

Doorley, Karina; Privalko, Ivan; Russell, Helen; Tuda, Dora

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## The Gender Pay Gap in Ireland from Austerity through Recovery

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DISCUSSION PAPER SERIES

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# The Gender Pay Gap in Ireland from Austerity through Recovery

**Karina Doorley**

*Economic and Social Research Institute,  
Trinity College Dublin and IZA*

**Ivan Privalko**

*Economic and Social Research Institute  
and Trinity College Dublin*

**Helen Russell**

*Economic and Social Research Institute  
and Trinity College Dublin*

**Dora Tuda**

*Economic and Social Research Institute  
and Trinity College Dublin*

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## ABSTRACT

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# The Gender Pay Gap in Ireland from Austerity through Recovery

This paper estimates the raw and adjusted gender pay gap in Ireland between 2011 and 2018, a period of austerity measures and recovery from the Great Recession. Using survey data sources linked to administrative information on earnings, we show that the raw gender wage gap across the wage distribution has not changed much over this period: it is larger for higher earners and is mainly concentrated in the private sector. Using a Distribution Regression method, we estimate the relative contributions of explained and unexplained components to the overall gender wage gap at each point at the wage distribution and summarise the findings by wage quantile. The explained gender wage gap is negative, indicating that women have better labour market characteristics than men, on average. The unexplained gender wage gap is positive and increases with the wage level. This results in a small or zero gender wage gap at the bottom of the wage distribution which rises to 10% at the top of the wage distribution. The stability of the gender pay gap across the wage distribution in the private sector over the period suggest the strong structural inequalities, that are unlikely to change without significant interventions

**JEL Classification:** J31, J71, D31

**Keywords:** gender pay gap, occupational segregation, discrimination, Ireland

**Corresponding author:**

Karina Doorley  
The Economic and Social Research Institute  
Whitaker Square  
Sir John Rogerson's Quay  
Dublin 2  
Ireland

E-mail: karina.doorley@esri.ie

## 1. Introduction

Recently, there has been renewed attention to the gender pay gap (GPG) as high profile cases and new organisational level information in a number of countries have highlighted the pervasiveness and the apparent intransigence of this gap (Boll et al 2016). Recent advances in the literature have confirmed some major contributors to the gender gap gap, including career interruptions (Albrecht, et al. 2018, Kleven, Landais and Sogaard 2018); working hours flexibility (Goldin 2014) and occupational segregation and role models (Olivetti and Petrongolo 2008, Busch 2020). In 2014, the European Commission recommended the introduction of pay transparency measures to tackle the GPG, and has just issued a formal proposal for a binding Directive on such measures.<sup>1</sup> In Ireland, the *Gender Pay Gap Information Bill* requiring firms with over 50 employees to reveal the GPG has been re-introduced in the parliament (*Oireachtas*). The issue of tackling the GPG was also considered by the Citizens Assembly<sup>2</sup> in Ireland in 2021 and a recommendation to reduce the hourly GPG to 9% by 2025, to 4% by 2030 and to zero by 2035 was made to the *Oireachtas*.

In Ireland, as in almost all developed economies, there is a significant pay gap between women and men. The official figures on the hourly GPG in Ireland suggest that the (mean) current gap is 11.3% (Eurostat). However, this headline figure does not illuminate the mechanisms that lead to the gap. The size of the pay gap at the mean or the median provides a very partial account of the differing returns that women and men face at different parts of the wage distribution and in different sectors of the economy. Whether the gap is wider at the top or the bottom of the wage distribution leads to different conclusions about the underlying processes and to alternative policy lessons. Analysing the sources of the gap across the wage distribution may help explain why the GPG persists, despite higher educational qualifications among women and increasing female labour market attachment.

In the immediate aftermath of the Great Recession there was a good deal of discussion internationally about its potential impact on gender wage inequalities (Bettio & Vershanga, 2014; Karamessini and Rubery 2014; Rubery and Rafferty, 2013). However, there has been relatively little empirical research on how the gender wage gap has subsequently evolved. An analysis of the GPG in UK over the period 1995 to 2015 by Jones et al (2018) found that the long-term narrowing of the GPG, arising mainly from an improvement in women's human capital, stalled in both the public and private sector in 2010. England et al. (2020a) also demonstrate that progress in narrowing the gender pay stalled in the US (see also England et al., 2020b) and Ireland in the last decade, with the unadjusted gap in Ireland being highest among top earners.

In this research, we use two different data sources to map the gender wage gap across the wage distribution in Ireland between 2011 and 2018. The Irish Labour Force Survey (LFS), which is linked to administrative data on earnings, is used in the first stage to show a comprehensive picture of the evolution of the Irish gender wage gap in the post-recession

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<sup>1</sup> European Commission 2021.

<sup>2</sup> The Citizens' Assembly on Gender Equality was established in 2019 to consider gender equality and make recommendations to the Oireachtas. 99 Citizens' were randomly selected by an independent polling company. They are broadly representative of the Citizens' of Ireland.

period. The Irish component of the Survey of Income and Living Conditions (SILC), which boasts a smaller sample size but a greater variety of explanatory variables, is then used to decompose the gender wage gap into the relevant contributions of explained and unexplained factors over the same time period. We use distribution regression (DR) in this analysis. DR has a number of advantages over the more commonly used Quantile Regression (QR) technique used in the literature. It is more flexible, allowing for a straightforward graphical check of wage bunching which may not be detected in traditional quantile analyses. It produces unconditional quantile estimates and allows for the decomposition of the unconditional quantile into a price and composition component. There is also evidence that distributional regression generally provides a better fit to wage distributions than quantile regression (Rothe and Wied, 2013; Van Kerm et al., 2016).

We contribute to the rich gender pay gap literature internationally by estimating the Irish GPG for post-recession years, using administrative income data, linked to survey data and a Distribution Regression method. We show that the raw gender wage gap across the wage distribution is mainly concentrated in the private sector, although we also provide evidence that a GPG also exists for high earners in the public sector. We estimate that the explained gender wage gap is negative, indicating that women, on average, have better labour market characteristics than men. The unexplained gender wage gap is positive and increases with the wage level. This results in a small or zero gender wage gap at the bottom of the wage distribution which rises to 10% at the top of the wage distribution. We find little evidence that the magnitude of the GPG or its components have shifted over the last decade and we conclude with policy recommendations.

## **2. The evolution of the Irish gender pay gap**

The last decade was one of considerable turmoil in the labour market, yet our understanding of how this influenced relative earnings between men and women is rather incomplete. There is good reason to expect that the recession and the subsequent austerity measures will have impacted on the GPG, as it brought about significant changes in the sectoral distribution of employment, earnings and other working conditions (Russell et al 2014). During this period, transitions into employment and earnings became more strongly related to education (Kelly & McGuinness, 2014; Bergin et al 2012), which might be expected to translate female educational advantages into narrowing pay gaps.

A possible countervailing influence came from cuts to public sector pay. In 2009, the introduction of a public sector pension levy resulted in cuts to net pay of up to 8 per cent.<sup>3</sup> A reduction in salary scales for new entrants of 10 per cent was also implemented in 2010. The imposition of these pay cuts led to a collapse of the partnership structures that had governed industrial relations since the late 1980s. In 2013 the *Haddington Road Agreement*, led to a further set of emergency adjustments in the public sector including a freeze on pay

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<sup>3</sup> The levy is deducted at source and is not linked to higher future pension payments. It therefore amounted to an effective pay cut.

increments, an additional salary reduction for those earning more than €65,000, changes to overtime and an increase in hours.

The changes to public sector pay are pertinent to the GPG because women are disproportionately employed in this sector and, at least prior to the austerity measures, it has traditionally been a source of well-paid jobs for women. The CSO estimated that the adjusted wage premium for public sector workers declined from 9.6 per cent in 2011 to 0.1 per cent by 2018.<sup>4</sup> Deducting the public sector pension levy from the earnings of public sector workers, the premium fell from 3.3% to a deficit of -3.4% over the same period. The public sector wage premium was higher for women than men in all years and was found to extend much higher up the wage distribution for women (CSO, 2019).

The GPG has been significantly lower in the public sector than the private sector in Ireland (Russell et al., 2005, O'Connell et al, 2015) though with some exceptions<sup>5</sup> and elsewhere in Europe (Anghel et al. 2011; Arulampalam et al 2007; Chatterji, et al 2011; Jones et al 2018). Women's concentration in public sector employment has therefore tended to reduce the size of the GPG (Jones et al. 2018).

In the private sector, the recession led to substantial job losses, particularly in the construction sector, but also in retail and manufacturing. Male employment dropped significantly leading to a narrowing employment gap between men and women. In the early recovery, increases in female employment lagged those of men, but parallel trends can be observed since 2015 (England et al. 2020).

The future direction of these trends is now ambiguous given the Covid-19 pandemic. The effects of the Covid-19 pandemic on employment are not expected to be gender neutral. There is emerging evidence that, unlike the “mancession” experienced during the last downturn, this time women have been more likely to lose their jobs and more likely to lose them permanently (Adams-Prassl et al, 2020; Andrew, et al., 2020; Oreffice & Quintana-Domeque, 2020; Dang & Nguyen, 2021). Although job loss rates have been reasonably similar for men and women in Ireland to date, there is emerging evidence that women's attachment to the labour market has decreased and that they have been disproportionately likely to move to inactivity or to care for a relative. Women were more likely than men to be absent from employment for Covid reasons in Q2 2020 and the participation rate of married women has decreased by more than that of married men between Q1 2020 and Q1 2021 (CSO).

Earlier analyses of the GPG in Ireland based on the Structure of Earnings Survey, (Bergin, et al, 2012; Turner et al 2016; McGuinness et al 2009) suggests that the adjusted or unexplained gap has fluctuated over time. McGuinness et al. (2009) estimated an adjusted GPG of 8 per cent in 2003. Bergin et al. (2012) found a wage premium of 15.6% for men in the private

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<sup>4</sup> These are results from OLS models in which firm size is not included (see CSO 2019, table 4.1) and refer to permanent full-time employees aged 25-59 years.

<sup>5</sup> Using decomposition analysis and the 2003 National Employment Survey, McGuinness et al. (2009) found that the adjusted GPG was lower than average in education and public administration but higher than average in health.

sector in 2006 and of 14.3% in 2009 controlling for a wide range of relevant factors including education, tenure, nationality, age, contract status, firm size, union membership, part-time status and sector.

Cross national research presents a mixed picture on Ireland's relative position in terms of the size of the pay gap. EU figures on the raw gap put Ireland below the EU average in recent years. However, Redmond and McGuinness (2017) find that both the raw and the adjusted pay gap in Ireland were above the average in the EU-28 countries, though in this case the sample is confined to full-time employees.<sup>6</sup> Boll et al (2016) show that the unadjusted pay gap in Ireland was narrower than the European average but the adjusted pay gap was higher than average, based on the analysis of EU SILC data.<sup>7</sup> The authors find that, in Ireland, the adjusted gender pay was higher than the raw gap, due to more favourable observed labour market characteristics of women, a finding reproduced by Christofides et al. (2013).

