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HOW UNEQUAL? THE UNADJUSTED GENDER PAY GAP IN NORTHERN IRELAND AND THE REPUBLIC OF IRELAND

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ABSTRACT
The gender pay gap is an issue of significant policy and political concern. But what is it? And how do we measure it? In broad terms the gender pay gap (GPG) is a metric that tells us the difference in the earnings of males and females in the labour market and is one of the main mechanisms used to assess the extent of gender inequalities in the labour market.

This paper concerns itself with the unadjusted gender pay gap across the island of Ireland. In so doing, it presents estimates of the scale of the unadjusted gender pay gap in both Northern Ireland and the Republic of Ireland. In addition, this paper shows how the composition of males and females in the labour market differs in terms of personal/household and labour market characteristics and how pay varies across characteristics. This paper also shows how pay varies between males and females with the same characteristics. Moreover, this paper concerns itself with the measurement of the unadjusted gender pay gap and shows through the presentation of various estimates of the unadjusted gender pay gap how what we measure matters.

In terms of findings the most obvious and pertinent finding is that when we compare the earnings of males and females, females tend to earn less than males across the island of Ireland - irrespective of how we measure the unadjusted gender pay gap. There are, however, substantial differences in the magnitude of the overall unadjusted gender pay gap dependent upon measure used and characteristic assessed. There is also substantial differences in the estimates of the unadjusted gender pay gap for Northern Ireland as compared to the Republic of Ireland.

The unadjusted gender pay gap based on hourly earnings shows when the estimates are based on the median, the size of the gap is larger in Northern Ireland than it is in the Republic of Ireland. The opposite is true for the Republic of Ireland, whereby the size of the unadjusted GPG is significantly wider based on estimates at the mean. In many ways the overarching story of the earnings distribution in the Republic of Ireland is a tale of the top earning male versus everyone else. Whilst a similar story can be applied to the top earning female in Northern Ireland, the more dominant finding from the analysis of the earnings distribution is just how prevalent and substantial are lower earnings for females across the majority of the earnings distribution.

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SECTION 1 INTRODUCTION

The gender pay gap is an issue of significant policy and political concern. But what is it? And how do we measure it? In broad terms, the gender pay gap is a metric that tells us about the difference in the earnings of males and females in the labour market and is one of the main mechanisms used to assess the extent of gender inequalities in the labour market. The gender pay gap is a concept that is broader than the concept of 'equal pay for equal work or work of equal value'. It also captures the differences in the average characteristics of male and female employees. That is, as well as capturing any differences in pay owing to discrimination the gender pay gap also captures the fact that: (a) different characteristics are rewarded differently in the labour market such as for example, different levels of educational attainment; and (b) males and females have different personal/family/household characteristics and work/job characteristics.

There are two overarching ways to measure the gender pay gap. When the gender pay gap is calculated by simply comparing the pay of all males to that of all females the estimate is known as the 'unadjusted' or 'raw' gender pay gap. Calculated in this way, the gender pay gap does not take into account all of the different factors or characteristics of males and females that may play a role in determining or explaining the differences, such as for example differences in education, occupation, sector of employed, hours worked etc. On the contrary, when the gender pay gap is calculated after accounting or controlling for underlying differences in characteristics the estimate is known as the 'adjusted' gender pay gap.

This paper concerns itself with the unadjusted gender pay gap across the island of Ireland. It presents updated estimates of the unadjusted gender pay gap in both Northern Ireland and the Republic of Ireland, using various different measures. The empirical analysis for Northern Ireland and the Republic of Ireland are presented separately.

The empirical analysis in this paper begins by presenting a number of different estimates of the overall unadjusted gender pay gap including the gap in median and mean hourly earnings and the gap in median and mean weekly/annual earnings. It also presents separate estimates of the unadjusted gender pay gap for those in full-time and part-time work. Furthermore, this paper presents estimates of the unadjusted gender pay gap across the earnings distribution allowing us to see the weaknesses and strengths in single summary measures such as the mean or median in capturing the complexity of gender differences in pay. It also allows us to see how the unadjusted gender pay gap manifests itself across the earnings distribution and whether or not the gap in earnings is evenly spread or if there are particular points of the earnings distribution where the gap is problematic.

From here the empirical analysis turns to look across the labour force and details differences in the personal/household characteristics and labour market characteristics composition of males and females in the labour market, as well as differences in average pay for these characteristics. This allows us to further understand how differences in the characteristics of males and females can in part explain our unadjusted gender pay gap. Key in this regard is the pay consequences arising from the differences in working arrangements of males and females, and the much higher likelihood of females to work part-time as compared to males. Also fundamental, as we will see, is the occupational and sectoral segregation of males and females across the labour market.

From here, the empirical analysis examines the extent of differences in pay for males and females with the same characteristics. This allows us to see, irrespective of reason or rationale, how the unadjusted gender gap varies by characteristics and particular problematic areas.

Aside from the empirical data presented, this paper also concerns itself with the measurement of the unadjusted gender pay gap and seeks to illustrate through the presentation of various different estimates of the unadjusted GPG how *what we measure matters*. Indeed, as will be discussed in detail in this study there are numerous different ways to measure the unadjusted gender gap and no single metric can capture its complexity. Thus, even in calculating the overall differences in pay of all males as compared to all females this paper shows that a number of different criteria matter immensely and have a very significant influence on our

estimate of the unadjusted GPG. For example, as this paper will show the earnings period on which we base our estimate of the GPG matters – such as whether we are comparing male and female earnings on an hourly, weekly, monthly or annual basis. We also show that whether we compare all males to all females or consider separately the gap in pay between males and females who work part-time and full-time also matters. This paper also shows that when we compare the earnings of males and females with the same characteristics such as, for example, with the same working pattern or the same level of educational attainment or the same personal/family circumstances, and so in this sense we make a 'partial adjustment', our estimate of the size of the gender pay varies substantially by characteristic. In so doing, this data shows us that gendered differences in pay are not spread equally across the labour market. Furthermore, we also show that our estimate of the unadjusted gender pay gap is also significantly influenced by which measure of the average we choose to compare and whether our estimate is based on a comparison of mean or median earnings.

This paper is structured as follows. Section 2 provides an overview of the current legal and policy context in which this work is situated. Section 3 provides a critical appraisal of the various different criteria which need to be taken into consideration when we are measuring the gender pay gap and the impact which these differences can have on the estimate of the unadjusted gender pay gap. Section 4 provides an overview of the way in which official international and national bodies measure the unadjusted gender pay gap. This section points to the lack of consensus on a single metric with which to assess it, but a nonetheless nonsensical preoccupation across each with only using a single metric when estimates are being made. Section 5 and Section 6 focus on Northern Ireland. Section 5 outlines the data utilised for the Northern Ireland element of the study. Section 6 subsequently presents Northern Ireland estimates of the unadjusted gender pay gap. Section 7 and Section 8 focus on the Republic of Ireland. Section 7 outlines the data utilised for the Republic of Ireland, with Section 8 subsequently presenting estimates of the unadjusted gender pay gap in the Republic of Ireland. Section 9 seeks to bring together and compare the findings in Northern Ireland and the Republic of Ireland. Section 10 concludes.

SECTION 2 CURRENT LEGAL AND POLICY CONTEXT

This section sets out the current legal and policy context in which this paper is situated. This section is not intended to be exhaustive in terms of detailing the full historical legal and policy context but rather outlines the nature of the most recent substantial policy intervention which seeks to tackle the gender pay gap (GPG).

Several countries have begun to look at the effectiveness of existing approaches and consider supplementary measures. One of the key mechanisms being used currently in this regard in both the United Kingdom and the Republic of Ireland is pay transparency legislation. In essence, pay transparency legislation seeks to force employers to track, report, understand and ultimately explain their unadjusted GPG.

In the United Kingdom, GPG reporting regulations were introduced in 2017 under the Equality Act 2010 and require public, private and voluntary sector organisations with 250 or more employees to publish and report specific figures about their GPG in England, Scotland and Wales, but not Northern Ireland. The regulations put in place the requirement for employers to publish annually their GPG using six different measures including the: mean GPG, median GPG, mean bonus gap, median bonus gap, bonus proportions; and the proportions of males and females which fall into each quartile pay band. These figures are analysed by relevant organisations on April in each year and the GPG report must be filed within 12 months and thereafter on an annual basis. This information is publicly available and failure to comply can lead to fines as well as reputational damage.

In Northern Ireland the Employment Act (Northern Ireland) 2016 provides for similar GPG reporting regulations to be introduced. However, as yet the Northern Ireland Executive has not imposed duties on employers via a set of statutory regulations. Moreover, as yet there also has been no underpinning consultation work carried out on draft GPG reporting regulations. Initially, the rationale for Northern Ireland falling behind in these regulations was put down to the fact that the Northern Ireland Executive had collapsed and was not functioning during the time that the regulations were enforced across the rest of the United Kingdom. However, we are now almost a year down the track of the Northern Ireland Executive having reconvened

(January 2020) and no further progress has been made on this issue. In this regard however it is important to mention that amongst a wide range of issues the 'New Decade, New Approach' agreement makes commitments that will encourage and support women into work, including the introduction of both a gender equality strategy and a childcare strategy to 'identify resources to deliver extended, affordable and high quality provision of early education and care initiatives for families with children aged 3-4.'. It is anticipated that these strategies will be published by the end of 2021 (Northern Ireland Executive, 2020).

In the Republic of Ireland, in 2018, the Minister for Justice announced the GPG Information Bill, as part of a range of measures aimed at reducing the GPG and promoting wage transparency. The Bill sought to amend the Employment Equality Act 1998 to require regulations to be made that would require certain employers to publish information in relation to the GPG in their organisations. Specifically, the Bill sought to require employers to publish information relating to the pay of their employees for the purpose of showing whether there are differences in such pay referable to gender and, if so, the size and reason for such differences. The regulations as laid out were only to apply to employers with 250 or more employees in the first two years after introduction. In the third year, the requirements would also apply to employers with 150 or more employees and thereafter, the requirements would apply to employers with 50 or more employees.

Under the proposed regulations the information which must be provided by employers includes the following: mean hourly GPG, expressed as a percentage; Median hourly GPG, expressed as a percentage; mean bonus GPG, expressed as a percentage; median bonus GPG, expressed as a percentage; mean hourly part-time GPG, expressed as a percentage; median hourly part-time GPG, expressed as a percentage; percentage of male and female employees who are paid bonuses; percentage of male and female employees who receive benefits in kind (Visser, 2019). In addition, employers will be required to publish, concurrently with the above GPG information, the reasons for such differences and the measures (if any) taken or proposed to be taken by the employer to eliminate or reduce such differences. While significant progress has been made, the legislation has not yet been enacted. The Bill progressed to the fourth committee stage of the Dáil in July of this year (Houses of the Oireachtas, 2020).

SECTION 3 MEASURING THE GENDER PAY GAP

On a basic level, the GPG refers to the difference between the earnings of males and females. There are however different ways of measuring the GPG, and the methodology used to estimate the GPG has a significant impact on the estimated magnitude of the GPG. There is however often little discussion across the literature about how we measure the GPG. Rather it is more common for different studies to simply state how they measure the GPG, with little to no critical appraisal as to how their measure compares with what measure other studies use - and ultimately how measurement decisions influence the estimated size of the GPG.

This section discusses the various different ways in which we can measure the GPG and the various different decisions which have to be made in doing so, as well as how these decisions impact on our estimate of the GPG.

3.1 Unadjusted and adjusted gender pay gaps

When comparing the earnings of males and females there are two overarching ways in which we can estimate the size of the GPG which include *unadjusted* and *adjusted* forms. When the GPG is calculated by simply comparing the pay of all males to that of all females the estimate is known as the unadjusted or 'raw' GPG. Calculated in this way, the GPG does not take into account all of the different factors or characteristics of males and females that may play a role in determining or explaining the differences, such as for example differences in education, occupation, sector of employed, hours worked etc. On the contrary, when the GPG is calculated after accounting or controlling for underlying differences in characteristics between males and females the estimate is known as the 'adjusted' GPG.

Comparing the unadjusted or raw differential between males and female earnings (irrespective of whether we use hourly, weekly or annual earnings; focus on full-time or part-time workers; or use the mean or the median) as a measure of the GPG is useful due to both its simple calculation and in giving an overall picture of the differences between male and female earnings. However, it is important to bear in mind that estimates of the GPG calculated in this way oversimplify an issue which is complex by nature. Estimates of the GPG calculated based on the raw or 'unadjusted' gap in male and female earnings do not explain why or where gaps

exist and can often disguise the fact that the GPG is caused and thus can be explained by a number of complex factors. In this way, the unadjusted GPG captures a concept that is broader than the concept of 'equal pay for equal work or work of equal value'. Its measurement covers both possible discrimination between males and females through 'unequal pay for equal work' and also the differences in the average characteristics of male and female employees. That is, males and females have different personal/family/household characteristics and job characteristics, which ultimately impact their pay.

As such, whilst the overall unadjusted GPG is useful in measuring overall gendered pay equality due to its simple calculation; it does not measure the difference in earnings between male and females doing the same job, in the same sector, with the same working pattern or with the same level of educational attainment. It also does not measure the difference in earnings between males and females with the same personal/family circumstances. Furthermore, the overall unadjusted GPG does not illustrate the fact that the size of the GPG varies across different characteristics. For example, previous research has found there to be a large gender gap in earnings amongst males and females with children, whereas only a small gap in the earnings of males and females with no children.

The unadjusted GPG also does not allow us to see if and how much of the difference in earnings between males and females can be explained by differences in the average characteristics of male and female workers. These differences in the average characteristics can result from many factors, including the segregation of males and females in particular sectors or occupations. For example, previous research has found that females are more likely to work part-time and work in lower-paying sectors, whereas males are more likely to work full-time in higher-paying sectors (Wilson, 2017). Of course, it is important to not jump to the conclusion that reducing female workers reliance on part-time work and increasing their employment in higher paid sectors, would automatically reduce the GPG, because the causality is more complex. This is because for example females working part-time and in lower paying sectors tend to have lower education, although of course this is not the case for every individual.

On the other hand, the adjusted GPG seeks to take into consideration differences in the average characteristics of male and female workers and so estimate how much of the gap in

earnings remain after we account for differences in characteristics of males and females. In this way, the adjusted GPG allows us to determine how much of the GPG can be 'explained' by differences in characteristics and how much of the gap remains 'unexplained'. In this sense, the adjusted GPG allows us to get closer to an estimate of how much of the GPG is owing to 'unequal pay for equal work'. Nonetheless, it is important to point out that whilst the adjusted GPG, i.e. the proportion of the unadjusted gap that remains unexplained by the variation in the explanatory factors/characteristics considered between males and females, may reflect discrimination to some extent.

However, one cannot simply assume that the entire adjusted GPG i.e. the unexplained gap relates to gendered pay discrimination, as all other factors that potentially influence the gap may not be fully captured in the available data. That is, more accurately the remaining gap is picking up all of the unobserved differences associated with gender. In addition, discrimination may influence the explained component of the wage gap where it shapes the distribution of the observable characteristics between men and women. Thus, while discrimination may well be a factor, its relative weight remains unknown. In this sense, it is important to bear in mind that some of the factors that are known to contribute to the GPG might also obscure various levels of discrimination that work indirectly. For instance, females might choose to undertake various forms of education or enter certain occupations which they consider more accessible to them. This selection effect might in turn be related to their perceptions of the problems of entry into the 'male world' (Bettio and Verashchagina, 2009).

It is fairly common in public discussions of the GPG for people to posit that the adjusted GPG is a superior measure of the GPG than the unadjusted GPG. Specifically, some people argue that because the unadjusted GPG does not control for differences in male and female characteristics that it is simply reflecting differences between males and females and so does not provide a true or accurate reflection of the GPG. Furthermore, they tend to argue that because the adjusted GPG is often smaller than the unadjusted GPG, that the gender gap in pay in the labour market is not actually an issue which should be of significant policy concern. Related to this viewpoint is the incorrect assumption that the 'true' measure of the GPG is one which captures the extent of differences in pay owing to gender-based discrimination. For example, a publication by Ibec (2017:10) posits this very point and argues that because

unadjusted measures of the GPG do not only capture discrimination they 'reflect a gender representation gap rather than a true….GPG'.

Of course, there are a number of reasons why this assumption is incorrect not least because of the incorrect assumption that the only issue of interest when it comes to the GPG is differences owing to discrimination. Aside from anything else, this position is based on the incorrect assumption that the adjusted GPG provides an estimate of how much gender-based discrimination affects differences in pay when in fact, as discussed above, this is not the case. Moreover, this position ignores the benefits of observing unadjusted differences in pay between males and females as opposed to just the adjusted GPG. Specifically, assessments of the GPG which are unadjusted provide a particularly useful tool to assess the overall extent and complexity of gender pay inequality in the labour market and the overall differential economic returns from work rewarded to females as compared to males.

