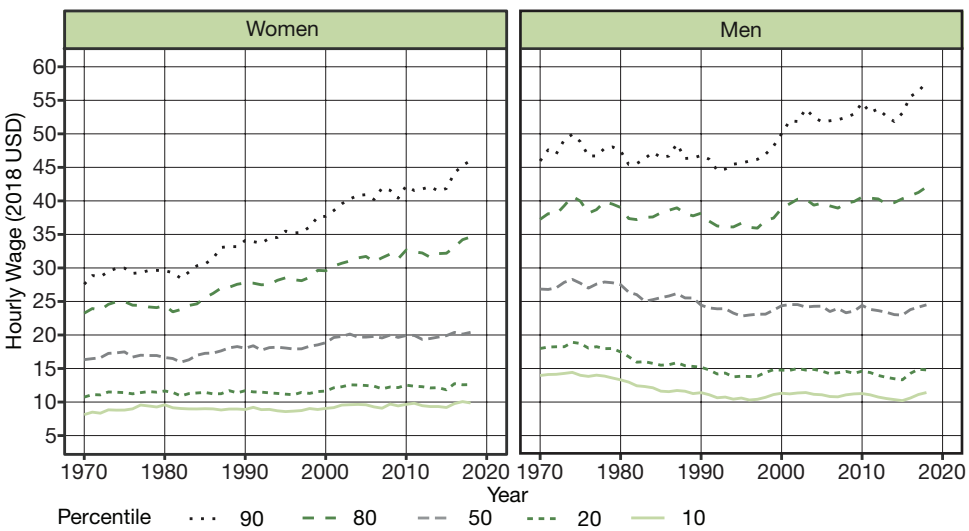
We next examine earnings trends and gender inequality at various percentiles of each gender's distribution. Figure 16 shows that, for US men, where as mentioned above median earnings fell, the fall was even steeper at the bottom (10th and 20th percentiles). US men's earnings were roughly flat at the 80th percentile but rose quite a bit after 1990 at the 90th percentile. The rise at the top and decline at the bottom means that inequality within men went up, as shown by other researchers (Autor *et al*., 2008; Western and Rosenfeld, 2011). Figure 16 also shows that, unlike men, women did not show wage declines at any percentile. But, consistent with prior research (Morris and Western, 1999; Autor *et al*., 2008), women, like men, exhibited increasing inequality as wages were flat at the bottom, increasing at the median, and increasing steeply at the top.

Figure 15: Ratio of Women's to Men's Hourly Wage, Aged 25–54, Ireland 2003 to 2018



Source: Data for 2003-2008 is from the CSO's National Employment Survey (omits some public sector jobs). Data for 2011-2018 is from a combined version of the Labour Force Survey and the CSO's EAADS.

Figure 16: Hourly Wage of US Full-Time Working Men and Women, Age 25–54, Employed in the Last Week, at 10th, 20th, 50th, 80th and 90th Percentile of their Distributions, 1970 to 2018