In the period 1995-2001, Arulampalam et al (2007) found that the raw GPG in Ireland was the widest at the bottom of the wage distribution and the narrowest at top. However, the patterns diverged for the public and private sector. Consistent with other research, the mean and the median GPG was narrower in the public sector, while the raw gender gap was widest for lower earnings in the public sector. In the private sector it was greatest for higher earners (90<sup>th</sup> percentile). Using quantile regressions the authors estimate the adjusted wage gap, and find that Ireland is one of two countries where there is no "glass ceiling" over the whole economy but such an effect appears in both sectors when the sample is split by public and private.

Christofides et al (2013) also apply quantile regression techniques to test whether the gender wage gap differs across the wage distribution in 24 countries. Using data from EU-SILC 2007 they find that Ireland is one of five countries where the size of the unexplained GPG is U shaped, i.e. widest at the top and bottom of the wage distribution.<sup>8</sup>

The availability of a new time series of data from 2011 to 2018 allows us to assess whether the major shock of the recession, and subsequent recovery has led to a change in the scale, distribution and determinants of the GPG in Ireland.

### **3. Methods & Data**

#### **3.1 Data**

We use two data sources in this research. The first is a survey dataset, linked to administrative information on earnings: Ireland's Labour Force Survey which has been linked

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<sup>6</sup> The study is based on the European Skills and Jobs Survey. N circa 1800 for Ireland. The earnings information is not as detailed as in SILC. In 30% of cases, across the 28 country sample, earnings were from wage bands only. The authors find a raw hourly wage gap in Ireland of 18% and the unexplained gap when the factors such as education, job tenure, and public/private sector and job preferences were taken into account was 11%

<sup>7</sup> The study uses EU SILC 2014. Ireland was not part of the main analysis but a decomposition model for Ireland is included in the appendix.

<sup>8</sup> The analysis is limited to employees aged 25-54 years who were in full-time, full-year employment. The exclusion of part-time workers from the analysis may distort the picture at the bottom end of the wage distribution



to administrative earnings data by the Irish Central Statistics Office (CSO).<sup>9</sup> This dataset, LFSEAADS, is available for the years 2011 to 2018 and is primarily used to explore the size of the unadjusted GPG across the income distribution. With a large sample size and administrative earnings information, this dataset provides a large and reliable source of hourly wage information for Ireland over time, which has been lacking for a number of years.<sup>10</sup>

Some key variables which typically explain some of the gender gap in pay are missing from this dataset, such as work experience and family composition. Therefore, in order to separately identify the explained and unexplained component of the gender wage gap, we use a complementary data source, the Survey of Income and Living Conditions. This survey provides richer detail on observables which may explain the difference in wages between men and women but boasts a smaller sample size to the LFSEAADS. SILC is linked to data from the Revenue Commissioners so that earnings information comes primarily from administrative sources linked to the individual's tax number (PPS). Currently, 96 percent of employee income information comes from administrative data. The CSO revert to data collected from the questionnaire for cases that cannot be matched to administrative data.

We use the SILC dataset to estimate the unadjusted GPG across the income distribution and compare results to those obtained using the LFSEAADS dataset. We then use SILC to decompose the total gender wage gap into the relative contributions of explained and unexplained components at each point of the wage distribution. Although the LFSEAADS is missing some key explanatory variables, we perform this decomposition using LFSEAADS too and compare results from the two datasets.

Hourly earnings, the key outcome variable in this analysis is measured as follows: in SILC, we use gross monthly earnings from which we create weekly earnings. Weekly earnings are then divided by usual hours worked to create the variable of interest – hourly earnings. Usual hours worked are the only variable on hours available in SILC. On the other hand, LFS collects information on both usual and actual hours worked. Hourly earnings are constructed for all employees with non-negative gross income and usual hours worked.

Before turning to estimation methods, we briefly outline the distribution of hourly earnings in the LFSEAADS dataset.<sup>11</sup> Focusing on 2018, median earnings for men (€17) were higher than median earnings for women (€16), as expected. There was little change in price-adjusted

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<sup>9</sup> Further details about the project titled Earnings Analysis from Administrative Data can be found at <https://www.cso.ie/en/releasesandpublications/ep/p-eaads/earningsanalysisusingadministrativedatasources2018>.

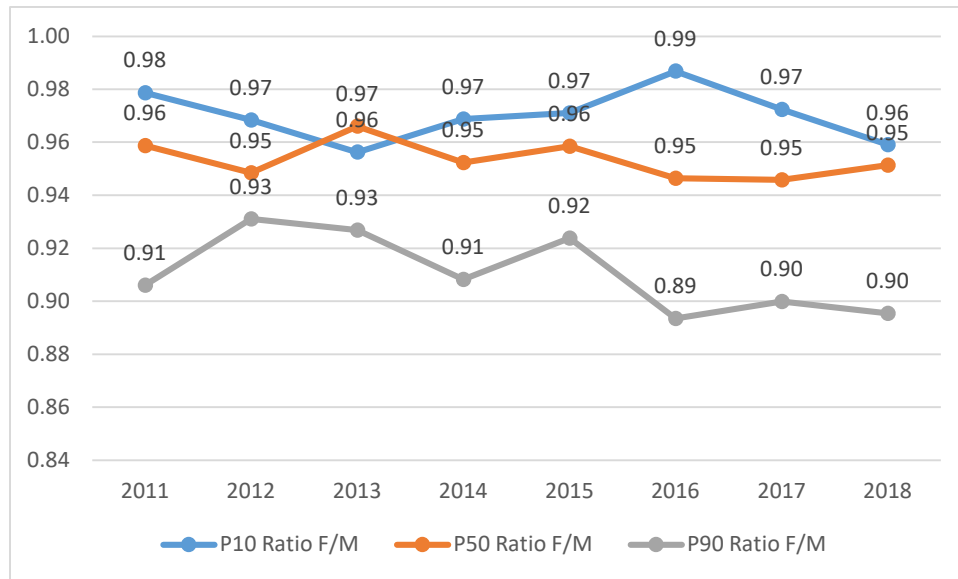
<sup>10</sup> The Structure of Earnings Survey which is used to examine wages EU countries was discontinued in Ireland in 2009 as part of austerity measures. It was reinstated in 2019, but the data is not yet available for analysis.

<sup>11</sup> Throughout, we apply grossing factor weights provided by the CSO and adjust for inflation using the CSO's Consumer Price Index, using 2018 prices. 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.

hourly earnings for both men and women 2011-2018. Even among top earners ,wages remained reasonably constant.

Figure 1 shows the ratio of women’s hourly pay to men’s at the 10th 50th, and 90th percentile. Gender inequality is growing at the top of the income distribution, but not at the middle or bottom of the distribution, which have remained steady for the years studied. At the 50th percentile, women earned roughly 5% less than men per hour in 2018. This gap was around 10% for women in the 90th percentile.

**FIGURE 1: RATIO OF WOMEN’S HOURLY EARNINGS TO MEN’S FOR THE 10TH, 50TH AND 90TH PERCENTILES**



Source: LFS and EAADS linked data files.

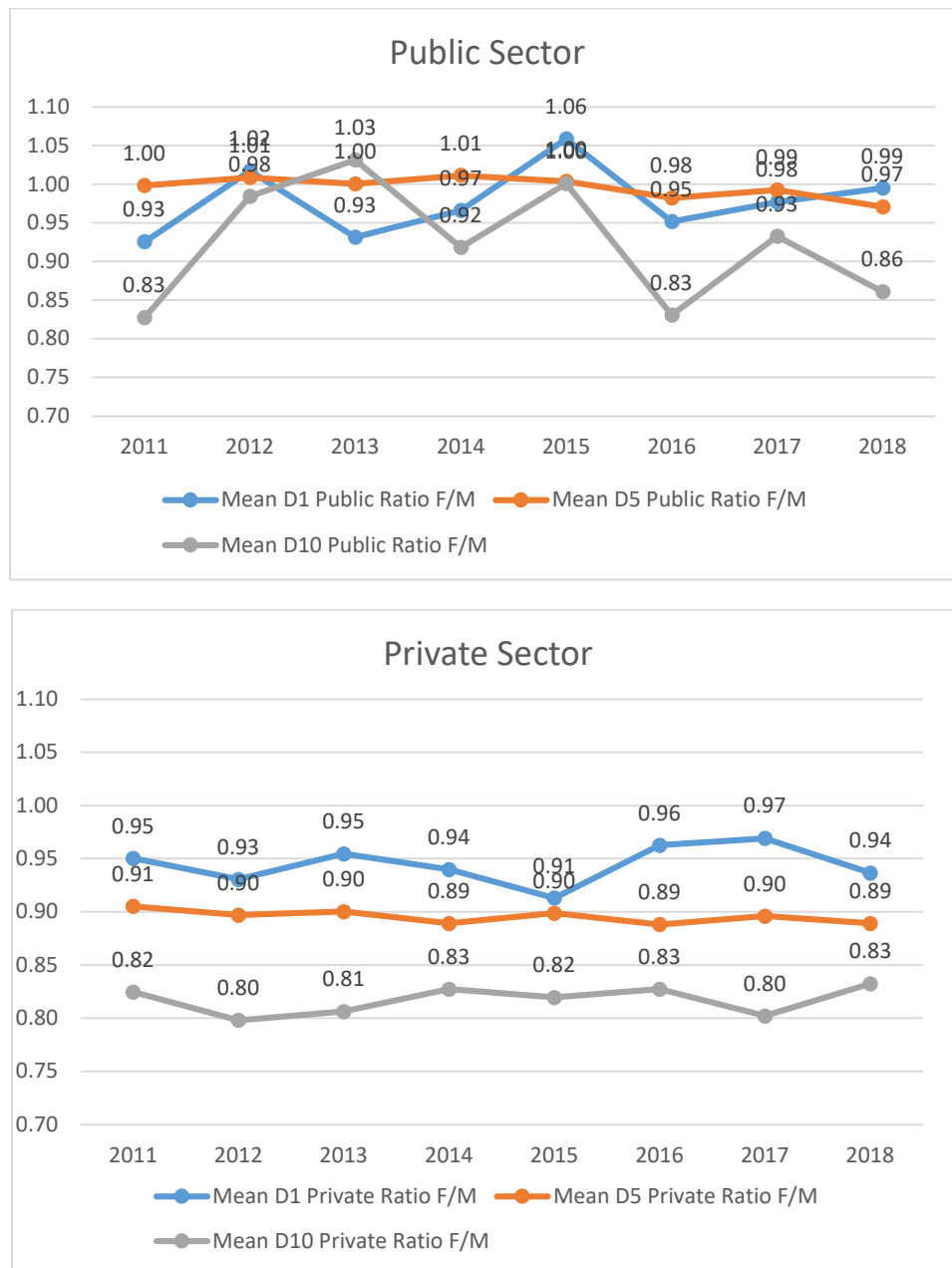
Notes: Earnings are CPI adjusted and weighted

Notes: Limited to respondents aged 25-54

Finally we consider how the ratio of women’s to men’s earnings differs in the public and private sectors<sup>12</sup>. Due to small cell sizes we present mean earnings in the bottom (1st), middle (5th) and top (10th) decile, instead of percentiles, for both men and women.