Additionally, it is often difficult to compare assessments of the adjusted GPG across different studies, time or countries because of the fact that there is no consensus on what characteristics we should adjust for. As such, it is difficult to compare differences across studies and to determine how the adjusted GPG is being driven by differences in data, data availability and what explanatory characteristics. Furthermore, it is unclear whether there are true differences across studies, over time or across countries in how much of the unadjusted GPG can be explained by explanatory characteristics and how much remains unexplained.

Nevertheless, of course, the very fact that the adjusted GPG allows us to see how important the differences in particular characteristics which we investigate are in determining overall differences in pay between males and females and so see how much of the unadjusted gender gap we can 'explain' this measure has its own benefits and advantages. For these reasons, rather than conclude that either unadjusted or adjusted measures are superior or inferior to the other, a fairer conclusion is that these different approaches to assessing the GPG have advantages. There is strong merit in assessing both.

3.2 Who do we compare?

In estimates of the GPG decisions have to be made about which groups of workers we are comparing. In this regard, it is common to see the GPG based on an estimate of the size of the pay gap between full-time workers only. For example, estimates of the GPG that are published by the OECD (2020) are based on a comparison of median hourly earnings of full-time employees only. Similarly, it is common to see studies concerned with the adjusted GPG to focus only on full-time employees, because of the substantial differences in the ways in which full-time and part-time workers engage in the labour market in terms of for example, where they work and what they work at. Thus, from this perspective it is argued that differences in characteristics between males and females are of differential importance in driving the GPG in the full-time and part-time labour markets. Data limitations on the part-time labour market mean that such studies tend to only be able to assess the full-time labour market.

However, it is widely recognised in the literature that it is not sufficient in today's labour market to only look at the gap in full-time male and full-time female earnings in isolation. In this sense, this is a problem because when we focus only on the GPG amongst those who work full-time, we implicitly ignore the fact that women are more likely to work part-time or in 'non-standard' employment arrangements for gender related reasons. This ignores the fact that even on an hourly basis the average returns to part-time work are significantly lower than the returns to full-time work. As such, some argue that in order to take into account the structural differences in the labour market and to give an accurate representation of the overall extent of gender inequalities in pay in the labour market we need to compare the earnings of all male earnings to all female earnings (International Labour Organisation, 2018).

However, one disadvantage of using a measure that includes all employees is that the combining of the full-time and part-time labour markets muddies the water. That is, by taking together and examining as one the full-time and part-time labour markets the different composition of males and females into full-time and part-time work is muddied with the different gendered pay distributions of full-time and part-time work. This has two troublesome consequences, the first of which relates to the fact that when we combine the two and look at the overall unadjusted GPG we cannot see how much of the gap relates to the different composition of males and females into full-time and part-time work and the fact that full-time

and part-time work is rewarded differently in the labour market. This is fundamental, because as mentioned above, irrespective of gender those who are employed on a part-time basis earn significantly less, even on an hourly basis, than those who are employed full-time. The second relates to the fact that when we combine the two, we cannot see what the gender gap in pay is within the full-time labour market and separately within the part-time labour market.

Thus, whilst it is fair to conclude that an overall comparison between all male and all female earnings offers us the opportunity to get a broad sense of the overall gap in earnings between males and females by splitting the data and separating out full-time and part-time workers we adjust for how different working patterns affect the nature of the GPG and illustrate the fact that overall differences in pay are influenced not just by gender, but also by differences that exist between part-time and full-time workers.

For the same reasons as outlined above, unadjusted GPGs can also be analysed across different groups of workers based upon numerous different work/job characteristics, as well as personal/household characteristics. In this sense, just as the overall unadjusted GPGs can conceal the differences that exist across and within full-time/part-time workers they similarly can conceal differences across and within other characteristics. As such for the same reasons as there is merit in separating out the unadjusted GPG for full-time and part-time workers. There is also merit in looking at differences in the returns from work for workers with different characteristics (for example, comparing pay across different occupations), as well as the differences which exist between males and females with the same characteristics (for example, comparing gender pay differences within different occupations) i.e. the differences which exist once we have made a partial adjustment.

3.3 What measure of earnings: Hourly, weekly, monthly or annual pay?

When seeking to estimate the GPG, the earnings period for which the earnings data covers (hourly, weekly, annual earnings) also matters - a lot. Specifically, the size of the difference in male and female pay depends on whether earnings are measured by hour, week, month or year. The size of the GPG is often larger when we look at the size of the gap using weekly, monthly or annual pay, compared with when we use hourly pay. This is because females and

males tend to engage in the labour market differently in that males are more likely to be employed full-time and females are more likely to be employed part-time.

However, so as to ensure that differences in hours worked by males and females do not distort estimates of the GPG there is a broad consensus that estimates of the GPG should be assessed via differences in hourly earnings, as opposed to weekly, monthly or annual earnings. From this point of view, it is thought that hourly earnings provide a better like-for-like comparison of male and female earnings because it adjusts for the fact that there are significant differences in the working hours of males and females (Hicks and Thomas, 2009). However, many disagree with this viewpoint and argue that to get an overall picture of gender inequalities in terms of pay we should look at differences in gender pay over a longer time period than hourly earnings such as by week, month or year because the very reasons behind why women tend to work fewer hours than males are in themselves gendered. As such, it is argued that by not taking into account the fact that various gender related disadvantages combine and mutually reinforce each other we do not capture the true extent of the GPG (Anderson *et al,* 2001). To make this point Lips (2003) uses the example of a woman applying for a mortgage or a loan 'When a woman applies for a mortgage or a car loan, she is not asked about her hourly income. The income statistic that affects whether or not she gets the loan, and indeed what kind of life she is able to afford, is her annual income.'

Similar to the rationale for assessing the GPG using hourly earnings, rather than over a longer time period, many argue that we should exclude any overtime hours or overtime pay in the estimation of the GPG. That is, we should compare differences in male and female basic pay only. The specific rationale here is that because men work relatively more overtime than women, by including overtime the size of the GPG could be skewed by the higher likelihood of men working overtime hours. However, others argue that the very reasons why females tend to work less overtime hours than males are also gendered, in that because women bear the majority of the day-to-day responsibility for looking after children or dependent relatives, they have less time to work overtime. Consequently, some argue that in order to get a true estimate of the GPG disadvantages such as this one should be incorporated into estimates of the size of the GPG, rather than excluded so as to isolate and estimate only the gender gap in basic hourly earnings. Others argue that as long as the measure of hourly pay is based on a

measurement which includes both overtime hours and overtime pay the GPG is not skewed by the higher likelihood of men working overtime, but rather the average hourly pay estimate more accurately captures average pay per hour – for both males and females.

3.3 Which measure of the average?

When looking at differences between men's and women's pay there is a choice as to which point of the earnings distribution we seek to compare and whether estimates of the gap in earnings are based upon differences in mean or median earnings. The mean is the most common measure of central tendency and is calculated by adding up all the numbers (earnings) and then dividing by how many numbers there is (number of employees). The median is the point at which half of employees earn more and half earn less.

It is important to understand that estimates of the GPG are affected by whether mean or median earnings are used. In this way, the mean provides a summary statistic that has the advantage of considering the earnings of every worker. The downside of this measure however it that it is more sensitive to change at the tails of the earnings distribution. Median measures of central tendency provide a more stable measure of the average as they are less affected by extreme values and so minimise the impact of a small number of very high or very low earners on the GPG. It should still be noted that median earnings will be affected if the number of high or low earners changes as this would affect where the middle point of the distribution would fall.

However, given that those on very high earnings are predominantly male, and those on very low earnings predominantly female, the mean should not be ignored and indeed is an important measure of female labour market disadvantage, as compared to males. In this sense, estimates of the GPG based on the mean take into consideration the fact that male and female earnings are skewed and so allow us to better capture the difference in men's and women's pay across the whole of the earnings distribution. Furthermore, another advantage of the mean, over the median, is that the multivariate methods of data analysis that are typically used to examine the GPG - ordinary least squares regression and standard decomposition techniques - are based on the mean.

SECTION 4 INTERNATIONAL AND NATIONAL MEASURES AND ASSESSMENTS OF THE UNADJUSTED GPG

International data on the unadjusted GPG is patchy although it is typically collected and disseminated by either Eurostat, the OECD or the International Labour Organisation. This section provides an overview of the way in which each of these international bodies measure the unadjusted GPG. From doing this, what is most clear is the lack of a consensus on one measurement tool through which to assess the unadjusted GPG. This means that estimates of the unadjusted GPG across each of these international organisations are often not directly comparable, because the way in which they measure the unadjusted GPG often differs. Furthermore, as we will see as we move to Section 4.2 and Section 4.3 this lack of consensus on how to measure the unadjusted GPG at an international level is similarly mirrored at national level. There is no consensus in the United Kingdom, and within it in Northern Ireland nor in the Republic of Ireland on how to measure the unadjusted GPG. The result of this, as we will see, often means that even official publications looking at the GPG tend to be based on different measures or use different methodologies, with little and more often no discussion on this actually being the case. This is of troubling, not least because it suggests an unawareness of how much the metric used matters, but also in doing so narrows the discussion and narrative on the size of the unadjusted GPG.

4.1 International measures and assessments of the unadjusted GPG

Eurostat (2020) measures the GPG as the percentage difference between the mean gross hourly earnings of female paid employees compared to female paid employees. Based on this measure they present data which show that in the EU-28 in 2018, women earned 15.7% less than males (Eurostat, 2020). On average, when comparing the unadjusted gross hourly earnings of all males and all females, females earned less than men in all EU member states, however this GPG varies considerably between countries. The largest differences were observed in Estonia (22.7%), Czech Republic (20.1%), Germany (20.9%), and the United Kingdom (19.9%). On the other hand, the smallest differences in earnings between women and men were found in Romania (3%), Luxembourg (4.6%), Belgium (6%). In 2017 in Ireland (the latest date for which there is available Eurostat data), the GPG was calculated provisionally at 14.4% (Eurostat, 2020).

The OECD uses a different methodology to calculate the GPG (OECD, 2020). The OECD calculate the GPG by looking at the size of the gap between the median hourly earnings of full-time male employees versus the median hourly earnings of full-time female employees. In 2018, the GPG across all OECD countries was estimated at 12.9%. In line with that seen from estimations across European countries, median earnings of full-time male employees were higher than the median full-time earnings of women's earnings across all OECD countries (OECD, 2020). There is however considerable heterogeneity across countries ranging from being smallest in Belgium (less than 5%) and widest in Korea (over 25%). Interestingly, at 16% the GPG in the United Kingdom is significantly higher than the OECD average GPG.

Headline data presented by the International Labour Organisation (ILO) on the scale of the unadjusted GPG is calculated based on the difference between mean hourly earnings of all males and females. Their most recent calculation of the global GPG estimates females to be paid around 20% less than males per hour at the mean (ILO, 2018). It is important to note however that the ILO however recognise the shortcomings of this measure and in their most recent report on global wages they present estimates of the GPG across countries based on two earnings periods (hourly and monthly) and using two measures of the average (median and mean) (ILO, 2018). Furthermore, they flag the benefit of what they call a 'factor weighted GPG' which weights the unadjusted GPG based on four factors: education, age, working-time status, and public/private sector (ILO, 2018).

4.2 Northern Ireland official measurement and assessment of the unadjusted GPG

Neither the United Kingdom Government, nor the Northern Ireland Executive produce any official reports or estimates of the GPG. The only official source of information produced in the UK on the GPG is in the annual reports from ONS and NISRA based on the Annual Survey of Hours and Earnings. This annual report presents estimates across the whole-economy on overall levels of earnings and hours, as well as their distribution and make-up. The results are also produced by gender, and various industrial, occupational and geographical breakdowns, as well as by public and private sector, and by age group. Thus, whilst not focused on the GPG the annual report based on ASHE produced by the Office for National Statistics (ONS) and the Northern Ireland Statistics and Research Agency (NISRA) is the only official source.

Nevertheless, in recent years NISRA as part of the ASHE publication have dedicated a section of their report to the GPG. In this they present the GPG as the gap which exists between males and females based on median hourly earnings excluding overtime amongst full-time employees only. They also however present estimates of the unadjusted GPG across other groups of employees as well. In their view, hourly earnings are used because they take account of the fact that males are proportionally more likely to work full-time than females. Nevertheless, they still narrow their headline measure to full-time employees only. The reason for this is unclear. They exclude overtime based on the argument that it distorts the picture as more men than women tend to work overtime. The median they say is preferred because using the mean can misrepresent the data due to small numbers of very high earners. The most recent data show that for the year up until April 2020 the median hourly earnings excluding overtime of full-time male employees were 3.6% below that of full-time female employees.

4.3 Republic of Ireland official measurement and assessment of the unadjusted GPG

The Republic of Ireland Government does not publish regularly an estimate of the unadjusted GPG, with estimates on its size usually taken from what is reported by Eurostat which is based on the gap in hourly earnings between all males and all females.

One of the general statistics publications published by the Central Statistics Office includes the 'Women and Men in Ireland' report (Central Statistics Office, 2019). This report includes a comparison of male and female earnings. However, it is interesting to note that the latest publication in this series was published in 2019 with estimates of the GPG based on a comparison of median annual earnings. For information purposes it finds median annual female earnings to be 21.7% below that of male earnings (Central Statistics Office, 2019). Whilst no rationale is given for the measure used it is worth noting its use as this is one of the only publications from the Central Statistics Office which presents the comparison based on this measure.

Indeed, it is more usual to see earnings data and specifically in this regard comparisons of earnings by gender as published by the Central Statistics Office to be based on mean hourly or weekly earnings. For example, the 2013 and 2016 'Women and Men in Ireland' report (and

indeed 'Women and Men in Ireland' reports prior to the most recent publication) presents the comparison based on mean hourly earnings (Central Statistics Office, 2013; Central Statistics Office, 2016).

Nevertheless, another key publication from the Central Statistics Office in this regard focused on historical earnings by gender over the period 1938-2015 with estimates of the GPG based upon mean weekly earnings (Central Statistics Office, 2017). From this, the long-term decline in the GPG is most notable, albeit by 2014 female mean weekly earnings were still 22.6% below that of male mean weekly earnings.

SECTION 5 DATA FOR NORTHERN IRELAND

5.1 The Data Source: Understanding Society

For the empirical analyses for Northern Ireland this study utilised data from the Northern Ireland element of the Understanding Society survey (University of Essex *et al,* 2018). The Understanding Society survey is a longitudinal annual survey of households and is the principal panel household dataset in the UK. This survey began in 2009 and replaced the British Household Panel Survey (BHPS) which ran from 1991-2008. It is commissioned by the Economic and Social Research Council (ESRC) and led by the Institute for Social and Economic Research (ISER) at the University of Essex. However, despite being a longitudinal survey, this paper only utilises the latest wave of data (Wave 8) to carry out cross-sectional analyses. Wave 8 data of Understanding Society was collected via a computer assisted individual questionnaire, with interviews attempted with all individuals aged 16 or more in each household. The majority of interviews (69%) were conducted face-to-face, although the questionnaire also included a computer assisted self-completion section for the collection of more sensitive, personal information. There were also a large number of web interviews completed (30% of all interviews) and 1% of respondents took part by telephone. The Wave 8 fieldwork started in January 2016 and ended in May 2018.

The Northern Ireland sample of Understanding Society was based on an unclustered systematic random sample of addresses, selected from the Land and Property Services Agency list of domestic addresses. Interviews were carried out with 1,427 households and 2,550 individuals. Given however that this study is focused on estimating the size of the GPG for those in employment the sample was restricted to those aged 16 years or more and in employment. This results in a final sample of 1,079 individuals.

Weights are used in all analyses in order to adjust for unequal selection probabilities, differential non-response, and potential sampling error. In particular, the weight adjusts for the higher sampling fraction in Northern Ireland and for different probabilities of selection of an ethnic minority boost sample, as well as for differences in the response rate between sub-groups of the sample. The variable used to weight the data in this study was "indpxui_xw", for which further details can be found in the technical report (Knies, 2018).

5.2 Technical details on the derived measures of earnings

Data from the Understanding Society survey provides an accurate estimate of earnings and so provides a good (valid/reliable) source of data through which to investigate the GPG. Indeed, research investigating the quality of income and earnings data in Understanding Society found that the data collected is of high quality and compares favourably to that collected in the Households Below Average Income (HBAI) survey (Fisher, 2019). The HBAI is the data source for official UK statistics on the income distribution and is frequently noted as the best source of income data available for the UK.

