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Modelling the Impact of an Increase in Low Pay in the Republic of Ireland

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MODELLING THE IMPACT OF AN INCREASE IN LOW PAY IN THE REPUBLIC OF IRELAND

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ABSTRACT

The establishment of a Low Pay Commission in the Republic of Ireland and the renewed focus on low pay and a 'living wage' both in Ireland and the UK has revived a growing interest in policies that focus on providing adequate minimum levels of pay for all employees.

This paper models the impact of an increase in the minimum wage to a level equal to two-thirds of median hourly earnings by 2020, a value equivalent to Eurostat's definition of the Low Pay threshold. The modelled increase would bring the minimum wage to a level of €12.50 per hour in that year, an increase of 36.6% between 2016 and 2020. In the context of previous changes to the Irish wage floor, the increase is equivalent to the change between October 2002 and July 2007 (+36.2%). This paper finds that the modelled increase would raise the hourly earnings for almost one-third of the lowest paid employees and reduce the level of inequity in the wage distribution.

The analysis uses data from a nationally representative income survey, the 2013 Survey on Income and Living Conditions, to model the effects of this increase. In doing so it draws on the research literature to incorporate the various spillover effects that are likely to be associated with such a change. The results of this analysis highlight the nominal increase in hourly earnings across all employees and its impact by gender, employment sector and age group. The change in the wage bill as a result of this increase is examined, as are the possible impacts it will have on employment levels and the wider economy.

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1. INTRODUCTION

The establishment of a Low Pay Commission in the Republic of Ireland, and the renewed focus on low pay and a 'living wage' both in Ireland and the UK, has revived interest in policies that focus on providing adequate minimum levels of pay for all employees. This attention reflects a greater policy interest in predistributive labour market policies and a renewed recognition of the role of earnings, alongside direct taxes and transfers, in pursuing redistributive policy objectives.

This paper models the impact of an increase in the wages of low paid employees through an uprating of the statutory wage floor. Eurostat (2012) define an employee who is on low pay as someone who is earning a wage that is less than two-thirds of the median wage in a country.[1] Collins (2015a) finds that one in five (25.6%) employees are earning a wage equal to or below the low pay threshold in Ireland.[2] This paper outlines one way to eliminate low pay and discusses the merits of doing so solely by increasing the statuary wage floor to a level that represents (a bite of) 66.6% of the median hourly wage in 2020. The analysis uses data from a nationally representative income survey, the 2013 Survey on Income and Living Conditions (SILC), to model the effects of this increase. In doing so it draws on the research literature to incorporate the various spillover and employment effects that are likely to be associated with such a change. The results of the analysis highlight the nominal increase in hourly earnings across all employees and its impact by gender, employment sector and age group.

This paper is structured as follows. Section 2 provides a background into the evolution of the interest in low pay and minimum wage policies in Ireland. The data used in the analysis is outlined in Section 3. Section 4 forecasts the 2020 earnings distribution and models an increase in the minimum wage to a value equal to two-thirds of the median wage, incorporating wage growth and spillover effects. Next Section 5 examines the impact the increase in the minimum wage has on the earnings distribution. Section 6 looks at what impact the increase will have on employees, what are the characteristics of those who will benefit and by how much will they benefit by. Section 7 predicts the cost the increase will impose on the wage bill and discuss the possible employment effects. Finally, Section 8 concludes.

[1] Eurostat calculate the low pay threshold as two-thirds of the median wage based on data for all employees (excluding apprentices) working in enterprises with 10 employees or more who operate in all sectors of the economy except agriculture, forestry and fishing (NACE sector A) and public administration and defence (NACE Section O) (see Eurostat, 2012).

[2] Collins (2015a) calculates the low pay threshold for Ireland as two-thirds of the median hourly earnings for employees in NACE sectors B to S excluding O who are in firms with 10 or more employees.

2. BACKGROUND AND CONTEXT

The 1997 Programme for Government made a commitment to introduce a national minimum wage. The commitment was part of that Government's commitment to 'an inclusive society' where 'all citizens have the opportunity and the incentive to participate fully in the social and economic life of the country…and to share in the benefits of economic growth" (1997: 5). Subsequently, a National Minimum Wage Commission was established, in July 1997, and reported with a series of recommendations regarding the establishment of a statutory minimum wage in March 1998.[3] The Government then appointed an inter-departmental implementation group to further assess the proposal and it reported during May 1999.[4] The National Minimum Wage Act 2000 was enacted in April 2000 and introduced a statutory minimum wage from April 1st of that year.

The minimum wage was introduced at a rate of IRL£4.40 per hour (€5.58) for experienced adult workers. The initial rate derived from the recommendations of the aforementioned National Minimum Wage Commission based on research for that Commission by Nolan (1998). The initial threshold was determined as the updated (to 1997) value of two-thirds of the median earnings for all employees. The figure was based on the results from the 1994 ESRI Living in Ireland Survey where two-thirds of median earnings were estimated at IRL£4.00 per hour and an assumption that average hourly earnings for all employees "rose by about 10% between 1994 and 1997" (Nolan, 1998: 8).

Table 1: Ireland's Adult Minimum Wage Rate, 2000-2016

Date	€ per hour	IRL£ per hour
1st April 2000	*€5.58*	£4.40
1st July 2001	*€5.97*	£4.70
1st October 2002	*€6.35*	£5.00
1st February 2004	€7.00	
1st May 2005	€7.65	
1st January 2007	€8.30	
1st July 2007	€8.65	
1st February 2011	€7.65	
1st July 2011	€8.65	
1st January 2016	€9.15	

Notes: The Euro was introduced on the 1st January 2002. The exchange rate between the IRL£ and € is £1=€1.27.
The rates for July 2001 (pre Euro introduction) and October 2002 (post Euro introduction) were set in IRL£s by Ministerial order on 30th June 2000.
The rate set on 1st January 2016 was the rate in place at the time of this papers publication (May, 2016).

Since 2000 the rate has changed nine times (see Table 1). Initially, the mechanism for changing the rate was through Labour Court reviews where these were initiated by requests from organisations such as the Irish Congress of Trade Unions. The Labour Court, having invited submissions on the issue from various interested parties, would make a recommendation to

[3] The report of the Commission was published on 5th April 1998.
[4] See http://www.djei.ie/publications/employment/1999/nationalminimumwagereport/

Government (the relevant Minister or Junior Minister) who would subsequently make an order, if appropriate, amending the minimum wage.

There was one reduction in the minimum wage, introduced on the 1st of February 2011. The reduction was flagged in the National Recovery Plan 2011-2014 (2010:35-36), initiated as part of the Financial Emergency Measures in the Public Interest Act 2010 and was justified in the context of the bailout programme Ireland had entered into in late 2010. However, the reduction, which only applied to new earners on the minimum wage, was short-lived and reversed by a new Government in July 2011. Neither the reduction nor restoration followed the previous Labour Court adjustment mechanism.

Ireland's economic recovery slowly emerged across 2014 as growth became more established and the domestic economy picked up; driven by recovery in household consumption and domestic investment (NERI, 2015b). In terms of earnings, 2014 marked the first year of an economy wide recovery in pay, with average weekly earnings increasing by 1.9% and average hourly earnings increasing by 1.4% between Q4 2013 and Q4 2014 (CSO, 2015). The 2014 earnings growth marked a reversal of a trend of decreasing earnings since 2009.

The emergence of a recovery in pay levels shifted a focus to a need to revisit the minimum wage and re-establish a process to determine changes to its level. In its Statement of Government Priorities 2014-2016, in effect a mid-term revision of the programme for government, a commitment was made to deliver "a new deal on living standards to ensure that the economic recovery is felt by low and middle-income working families". Among the commitments made the Government stated that:

> *We will establish a Low Pay Commission on a statutory basis as an independent body to make annual recommendations to the Government about the appropriate level of the minimum wage and related matters* (2014: 4).

The Commission was established under the National Minimum Wage (Low Pay Commission) Act 2015 with its members appointed for terms of three years. While the Commission is tasked with examining broader issues relating to the conditions of workers, in particular those experiencing precarious employment patterns, it is also tasked with making an annual recommendation on any revision to the minimum wage.[5] A move to annual assessments, and possible changes to the minimum wage, reflects the experience of other countries where relatively small and frequent changes have been found to be less disruptive than occasional relatively large changes (Nolan et al, 2003:10).

The establishment of the Low Pay Commission shows a renewed interest by the government into the minimum wage and low pay issues. The commission's first recommendation was to increase the minimum wage by €0.50 an hour which resulted in an uprating of the minimum wage to €9.15 an hour, on the 1st January 2016. This interest was further reflected in the new Programme for Partnership Government published in May 2016.

After the minimum wage was introduced in 2000, there was limited interest in low pay and minimum wage rates, until the past decade. The revival of interest in low pay can be somewhat

[5] The Commission's first recommendation was made in July 2015. See http://www.lowpaycommission.ie/publications/national-minimum-wage-/recommendations-of-the-low-pay-commission-for-the-national-minimum-wage-2015-.pdf

accounted for by the more favourable economic environment and the establishment of 'living wage' campaigns in the United States, the UK and New Zealand, to name a few, which have given the 'living wage' and low pay policy traction.