<sup>12</sup> We include those working in semi-state bodies in the public sector category. Average earnings in semi state bodies for men and women differ little from average earnings in public sector jobs more broadly.

**FIGURE 2: RATIO OF WOMEN’S MEAN HOURLY EARNINGS TO MEN’S FOR THE 1ST, 5TH AND 10TH DECILE FOR THE PUBLIC AND PRIVATE SECTOR**



Source: LFS and EAADS linked data files.

Notes: Earnings are CPI adjusted and weighted

Notes: Limited to respondents aged 25-54

Figure 2 shows the gap in hourly earnings in the bottom, middle, and top decile, split by public (top figure) and private sector (bottom figure). In the public sector, the gender gap was widest in the top decile in 2011 before gradually closing between 2012 and 2015. However, from 2016 the gap again grew suddenly, widening to almost 14 per cent in 2018. In the middle decile, there is little obvious gender inequality in wages throughout the period (the

values for each year are close to 1). Finally, the GPG in the bottom decile has been fluctuating between per cent 7 per cent in favour of men (2011) and 6 per cent in favour of women (2015). By 2018, the gap in pay between men and women is minimal, although this series is generally less predictable than the others..

In the private sector, we see a more stable pattern. In the top decile, gender inequality has remained consistently high, at the 20 per cent mark, with a small increase in equality by 2018. In the middle decile, the GPG also remains relatively stable over the time at around 10-12 per cent for each year. Finally, in the bottom decile, we observe a lower gender wage gap, ranging between 9 and 4 per cent per cent, depending on the year.

These descriptive statistics offer some insight for further analysis: First, gender inequality is highest at the top of the wage distribution, where highly paid men are earning around 10 per cent more than highly paid women. Second, at the bottom and the middle of the wage distribution, we see a gap of roughly 3-8 per cent of male wages. Third, differences between sectors are important, with gender pay gaps higher and more consistent in the private sector.

### 3.2 Distribution Regression

In order to estimate the explained and unexplained gender wage gaps, we model the entire distribution of male and female wages and predict a counterfactual distribution for females, if they were paid according to the male price structure. To this end, we employ a distribution regression (DR) technique.<sup>13</sup> It is theoretically similar to the more commonly used Quantile Regression (QR) technique (Koenker et al., 2013). However, unlike QR, inference using DR is not affected by the bunching of data. It is difficult for QR to accurately model incidents of bunching as their location within the quantile cannot be accurately gauged. However, if a narrow enough grid is used with DR, a detailed plot of wage distributions, including the location of such bunching, is possible. Empirical evidence suggests that DR generally provides a better fit to wage distributions than quantile regression (Rothe and Wied, 2013; Van Kerm et al., 2016).

We run a series of probit models at each point of the wage distribution for men and women separately in each time period. The dependent variable is binary and takes the value of 1 if the individual has an hourly wage below  $w$ , and 0 otherwise, where  $w$  takes the value of each point of the wage distribution sequentially. These models are used to predict the probability that an individual has a wage below  $w$  in the distribution, as well as predicting what this probability would be for women if they were compensated as men. We employ an Oaxaca-Blinder style decomposition of the marginal wage distributions of men and women to identify what the wage gap in each time period are. Marginal wage distributions are derived by integration of the conditional distributions over observable characteristics:

$$F_l^k(w) = \int_{\Omega_x} F^k(w | x) h_l(x) dx$$

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<sup>13</sup> See Bargain et al (2019) and Redmond et al (2020) for recent applications of this method to the effect of the minimum wage on the gender wage gap and on wage inequality.

(1)

where  $F^k(.|x)$  is the conditional wage distribution function given human capital and job characteristics  $x$  in gender group  $k$  and  $h_l$  is the density distribution of these characteristics in gender group  $l$ . So,  $F_l^k(w)$  can either be an observed or a counterfactual marginal wage distribution where the superscript refers to the conditional wage distribution and the subscript refers to the covariate distribution. The conditional wage distribution can be that of women ( $k=f$ ) or men ( $k=m$ ) and the covariate distribution can also relate to women ( $l=f$ ) or men ( $l=m$ ). The separation of conditional wage distributions and the distribution of characteristics offers a straightforward way to create counterfactual marginal wage distributions.

We can also invert the estimated distribution function to obtain counterfactual quantiles. Consider  $Q_{l,\tau}^k$  the  $\tau$ th quantile of the counterfactual distribution  $F_l^k$ . The estimated counterfactual quantile is:

$$Q_{l,\tau}^k = \{\hat{F}_l^k(\tau)\}^{-1}$$

We can then separate the gender gap in hourly wages into the relative contributions of explained and unexplained factors at each quantile. The explained gender wage gap estimates the pay differential that is explained by observable differences in labour market attributes between men and women (e.g. education, experience, etc). The unexplained gender wage gap measures the portion that is not explained by observables and which may be due to unobserved differences in labour market attributes (such as ability and effort), gender differences in trade-offs (e.g. between pay and workplace location), gender differences in negotiation or bargaining skills or simply discrimination.

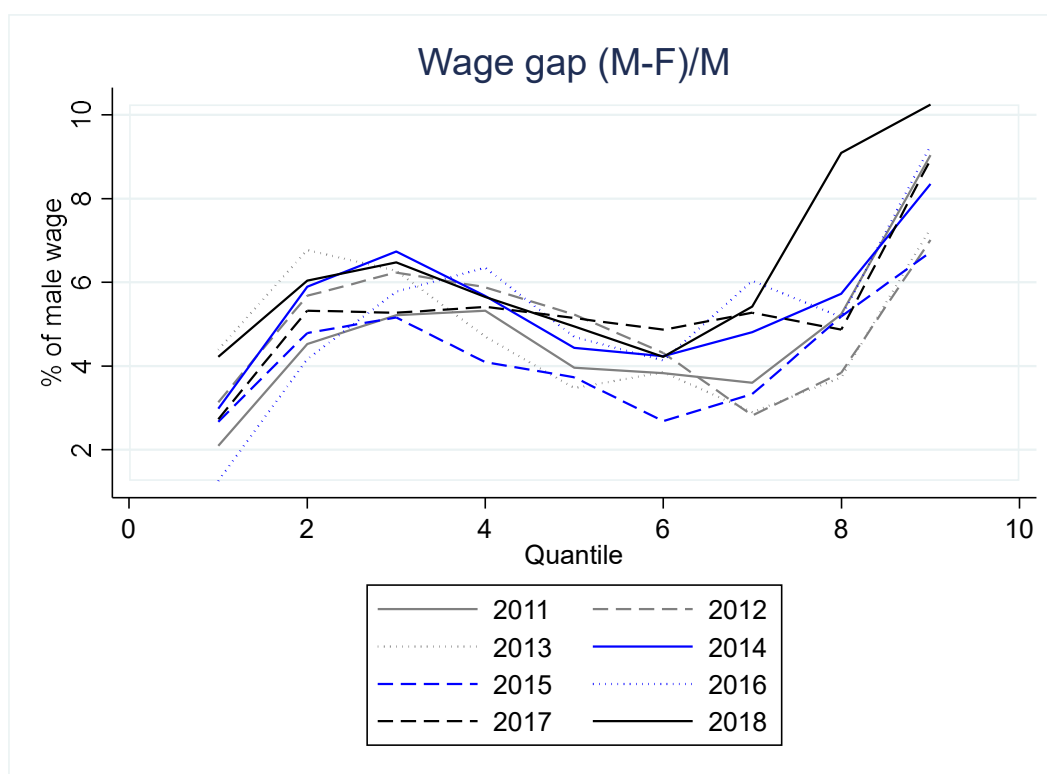
$$GPG_\tau = \underbrace{(Q_{m,\tau}^m - Q_{f,\tau}^m)}_{Explained} + \underbrace{(Q_{f,\tau}^m - Q_{f,\tau}^f)}_{Unexplained}$$

## 4. Distribution regression analysis of the gender pay gap

### 4.1 Unadjusted pay gap

Figure 3 plots the unconditional quantiles of the gender wage gap across the income distribution between 2011 and 2018, using the LFSEAADS data and the Distribution Regression method outlined in Section 3.2. The pattern of the gender wage gap across the wage distribution is N-shaped with a smaller gap at the very bottom and the middle of the wage distribution. The gap ranges from a low of 0-5% at the very bottom of the wage distribution to a high of 7-10% at the top of the wage distribution. The very low gap at the bottom of the wage distribution is consistent with findings that the Irish minimum wage eliminates the gender wage gap for low earning men and women (Bargain et al., 2018). There is no obvious pattern of change over time in the lower half of the wage distribution, but it does appear that the gender wage gap has been growing over the last few years at very top of the wage distribution.

**FIGURE 3: THE GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME**



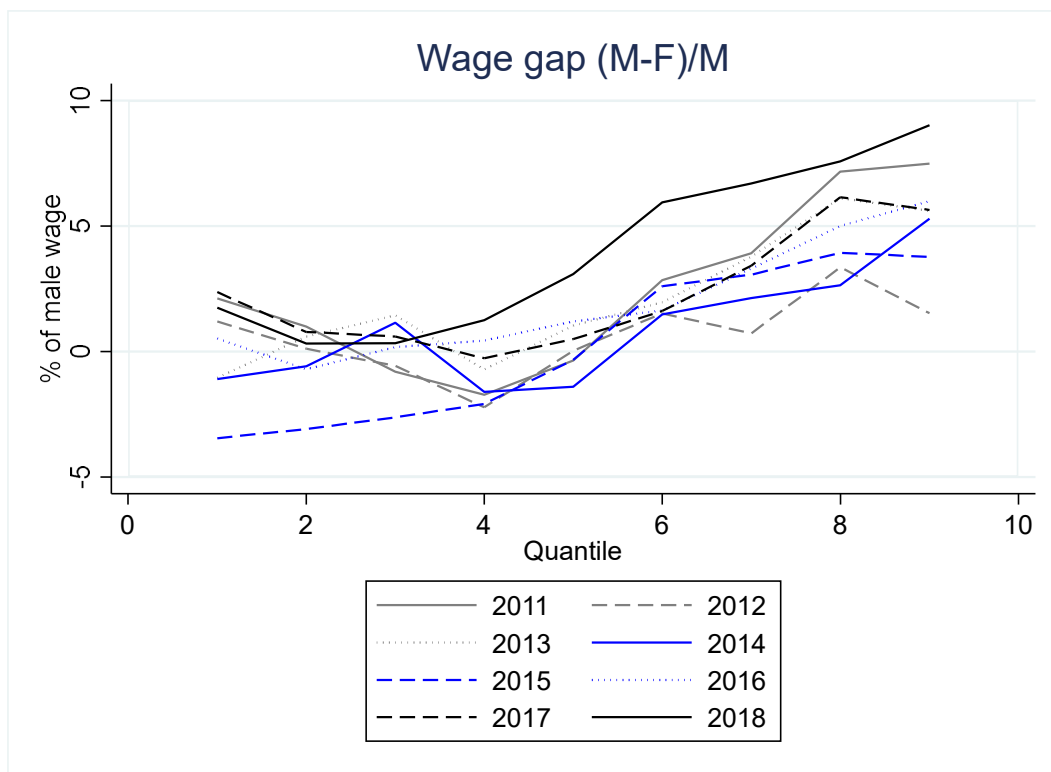
Source: Unconditional quantiles calculated using LFS and EAADS linked data files.

