# Impacts of minimum wages:
## review of the international evidence

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# Contents

# Executive summary

## In brief

This report reviews the international evidence on the impacts of minimum wages, as well as recent research documenting the impact of the National Living Wage (NLW) in the UK, to inform the UK government's decisions on the future remit of the Low Pay Commission (LPC) beyond 2020.

Overall the most up to date body of research from US, UK and other developed countries points to a very muted effect of minimum wages on employment, while significantly increasing the earnings of low paid workers. Importantly, this was found to be the case even for the most recent ambitious policies.

Therefore, it concludes that, based on the overall weight of the available evidence, there is room for exploring a more ambitious NLW remit in the UK in the coming years, in the range of 60% to two-thirds of median hourly earnings.

However, given that the evidence base is still developing, it would also be prudent to accompany more ambitious minimum wages with a clear mandate that the Low Pay Commission (LPC) can use to implement, evaluate and recalibrate any proposed changes to the NLW, thereby designing in responsiveness to any unforeseen impacts if required.

To assist this, government should look to improve the evidence base and the quality of data used in assessing the impact of minimum wages.

## UK National Living Wage

The UK NLW now stands at £8.21 per hour, or 58.9% of median hourly earnings in October 2019, with the government having a stated objective of raising this figure to 60% by 2020, subject to sustained economic growth.

In 2018, the NLW covered close to 7% of UK workers aged 25 and over (excluding first-year apprentices). Women are more likely than men to be paid at the 2018 NLW, and more part-time workers earn the NLW relative to full-time workers.

Coverage varies depending on the size of different economic sectors in a given region. Wholesale and retail trade, and accommodation and food services sectors account for the highest shares of workers affected by the NLW.

### Evidence

The potential benefits of minimum wage policy in terms of higher earnings for low paid workers, reduced public benefits, and increased perceived fairness should be

juxtaposed against the potential costs: reduced employment and hours for the low paid.

There is good evidence that the labour market is not always characterised by a simple, perfectly competitive supply and demand framework. Rather, firms appear to have a degree of wage setting power. In an imperfectly competitive labour market, a higher minimum wage could reduce vacancies and turnover instead of destroying jobs. Of course, eventually a higher minimum wage will lower employment. Exactly how far one can push the minimum wage before job losses start becoming pronounced is an empirical question.

In the US, a large body of high-quality research has investigated the impact of minimum wages on employment. Overall, this body of evidence points to a relatively modest overall impact on low wage employment to date. Recent work helped identify how this impact may vary by the level of the minimum wage. Across US states, the best evidence suggests that the employment effects are small up to around 59% of the median wage. Evidence using sub-state county-level variation found this to hold even in lower wage counties where the minimum stood at up to 81% of the median wage. Research conducted for this report also finds that in the 7 US states with the highest minimum wage, where the minimum is binding for around 17% of the workforce, employment effects have been similarly modest.

Not all US studies suggest small employment effects, and there are notable counter examples. However, the weight of the evidence suggests the employment effects are modest. Moreover, recent research has helped reconcile some of the divergent findings. Much of this divergence concerns how different methods handle economic shocks that affected states differently in the 1980s and early 1990s, a period with relatively little state-level variation in minimum wages. When using data from the last 25 years (the period with most state-level minimum wage variation), different methodologies tend to be much more in accordance with each other. Moreover, when it comes to adult low-wage workers, the evidence is also more consistent cross methodologies.

In the UK, research on the impact of the National Minimum Wage (NMW) was reviewed extensively by a Low Pay Commission (LPC) report in 2016. The LPC concluded that in general there was little effect on employment but found some evidence that the NMW had led to small reductions in hours.

More recent research on the impact of the National Living Wage suggests that its introduction did not have a substantial negative effect on low wage employment (though one study finds some impact on part-time female workers, similar to findings for the NMW).

Research conducted for this report comparing wage and employment changes across demographic and regional groups finds similarly small impact on employment and hours from the 2016 introduction of the NLW.

The evidence of little impact on low wage employment is also consistent with recent research on minimum wages increases in Germany and Hungary.

Small employment effects imply that firms adjusted to higher minimum wages in other ways. The evidence base on other margins of adjustment is much less well developed than the employment literature. However, there is clear evidence for

prices being an important margin of adjustment, as well as some more limited evidence of impacts on profits and productivity.

Overall, existing research therefore points to a muted effect of minimum wages on employment, while suggesting that minimum wages significantly increase the earnings of low paid workers. Especially for the set of studies that consider broad groups of workers, the overall evidence base suggests an employment impact of close to zero. These ex post evaluations point to a much more modest impact on employment than often assumed in prospective simulation studies.

However, the evidence base on the effects of high minimum wage levels is still developing. Careful consideration therefore needs to be given to the implementation of any ambitious future policy.

## Implementation

A more ambitious minimum wage policy should be paired with clear guidelines for the LPC to recommend and evaluate changes in the National Living Wage.

In particular, there needs to be a clear mandate for the LPC to pause and reconsider if the evidence suggests significant losses in jobs for those affected by the policy. Since lowering the nominal NLW is highly unlikely for a variety of reasons, the main revision would occur through allowing inflation to erode the value of the NLW, were it to exceed the desirable target level based on the evidence.

It is also important to improve the data infrastructure available to the LPC and academics to facilitate timely evaluation. To support evidence-based decision making, the government should:

a) Consider how Annual Survey of Hours and Earnings (ASHE) data, one of the most common data sources currently used for minimum wage evaluations in the UK, can be available to the LPC further in advance of its decision making.

b) Consider whether to change the month when the NLW/NMW are increased to avoid increases in the same month as ASHE data is collected.

c) Following best practice among peer countries, go further in providing access to administrative data for labour market research. One promising avenue is to make the HM Revenue and Customs (HMRC) Real Time Information (RTI) administrative database on earnings available for conducting evaluations of labour market policies, like the NLW upratings, in a timely manner.

The LPC has been a tremendous success story. Going forward, the LPC may wish to consider:

d) Developing more off the shelf methods for evaluating the minimum wage policy. While the LPC should certainly continue to commission research, it would be useful to have some standardized evaluation tools that have already been stress-tested.

e) Commissioning less frequent, major evaluations from leading researchers.

## Conclusion

With these structures in place, the report concludes that the evidence to date is consistent with exploring a higher post-2020 NLW up to two-thirds of median hourly earnings, beyond its current trajectory that will take it to 60% of the median by 2020.

# Chapter 1

# Introduction – motivation for a minimum wage, and current policy context

1.1 Five years before the 1938 introduction of the first national minimum wage in the United States, then President Franklin Delano Roosevelt proclaimed that "No business which depends for existence on paying less than living wages to its workers has any right to continue in this country…By living wages, I mean more than a bare subsistence level — I mean the wages of a decent living." (1933, Statement on National Industrial Recovery Act).[1] This statement tapped into a pervasive sentiment that sometimes market wages may fall below what is considered a "living wage" by social standards, and that it is the role of public policy to correct this. Such a sentiment is not unique to President Roosevelt or the U.S by any means. Similar motivations have led to the introduction of minimum wages throughout the world over the past hundred years. When the United Kingdom introduced its National Minimum Wage (NMW) in the late 1990s, then Prime Minister Tony Blair specifically noted in his written comment to the House of Commons that the NMW would "provide a wage floor to remove the worst excesses of low pay and exploitation of workers."

1.2 Some of the motivation behind abolishing low wages reflects concerns about what is fair remuneration for an hour or a day's work. This type of concern for fairness runs deep in the human psyche. There is a widespread sense that it is unfair of employers to take advantage of workers who may have little recourse but to work at very low wages (Kahnemann et al. 1986).[2] For example, experimental studies have documented that the preference for fairness in transactions is strong: individuals are often willing to sacrifice their own payoffs to punish those who are seen as acting unfairly (Fehr et al. 2009).[3] People also strongly support banning transactions that they see as being exploitative of others — even if they think such a ban would entail some economic costs (Fehr and Fischbacher 2004).[4] Such fairness concerns may be particularly pronounced if wage inequality is growing, and wages at the bottom fail to keep up with rest of the economy—which has been empirically true in much of the developed economies since the 1980s. It is, then, perhaps not

[1] President Franklin Delano Roosevelt, Statement on National Industrial Recovery Act). July 1933

[2] Kahnemann et al., 'Fairness as a Constraint on Profit Seeking: Entitlements in the Market', 1986

[3] Fehr et al., 'A Behavioral Account of the Labor Market: The Role of Fairness Concerns', 2009

[4] Fehr and Fischbacher, 'Third-party punishment and social norms' 2004

surprising that we have seen a groundswell of interest in exploring higher minimum wages across the globe in recent years.

1.3 The UK introduced its NMW policy in the late nineties, having established an independent Low Pay Commission (LPC) comprising academics as well as employer and employee representatives, in 1997.[5] In 1999, two minimum wage rates were introduced, one for workers aged 22 and over, and the other for those aged 18-21. Both rates underwent gradual increases over the next fifteen years, with the structure of the rates undergoing three shifts.

1.4 Today, the UK has five minimum wage rates (Table 1), with the government having introduced a separate National Living Wage (NLW) rate for workers aged 25 and over (excluding those in the first year of apprenticeship) in April 2016. The NLW was also underpinned by concerns revolving around fair compensation for low paid workers. The 2016 LPC remit stated that the government's aim was "to have NMW rates that help as many low-paid workers as possible without damaging their employment prospects", and that the government intended to "see a higher wage for more experienced workers and so is introducing a premium for workers aged 25 and over".[6]

1.5 The NLW rate in 2016 was £7.20 per hour, with the government having a stated objective of raising this to 60 percent of hourly median earnings by 2020, subject to sustained economic growth. The NLW now stands at £8.21 per hour (Table 1).

## Table 1.A: UK NLW and NMW rates

| Group | 2010 rate (£/hr) | April 2018 rate (£/hr) | April 2019 rate (£/hr) | % increase, April 2018 – April 2019 |
|---|---|---|---|---|
| NLW (25+) | £5.93* | £7.83 | £8.21 | 4.9% |
| 21-24 year olds | £5.93 | £7.38 | £7.70 | 4.3% |
| 18-20 year olds | £4.92 | £5.90 | £6.15 | 4.2% |
| 16-17 year olds | £3.64 | £4.20 | £4.35 | 3.6% |
| Apprentices | £2.50 | £3.70 | £3.90 | 5.4% |

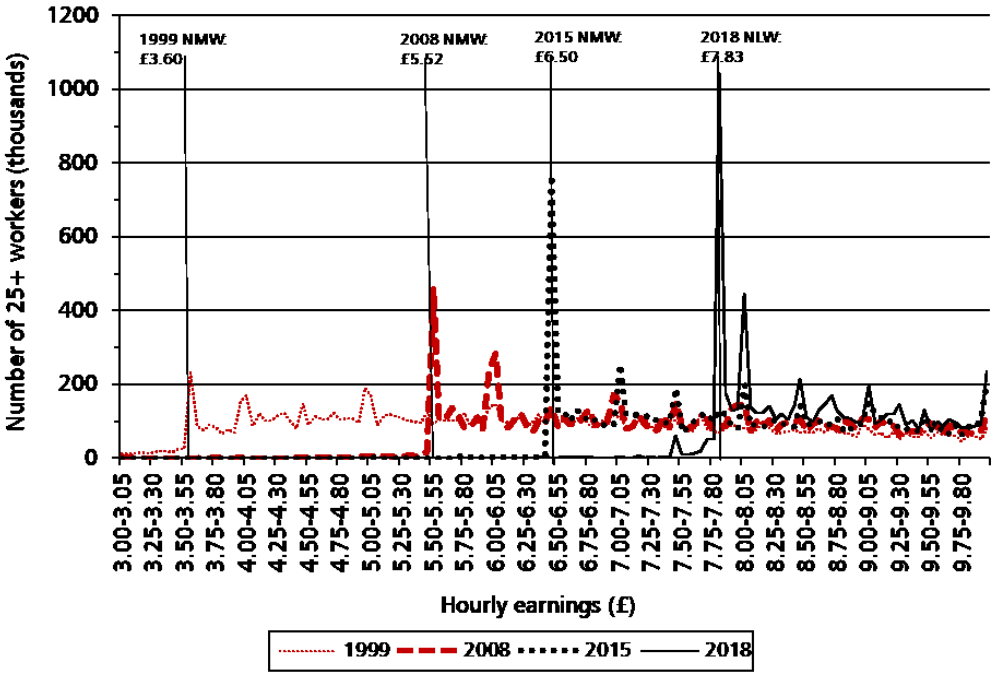
*The NLW was introduced in April 2016, prior to which the same (NMW) rate applied to all workers aged 21 and over.

1.6 The impact of the NMW/NLW on the hourly earnings distribution is visible in Chart 1.A, which plots the distribution for workers aged 25 and over in 1999, 2008, 2015 and 2018. The increases in the NMW/NLW rates applying to these workers over time are evident from the rightward trajectory of the spikes around these rates in the distribution.

5 Prior to that, there were a number of wages councils that set wage rates by sectors, but these were largely abolished by 1992.

6 Department for Business, Innovation and Skills. National Minimum Wage: Low Pay Commission Remit 2016. 2015; Further, the 2019 LPC remit stated that: "The Government continues to build an economy that works for everyone. Making work pay for the lowest earners in our society is a core part of our commitment." [BEIS (2019). The National Living Wage and National Minimum Wage: Low Pay Commission Remit 2019.]