In early 2014 a discussion on the 'living wage' commenced in Ireland with a 'living wage' value of €11.45 per hour being established in July 2014 by the Living Wage Technical Group.[6] The living wage rate in Ireland represents an hourly rate that should provide employees with sufficient income to achieve an agreed acceptable minimum standard of living. Collins (2015a) finds that just over one in five employees (25.6%) find themselves earning a wage equal to or below the living wage value, which he also calculates to be approximately the low pay threshold for Ireland.

The revival of an interest in low pay in the UK sparked the introduction of a "National Living Wage" for workers aged 25 years old and older.[7] The introduction of this new statutory wage floor was based on recommendations made in the Resolution Foundation's (2014) report that reviews the future for the UK's National Minimum Wage. This report recommended that the UK government should build their low pay strategy on the official relative definition of low pay. Eurostat (2012) define someone who is on low pay as an employee earning a wage that is below two thirds of the hourly median wage in that country. This review lead to the announcement made by The UK Chancellor, George Osborne, in the Summer Budget of July 2015 to introduce a new mandatory higher minimum wage for those aged 25 and over from April 2016 as part of his intention to "tackle low pay and ensure that lower wage workers can take a greater share of the gains from growth". The 'National Living Wage' (NLW) is due to be set with reference to the prevailing median level of pay in the economy, with the intended value to represent a bite of 55% of the median wage among those aged 25 years and older in 2016 and with the long-term aim of reaching a bite of 60% of the 25 years old or older median wage in 2020. The achievement of the end value will be done so incrementally conditional on recommendations made by the UK's Low Pay Commission.[8]

In the context of the Irish earnings distribution, this paper will model the impact of an increase in the Irish minimum wage to a value that represents two-thirds of the median wage in 2020, analysing its impact on the earnings distribution, low paid employees, the wage bill and employment levels.

[6] Note, the Living Wage has been estimated for a single-person working full-time and as such the hourly figure does not necessarily capture employees who face different costs and circumstances (couples with children etc). As the figure is an hourly one derived from an assumption of full-time work, employees at or above the Living Wage but working less than a full-week (voluntarily or involuntarily) may also be unable to achieve a weekly living wage (see Living Wage Technical Group, 2014).

[7] The "National Living Wage" is different to the Living Wage calculated by the living wage campaign in the UK in that it is not calculated based on the cost of living. It is a statutory wage floor for employees aged 25 or over where as the living wage is voluntary wage employers are encouraged to pay. See http://resolutionfoundation.org/publications/higher-ground-who-gains-from-the-national-living-wage/

[8] For further details see http://resolutionfoundation.org/publications/higher-ground-who-gains-from-the-national-living-wage/

3. DATA

The analysis in this paper draws from an examination of the micro data from the 2013 Central Statistics Office (CSO) *Survey on Income and Living Conditions* (SILC). This survey is part of an annual Europe wide household living standards survey and collects income and living standards information from a representative national sample. The data was released in late January 2015 and comprised responses from 12,663 individuals in 4,922 households.

Like all survey data sources, the SILC dataset, and consequently any analysis drawn from it, is subject to some caveats. In particular, income surveys tend to experience lower response rates from high income households. Similarly, successful sampling can be challenging among low-income households and minorities while those in institutions are excluded from the sample.[9] While the data includes a probability weight variable to correct for under-representation and non-response, and these weights are used in the analysis, deficits at both ends of the distribution remain. However, the collected income data is reconciled by the CSO with administrative tax and welfare records in an attempt to ensure its accuracy. Overall, the SILC data remains the most detailed and robust data source available for Irish individual and household income.

Data on earnings is available for all those in the dataset indicating that their principle economic status is 'at work' and who are employees. The data includes an average hourly wage rate for each employee in their main job. Overall, the 2013 SILC sample includes hourly earnings data for a sample of 3,369 employees.

To assess the representativeness of the SILC data, Table 2 compares values generated from that data with other labour market indicators published by the CSO for the reference year. Overall, the SILC data compares well to the other labour market indicators.[10] There are challenges comparing the SILC results with measures of the number of employees in the *Quarterly National Household Survey* (QNHS). The latter uses the International Labour Office (ILO) method of measuring those who are at work, capturing all those working for pay, profit or in a family business for more than one hour a week as employed. Conversely, the SILC data is based on a measure of a person's principal economic status, the main thing that the person does. As a person may be employed for a few hours per week, for example working part-time, but may regard themselves as principally a student, retired, unemployed or working in the home, estimates of the total number of employees using these two approaches are likely to differ fairly substantially. In an attempt to take account of this, the table compares the number of individual with any employee income (from SILC) with the QNHS measure of employees.

As the SILC data is focused only on those whose principal economic status is 'at work' and who are employees, the number of workers represented by the hourly earnings analysis in this paper is a smaller figure than the total number with any employee income (seen in Table 2).

[9] These sampling challenges, common to all households surveys, are explored further in: Groves and Couper (1998), Fitzgerald et al (1998), Goyder (1987), Nathan (1999), Cheesbrough (1993), Lynn and Clarke (2002) and Uhrig (2008).

[10] A study by Foley et al (2015) examined the consistency of the SILC data compared to *Household Budget Survey* results. It also found that SILC provided "robust and reliable" measures (2015: 7).

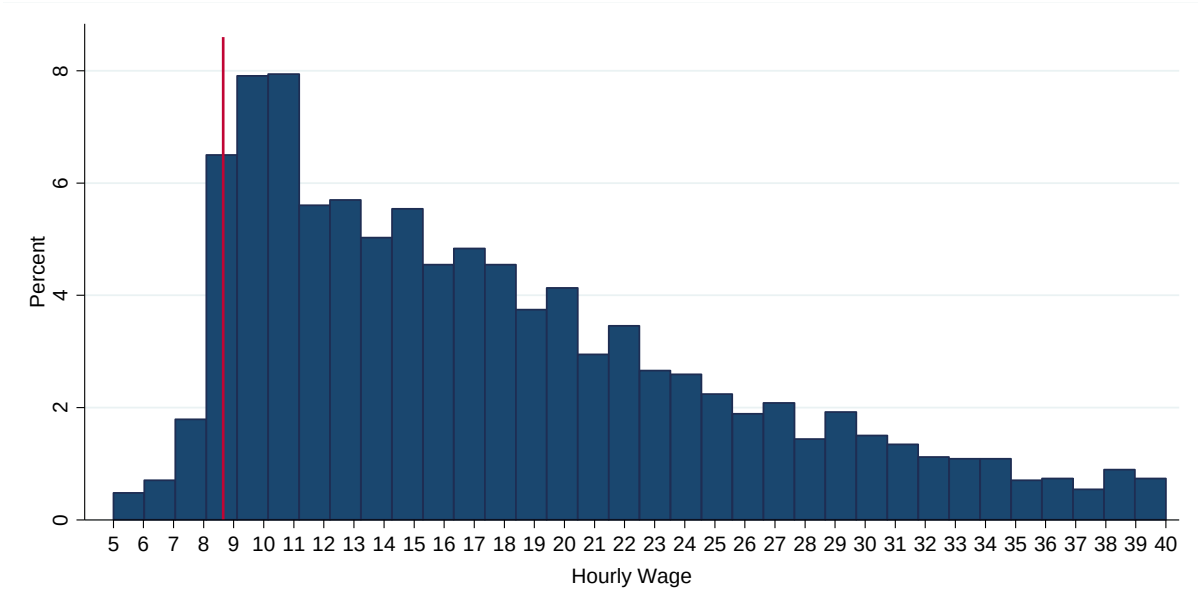
Table 2: Representativeness of the SILC Labour Market Estimates

Indicator	CSO Labour Market Data	SILC Analysis
Annual average earnings	€35,830	€35,487
Average hourly earnings	€20.75	€20.63
Average weekly hours	31.55hrs	33.22hrs
Employees / Any Employee Income	1,555,775	1,530,624
Employees % male	49.0%	47.5%
Employees % female	51.0%	52.5%

Notes: CSO labour market data is for 2013 and where data is quarterly it is averaged over the four quarters to provide an annual figure. Average annual earnings is from the *Earnings and Labour Costs Annual 2013*. Hourly earnings and hours worked data is from the *Earnings and Labour Costs Quarterly Survey*. Employee estimates are from the *Quarterly National Household Survey*. SILC values for annual average earnings and hourly earnings are calculated for the sample of employees for whom hourly earnings data is calculable.

Our analysis focuses on the hourly earnings distribution and the characteristic profile of those whose principle economic status is 'at work' and who are employees. The 2013 hourly earnings distribution can be seen in Chart 1. This will be our baseline distribution which we will use to forecast the 2020 hourly wage distribution in which we will model an increase in low pay.

Chart 1: Distribution of Hourly Earnings, Ireland 2013 (% of employees)



Source: EU Survey on Income and Living Conditions
Notes: 2013 Earnings distribution compiled using SILC 2013 data. The red line represents the minimum wage of €8.65.
There are some entries with spurious values where the hourly wage is very low; earnings less than €5 an hour are dropped to give a more robust data basis.
The earnings graph only shows the earnings for those earning a wage less than €40 an hour. 6.9% of employees earn a wage above €40 an hour.