Notes: Earnings are CPI adjusted and weighted

Figures 4 and 5 show the unconditional quantiles of the gender wage gap over time in the public and private sector separately. This split makes the source of the N shape of the gender wage gap plot obvious. The gender wage gap in the public sector is close to zero at the bottom and in the middle of the wage distribution but is slightly higher at the top of the distribution (1-9%). The gender wage gap at both the bottom and top of the wage distribution in the public sector appears larger in recent years.

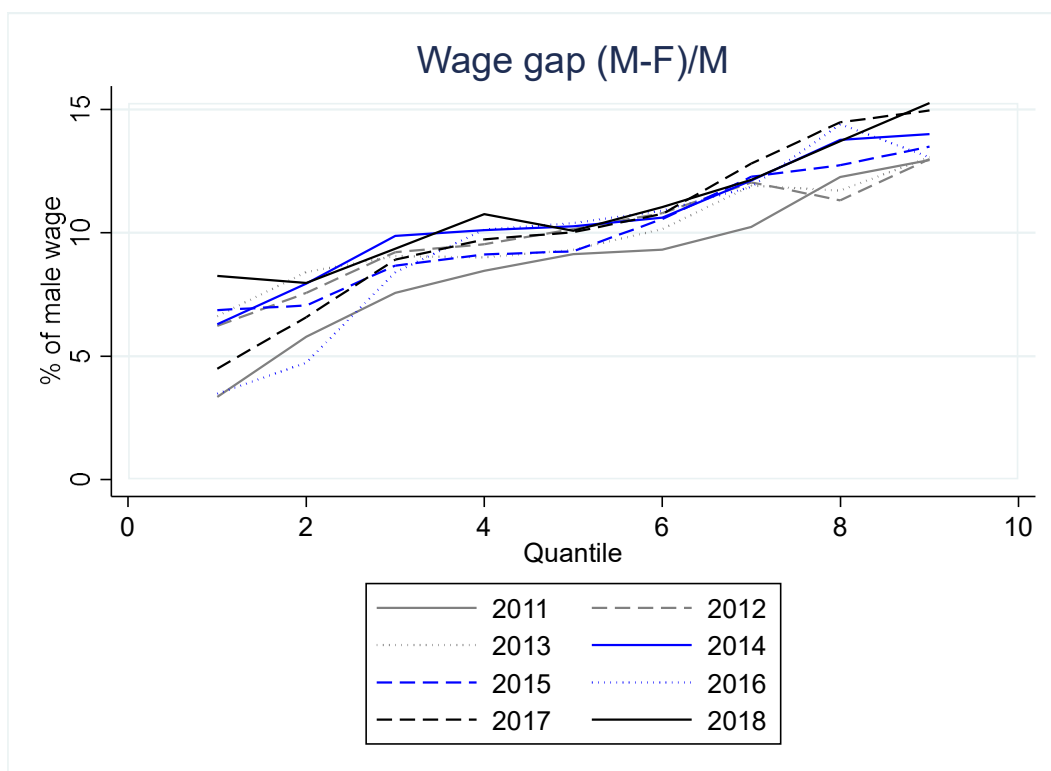
The gender wage gap in the private sector, on the other hand, is at its lowest (4-8%) at the bottom of the wage distribution but increases almost linearly as wages increase to peak at close to 15% at the top of the wage distribution. This picture is consistent with more gender equality in the public sector but the existence of an important glass ceiling in the private sector in Ireland.

**FIGURE 4: THE GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION IN THE PUBLIC SECTOR OVER TIME**



*Source:* Unconditional quantiles calculated using LFS and EAADS linked data files.  
*Notes:* Earnings are CPI adjusted and weighted. The public sector includes semi-state bodies.

**FIGURE 5: THE GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION IN THE PRIVATE SECTOR OVER TIME**



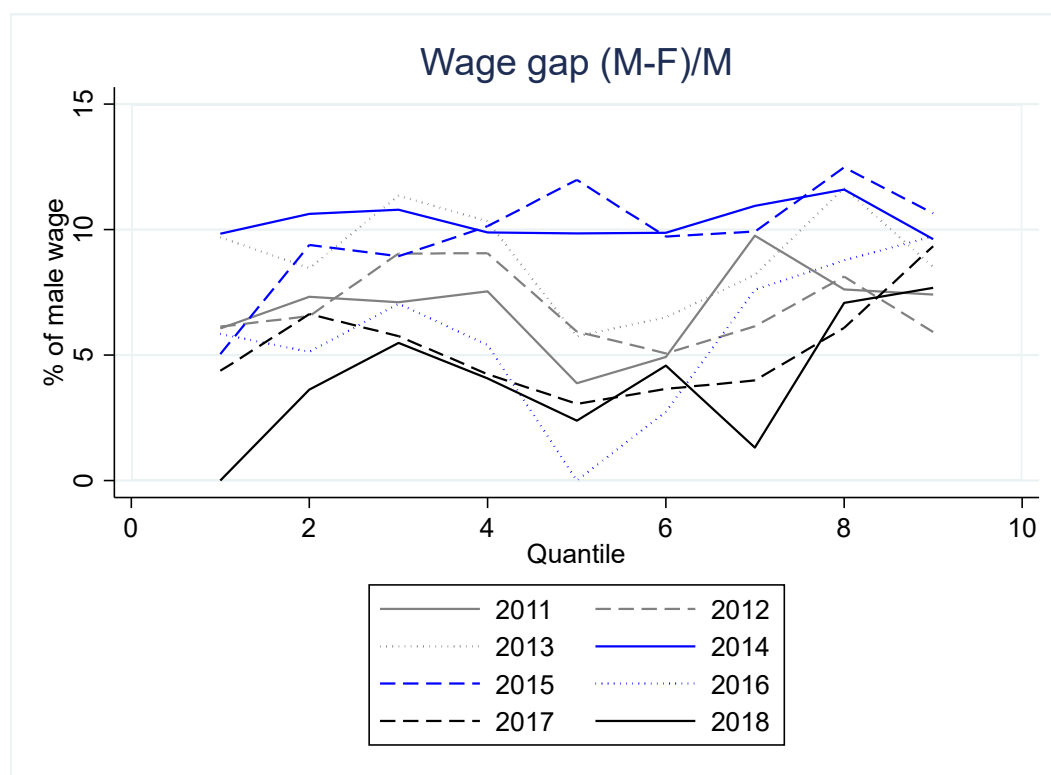
*Source:* Unconditional quantiles calculated using LFS and EAADS linked data files.  
*Notes:* Earnings are CPI adjusted and weighted.

As the LFSEAADS dataset is missing some variables which could be key explainers of the gender wage gap (e.g. full labour market experience, number of children), in the next section we use SILC data, which contains a richer set of explanatory variables, to decompose the gender wage gap into explained and unexplained components. However, we also provide this decomposition using LFSEAADS and the available explanatory variables in Appendix A.

#### 4.2 Explained and Unexplained pay gaps

Figure 6 shows the unconditional gender wage gap across the wage distribution for the same period (2011-2018) using SILC data. Despite the much smaller sample size of SILC, the pattern of the gender wage gap is very similar to that observed in Figure 3 using LFSEAADS data. Most years, the unconditional gender wage gap has tended to be lower at the bottom of the wage distribution than the middle of the distribution. In contrast to the results from LFSEAADS which indicate recent growth in the gender wage gap at the top of the wage distribution (Figure 1), using SILC, the gender wage gap appears to be higher between 2013 and 2015 than in earlier years. In recent years (2017 and 2018) the gender gap is lower at the top of the wage distribution.

FIGURE 6: THE GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME



Source: Unconditional quantiles calculated using SILC data.

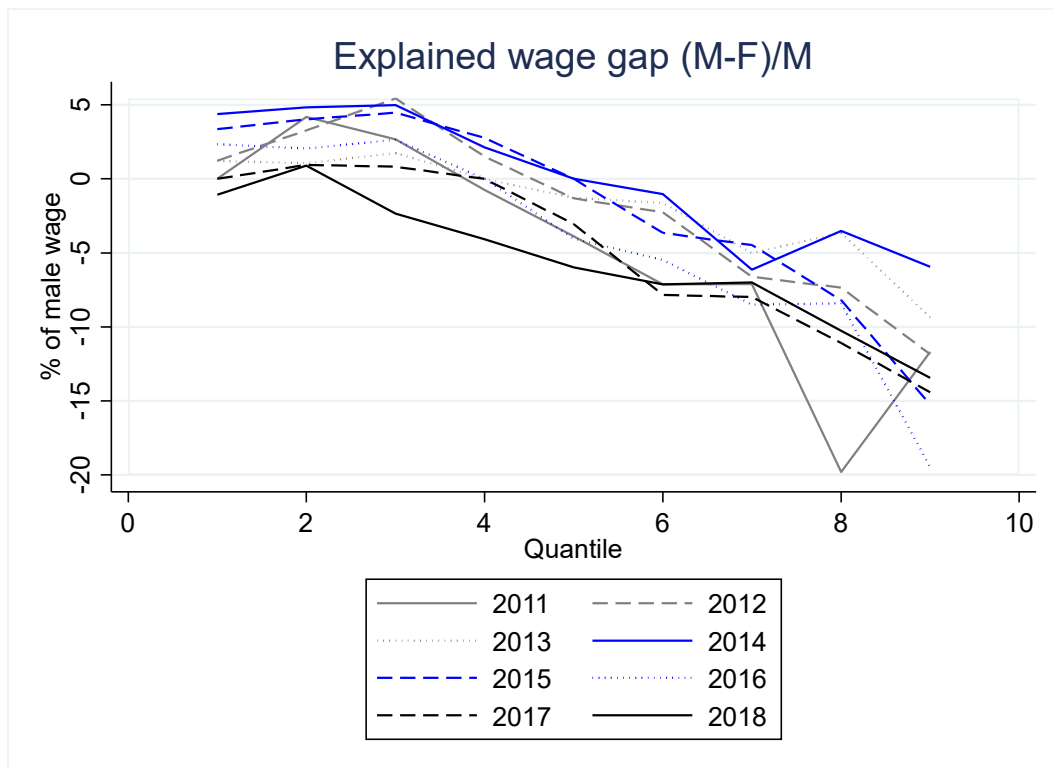
Notes: Earnings are CPI adjusted and weighted.