## Chart 1.A: The hourly earnings distribution for workers aged 25 and over in the UK (1999, 2008, 2015 and 2018)*




*Source: Analysis of ONS ASHE data (1999-2018) *The NMW applied to all workers aged 22 and over in 1999 and 2008 and to all workers aged 21 and over in 2015, whereas the NLW applied to all workers aged 25 and over in 2018 [NMW/NLW rates: April 1999 NMW: £3.60, October 2007 NMW: £5.52, October 2014 NMW: £6.50, April 2018 NLW: £7.83 – based on LPC (2019). 20 years of the National Minimum Wage: A history of the UK minimum wage and its effects.]*

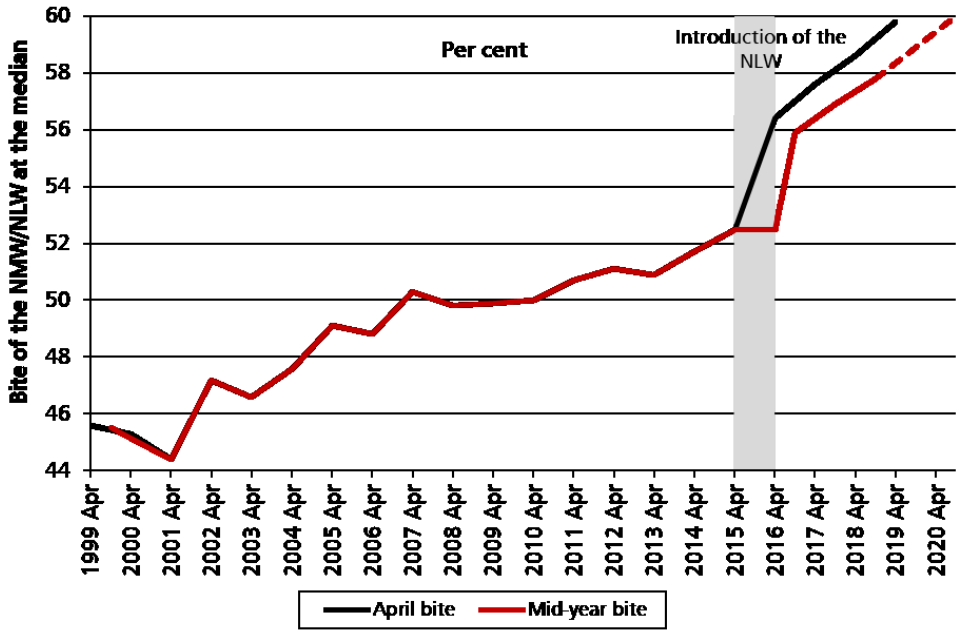
1.7 The 'bite' of the minimum wage (its ratio to median hourly earnings, also known as the "Kaitz index") has followed an increasing trend over time (Chart 1.B). At the inception of the NMW in April 1999, the LPC estimated its bite to be 45.6%.[7] After the bite reached a level of 50.3% in April 2007, the cautious increases in the NMW in the financial crisis and recovery years (2008-2015) led to slower growth and the bite increased only to 52.5% in April 2015. Thereafter, the introduction of the NLW led to the bite rising more rapidly. The NLW bite was estimated at 56.4% in April 2016.[8] With an estimated October 2019 'bite' of 58.9%, the NLW has a bite target of 60% in October 2020.[9]

7 Low Pay Commission, '20 years of the National Minimum Wage: A history of the UK minimum wage and its effects', 2019

8 Ibid.

9 Low Pay Commission, 'National Minimum Wage: Low Pay Commission Report 2018', 2018

## Chart 1.B: The 'bite' of the NMW/NLW for workers aged 25 and over (1999-2020)




*Source: Figure 2.5 in LPC (2018). National Minimum Wage: Low Pay Commission Report 2018. LPC estimates using adjusted earnings data based on ONS data: ASHE without supplementary information, April 1999-2004; ASHE with supplementary information, April 2004-06; ASHE 2007 methodology, April 2006-11; and ASHE 2010 methodology, April 2011-18, standard weights, UK; and earnings forecasts from HM Treasury panel of independent forecasts (2018), and Bank of England average earnings forecasts (2018). Notes: a. Bites (the ratios of the NMW/NLW to median hourly earnings) from mid-year 2018 are based on earnings forecasts and may change when out-turn data is available. b. Data include all apprentices (as it is not possible to identify apprentices prior to 2013).*

1.8 In Spring 2019, then Chancellor Phillip Hammond suggested that the LPC's post-2020 remit should include "the objective of ending low pay in the UK," where "low pay" was based on the commonly used definition of two-thirds of median earnings. At the same time, an increase of the "bite" of the minimum wage to a level above 60% would place the UK as having one of the highest national minimum wages among developed countries.

1.9 To better understand what a more ambitious post-2020 remit might entail, it is instructive to look at the empirical evidence on the impact of minimum wages, especially as it relates to potential unintended consequences such as reduced employment growth.

1.10 This report reviews what the best international evidence suggests about the impact of minimum wages, with particular attention to recent, high quality evaluations of more ambitious minimum wage policies. Special emphasis is placed on recent research documenting the impact of the NLW in UK, as well as the impact of recently implemented high minimum wages in numerous states in the US. Following the review of evidence, the report provides guidance for thinking about an ambitious post-2020 remit. In summary, the report concludes that the evidence to date is consistent with exploring a higher NLW up to two-thirds of the median wage. At the same time, it is important that the LPC be able to use timely empirical evidence to modulate the uprating based on economic conditions, with a clear mandate to reconsider if the minimum wage is deemed to be hurting employment prospects of low-wage workers. Given the critical role that the LPC has played in the

success of the minimum wage setting the UK, it vital that the LPC's independence is respected, and that it has the discretion to depart from a target if facts on the ground suggest so. It is also important to improve the data infrastructure available to the LPC and other researchers to conduct timely evaluations, and a number of suggestions are offered that can better facilitate evidence-based decision making.

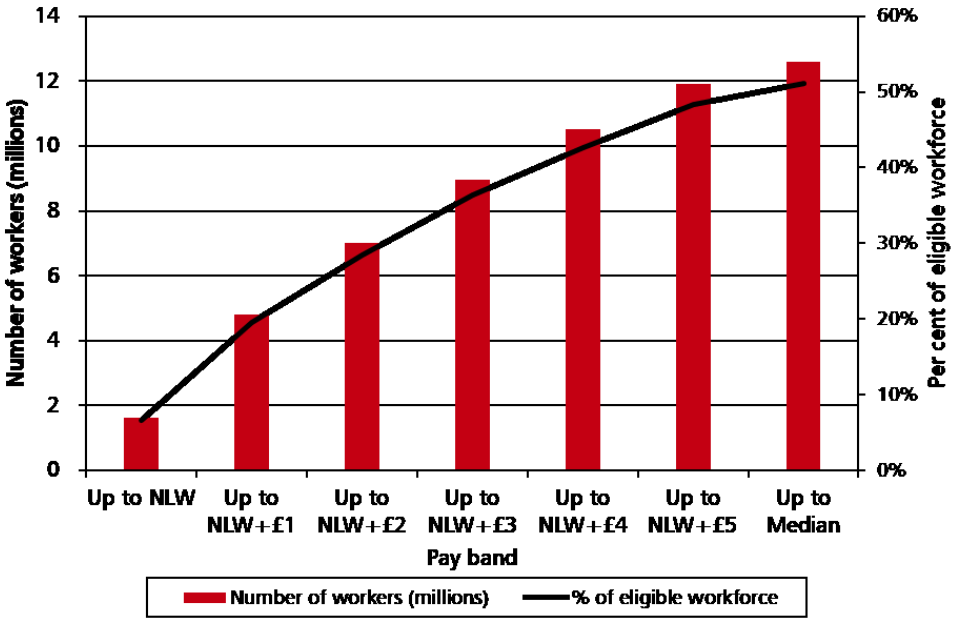
# Chapter 2

# Who would be affected by a higher National Living Wage

2.1 As a starting point, it is important to understand how the share and composition of the workforce would change when considering higher levels of the NLW. This section outlines coverage rates and worker characteristics at the NLW and further up the earnings distribution, up to the median hourly earnings level, for 2018. Moreover, while the overall coverage rate is instructive, it is also important to understand how the coverage rates may differ across various regions of the UK. Finally, as discussed below, the sectoral composition of the workforce can play an important role in determining the effect of the policy on the labour market; for this reason, we will also consider how the sectoral composition shifts with alternative levels of the NLW.

2.2 Chart 2.A plots the number of workers who are covered by different bands of the hourly earnings distribution, beginning with an upper limit of the 2018 NLW (£7.83 per hour) and moving (only) this upper limit further up in £1 intervals up to the median hourly earnings level, and the corresponding shares of the eligible (25+) workforce. The skewed shape of the earnings distribution means that the increase in coverage from a £1 increase in the hourly earnings threshold declines as we move further up the distribution. (Chart 2.B). To put this in perspective, in terms of the 2018 wage distribution, two-thirds of the median wage for workers aged 25+ would be around £1 above the 2018 NLW and would see an increase in the coverage rate from around 7% to 22%.

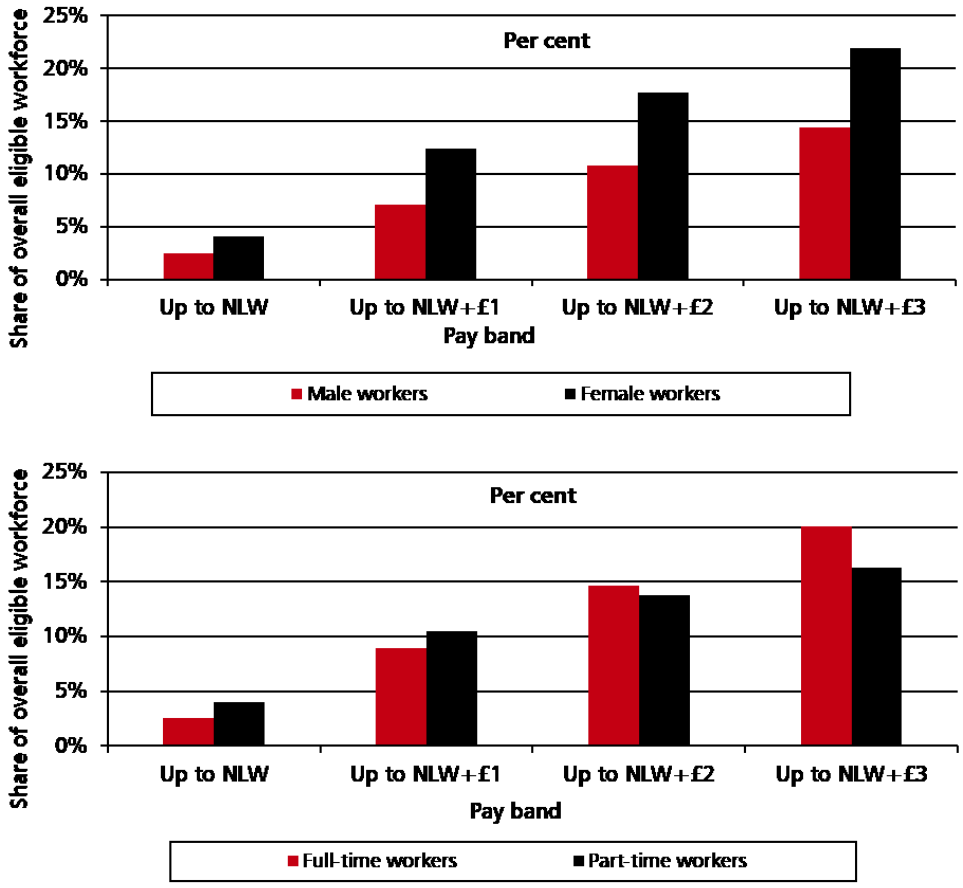
## Chart 2.A: Number of workers / Share of eligible workforce under different NLW levels




*Source: Analysis of ASHE (2018) data The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights.*

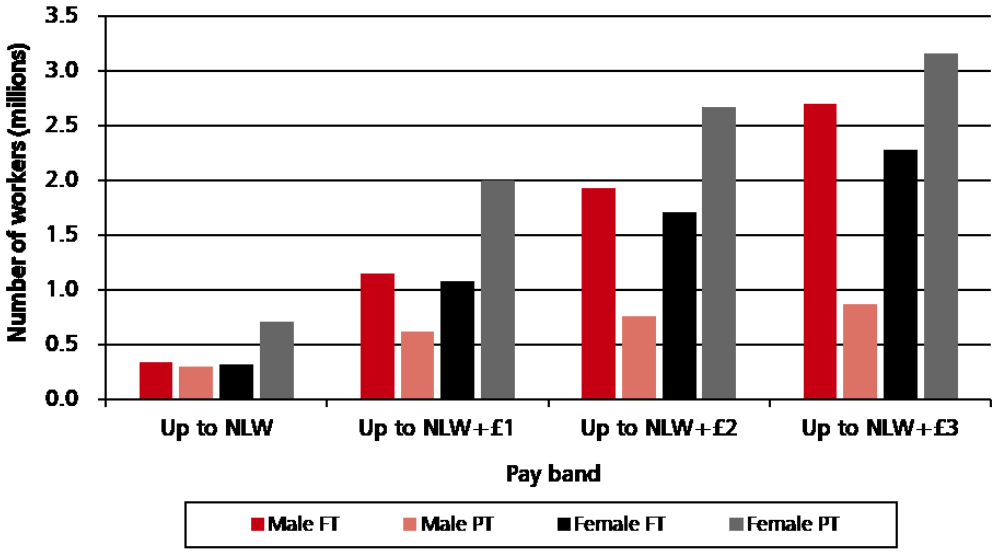
2.3 Women are more likely than men to be paid at the 2018 NLW, and more part-time workers earn the NLW relative to full-time workers (Chart 2.C). Although full-time male and female workers comprise a relatively small share of the workforce covered by the current NLW, their numbers rise quite rapidly further up the hourly earnings distribution. On the other hand, the number of part-time female workers covered by the NLW and up to £2 above the NLW is fairly high but rises at a slower rate further up the distribution.

## Chart 2.B: Coverage of male, female, full-time and part-time workers* across different hourly pay bands:




*Source: Analysis of ASHE (2018) data. The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights. *Full-time workers are defined as those working for more than 30 paid hours per week (or 25 or more paid hours for the teaching profession).*

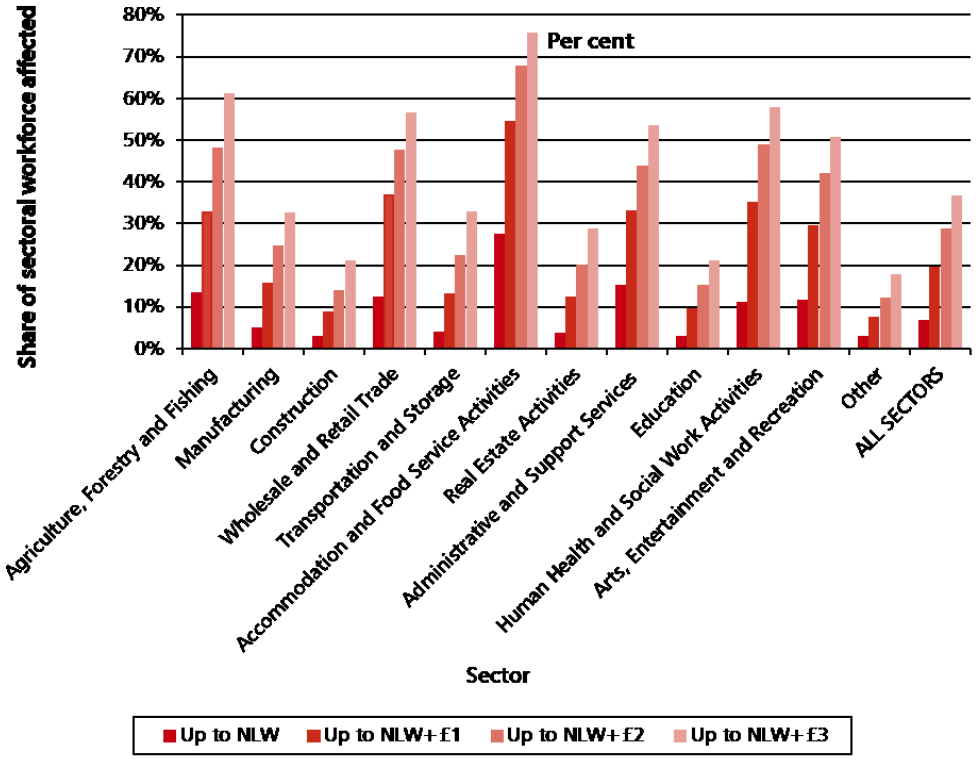
Chart 2.C: Coverage of male, female, full-time and part-time workers* across different hourly pay bands: II (FT: full time, PT: part time)




*Source: Analysis of ASHE (2018) data. The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights. *Full-time workers are defined as those working for more than 30 paid hours per week (or 25 or more paid hours for the teaching profession).*

2.4 Coverage increases differently across sectors as we move further up the hourly earnings distribution. Chart 2.D shows that at the NLW, the highest coverage rates are found in the accommodation and food service and administrative and support service sectors. As we move further up the hourly earnings distribution, coverage rates increase particularly rapidly in these sectors and in wholesale and retail trade, health and social care, and agriculture.