4. FORECASTING THE 2020 EARNINGS DISTRIBUTION AND MODELLING THE MINIMUM WAGE INCREASE

This section projects the 2013 earnings distribution forward to 2020 incorporating annual wage growth and the direct and indirect effects of the 2016 minimum wage increase. This analysis is based on an assumption that the composition of the workforce does not change between 2013 and 2020.[11]

To forecast the 2020 earnings distribution, and model an increase in low pay, the paper follows four steps:

1. Forecast the 2016 earnings distribution prior to the 2016 minimum wage increase
2. Model the impact of the increase in the 2016 minimum wage on the 2016 earnings distribution
3. Project the 2016 earnings distribution forward to 2020
4. Model the impact of an increase in the minimum wage in 2020

Step 1: 2016 Earnings Distribution before the 2016 Minimum Wage Increase

To project the 2013 earnings distribution forward to 2020 we incorporate annual wage growth. We use the CSO's (2015) value for annual wage growth in 2014 of 1.4% and an estimate of 2% for the remaining years based on data and projections from the CSO (2015), NERI (2015), the Central Bank (2015), OECD (2015) and the Department of Finance (2015). We apply the annual wage growth figures to all employees earning a wage above the minimum rate in each year. Minimum wages and sub-minimum rates of pay are policy instruments that create a wage floor which do not grow in line with wage growth and are increased at the discretion of the government.

Applying the average wage growth figures to above minimum wage workers, while maintaining the size and composition of the workforce for each year from 2013 to 2016, leaves us with the 2016 earnings distribution, prior to any minimum wage increase.

Step 2: 2016 Minimum Wage Increase

The minimum wage increased from €8.65 to €9.15 on January 1st, 2016. We incorporate this increase when modelling the 2016 earnings distribution. There are 3 main steps involved in modelling the effects of this increase in the minimum wage.

Step 2.a: All wage earners with a wage between €8.22 and €9.08 see an increase in their wages to the new wage floor of €9.15.

Collins (2015b) classifies those with hourly earnings between €8.22 and €9.08 as being minimum wage workers. This is due to the calculation method used to determine hourly earnings in the SILC data set. The SILC data provides figures for usual hours worked and usual gross monthly pay and using these two numbers an estimate of hourly earnings is established. Due to this calculation approach it is likely that wage earners with a wage close to the minimum wage rate are in fact on this rate and in recognition of this the cohort of earners on the

[11] We revisit this assumption later (see Section 7).

minimum wage are identified as those whose hourly earnings are +/-5% from the €8.65 threshold.

Step 2.b: On the 1st of January 2016 all those earning a wage below €8.65 receive an increase of €0.50 an hour.

Collins (2015b) identified 5.5% of employees who have an hourly wage below the 2013 statutory minimum wage. This cohort of employees are likely to be on sub-minimum rates and include workers aged under 18 years, 18 year old workers working in their first and second year of their first employment, persons employed by a close relative, apprentices and those on structured training schemes.

Sub-minima wage workers are on a wage that is a stated percentage of the minimum wage. The bite of the minimum wage varies depending on which group of sub-minima wage workers a person falls into.[12] It is difficult, using the SILC data to determine which groups of sub-minima workers the 5.5% of employees fall into. For simplicity of modelling we assume that all sub-minima workers receive an increase in wages equal to the nominal increase in the minimum wage.

The third step (***Step 2.c***) in modelling the 2016 earnings distribution is to incorporate spillover effects of the minimum wage increase. We do this by increasing the average wage for workers at the percentiles above the minimum wage, starting at the 10th percentile (as a minimum wage of €9.15 extends to the 10th percentile of the earnings distribution) and continuing as far as the 25th percentile, by the increase that is calculated for each percentile using a formula proposed by Lee (1999).

When a wage floor is increased the literature suggests that it may result in spillover effects higher up the earnings distribution. Employers may increase the wages of those workers who were originally earning a wage equal to, or just above, the newly implemented wage floor in order to preserve some of the pre-measures earning differentials between workers in different roles or with higher skill sets.

There are contrasting views in the literature in relation to spillover effects. Dickens and Manning (2004) found no evidence of spillover effects from the introduction of the UK NMW in 1999. This was in contrast to studies in the US which found significant spillover effects to an increase in the wage floor (Stewart, 2012 and Lee, 1999). However, more recent research in the UK has found evidence of spillover effects extending up to the 25th percentile of the earnings distribution (Butcher, Dickens and Manning, 2012). It is noted that the presence of spillover effects in later years in Britain may be due to the larger increase in the minimum wage that was examined, or because spillover effects take time to feed their way through to the earnings distribution.

To model the spillover effects of an increase in the minimum wage we use a formula articulated by Lee (1999). Lee's (1999) formula measures the spillover parameter as the difference

[12] Details on who receives a sub-minima wage and the sub-minima rates can be found in ICTU's Low Pay Commission Submission (2016) or at http://www.citizensinformation.ie/en/employment/employment_rights_and_conditions/pay_and_employment/pay_inc_min_wage.html.

between the log earnings distribution after the minimum wage increase at a given percentile (the actual (observed) distribution) and the "latent" distribution at that percentile (the distribution of earnings that would have been observed if there was no increase in the minimum wage). As our aim is to forecast the actual earnings distribution in 2016 we reverse the formula and use the "latent" distribution at a given percentile and an estimate of the spillover parameter to complete our modelling of the 2016 distribution.

We use the same central assumption of a spillover parameter of 0.03 as the Resolution Foundation and the OBR used in their modelling of the effect of the introduction of a NLW in the UK and similarly extend spillovers to the 25th percentile of the earnings distribution. We sensitivity test for no spillovers, a low parameter (.02) and a high parameter (.04) but see only marginal differences in our results. The differential impacts of these parameters can be seen in Chart A1 in the Appendix.

It should be noted that given the nature of the model being used, this approach averages the impact of spillovers across all employees at each percentile of the effected part of the wage distribution. This may not be observed in reality, as not all employers who have employees in the indirectly effected part of the distribution (up to the 25th percentile) will increase their wages by an equal amount to others who lie at the same percentile. Therefore, the spillover effects modelled may be over or underestimated for some employees. It should also be noted, that the spillover effects (indirect effects) are modelled to be happening concurrently with the minimum wage increase (direct effects) where in reality spillover effects may take time to feed through and work their way up the earnings distribution.

Following these adjustments and calculations, the forecasted 2016 earnings distribution can be seen in Chart 2.

Step 3: Transition from the 2016 earnings distribution to the 2020 earnings distribution before an increase in low pay is modelled

To arrive at the projected 2020 distribution, in which the impact of an increase in low pay is modelled, average wage growth figures for each year, must firstly be incorporated.

An estimate of 2% average wage growth for each year between 2016 and 2020 is applied to all employees earning a wage above the 2016 minimum wage (for reasons outlined previously) keeping the assumption that the composition of the workforce remains constant at 2013 levels.[13]

This gives the 2020 hourly earnings distribution before any increase in the minimum wage is modelled. The corresponding median wage for this distribution is €18.79. We will model an increase in the wage floor into this distribution, to a level that has a bite of 66.6% of the median wage, which we calculate to be a minimum wage of €12.50.

Step 4: Modelling an increase in low pay in 2020

Eurostat (2012) define low paid workers as those earning a wage two thirds or less of the gross median hourly wage in a particular country.

[13] Estimated wage growth figure based on literature from the CSO (2015), NERI (2015), the Central Bank (2015), OECD (2015) and the Department of Finance (2015).

There are three main steps involved in the modelling of this increase in the minimum wage into the 2020 earnings distribution. They are similar to those followed for the aforementioned 2016 minimum wage increase.

Step 4.a will be to increase the wages of those who were previously earning a wage below the minimum wage of €9.15 by €3.35 an hour, retaining the simplifying assumption that sub-minima rates increase by the same nominal amount as the minimum wage.

Step 4.b involves increasing the wages of employees who were previously earning a wage between €9.15 and €12.50 to the new wage floor of €12.50. Previous research suggests that there may be a second effect for this group of workers. Along with benefiting directly by being pushed up to the new wage floor they may also benefit indirectly through spillover effects. As a substantial increase in the minimum wage is being modelled, it is possible that employers might wish to maintain some pay differentials between the 2016 minimum wage workers and those who were previously earning a wage near €12.50 an hour, due to contrasting skill sets and levels of productivity. We sensitivity test for the possibility that these employees may receive direct and indirect increases in wages due to the minimum wage uprating. The different versions of the 2020 earnings distribution can be seen in Chart A2 in the Appendix. Allowing employees with a wage between the previous and new minimum wage to benefit both directly and indirectly from the minimum wage increase reduces the density of workers earning a wage equal to the 2020 wage floor as employees are pushed into higher wage brackets.

Step 4.c deals with those workers who prior to the minimum wage increase were earning a wage near the newly imposed minimum wage of €12.50. As was the case with the 2016 minimum wage increase, we assume that these workers may benefit indirectly from the new wage floor through spillover effects. Due to the magnitude of the increase in the minimum wage the new value of €12.50 extends to the 25th percentile of the earnings distribution. Given the scale of this increase, there is little guidance from the literature regarding the modelling of its spillover effects. However, we use Lee's (1999) model to incorporate spillover effects into the 2020 earnings distribution. We use the central assumption of a spillover parameter of 0.03. Due to the size of the minimum wage increase we extend the spillover effects to percentiles further up the distribution than was previously done for 2016 or that we could find evidence of in the literature. The spillover parameter is applied to calculate the actual 2020 wage at each percentile above the minimum wage. We increase the wages of all those at the percentiles who receive an increase in wages greater than or equal to €0.05 an hour as a result of the spillover effect. This approach results in workers up to, and including the 32nd percentile of the earnings distribution benefitting from the minimum wage increase.