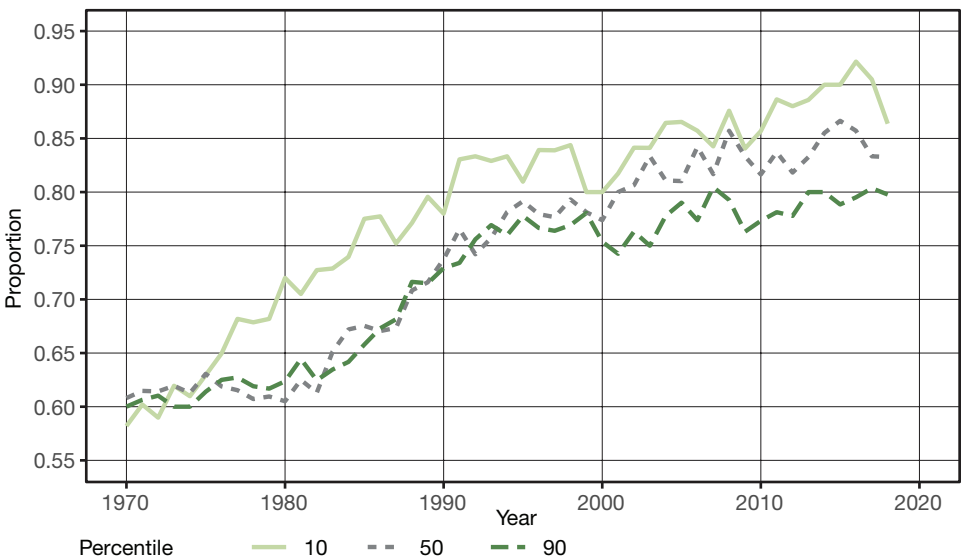


Source: England *et al*., 2020.

Next we consider how gender inequality in earnings differs between the bottom, middle, and top of the earnings distributions by comparing men and women at the same percentile of their respective distributions. Figure 17 reveals that, in 1970,

US women earned approximately 60 per cent of what men did regardless of the percentile of the distribution examined, but since the middle 1970s, the bottom percentiles have showed the most gender equality (indicated by a higher ratio of women's pay to men's pay). Figure 17 also reveals that the increase in the ratio of women's to men's pay has been steepest for the lowest earning and least steep for the highest earning workers. This is not because men at the top gained more in pay than women at the top; computations from Figure 16 actually show that women's wages at their 90th percentile have increased more than the increase in men's wages at their 90th percentile. However, the extent to which women's wage increase exceeded men's was even greater at each gender's respective 10th percentile than at the 90th percentile, and this accounts for the increasing distance between the ratios for the 90th and 10th percentiles. In sum, the US female-to-male wage ratio, our measure of gender inequality, rose more and was generally higher for those at the bottom than the top, with an intermediate situation for those in the middle.

Figure 17: Ratio of US Women's to Men's Hourly Wage at the 10th, 20th, 80th and 90th Percentile of their Distributions, For Full-Time Workers Employed in the Last Week Age 25–54, 1970 to 2018

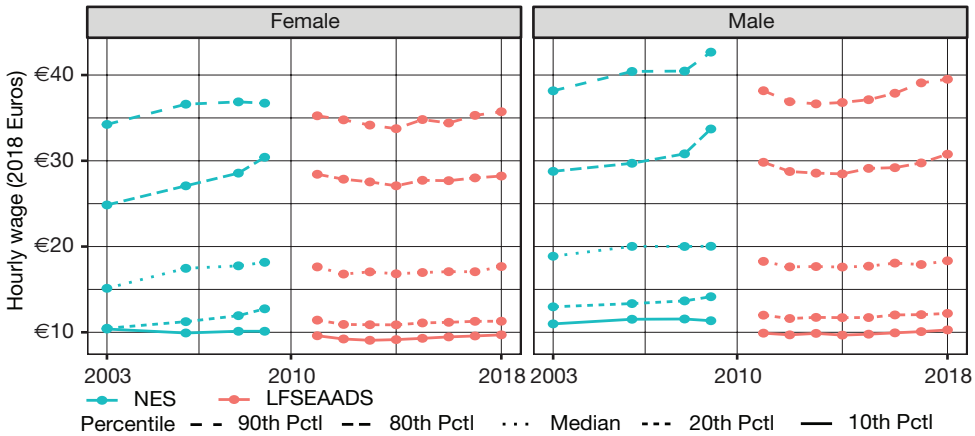


Source: England *et al*., 2020.