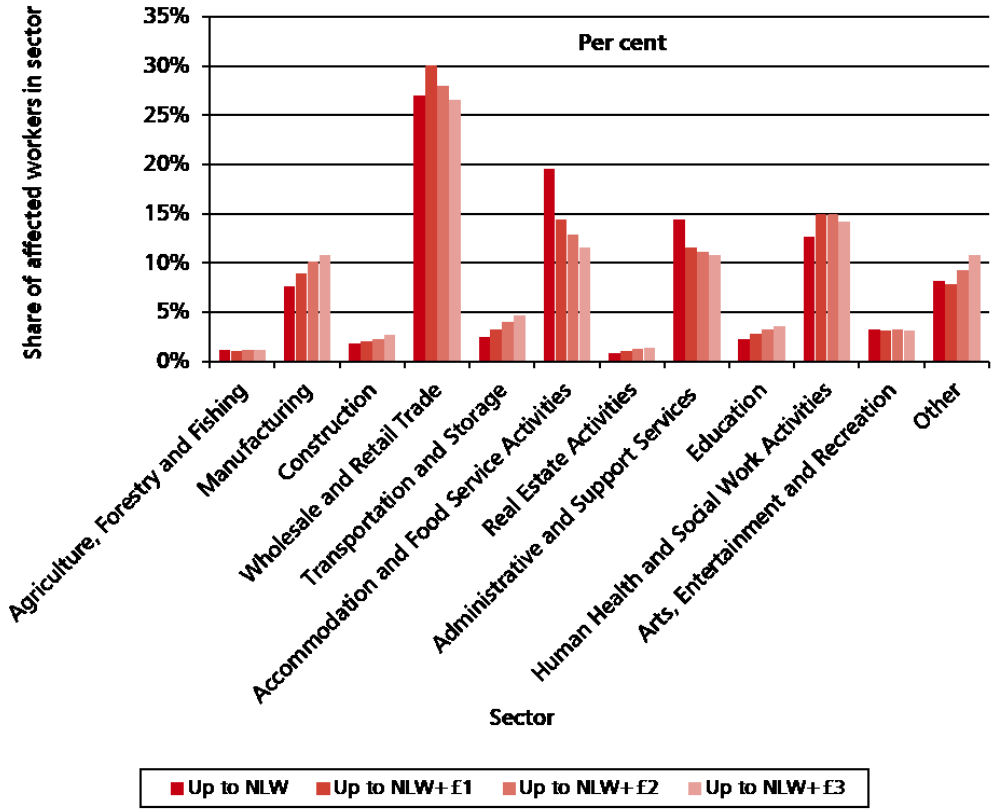
## Chart 2.D: Selected sectoral coverage rates by hourly pay band*




*Source: Analysis of ASHE (2018) data. The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights. *Other sectors include mining and quarrying; electricity, gas, steam, and air conditioning supply; water supply, sewage, waste management, and remediation activities, information and communication, financial and insurance activities; professional, scientific, and technical activities; and other service activities.*

2.5 Further, Chart 2.E captures how some sectors have higher coverage rates than others within each hourly earnings band. In particular, wholesale and retail, trade and accommodation, and food services account for the highest shares of workers affected at the NLW, but their shares gradually fall further up the hourly earnings distribution. Conversely, manufacturing accounts for a smaller share of NLW earners, but this share gradually rises as we move up towards a higher hourly earnings limit. An increase in the NLW to around two-thirds of the median wage (i.e., NLW+£1) would only modestly increase the manufacturing share of covered workers from around 7% to 9%. We will return to the issue of manufacturing coverage when we review the evidence on employment effects by sector.

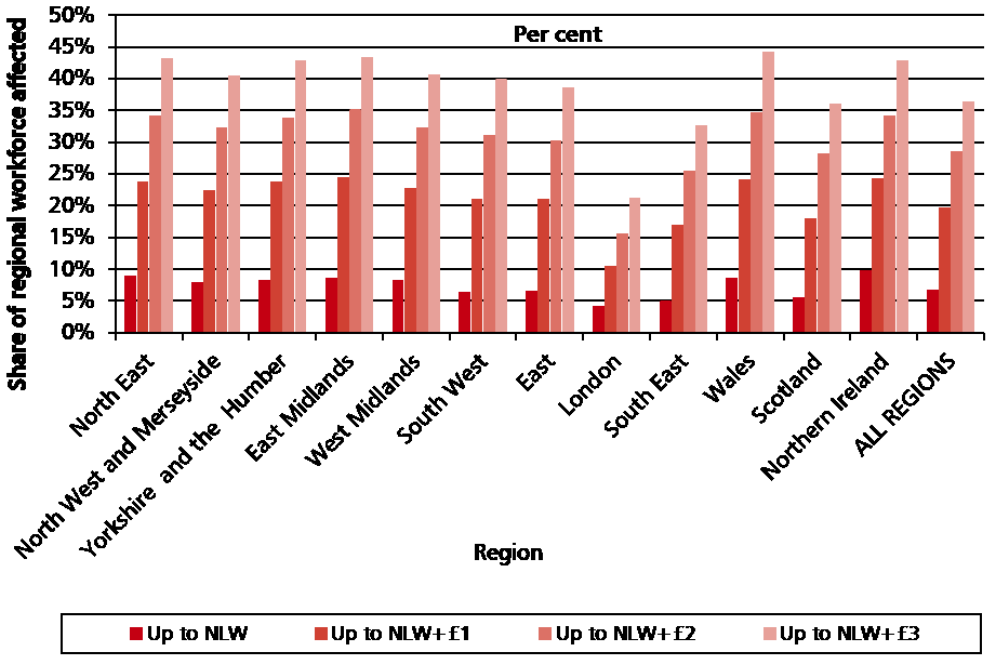
## Chart 2.E: Sectoral composition of covered workers within hourly pay bands*




*Source: Analysis of ASHE (2018) data. The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights. *Other sectors include mining and quarrying; electricity, gas, steam, and air conditioning supply; water supply, sewage, waste management, and remediation activities, information and communication, financial and insurance activities; professional, scientific, and technical activities; and other service activities. As all sectors are covered in this graph, the shares of affected workers within each pay band shown here total 100% (after rounding).*

2.6 Coverage rates also vary quite differently by region as we move further up the hourly earnings distribution. As shown in Chart 2.F, regions such as Northern Ireland and the East Midlands have the highest proportions of their workers earning at or below £8.88 (£1 above the 2018 NLW). While Scotland and the South East register the highest proportionate increases in coverage as we move up the distribution, the percentage point increases are highest in Wales and the North East. A £1 increase in the NLW would be associated with coverage rates varying between 10% and 24% across the 12 regions.

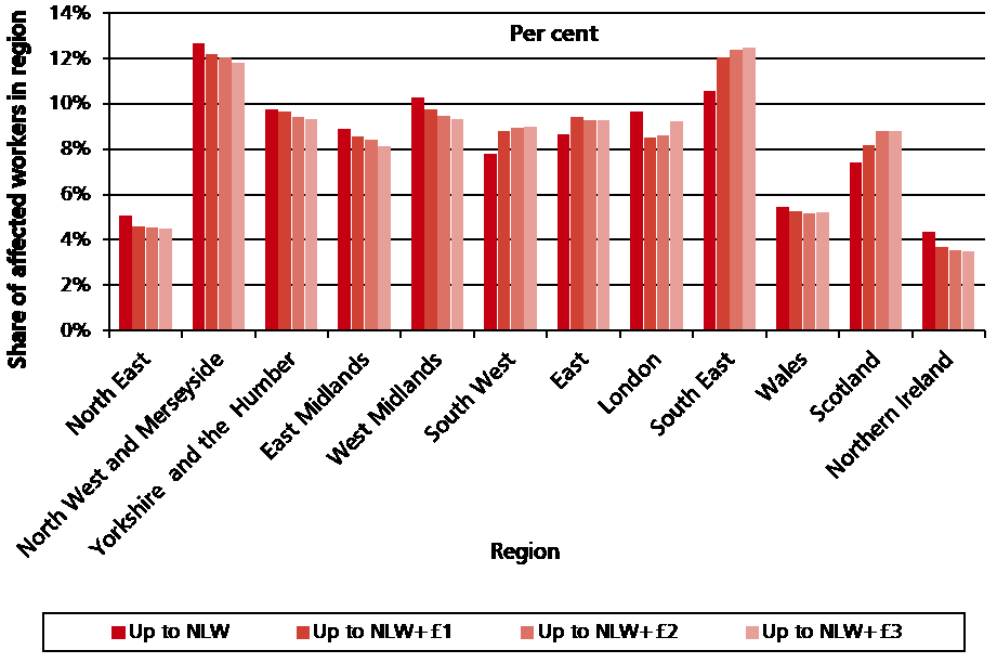
## Chart 2.F: Regional coverage rates by hourly pay band




*Source: Analysis of ASHE (2018) data. The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights.*

2.7 Moreover, as we move up the hourly earnings distribution, higher shares of the workers covered are based in Scotland, the South East and London (Chart 2.G highlights this by presenting how the regional shares of workers covered within wage bins change as we move up the distribution).

## Chart 2.G: Share of workers covered in each region within hourly pay bands*




*Source: Analysis of ASHE (2018) data. The eligible workforce includes those entitled to the NLW (aged 25 and over and not in the first year of their apprenticeship) and paid below or within 5 pence of the NLW. Results are weighted using the ASHE survey low pay weights.*

**As all regions are displayed in this graph, the shares of affected workers within each pay band shown here total 100% (after rounding).*

2.8 Overall, data on employee earnings in 2018 indicates that increasing the NLW to around two-thirds of the median hourly wage would likely substantially increase the coverage rate to around 20%. The composition of covered workers would shift towards more full-time workers. The composition would also shift away from accommodation and food services and administrative services, and towards retail and health care, and a slight increase in the manufacturing share. The increase in coverage would be substantial across all regions of the UK. However, the composition of covered workers would also shift away from the Northern Ireland (lower wage region) and London (high wage region) while rising in South East, Scotland and East (middle wage regions).

# Chapter 3

# A framework for understanding the costs and benefits of minimum wages

3.1 While minimum wages raise pay at the bottom, this benefit needs to be traded off against the possible costs of imposing such a standard. The most prominent cost in the policy debates over minimum wages relate to the unintended consequence for the low-wage workers themselves: that employers may cut back on hiring, leading to possibly fewer jobs or work hours for low wage workers. Here we review the theoretical basis for explaining the employment effects of the minimum wage, which can help us interpret the existing evidence and help form reasonable projections of how the effect of the minimum wage may be heterogeneous by structure of the economy and the bite of the policy.

3.2 The concern about unintended consequences of minimum wages on employment comes from basic supply and demand: when labour is made more costly, employers may hire less of it. In the standard model of supply and demand, competition between employers ensures that wages are equal to the "value marginal product of labour"—the value of what a worker contributes to the employer's production. It is also assumed that this marginal product is diminishing in the number of workers hired; holding all other inputs like machinery and materials constant, additional workers will make smaller economic contributions. This diminishing marginal product leads to a downward sloping demand curve for labour. Market wages are set where this demand meets the supply of workers. In such an environment, a government mandated wage standard above the market wage will produce some job loss.

3.3 Of course, just because there may be some job losses does not make a policy undesirable if there are other benefits from it (including increasing perceived fairness and reduced overall reliance on public assistance). The relevant issue is the magnitude of such job losses. The standard supply and demand framework suggests that job losses for lower-skilled workers at minimum wage jobs will be larger when:

- low-skilled workers are more easily substituted with other inputs like machinery or higher skilled workers. In this case employers will react to a higher minimum wage by reducing use of lower skilled workers and increasing other input use.
- the demand for goods and services produced using minimum wage labour are very price sensitive (or elastic). In this case employers cannot

easily pass on the higher costs to consumers as prices, and this leads to further cutback in production and hiring.

3.4 One implication is that if minimum wage workers cannot be easily substituted with machinery or higher skilled workers, job losses may be modest. Similarly, if it is easy to pass on the added costs of production to consumers, job losses may also be modest. For example, many manufacturing sector jobs are relatively more easily replaced with automation. In addition, manufacturing goods are typically tradable goods, whose prices may be set internationally; this makes it more difficult for manufacturing firms to raise their prices when their labour costs rise than would be true for retailers or other service-sector firms. For this reason, it is important to assess the sectoral composition of workers affected by different levels of the minimum wage – as we do in the next section when we review the empirical evidence.

3.5 The discussion above assumes that the labour market is perfectly competitive, which means wages are set by a "labour market" and not by individual employers. However, this may not be a realistic assumption, since there is a lot of evidence of important frictions in the labour market which may give firms some degree of wage setting (or monopsony) power. (See reviews by Ashenfelter, Farber and Ransom 2010;[1] and Manning 2011).[2]

3.6 Why might this be the case? One reason is that there are "search frictions" due to costs of finding jobs and filling vacancies (Manning 2003).[3] There are good jobs and bad jobs at the low end of the labour market, and movements between these lead to vacancies and turnover. The impact of a higher minimum wage may be quite different in such a monopsonistic market. Under monopsony, in some cases employment may be constrained by the supply of labour to the firm, and not the firm's demand for labour. If a low-wage employer is required to raise its pay, fewer of its workers will leave to take other jobs. This means fewer vacancies at that employer, which can raise the actual number of realized jobs. Additionally, there is an indirect effect of fewer workers leaving to other firms: this means other employers are more likely to fill their job openings from the ranks of the unemployed, which tends to keep unemployment down. So while higher costs may dissuade some employers from creating new positions, it also helps other employers recruit and retain workers. In other words, some increases in the minimum wage can reduce vacancies and turnover instead of destroying jobs.

3.7 An additional source of monopsony power comes from the fact that not all jobs are equally valued by all workers, even for a given wage level. For example, ease of commuting, work culture, flexibility, or relationship with supervisors and co-workers are "amenities" at jobs whose value may differ substantially across workers. The more varied are the valuations, the less sensitive is recruitment and retention to the exact pay level, which leads employers to have a degree of wage setting power.