As previously mentioned, due to the magnitude of the proposed increase in the minimum wage we find ourselves in unprecedented territory. The approach of estimating the spillover effects is an approximation of what may happen as there is no firm academic consensus on how large spillovers tend to be. Spillovers may be larger or smaller than estimated depending on employer's responses to the policy. To account for this uncertainty, we sensitivity test for no spillovers, a low parameter (.01) and a high parameter (.04) and the results can be seen in Chart A3 in the Appendix. The different parameters result in minor changes in the earnings distribution. There is also uncertainty attached to how long it takes for spillover effects to make their way up the earnings distribution. This model assumes that the direct and indirect effects of an increase in the minimum wage happen simultaneously.

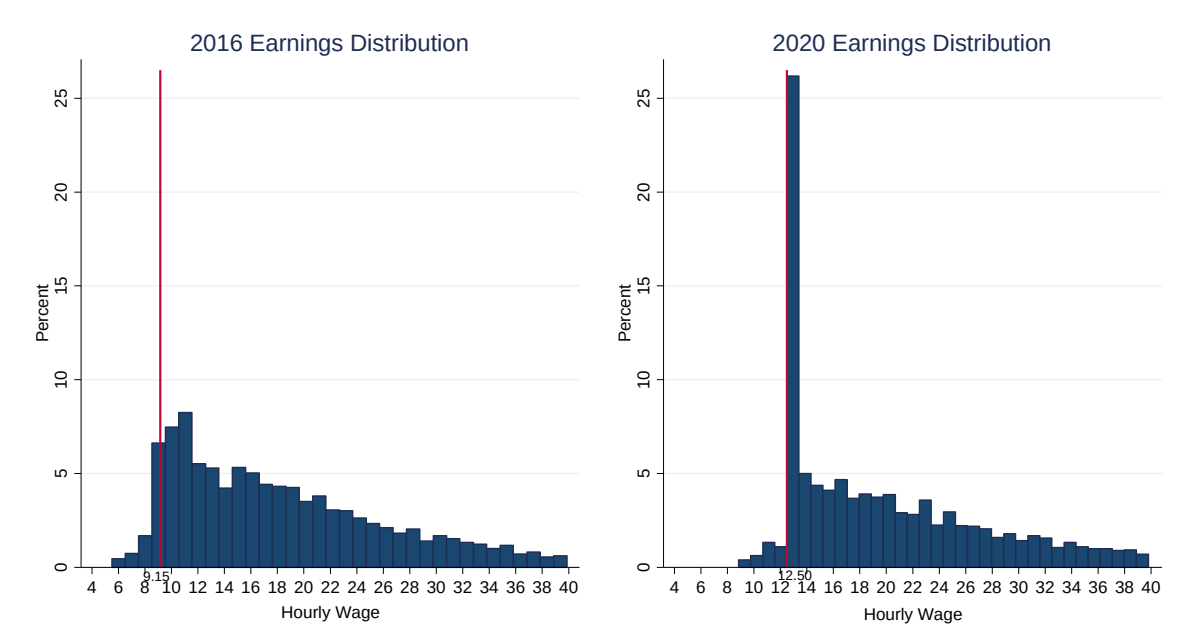
After completion of the three steps we arrive at a forecasted 2020 hourly earnings distribution. This paper continues by considering the impact of this increase in the minimum wage to €12.50, which has a bite equal to two-thirds of the gross median hourly wage in 2020. This represents a 36.6% increases in the minimum wage or an increase of €3.35 an hour. The evolution of the hourly earnings distribution in 2016 and 2020 is illustrated in Chart 2 and 3.

5. THE 2020 HOURLY EARNINGS DISTRIBUTION

This section analyses the impact the minimum wage increase has on the shape of the forecasted 2020 earnings distribution.

The evolution of the wage distribution from 2016 to 2020 is illustrated in Chart 2 and Chart 3. The effect of the minimum wage increase from €9.15 to €12.50 can be observed from the shift of the earnings distribution to the right. The minimum wage increase pushes workers in the bottom 31% of the 2016 distribution up to €12.50 or higher, increasing the density of employees on and near the 2020 wage floor.

Chart 2: Projected Distribution of Hourly Earnings, Ireland 2016 and 2020 (% of employees)



Notes: The 2016 earnings distribution is modelled to account for the direct and indirect effects of the increase in the minimum wage to €9.15.
The 2020 distribution includes a further increase in the minimum wage to €12.50 and includes both the direct and indirect effects resulting from this increase. We assume there are no changes in the minimum wage between 2016 and 2020 and the composition and size of the workforce remains constant at 2013 levels.

Chart 3: Projected Distribution of Hourly Earnings, Ireland 2016 and 2020 (density of employees)

Notes: The 2016 earnings distribution is modelled to account for the direct and indirect effects of the increase in the minimum wage to €9.15.
The 2020 distribution includes a further increase in the minimum wage to €12.50 and includes both the direct and indirect effects resulting from this increase. We assume there are no changes in the minimum wage between 2016 and 2020 and the composition and size of the workforce remains constant at 2013 levels.

In The Resolution Foundation (2015) analysis of the effect of the introduction of the NLW in the UK they highlight the possible problems of having a high percentage of employees on the statutory wage floor. While 31% of employees will benefit either directly or indirectly from this increase, it is evident from Charts 2 and 3 that the substantial increase in the wage floor causes the current structure of the earnings distribution to be altered, with a larger bunching of employees at and around €12.50. A possible challenge of having such a high statutory wage floor is that it may reduce the probability of future wage progression and advancement for low paid workers.

Table 3 illustrates the increase in wages between 2016 and 2020 as a result of annual wage growth and the 2020 minimum wage increase for all employees. It shows the level of increases received by the different beneficiaries of the minimum wage uprating and those who did not benefit from the increase in the wage floor. As mentioned previously, almost a third (31%) of employees receive an increase in wages as a result of the minimum wage increase. 24% of employees benefit directly (either from sub-minima increases or being pushed up to the minimum wage) and 7% of employees benefit indirectly as a result of 'spillover' effects. In 2020, almost a fifth (20.6%) of employees earn the statutory minimum wage, an increase from 5.6% who earned the 2013 minimum wage. This group experience an average hourly increase in wages of €2.28.

The highest increase in wages was experienced by sub-minimum wage earners, who receive an increase equivalent to the nominal uprating of the minimum wage. This increase is based on the assumption that sub-minima rates increase in line with the minimum wage. This is not the case

as this group of workers would receive a smaller increase equivalent to a defined bite of the minimum wage increase conditional on which sub-minima group they fall into.

Table 3: Projected Distribution of Earnings per Selected Pay Threshold in 2020 (% of employees)

Threshold	% above	% at each category	Average Hourly Increase	Average Annual Increase
Below €12.50	96.63%	3.37%	€3.35	€4,599
At €12.50	76.04%	20.59%	€2.28	€3,345
Above €12.50 with spillovers	69.05%	6.99%	€1.16	€1,876
Other Employees	0.00%	69.05%	€2.19	€3,948

Notes: The first three rows split those employees who receive an increase in their wages due to the minimum wage increase by the type of increase the receive.
The fourth row contains all other employees who's wages are not affected by the increase in the minimum wage.
Average Hourly and Annual Increase measures the gross increase employees receive as a result of both wage growth and the increase in the minimum wage between 2016 and 2020.

It is useful to situate these increases in the context of the changes in the overall hourly earnings distribution. To do this, Table 4 and Chart 4 show the increase in wages between 2016 and 2020 across the quartiles of the earnings distribution. The highest increase in wages was received by the top quartile and was equivalent to €3.38 an hour or €5,978 a year, followed by the bottom quartile which would include below and minimum wage workers, who see an increase of €2.38 an hour (€3,470 a year).

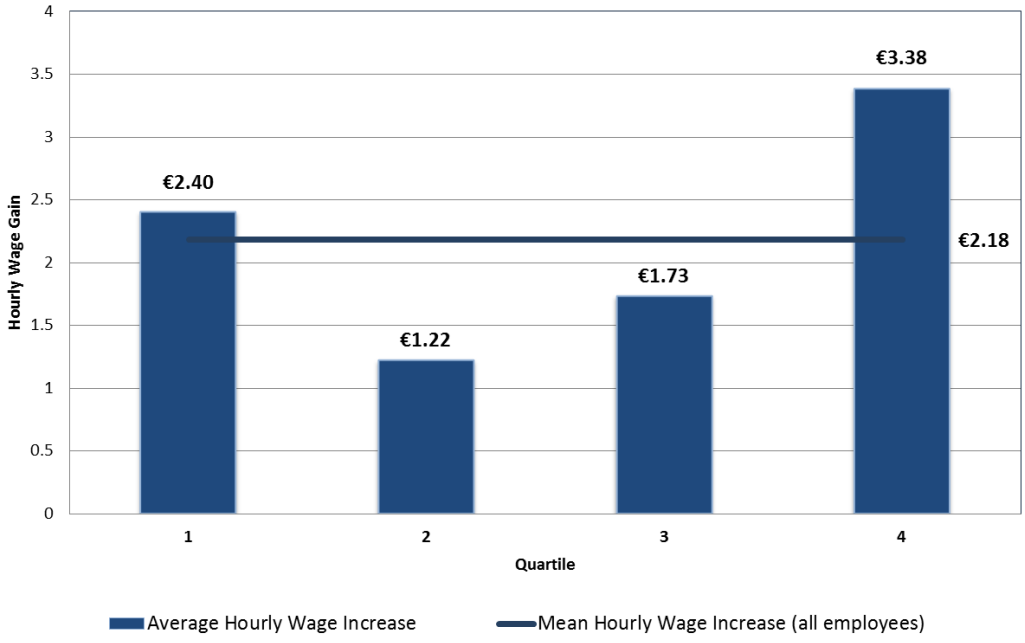
The top 69% of the earnings distribution are not affected by the increase in the minimum wage in 2020, so any increases in their wages are solely a result of average wage growth. Such growth would have happened in the absence of a change in the minimum wage. As the results show, the minimum wage increase which affected the bottom 31% of the earnings distribution reduces the growth in the gap between the bottom and top quartile, impeding growth in the dispersion of the hourly earnings distribution. Suggesting that a higher wage floor may decrease the level of inequity in the earnings distribution.