The Understanding Society survey provides the necessary data required to assess the GPG in terms of hourly, weekly and annual pay. In particular, the following pay related variables were used from the Understanding Society survey data as obtained from the UK Data service:

Gross monthly pay: The Understanding Society dataset provided a derived measure of total gross monthly pay. This is the sum of three earnings components: net usual pay (w_paynu_dv); net self-employment income (w_seearnnet_dv); net pay in second job (w_j2paynet_dv), which is gross pay in second job (w_j2pay_dv) [Variable name: w_fimnlabgrs_dv].

Working hours: Respondents were asked to detail how many hours they normally work each week, excluding overtime and meal breaks [Variable name: h_jbhrs].

Overtime working hours: Respondents were asked to detail the number of overtime hours they usually work in a normal week [Variable name: jbot].

Paid overtime working hours: Respondents were asked to detail the number of paid overtime hours they usually work in a normal week [Variable name: jbot_pd].

These data were then utilised to derive estimates of hourly pay, gross hourly pay, gross weekly pay and gross annual pay the technical method of which is detailed below.

Respondents were asked to report their usual gross monthly pay. Subsequently, an estimate of weekly gross pay was derived from monthly pay by dividing it by 30 and multiplying it by 7. Similarly, an estimate of annual pay was derived from monthly pay by multiplying it by 12.

In order to derive an estimate of basic hourly pay weekly pay was divided by working hours. Importantly, however, because weekly pay included income from overtime, and data on weekly working hours did not in order to estimate gross hourly pay it was necessary to calculate the

total number of working hours (both basic hours and overtime hours) worked by a person and divide it by the total weekly pay including overtime. However, in order to estimate basic hourly earnings, it was necessary to remove overtime earnings from monthly pay. To do this, we utilised data which captured the number of paid over time working hours a respondent usually worked, and multiplied this by their overtime hourly pay rate to obtain a weekly total of overtime pay. We then scaled this up to get an estimate of monthly overtime pay. From here, monthly overtime pay was detracted from gross monthly pay. An estimate of hourly pay was then derived by dividing gross monthly pay by normal working hours excluding overtime and meal breaks.

5.3 Comparing estimates of the GPG using Understanding Society survey data versus Annual Survey of Hours and Earnings data

It is worth mentioning that estimates of earnings obtained using data from the Understanding Society survey are different from those obtained using data from the Annual Survey of Hours and Earnings. We attribute this to a number of reasons, including the different means of data collection in both surveys. Nonetheless, we remain satisfied with the quality of earnings data collected in both.

Understanding Society is a household survey, whereby data are collected directly from respondents. The Annual Survey of Hours and Earnings (ASHE) is based on a 1% sample of employees on the pay as you earn register (PAYE) with employers responsible for providing employee information. Furthermore, another reason suggested for differences in estimates is that Understanding Society survey data is more likely to obtain responses from low-paid workers. This is because low-paid workers whose earnings fall below the National Insurance Lower Earnings Limit will not be included in the PAYE register and so not be included in ASHE. Furthermore, ASHE excludes those who have not been in continuous employment for at least 12 months. Existing evidence showing that substantial proportions of females are low paid it was posited that the Understanding Society survey data provided the most suitable data given the focus of this study.

Another reason as to why this study utilised data from Understanding Society, rather than ASHE is that despite being one of the largest datasets on earnings for Northern Ireland, ASHE lacks key variables necessary to conduct a full analysis of factors which can explain the GPG. In this way, the Understanding Society survey facilitates the production of estimates of differences in men's and women's pay by different personal characteristics which are not available in ASHE, such as for example number of dependent children and education. Of course, all data sources come with their limitations in terms of data availability and in the context of this study the most notable is the lack of data capturing job tenure.

Table 1 : Median Earnings estimates in Understanding Society versus Annual Survey of Hours and Earnings, 2017

	Hourly pay - Excluding overtime (£)		Gross Hourly pay (£)		Gross Weekly pay (£)		Gross Annual pay (£)	
	US	**ASHE**	**US**	**ASHE**	**US**	**ASHE**	**US**	**ASHE**
All	10.26	11.00	10.69	11.06	350	407.4	18000	21,215
Male	10.98	11.43	11.13	11.55	430.42	464.3	22137	24,324
Female	10.02	10.45	10.23	10.52	303.33	334.1	15600	17,599
Full-time	11.26	12.31	11.56	12.46	432.25	500	22230	25,935
Part-time	8.18	8.65	8.20	8.65	166.62	175.5	8569	9,871
Male Full-time	11.38	12.22	11.56	12.38	455	514.20	23400	26,716
Female Full-time	10.89	12.52	11.50	12.63	419.88	480.00	21594	24,935
Male Part-time	7.26	8.03	7.24	8.05	118.86	157	6112	x
Female Part-time	8.45	8.94	8.52	8.94	175	181.5	9000	10,106

* US = Understanding Society, ASHE = Annual Survey of Hours and Earnings. Both Understanding Society and ASHE data relates to 2017.

Furthermore, whilst the data collected from the Understanding Society survey and the ASHE provide different estimates of earnings reassuringly estimates of the overall GPG presented in this study using the Understanding Society survey are approximately similar to that which are obtained using the ASHE data (See Table 2). This provides reassurance in terms of the validity and reliability of the estimates presented in this paper.

Table 2: Comparing estimates of the unadjusted GPG using median earnings in Understanding Society versus the Annual Survey of Hours and Earnings, 2017

	Hourly pay - Excluding overtime (£)		Gross Hourly pay (£)		Gross Weekly pay (£)	
	US	**ASHE**	**US**	**ASHE**	**US**	**ASHE**
All Female vs. All Male	-8.7	-8.57	-8.1	-8.92	-29.5	-28.0
Female Full-time vs. Male Full-time	4.3	2.45	-0.5	2.02	-7.7	-6.7
Female Part-time vs. Male Part-time	25.7	11.33	17.68	11.06	47.2	15.6
Female Part-time vs. Male Full-time	-23	-26.84	-26.29	-27.79	-61.5	-64.7

* US = Understanding Society, ASHE = Annual Survey of Hours and Earnings. Both Understanding Society and ASHE data relates to 2017.

SECTION 6 THE GPG IN NORTHERN IRELAND

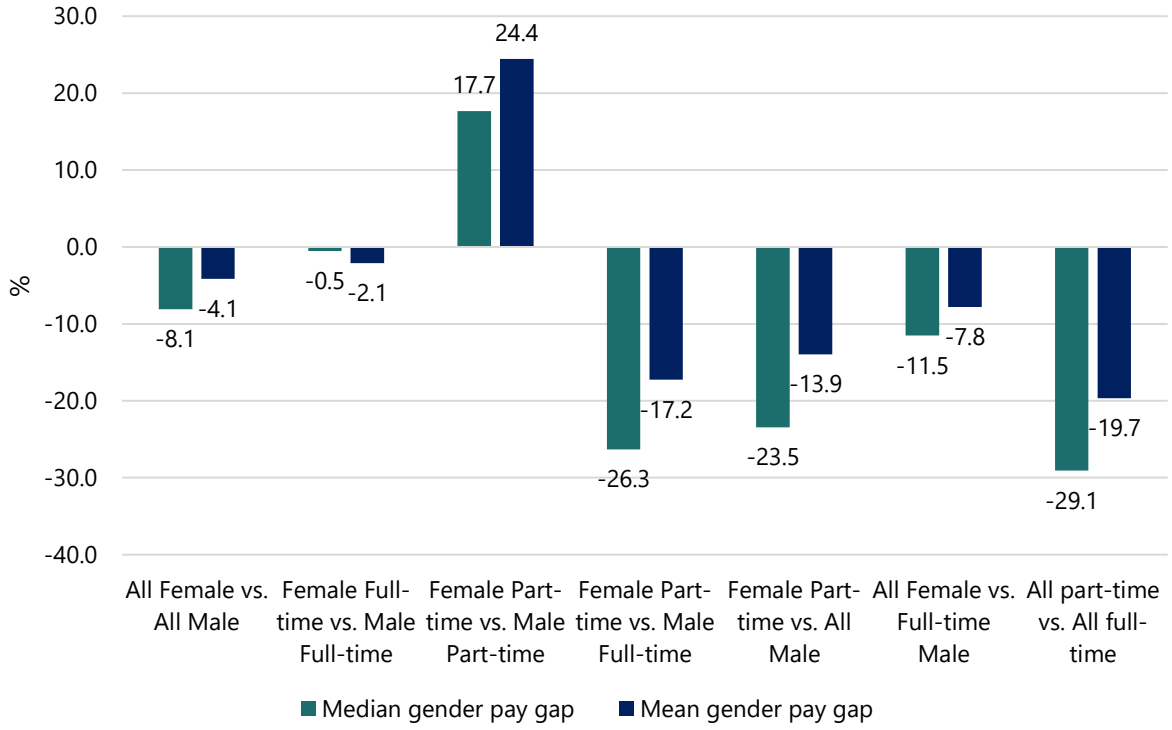
6.1 An overview of the GPG in Northern Ireland

6.1.1 Gender Pay Gap in hourly earnings by working arrangement

We begin our analysis by looking at the average GPG with Figure 1 below presenting estimates of the unadjusted GPG in gross hourly earnings at both the median and the mean.

In comparing the median hourly pay of males and females we see that female earnings were 8.1% below male earnings (See Figure 1 below). In nominal terms gross hourly female earnings are 91p less per hour on average than males (See Appendix 1). Estimates of the overall gender gap in mean hourly pay show a considerably smaller gap in earnings, with a difference of 4.1% in the mean hourly pay of males and females. This means that for every £1 earned by a male, females earned on average just under 96p.

Figure 1: Gender Pay Gap in median and mean hourly pay: Percentage difference in female earnings as compared to male earnings



At this stage it is worth drawing attention to the significant difference in the estimate of the overall unadjusted GPG when the measure is based on the median as compared to the mean. These differences of course relate to the complexity of the underlying earnings distributions of males and females which neither of these summary measures can truly capture, but nonetheless the substantial difference in the estimates serves to highlight how only relying only on one or the other can alter our perceptions and conclusions in regards to the GPG.

Furthermore, as discussed in Section 3, it is also often argued that assessments of the GPG via the average (median or mean) earnings of all males versus all females are skewed by the different employment characteristics of men and women. In this sense, previous research consistently finds the distribution of women and men between full-time and part-time roles to be key in explaining the reasons behind overall gender differences in pay (Brynin, 2017). Thus, Figure 1 above also presents estimates of the unadjusted GPG broken down by full-time and part-time working arrangements. It is clear from doing this that when we look separately at hourly pay for those in full-time employment and part-time employment the GPG picture becomes a bit more complicated. Specifically, the GPG between males and females in full-time employment is only slight with a gap of 0.5%. Nevertheless, at £11.56 the median gross hourly earnings of males in full-time employment is still higher than that of females in full-time employment at £11.50. In contrast, the gap in mean hourly earnings between full-time males and females is slightly higher at 2.1%.

However, we see that the gap not only widens for those in part-time employment but actually works the other way around. This is often referred to as a 'reverse GPG'. Specifically, there is a reverse median (hourly) GPG of 17.7%, and a gap of 24.4% in mean hourly pay. It is clear that part-time female workers earn considerably more per hour than part-time male workers, although given the difference in the size of the pay gap when estimated using the median compared to the mean it is clear that there is considerable skew in the mean earnings of part-time females. In this sense, it is likely that the estimate of mean part-time hourly earnings is skewed by a small number of high earning females.

It has been argued by some that this part-time measure of the GPG is of limited value because, so few males work part-time. However, this is a hasty conclusion in the context of structural

changes which have been occurring in the labour market in recent years and the increase in the proportion of men working part-time (Rahman, 2018; Wilson, 2017). In addition, the increased importance of paying attention to the part-time GPG is important in the context of research findings from the Resolution Foundation which shows that whilst the full-time GPG has declined in recent decades, the part-time GPG has increased (Rahman, 2018). In terms of Northern Ireland, a cursory glance at trends using published data from the Annual Survey of Hours and Earnings shows similarly that the GPG for full-time workers has narrowed over recent decades, whilst the GPG has increased for part-time workers (NISRA, 2019). However, in more recent years, the full-time GPG has again widened, whilst the part-time GPG has narrowed. Much of the narrowing of the part-time GPG however can be explained by the slowing of income growth for females as compared to males. For example, between 2013 and 2019 part-time male employee gross hourly earnings increased by 31%. This compared to an increase of 17% amongst part-time female employees (NISRA, 2019).

Nevertheless, despite part-time male hourly earnings being lower than part-time female hourly earnings it remains that overall female hourly earnings are lower than average male hourly earnings because of the fact that not only is the hourly pay rate for part-time employment much lower than the pay rate for full-time employment, but also because of the fact that females are much more likely to work part-time than males. Data used in this study estimates the median hourly earnings for part-time employment to be 29.1% lower than the median hourly earnings for full-time employment (£8.20 vs. £11.56). Whilst the gap is smaller when we compare the mean hourly earnings for those in part-time employment compared to full-time employment, there is still a gap of 19.7%. Furthermore, close to 40% of females were employed on a part-time basis, compared to 12% of males.

Some argue that because of the inferiority of part-time earnings as compared to full-time earnings and because of the much higher likelihood of females to work part-time compared to males we should utilise an indicator to capture the overall unadjusted GPG which captures the different employment arrangements in order to accurately assess the GPG (Close the Gap, 2019). Thus, Figure 1 above also presents the gap in hourly earnings between: (i) part-time female earnings compared to full-time male earnings; (ii) part-time female earnings compared to all male earnings; (iii) all female earnings compared to full-time male earnings.

In doing so, what is most clear is that when the GPG is calculated in a way which takes into account the gendered nature of employment arrangements the size of the GPG is much wider. Specifically, as shown in Figure 1 above median part-time female earnings are 23.5% lower than that of median full-time male earnings. The mean difference between part-time female hourly earnings and full-time male hourly earnings is 13.9%.

6.1.2 Weekly/Annual Gender Pay Gap, by working arrangement

As seen in Section 3 others argue that in order to take into account these differences in employment arrangements and illustrate the effect of these differences for male and female earnings on the whole we should compare gendered differences in weekly or annual earnings and calculate the GPG in this way. As shown in Table 3 below, when we assess the GPG via gross weekly or gross annual earnings gender differences in pay are much larger, than when assessed based on hourly earnings. Specifically, assessed on a weekly basis we see that median female hourly earnings were 29.5% less than men per week/per year. Based on mean gross earnings males earned 28.4% more per week/per year than females. In effect, this means that on average females earned just close to 70p for every £1 that males earned on a weekly or an annual basis.

To be clear, the wider GPG when assessed on a weekly or annual basis as compared to an hourly basis can be explained by a combination of the fact that men earn more per hour than females, tend to work longer hours over the week (and year) than women, and are also more likely to receive additional and higher pay for these hours, such as overtime pay. On average, males worked 39.1 hours per week on average, whilst females worked 31.5 hours per week on average (mean). Furthermore, males who worked overtime earned considerably more from overtime working than females. Specifically, males who worked overtime earned £115 per week on average, in overtime earnings, compared to females who earned £88 per week.

Table 3: Gender Pay Gap in earnings Northern Ireland: Percentage difference in female earnings as compared to male earnings

	Median Gross Weekly/Gross Annual Pay Gap	Mean Gross Weekly/Gross Annual Pay Gap
All Female vs. All Male	-29.5	-28.42
Female Full-time vs. Male Full-time	-7.7	-9.42
Female Part-time vs. Male Part-time	47.2	15.54
Female Part-time vs. Male Full-time	-61.5	-147.73
Female Part-time vs. All Male	-59.3	-128.78
All Female vs. Full-time Male	-33.3	-39.05

The difference in estimates of the GPG obtained using the various different indicators above reflects not only the complex nature of the GPG, but also the limitations of relying solely on one indicator or measure of the GPG. Indeed, what is most clear from the above analysis is how much the estimate of the size of the unadjusted GPG varies depending on the measure of earnings and the denominator and comparator used. This point however is not laboured enough across the literature or in estimates of the GPG which are presented by different international and national organisations. As such, the entire discussion and debate around the size of the GPG is muddied by this very fact. There needs to be further recognition that estimating the GPG is a complex task and cannot be accurately captured via a single figure.

What is more, whilst the overall unadjusted GPG is useful in measuring overall gendered pay equality due to its simple calculation; it does not illustrate the fact that differences in earnings between males and females in the labour market arise from both differences in characteristics and also differences in pay for males and females with the same characteristics and the fact that the GPG is much larger or smaller for some groups of workers than it is for others. Thus, Section 6.3 through Section 6.6 below present (a) a breakdown of the differing compositions of males and females in the labour market based on a number of different characteristics, as well as how pay varies by gender across workers with different characteristics; and (b) how pay varies by gender between/within workers with the same characteristics.