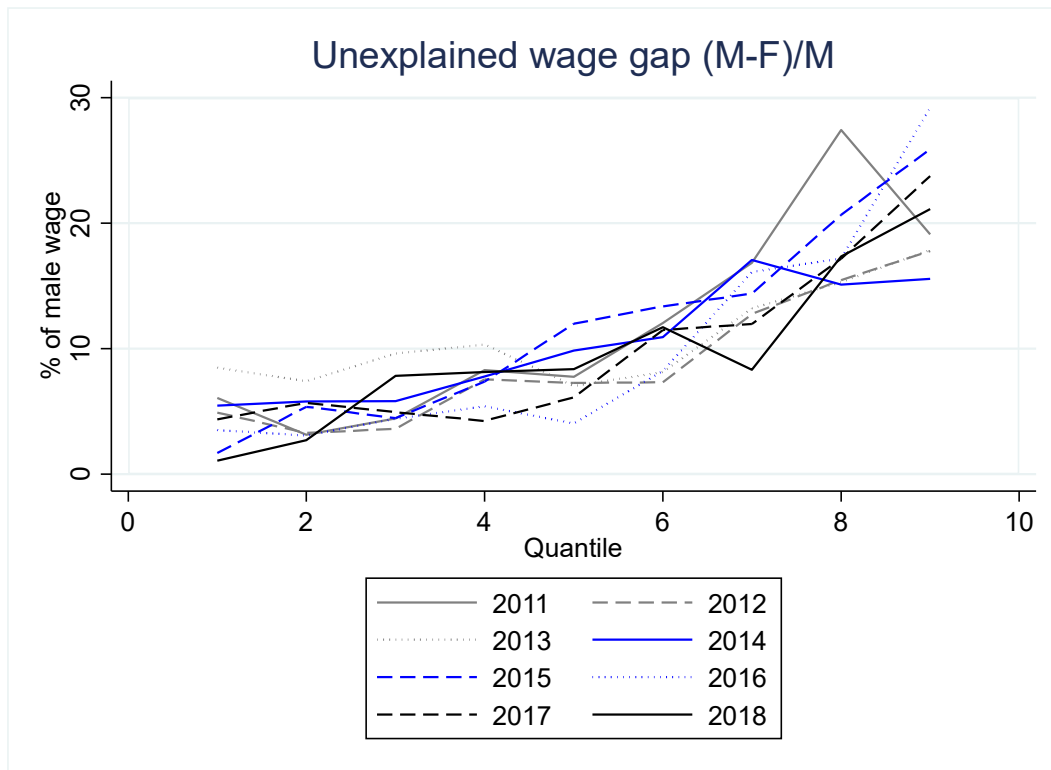
Figure 7 shows the decomposition of the gender wage gap into explained and unexplained components using the Distribution Regression method outlined in Section 3.2. In estimating the explained portion of the gender wage gap, the following explanatory variables were used: second-order polynomial of age, education status, marital status, Irish citizenship, type of contract (temporary, part-time), public or private sector employment, years in paid work and



the presence of children under 18 and 3 years old. By excluding variables such as occupation characteristics and industry in the model, we are taking a broader view of the unexplained component of the gender wage gap. We choose to exclude these variables from the model as selection into particularly industries/occupations is often partly pre-determined by gender according to norms and opportunities (Arulampalam et al, 2007). However, excluding them may also lead to an over-estimate of the portion of the gender wage gap that might be attributable to unobservable labour market attributes, to negotiation power, to preferences or to discrimination.

**FIGURE 7: DECOMPOSITION OF THE GENDER WAGE GAP OVER TIME**





Source: Unconditional quantiles calculated using SILC data.  
Notes: Earnings are CPI adjusted and weighted.

The explained gender wage gap, displayed in the top panel of Figure 7, shows that this lies between 0-5% at the bottom of the wage distribution and becomes negative and larger as wages increase. This suggests that men in the bottom wage quantile have similar or slightly better labour market characteristics than women in the same wage quantile. However, in higher wage quantiles, the pattern flips indicating that women have better labour market characteristics than men. This is in line with previous findings for Ireland which indicate that women have been better educated, on average, than men for a number of decades.

The lower panel of Figure 7 shows that the unexplained gender wage gap is positive and increasing across the wage distribution. It is lowest in the bottom wage quantile at between 0-9% of male wages. It increases throughout the wage distribution, peaking at 12-20% in the top wage quantile.

In the absence of an unexplained gender wage gap, which may be attributable to unobservables such as effort; to preferences or simply to discrimination, these figures indicate that women would receive similar or slightly lower wages than men in the bottom wage quantile based on their labour market attributes. However, moving up the wage distribution, this discrepancy would vanish, and women would be paid up to 10% more than men in the absence of an unexplained wage gap.

Given the existence of the unexplained gender wage gap in Ireland, we estimate that women are instead paid less than men at most points of the wage distribution. The unexplained gender wage gap is lowest at the bottom of the wage distribution where the minimum wage

acts to equalise the pay of men and women. It increases as the wage level increases so that the unexplained gender wage gap at the top of the wage distribution lies between 12-20%. There has been no obvious pattern of change to either of these gaps over time although there is a suggestion, looking at the LFSEAADS data, that the unexplained GPG has been increasing for high earners over the last few years (Figure A2).

Fitting confidence intervals to these plots (shown in Appendix B) shows that these wage gaps are not always statistically significant. This may be due to the relatively small sample size of the SILC data. However, the unexplained gender wage gap at the top of the wage distribution is consistently statistically significant over time.<sup>14</sup>

### **4.3 Public sector vs. Private sector**

The analysis in Sections 3.1 and 4.1 show that there are important structural differences to the GPG in the public and private sectors. In this section, we split the SILC sample into public and private sector workers and show how the explained and unexplained gender wage gaps contribute to the overall gender wage gap across the wage distribution in these sectors.

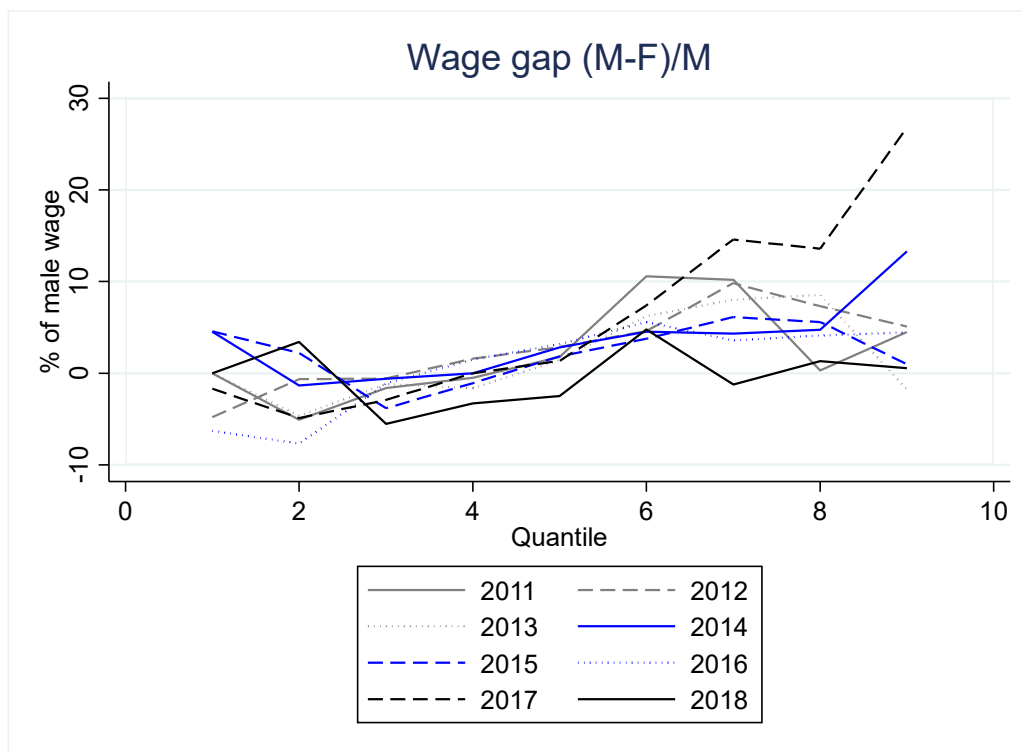
Figures 8 and 9 show the GPG for the public and private sector, respectively. In the public sector, the pay gap is close to zero at the bottom of the distribution in all years. At the top of the income distribution, the pay gap is -1 – 5% for most years studied, in line with findings from LFSEAADS. Two years which prove outliers are 2014 (13%) and 2017 (27%). The volatility of the estimated GPG in the public sector may be due to the small sample size of public sector workers in SILC. It may also reflect policy changes in pay, hours and recruitment during the Irish austerity and recovery phases.

In line with the the LFSEAADS data, using SILC we estimate that the pay gap is higher in the private sector than in the public sector. In the private sector, the pay gap is lowest (0-7%) at the bottom of the wage distribution but increases almost linearly as wages increase to peak at up to 20% at the top of the wage distribution.

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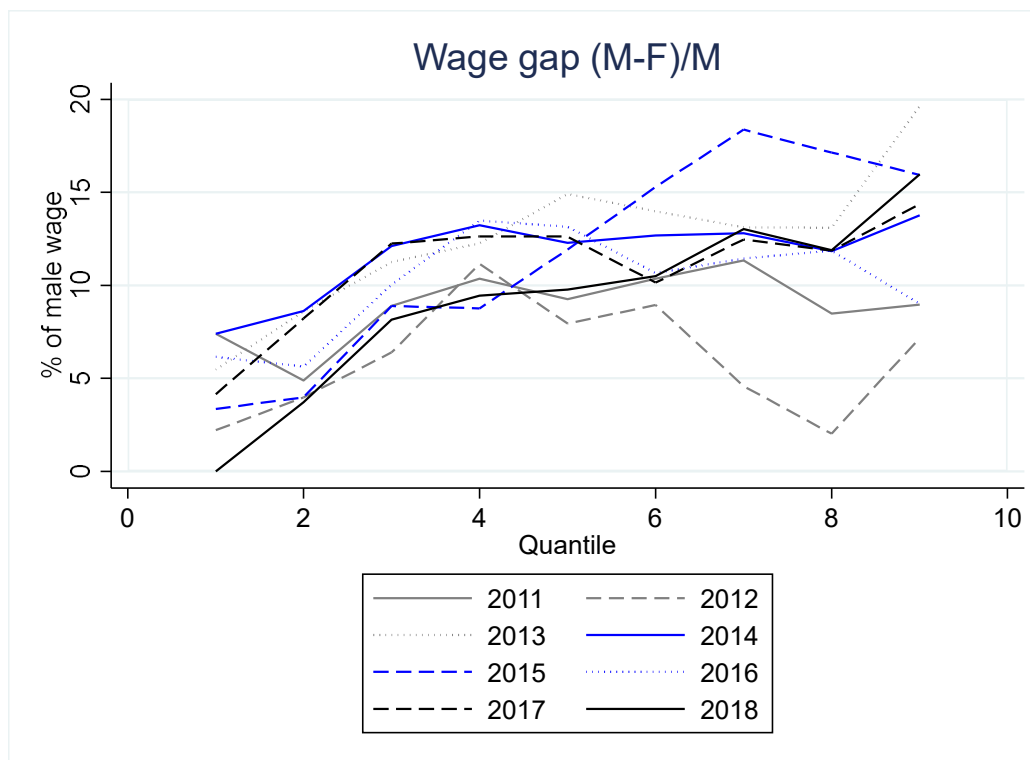
<sup>14</sup> Confidence intervals are fitted using the stata package *yadap* written by Van Kerm (2017)

**FIGURE 8: THE GENDER WAGE GAP IN THE PUBLIC SECTOR OVER TIME**



*Source:* Unconditional quantiles calculated using SILC data.  
*Notes:* Earnings are CPI adjusted and weighted.