Table 4: Projected Distribution of wage changes across the quartiles of the Hourly Earnings Distribution, 2020

Quartile	Average Wage	Average Hourly Increase	Average Hours Worked (per month)	Average Annual Increase
1	€12.32	€2.38	124.5	€3,470
2	€15.64	€1.22	145.9	€2,141
3	€22.68	€1.73	154.4	€3,208
4	€44.36	€3.38	153.5	€5,978

Note: Average hourly and annual increase include both the increase in wages due to wage growth and the increase due to the change in the minimum wage in 2020.

Chart 4: Distribution of Hourly Wage Changes across the Quartiles, 2016-2020



Notes: See notes to Table 4.

6. WHAT IS THE IMPACT OF THE MINIMUM WAGE INCREASE ON EMPLOYEES?

The minimum wage increase has a progressive effect on the earnings distribution. Our analysis finds that 31% of employees will benefit from an increase in the minimum wage. Almost a quarter of employees (24%) will directly benefit, while 7% will indirectly benefit from 'spillover' effects which equate to an average increase of €0.15 in hourly earnings or €247 in annual earnings. As previously discussed the nature of these increases are uncertain as they are at the discretion of the employers.

Table 5: Increase in Earnings due to the Minimum Wage Increase

Threshold	% at each category	Average Hourly Increase	Average Annual Increase
Below €12.50	3.37%	€3.35	€4,599
€12.50	20.59%	€1.64	€2,358
Above €12.50 with spillovers	6.99%	€0.15	€247
Other Employees	69.05%	€0.00	€0

Notes: Average wage increases include only the direct and indirect increases in wages received as a result of the increase in the minimum wage to €12.50 in 2020.
The small percentage of employees earning a wage below €12.50 are sub-minimum wage workers.

Of those employees who are directly affected by the minimum wage increase 20.59% find themselves on the new wage floor of €12.50 (see Table 5). This group of employees receive an average increase in hourly earnings of €1.64 and an annual increase of €2,358, solely due to the

increase in the minimum wage. In the absence of the minimum wage increase they would receive an average increase in wages equal to €0.64 an hour or €987 a year as a result of wage growth. Considering the increase in earnings of these low pay employees in terms of those at the highest quartile of the earnings distribution, who receive an increase in average wages of €3.38 an hour and €5978 a year solely due to wage growth, the inequality reducing aspect of the minimum wage increase is evident.

Table 6 examines the characteristic profile of minimum wage workers and the increase in earnings they receive. It is important to note that it is assumed that the composition and size of the workforce remains constant at 2013 levels. Therefore, we have not incorporated the possibility that the increase in the wage floor or employment growth would have changed the profile of low pay workers.

A higher proportion of females (23%) in comparison to males (17.87%) find themselves on the minimum wage in 2020. The highest increase in hourly earnings is received by females, however, males see a higher increase in annual earnings, exceeding the annual increase received by females by €712. The increase in the wage floor is likely to have only a modest narrowing effect on the gender pay gap as the percentage of those effected who are female is not drastically larger than the percentage who are male.

The increase in the wage floor has a substantial impact on young workers with almost 64% of those affected being between the ages of 18 and 39 years old. Close to 40% of workers aged between 18 and 29 years are on the 2020 minimum wage, receiving an average increase of €2.36 an hour or €3,541 a year. Of the oldest group of workers, aged 60 years or older, 22% earn the minimum wage in 2020 however they only make up 6.06% of those effected, receiving an increase in earnings of €2.19 an hour or €2,917 a year.

Part-time workers receive the highest increase in hourly earnings and make up just under half of minimum wage workers.

The sectors that are most likely to employ minimum wage workers are the accommodation and food sector where approximately 50% of employees are on the 2020 minimum wage, the administration and support services sector where almost 44% earn the minimum wage and the wholesale and retail sector where 34% of employees are on the minimum wage. Of those who are minimum wage employees 23% work in wholesale and retail, 18% in accommodation and food, 14% in health and social work and only 6% work in administration and support services.

As previously discussed, such a large increase in the minimum wage causes changes in the structure of the earnings distribution, increasing the percentage of workers on the wage floor from 5.6% in 2013 to 20.59% in 2020. The remainder of this section will explore the change in the incidence and risk of being on the minimum wage between these years.

Table 7a and 7b examine those classified as on the minimum wage in 2013 and 2020. As a comparison, the distribution of all employees (both the minimum wage and otherwise) are presented in the first column.

Table 6: Characteristics of those who Directly Benefit from the Minimum Wage Increase

	Share of Employees Affected (%)	Share of all Affected (%)	Average Hourly Gain	Average Yearly Gain
Total	20.59	100.00	€2.28	€3,345
Gender				
Male	17.87	41.30	€2.17	€3,784
Female	23.07	58.70	€2.36	€3,072
Age group				
18-29yrs	39.40	33.30	€2.36	€3,541
30-39yrs	19.26	30.56	€2.29	€3,502
40-49yrs	13.96	16.80	€2.31	€3,305
50-59yrs	14.06	13.28	€2.13	€2,839
60+yrs	22.01	6.06	€2.19	€2,917
Hours				
Full-time	14.60	51.17	€2.23	€4,516
Part-time	36.18	48.83	€2.35	€2,215
NACE Sector				
Agri, Forestry/Fishing	-	-	-	-
Industry	14.14	11.07	€2.41	€4,335
Wholesale and Retail	33.94	23.31	€2.28	€3,132
Accommodation and Food	49.78	18.22	€2.45	€3,145
Admin & Support Services	43.60	5.84	€2.24	€3,160
Health and Social Work	18.86	14.30	€2.13	€2,938
Pub Adm. Defence, Educ.	7.41	6.26	€2.10	€2,661
All Other Sectors	14.37	17.61	€2.27	€3,627

Notes: - Less than 25 observations
This table looks only at those who were brought up to and are now on the 2020 minimum wage of €12.50 per hour. It does not include sub minimum wage workers or those who benefitted from spillover effects.

The difference in the percentage of minimum wage workers who are male or female decreases in 2020, as the percentage who are female fell from almost two-thirds (64.7%) to less than 60%. Workers younger than 39 years continue to represent the majority of minimum wage workers in 2020, however the percentage of minimum wage workers younger than 30 has falls from 39% to 33%.

The sectoral profile of minimum wage workers changed slightly with the wholesale and retail sector overtaking the accommodation and food sector as the highest employer of minimum wage workers. More than one-fifth (23.3%) are employed in this sector and 18% in the accommodation and food sector in 2020. Relative to the size of these sectors (14.1% and 7.5% of all employees respectively) the prevalence of workers on the minimum wage is high. When employees on the minimum wage are examined by the occupation they have 15% work in personal and protective services and 18% in sales.

Table 7a: Incidence of employees on the minimum wage in 2013 and 2020, (% of employees)

	% employees	2013 Minimum Wage (€8.65)*	2020 Minimum Wage (€12.50)*
All employees	100.0	100.0	100.0
Gender			
Male	47.6	35.3	41.3
Female	52.4	64.7	58.7
Age Group			
18-29	17.4	39.1	33.3
30-39	32.7	31.2	30.6
40-49	24.8	15.6	16.8
50-59	19.5	-	13.3
60+	5.7	-	6.1
Highest Completed Education			
Primary or below	4.6	-	7.4
Lower secondary	10.1	-	14.7
Higher secondary	24.0	29.4	35.4
Post leaving cert	7.0	22.5	12.4
Third level non degree	21.4	-	17.1
Third level degree or above	32.9	16.2	13.1
NACE Sector			
Agri, Forestry/Fishing	1.2	-	-
Industry	16.1	15.0	11.1
Wholesale and Retail Trade	14.1	20.3	23.3
Accommodation and Food	7.5	22.3	18.2
Admin & Support Services	2.8	-	5.8
Health and Social Work	15.6	14.8	14.3
Pub Adm, Defence, Educ.	17.4	-	6.3
All Other Sectors	25.2	15.9	17.6

Notes: The 2013 results are taken from a previous paper by Collins (2015a).
- Sample is too small to report (i.e. less than 25 observations in the sample data)
NACE sectors: Industry includes construction while 'all other sectors' includes: transportation and storage; information and communication; financial, insurance and real estate activities; professional, scientific and technical; and those classified by the CSO as 'other NACE activities'.
* A statistical test was completed and reports the p-value from a weighted Pearson chi-squared test to determine if the reported differences between the sample categories are statistically significant. $P<0.001$ in all cases

Table 7b: Incidence of employees on the minimum wage in 2013 and 2020, (% of employees)

	% employees	2013 Minimum Wage (€8.65)*	2020 Minimum Wage (€12.50)*
All Employees	100.0	100.0	100.0
Occupation			
Managers and admin	6.7	-	-
Professional	20.8	-	4.5
Associate Prof & technical	12.8	-	6.2
Clerical and Secretarial	13.4	-	8.7
Craft and Related	9.5	-	9.8
Personal/ protective services	8.0	14.0	15.3
Sales	8.7	20.4	18.3
Plant/Machine Operatives	7.5	-	8.0
Others	12.5	38.8	26.4
Sector of Employment			
Public	29.2	-	10.8
Private	67.8	90.7	86.3
Hours Worked per week			
1-19hrs	13.4	32.5	25.0
20-34.9hrs	24.0	30.0	30.7
35+hrs	62.6	37.5	44.4
Work Status			
Full-time	72.2	42.6	51.2
Part-time	27.8	57.4	48.8
Contract Type			
Permanent	91.1	82.6	82.0
Temporary	8.9	17.4	18.0
Urban/Rural Location			
Urban	66.5	63.7	64.7
Rural	33.5	36.3	35.3

Notes: See notes to Table 7a.