[1] Ashenfelter, Farber and Ransom, 'Labor Market Monopsony. Journal of Labor Economics', 2010

[2] Manning, 'Imperfect Competition in the Labor Market' 2011

[3] Manning, 'Monopsony in Motion' 2003

(See Card, Cardoso, Heining and Kline 2018[4], and Dickens, Manning and Butcher 2012[5] for more.)

3.8 Of course, even with monopsonistic competition in the labour market, a sufficiently high minimum wage will lead to labour demand being the binding factor, as employers may not want to fill a vacancy even if they can do so more easily. Eventually, a higher minimum wage is very likely to lower employment. However, some increases in the minimum wage may have little negative effect on employment in a monopsonistic labour market.

3.9 The extent to which this is true depends on both the structure of the labour market (such as degree of monopsony power), sectoral composition of workers which can affect the impact of automation or ability to pass wage costs through to consumer prices. Exactly how far one can push the minimum wage before the job losses start becoming pronounced is, of course, an empirical question. In our discussion of this empirical evidence below, we will also keep in mind exactly how the effect of the minimum wage may vary by the "bite" or level of the minimum wage.

4 Card, Cardoso, Heining and Kline, 'Firms and Labor Market Inequality: Evidence and Some Theory', 2018

5 Dickens, Manning and Butcher, 'Minimum Wages and Wage Inequality: Some Theory and an Application to the UK' 2012

# Chapter 4

# Evidence on minimum wage research: impact on incomes and employment

4.1 Most modern evaluations of minimum wage policies use "quasi-experimental" variation which study how outcomes change following a change in the minimum wage laws. There are two important concerns about what groups of workers to study to assess the impact of a policy intervention: the choice of a "treatment group" of workers likely affected by the minimum wage, and the choice of a "control group" of workers who are unaffected by the policy, but who are otherwise similar to the treatment group.

4.2 In most cases, minimum wages affect too small a share of the workforce to be able to plausibly detect an impact of the policy (whatever it may be), by studying aggregate outcomes like economy-wide employment or unemployment rates, or measures of average wages. This requires researchers to focus on narrower subgroups of workers or jobs when doing an evaluation. The most common approach in the literature to date is to consider high-impact demographic groups like teens (or young workers) who are disproportionately likely to earn minimum wages (e.g., Neumark and Wascher 1992,[1] Card 1992,[2] Allegretto et al. 2011)[3]. An attractive aspect of this strategy is that we are likely to detect a clear effect on the average wage of a group like teens, giving us confidence that whatever effect we find on employment (or other outcomes) is likely to be meaningful. At the same time, if the effects are heterogeneous across groups, a focus on a very narrow group may produce misleading inferences about the overall effect of the policy on low-wage workers.

4.3 A different approach focuses on incumbent workers (e.g., Currie and Fallick 1996,[4] Stewart 2004,[5] Clemens and Wither 2019)[6] who categorize by their pre-intervention wage and track their employment outcomes over time. The advantage of this approach is that the selected workers are highly likely to be affected by the

[1] Neumark and Wascher, 'Employment effects of minimum and subminimum wages: panel data on state minimum wage laws' 1992

[2] Card, 'Using regional variation in wages to measure the effects of the federal minimum wage' 1992

[3] Allegretto et al. 'Do minimum wages really reduce teen employment? Accounting for heterogeneity and selectivity in state panel data', 2011

[4] Currie and Fallick, 'The Minimum Wage and the Employment of Youth: Evidence from the NLSY',1996

[5] Stewart, 'The employment effects of the national minimum wage', 2004

[6] Clemens and Wither, 'The minimum wage and the Great Recession: Evidence of effects on the employment and income trajectories of low-skilled workers', 2019

minimum wage change. A disadvantage is that it only allows us to study the effect on incumbent workers, and not on those who were not working right before the policy change.

4.4 Besides looking at low-wage workers, there is also a set of work that looks at low-wage firms (e.g., Katz and Krueger 1992;[7] Card and Krueger 1994;[8] Harasztosi and Lindner 2019).[9] This is a focus on low-wage jobs as opposed to workers; one possible limitation is that the workforce composition may change in response to the minimum wage increase, or there may be reallocations across firms. Finally, a number of recent studies have considered as an outcome the number of low-wage jobs paying at, or slightly above, the new minimum wage (e.g., Cengiz et al. 2019;[10] Jardim et al. 2018).[11] This is sometimes called the "bunching" approach because of the focus on the spike or bunching of jobs just around the minimum wage. This approach allows us to assess how a minimum wage affects to total number of jobs. While the impact on the total number of low-wage jobs may not tell us who is actually employed in those jobs, supplementary analysis combining demographic and the bunching approach can assess possible labour-labour substitution across various worker groups.

4.5 A second critical issue in estimating the effect of a policy intervention is to construct the "counterfactual" scenario—i.e., what would have happened to an outcome (e.g., employment or wages) were it not for the policy change. Many modern evaluations use a difference-in-differences technique, which compares how an outcome changes in the "treatment group" or affected workers following the intervention, as compared to the change in the outcome for a suitably chosen "control group" of workers who are unlikely to be affected by the policy. In practice, such control groups can be other jurisdictions where the policy did not change (as in comparing states across the US), higher wage workers, or comparing across high and low wage regions and/or demographic groups. The latter two approaches are more common in contexts like the UK, where the minimum pay standards do not vary by region (unlike, say, US or Canada).

4.6 In a difference-in-differences evaluation, a key concern revolves around the plausibility of the "parallel trends" assumption: that absent the intervention, the outcomes in the treatment and control groups would have evolved in a parallel fashion. Whether this assumption holds in specific contexts has been an important topic of scholarly disagreements about the employment effects of minimum wages (e.g., Neumark Salas and Wascher 2014;[12] Allegretto et al. 2017).[13] There are a number of tests economists have developed to help assess the plausibility of the "parallel trends" assumption. This includes assessing whether there were pre-existing trends in outcomes across the treatment and control groups even prior to the intervention. Additionally, it is sometimes useful to test whether we find a

[7] Katz and Krueger, 'The Effect Of The Minimum Wage On The Fast Food Industry', 1992

[8] Card and Krueger, 'Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania', 1994

[9] Harasztosi and Lindner, 'Who Pays for the Minimum Wage?', 2019

[10] Cengiz et al., 'The Effect Of Minimum Wages On Low-Wage Jobs: Evidence From The United States Using A Bunching Estimator', 2019

[11] Jardim et al., 'Minimum Wage Increases, Wages, And Low-Wage Employment: Evidence From Seattle', 2018

[12] Neumark, Salas and Wascher, 'More On Recent Evidence On The Effects Of Minimum Wages In The United States', 2014

[13] Allegretto et al., 'Credible Research Designs For Minimum Wage Studies: A Response To Neumark, Salas, And Wascher', 2017

measured effect on outcomes that should not be plausibly affected by the policy; if we do, that indicates a likely problem with the research design.

4.7 When the simple parallel trends assumption does not hold in a difference-in-differences design, there are a number of strategies available to researchers. This includes adjusting for either long or short-run trend differences between treatment and control groups, though these may rely on strong parametric assumptions. Alternatively, researchers can try to find more similar control groups. This could entail using neighbouring areas which tend to be more similar, though there is a worry about spillovers across the jurisdictional border (e.g., Dube Lester and Reich 2010).[14] Another alternative is to find control groups that exhibit similar pre-intervention evolutions in the outcomes or other characteristics, as is done using matching, synthetic controls (Dube and Zipperer 2015;[15] Neumark, Salas and Wascher 2014)[16], or factor models (Totty 2017).[17]

4.8 The issue of a credible counterfactual will play an important role in our discussion of the literature below as we assess the reliability of the findings from a rather large set of studies.

## Evidence from the U.S.: leveraging local variation in minimum wages

4.9 A disproportionate share of minimum wage studies have used data from the United States. One reason for this is because among developed countries, the US is somewhat unique in having a tremendous amount of variation in the effective minimum wages across various localities, especially in recent years. This makes the U.S. somewhat of a proverbial lamppost under which economists have often looked when it comes to uncovering the effects of minimum wages.

4.10 The US federal minimum wage was established in 1938. Between 1938 and 1980, the minimum wage roughly kept pace with the median wage via periodic legislative action. However, during the 1980s the real minimum wage declined to below $7/hour in current (2019) dollars, and over the past 20 years, the minimum wage has fallen or remained stable, reaching a historical low of $6.66/hour in 2006 prior to the last increase, and now standing $7.25/hour.

4.11 The stagnant federal minimum wage has led states to raise their minimum above the federal standard, beginning in late 1980s, but especially since 2000. Today, 29 out of the 50 states (and the District of Columbia) have state minimums that exceed the federal standard. The increasing use of state minimum wages has led to the blossoming of the "new minimum wage research" since the early 1990s, using cross-state variation in minimum wages. There is a large literature that has looked at this question with sometimes different conclusions (Card and Krueger

[14] Dube, Lester, and Reich, 'Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties', 2010

[15] Dube and Zipperer, 'Pooling Multiple Case Studies Using Synthetic Controls: An Application to Minimum Wage Policies', 2015

[16] Neumark, Salas and Wascher, 'More On Recent Evidence On The Effects Of Minimum Wages In The United States', 2014

[17] Totty, 'The Effects of Minimum Wage on Employment: A Factor Model Approach', 2017

1994, 2000;[18] Neumark and Wascher 2000;[19] Dube Lester and Reich 2010;[20] Neumark Salas and Wascher 2014;[21] Allegretto, Dube, Reich, Zipperer 2017;[22] Meer and West 2016;[23] Cengiz Dube Lindner and Zipperer 2019).[24]

4.12 While the evidence sometimes varies by the specific method used, it's useful to start with the big picture. A useful survey of the evidence from this "new minimum wage research" literature is provided by Wolfson and Belman (2014)[25] in their book What Do Minimum Wages Do? Much of the literature they survey consist of effects of minimum wage on the employment in low-wage groups (such as restaurant sector, or teenage workers). They key measure they consider is the "minimum wage employment elasticity" (MWE) which is defined as the percentage change in employment divided by percentage change in minimum wage.

$$MWE = \frac{\%\Delta\ Employment}{\%\Delta\ \text{Minimum Wage}}$$

4.13 The range of estimates of this large literature can be usefully summarised by the following histogram of 439 estimated elasticities of employment or hours for various low-wage groups with respect to the minimum wage, derived from 23 separate studies and reported in Belman and Wolfson (2014). Some are negative while others are positive, but they are centred around zero. The median MWE is around -0.05, which is economically small given the groups studied are typically teens and restaurant workers, where a substantial share (around 40%) of workers earn at or near the minimum wage. Overall, the authors conclude that it was unlikely that the minimum wage increases under study led to statistically or economically meaningful job losses.

18 Card and Krueger, 'Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania', 1994; Card and Krueger, 'Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply', 2000

19 Neumark and Wascher, 'Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania', 2000

20 Dube, Lester, and Reich, 'Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties', 2010

21 Neumark, Salas and Wascher, 'More On Recent Evidence On The Effects Of Minimum Wages In The United States', 2014

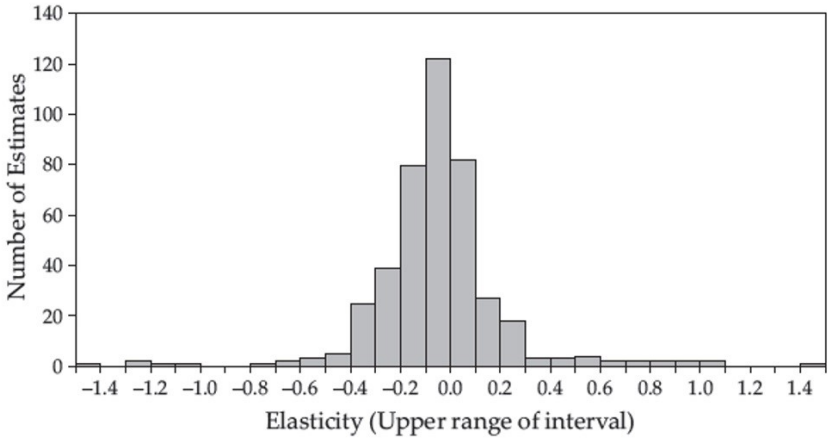
22 Allegretto, Dube, Reich, and Zipperer, 'Credible Research Designs for Minimum Wage Studies: A Response to Neumark, Salas, and Wascher', February 2017

23 Meer and West,' Effects Of The Minimum Wage On Employment Dynamics', 2016

24 Cengiz, Dube, Lindner and Zipperer, 'The Effect Of Minimum Wages On Low-Wage Jobs: Evidence From The United States Using A Bunching Estimator', 2019

25 Belman and Wolfson, 'The New Minimum Wage Research', 2014

## Chart 4.A: Distribution of minimum wage employment elasticities from the minimum wage literature




*Source: Preface to 2015 edition of Card and Krueger's Myth and Measurement, using data from Belman and Wolfson (2015).*

4.14 A similar conclusion was reached by other economists doing formal meta-analysis, a well-defined statistical approach of pooling the results from a large number of separate analyses. A meta-analysis conducted by Doucouliagos and Stanley (2009), along with one released in 2015 by Belman and Wolfson, also conclude that the overall impact of minimum wages on employment is small.[26] In addition, a number of meta-analyses have found a tendency in the literature to "over-publish" statistically-significant negative findings, which means if anything a simple average of estimates might be somewhat biased towards finding job losses (Andrews and Kasy 2019); we return to this point below.[27]

4.15 While useful, there are several limitations to the above summary of the literature. First, the MWE is not a particularly useful way of summarizing the impact of minimum wages when comparing across groups and minimum wage experiments with very different "bite" of the policy. For example, consider case A, where a minimum wage increase that is binding for 10% of the workers overall, 15% of those in retail, and 40% of those in restaurants, versus case B, where it's binding for 5% overall, 10% in retail and 30% of those in restaurants. Study # 1 may use case A, and report the estimate for restaurants (40% bound), while another study # 2 may use case B and retail (10% bound). The bite of the policy is quite different across the two studies because in general case study # 1 is using a more generally binding minimum wage increase, and because it is using a generally lower-wage group. A more useful measure that accounts for these discrepancies is the "own-wage employment elasticity" (OWE), which tells us how employment for the specific group responds to an increase in the average wage of that group induced by the minimum wage change. (This is sometimes also referred to as an estimate of the "labour demand elasticity" which is an accurate description if the labour market is perfectly competitive. But since it may not be, this report uses the more general term "own-wage employment elasticity".) In practice, this can be estimated by

[26] Doucouliagos and Stanley, 'Publication Selection Bias in Minimum-Wage Research? A Meta-Regression Analysis', 2009; Belman and Wolfson, '15 Years of Research on U.S. Employment and the Minimum Wage', 2016

[27] Andrews and Kasy,, 'Identification of and Correction for Publication Bias ', 2019

dividing the MWE by the elasticity of the average wage of the group with respect to the minimum wage (the average wage elasticity, or AWE):

$$OWE = \frac{\left(\frac{\%\Delta\ Employment}{\%\Delta\ Minimum\ Wage}\right)}{\left(\frac{\%\Delta\ Average\ Wage}{\%\Delta\ Minimum\ Wage}\right)} = \frac{MWE}{AWE}$$

4.16 A generally more binding minimum wage increase, and use of a sub-group for whom the minimum wage is more binding, will tend to produce a larger average wage elasticity (i.e., the denominator above). This normalizes the MWEs to produce a more apples-to-apples comparison. Unfortunately, not all studies actually report the effect on the group average wage, which makes it difficult to meaningfully compare employment estimates across studies. However, focusing on the studies that do report both allows a more informative evaluation of the existing evidence base. The magnitude of the OWE is important: for example, an OWE=-1 implies that job losses and wage gains fully cancel out, and the affected group sees no net increase in total earnings. In contrast, an OWE of say -0.1 implies a very small impact of employment; the increase in total earnings to the group in this case is only slightly smaller than the "no job loss" scenario. While all categorizations are inherently arbitrary, we can roughly think of an OWE less negative than -0.4 as small in magnitude, between -0.4 and -0.8 as medium, and more negative than -0.8 as large.