**FIGURE 9: THE GENDER WAGE GAP IN THE PRIVATE SECTOR OVER TIME**



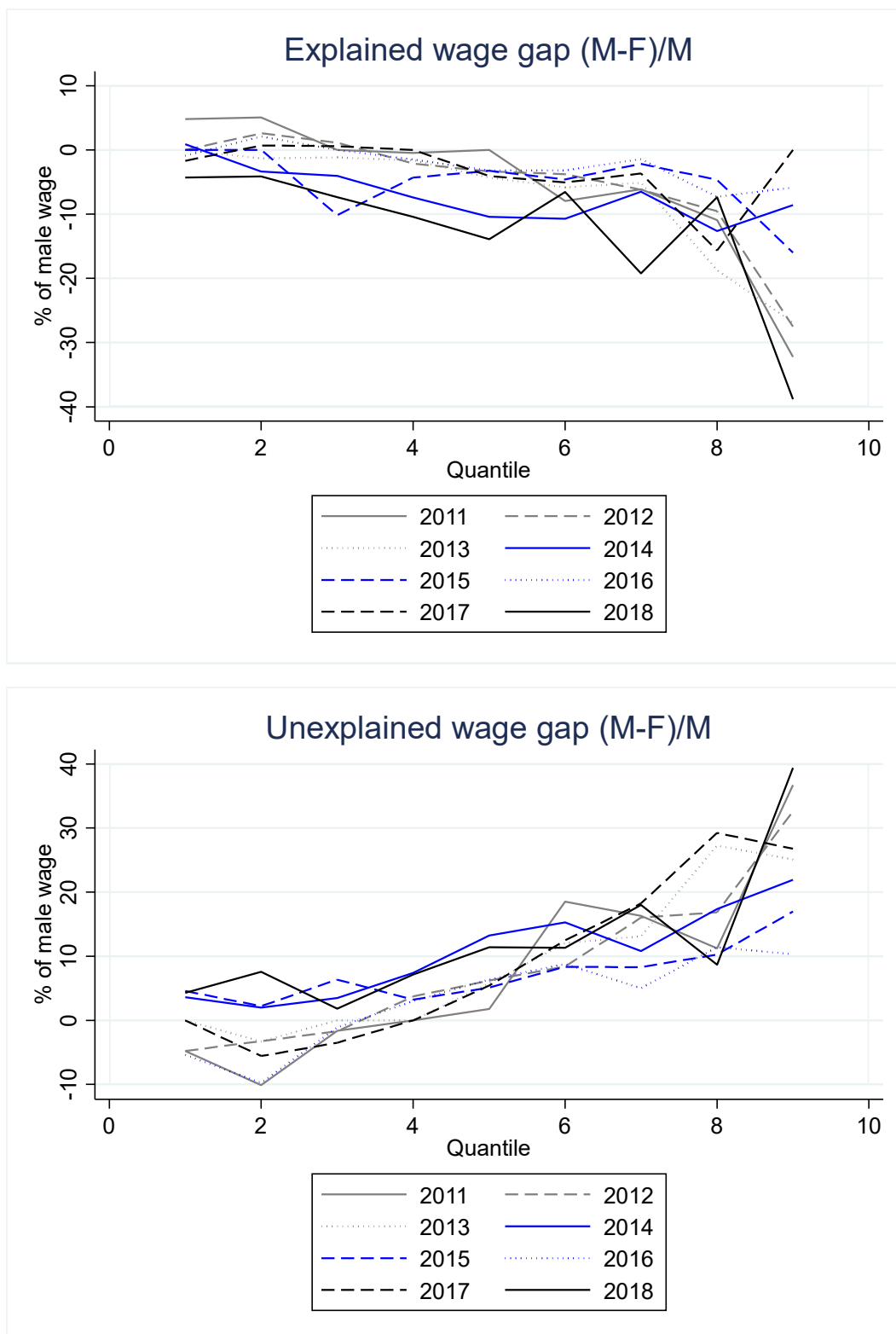
*Source:* Unconditional quantiles calculated using SILC data.  
*Notes:* Earnings are CPI adjusted and weighted.

Figure 10 shows the decomposition of the gender wage gap in the public sector into the explained and unexplained component. The explained wage gap is close to zero across most of the wage distribution, indicating that men and women in the public sector receive the same pay, conditional on observable characteristics, apart from in the top quantile. There is a negative explained wage gap in the top quantile, indicating that women have better average labour market characteristics than men in this quantile.

The unexplained share of the gender wage gap in the public sector is close to zero at the bottom of the wage distribution but increases further up the wage distribution, to a high of 10-40% in 2014 at the top of the wage distribution. Given the transparent and relatively rigid pay scales and promotion criteria in existence in the public sector, this finding may be surprising. It suggests the promotion opportunities are not available at the same rate for men and women, either because women are less likely to apply for promotion or because they are less likely to be promoted. Research on this topic for the Irish civil service found support for both mechanisms. Men were twice as likely to occupy senior positions as women with the same education levels and length of service. Women were more likely to delay applications for promotion, and this was partly contingent on loss of flexibility, lack of induction to new roles and a gendered perception of “readiness” (Russell et al. 2017). Inequalities in access to tasks that are visible and valued for promotion also played a role.

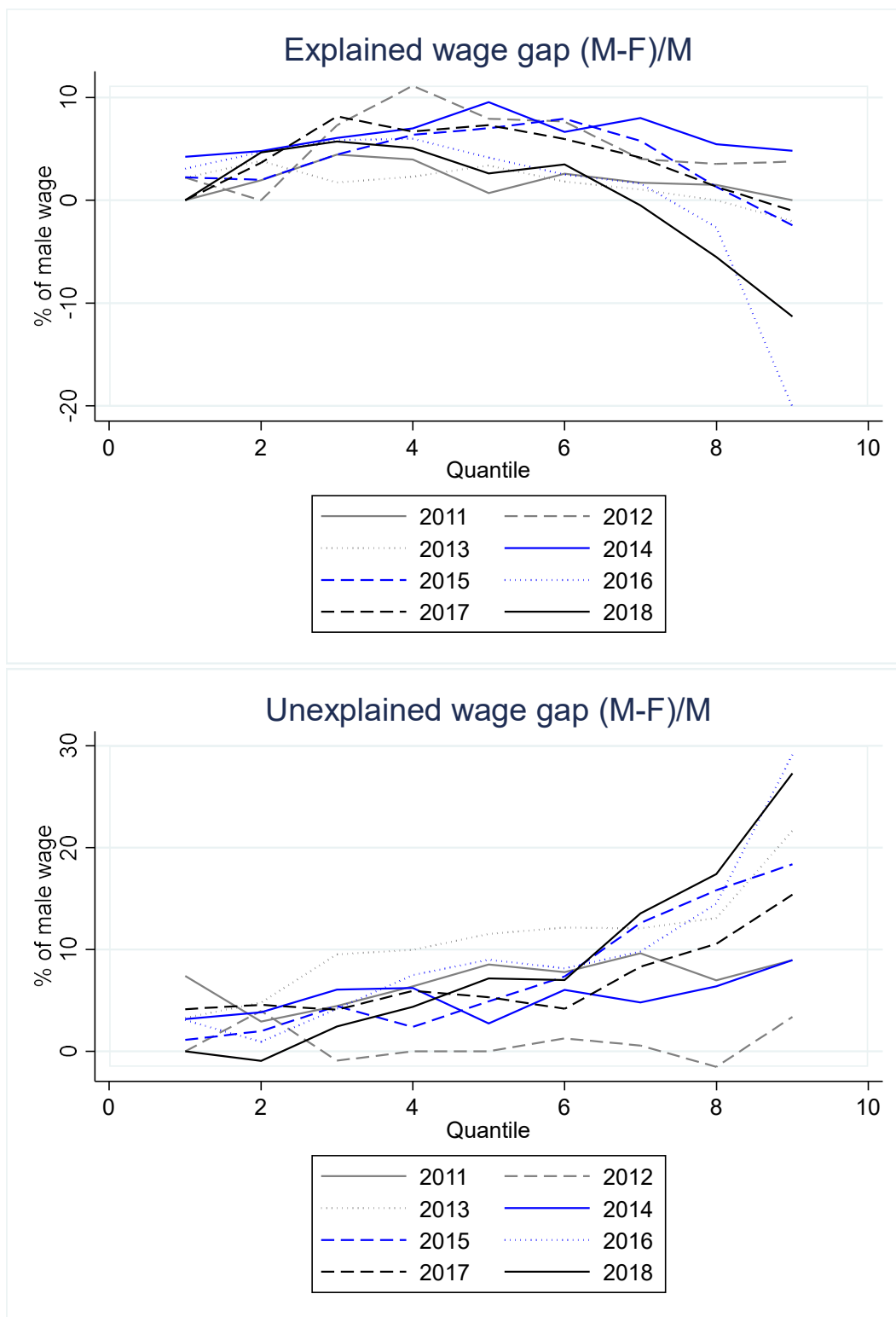
In the private sector, Figure 11 shows that the explained portion of the wage gap is stable across much of the wage distribution and over time, ranging between 0-10% at most points of the wage distribution. The explained wage gap at the top of the wage distribution has been more volatile over time. The unexplained portion of the wage gap has shown a reasonably stable pattern over time, increasing with wages. Therefore, the gender pay gap at the top of the wage distribution in the private sector of up to 20% (Figure 9 above) is not explained by observable labour market attributes.

FIGURE 10: DECOMPOSITION OF THE GENDER WAGE GAP IN THE PUBLIC SECTOR OVER TIME



Source: Unconditional quantiles calculated using SILC data.  
 Notes: Earnings are CPI adjusted and weighted.

**FIGURE 11: DECOMPOSITION OF THE GENDER WAGE GAP IN THE PRIVATE SECTOR OVER TIME**



Source: Unconditional quantiles calculated using SILC data.  
 Notes: Earnings are CPI adjusted and weighted.

## 5. Conclusions

This paper estimates the raw and adjusted GPG in Ireland between 2011 and 2018. Using survey data sources linked to administrative information on earnings, we show that the raw gender wage gap across the wage distribution has not changed much over this period: it is larger for higher earners and in the private sector. Using a Distribution Regression method, we estimate the relative contributions of explained and unexplained components to the overall gender wage gap at each point of the wage distribution and summarise the findings by wage quantile.

Despite some differences in findings by year and by dataset used, some findings are fully supported by both. First, the explained gender wage gap is negative at most points of the wage distribution, indicating that women have better labour market characteristics than men, on average. Second, the unexplained gender wage gap increases with the wage level. This results in a small or zero gender wage gap at the bottom of the wage distribution which rises to up to 10% at the top of the wage distribution. Third, the gender wage gap in Ireland has been mainly concentrated in the private sector although we do also present evidence that it is present for high earners in the public sector.