Figures 18 and 19 show analogous trends for Ireland at various percentiles of each gender's respective earnings distribution for 2003-2008 and 2011-2018. Ireland, like the US, shows signs of increased inequality within each gender's distribution, as wages stayed flat at the bottom and rose at the top (Figure 18). For Ireland, there is no clear conclusion regarding the percentile at which the ratio of women's to men's wages is largest. If focusing only on data after 2011, the ratio of women's to

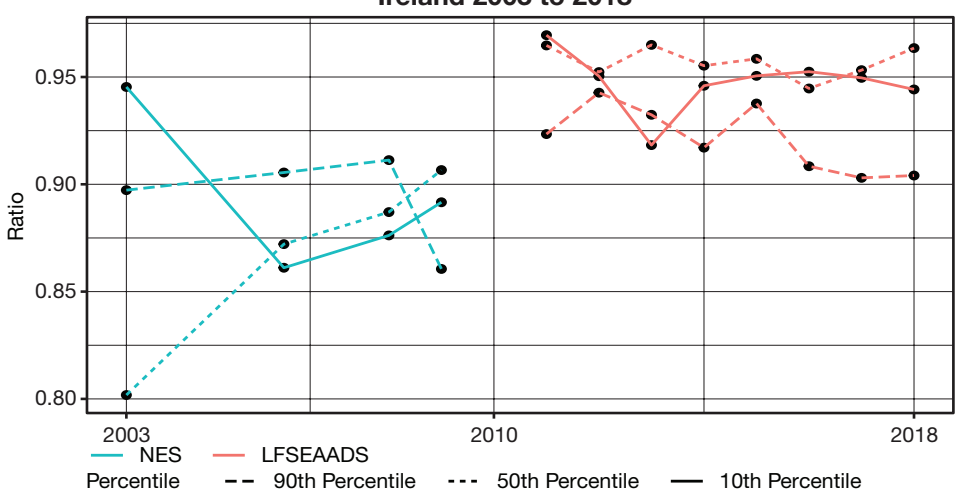
men's wage goes mainly downward. Figure 19 suggests this trend stems from the sharp rise in the earnings of highly paid men, at a time when the earnings of highly paid women remained flat.

Figure 18: Hourly Wage of Employed Women and Men, Age 25–54, At the 10th, 20th, 50th, 80th and 90th Percentile of their Distribution, Ireland 2003 to 2018



Source: Data for 2003-2008 is from the CSO's National Employment Survey (omits some public sector jobs). Data for 2011-2018 is from a combined version of the Labour Force Survey and the CSO's EAADS.

Figure 19: Ratio of Women's Hourly Wage to Men's, Age 25–54, At the 10th, 50th and 90th Percentile of their Distribution, Ireland 2003 to 2018



Source: Data for 2003-2008 is from the CSO's National Employment Survey (omits some public sector jobs). Data for 2011-2018 is from a combined version of the Labour Force Survey and the CSO's EAADS.

IV DISCUSSION

Our analysis has shown substantial reductions in gender inequality in the US and Ireland. Yet, on a number of indicators, women's progress relative to men has slowed, and in some cases has stalled entirely. Here we review our findings and use past research on causes of gender inequality to speculate about what would need to change to hasten the reduction of inequality.

In the US in 2018, 73 per cent of women were employed. While women's employment increased dramatically from 1970 to 1990, since then it has always hovered between 70 per cent and 75 per cent. The ratio of US women's to men's employment rose dramatically from 53 per cent as many women as men employed in 1970, to 85 per cent as many in 1995. Since then the ratio stalled. The long-term increase in the ratio reflects women's increasing and men's declining employment, and the stall in the ratio mainly reflects a stall in the growth of women's employment. As for Ireland, we considered data from 1995 to 2019, and showed that women's employment has continued to rise steadily except for a downturn in 2008 associated with the Great Recession. But because men's employment has risen just as much as women's since the recovery from the Great Recession started about 2010, the ratio of women's to men's employment has been stalled at 85 per cent of men's since 2010. Thus, in both nations, the gender gap in employment is no longer closing.

Women's attainment of bachelor's and doctoral degrees has increased absolutely and relative to men's, and now exceeds men's in both the US and Ireland.