4.17 Chart 4.B shows estimates of the OWE from 55 studies where it is possible to construct this estimate. We started with the list compiled by Harasztosi and Lindner (2019),[28] and Brown and Hamermesh (2019),[29] and then added other (especially more recent) publications that also provide both wage and employment effects. In almost all cases, only a single (preferred or baseline) estimate is used from each study; the sole exceptions are Ericksson and Pytlikova (2004)[30] who provide separate estimates for the Czech Republic and Slovakia ; Bell (1997)[31] who provides separate estimates for Colombia and Mexico; Totty (2018)[32] who reports estimates for teens and restaurant workers; and this report (Dube 2019) which provides separate estimates for U.S. and U.K. Estimates from the U.S. studies are in blue. Pooling across 36 estimates from the U.S. (regardless of the group under study), the median estimate is -0.17. In other words, if we simply aggregate across all the U.S. studies, the proportionate change in employment is much smaller than the change in wage (around 1/6 as large). This OWE is quite small in economic terms, and consistent with the findings around the MWE reported above.

4.18 Note that the majority of these U.S. estimates (26 out of 36) are based on narrow subgroups (like teens, restaurant or retail workers, lower-educated immigrants), and are delineated by open circles (from the U.S.), triangles (from the U.K.), or squares (from other countries). These estimates include studies conducted using a variety of methods, including comparing border counties (e.g. Dube Lester

28 Harasztosi and Lindner, 'Who Pays for the Minimum Wage?' 2019

29 Brown and Hamermesh. 'Wages and Hours Laws: What Do We Know? What Can Be Done?', 2019

30 Ericksson and Pytlikova, 'Firm-level Consequences of Large Minimum-wage Increases in the Czech and Slovak Republics', 2004

31 Bell, 'The Impact of Minimum Wages in Mexico and Columbia', 1997

32 Totty, 'The Effects of Minimum Wage on Employment: A Factor Model Approach', 2018

Reich 2010, 2016),[33] estimates using a factor model to construct data driven counterfactuals (Totty 2017), synthetic control methods (Dube and Zipperer 2015),[34] more standard difference-in-differences approach (e.g., Zavodny 2000,[35] Neumark and Nizalova 2007),[36] difference-in-differences approach controlling for state-specific trends and/or regional controls (e.g., Addison et al. 2012, [37]Allegretto et al. 2011). [38] For this set of 26 estimates from the U.S., the median OWE is -0.19.

[33] Dube, Lester and Reich, 'Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties', 2010; Dube, Lester, and Reich, 'Minimum Wage Shocks, Employment Flows and Labor Market Frictions', 2016

[34] Dube and Zipperer, 'Credible Research Designs for Minimum Wage Studies: A Response to Neumark, Salas and Wascher',, 2015

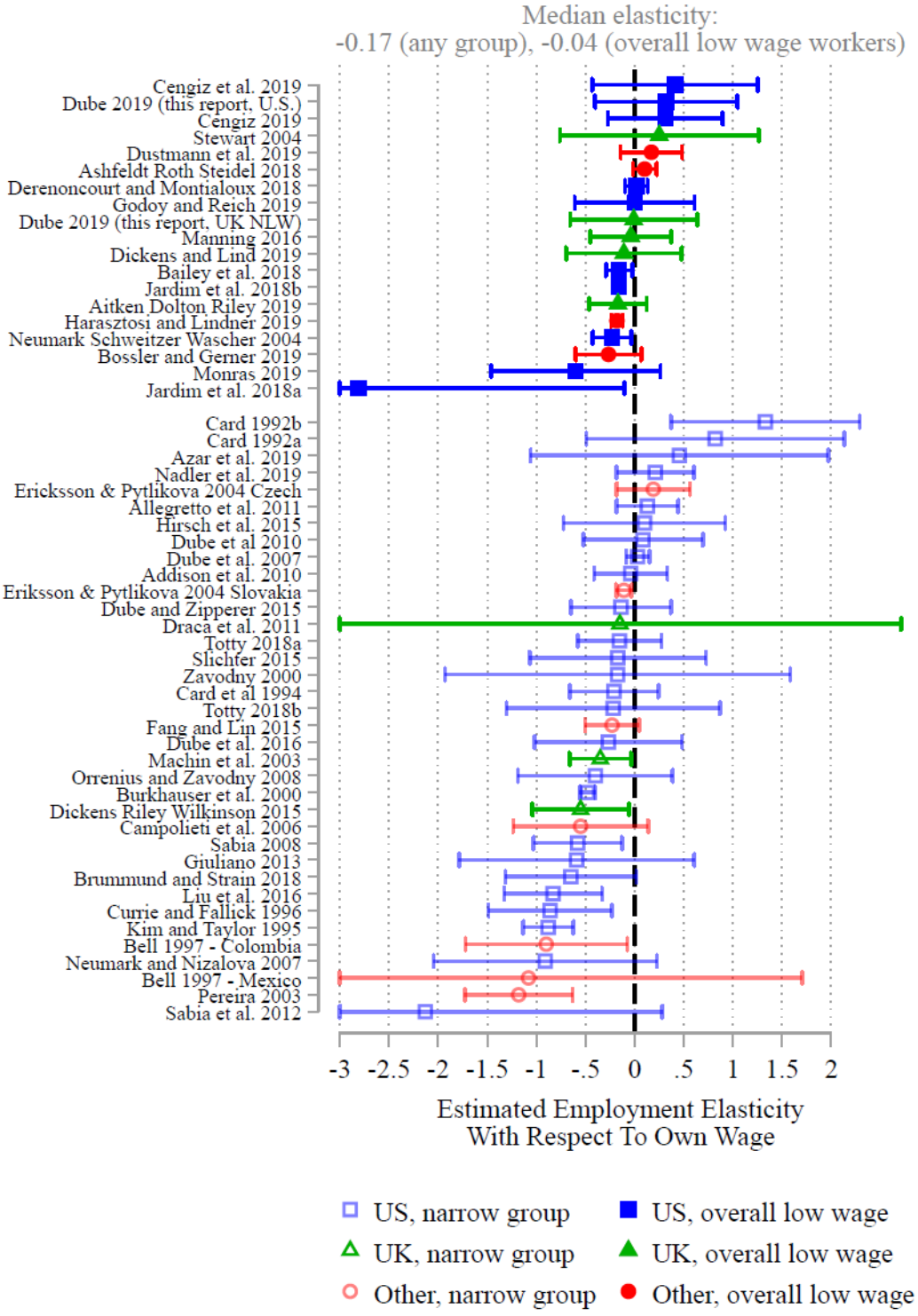
[35] Zanvodny, 'The effect of the minimum wage on employment and hours', 2000

[36] Neumark and Nizalova, 'Minimum Wage Effects in the Longer Run', 2007

[37] Addison et al., 'Minimum Wages, Labor Market Institutions, and Female Employment and Unemployment: A Cross-Country Analysis', 2012

[38] Allegretto et al, 'Do Minimum Wages Really Reduce Teen Employment? Accounting for Heterogeneity and Selectivity in State Panel Data', 2011

Chart 4.B: Own-wage employment elasticities from the minimum wage literature




4.19 A limitation of using narrow subgroups is that the estimate may not be representative of the overall impact of minimum wage policies. This is especially because much of the literature, especially in the US, has revolved around teens; for

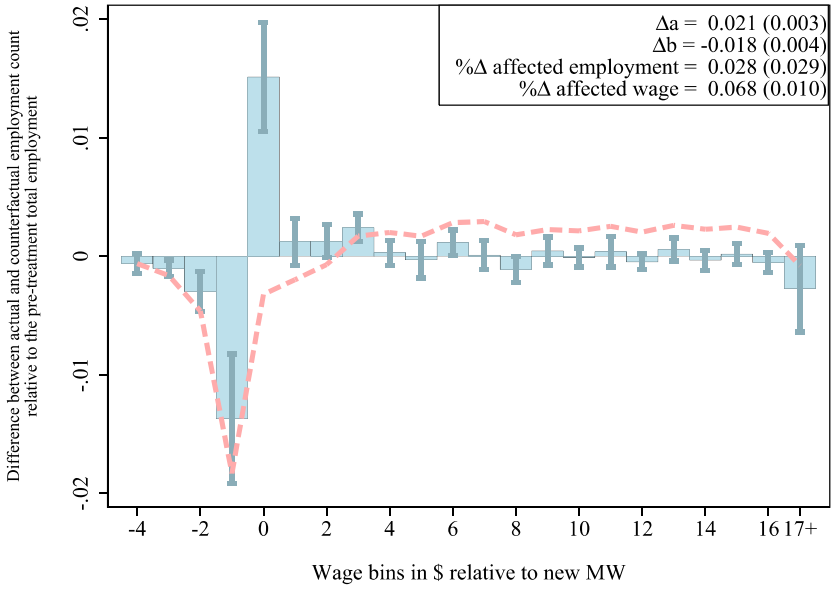
example, roughly half of the studies reviewed in Belman and Wolfson (2016) focus on this subgroup.[39]

4.20 The reason for this focus on teens is because a large share of teen workers (nearly half) earn near the minimum wage: as a result, it is easier to detect an effect (whatever it might be) for this group than by, say, studying all workers in the workforce or even groups like those without a college degree. At the same time, there are many reasons to question the representativeness of teen estimates: for example, only around 20% of minimum wage workers in the U.S. today are teens, and this share has fallen substantially since the 1980s. The second most common group studied in the U.S. literature are restaurant workers: again, this arises from the fact that there is a substantial impact on wages of this group overall, ensuring the employment effects are informative. At the same time, there are limitations on focusing on a specific sector, including both representativeness of the impact for low-wage jobs overall, possible substitution across workers of different skill types within a particular sector, and possible reallocations of low-wage workers across sectors. Ideally, we would like to estimate the overall impact on low wage jobs, and additionally provide estimates for specific subgroups based on policy interest – for instance as adults with lower educational credentials—and not simply for groups like teens for whom it is easier to detect an effect.

4.21 This is exactly the approach taken in Cengiz, Dube, Lindner and Zipperer (2019), which arguably provides the most complete picture to date of how minimum wages impact low wage employment in the United States. The basic idea is as follows. Imagine the minimum wage rises from $9 to $10 an hour in Nebraska. There should be fewer jobs paying below $10 in Nebraska after the policy is enacted. Some of those jobs that would have paid below $10 are now simply paying $10 or a bit more; other jobs may be destroyed if the costs exceed benefits to employers. By comparing how many fewer jobs under $10 there are due to the policy to how many additional jobs are paying $10 or slightly above, we can infer the total change in low wage jobs caused by the minimum wage policy change. Of course, it is possible that wages would have risen even absent the policy change in Nebraska; to account for that we compare the changes in sub-$10 jobs and above-$10 jobs in Nebraska to the same in other states that did not raise the minimum wage. Finally, the study pools across 138 prominent minimum wage changes instituted between 1979 and 2016 across various states.

[39] Belman and Wolfson, '15 Years of Research on U.S. Employment and the Minimum Wage', 2016

## Chart 4.C: Effect of the Minimum Wage on Jobs Throughout the Wage Distribution – 5-year Change in Employment by Wage Bins

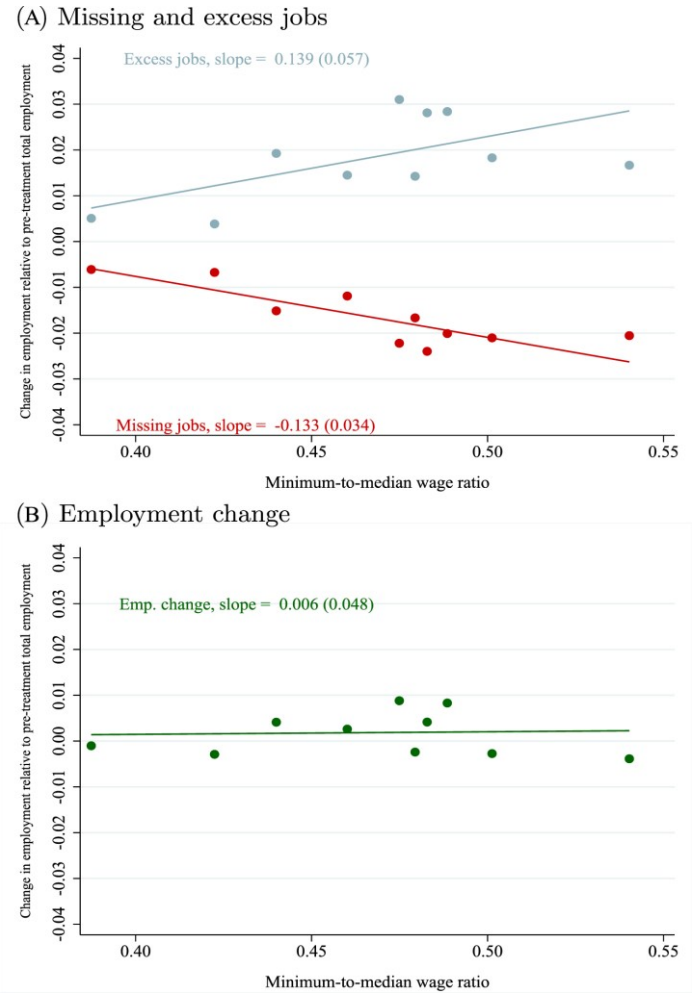



*Source: Reproduced from Cengiz, Dube, Lindner and Zipperer (2019).*

4.22 Summarising the key findings, Chart 4.C shows the effect of an average minimum wage increase on the wage distribution at each wage level relative to the minimum wage. Minimum wage increases led to a clear reduction in jobs below the new minimum wage, confirming that the minimum wages we study are binding. However, the reduction in jobs paying below the minimum was balanced by a sharp increase in the number of jobs paying at the new minimum, along with additional increases in jobs paying up to $5 above the new minimum. As the figure also shows, there is virtually no change in employment higher up in the wage distribution. This is reassuring, as it is unlikely that a minimum wage increase would lead to large changes in jobs paying much more to begin with. Overall, then, low-wage workers saw a wage gain of 7% after a minimum wage increase, but little change in employment over the five years following implementation.