The national minimum wage has addressed the GPG at the very bottom of the wage distribution. The over-representation of women in minimum wage employment (Bargain et al. 2019), means the rate at which it is set remains crucial for the economy-wide GPG.

The consistently high unexplained gap at the upper end of the wage distribution suggests that efforts to tackle the pay gap should address the glass ceiling. Obstacles to women's access to more senior, higher paid positions include persisting gender stereotypes (unconscious biases) that identify authority and leadership as male characteristics and that punish mothers for contravening norms of the "ideal worker" (Correll et al 2007, Fuegen et al., 2004; Heilman, 2012). Factors which have also been shown to hinder women's career advancement include unequal caring responsibilities (OECD, 2014; Grotti et al 2019); lack of flexibility and long hours cultures in higher positions (Russell et al 2017; Chung, 2018); and inequalities in access to training opportunities, networks and assignments (eg. Aisa et al. 2016; Babcock et al. 2017; Diekhoff & Steiber 2011). It is possible that the move to flexible working arrangements brought about by the Covid-19 pandemic will facilitate more career advancement for women in this respect. However, it is equally likely that the disproportionate number of career interruptions by women due to caring duties during the pandemic will slow or reverse recent progress made in gender wage equality.

While we find wage inequalities at the top are greater in the private sector, these barriers to promotion persist to a lesser extent in the public sector despite a wider range of equality policies and formalised human resource systems (Russell et al. 2017; O'Connor, 2020).

The changes in the GPG over time in Ireland do not fit with a simple austerity narrative. Public sector pay cuts and pay freezes were not associated with any widening of the economy-wide GPG. It is possible that the effect of these changes was swamped by other labour market adjustments during the period. The greater fluctuation in the GPG within the public sector over the period may reflect policy changes in pay, hours and recruitment but



further research is necessary to investigate this. The stability of the GPG across the wage distribution in the private sector over the period suggest strong structural inequalities, that are unlikely to change without significant interventions.

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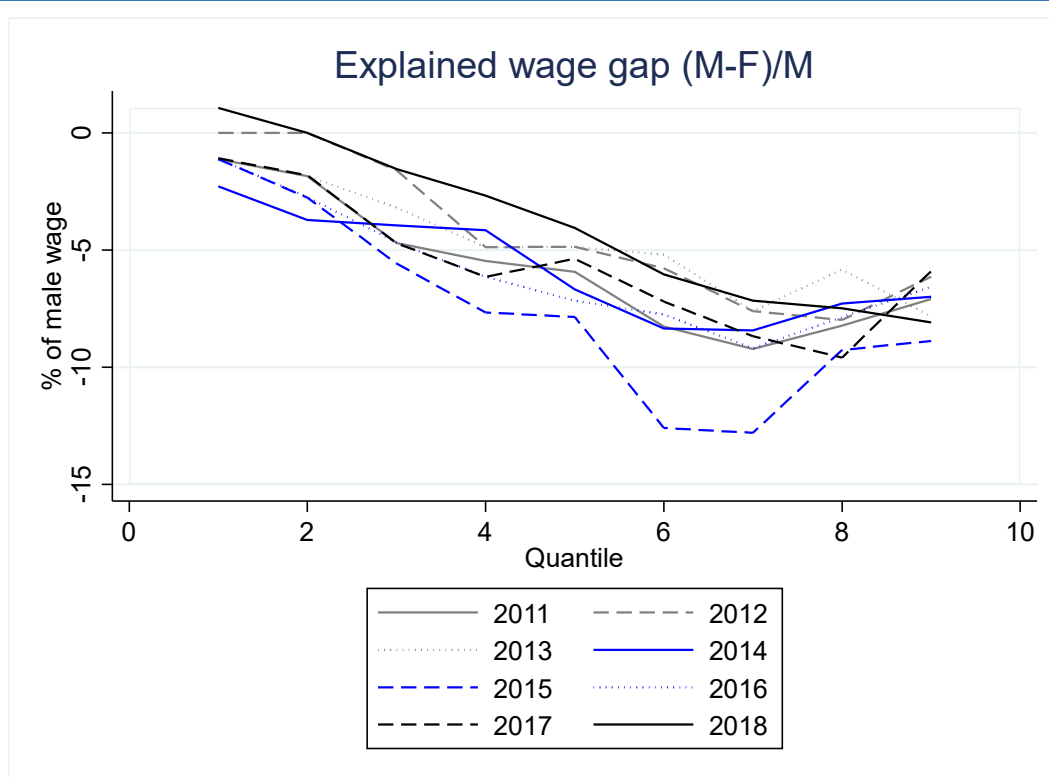
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## Appendix A – Decomposition using LFSEAADS

Figure A1 shows the explained and unexplained components of the gender wage gap across the distribution using the decomposition outlined in Section 3.2 and LFSEAADS data. The explained gender wage gap<sup>15</sup>, which is the portion which can be attributed to different labour market characteristics between men and women, is close to zero at the bottom of the wage distribution but becomes negative and more important as wages increase, peaking at -6 to -10 percent towards the top of the wage distribution. This indicates that the average woman has “better” labour market characteristics than men at most points of the wage distribution. In the absence of any unexplained gender wage gap, we would expect women to be better paid than men, on average.

**FIGURE A1: THE EXPLAINED GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME**



*Source:* The explained wage gap is calculated as the difference between the conditional male quantile and the counterfactual female quantile with male coefficients. This is calculated using LFS and EAADS linked data files.

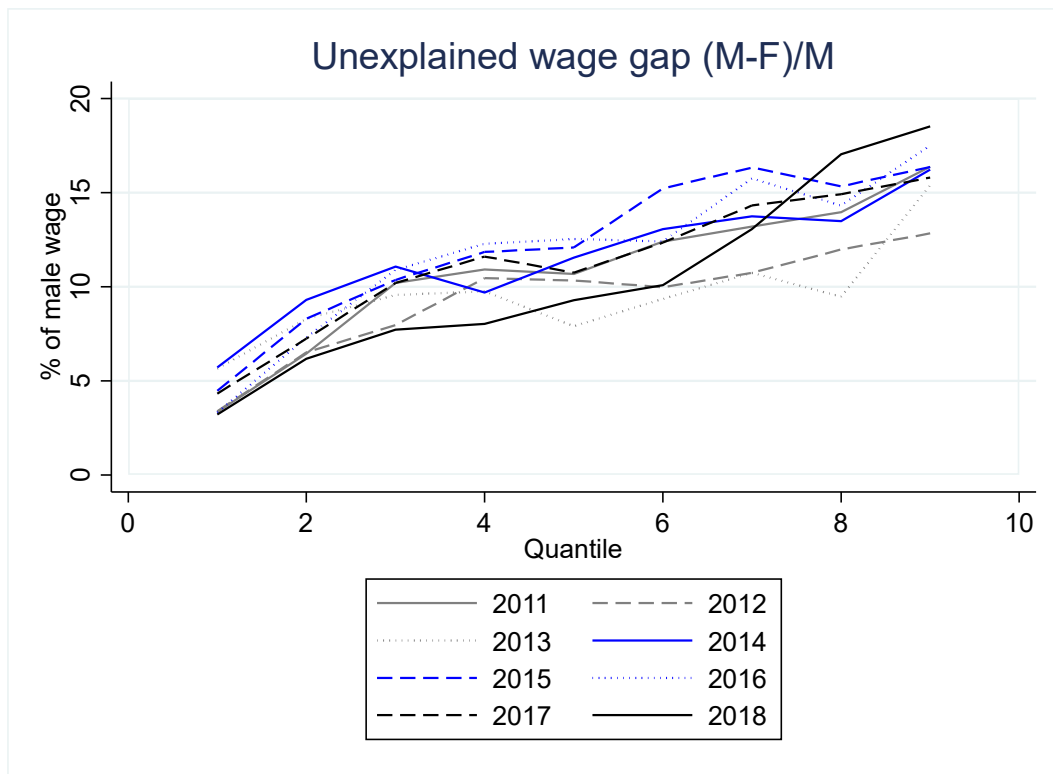
*Notes:* Earnings are CPI adjusted and weighted

The unexplained gender wage gap is larger than the explained gender wage gap and positive at all points of the wage distribution. It is around 4-6% in the bottom wage quantile and

<sup>15</sup> In estimating the explained part of the gender wage gap, the following explanatory variables were used: age, age squared, work experience with the current employer and dummy variables for being married, Irish, having a temporary contract, having a part-time contract, being a supervisor, working in Dublin, doing shift work, being in a union, being in the public sector, working in a large firm and nace sector

increases almost linearly as wages increase, peaking at 13-19% in the top wage quantile, consistent with the existence of a glass ceiling for women in Ireland.

**FIGURE A2: THE UNEXPLAINED GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME**



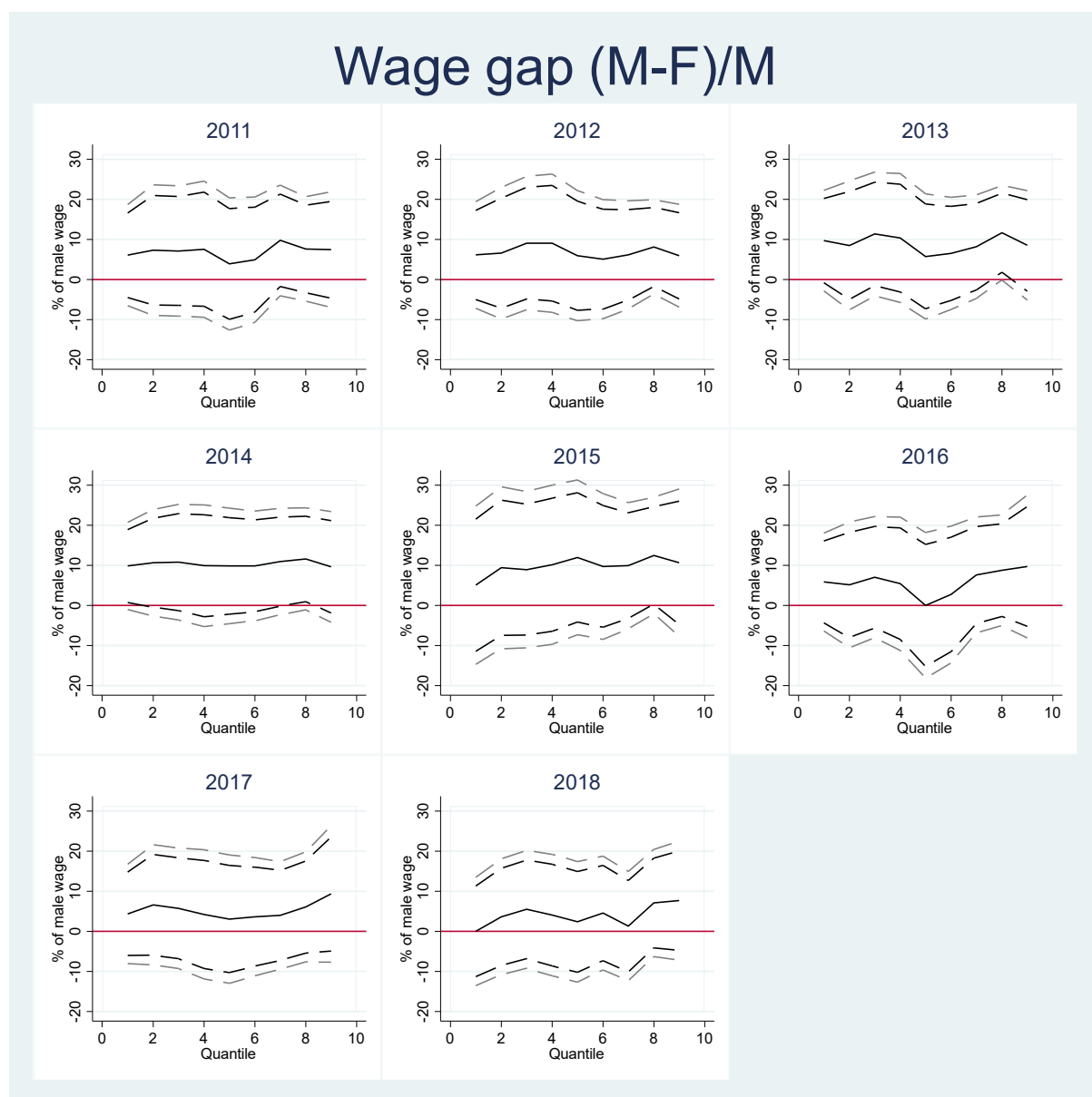
*Source:* The explained wage gap is calculated as the difference between the counterfactual female quantile with male coefficients and the conditional female quantile. This is calculated using LFS and EAADS linked data files.