Almost three-fifths (57.4%) of minimum wage employees worked part-time in 2013 reducing to 48% in 2020 as more full-time workers were brought up to the higher wage floor, increasing the amount of minimum wage workers working more the 35 hour weeks (44.4%) in 2020 in comparison to 2013 (37.5%). The proportion of minimum wage workers who work less than 19 hour weeks falls from close to two-thirds (32.5%) of minimum wage employees in 2013 to one-quarter of minimum wage employees in 2020 (25%).

We now consider who is most likely to be on the minimum wage? Tables 8a and 8b examine the risk of workers with different characteristics working for the minimum rate in 2013 and 2020. Since the 2020 minimum wage is significantly higher than the 2013 value, and has almost four

times the amount of employees earning a wage at the wage floor, the risk of being on the minimum wage is considerably larger in 2020.

Of all male employees 17.9% earn the minimum wage whereas the risk is higher for female employees with almost 23% earning a wage at that rate. The risk of being on the minimum wage is greatest for young workers with 39.4% under 30 years earning this rate, and then declines with age up to the age of 59 years. The risk of earning the minimum wage if aged 60 years or older is the second highest with over one-fifth (22%) of employees earning a wage at the wage floor.

Workers whose highest level of education attained is a post leaving certificate education face the highest risk of earning the minimum wage (35.7%) with all employees who have a lower education attainment being more at risk than those with a third level non degree (16%) or degree (8%) of being minimum wage workers.

Considering the concentration of minimum wage workers in particular sectors, the highest risk of being on the minimum wage is for employees working in the accommodation and food sector where almost half of employees are on the minimum wage (49.8%). Administration and support services carry the second highest risk with almost 44% earning this rate and the wholesale and retail trade carrying the third highest risk of minimum wage with almost 34% earning a wage at the minimum rate. These figures offer an insight to the degree of exposure these sectors have to the increase in the minimum wage. The high percentage of minimum wage workers in these sectors suggests they would face a higher increase in wage bills as a result of the increase than the other sectors. Depending on how the employers in these sectors decide to react to the increase in costs, they may reduce employment or increase prices by a higher amount than others. We consider employers reaction to the minimum wage increase and the impact it will have on employment levels in the next section.

Looking at employee's occupation profiles, those working in sales carry the highest risk of being on the minimum wage with 43% with this occupation earning a wage at this rate. Personal and protective services occupations carry the second highest risk (39.4%) followed by plant and machine operatives (21.78%) and craft and related occupations (21.2%).

Low pay is commonly associated with workers who work short, low hour contracts. Part-time employees are more at risk of being low paid with 36% of them in 2020 being on the minimum wage, 38% of employees work less than 20 hours a week and 26% working less than 35 hours a week are earning the minimum wage. Employees on temporary contracts are more likely to be low paid with 39% being on the minimum wage.

Table 8a: Risk of being on the Minimum Wage in 2013 and 2020

	2013 Minimum Wage (€8.65)*	2020 Minimum Wage (€12.50)*
All employees	5.6	20.6
Gender		
Male	4.2	17.9
Female	6.9	23.1
Age Group		
18-29	12.7	39.4
30-39	5.4	19.3
40-49	3.5	14.0
50-59	-	14.1
60+	-	22.0
Highest Completed Education		
Primary or below	-	32.2
Lower secondary	-	29.2
Higher secondary	7.1	29.6
Post leaving cert	10.3	35.7
Third level non degree	-	16.0
Third level degree or above	2.8	8.0
NACE Sector		
Agri, Forestry/Fishing	-	-
Industry	5.3	14.1
Wholesale and Retail Trade	8.0	33.9
Accommodation and Food	16.7	49.8
Admin & Support Services	-	43.6
Health and Social Work	5.4	18.9
Pub Adm, Defence, Edu	-	7.4
All Other Sectors	3.5	14.4

Notes: - Sample is too small to report (i.e. less than 25 observations in the sample data)
NACE sectors: Industry includes construction while 'all other sectors' includes: transportation and storage; information and communication; financial, insurance and real estate activities; professional, scientific and technical; and those classified by the CSO as 'other NACE activities'.
* A statistical test was completed and reports the p-value from a weighted Pearson chi-squared test to determine if the reported differences between the sample categories are statistically significant. $P<0.001$ in all cases

Table 8b: Risk of being on the Minimum Wage in 2013 and 2020

	2013 Minimum Wage (€8.65)*	2020 Minimum Wage (€12.50)*
All Employees	5.6	20.6
Occupation		
Managers and admin	-	-
Professional	-	4.4
Associate Prof & technical	-	10.0
Clerical and Secretarial	-	13.4
Craft and Related	-	21.2
Personal/ protective services	9.9	39.4
Sales	13.0	43.1
Plant/Machine Operatives	-	21.8
Others	17.5	43.5
Sector of Employment		
Public	-	7.6
Private	7.5	26.2
Hours Worked per week		
1-19hrs	13.5	38.3
20-34.9hrs	7.1	26.3
35+hrs	3.4	14.6
Work Status		
Full-time	3.3	14.6
Part-time	11.6	36.2
Contract Type		
Permanent	4.7	17.7
Temporary	9.9	39.9
Urban/Rural Location		
Urban	5.4	20.1
Rural	6.1	21.7

Notes: See notes to Table 8a.

7. WHAT IS THE IMPACT OF THE MINIMUM WAGE INCREASE ON THE ECONOMY'S WAGE BILL AND EMPLOYMENT LEVEL?

The minimum wage increase has been seen to have a progressive effect on the earnings distribution; increasing earnings for the bottom 31% of employees by on average €1.50 an hour either through direct or indirect effects.[14] This increase in wages for almost a third of employees will have an impact on the operating costs of many firms. This section estimates the increase in the economy's wage bill that will arise from the minimum wage uprating, and examines the

[14] This value refers to the average increase in hourly wages for all employees who received some increase in wages as a result of the minimum wage increase.

possible reactions employers will make to such an increase and discusses the possible consequences for employment levels.

Up to now we have assumed that the size of the workforce has remained constant at 2013 levels. The Irish Economy was in a recovery phase in 2013 and continued to be with GDP growth of 5.2% in 2014 and 7.8% in 2015.[15] This positive growth in domestic demand is likely to feed into the labour market, increasing the demand for labour and employment numbers. Prior to our wage bill calculations we incorporate growth in the numbers of people in employment out until 2020. The SILC 2013 dataset is representative of 1,345,395 employees.[16] We forecast the number of employees in 2020 by projecting the 2013 number of employees forward using estimates for employment growth from NERI[17] and The Department of Finance[18]. We use NERI's estimates up to 2017 and The Department of Finance's estimate of 1.9% for 2018 which we extend out to 2020. The forecasted number of employees in 2020 is 1,540,840.

Table 9 estimates the increase in the economy's employee wage bill for both the direct and indirect effects of the minimum wage increase using this revised employee number and continuing the assumption that the structure of the labour market remains constant. The total effect of the bottom 31% of the earnings distribution receiving an increase in wages is a 1.6% increase in the economy's wage bill. This calculation includes increases received by those on sub-minima rates, those being pushed up to the new minimum wage and increases due to spillover effects of the minimum wage uprating. As discussed previously, increases due to spillover effects are not mandatory and the increase in sub-minima rates is likely to be overestimated so this increase is likely to overstate the impact. When we consider just the increase received by sub-minima and minimum wage workers the overall wage bill increases by 1.56%. The increase in wages received solely by those on the new minimum wage of €12.50 increases the wage bill by 1.19%.

Table 9: Increase in the Total Wage Bill as a Result of the Minimum Wage Increase

	Increase in Wage Bill	% Increase in Wage Bill
Strict Direct Effects	€748.7m	1.19%
Direct Effects (sub-minima + MW increases)	€987.3m	1.56%
Total Effect (including spillover effects)	€1,013.9m	1.60%

Notes:
-Strict direct effects only consider the increase in the wage bill generated from increasing those between €9.15 and €12.50 to €12.50 in 2020
-Direct effects look at the increase in the wage bill including those pushed up to €12.50 in 2020 and those who earned a wage below the previous minimum wage who just received an increase in earnings equal to the increase in the minimum wage of €3.35 per hour
-Total effect measures the total increase in the wage bill including those on and below the minimum wage in 2020 who seen wage increases as well as those just above the 2020 minimum wage who benefitted from spillovers.