4.23 Finally, and importantly, Cengiz et al. also provide (the first time in this literature) a clear measure of how the marginal impact of the minimum wage may vary by the bite of the minimum wage, as measured by the minimum-to-median wage ratio. As expected, for higher bites, more workers are affected, as indicated by the "missing jobs" below the minimum wage in Chart 4.D. However, nearly all these jobs seem to have been upgraded and not destroyed, as indicated by the rising number of "excess jobs" paying at or slightly above the minimum for events with a bigger bite. Overall, there is little indication of job losses for events going as high as 59% of the median wage, as indicated by the flat profile of employment change in relation to the bite of the minimum wage.

## Chart 4.D: Heterogeneity of the effects of minimum wages by the bite of the policy



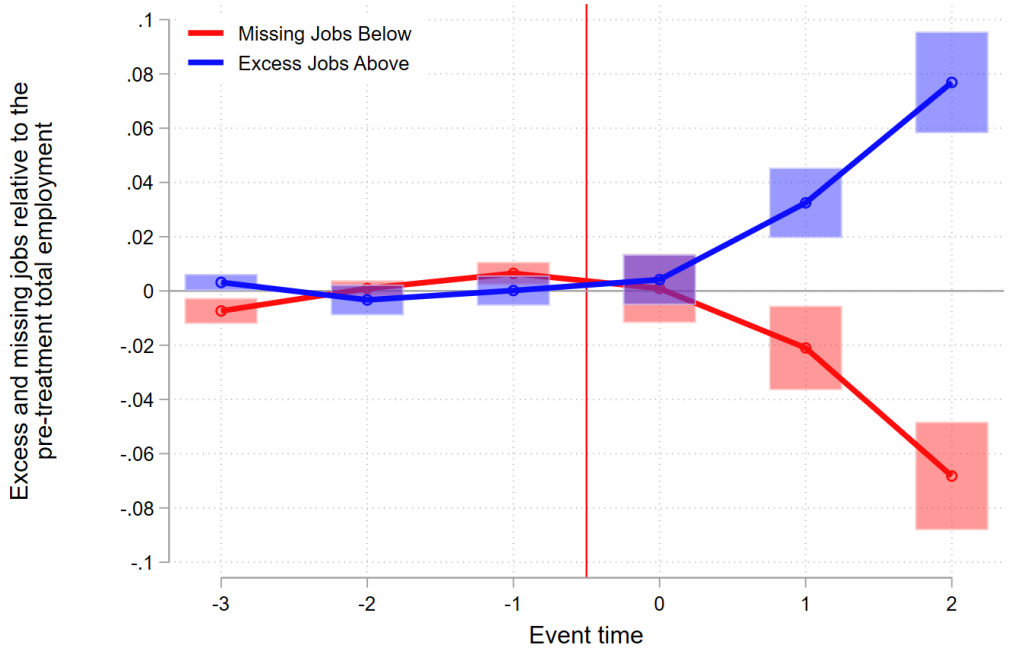

*Source: Reproduced from Cengiz, Dube, Lindner and Zipperer (2019).*

4.24 To provide further evidence on the impact of more ambitious minimum wages, this report updates the findings for Cengiz et al. (2019) using data from states that have substantially raised the minimum wage in recent years. Seven states raised their minimum wage to at least $10.50 by 2018; most of these states are on a path to increase the minimum wage to anywhere between $12 and $15 over the coming years. These states include California, Oregon, Washington, Colorado, Massachusetts, New York and Maine. On average, the minimum wage rose by around 30% in these states since the policies were enacted; the average minimum-to-median wage ratio is around 53% (but is slated to rise even further in coming years). Importantly, the coverage rate is quite high: on average around 17% of the workforce earned below the new 2018 minimum prior to implementation, making these policies highly relevant when considering an increase in the NLW to two-thirds of the median (given the expected coverage rate of around 20%). The details behind the estimates are provided in Technical Annex A to this report.

4.25 Using a similar event-study analysis as in Cengiz et al., Chart 4.E shows the evolution of changes in "missing jobs" below the new minimum wage and the "excess jobs" above in the treated state as compared to states that did not raise the

minimum wage over the 2010-2018 period. There was a clear and sharp fall in the jobs paying below the new minimum, indicating the policies were strongly binding. The fall in the missing jobs is more than twice the magnitude here than in the Cengiz et al. sample, confirming that these policies had much higher coverage rates. At the same time, similar to Cengiz et al. findings, the number of jobs paying at or slightly higher than the minimum are virtually identical to the number of missing jobs, keeping the total number of low wage jobs constant. The estimated OWE for the last year (i.e., at date "2" in the figure below or 2018 in calendar time) is 0.32 (S.E. 0.37), which is very similar to the Cengiz et al. findings. (Chart 4.B labels this estimate as "Dube 2019, this report".) The effects for high impact subgroups—those without a high school degree, or generally likely to be low-wage workers—are also similar, ruling out substantial labour-labour substitution (see technical annex A). Overall, these findings suggest that the recent enactment of high minimum wages in US states have been absorbed with little loss in employment to date.

## Chart 4.E: Impact of a change in minimum wage on excess and missing jobs over time – States with minimum wages exceeding $10.50




*Source: Author's calculations, see Technical Annex A for details.*

4.26 One important observation is that the size of the wage spillovers (i.e., wage increases for those who were already earning at or above the new minimum wage) are bigger for higher levels of minimum wages. Cengiz et al. (2019) found that around 40% of the overall increase in wages is from spillovers, as opposed to bringing wages up to the new minimum; in contrast, more than half of the overall wage increases are from such spillovers when we consider the seven states with large recent minimum wage increases.

4.27 There are several other recent estimates that provide an "overall" (or at least close to) estimate for the OWE. Cengiz (2019) uses machine learning tools to

identify likely minimum wage workers using demographic information (such as age, education, race, gender, immigration status, rural versus urban status, etc.). His baseline group can successfully predict (out of a sample) nearly three-quarters of minimum wage workers, making the estimates highly externally valid for the overall low-wage population. He then uses both state and federal minimum wage changes between 1996 and 2017 to estimate wage and employment effect for this group of affected workers, using a variety of approaches to construct the counterfactual. His preferred specification uses an interactive fixed effects approach which generalises the difference-in-differences approach to allow violations of the "parallel trends" assumption. The OWE estimate is 0.31 (S.E. 0.30). Importantly, he also shows that for adults (18 or older), there is only modest variation in estimates of the OWE across specifications including the standard difference-in-differences approach.

4.28 Monras (2019) uses an event-based design using state and federal increases, but finds a strong positive pre-existing employment trend for the group under study (those with a high school degree or less).[40] He using a linear pre-trend extrapolation to account for this and, with correction, he finds a sizable negative employment effect with an implied OWE of around -0.6; however, his estimates are not sufficiently precise to rule out positive OWEs, in part because the wage estimates in his studies are quite small. (This is not surprising given the rather broad group he studies, whose average wages are not sizably affected by minimum wage policies.) The specific pre-trend extrapolation used in Monras also raises some concerns as it relies on strong assumptions. We don't know if the linear trend fitted using a few years of pre-treatment data would continue for years afterwards. Monras mentions that these pre-existing trends only arise from inclusion of federal minimum wage increases, and that events using state minimum wage increases do not exhibit such trends. However, he does not report estimates for this set of cleaner events. Cengiz et al. (2019) use a larger of state-level minimum wage increase, and for a much larger set of affected groups. They find no pre-existing employment trends, and also find employment estimates to be much less negative.

4.29 Neumark Schweitzer and Wascher (2004)[41] provide short-run (1 year) effect on wages and employment by pre-treatment wage of incumbent workers from the 1989-1997 period. For workers earning no more than 10% above the new minimum, their implied OWE including hours and employment is around -0.23 (S.E. 0.1).[42] [43]

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[40] Monras, 'Minimum Wages and Spatial Equilibrium: Theory and Evidence', 2019

[41] Neumark, Schweitzer and Wascher, 'Minimum Wage Effects throughout the Wage Distribution', 2004

[42] They also report lagged effects. However, given the structure of the data (Current Population Survey only allows construction of a 12 month panel) it is not possible to credibly estimate the actual 2-year-out effect based on pre-treatment wage. Their reported wage effects for the second year are negative, which likely reflects the problem with their design.

[43] Another study that merits a discussion is Clemens and Wither (2019), who compare employment probabilities of workers previously earning low wages following the federal minimum wage increase in 2008-2010, comparing states bound by the federal policy and those that were not—because they had state minimums exceeding the new federal standard. They find a large reduction in employment for low-wage workers following the federal minimum wage increase. (They do not provide an estimate of the wage effect, preventing us from constructing an OWE estimate for Figure 11.) However, there are several concerns with their analysis. First, their estimates depend critically on how exactly one controls for the downturn in the housing market in the Great Recession. They use a housing price index as a control, and the estimates are sensitive to its inclusion. However, if one additionally accounts for construction (and other sectoral) composition of low-wage workers prior to the minimum wage increase, the employment estimates are closer to zero (Zipperer 2016). Moreover, it is unclear the extent to which we can generalize from

4.30 Several recent studies have gone back to consider a large increase in the federal minimum wage coverage in the 1966 expansion of Fair Labor Standards Act (FLSA). Prior to 1966, service industries like retail, restaurants, or laundries were not covered by the FLSA. Both Bailey et al. (2018)[44] and Derenoncourt and Montialoux (2019)[45] both consider the impact of this large and persistent increase in the minimum wage due to FLSA expansion, using slightly different methodological approaches. While Bailey et al. use the variation in the bite of the policy change using pre-intervention shares of workers earning below the new minimum, Derenoncourt and Montialoux use the presence of state laws that had expanded coverage before 1966 as the source of variation. Importantly, both studies find large, immediate impact on wages but at most modest overall impact on low-wage jobs. The OWE estimate in Bailey et al. is -0.17 (SE=0.07) while for Derenoncourt and Montialoux it is 0.02 (SE=0.06).[46]

4.31 Godoy and Reich (2019)[47] use county-level[48] evidence by bite of minimum wages from recent US state minimum wage increases through 2017. They consider low wage counties, where the bite of the policy is much higher, and compare wage employment trends for those without a college degree in states raising the minimum wage versus those that did not. Using this granular information at the county level is quite valuable, because the bite of the policy is much more heterogeneous across counties than across states. For example, they are able to show evidence of wage and employment effects for counties where the minimum is as high as 81% of the median wage. The authors find clear evidence that the average wage rose sharply following the implementation of the policy, but employment change was close to zero. The implied overall OWE is 0.00 (S.E. 0.20) as reported in Figure 11. Going beyond the overall effect, they also look at the heterogeneity of the effect by quartiles of the bite. As expected, the effect size on average wages was much higher for high bite events. At the same time, employment trends were flat prior to the change for these events, and remained so in the four years following implementation. For the minimum wage events where the Kaitz index exceeded 60%, the OWE was 0.21 (S.E. 0.23), which rules out all but modest reductions in employment.

estimates which study the impact of minimum wage increases in the middle of the deepest economic downturn since the Great Depression.

44 Bailey et al., 'The Economic Impact of a High National Minimum Wage: Evidence from the 1966 Fair Labour Standards Act', 2018

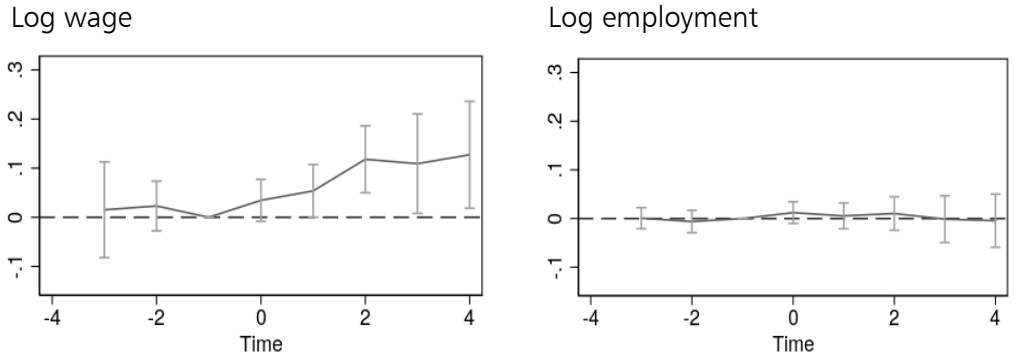
45 Derenoncourt and Montialoux, 'Minimum Wage and Racial Inequality', 2019

46 The two studies do find somewhat different outcomes for some subgroups; while Bailey et al. find some evidence of job loss for African Americans, Derenoncourt and Montialoux do not find any effect on African American employment.

47 Godoy and Reich, 'Minimum Wage Effects in Low-Wage Areas', June 2019

48 More precisely, they look at "Couma's," which sometimes are bigger than counties when the finest aggregation in the Census (public use micro area's, or PUMA's) is coarser than the county.

## Chart 4.F: Event study estimates of the impact of minimum wages on average wages and employment – jurisdictions in the top quartile of minimum-to-median wage ratio




*Source: Reproduced from Godoy and Reich (2019).*

4.32 A final source of evidence comes from US cities. Starting in 2015 with Seattle, a number of US cities instituted high citywide minimum wages often going up to $15 per hour. These were substantial increases, and a number of recent papers have evaluated their impact. It is important to put these in context, however. While the wage levels are high, cities like Seattle, San Francisco, New York or Chicago are high wage, high cost-of-living areas where the bite of a $15 per hour means something very different than in U.S. overall. For example, Seattle's minimum wage is somewhat below 50% of the median wage in the city.

4.33 Jardim et al. (2018) estimate the impact of Seattle raising its minimum wage to $13 per hour.[49] They find a substantial fall in the total number of low-wage jobs paying $19 per hour or lower in Seattle as compared to their synthetic control group (based on other areas in the state of Washington), which they interpret as suggesting wide-spread job losses. The OWE implied by their estimates is around -2.8, which as Chart 4.B shows makes it an outlier in the literature. Moreover, there are some concerns about interpretation of their findings. The very high overall growth rate in Seattle's wages (as compared to other areas in Washington state) over this period may have led to fewer low-paid jobs because many people were getting raises, not because those jobs were destroyed. Indeed, there is a large increase in the number of people being paid more than $19 per hour in Seattle (Zipperer and Schmitt 2017).[50] This suggests the possibility that Jardim et al. findings of job losses are actually just growth in wages.[51] In a follow-up study, Jardim et al. (2018b) evaluate the impact on incumbent workers who were earning below the new minimum wage by tracking their employment retention rate over time, as compared to similar workers outside of Seattle.[52] Here the authors are

[49] Jardim et al., 'Minimum Wage Increases, Wages, And Low-Wage Employment: Evidence From Seattle', 2018

[50] Zipperer and Schmitt, 'The "high road" Seatlle labor market and the effects of the minimum wage increase', 2017

[51] The exchange over the Seattle evidence also highlights the limits of single case studies like the one from Seattle. Quirks—like unusually high wage growth in Seattle—are much more likely to affect individual cases, making it hard to convincingly separate out signal from noise. It is easier to filter out the noise and average out the highs and the lows when pooling across many such events. This also highlights the importance of evaluating how the number of jobs were changing in higher wage bins (like in Figure 12) when conducting an analysis using the number of low wage jobs; in the environment being studied is one with unrealistically large upper tail effects, we need to be cautious about interpreting the evidence on the number of low-wage jobs.