*Notes:* Earnings are CPI adjusted and weighted

The magnitude and patterns of the explained and unexplained gender wage gap calculated using LFSEAADS data is very similar to those calculated using SILC data, despite the difference in sample size and variables observed in the two datasets.

## Appendix B – Decomposition using SILC, with confidence intervals

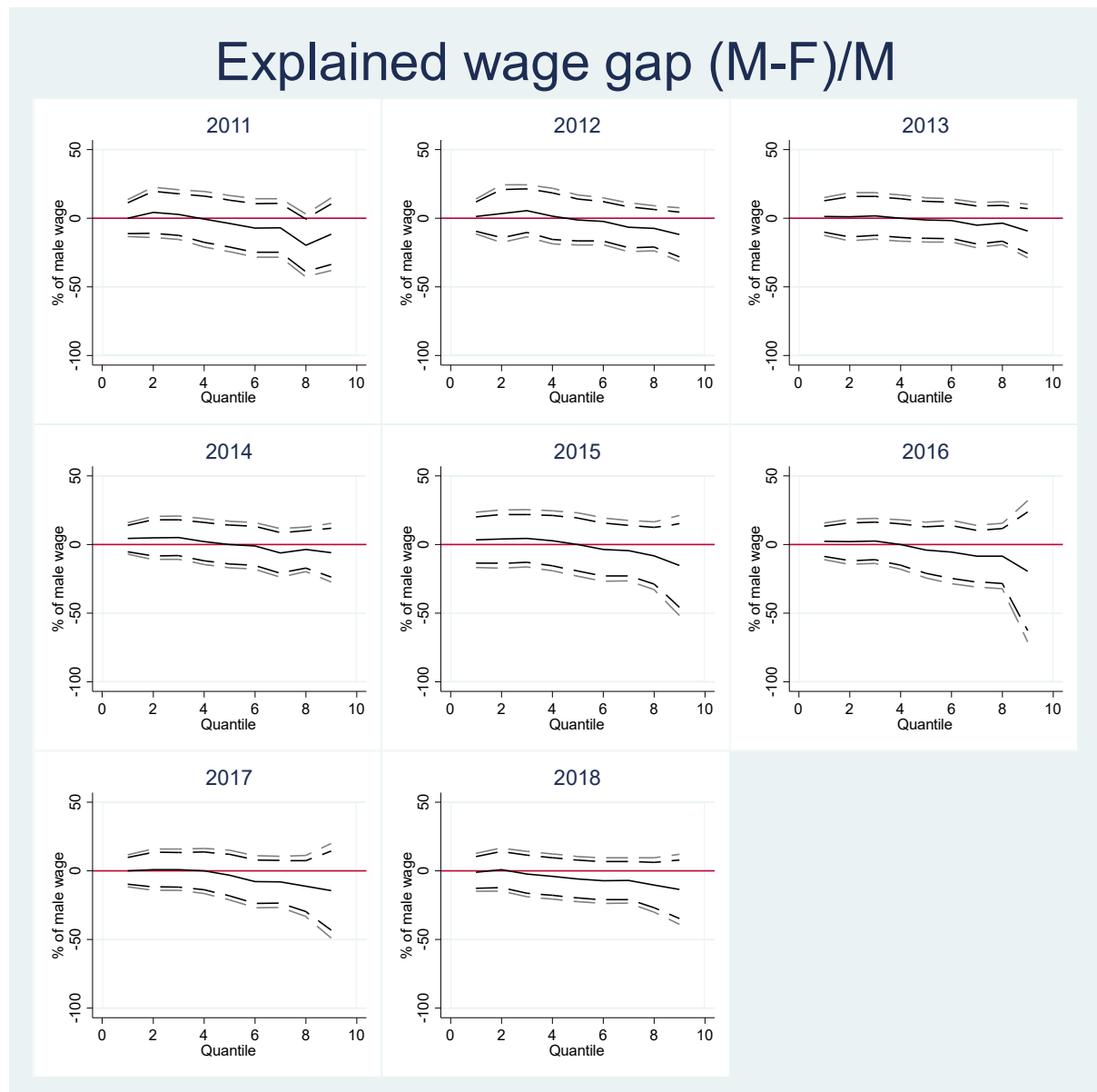
FIGURE B1 THE TOTAL GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME WITH 95% CONFIDENCE INTERVALS



Source: Unconditional quantiles calculated using SILC data and confidence intervals calculated using the Stata package *yadap* (Van Kerm, 2017).

Notes: Earnings are CPI adjusted and weighted. Grey dashed lines show 95% confidence intervals. Black dashed lines show 90% confidence intervals.

**FIGURE B2 THE EXPLAINED GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME WITH 95% CONFIDENCE INTERVALS**

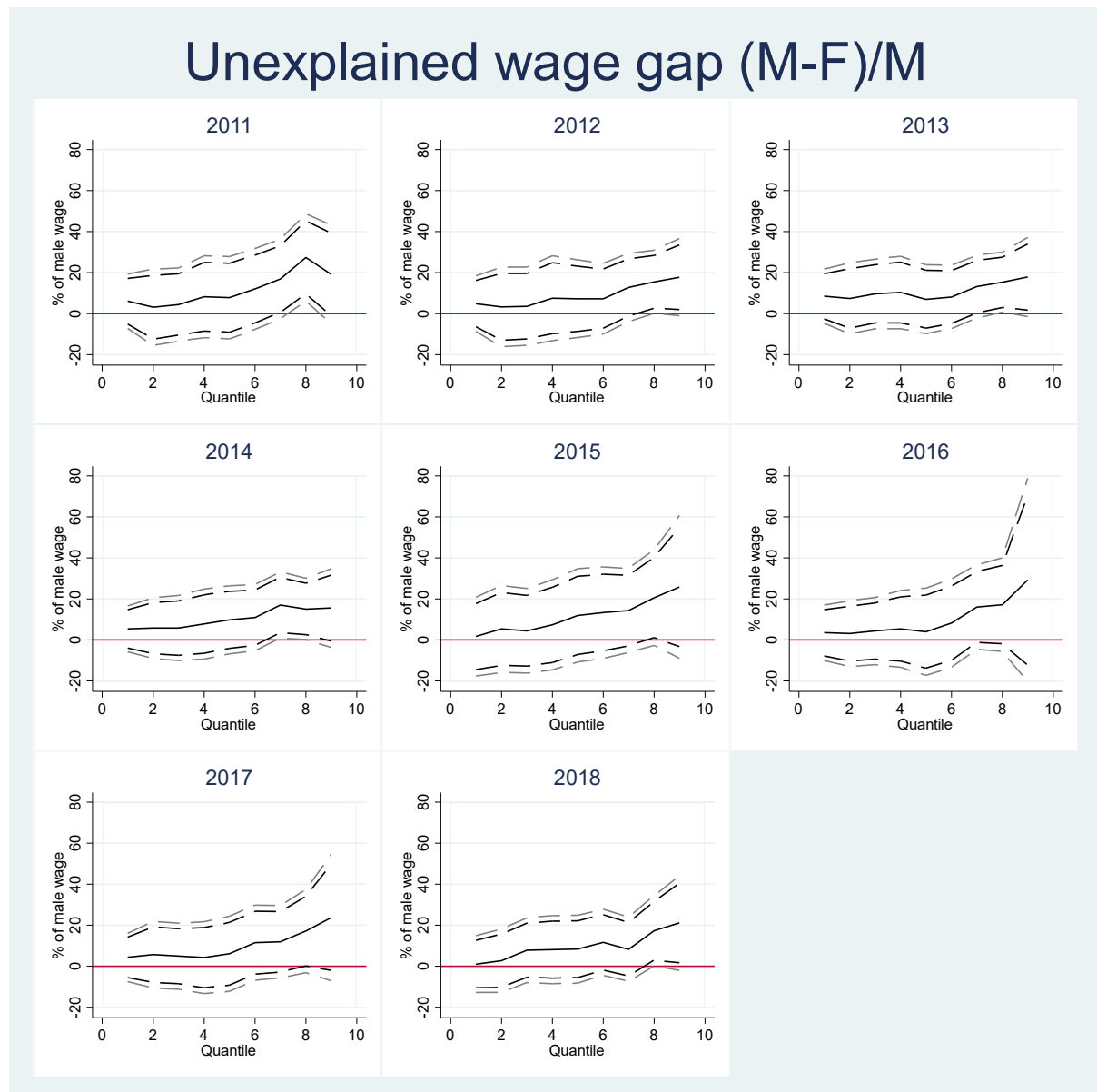


**Source:** Unconditional quantiles calculated using SILC data and confidence intervals calculated using the Stata package *yadap* (Van Kerm, 2017).

**Notes:** Earnings are CPI adjusted and weighted. Grey dashed lines show 95% confidence intervals. Black dashed lines show 90% confidence intervals.



**FIGURE B3 THE UNEXPLAINED GENDER WAGE GAP ACROSS THE WAGE DISTRIBUTION OVER TIME WITH 95% CONFIDENCE INTERVALS**



**Source:** Unconditional quantiles calculated using SILC data and confidence intervals calculated using the Stata package *yadap* (Van Kerm, 2017).

**Notes:** Earnings are CPI adjusted and weighted. Grey dashed lines show 95% confidence intervals. Black dashed lines show 90% confidence intervals.