6.2 How does the gender pay gap vary across the distribution of earnings?

Figure 2 below shows the distribution of earnings across males and females. It shows the percentage of workers in Northern Ireland with different levels of gross hourly earnings. Earnings are notably concentrated in the bottom half of the earnings distribution, and this is particularly the case for females. Specifically, just over 46% of females earn below £9.50 per hour, compared to 36% of males. In contrast, males are more likely than females to have very low earnings (less than £4.50 per hour) and mid to high earnings.

Figure 2: The distribution of male and female hourly earnings

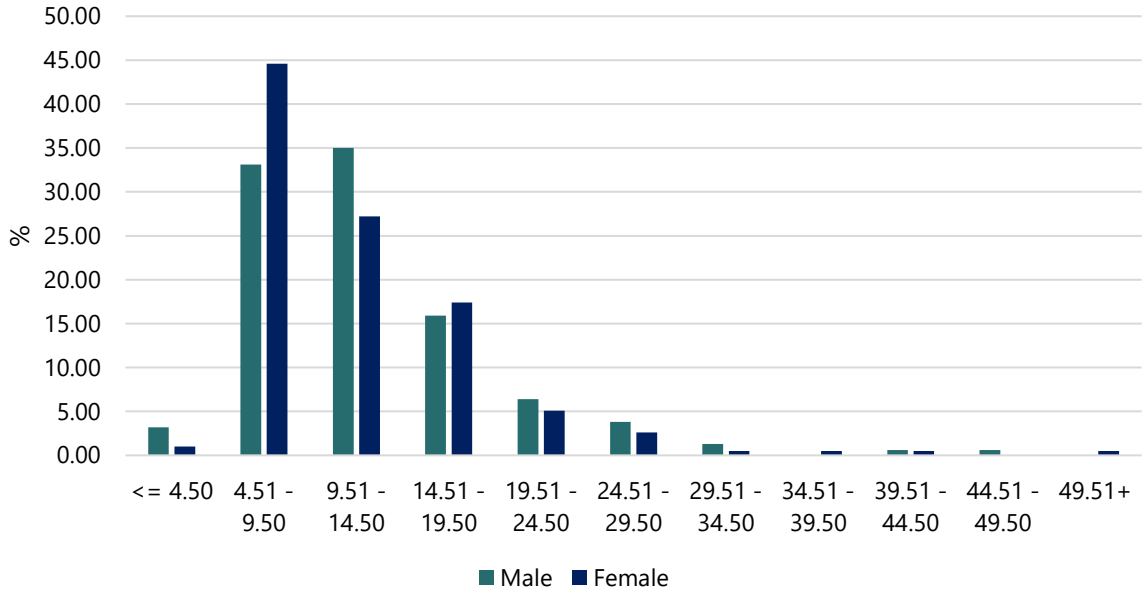
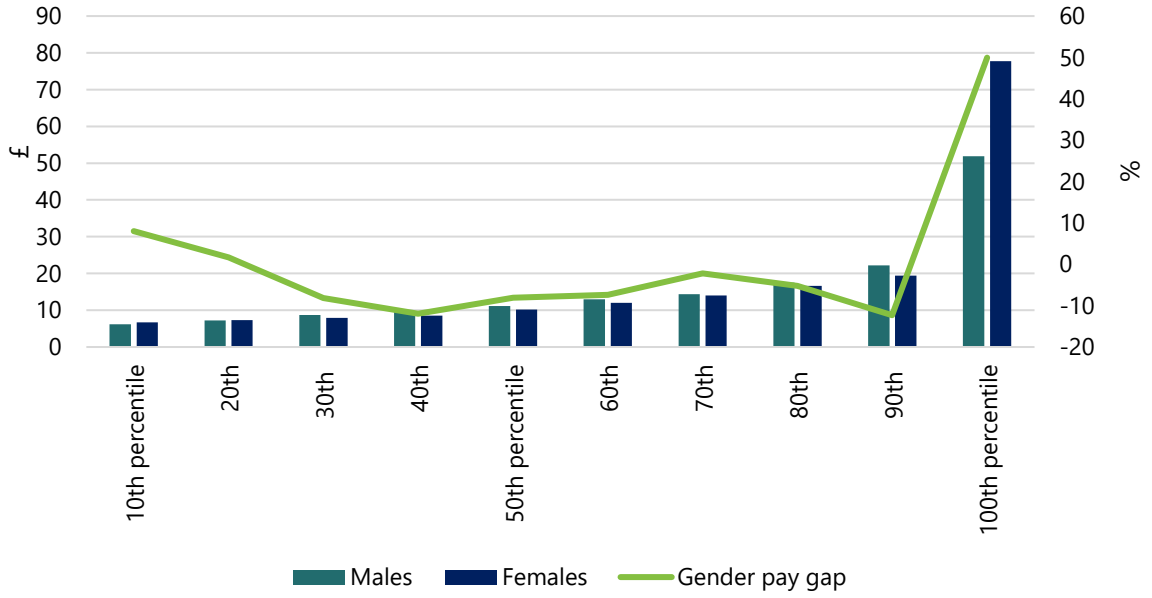


Figure 3 below allows us to establish the extent of inequality in earnings for all workers, as well as the extent of the gap between males and females at different parts of the earnings distribution. In interpreting the data what is most clear is that there is considerable inequality in earnings across the distribution, irrespective of gender. In particular, the gap in earnings between the top percentile and everyone else is particularly striking.

What is also particularly clear however as we look across the income distribution is that across the majority of the earnings distribution females earn substantially less than males. Nevertheless, the widest gaps in earnings are at either tail of the earnings distribution where female hourly earnings are significantly higher than male hourly earnings. At the 10th percentile

females earn just over 8% more per hour than males. The gap at the upper tail of the distribution is significantly higher whereby females earn 50% more per hour than males.

Figure 3: Hourly earnings by gender across income deciles and gender pay gap in hourly earnings



6.3 How do differences and similarities in worker characteristics and household/family structure characteristics affect gender differences in pay?

The overall GPG can disguise widely varying GPGs between different categories of workers and indeed reasons for its existence. In this respect, the overall unadjusted GPG can be determined by two factors, including (a) differences in the characteristics of males and females in our labour market and the differential rewards which workers with different characteristics receive; and (b) differences in pay between males and females for workers with the same characteristics.

In order to gain a better understanding of the nature of the unadjusted GPG we present in Table 4 the composition of male and females within the labour market in terms of different personal/household characteristics. Table 4 also presents the gap in average earnings across workers with different characteristics including age, educational qualifications, marital status, and whether the worker has dependent children. In addition to this we also present in Table 5

the gendered gap in earnings for workers with the same characteristics or household/family characteristics.

Focusing first on age, it is clear from Table 4 below that the age distribution of males and females in the labour force is approximately similar. In general, earnings tend to increase with age as the worker builds up experience and seniority. In terms however of gendered differences in earnings by age, the first point to note is the general trend for females to earn less than males per hour as age increases (See Table 5). This may reflect the fact that male labour market careers tend to have fewer and shorter interruptions than females. Indeed, the results show that across the younger age groups female workers actually earn more on average than male workers, albeit the size of the GPG is relatively small. Median hourly female earnings for those aged 16-29 are 2% higher per hour than males of the same age, whilst median female hourly earnings for those aged 30-39 are 3% higher per hour. However, in older age groups (40-49, 50-59, 60+) the results show that not only do males earn considerably more per hour than females, but the size of the pay gap is considerably larger. For example, as shown below the median hourly earnings of females aged between 40-49 are just under 10% more lower than median hourly male earnings at the same age. The largest GPG is amongst those aged 60+, whereby median hourly female earnings are 29% less per hour than males.

It is worth noting that when we assess the gender gap in earnings by age using mean hourly earnings the overall story remains, however the size of the gender gap amongst the youngest workers are significantly larger. Specifically, whilst we saw using median hourly earnings that females aged between 16-39 earned relatively more than males, the scale of the gap was relatively small at circa 2-3%. However, when we compare the gap using mean hourly earnings, we see a much larger gap, with females aged between 16-39 earning around 10-12% more on average (mean) than males of the same age.

That said, working arrangement has an important impact on the gendered nature of earnings across age groups. For full-time employees, whilst females in the youngest (16-29) and oldest (60+) age categories earn less per hour than males, by the age 30 female earnings make up this gap and indeed surpass male earnings. Specifically, females working full-time and aged

between 30-59 earn more per hour on average than males of the same age. The gap in full-time earnings is smallest between those aged 30-39-years.

For part-time employees, females aged between 16-49 earn more than males in the same age category per hour. However, females employed on a part-time basis aged 50 and above earn considerably less per hour than males.

Moving next to educational qualifications, the results presented in Table 4 below show that whilst irrespective of gender educational qualifications is in its own right an important determinant of pay. On this however, it is important to point out that females are more likely to be educated to degree or higher level than males (45.9% of females vs. 36.1% of males). On the other hand, males in the labour force are substantially more likely to have no qualifications as compared to females (29.2% of males vs. 22.9% of females). That said, there remains a substantial gap in hourly earnings between males and females at each educational level. Female median hourly earnings are lower than male earnings across below degree levels of educational attainment. The gap is widest amongst those with no qualifications where at £8.25 median female hourly earnings are 23.8% below that of male earnings. Whilst the gap is much smaller amongst those with below degree level qualifications females still earn 14% less than males on average. Nevertheless, for those with degree or above level qualifications the GPG is actually reversed, with median female hourly earnings 2.1% higher than median male hourly earnings.

As such, the greater likelihood of females to have degree or higher levels of education compared to males, as well as the higher returns they receive for such, would suggest that education and the higher levels of human capital amongst females plays a key role in moderating the GPG in the Northern Ireland labour market. Smaller gaps in gendered pay the higher the level of educational qualification may in part be due to greater labour market attachment among females with higher levels of educational attainment. For example, previous research in the UK has shown that women with university degrees spend much shorter periods outside the labour market and are more likely to work full-time (McRae, 1993; Rubery, Smith and Fagan, 1999).

The analysis also looks at how the GPG, based on median hourly earnings, varies by marital status and by whether or not one has or does not have dependent children. The largest gap in earnings is amongst those who are separated/divorced/widowed whereby females earn 21.2% less than males per hour. The median hourly earnings of married females are also around 75p lower than that of married males, equating to a 6% gap in earnings. Interestingly, the earnings of single females are 5.8% higher than the earnings of single males. This suggests that there is a considerable 'marriage premium' for male earnings and a 'marriage penalty' for female earnings. This 'marriage premium' in earnings is a well-documented fact in previous research for male earnings, with a number of competing theories seeking to explain it (Hill, 1979; Hewitt *et al,* 2002).

In terms of the impact of having children on male and female earnings the data presented in Table 4 shows that the median and mean hourly earnings of both males and females with dependent children are higher than the earnings of males and females with no children. Nevertheless, despite females with dependent children earning more per hour than females with no dependent children, the pay premium for having children is significantly larger for males. The effect of this in terms of the GPG is that compared with having no children where females earn 5.7% less per hour on average than males, the GPG for those with children is much larger at 10.8%. That is the GPG between males and females is substantially wider for those with children. This finding reaffirms findings of a 'motherhood penalty' as found in previous research.

The survey asks respondents how long they spend on housework each week. As would be expected, females spend more time on average on housework. Specifically, females spend 13.8 hours per week on average (mean) on housework compared to males who spend 6.4 hours per week on average (mean). Furthermore, females not only do more housework, but the amount of housework hours is more closely (and negatively) related to work hours than it is for male workers. That is, the more housework hours a woman carry's out the lower the number of hours they tend to work in the labour market. Whilst the same is true for males the relationship is not as strong. The correlation between housework and work hours for females is -0.23, indicating that where females work fewer hours, they do more housework. The correlation for males is much smaller, at -0.14, although the correlation is still statistically

significant. This means that males do not lower their paid working hours as much as females, according to how many hours a week they spend doing housework. That is, their contribution tends to remain lower than females regardless of working hours. On the other hand, females who spend more hours per week carrying out housework tend to work less paid working hours.

When we look at the GPG for those who spend differing amounts of time on housework, we get an unexpected result in that the GPG varies little based on the amount of time spent on housework a week. Interestingly, however, the GPG is largest among those who spend the least amount of time on housework. The reason however for the smaller GPG in earnings for those who spend the longest hours per week on housework is that males who do this amount of housework have a relatively low hourly wage rate. Males who spend 10 or more hours per week on housework earn 62p less per hour than males who spend between 0 and 4 hours. The pay penalty for females for doing more housework is not as large, with females who spend 10 or more hours per week earning 40p less per hour than females who spend between 0 and 4 hours. Still however, the rate of pay for women spending 10 or more hours per week on housework is 33p lower per hour than males who spend the same amount of time on housework. These results could be interpreted as suggesting that it is not in men's interests to take on the burden of more housework responsibilities. All in all, these results suggest that whatever the nature of the causal influences at work here, there is a relationship between high housework demands and lower pay, which is further mediated by gender.

Males are slightly more likely than females to be employed in temporary employment arrangements as compared to females. Nevertheless, in terms of the GPG based on employment arrangement the data presented below show that amongst those in permanent employment females earn just over 10% less than males. In contrast however, females in temporary employment earn just over 60% more per hour than males in temporary employment.

Table 4: Average differences in earnings by personal/family characteristics, across gender

	All	Male	Female	Median Hourly pay	Mean hourly pay
	%	%	%	£	£
Age					
16-29	18.5	20.2	17	7.96	10.30
30-39	23.4	23	23.8	10.29	11.49
40-49	25.6	24.6	26.5	12.15	13.71
50-59	23.4	23	23.8	12.09	13.82
60 +	9.1	9.3	9	10.74	13.32
Educational qualifications					
Degree or higher	41.2	36.1	45.9	14.11	14.87
Below Degree	32.9	34.7	32.2	8.43	9.71
No Qualifications	25.9	29.2	22.9	9.36	11.41
Marital Status					
Single	30.7	29.9	31.4	8.48	10.71
Married/Civil Partnership	60.5	65	56.8	12.38	13.69
Separated/ Divorced/ Widowed	8.8	5.1	11.8	10.04	10.99
Dependent children					
No dependent children	58.6	60.2	57.3	10.48	12.45
Has dependent children	41.4	39.8	42.7	11.02	12.67
Childcare responsibilities					
Mainly self	19.7	1.4	37.5	10.85	12.45
Mainly partner	14.8	27.1	2.8	13.12	13.97
Shared	65.5	71.4	59.7	11.67	12.98
Housework responsibilities					
0 to 4 hours	26.1	46.1	11.7	10.86	12.89
5 to 9 hours	19	24.8	14.8	11.11	12.33
10 + hours	54.9	29.1	73.5	10.22	12.35
Working hours					
0 to 15 hours	5.8	1.9	9.1	8.01	14.06
16 to 30 hours	28.1	15.4	38.4	8.65	10.64
31+ hours	66.1	82.7	52.5	11.82	13.24
Working arrangements					
Full-time	73.6	88.4	61.5	11.56	13.22
Part-time	26.4	61.5	38.5	8.21	10.62
Employment arrangements					
Permanent	93.8	93.5	94.1	10.87	12.71
Temporary	6.2	6.5	5.9	8.11	10.03

Table 5: Gender pay gap in hourly earnings based on worker and household/family structure characteristics

	Median hourly earnings		Percentage difference in female earnings as compared to male earnings (median)	Mean hourly earnings		Percentage difference in female earnings as compared to male earnings (mean)
Age	**Male**	**Female**	**All**	**Male**	**Female**	**All**
16-29	7.95	8.11	2.0	9.81	10.77	9.8
30-39	10.01	10.31	3.0	10.78	12.03	11.6
40-49	12.85	11.67	-9.2	14.53	13.04	-10.3
50-59	13.08	11.40	-12.8	15.05	12.91	-14.2
60 +	12.95	9.21	-28.9	15.06	11.96	-20.6
Educational qualifications						
Degree or higher	13.83	14.12	2.1	14.83	14.89	0.4
Below Degree	9.72	8.36	-14.0	9.76	9.65	-1.1
No Qualifications	10.82	8.25	-23.8	12.27	10.40	-15.2
Marital Status						
Single	8.41	8.56	1.8	10.19	11.11	9.0
Married/Civil Partnership	12.75	11.99	-6.0	14.14	13.27	-6.2
Separated/ Divorced/ Widowed	12.63	9.95	-21.2	11.31	10.89	-3.7
Dependent children						
No dependent children	10.71	10.10	-5.7	12.88	12.09	-6.1
Has dependent children	11.53	10.29	-10.8	12.77	12.59	-1.4
Childcare responsibilities			-			
Mainly self	-	10.97	-	-	12.49	-
Mainly partner	14.12	-	-	14.63	-	-
Shared	11.37	12.87	13.2	12.18	13.96	14.6
Housework responsibilities						
0 to 4	10.89	10.45	-4.0	12.88	12.91	0.2
5 to 9	11.31	10.77	-4.8	12.61	11.99	-4.9
10 + hours	11.51	10.12	-12.1	12.94	12.17	-6.0
Working hours						
0 to 15 hours	8.09	8.42	4.1	15.88	13.76	-13.4
16 to 30 hours	8.11	8.79	8.4	9.45	11.03	16.7
31+ hours	12.14	11.75	-3.2	13.42	12.99	-3.2
Employment arrangement						
Permanent	11.41	10.28	-9.9	13.26	12.27	-7.5
Temporary	5.49	8.84	61.0	6.72	13.31	98.1

6.4 How does pay vary by gender across the structure of employment?

While similar proportions of males (15%) and females (15.1%) are employed in *professional occupations,* the occupational category with the highest pay the results presented in Table 6 below also show that, relative to their male counterparts, females are more likely to be employed in the top three paid occupational groupings combined *including 'managerial, directors and senior officials*', *'professional'*, and '*associate professional and technical'* occupations.