While women have surpassed men in amount of education attained, there has been nothing like convergence in the fields of study in which men and women get degrees. In the US bachelor's degrees showed declining segregation from 1970 to almost 2000, and segregation has risen slightly since. For US doctoral degrees, segregation fell from 1970 to 1987 and has hovered slightly higher since. In neither case has there been any net reduction in segregation for over 20 years. For Ireland, we have data from 2008 to 2018, a period during which segregation of fields of study was stable in the US. Ireland saw largely stable or rising segregation of bachelor's fields until 2012 then some decline until 2014 and a stall between 2014 and 2018. Doctoral degrees in Ireland show no clear trend from 2008. Thus, in both nations gender convergence in fields of study has stalled.

Segregated fields of study are one of the explanations for segregated occupations. The segregation of occupations has fallen steadily since 1970 in the US; however desegregation occurred much faster in the 1970s and 1980s than it has since 1990. Thus there has been a slow-down, but not a complete stall of occupational desegregation. In Ireland, for which we have data for 1991 to 2016, there is a steady decline, with no sign of slowing.

All of the trends we have considered affect the gender gap in pay; individuals' pay is affected by their amount of education, field of study, years of employment

experience (reflecting continuity of employment), and occupation. The gap is also affected by various forms of gender discrimination by employers – in hiring, pay differences within jobs, and the relative pay levels set in predominantly female versus predominantly male jobs. Reflecting changes in all these factors, our main measure of gender earnings inequality, the ratio of women's to men's median hourly earnings among full-time workers, went up strongly from 0.61 in 1980 to 0.83 in the US, with much faster progress in the 1980s than in decades since 1990. The slowdown of progress toward equality in earnings was seen toward the bottom and top of the earnings distribution, although the slowdown in women's relative progress was less pronounced at lower percentiles of the earnings distribution (more because of declines in men's rather than increases in women's earnings).

For Ireland, the trend in the ratio of Irish women's to men's earnings shows that women's relative pay increased between 2003 and 2008 but changed little from 2011 to 2018. Thus, the US shows a long-term convergence of women's and men's pay, which has slowed but not entirely stalled in recent years; in Ireland, with that caveat that we are using two different data series, and we are only looking at more recent figures, we show a convergence in the early 2000s, but a complete stall after 2011.

In a number of cases, we have shown a slowing of progress toward equality, or, on some indicators, a complete stall of progress in women's relative status. Discovering why progress has slowed or stalled is beyond the scope of our analysis. However, we offer a few speculations, based on past research on causes of gender equality, regarding what would need to change for further reductions in gender inequality. Further change will require transformations of both cultural attitudes and institutional practices.

Change in the gender system has been deeply asymmetric; women's entrance to careers came more readily than changes in men's roles at home (England, 2010). This can be seen in our analysis that shows a much larger increase in women's employment than decrease in men's employment, implying that there was nothing close to an increase of one stay-at-home husband for every one increased woman employed. The asymmetry is also seen in other research showing a much larger increase in women's paid work hours than increase in men's housework, childcare, and shopping (Bianchi *et al*., 2006: Tables 5A.1 and 5A.2, data on married mothers and fathers).

This asymmetry in behavioural change by women and men is reflected in cultural attitudes as well. There is still a strong norm eschewing anything but full-time paid work for husbands (Killewald and García-Manglano, 2016); this creates pressure on women to do more family work than men, and adjust their careers accordingly. Given that most women form families with men, it may be difficult to close the remaining gender gap in pay without either increases in men's domestic work or public provision of childcare, or both. Public provision of childcare could have an especially strongly impact on the employment of working-class women,

as their jobs often pay little more than the costs of childcare for their children. Institutional change in employer policies that eased both men's and women's ability to combine family with work would also help close the gender gap in pay, provided that such policies are not used only by women, perpetuating the expectation that women will carry most of the responsibility of care. Although an increasing proportion of marriages feature a woman earning more than her husband, there is substantial evidence that many couples try to avoid this (Bertrand *et al*., 2015); gender inequality within couples would be eased by cultural change that led people to accept change in men's as well as women's roles, and to accept marriages in which women earn more than their husbands as unremarkable.