[15] See NERI (2016) "Quarterly Economic Observer", Spring 2016.
[16] This total represents the weighted value of the final sample size which was also cleaned to exclude variables with missing or spurious monthly earnings / unusual hours data.
[17] NERI (2015) estimate employment growth to be 1.7% in 2014, 2.7% in 2015, 2% in 2016 and 1.6% in 2017.
[18] The Department of Finance (2015) forecast employment to grow by 1.8% in 2014, 2.4% in 2015, 1.9% in 2016, 1.9% in 2017 and 1.9% in 2018.

These figures relate to the nominal increase in the wage bill, as it is calculated from the gross increase in wages received by those who benefitted from the uprating of the wage floor. Employers wage bills after the minimum wage increase are likely to be higher as they will face extra costs in terms of PRSI contributions. We cannot accurately model the full change in the wage bill without full knowledge of the structure of the social insurance system in the Republic of Ireland in 2020.

Our analysis of the concentration of minimum wage workers in the different sectors indicates that not all sectors or employers will face an equal increase in their wage bills. Employers in the accommodation and food sector will experience the greatest increases in operating costs with almost every second employee earning the minimum wage (49.8%) compared to the public administration, defence and education where only 7.4% earn a wage at this rate.[19]

With a 36.6% increase in the minimum wage raising the wages of almost a third of employees and increasing the wage bill for numerous firms, it seems likely that this policy will have some impact on employment levels and possibly result in ripple effects to the economy in the form of domestic demand, consumption and unemployment. The magnitude and timing of these effects is unknown and somewhat dependent on both the employers response to an increase in their operating costs and the employees reactions to an increase in their disposable income. The extent to which employers react by imposing a series of cost cutting measures to counteract the increase in their wage bill and maintain employment numbers, and the extent to which they react by decreasing their employment numbers, is of major interest to policy makers.

There are mixed views in the vast academic literature on the impact the minimum wage has on total and sectoral employment, hours worked, wages and prices. The theoretical labour market models: the competitive model, the dynamic monopsony model and the institutional model all predict contrasting effects for a minimum wage increase on employment numbers. The reminder of this section will discuss the empirical evidence of the effects of minimum wage increases from the literature considering the evidence in terms of the theoretical labour market models.

The competitive labour market assumes that the market is operating at peak efficiency and that the introduction of a binding wage floor greater than the competitive equilibrium wage will result in a decrease in demand for labour with the supply of labour at the new wage floor exceeding demand, resulting in a surplus of labour (unemployment) in the economy. However, evidence for adverse effects of the UK National Minimum Wage on employment levels is limited. Byran et al (2013), Dickens et al (2009) and Stewart (2004) along with the Low Pay Commission (2015) and the London School of Economics (CEP, 2008) failed to find a negative effect of the UK's National Minimum Wage upratings on employment levels. In their 2013 report the UK Low Pay Commission state that "there remains little evidence of a significant adverse effect of the minimum wage on employment". Their 2016 report again found little evidence of adverse effects on employment or the economy (LPC, 2016).

In the 1980s, the research on the impact of the minimum wage on employment was highly influenced by the Minimum Wage Study Commission (MWSC). The MWSC conducted a four year study between 1977 and 1981, covering the US and Canada, which concluded that the minimum

[19] In our calculations we estimate the total increase in the economy's wage bill for the minimum wage uprating. We do not consider the individual sector effect which could be a possible future extension.

wage reduced teenage employment and had a small but negative effect on young adults, supporting the predictions of the competitive labour market model. The effect it had on adult employment rates was uncertain and the MWSC conclude by reporting the dis-employment effects to be small and limited to teenagers, and to a lesser extent young adults.

The 1990s saw the rise of a 'New Minimum Wage Research' methodology which attempted to stimulate natural experiments to examine the impact the minimum wage had on employment. The Card and Kreuger (1994) study was the most famous. New Jersey had increased its minimum wage, while similar neighbouring Pennsylvania had not, and this policy provided the researchers with natural treatment and control groups. Card and Krueger (1994) computed estimates of the effect of the minimum wage increase on fast food sector employment in the two states and found that the effects of the minimum wage laws on employment were non-existent, concluding that the minimum wage increase did not reduce employment in the fast food sector. These results may support the dynamic monopsony predictions, that an increase in the statutory wage may have no effect or possibly a positive effect on employment as a result of higher wages making it easier to hire and maintain staff, reducing turnover costs. However, the results of this study have been criticised due to its experimental approach (Neumark and Wascher, 2007).

Doucouliagos and Stanley (2007) conduct a meta-study of 64 minimum wage studies published between 1972 and 2007. Their overall results validate the Card and Kreuger (1994) findings of insignificant employment effects from minimum wage increases. Doucouliagos and Stanley (2007) graph over 1000 employment estimates and found the most precise estimates were clustered at or near zero employment effects. They estimate the employment effect to be -0.01 suggesting that the minimum wage would need to double for there to be a 1 per cent fall in teenage employment. Belman and Wolfson (2013) conducted a meta-study of 27 minimum wage studies that have been published since 2000. They conclude that the effects of the minimum wage on employment are detectable but 'between small and vanishingly small' (Belman and Wolfson, 2013), reinforcing previous findings of no statistically significant employment effects.

Neumark and Wascher (2007) complete a qualitative review on minimum wage literature of the effects of the minimum wage in the US and other countries since the 1990s. They found that a sizeable majority of the studies examined give a relatively consistent (although not always statistically significant) indication of negative employment effects of the minimum wage. They find evidence of labour-labour substitution within low skill groups, supporting the notion that employers replace their lowest skilled workers with close substitutes as a response to an increase in the wage floor. As a result the minimum wage increase may be more harmful for the least skilled workers than what is suggested by the net disemployment effects estimated in many studies[20]. Neumark and Wascher's review has been criticised for excluding many studies and over emphasizing their own work (Schmitt, 2013).

Contemporary minimum wage research similarly highlights the absence of negative effects on employment of increasing the minimum wage. Hirsch, Kaufman and Zelenka (2011) examine

[20] Neumark (2014) outline in this later paper that minimum wages create winners and losers, an increase in the price of low-skilled labour in relation to high-skilled labour may result in firms substituting low-skilled employees for higher-skilled employees. The extent of this effect may go unnoticed as it would not decrease the total number in employment.

the economic impact of the 2007-2009 increases in the US federal minimum wage on a sample of quick-service restaurants in Georgia and Alabama. The US federal minimum wage increased by a total 40.8% over the three years of their analysis. Their results find that the employment impact is variable across establishments but overall it is not statistically distinguishable from zero, even when examined over the three year period. Instead Hirsch, Kaufman and Zelenka (2011) found that the cost of the minimum wage increase was passed on through other channels of adjustment. The most important channels of adjustments used to outweigh the increase in the wage bill was an increase in the product price passed on to consumers, a tightening of the employee performance standards and work effort, new marketing programmes to expand sales and a compression of the internal wage structure.

Contemporary research on the effect of minimum wage increases is mostly supportive of the institutional labour market model. This model describes multiple 'channels of adjustment' in which firms may use to offset the increase in their wage bills other than reducing employment numbers. Institutional models are multi-sector and there is unlikely to be a single well defined downward sloping demand curve. It accepts that the economy and labour market are complex systems with multiple elements, multiple interactions, multiple equilibria and ultimately multiple channels of adjustment to price and wage changes. Under this labour market model firms are assumed to use alternative channels of adjustment other than decreasing employment numbers to offset any increases in their wage bill imposed from a change in the minimum wage.

Along with Hirsch, Kaufman and Zelenka (2011), Schmitt (2013) also highlights the possibility of counteracting the increase in costs of an increase in the minimum wage through alternative 'channels of adjustment' other than decreasing employment numbers, as a possible explaination for the absence of negative employment effects found in the literature. Schmitt (2013) outlines various 'channels of adjustment' employers may use to offset the increase in the wage bill. The possible alternative channels of adjustments suggested are:

- A reduction in hours worked by employees[21]
- A reduction of non-wage benefits and training
- An increase in the prices of a firm's products as an attempt to pass on the increase in costs to customers
- Improvements in efficiency – such as increased performance standards and work effort
- 'Efficiency wage' responses from workers – a higher wage may result in employees being motivated to work harder
- Wage compression – cutting the earnings of higher paid workers to make up some of the cost the higher minimum wage imposes
- Reduction in profits[22]
- Reduced turnover – the higher minimum wage may make it easier to hire and keep workers
- Increase in demand – as a second round effect to an increase in the minimum wage it is possible that employees who receive an increase in wages will increase their consumption which may increase the demand for a firm's goods and services

[21] Stewart et al (2006) and Dickens et al (2009 and 2012) report a reduction in hours as a result of the introduction of the UK's National Minimum Wage.
[22] Draca, Machin and Van Reenan (2011) report reductions in the profitability of care homes in the UK as a result of the introduction of the National Minimum Wage

The literature for the effect the minimum wage has on emplyment levels in the Irish labour market is limited. When the reaction of a representative sample of firms to the introduction of the minimum wage in the Irish economy was examined, Nolan and O'Neill (2002) find no evidence of the minimum wage reducing employment levels. However, when the analysis is limited to only the firms who have low wage workers, who would not have increased their wages in absence of the policy change, significant negative employment effects were found. It seems likely that the examination of employment effects of minimum wage increases at a national level fail to capture any employment effects. However, when only low wage workers or those who have a high risk of being low paid (teenagers, uneducated workers, etc.) are considered there is some evidence of negative employment effects (Machin et al, 2003 and Nolan and O'Neill, 2002 and Neumark and Wascher (2007))

The previous increases in the minimum wage that have been examined in the literature are predominantly minor increases. This paper models a 36.6% increase in the minimum wage. Due to the magnitude of this increase and the significant impact it will have on the operating costs of firms, in particular those in the low-pay sectors, it is unlikely that its effect on employment levels will match those found in the previous literature.