[52] Jardim et al., 'Minimum Wage Increases and Individual Employment Trajectories', 2018

tracking employment probability of low-wage workers, and not the number of low wage jobs. They find negligible impact on headcount employment, and a modest reduction in hours; overall, the full-time-equivalent OWE implied by their estimates is around -0.16 (reported in Figure 11).[53] While one possible way to resolve the discrepancy between the two studies (one the authors highlight) is by implicitly assuming that nearly all of the reductions in employment came from new entrants to the labour force, another possibility is that the 2017 study which focused on the number of jobs mistook the growth in wages as loss in jobs.

4.34 Consistent with the "wage growth" hypothesis, a study of the low-wage restaurant sector by Reich et al. (2017) compared restaurant employment changes in Seattle to a synthetic control based on other US areas, and found no discernible job loss.[54] Nadler et al (2019) expand this to 6 cities (Seattle, Los Angeles, San Francisco, Chicago, San Jose and Washington DC), and found strong positive effect on restaurant workers' earnings, but little impact on employment.[55] The OWE from their pooled event-study design was around 0.21 (S.E 0.20). Nadler et al. also respond to a concern raised by Jardim et al. (2018) about studying the overall employment effects in restaurants or other low wage sectors: that low-skilled, low-wage restaurant jobs may be destroyed and replaced by higher wage, higher skilled workers. Nadler et al. show that realistic elasticities of substitution between high and low-skill workers imply that if low-skilled restaurant jobs are destroyed, it is highly likely that this would be reflected in the overall restaurant employment. Therefore, it appears unlikely that a null finding on the impact of Seattle restaurant employment in Reich et al. (2017), or for the six cities studied in Nadler et al., can be attributed to labour-labour substitution. Rather, it appears that this low wage sector which accounts for a substantial portion of minimum wage workers did not see notable job losses following the minimum wage implementation. (One limitation is that the difference-in-difference event study estimates in Nadler et al. rely on a linear pre-trend extrapolation, which raises similar concerns as in Monras 2019. However, their synthetic control estimates are broadly similar.)

4.35 Taking stock of the city studies overall, only one of the four studies finds substantial job losses. However, a variety of evidence suggests caution in interpreting the findings in that study causally.

## Reconciling some of the key differences across US studies

4.36 Given the somewhat different conclusions reached across various US studies over the past several decades, it is useful to clarify how some of the long-standing controversies are being reconciled in recent work. This is encouraging, as it indicates progress in better understanding the historical record.

4.37 As mentioned above, a somewhat surprisingly large share of the minimum wage literature has focused on teens. The US literature in particular has also seen estimates that are quite different from each other. Focusing on the 12 US teen studies that provide both wage and employment estimates, the OWE's range between -0.88 and 1.33, with a median of -0.20. While the median estimate is

53 The study does not provide sufficient information to construct a confidence interval for the OWE.

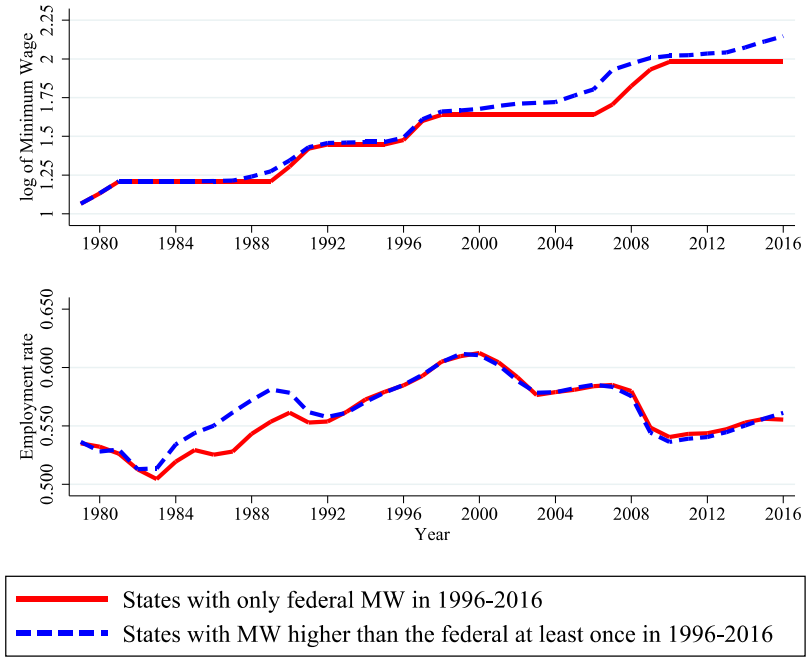
54 Reich et al., 'Seattle's Minimum Wage Experience 2015-16', 2017

55 Nadler, Allegretto, Godoy and Reich, 'Are local minimum wages too high', 2019

small in magnitude, this is a wide range. And much of the differences stem from exactly how to account for possible violations of the "parallel trends" assumption across US states.

4.38 One of the contributions of Cengiz et al. (2019) is to show that much of this disagreement stems from a rather peculiar, but transitory, deviation in employment growth between Democratic and Republican leaning states in the late 1980s and early 1990s. This can be readily seen in the following Chart 4.G, which shows the evolution of the log of the effective minimum wage (higher of the state or federal standard) and the aggregate employment rates for states that at some point enacted their own minimum wages (in blue) and those that did not (in red). First, most of the variation in the minimum wage between these two groups of states occurred in the 2000s. When it comes to employment rates, the two sets of states mostly followed overall similar employment rates except during the late 1980s and early 1990s, a period substantially before the advent of major variation in state minimum wages, which occurred in the 2000s.

## Chart 4.G: Evolution of the effective minimum wage and overall employment rates in states with and without state-level minimum wages in the US




*Source: Reproduced from Cengiz, Dube, Lindner and Zipperer (2019).*

4.39 In the period starting with the mid 1990s, as minimum wage differentials across the US widened, there was little difference in the aggregate employment rate. However, when studies include the 1980s in a long panel, the 1980s employment differences across states serves as a baseline, leading some specifications (especially ones that do not explicitly look around the time of the minimum wage changes) to spuriously attribute the relative decline in employment in high minimum wage states in the early 1990s as being a causal effect of policies

passed in 2000s. In contrast, studies that look locally around minimum wage changes, including those that consider fairly long run effects up to 5 or 7 years (e.g., Cengiz et al. 2019) are not affected by the 1980s deviations because they explicitly look at the changes that occurred to employment after the enactment of the policies. These deviations in the 1980s helps explain why some specifications using aggregate employment as an outcome suggest very large employment reductions (e.g., in Meer and West 2016).[56]

4.40 This finding also helps explain why certain designs are more likely to produce reliable estimates. For example, Dube Lester and Reich (2010) use a design comparing counties across US state borders to purge of possible confounders. The basic idea is that while high and low minimum wage areas in general may not be on "parallel trends" all the time, they are much more likely to be when they are adjacent to each other as they are likely to experience similar economic shocks. Cengiz et al. (2019) show that for both overall employment or for restaurant employment studied in Dube Lester and Reich, the bias in the standard "difference-in-difference" estimates is driven by the inclusion of the early 1990s period in the estimation sample. Either looking around specific minimum wage events (which are mostly after mid 1990s), or using contiguous county controls produce employment effects close to zero. This clarifies that the key "problem" being solved by the more sophisticated border county methodology introduced in Dube Lester and Reich (2010) was related to the employment deviations in the 1980s.

4.41 The 1980s deviations also explain some of the sensitivity of the teen estimates to specification choices. For example, across key specifications that were the subject of disagreements in Allegretto et al. 2017 and Neumark et al. 2014 (i.e., whether to control for regional differences in the evolution of teen employment rates or state-specific trend differences), the results for teens uniformly suggest very small employment effects. While the OWE for the post 1979 sample varies between -0.80 and 0.04 across specifications, in the post 1994 sample it is under 0.2 in magnitude and not statistically different from zero across the same specifications (results not reported in tables).[57] This clarifies that some of the sharpest disagreements in findings in the teen literature vanish when we look at the last 25 years of data—precisely when much of the state-level variations in minimum wages occurred in the US.

4.42 Additionally, Cengiz (2019) shows that the disagreement across specifications is even less when we focus on adult low-wage workers. For non-teen minimum wage workers, the OWE varies between -0.18 in the case of the classic difference-in-differences specification and 0.00 using the more sophisticated (interactive fixed effects) specifications; neither is statistically distinguishable from

[56] In addition, Cengiz et al. demonstrate that when certain specifications do suggest large, negative aggregate employment effects (like in the case of some of the specifications in Meer and West 2016), they typically indicate unrealistically large losses occurring for jobs paying much higher than the minimum wages, often above the median. Cengiz et al (2019) specifically replicates Meer and West 2016 and shows that the entirety of the job losses they detect are for high skilled workers earning much more than the minimum wage, in other words, they likely picked up job losses that are unrelated with minimum wage policies. This point is also made in Schmitt 2015, who points out the unrealistically large employment losses found by Meer and West in high-wage sectors like business services. Together, these pieces of evidence raise questions about the causal import of the estimates reported by Meer and West.

[57] The employment estimates for teens provided in Neumark et al. 2015 are not included in Figure 11 because they do not report a wage elasticity. However, based on a teen wage elasticity of around 0.2 that is similar to other studies, this would imply an OWE of -0.75 using their preferred method.

zero. In other words, the debate around the teen employment estimates in US minimum wage stududies may have generated more heat than light when it comes to better understanding the broader impact on low wage workers.

4.43 In sum, much of the high-quality recent research investigating the impact of US minimum wages suggest relatively modest overall impact on low wage employment. To be sure, there are some prominent studies that have suggested very sizable job losses, including ones we have discussed above (e.g., Meer and West 2016, Jardim et al. 2018). One factor to keep in mind when considering such studies is the issue of publication bias. As mentioned above, a number of researchers have documented that studies finding "statistically significant" negative effects are more likely to be written up and published than studies suggesting no or positive effects. These researchers use the fact that we should not expect to find a lot of studies that just happen to be precise enough to obtain "statistical significance" out of luck alone. Yet, that is indeed what we find—when it comes to studies finding a negative effect. In other words, there are more studies with large, negative, "statistically significant" estimates than would be expected from chance alone, regardless of the true effect of minimum wages on employment. (Andrews and Kasy 2019; Belman and Wolfson 2015; Doucouliagos and Stanley 2009.)

4.44 To clarify, publication bias does not imply anything nefarious. If the true effect is close to zero, just by chance some studies will find a large positive effect while others a large negative one. However, scholars may be more skeptical of a large positive estimate than a large negative one based on their priors, and the latter studies may be more likely to be relegated to "file drawers" or screened out in the publication process. This type of publication bias can help explain why sometimes there are prominent studies finding large, negative employment effects that receive attention, but do not fare well under close scrutiny.

# Evidence from the UK

## National Minimum Wage evaluations

4.45 The introduction of the National Minimum Wage (NMW) in 1999 offered a "natural experiment" to better understand the impact of the policy. Unlike the US, however, there is no policy variation within the UK. Therefore, quasi-experimental approaches in the UK have predominantly either conducted difference-in-differences analysis comparing those initially earning below the new minimum wage or somewhat above; comparing across regions (or region-by-demographic groups) with difference in the "bite" of the policy; or compared across lower and higher wage firms.

4.46 The findings were reviewed extensively by the Low Pay Commission report in 2016, which concluded that "In general…research finds little effect on employment but there is some evidence that it has led to small reductions in hours. Some studies have also found adverse effects on particular groups, for example part-time female employees, in some time periods under certain model specifications." The discussion in this report highlights the key research papers, with an emphasis on papers that report both wage and employment effects allowing us to construct an OWE estimate allowing us to compare these estimates from those in other settings.

4.47 Stewart (2004) compares employment probabilities of those "treated" by the minimum wage (earning below the new NMW) as compared to those who were

earning wages that were slightly above. He considers adult men and women, as well as younger men and women separately, and finds no impact on the short-term employment probabilities of those affected by the 1999 introduction of the NMW. The implied OWE pooling his adult men and women estimates is around 0.25 (S.E. 0.51), reported in Chart 4.B.[58] A number of other papers have reached similar conclusions including Dickens and Draca 2005,[59] and Bryan, Salvatori & Taylor 2013.[60] One notable exception is Dickens, Riley and Wilkinson (2015) who found that while the overall impact for most groups was small, employment reductions for part-time women were more sizable. The implied OWE constructed from their estimates (reported in Chart 4.B) is around -0.55 (S.E. 0.25).[61] This suggests some caution is warranted about impacts on specific groups of low-wage workers, even as the overall impact on low-wage workers in the U.K. seems fairly small.

4.48 A different approach is to compare lower wage versus higher wage areas within the UK following a change in the minimum wage. The introduction of the NMW affected much fewer workers in the high-wage London area as compared to the relatively lower wage local labour markets. This allows a difference-in-differences strategy comparing high versus low wage areas following the introduction of the NMW. Dickens, Riley & Wilkinson (2009)[62] do not find any evidence of substantial change in employment rates across regions with low versus high initial wages—with the bite being larger in the former—even as the bottom wage growth was faster in the former. Dolton, Rosazza-Bondibene and Stops (2012)[63] provides complementary evidence, including allowing for spatial dependence, with largely a similar overall finding.

4.49 Particularly compelling evidence about the longer run impact of the NMW comes from Manning (2016).[64] Manning constructs groups based on region-by-age-by-gender categories. He then considers how the change in log of average wages and employment rates varied across these groups between 1997 and 2007, as a function of the share below the future NMW prior to its enactment. He also partials out age group, gender and region fixed effects, allowing for differing trends by region and demographic groups, so Chart 4.H below is based on residualized outcomes and shares after partialing out these fixed effects.

4.50 Chart 4.H shows that while the wage growth was much more pronounced in groups where the share was high, the employment rate was largely constant across these groups. The implied OWE is around -0.04 (S.E. 0.21), which suggests that the long-term impact of the NMW was largely to raise wages with little impact on the employment rate of affected workers. These findings covering a 10-year period after the introduction of the NMW also addresses the concern that is sometimes raised that the long run impact may be more negative than short run

58 He shows estimates with a variety of specifications and datasets. They are broadly similar; Figure 11 uses his estimates for adult men and women using the LFS dataset, using "actual hours" and the linear difference-in-difference specification.