Nevertheless, females are also more likely than males to work in the lowest paid occupations. For example, 36.7% of females are employed in the three lowest paid occupations combined, compared to 26.9% of males *(elementary occupations* (17.5% male vs. 12.4% female), '*sales and customer service occupations'* (6.9% male vs. 11.9% female) and '*caring, leisure and other service occupations'* (2.5% male vs. 12.4% female).

In terms of how the sector of employment affects gendered differences in pay it is firstly worth drawing attention to the fact that female employment is dominated in the *public administration, health and education* sector which has relatively high rates (3rd highest paying sector) of median hourly pay compared to some of the other sectors. 58.8% of all females are employed in the *public administration, health and education* sector, compared to 26% of males. Similar proportions of male and female employment are in the lowest paying sectors of the economy in Northern Ireland. For example, 5.9% of all male workers and 5.4% of female workers are employed in the lowest paying sector – the '*accommodation and food services*' sector - with a median hourly pay rate of £7.29 and a mean hourly pay rate of £6.99. Similarly, 15.4% of males and 15.7% of females are employed in the second lowest paid sector – the '*wholesale, retail and transportation*' sector with a median hourly pay rate of £8.34 and a mean hourly pay rate of £9.19.

In contrast, although small in terms of the overall proportion of employment, almost twice as many males (1.8%) than females (1%) are employed in the highest paying sector - the *agriculture, forestry, fishing, electricity and water* sector (£15.02). Similarly, almost twice the proportion of males (8.3%) than females (4.4%) are employed in the second highest paying sector – *information, communications, financial, insurance and real estate* sector. Males are

almost four times as likely to be employed in the third highest paying sector – the *manufacturing* sector (£11.33) – with 17.2% of males and 4.4% of females employed in this sector.

Females (33.7%) are more likely than males (38.7%) to be employed in a workplace with between 0-24 employees, which offer significantly lower rates of pay than larger workplaces. Specifically, as shown in **Table 6** below median hourly earnings in workplaces with between 0-24 employees are £8.70 (mean £10.58), whilst in workplaces, with 25-99 employees they are £10.78 (mean £12.96) and £12.95 (mean £14.19) in workplaces with more than 100 employees.

Table 6: Gender differences in the structure of employment

	All	Male	Female	Median Hourly pay	Mean Hourly pay
	%	%	%	£	£
Occupation					
Managerial, Directors, Senior Officials	8.6	10.6	6.5	15.23	17.94
Professional	15.2	15.0	15.1	17.54	18.47
Associate Professional & Technical	16.9	11.9	21.6	14.26	14.75
Administrative & Secretarial	12.5	8.8	15.7	10.70	11.77
Skilled trades	7.9	16.3	1.1	10.88	12.34
Caring, Leisure & Other service	7.9	2.5	12.4	8.02	9.59
Sales & Customer service	9.8	6.9	11.9	7.33	8.25
Process, Plant & Machine	6.6	10.6	3.2	10.33	11.09
Elementary	14.6	17.5	12.4	7.60	8.41
Industry					
Agriculture, Forestry, Fishing, Electricity, Water	1.4	1.8	1.0	15.96	14.60
Manufacturing	10.1	17.2	4.4	12.32	13.27
Construction	3.1	6.5	-	9.78	11.64
Wholesale, Retail & Transportation	15.6	15.4	15.7	8.34	9.19
Accommodation & Food	5.5	5.9	5.4	7.29	6.99
Information, Comms, Financial, Insurance & Real Estate	6.3	8.3	4.4	12.96	15.02
Professional, Technical, Scientific, Administration	6.9	8.3	5.9	10.49	13.37
Public admin, Health, Education	44.2	26.0	58.8	12.63	14.13
Arts, Entertainment & Recreation	3.3	5.3	2.0	8.77	9.52
Other service activities	3.6	5.3	2.5	9.77	10.22
Sector of employment					
Public	42.9	31.6	52.1	9.15	10.95
Private	57.1	68.4	47.9	13.25	14.67
Number employed at workplace					
0-24	36.5	33.7	38.7	8.70	10.58
25-99	26.2	24.5	27.6	10.78	12.96
100 +	37.3	41.7	33.7	12.95	14.19

6.5 How does pay vary by gender within the structure of employment?

Next, we turn to look at gender differences in pay within the structure of employment and compare the earnings of males and females with the same job characteristics. It is important to bear in mind in interpreting these results that each estimate represents only the raw gap, in that it is made without controlling for differences in other characteristics.

As detailed in Table 7 below male median hourly earnings were higher than that of females across the majority of major occupational groups, with the exception of '*professional' occupations*, *'sales and customer service*' occupations, '*administrative and secretarial*' occupations and '*elementary*' occupations where females earned more than males. The gap in earnings was largest for those in *'skilled trades'* occupations. Female hourly earnings were also considerably lower in *''caring, leisure and other service'* occupations and *'process, plant and machine'* occupations., and *'skilled trades'* occupations. As such, despite females being more likely than males to be employed in the top three paying occupations as we seen in Table 7 below, females still earn less than males across two of these three occupations, including '*Managerial, Directors and Senior Official*' and '*Associate Professional and Technical*' occupations.

Looking across a breakdown of major industries it is clear that female median hourly earnings are considerably lower than males across the majority of industries. Specifically, in all but a few of the major industries (namely the '*accommodation and food services'* sector, the *'professional, technical, scientific and administration'* sector and indeed the *'construction*' sector) median hourly earnings were lower for females, than males. The GPG was largest in the '*accommodation and food services'* sector where female median hourly earnings were 48% higher than males. Female median hourly earnings were 27.5% below that of males in the '*other services'* sector (23.4% using mean hourly earnings) and 16.2% below that of males in the *'manufacturing'* sector (-9.9% using mean hourly earnings). The gendered gap in hourly earnings was smallest in the '*information, communication, financial, insurance and real estate*' sector where using median hourly earnings there was no GPG found, and only a 1.2% gap using mean female hourly earnings.

The data presented below also shows that the GPG is much higher in the private sector than in the public sector, with female median hourly earnings 17% less in the private sector and 9.2% less in the public sector. Using mean hourly earnings the gaps are 10.9% and 9.5% respectively. Importantly, however, it is worth emphasising that despite females earning less than males on average in the public sector, it remains the case that the both the high proportion of female employment in the public sector, and the fact that the gap in earnings is lower in the public sector compared to the private sector that public sector employment buffers the overall GPG. Albeit, of course, the causal influences here are complex meaning that we cannot necessarily conclude from this data that further increasing female employment in the public sector would reduce the size of the GPG.

Whilst we have seen in the previous section that females are more likely to be employed in workplaces with between 0-24 employees than males the results in Table 7 below show that females earn less than males employed in similar workplaces. Using median hourly earnings, the gap is 8.5%, whilst using mean hourly earnings the gap is 3%. Females earn around 10% less in workplaces which have more than 100 employees (based on either the median or the mean).

Table 7: Gender pay gap in hourly earnings: Percentage difference in female earnings as compared to male earnings

	Median hourly earnings		GPG (median)	Mean hourly earnings		GPG (mean)
	Male	**Female**	**All**	**Male**	**Female**	**All**
Occupation						
Managerial, Directors, Senior Officials	15.54	15.23	-2.0	18.15	17.64	-2.8
Professional	15.78	18.92	19.9	16.73	19.90	18.9
Associate Professional & Technical	14.57	14.25	-2.2	15.10	14.58	-3.4
Administrative & Secretarial	10.31	10.72	4.0	12.50	11.39	-8.9
Skilled trades	11.41	7.56	-33.7	12.61	7.05	-44.1
Caring, Leisure & Other service	9.72	7.80	-19.8	15.69	8.71	-44.5
Sales & Customer service	7.28	7.50	3.0	8.57	8.10	-5.5
Process, Plant & Machine	10.78	7.39	-31.4	11.56	9.78	-15.4
Elementary	7.82	7.58	-3.1	8.26	8.59	4.0
Industry						
Agriculture, Forestry, Fishing, Electricity, Water	17.94	13.90	-22.5	16.91	10.76	-36.4
Manufacturing	12.76	10.69	-16.2	13.58	12.24	-9.9
Construction	9.10	12.64	38.9	11.61	12.64	8.9
Wholesale, Retail & Transportation	9.58	7.98	-16.7	10.14	8.47	-16.5
Accommodation & Food	5.12	7.58	48.0	5.71	8.12	42.2
Information, Comms, Financial, Insurance & Real Estate	12.96	12.96	0.0	15.09	14.91	-1.2
Professional, Technical, Scientific, Administration	10.65	10.38	-2.5	12.44	14.57	17.1
Public admin, Health, Education	14.31	11.96	-16.4	15.78	13.53	-14.3
Arts, Entertainment & Recreation	9.38	7.66	-18.3	9.30	9.95	7.0
Other service activities	9.77	7.08	-27.5	10.99	8.42	-23.4
Sector of Employment						
Private	9.92	8.22	-17.1	11.54	10.28	-10.9
Public	13.94	12.66	-9.2	15.66	14.18	-9.5
Number employed at workplace						
0-24	9.32	8.53	-8.5	10.77	10.45	-3.0
25-99	10.85	10.89	0.4	12.28	13.43	9.4
100 +	13.38	12.01	-10.2	14.85	13.52	-9.0

SECTION 7 DATA FOR REPUBLIC OF IRELAND

7.1 The Data Source: European Union Survey of Income and Living Conditions (EU-SILC)

For the empirical analyses for the Republic of Ireland this study utilised data from the 2017 EU-SILC survey. EU SILC is a survey that the Central Statistics Office (CSO) has undertaken every year since 2004 and it focusses on particular on income and living conditions. It's part of an EU-wide programme which allows policymakers to make comparisons across member states. The primary focus of the Survey on Income and Living Conditions (SILC) is the collection of information on the income and living conditions of different types of households in Ireland, in order to derive indicators on poverty, deprivation and social exclusion.

Information is collected continuously throughout the year with household interviews being conducted on a weekly basis. The income reference period for SILC is the 12 months immediately prior to the date of interview. Therefore, the income referenced spans the period from January 2016 to December 2017. In 2017, the achieved sample size was 5,029 households and 12,612 individuals. Given however that this study is focused on estimating the size of the GPG for those in employment the sample was restricted to those aged 15 years or more and in employment. This results in a final sample of 3,086 individuals.

The SILC sample is a multi-stage cluster sample resulting in all households in Ireland having an equal probability of selection. A design weight is assigned to each household which is calculated as the inverse proportion to the probability with which the household was sampled. For SILC, the probability of the selection of a household is based on two elements; the probability of the selection of a block and the probability of selection of a household within that block. The design weights were calculated separately for each wave. In accordance with Eurostat recommendation, CALMAR was used to calculate the household cross-sectional weights. Benchmark information was used to gross up the data to population estimates. The weight variable used in all of the current analysis is coded in the technical report as 'euroweight' (ISSDA, 2019).

7.2 Technical details on the derived measures of earnings

The following employment earnings/income related variables were used from the EU-SILC survey data as obtained from the Irish Social Science Data Archive:

Gross monthly pay: The EU-SILC dataset provided a derived measure of total gross monthly pay. [Variable name: curr_inc]

Working hours: Respondents were asked to detail how many hours they work in their main job [Variable name: hrs_uwm].

Working hours other job(s): Respondents were asked to detail how many hours they work in other job(s) [Variable name: hrs_uwo].

These data were then utilised to derive estimates gross hourly pay, gross weekly pay and gross annual pay. The technical method of how this was derived is detailed below.

Respondents were asked to report their usual gross monthly pay. Subsequently, an estimate of weekly gross pay was derived from monthly pay by dividing it by 30 and multiplying it by 7. Similarly, an estimate of annual pay was derived from monthly pay by multiplying it by 12. In order to derive an estimate of gross hourly pay weekly pay was divided by weekly working hours (both hours worked in main job and in other jobs).

7.3 Quality of earnings data as collected in EU-SILC

The EU-SILC survey provides data on income including that from earnings. In this respect, EU-SILC was established to provide data on income and its various components and to allow study of social cohesion issues such as the GPG (European University Institute, 2020). In this respect, the measurement of incomes including income earnings from employment is one of the primary raisons d"être of the EU-SILC. It does form a unique, and in many respects, an extremely valuable and high-quality resource for the analysis of incomes and employment income/earnings across the EU, including the Republic of Ireland (Eurostat, 2007; Eurostat, 2018).

That being said, it is widely recognised that income is notoriously difficult to measure accurately in survey research with measurement error often a problem as a result of both non-response and income response error (Moore *et al*, 2000). All surveys have to deal with non-response, i.e. information missing for some of the sample units. Unit non-response happens

when no interview can be obtained, while item non-response does when only some of the items are missing. Non-response is a potential source of bias particularly if the non-responding units have specific survey patterns ('non-ignorable' non-response). For instance, research shows that one might expect persons with high incomes to be more reluctant to give income information to an interviewer, thus making the upper income class under-represented in the sample and the estimates downwardly biased (Moore *et al*, 2000).

In the case of analysis for the current study using employee income item non-response is not an issue given as outlined in Table 8 below the small percentage of item non-response for employment income variables (Eurostat, 2018). What is more, data cleansing techniques are employed to handle these issues. As such it is concluded that inaccuracy in the employment income data as a result of non-response should not lead us to be concerned about the overall quality of the employment income data. Item non-response imputation is conducted for missing direct income values. Specifically, for missing private sector pay, a form of hot-decking is employed to impute missing data. In the case of public sector pay, estimation of missing pay is based on public sector pay scales utilising information on grade and years of service (Eurostat, 2018).

Table 8: Item non-response rates

Income gross variables at individual level	% of persons 16+ with missing values (before imputation)	% of persons 16+ with partial information (before imputation)
Cash or near-cash employee income	0.2	0.2
Other non-cash employee income	0.9	0.9
Income from private use of company car	0.8	0.8
Employers social insurance contributions	0.1	41.9
Cash profits or losses from self-employment	5.7	5.7

Source: Eurostat (2018)

Income response error is concerned with the "truth" of a respondent's income and his/her report of that income. Moore *et al* (2000) note how the reporting of income in surveys is a two-stage process: the first involving the correct retrieval of information on income source and the second involving the accurate reporting of amounts of income from these sources.

In general Moore *et al* (2000) find a tendency toward underreporting of income source, but detail that the extent of underreporting is dependent on income source, which they have separated into three major categories. Specifically, their study details that underreporting bias affects wage and salary income sources only very modestly, reports of participation in government transfer income somewhat more so, with reports of income from assets most of all.

It needs also be noted that whilst the EU-SILC survey is not the principle official source of data on employment earnings for the Republic of Ireland, which rather is provided by the Structure of Earnings survey. However, the EU-SILC provides a range of additional data capturing worker characteristics, household/family characteristics and job characteristics which is necessary to examine the nature of the GPG. This range of data is not available from the Structure of Earnings survey which provides only data on earnings and worker and job characteristics, but none of the required data in terms of household/family characteristics. Such data is fundamental when investigating the GPG.

7.4 Comparing estimates of the GPG using EU-SILC data versus using official earnings data published by the Central Statistics Office

Earnings data is collected and published by the Central Statistics Office via a number of different sources each of which was given consideration in deciding the data source for this study, including the Earnings and Labour Costs Quarterly survey; data from Administrative data sources; and the Structure of Earnings Survey.

The Earnings and Labour Costs Quarterly survey provides data on quarterly and annual earnings and labour costs statistics across economic sectors in Ireland (See: CSO, 2020).