Cultural change may also be required to tackle the strong level of sex segregation in fields of study and in occupations. For many decades, girls' high school Mathematics coursework and scores have been as good as boys' so they are unlikely to explain gender differences in bachelor's majors (Xie and Shauman, 2003). Nor does women's anticipation of more family work explain gender differences in choice of major (DiPrete and Buchman, 2013, Chapter 8). But this does not mean the explanation lies entirely with policies of universities; indeed, most universities allow any student to declare a major in any field. Gender differences in fields of study may arise from lingering essentialist beliefs about differences in men and women's skills and abilities (Charles and Bradley, 2009; Smyth and Darmody, 2009). These beliefs create external social pressures on men and women to choose gender-typical fields of studies and careers which may also be internalised as norms. Whether the force is external or internal, the result is a different (although overlapping) distribution of choices by men and women. Gender differences in job choices may also reflect differences in preferences (finding gender-typical activities more interesting and meaningful) that originate in gendered socialisation. Such beliefs and preferences also incline men and women who don't complete college degrees in favour of gender-typical jobs. Changes in these beliefs or preferences would enhance equality from the supply side of labour markets. But culture does not only affect the supply side of labor markets. Such beliefs about what men and women should do, or are better at, or prefer, when held by employers and managers, lead to discriminatory hiring, placement and promotion. Thus, changing these beliefs would lessen discrimination by gender as well as reduce supply-side forces promoting segregation.

Institutional change is necessary as well. Policy changes that reduce gender bias by employers would also help further reduce occupational segregation and the gender gap in pay. In the 1960s and sometimes beyond, some organisations had explicit policies of not hiring women in certain jobs, and sex preferences were stated in advertisements. Such overt policies are largely gone. However, more subtle hiring discrimination probably persists, although it is hard to measure. Also, policies that reduced employer discrimination against mothers would help shrink the gender pay gap; research has documented hiring discrimination against mothers relative to

other women (but not fathers relative to other men) (Correll *et al*., 2007). Gender biases may affect pay differences within jobs as well despite how simple "equal pay for equal work" sounds (Castilla, 2008).

A substantial part of the gender gap in pay is between occupations (Petersen and Morgan, 1995; Blau and Kahn 2017; Weeden *et al*., 2018). This portion could be reduced by supply- or demand-side changes that reduced segregation. This between-occupation portion of the pay gap could also be reduced by policies that successfully remove gender bias from decisions about the relative pay levels of predominantly male and predominantly female jobs. There is strong suggestive evidence that employers take the sex composition of jobs into account when setting their pay levels; studies find lower relative pay in predominantly female occupations than can be explained by their skill requirements or working conditions (Kilbourne *et al*., 1994; Levanon *et al*., 2009). This issue, called "comparable worth" or "pay equity" in the 1990s, never led to legislation, so it is a type of discrimination that is generally not illegal in the US, although it is in Ireland, owing to European Union legislation. While Ireland passed the Anti-Discrimination (Pay) Act in 1974 and the Employment Equality Act in 1977, which aim to ensure equal pay for men and women for work of equal value, Cassidy *et al*. (2002) argue that the acts had only a minor impact on the pay gap between men and women. Focusing on the manufacturing sector, they claim that legislation alone is responsible for about 4 per cent worth of the change in female to male earnings, although this gap narrowed for other reasons since the acts were passed.

In sum, without deliberate efforts to promote both cultural and institutional change along the lines we have discussed, progress toward gender equality may remain slow or stalled.

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APPENDIX I

Note 7 in the paper refers to data on the number of men and women getting doctoral degrees in Ireland from 2008 from 2018, shown in Figure A1.

Figure A1: Number of Women and Men Receiving Doctoral Degrees, Ireland 2008 to 2018