The extent to which the increase in the minimum wage will affect employment levels is dependent on the economic environment at the time of its increase. Its impact on employment levels or hours of work is likely to vary from sector to sector and firm to firm and is likely to be dependent on how many employees are effected, the level of growth in output faced by the sector or firm, the profitability of the sector and firm, their ability to counteract the increase in the wage bill through alternative channels of adjustment and how labour intensive the sector is.

It is also likely that there may be first and second round effects to the minimum wage increase as firms will take some time to adjust production in order to reduce headcount or hours worked by employees. It may also be the case that firms initially absorb the additional costs, thereby altering profit margins, before subsequently increasing performance standards and decreasing operating costs in an alternative way to limit employment losses.

An increase in the statutory wage floor will also have an impact on the wider economy. Increasing the wages of 31% of employees will increase their disposable income and consumption. This increase in consumption is likely to turn into an increase in consumer demand which may subsequently increase sales for firms, increasing profits.[23]

Due to the uncertainty surrounding the effect minimum wages have on employment numbers and hours worked along with the unknown economic environment that the increase will be imposed in, it is impossible to forecast the actual effect the modelled increase will have. However, due to the magnitude of the increase it is likely to result in some negative employment effects, but the magnitude of the negative effects and the proportion of them which may be counteracted due to increases in consumer demand that may result from increasing the disposable income of low paid employees are unknown.

[23] There are also likely to be benefits to the government through increases in direct and indirect taxation revenues and reductions in the cost of in work benefits and supports.

8. CONCLUSION

Renewed policy interest in the topic of low pay highlights challenges regarding the future direction of statutory low pay policy and in particular decisions regarding the scale of increases to this wage floor. In the past such increases have been arbitrary, with little or no relationship to the overall earnings structure and the relative position of the level of the minimum wage. If policy is intent on either stabilising or reducing low pay then it would seem appropriate that increases should be linked to the official relative definition of low pay – set at two-thirds of median hourly earnings.

Reflecting that relationship, this paper models an increase in low pay for the Republic of Ireland so that the rate reaches the low pay threshold by 2020. The modelled increase would bring the minimum wage to a level of €12.50 per hour in that year, an increase of 36.6% between 2016 and 2020. In the context of previous changes to the Irish wage floor, the increase is equivalent to the change between October 2002 and July 2007 (+36.2%).

This uprating of the wage floor is estimated to increase the wages of the lowest paid employees. With almost a quarter of employees benefitting directly (24%) and close to a third (31%) of employees benefitting in total, from the direct and indirect effects of the minimum wage increase. In 2020, one in five (20.6%) employees will find themselves earning the minimum wage after receiving an average increase of €2.28 in hourly earnings. More females (58.7%) than males (41.3%) will benefit from the increase, receiving a higher increase in hourly earnings. Almost two-thirds (64%) of workers younger than 40 years will see their wages increase as a result of the uprating of the wage floor.

While the minimum wage increase has its benefits there are also some drawbacks of increasing the statutory wage floor. The increase in the minimum wage results in an increase in the average wage bill from between 1.19% and 1.60%. The accommodation and food sector will face the highest increase in operating costs with almost half of their employees earning a minimum wage in 2020 (49.7%), administration and support services closely following with 43.6% of employees earning the minimum wage and wholesale and retail who have 33.9% of employees earning a wage at the wage floor.

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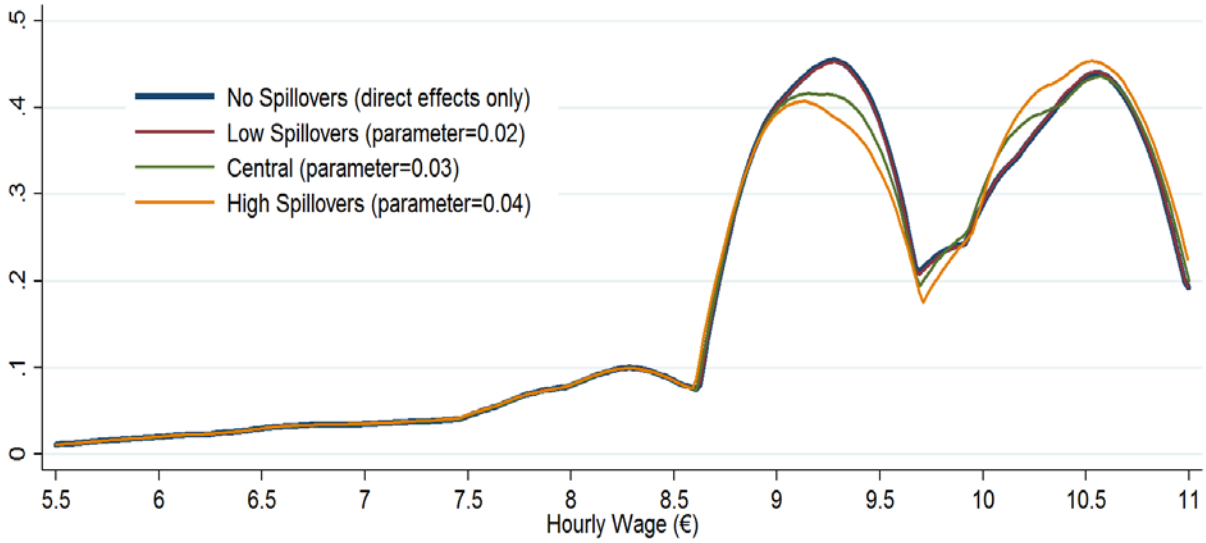
APPENDICES

Chart A1: Impact of the Minimum Wage Increase in the Earnings Distribution, by size of indirect Effects, 2016

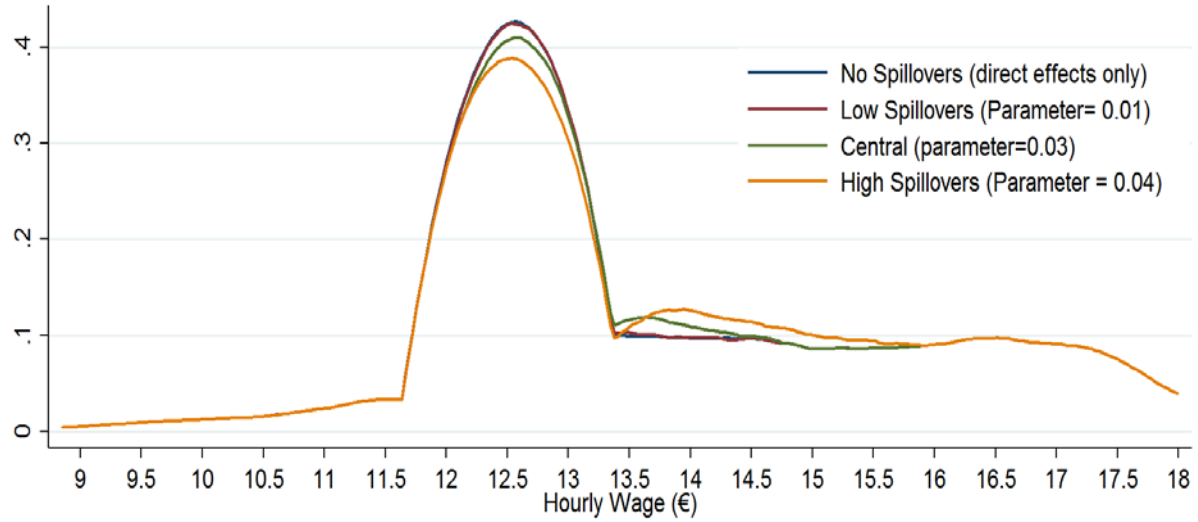


Notes: Chart A1 shows the 2016 distribution after the minimum wage increase for the case where there are no spillovers , a low spillover parameter, a central parameter and a high parameter. Spillover effects extend up to the 25th percentile.

Chart A2: Earnings Distribution with and without Extended Spillover Effects, 2020

Notes: Chart A2 compares the base distribution that we use in our analysis to the 2020 earnings distribution with extended spillovers.
The 2020 distribution with extended spillovers extends spillover effects to those wage earners who were previously earning a wage in-between the previous minimum and €12.50 prior to the minimum wage increase along with those employees earning a wage just above the minimum.

Chart A3: Impact of the Minimum Wage Increase in the Earnings Distribution, by size of indirect Effects, 2020



Notes: Chart A3 shows the 2020 earnings distribution in the case of no spillover effects, a low spillover parameter, a central parameter and a high spillover parameter.
Since the minimum wage is increased substantially in 2020, the new wage floor reaches to the 25th percentile, so spillover effects are extended to the 31st percentile (until the wage increase as a result of spillovers goes below €0.05).

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