Importantly, however, whilst this data source provides an important source of data for average hourly earnings and average weekly earnings, this survey does not collect data on gender and so it does not provide a suitable source to study the GPG in the Republic of Ireland.

Earnings analysis using Administrative Data sources presents statistics on earnings based on

administrative data sources. The primary data source is the Revenue Commissioner's P35L dataset of employee annual earnings which is linked to the Central Statistics Office and other data to provide demographic breakdowns of earnings similar to those previously provided by the National Employment Survey (NES). The publication provides earnings data by NACE economic sector, gender, age, nationality and region (residence) and are available from the Central Statistics Office statbank. However, earnings data collected using Administrative Data sources does not contain any breakdown of hours worked or hourly earnings, and so it is not possible to compare the hourly earnings of males and females. As such, given what we know about the importance of working hours in determining earnings, without connecting to another data source such as the Labour Force survey it is not possible to sufficiently examine the GPG.

The Structure of Earnings survey conducted in 2018 provided another possible data source with which to examine the GPG in the Republic of Ireland. The Structure of Earnings survey is a large enterprise sample survey (50000 employees) providing detailed and comparable information on the relationships between earnings and individual characteristics of employees (sex, age, occupation, length of service, highest educational level attained, etc.) and those of their employer (economic activity, size and location of the enterprise). In this respect, it provides much of the data required to examine the GPG. However, a key limitation of the Structure of Earnings survey in being able to examine the GPG is that it does not provide data on family/household characteristics such as whether there are dependent children in the household. Given the fact that previous literature identifies the crucial importance of children in determining gendered differences in pay it was decided for this reason that this data source was not suitable.

Given however that the main purpose of the EU-SILC survey is not to collect earnings data it was thought prudent to compare the estimates of earnings provided by these specialised sources of earnings data – and where possible to compare estimates of the overall GPG derived from these different sources. In doing so, what became clear was that the estimates of earnings obtained using data from the EU-SILC survey are different from those obtained using the different earnings sources as released by the Central Statistics Office. It is also worth noting however that this was not surprising as estimates of earnings based on the more specialised

sources of earnings data were also different from each other. It is not thought however that the differences in estimates should cause concern about data quality, but rather can be explained by a number of reasons, including different means of data collection, different samples and different time periods for which the data cover. For example, no employee is excluded in the analysis presented in this study using EU-SILC. However, estimates of earnings using administrative data sources published by the CSO excludes employees earning less than €500 per annum and employments where the duration was less than two weeks in the year. It also excludes secondary employments earning less than €4,000 per year and extremely high earnings values. Employment activity in NACE sectors A, T and U are also excluded from their analysis. Furthermore, in line with Eurostat requirements relating to Structure of Earnings Statistics (in particular Council Regulation (EC) No 530/1999) the data used is restricted to employments that were active in the month of October. Analysis by the CSO shows that the effect of this restriction on median weekly earnings is that median weekly earnings are estimated as 5.5% higher, than what they would have been estimated over the full year (Central Statistics Office, 2020).

Nevertheless, despite slight differences in estimates of earnings as is clear from Table 9 below a comparison of earnings estimates as available from that published by the CSO to that derived for the current study using data from EU-SILC shows not inordinate differences in estimates of hourly and weekly earnings.

Table 9: Earnings estimates in EU-SILC versus other earnings sources as published by CSO, 2017 (€)

	Mean weekly	Median weekly	Mean hourly	Median hourly
Earnings and Labour Costs Quarterly	723.76	x	22.43	x
Administrative data sources	716.40	575.75	x	x
EU-SILC	716.04	595	21.27	16.75

Table 10 presents a comparison of estimates of weekly median and mean pay by gender as derived from CSO published administrative data sources and that derived by the author of this paper using EU-SILC data. Most notable and reassuring from this is that estimates of the median weekly pay gap are almost exactly that same. Estimates of differences in mean pay

show a wider gap when derived using Administrative data sources than they do when derived using EU-SILC. This perhaps is unsurprising given as discussed in the previous section the difficulties which surveys have in obtaining data from high earners, whom are more likely to be male. Nevertheless, all in all the similarity of estimates at both the median and mean using both data sources provide reassurance in terms of the validity and reliability of the estimates presented in this paper for the Republic of Ireland.

Table 10: Weekly earnings estimates by gender and estimate of overall unadjusted GPG in EU-SILC versus other earnings sources as published by CSO, 2017 (€)

		Administrative data sources		**GPG**	**EU SILC**		**GPG**
		Male	Female		Male	Female	
		€		%	€		%
Weekly pay	Mean	817.7	616.3	-24.6	808.8	623.3	-22.9
	Median	636.1	504.7	-20.6	660.3	525	-20.5

SECTION 8 THE UNADJUSTED GENDER PAY GAP IN THE REPUBLIC OF IRELAND

8.1 An overview of the gender pay gap in the Republic of Ireland

We begin our analysis by looking at the overall unadjusted GPG in hourly earnings with Figure 4 below presenting estimates at both the median and the mean. In comparing the median hourly pay of males and females we see that female earnings are 2.8% below male earnings. This means that for every €1 earned at the median by a male, females earn just under 97 cents. In nominal terms median hourly female earnings are 48 cents less per hour than male median hourly earnings (See Appendix 2).

In contrast to the relatively small gap which is found between the median hourly earnings of males and females, as shown in Figure 5 below estimates of the overall gender gap in mean hourly pay show a considerably larger gap in earnings, with males earning 9% more than females. In nominal terms this equates to just over a €2 gap in the mean earnings of males and females. The fact that there is a relatively low gap in the overall median earnings of all males versus all females but a substantial gap in the mean earnings of males versus females suggests that not only are earnings heavily skewed, but that this skew is particularly gendered. This will be examined further in the next section.

8.1.1 GPG in hourly earnings by working arrangement

Figure 4: GPG in median and mean gross hourly pay: Percentage difference in female earnings as compared to male earnings

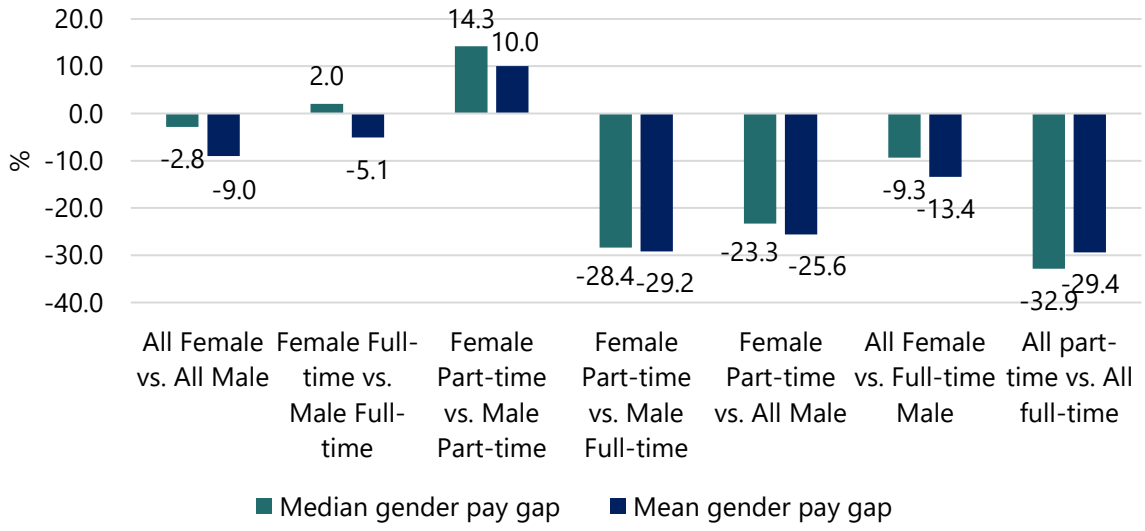


Figure 4 above also presents estimates of the GPG broken down by full-time and part-time working arrangements. It is clear when we look separately at the gap in hourly pay for those in full-time employment and part-time employment the GPG picture becomes a bit more complicated. Indeed, very clearly the data shows that the extent and nature of the GPG amongst those in full-time employment is very different to that amongst those in part-time employment. Specifically, the GPG between males and females in full-time employment is significantly smaller than it is for those in part-time employment. Moreover, focusing only on the gap amongst those in full-time employment what is notable from Figure 4 is that the direction of the GPG is dependent upon whether the gap is estimated using median or mean earnings. Specifically, the median hourly earnings of females in full-time employment is 2% higher than it is for males in full-time employment. In contrast, when we compare the earnings of males and females in full-time employment using mean earnings, we see that females in full-time employment earn close to 5% less than males in full-time employment.

These contrasts in estimates of the GPG between the median and mean show the importance of the measurement tool used to assess the unadjusted GPG. Indeed, when we compare males and females in full-time employment at the middle of the earnings distribution i.e. at the median there is not actually a very large difference in earnings. Nevertheless, when we take into consideration the earnings of all males and females such as what we do when we estimate the GPG at the mean, we see a significantly larger GPG. Again, similar to that suggested above these differences in estimates suggest a skewed and gendered distribution.

Focusing now on those in part-time employment we see that the gap not only widens for those in part-time employment but actually works the other way around. This is the case irrespective of whether we base our estimate on median or mean earnings and is similar to that which we have seen in our estimates for Northern Ireland. This is often referred to as a 'reverse GPG'. Specifically, there is a reverse GPG in median hourly pay of part-time workers of 14.3%, and a gap of 10% in mean hourly pay. An investigation of the distribution of earnings of males and females in part-time employment shows that mean part-time hourly earnings are skewed by a small number of high-earning females and low-earning males, albeit this distribution was more heavily skewed by male part-time earnings than female part-time earnings.

Nevertheless, similar to what we have seen in Northern Ireland, despite part-time male hourly earnings being lower than part-time female hourly earnings it remains that overall female hourly earnings are lower than overall mean male hourly earnings because of the fact that not only is the hourly pay rate for part-time employment much lower than the pay rate for full-time employment, but also because of the fact that females are much more likely to work part-time than males. Data used in this study estimates the median hourly earnings for part-time employment to be 32.9% lower than the median hourly earnings for full-time employment (€12.25 vs. €18.25). Whilst the gap is smaller when we compare the mean hourly earnings (€16.16 vs. €22.89), there is still a gap of 29.4%. Furthermore, close to 35% of females were employed on a part-time basis, compared to 13.7% of males.

Figure 4 above also presents the gap in hourly earnings between: (i) part-time female earnings compared to full-time male earnings; (ii) part-time female earnings compared to all male earnings; (iii) all female earnings compared to full-time male earnings. What is most clear from these data is that when the GPG is calculated in ways which illustrates the gendered structure of employment arrangements the size of the GPG is much wider. Specifically, as shown in Figure 5 above median part-time female earnings are 28.4% lower than that of median full-time male earnings (mean earnings of part-time female workers are 29.2% lower). The difference between part-time female hourly earnings and all male hourly earnings using median earnings is 23.3% using median hourly earnings and 25.6% using mean hourly earnings. Interestingly, when we compare the gap between all female hourly earnings and that of full-time male earnings only the gap is much lower - based on median hourly earnings it is 9.3% and using mean hourly earnings it is 13.4%.

8.1.2 Weekly/Annual GPG, by working arrangement

Assessed on a weekly or annual basis we see that irrespective of whether we use median or mean earnings for our estimates the size of the GPG are much wider. The wider GPG can be explained by a combination of the fact that overall males earn more per hour than females, and also tend to work longer hours over the week (and year) than women. An assessment of hours worked shows that on average, males worked 41.6 hours per week on average, whilst females worked 30.9 hours per week on average (mean).

Median female earnings were 20.5% lower and mean female earnings were 22.9% lower than male weekly/annual earnings. In effect, this means that on average females earned just close to 80 cents for every 1 euro that males earned on a weekly or an annual basis.

Table 11: Gender Pay Gap in earnings in the Republic of Ireland: Percentage difference in female earnings as compared to male earnings

	Median Gross Weekly/Gross Annual Pay Gap	Mean Gross Weekly/Gross Annual Pay Gap
All Female vs. All Male	-20.49	-22.93
Female Full-time vs. Male Full-time	-4.18	-11.56
Female Part-time vs. Male Part-time	10.31	11.11
Female Part-time vs. Male Full-time	-65.60	-65.48
Female Part-time vs. All Male	-62.19	-61.90
All Female vs. Full-time Male	-27.65	-43.22

8.2 How does the gender pay gap vary across the distribution of earnings?

Figure 5 below shows the distribution of earnings across males and females. It shows the percentage of workers in the Republic of Ireland with different levels of hourly earnings. Earnings are notably concentrated in the bottom half of the earnings distribution, and this is particularly the case for females. Specifically, just under 30% of females earn below €12.00 per hour, compared to 25% of males. In contrast, males are more likely than females to have either very low earnings (less than €6 per hour) or high earnings. 47% of males earn between €12 and €24, compared to 44% of females.

Figure 5: The distribution of male and female hourly earnings

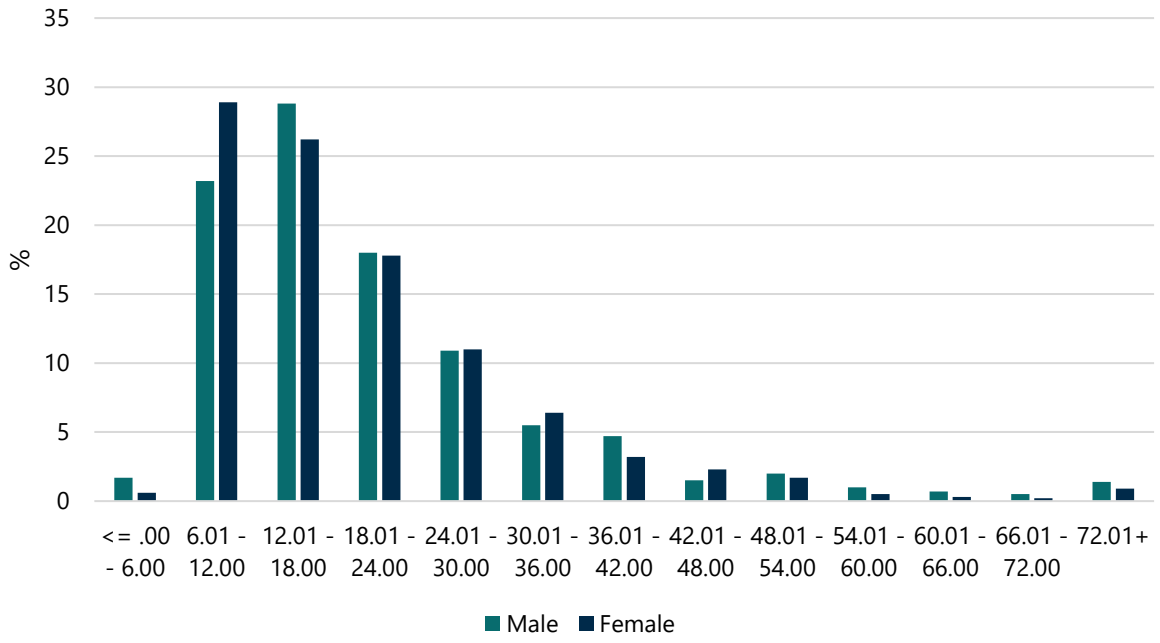


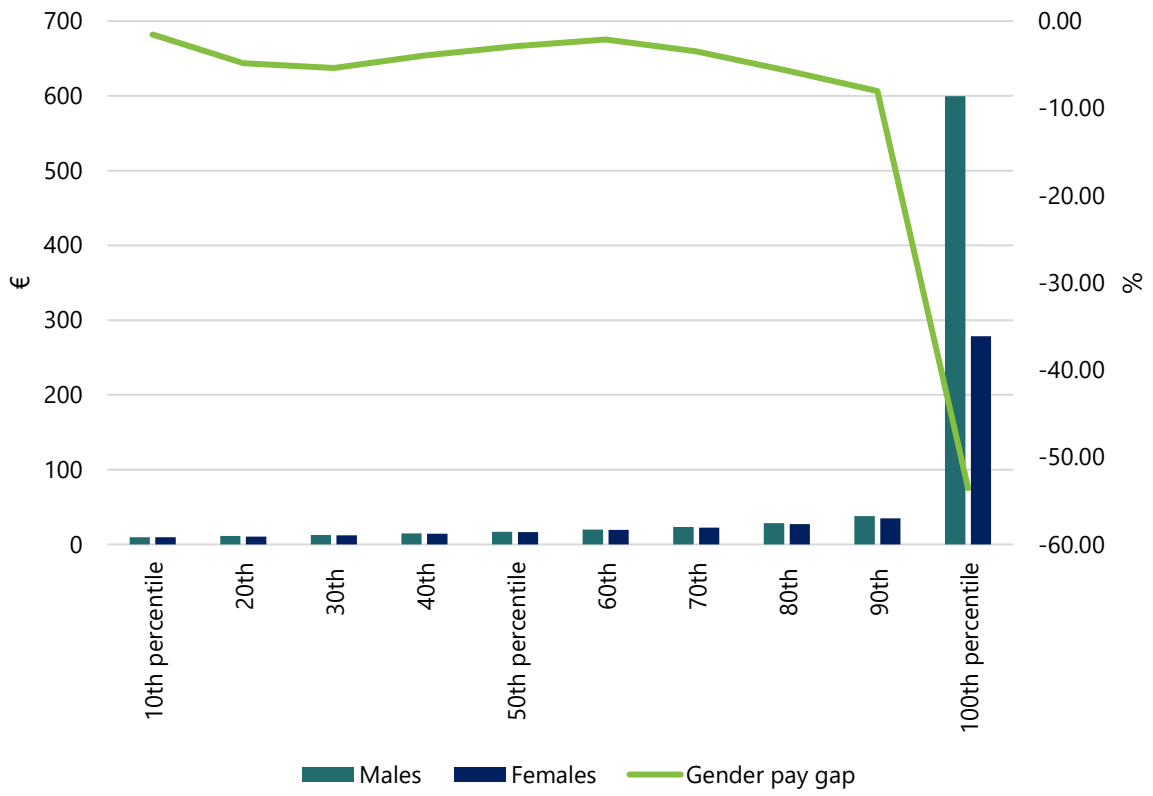
Figure 6 below allows us to establish the extent of inequality in earnings for all workers, as well as the extent of the gap between males and females at different parts of the earnings distribution. In interpreting the data what is most clear is that there is considerable inequality in earnings across the distribution, irrespective of gender. In particular, similar to what we have seen for Northern Ireland, the gap in earnings between the top percentile and everyone else is particularly striking. However, it is worth noting that the scale of the gap between the top and everyone else is significantly greater here than it is in Northern Ireland.

Focusing now on gender, what is clear is that, whilst the earnings between males and females across the earning distribution are different and females earn less than males at each point, the size of the differences are moderate. Towards the middle of the earnings distribution we see that often there exists only a small gap in hourly earnings. However, at the top of the earnings distribution the gap in earnings is particularly stark, where males earn over 50% more per hour than same females.

Indeed, what is most clear from this examination of the gendered nature of earnings across the earnings distribution is that for the vast majority irrespective of gender it is the gap in earnings between those at the top of the income distribution and everyone else which is particularly pertinent. However, when we add gender to the analysis, what is particularly

remarkable, is the earnings of the top earning male, whose earnings are far above those of everyone else. In this sense, in many ways the overarching story of the earnings distribution in the Republic of Ireland is a tale of the top earning male versus everyone else.

Figure 6: Hourly earnings by gender across income deciles and gender pay gap in hourly earnings



8.3 How do differences and similarities in worker characteristics and household/family structure characteristics affect gender differences in pay?

The overall GPG can disguise widely varying GPGs between different categories of workers and indeed reasons for its existence. In this respect, the overall unadjusted GPG can be determined by two factors, including (a) differences in the characteristics of males and females in our labour market and the differential rewards which workers with different characteristics receive; and (b) differences in pay between males and females for workers with the same characteristics.

Focusing first on age, it is clear from Table 12 below that the age distribution of males and females in the labour force is approximately similar and, in general, earnings tend to increase with age as the worker builds up experience and seniority. In terms of the gendered nature of earnings by age as presented separately in Table 13**,** the first point to note is the general trend for females to earn less than males per hour during the middle working age years. It is worth noting that these are the same years in which females are likely to bear children and thus have career interruptions as a result. Specifically, the median earnings of females aged 25-49 are just over 7% less per hour than males. However, in older workers (65+) the results show that median female hourly earnings are considerably higher (29.5%) than male median hourly earnings. When looking at the gendered gap in earnings using mean pay rather than median pay, we see that mean hourly earnings of females compared to males between the ages of 15-24 are actually significantly higher, but beyond this, females earn significantly less than males, with the gap generally widening with age. For example, mean female earnings are almost 10% beneath that of mean male earnings between the ages of 25-49. Between the ages of 50-64 mean female earnings are almost 14% beneath that of mean male earnings.

Moving next to educational qualifications, the results presented in Table 12 below show that whilst irrespective of gender educational qualifications is in its own right an important determinant of pay. That is, as shown in Table 12 those with degree or above qualifications have significantly higher pay than those with below degree level qualifications who in turn have significantly higher pay than those with no qualifications. Looking at these differences through a gendered lens it is noteworthy that females are more likely to be educated to degree level or above (64.1% female vs. 60.8% male).

Nevertheless, there remains a substantial gap in hourly earnings between males and females at each educational level. Irrespective of level of educational attainment males earn more per hour than females. The gap is widest amongst those with no qualifications where median female hourly earnings are 20.7% below that of male earnings. Whilst the gap is much smaller amongst those with below degree level qualifications female median hourly earnings are still 8% less than males. For those with degree or above level qualifications the GPG is again wider, with median female hourly earnings 12% less than male. This is in contrast to that we have

seen when looking at the same data for Northern Ireland where there is almost no gap in earnings for those with degree level or above qualifications.

Table 12: Average differences in hourly earnings by personal/family characteristics, across gender

	All	Male	Female	Median Hourly pay	Mean hourly pay
	%	%	%	£	£
Age					
15-24	10.1	11.5	8.7	10.50	11.78
25-49	62.5	60.8	64.1	17.21	21.51
50-64	26	26.5	25.6	19.92	24.48
65+	1.4	1.2	1.6	14.00	19.98
Educational qualifications					
Degree or higher	36.3	32.5	40.2	23.64	27.17
Below Degree	60.1	63.6	56.6	14.11	17.83
No Qualifications	3.6	3.9	3.2	12.41	14.63
Marital Status					
Single	36.1	36.2	36	13.12	16.8
Married/Civil Partnership	58.5	60.5	56.6	19.43	24.06
Separated/ Divorced/ Widowed	5.4	3.3	7.4	16.92	21.1
Household type					
Adults & No children in household	47.2	47.2	47.1	16.14	21.01
1 adult and 1+ children u18	3.2	0.7	5.6	14.11	17.89
2 adults and 1-3 children u18	34.8	36.3	33.1	18.66	22.63
Other households' w/ children u18	14.9	15.8	14	14.64	19.63
Working hours					
0 to 15 hours	7.6	4.3	11	12.13	29.2
16 to 30 hours	22.2	11.9	32.4	13.76	18.76
31+ hours	70.2	83.8	56.6	17.85	21.2
Working arrangement					
Full-time	75.8	86.3	65.4	18.25	22.89
Part-time	24.2	13.7	34.6	12.25	16.15

The analysis presented in Table 12 above also shows the composition of workers in terms of marital status and household composition as well as differences in hourly pay between these groups. Table 13 below then subsequently presents the gendered differences in pay for workers with the same personal/household characteristics. Focusing on the gendered gap in earnings in terms of marital status what is most notable is that there is close to no gendered differences in the median earnings of males and females, while when assessed using mean

earnings we in fact see that single females earn just over 7% more than single males per hour. These trends are entirely reversed for those who are either married or in a civil partnership and for those separated/divorced/widowed whereby not only do such males earn more than females irrespective of whether we look at the gap in earnings using median or mean earnings, but the gap is significantly wider. Specifically, the hourly earnings of males who are married/civil partnership are 5.4% higher using median earnings and 14.4% higher using mean earnings.

These data suggest that there is a considerable 'marriage premium' for male earnings and a 'marriage penalty' for female earnings. This 'marriage premium' in earnings is a well-documented fact in previous research for male earnings, with a number of competing theories seeking to explain it (Hill, 1979; Hewitt *et al,* 2002).

In terms of the impact of household composition on male and female earnings the data presented in Table 12 shows that the median hourly earnings across workers who live in households of different composition, whilst Table 13 shows the gendered gap in earnings for those with the same household composition. What is most noteworthy is that those who live in two adult households with 1-3 children under 18 have the highest hourly earnings compared to other household types. This is followed by adult only households whose median hourly pay is €16.14 and mean hourly pay is €21.01. As seen in many other studies, unsurprisingly, lone parent households have the lowest hourly earnings on average.

It is worth noting that the hourly earnings of both males and females in households with dependent children are higher than the earnings of males and females in adult only households with no children. However, despite females in adult households with dependent children earning more per hour than females in adult only households with no dependent children, the pay premium for having children in the household is significantly larger for males. In terms of the GPG, the effect of this is that compared with having no children where female median hourly earnings are actually 5.6% higher than males, median female earnings in households with children are 10.5% less than males in the same households. This the GPG

between males and females in households with children reaffirms findings of a 'motherhood penalty' for females as found in previous research.

Table 13: Gender pay gap in hourly earnings based on worker and household/family structure characteristics

	Median hourly earnings		Percentage difference in female earnings as compared to male earnings (median)	Mean hourly earnings		Percentage difference in female earnings as compared to male earnings (mean)
	Male	**Female**	**All**	**Male**	**Female**	**All**
Age						
15-24	10.58	10.4	-1.70	11.25	12.47	10.84
25-49	17.79	16.51	-7.20	22.67	20.42	-9.93
50-64	20.12	19.61	-2.53	26.28	22.61	-13.97
65+	12.03	15.58	29.51	20	19.98	-0.10
Educational qualifications						
Degree or higher	25	22	-12.00	28.66	25.96	-9.42
Below Degree	14.64	13.46	-8.06	19.12	16.39	-14.28
No Qualifications	14.11	11.18	-20.77	16.05	12.84	-20.00
Marital Status						
Single	13.16	13.13	-0.23	16.2	17.4	7.41
Married/Civil Partnership	19.72	18.66	-5.38	25.85	22.14	-14.35
Separated/ Divorced/ Widowed	17.44	16.33	-6.36	23.59	19.99	-15.26
Dependent children						
Adults & No children in household	15.89	16.78	5.60	21.37	20.66	-3.32
1 adult and 1+ children u18	12.83	14.12	10.05	14.27	18.29	28.17
2 adults and 1-3 children u18	19.46	17.42	-10.48	24.03	21.11	-12.15
Other households with children u18	14.88	14.12	-5.11	21.29	17.77	-16.53
Working hours						
0 to 15 hours	12.33	12.13	-1.62	47.69	21.98	-53.91
16 to 30 hours	12.03	15.16	26.02	17.17	19.34	12.64
31+ hours	17.79	17.88	0.51	21.69	20.46	-5.67

In terms of gendered differences based on working hours it is clear that females are much more likely to work between 0-15 hours (4.3% males vs. 11% females) and between 16-30 hours (11.9% males and 32.4% females) per week than males. What is more, there appears to be a linear relationship in terms of earnings by working hours whereby hourly earnings increase as hours worked increase. In this respect, median hourly earnings of who work the shortest number of hours per week (that is between 0-15 hours) are €12.13 compared to €13.76 for those who work between 16-30 hours, and €17.85 for those who work 31 or more hours per week.

8.4 How does pay vary by gender across the structure of employment?

Looking first to the data presented in Table 14 below in terms of differences in hourly pay for those in different occupations we see that those in '*Professional'* occupations have the highest average hourly earnings (both median and mean). This is closely followed by those in '*Managerial, Director and Senior Official'* occupations (median hourly pay €27.41, mean hourly pay €30.45) and then those in '*Associate Professional and Technical'* occupations (median hourly pay €21.49, mean hourly pay €24.76). In terms of the gendered composition of employment in the highest paying sectors the data show no substantial differences in the overall distribution of males and females into the three highest paying sectors. In this respect, whilst females are significantly more likely than males to work in '*Professional'* occupations, males are more likely as females to work in '*Managerial, Director and Senior Official'* and '*Associate Professional and Technical'* occupations.

Turning next to look at gendered differences in employment in the lowest paid occupations we see that males are more likely than females to be employed in the three lowest paid occupations: *'Elementary'* occupations, '*Sales and customer service'* occupations, and '*Caring, leisure and other service'* occupations. Specifically, 30% of males are employed in these three occupations, compared to 25.2% of females.

In terms of how the sector of employment affects gendered differences in pay it is firstly worth drawing attention to the fact that female employment is dominated in the '*public administration, health and education'* sector whereby 44.9% of females are employed (compared to 18.5% of males). This sector has relatively high rates of average hourly pay (2nd

highest hourly paying sector) of hourly pay compared to some of the other sectors. Interestingly, the same dominance of females in this sector was seen for Northern Ireland albeit female employment was even more concentrated in this sector with 58.8% of all females employed in the '*public administration, health and education'* sector in Northern Ireland compared to 26% of males.

Females are also found to be more likely than males to be employed in the lowest paying sectors. For example, 8.7% of female workers compared to 5.5% of males are employed in the lowest paying sector – the '*accommodation and food services'* sector - with a median hourly pay rate of €11 and a mean hourly pay rate of €13.38. Nevertheless, large proportions of males were found to be employed in the third lowing paying sector – *wholesale, retail and transportation'* sector. Specifically, with a median hourly pay rate of €13.53 23.5% of males are employed in this sector compared to 16.3% of females.

In contrast, males are more likely than females to be employed in the highest paying sector – '*information, communications, financial, insurance and real estate'* sector – with 11.2% of all males in this sector compared to 8.4% of females. Males are also more likely to be employed in the third highest paying sector – the '*manufacturing'* sector (median hourly pay €17.42 and mean hourly pay of €27.58) – with 16% of males and 7.4% of females employed in this sector.

Females (11%) are more likely than males (8.7%) to be employed in a workplace with between 0-19 employees, which as clear in Table 14 offer significantly lower rates of pay than larger workplaces. Specifically, in workplaces with between 0-19 employees are €13.30, whilst in workplaces, with 20-49 employees they are €14.30 and €20.00 in workplaces with more than 50 employees.

Table 14: Gender differences in the structure of employment

	All	Male	Female	Median Hourly pay	Mean Hourly pay
	%	%	%	£	£
Occupation					
Managerial, Directors, Senior Officials	5.5	7.5	3.6	27.06	29.16
Professional	21.1	17.1	25.1	27.41	30.45
Associate Professional & Technical	12.4	14.1	10.7	21.49	24.76
Administrative & Secretarial	12	5	19.1	17.5	19.69
Skilled trades	9.8	17.4	2.2	15.62	17.4
Caring, Leisure & Other service	9.8	3.6	14.1	12.83	15.3
Sales & Customer service	9.3	7.3	11.3	11.51	13.14
Process, Plant & Machine	7.3	12.3	2.3	13.94	15.71
Elementary	13.7	15.7	11.6	11.43	17.31
Industry					
Agriculture, Forestry, Fishing, Electricity, Water	2.4	3.7	1.1	13.70	20.26
Manufacturing	11.7	16	7.4	17.42	20.16
Construction	4.4	8.1	0.7	16.75	17.41
Wholesale, Retail & Transportation	19.9	23.5	16.3	13.53	16.88
Accommodation & Food	7.1	5.5	8.7	11	13.38
Information, Comms, Financial, Insurance & Real Estate	9.8	11.2	8.4	23.64	27.58
Professional, Technical, Scientific	8.8	10.4	7.3	15.55	20.04
Public admin, Health, Education	31.7	18.5	44.9	21.64	25.91
Arts, Entertainment & Recreation	1.9	1.6	2.1	14.41	17.86
Other service activities	2.3	1.5	3.1	11.27	15.54
Number employed at workplace					
0-19	9.9	8.7	11	13.3	17.76
20-49	38.2	36.1	40.3	14.30	19.35
50 +	48.2	51.3	45.1	20.00	24.08
Do not know but more than 10	3.7	4	3.5	16.66	19.32

8.5 How does pay vary by gender within the structure of employment?

Next, we turn to look at gender differences in pay within the structure of employment and compare the earnings of males and females with the same job characteristics. These analyses thus make what is known as a 'partial adjustment' to the overall unadjusted GPG. It is important to bear in mind in interpreting these results that each estimate represents only the raw gap, in that it is made without controlling for differences in other characteristics.

Focusing first on gendered differences in pay based on occupation what is most notable is that male median hourly earnings are higher than female median hourly earnings in all occupations, with the exception of those in '*Managerial, Director and Senior official*'

occupations whereby females earned 15% more than males. When we base the comparison of male and female hourly earnings on the mean, we see that males earn more than females in all occupations. Indeed, despite as we seen in the previous section whereby females are much more likely to be employed in '*Professional*' occupations than males, as detailed in Table 15 below female median hourly earnings were almost 5% lower than female median hourly earnings (mean hourly earnings 6.6% lower).

The gap in earnings is largest for those in '*Skilled trades*' occupations whereby female median hourly earnings were 29.7% below that of females (19.5% below using mean hourly earnings). Females in '*Caring, leisure and other service*' occupations also earned considerably less than males in the same occupations with a gap of 16.3% using median hourly earnings and a gap of 8.6% using mean hourly earnings. The gendered gap in earnings is smallest for those in '*Associate Professional and Technical'* occupations. Indeed, despite the fact that males are more likely to be employed in this sector, median female earnings were 1.8% higher than male earnings. Although, based on the mean female hourly earnings are 7.3% less than male hourly earnings.

Looking across a breakdown of major industries it is clear that female median hourly earnings are considerably lower than males across the majority of industries. Specifically, based on median hourly earnings it is only the '*Public Administration, Health and Education'* sector that female earnings are higher (albeit, just) than male earnings. Using mean hourly earnings, it is only in the '*Arts, Entertainment and Recreational services'* sector and the *'Construction'* sector where female earnings are higher than male earnings.

Based on median hourly earnings the GPG was largest in the *'Other service activities'* sector where female median hourly earnings were 30.3% below that of males. There was also a large gap in earnings between males and females employed in the '*Wholesale, Retail & Transportation'* sector where female median hourly earnings were 19.6% below that of males. Using mean hourly earnings, the GPG at 30.2% is largest for those employed in the *'Agriculture, Forestry, Fishing, Electricity, Water'* sector. Albeit the gap is also relatively large in the '*Wholesale, Retail & Transportation*' sector (27.9%) and in the '*Other service activities'* sector (17.4%).

Whilst we seen in the previous section that females are more likely to be employed in workplaces with between 0-19 employees than males the results in Table 15 below show that females earn significantly more than males employed in similar workplaces. That being said the size of this gap is smaller in larger workplaces. Specifically, females earn close to 5% less in workplaces which have between 20-49 employees and 6% more in workplaces with more than 50 employees.

Table 15: Gender Pay Gap in hourly earnings: Percentage difference in female earnings as compared to male earnings

	Median hourly earnings		**Percentage difference in female earnings compared to male earnings**	**Mean hourly earnings**		**Percentage difference in female earnings compared to male earnings**
	Male	**Female**		**Male**	**Female**	
Occupation						
Managerial, Directors, Senior Officials	26.83	31.05	15.73	29.83	27.74	-7.01
Professional	28.44	27.10	-4.71	31.69	29.61	-6.56
Associate Professional & Technical	21.11	21.49	1.80	25.56	23.69	-7.32
Administrative & Secretarial	20.14	17.32	-14.00	21.51	19.21	-10.69
Skilled trades	15.93	11.20	-29.69	17.78	14.31	-19.52
Caring, Leisure & Other service	14.95	12.51	-16.32	16.42	15.01	-8.59
Sales & Customer service	12.50	11.08	-11.36	13.85	12.67	-8.52
Process, Plant & Machine	14.00	13.34	-4.71	15.99	14.20	-11.19
Elementary	11.82	10.77	-8.88	20.90	12.53	-40.05
Industry						
Agriculture, Forestry, Fishing, Electricity, Water	14.12	12.62	-10.62	21.74	15.16	-30.27
Manufacturing	18.32	16.41	-10.43	20.88	18.61	-10.87
Construction	16.87	16.75	-0.71	17.38	17.69	1.78
Wholesale, Retail & Transportation	14.58	11.73	-19.55	19.08	13.74	-27.99
Accommodation & Food	10.97	11.12	1.37	12.86	13.71	6.61
Information, Comms, Financial, Insurance & Real Estate	25.38	21.69	-14.54	28.33	26.57	-6.21
Professional, Technical, Scientific	16.44	14.58	-11.31	21.55	17.88	-17.03
Public admin, Health, Education	21.47	21.66	0.88	29.96	24.24	-19.09
Arts, Entertainment & Recreation	14.42	14.19	-1.60	16.58	17.86	7.72
Other service activities	14.64	10.21	-30.26	17.61	14.55	-17.38
Number employed at workplace						
0-19	13.16	14.21	7.98	16.65	18.63	11.89
20-49	14.74	14	-5.02	20.81	18.06	-13.21
50 +	20.7	19.44	-6.09	24.84	23.23	-6.48
Do not know but more than 10	17.65	15.24	-13.65	20.51	17.93	-12.58

SECTION 9 COMPARING THE UNADJUSTED GENDER PAY GAPS IN NORTHERN IRELAND AND THE REPUBLIC OF IRELAND

In comparing the overall estimates of the unadjusted GPG between Northern Ireland and the Republic of Ireland the most obvious and pertinent finding is the fact that overall, females earn less than males across the island of Ireland - irrespective of whether we base the estimate on mean or median earnings or which earnings period we base our estimate on.

There are however substantial differences in the magnitude of the overall unadjusted GPG between Northern Ireland and the Republic of Ireland dependent upon what and who we are comparing. These differences will be drawn out and commented upon in this section.

The unadjusted GPG based on hourly earnings shows when the estimates are based on the median the size of the gap is larger in Northern Ireland than it is in the Republic of Ireland. The opposite is true for mean. These differences are important because they suggest that the nature of the earnings distribution and in turn the unadjusted GPG is different in Northern Ireland compared to the Republic of Ireland.

The fact that there is a relatively low gap in the median earnings of all males versus all females in the Republic of Ireland but a substantial gap in the mean earnings of males versus females suggests that, in large part, it is the skew in earnings and the gendered nature of this skew which is of particular importance in driving the unadjusted GPG.

Interestingly, the GPG in hourly earnings amongst full-time workers only is significantly larger in the Republic of Ireland than it is in Northern Ireland. That is, females in full-time employment in the Republic of Ireland compare relatively worse to males, than similar females do to similar males in Northern Ireland.

Another particularly noteworthy finding relates to the fact that right across the island of Ireland part-time female workers earn considerably more per hour than part-time male workers. It is worth noting however that the size of the unadjusted GPG in hourly earnings is much larger in Northern Ireland than it is in the Republic of Ireland, irrespective of whether the estimate is

based at the mean or the median. This is often referred to as a reverse GPG and merits attention in its own right. It is worth noting that we also estimate a reverse GPG for the Republic of Ireland when we base our estimate on male and female median full-time earnings. When we base our estimate on the mean however the gap in earnings of full-time females is significantly larger in the Republic of Ireland, compared to Northern Ireland.

A comparison of the earnings distributions in Northern Ireland and the Republic of Ireland shows stark differences not least in terms of how inequalities in earnings manifest across the overall distribution of earnings, but also in terms of how differently the gendered gap in earnings manifests across the distribution in Northern Ireland as compared to the Republic of Ireland. In summing up these differences we see that in Northern Ireland across the majority of the distribution females earn considerably less than males per hour. However, interestingly it is at the tails of the distribution where the gap in earnings is widest, and indeed, females who earn significantly more than males at the lower and upper tails of the distribution. Indeed, in Northern Ireland, it is the top earning female whose earnings are far above everyone else. Nonetheless, it remains the case that the earnings of the vast majority of females are significantly below that of males.

In contrast, almost the opposite can be said about how the gendered gap in earnings manifests itself across the earnings distribution in the Republic of Ireland. Indeed, here we see that whilst females earn less than males across each decile of the earnings distribution, the size of the gap is generally lower than the gaps we see for Northern Ireland. However, at the top end of the earnings distribution in the Republic of Ireland there is a monumental gap in earnings with males earning more than 50% more per hour than same females. What is more, it is also remarkable that the earnings of males at the very top of the earnings distribution (top decile) are far above those of everyone else. The gap in earnings between top earning males versus everyone else is significantly higher in the Republic of Ireland than it is for the highest earners (i.e. top earning females) in Northern Ireland. Thus, not only is the gap in earnings between males and females at the top larger in the Republic of Ireland than it is in Northern Ireland, but also is the gap between males in the top decile and males/females across the rest of the distribution.

In many ways the overarching story of the earnings distribution in the Republic of Ireland is a tale of the top earning male versus everyone else. Whilst a similar story can be applied to the top earning female in Northern Ireland, the more dominant finding from the analysis of the earnings distribution is just how prevalent and substantial are lower earnings for females across the majority of the earnings distribution.

A comparison of the data presented for Northern Ireland and the Republic of Ireland across characteristics shows number of notable findings including substantial differences in the composition of the labour force by gender in terms of education, as well as in the unadjusted GPG for those with different levels of education which is worth commenting on. A greater proportion of workers in the Northern Ireland labour market are educated to degree or above level as compared to the Republic of Ireland. However, the data shows that the overall returns to work from degree or above level education in Northern Ireland is are not as great as they are in the Republic of Ireland. Nevertheless, importantly in terms of the GPG having degree level or above levels of education reverses the partially adjusted GPG in Northern Ireland. Indeed, as we seen in Section 6 the hourly earnings of females with degree or higher levels of education are 2% more at the median and 0.4% at the mean than same males. The same is not true in the Republic of Ireland where males with degree level or higher levels of education are significantly higher than same females (12% more at median, 9.4% at mean).

Furthermore, in terms of education significantly more of the labour force in Northern Ireland as compared to the Republic of Ireland have no qualifications and indeed, having no qualifications does not carry the same wage penalty in the Northern Ireland labour market as it does in the Republic of Ireland labour market. That said, there is a significantly larger unadjusted GPG in median hourly earnings for those in Northern Ireland as compared to the Republic of Ireland. This means, in essence that the wage penalty for being female amongst those with no qualifications in Northern Ireland (23.8% gap at median, 15.2% gap at mean) is greater than it is in the Republic of Ireland (20.7% gap at median, 20% gap at mean).

In terms of differences in the structure of employment much larger proportions of females in Northern Ireland (58.8%) are employed in the *'Public Administration, Health and Education'* sector than are in the Republic of Ireland (44.9%), which in both regions is a relatively high

paid sector to be employed. It is worth commenting that this higher share of female employment in this sector in Northern Ireland as compared to the Republic of Ireland is likely to go some way to explaining why the overall unadjusted gap in mean hourly earnings is significantly larger in the Republic of Ireland than in Northern Ireland. Nevertheless, it is also worth drawing attention to differences in the size of the unadjusted GPG in hourly earnings for those employed in this sector in Northern Ireland. Specifically, female hourly earnings at the median are 16.4% below that of males in Northern Ireland, whilst in the Republic of Ireland female median hourly earnings are 0.8% higher than male earnings in this sector. However, when we look at the size of the gap using mean hourly earnings it is interesting to note that the females earn 19.9% less than males in the Republic of Ireland and 14.3% in Northern Ireland. Thus, we can conclude from this is that the gendered distribution of earnings in this sector is substantially different in Northern Ireland as it is in the Republic of Ireland. In this respect, the substantial gap in median hourly earnings in Northern Ireland but not in the Republic of Ireland would suggest that females are clustered amongst the lowest paid jobs in this sector in Northern Ireland, but in the Republic of Ireland it appears as though males and females are equally as likely to be low paid. Nevertheless, the larger gap in mean hourly earnings in this sector in the Republic of Ireland as compared to in Northern Ireland suggests that the racing away of the top earning male in this sector is significantly greater in the former, a trend which we have already seen is mirrored across the labour force as a whole.

SECTION 10 CONCLUSION

This paper provides an in-depth assessment of the unadjusted GPG in both Northern Ireland and the Republic of Ireland. A key observation arising from all of the data presented in this paper is that the story of the unadjusted GPG is overwhelmingly one where females earn less than males. Thus, despite the fact that some estimates of the GPG based on particular groups of workers reveal a reverse GPG, in that males earn less than females, this should not derail the broad conclusion which should be drawn from the body of evidence presented.

Overall, the data presented in this paper shows that the unadjusted GPG in hourly pay is exacerbated by the large numbers of women that work part-time and the fact that despite those in part-time employment having lower hourly pay than those in full-time employment females in part-time employment are paid significantly more than same males. It is mitigated by the number of women who have degree level or higher levels of education and the number of women in the public administration, education and health sector and the rewards of both of these factors in the labour market. Furthermore, across the island of Ireland the GPG is significantly higher when the estimate is based on weekly/annual pay rather than hourly pay. This of course reflects the fact that males and females differ significantly in respect of working time - in that part-time work is more prevalent among females than among males.

It is worth drawing attention to the fact that dependent on whether or not we base the estimate of the GPG at the mean and median generates very different results. The unadjusted GPG based on hourly earnings shows when the estimates are based on the median the size of the gap is larger in Northern Ireland than it is in the Republic of Ireland. The opposite is true for the Republic of Ireland, whereby the size of the unadjusted GPG is significantly wider based on estimates at the mean, than they are based on estimates at the median. These differences were shown to be the result of substantive differences in the earnings distributions of males and females in Northern Ireland as compared to the Republic of Ireland. Indeed, the data showed substantial gaps in earnings across the whole of the distribution, whereby female earnings tend to be significantly less than male earnings. The exception to this, as we seen, was at the tails of the earnings distribution where females at the top and bottom of the earnings distribution in Northern Ireland earn significantly more per hour than males. In

contrast, in the Republic of Ireland, an analysis of the earnings distribution show that whilst males earn more than females across the entire distribution, the differences are often quite small. However, at the top end of the earnings distribution in the Republic of Ireland there is a monumental gap in earnings with males earning more than 50% more per hour than same females. Reducing the gap between these top earning males and everyone else would have a significant impact on the overall unadjusted GPG.

The presence of alternative ways to measure the unadjusted GPG and the in turn differing estimates of the GPG can create the misconception that data on the GPG are unreliable. It can also create the false perception that it is the presence of alternative measures that confuses the debate and that in assessing the unadjusted GPG we should seek to do so via a single metric. However, as this paper shows, irrespective of which measure we use, the data on the unadjusted GPG are remarkably reliable and paint an overall clear and consistent picture i.e. females by and large earn less than males. However, as is also shown, different measures reveal different things and force us to accept the complexity of the issue. In this sense the tendency for international and national bodies to assess the GPG via a single metric inevitably narrows the discussion and given the fact that they all tend to use different measures makes comparisons difficult and ends up muddying the waters.

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APPENDIX 1: NORTHERN IRELAND

An overview of average (median and mean) nominal pay by gender and working pattern

Table 1.A and **Table 2.A** below presents hourly earnings excluding overtime, gross hourly earnings, gross weekly earnings and gross annual earnings by gender and working arrangement.

Table 1.A: Median earnings by gender, Understanding Society survey 2018

	Hourly pay - Excluding overtime (£)	Gross Hourly pay (£)	Gross Weekly pay (£)	Gross Annual pay (£)
All	10.26	10.69	350	18000.00
Male	10.98	11.13	430.42	22137.00
Female	10.02	10.22	303.33	15600.00
Full-time	11.26	11.56	432.25	22230.00
Part-time	8.18	8.21	166.62	8569.00
Male Full-time	11.38	11.56	455	23400.00
Female Full-time	10.89	11.50	419.88	21594.00
Male Part-time	7.26	7.24	118.86	6112.80
Female Part-time	8.45	8.52	175	9000.00

Table 2.A: Mean earnings by gender, Understanding Society survey 2018

	Hourly pay - Excluding overtime (£)	Gross Hourly pay (£)	Gross Weekly pay (£)	Gross Annual pay (£)
All	12.32	12.54	413.51	21266.46
Male	12.52	12.84	471.03	24224.46
Female	12.15	12.31	366.8	18863.98
Full-time	12.83	13.22	489.62	25180.66
Part-time	10.93	10.62	200.38	10305.36
Male Full-time	13.03	13.35	510.05	26231.48
Female Full-time	12.60	13.06	466.16	23974.1
Male Part-time	8.92	8.87	178.2	9164.46
Female Part-time	11.41	11.05	205.89	10588.8

APPENDIX 2: REPUBLIC OF IRELAND

Table 2.A: Median earnings by gender, EU-SILC survey 2017

	Gross hourly pay (€)	Weekly pay (€)
All	16.75	595
Male	16.93	660.33
Female	16.45	525
Full-time	18.25	709.33
Part-time	12.25	238
Male full-time	18.14	725.66
Female full-time	18.51	695.33
Male part-time	11.37	226.33
Female part-time	12.99	249.66

Table 2.A: Mean earnings by gender, EU-SILC survey 2017

	Gross hourly pay (€)	Weekly pay (€)
All	21.27	716.04
Male	22.28	808.8
Female	20.27	623.34
Full-time	22.89	848.21
Part-time	16.16	299.44
Male full-time	23.41	892.74
Female full-time	22.22	789.52
Male part-time	15.07	277.36
Female part-time	16.58	308.18

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