59 Dickens and Draca, 'The employment effects of the October 2003 increase in the National Minimum Wage', 2005

60 Bryan, Salvatori, and Taylor, 'The Impact of the National Minimum Wage on Employment Retention, Hours and Job Entry, 2013

61 Dickens, Riley and Wilkinson, 'A Re-examination of the Impact of the UK National Minimum Wage on Employment', 2015

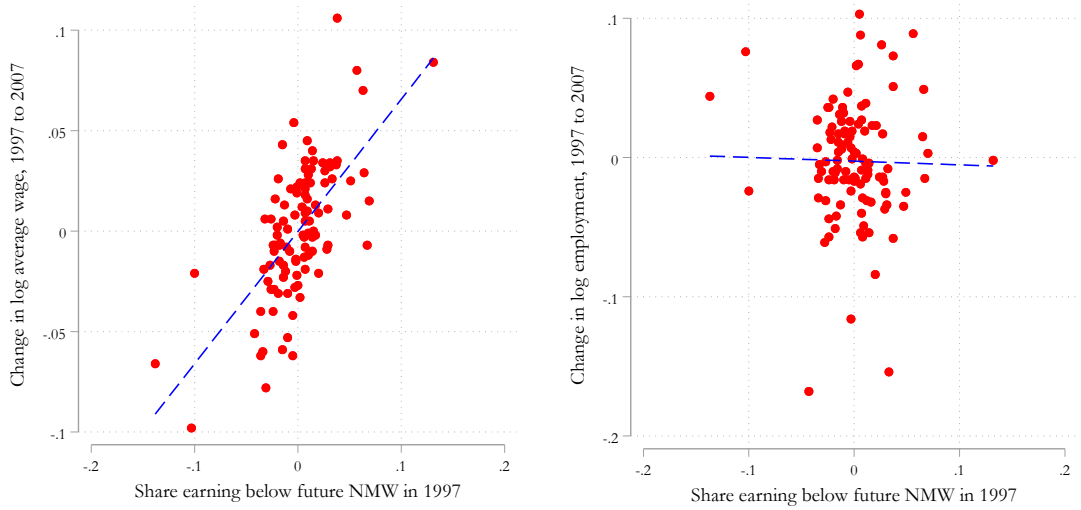
62 Dickens, Riley and Wilkinson, 'The employment and hours of work effects changing national minimum wage', 2009

63 Dolton, Rosazza-Bondibene and Stops, 'The Spatial Analysis of the Employment Effect of the Minimum Wage: Case of the UK 1999-2010', 2012

64 Manning, 'The Elusive Employment Effect of the Minimum Wage', 2016

impacts (e.g, Sorkin 2015).[65] For the NMW, this does not seem to have been the case.

## Chart 4.H: Impact of the NMW on Wages and Employment Across Region-by-Demographic Groups, 1997 to 2007




*Source: The data points were digitised from Manning (2016), Figure 1. Each point on these graphs represents an age-gender-region cell. Age group, gender and region fixed effects have been removed from all the variables so the graphs are of residualized wages and employment against a residualized measure of the impact of the national minimum wage measured as the proportion of workers paid below the future minimum wage in 1997.*

4.51 Finally, there have been a number of industry case studies, such as hairdressing (Druker, Stanworth and White, 2002),[66] textiles (Heyes and Gray, 2001),[67] hospitality and clothing (Lucas and Langlois, 2003),[68] hospitality (Adam-Smith, Norris and Williams, 2001)[69] and horse racing (Winters, 2001),[70] that have evaluated the impact of the introduction of the National Minimum Wage. They generally found little effect on employment from minimum wage increases. Machin, Manning and Rahman (2003),[71] Machin and Wilson (2004),[72] and Georgiadis (2006)[73] looked at the impact in residential care homes and found only modest

65 Sorkin, 'Are there long-run effects of the minimum wage?', 2015

66 Druker, Stanworth and White, 'Impact of the National Minimum Wage on the Hairdressing Sector', 2002

67 Heyes and Gray, 'Homeworkers and the National Minimum Wage: Evidence from the Textiles and Clothing Industry', 2001

68 Lucas and Langlois, 'Anticipating and adjusting to the introduction of the National Minimum Wage in the hospitality and clothing industries', 2003

69 Adam-Smith, Norris and Williams, 'The Impact of the National Minimum Wage in the Hospitality Sector: A Case Study Investigation', 2001

70 Winters, 'The Impact of the National Minimum Wage on the UK Thoroughbred Horseracing Industry. Research Report to the Low Pay Commission', 2001

71 Machin, Manning and Rahman, 'Where the minimum wage bites hard: Introduction of Minimum Wages to a Low Wage Sector', 2003

72 Machin and Wilson, 'Minimum wages in a low-wage labour market: care homes in the UK', 2004

73 Georgiadis, 'Is the Minimum Wage Efficient?: Evidence of the Effects of the UK National Minimum Wage in the Residential Care Homes Sector', 2006

effects on employment. In addition, Draca, Machin and Van Reenan (2011) provide evidence on the channels of absorption of minimum wage increases. They found that care homes mostly absorbed them through reduced profits and not changes in employment.[74]

## National Living Wage evaluations

4.52 The 2016 introduction of the NLW led to a much larger uprating for those 25 years or older. Aitken, Dolton and Riley (2019)[75] conduct a difference-in-differences analysis similar to Stewart (2004), to evaluate the impact of the introduction of the National Living Wage (NLW) in 2016. Using a baseline from 2014 (the year before the announcement of the NLW), they find strong evidence that the NLW led to a sharp rise in the wage growth for those earning at the very bottom of the distribution prior to implementation of the NLW—more so than those earning slightly above. In contrast, they find little difference in the employment retention probabilities across the groups. Overall, their wage and employment estimates imply an OWE of aroun -0.17 (reported in Chart 4.B); moreover, the implied confidence intervals rule out substantial job losses, which addresses a concern raised by Brewer et al. (2019).[76] (They do find some job losses for part time female workers, which is similar to findings for the NMW.)

4.53 Dickens and Lind (forthcoming) use the LFS and compare overall wage and employment rate evolutions across local labour markets (time to work areas, or TTWAS) in the UK based on the share impacted by the introduction of the NLW. Across the 170 TTWAs, they find clear association between the pre-intervention share below the NLW and the rise in the 10th percentile wage as well as the average wages in the TTWA between 2013 and 2017.[77] However, there is no statistically significant or economically sizable change in the employment rates after 2016 across TTWA's with high versus low share of workers impacted by the NLW. The implied OWE is -0.11 (S.E. 0.30), as reported in Chart 4.B.

4.54 In this report we also implement the grouping estimator in Manning (2016) which uses region-by-demographic variation. Across the 96 groups defined by 12 regions, 4 age categories and 2 gender categories, the affected share varies between 6% and 34%. We consider changes in group level log average wages and log employment between 2014 (the year prior to the announcement of the NLW) and 2018. Just as in Manning (2016), the outcomes are residualized allowing for age, region and gender specific fixed effects. The left panel shows that average wage growth was much faster following the introduction of the NLW in groups with larger share of affected workers: the regression coefficient is 0.36 (S.E. 0.14). In contrast, there is no statistically significant or sizable relationship between the affected share and employment. The regression coefficient is -0.05 (S.E. 0.11). Together, the implied OWE is -0.13 (S.E. 0.32), which suggests little impact on employment following the introduction of the NLW. To account for possible hours effects, we can use full-time-equivalent (FTE) employment instead of headcount employment. The OWE using FTE employment is -0.01 (S.E. 0.33), which does not

74 Draca, Machin and Van Reenen, 'Minimum Wages and Firm Profitability', 2011

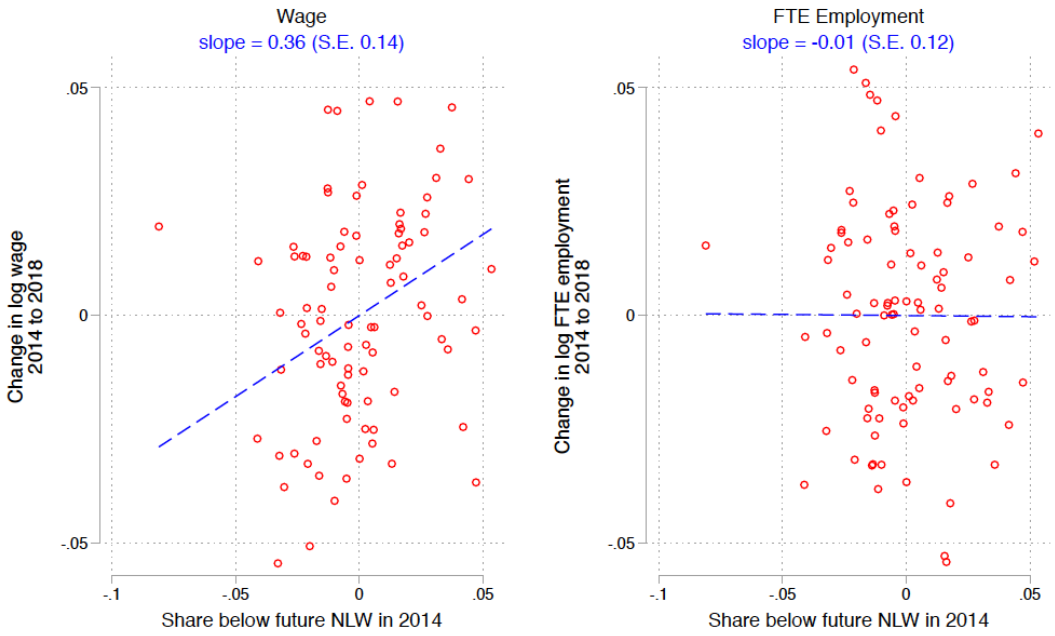
75 Aitken, Dolton and Riley, 'The Impact of the Introduction of the National Living Wage on Employment, Hours and Wages', 2019.

76 Brewer, et al., 'What Do We Really Know about the Employment Effects of the UK's National Minimum Wage', 2019

77 Dickens and Lind, 'The Impact of the Recent Increases in the Minimum Wage on the UK Labour Market: An Area-based Analysis', (forthcoming)

suggest a negative impact on headcount or hours (reported in Chart 4.B as "Dube 2019 (this report), U.K"). More details are provided in the Technical Annex to this report, which also shows there were no pre-existing trends in employment by share below the NLW.

## Chart 4.I: Impact of the NLW on Wages and Employment Across Region-by-Demographic Groups, 2014 to 2018




*Source: Author's calculations based on ASHE and Annual Population Survey (APS) data, 2014-2018. Each point on these graphs represents an age-gender-region cell for those 25 or older. Age group, gender and region fixed effects have been removed from all variables, so the graphs are of residualized wages and employment against a residualized measure of the impact of the national minimum wage measured as the proportion of workers paid below the future National Living Wage in 2014.*

4.55 Finally, we can also estimate the impact of the NLW introduction by considering the number of low-wage jobs, following the approach in Cengiz et al. (2019). An obvious limitation in the U.K. context is that there is no "control jurisdiction" that did not raise the statutory minimum wage; as a result, we have to use a before-after comparison in the frequency distribution of wages to infer the impact on low-wage jobs. More details behind the estimation are provided in the Technical Annex B to this report.

4.56 The following chart 4.J plots the per-capita employment rate by wage bins relative to the National Living Wage in 2014 (the year prior to the announcement of the NLW) and 2018. The wage levels in 2015 are deflated using a measure of wage inflation, namely the annual rate of growth in the mean wage in ASHE. Comparing the job counts at wages above, say a few pounds above the NLW, the figure suggests the 2014 frequency distribution of wages was likely a reliable

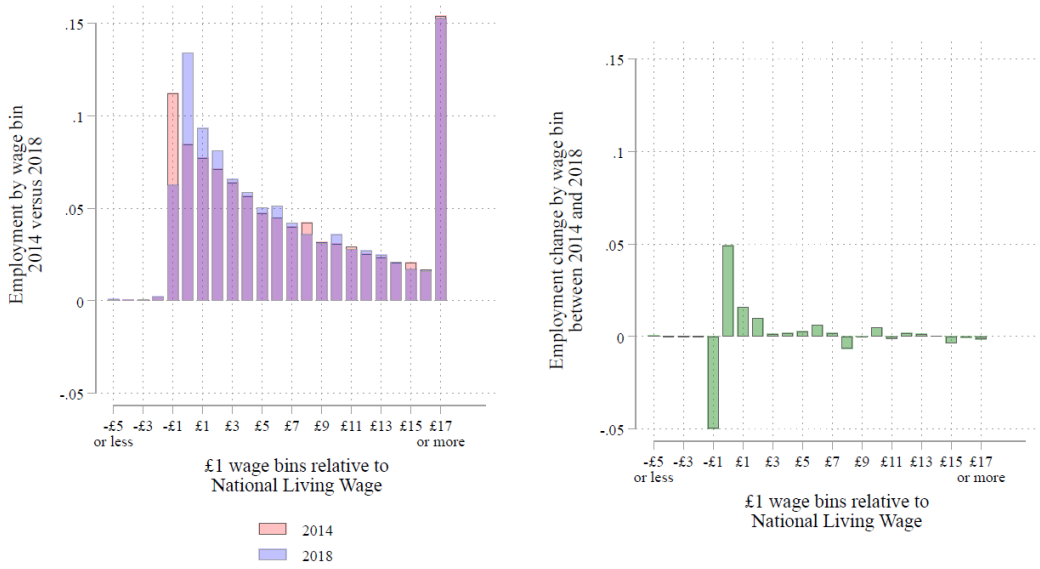
counterfactual for the 2018 distribution: the distribution of employment by wage bins were quite similar except just around the new NLW. The estimates in Chart 4.K suggest a very sharp reduction in jobs paying right below the NLW ("missing jobs below"), and a similarly sized increase in jobs paying at or up to £3 above the NLW ("excess jobs above"). The overall employment impact is modestly positive if we use the 2018 counts, or right around zero if we use 2016 or 2017 counts. This is one of the challenges with using before-after comparisons, as the real frequency distribution is unlikely to be stable for an extended period of time; for this reason, it is probably more reliable to consider the impact through 2017 using this approach.

4.57 Overall, we can draw several conclusions. First, the NLW was quite binding for those 25 or older, as indicated by the missing jobs below the NLW level. Second, there was a moderate amount of wage spillovers, going up to around £3 above the NLW, as indicated by the excess jobs right above the NLW. Third, the overall number of low-wage jobs (e.g. number of jobs paying below NLW+£3) was virtually unchanged between 2012 and 2017, including after the announcement of the NLW in 2015, while it rose slightly in 2018.[78] Finally, and importantly, the changes in jobs in bins +£4 or higher remained virtually unchanged through 2018. This lack of any movements in the upper tail is crucial for a valid research design, as it suggests the (deflated) wage frequency distribution was fairly stable over the period under study, which is a necessary condition to ensure that the 2014 distribution was a valid counterfactual.

4.58 This analysis is complementary with the findings on employment retention in Aitken, Dolton and Riley (2019), Dickens and Lind (forthcoming) and the grouping estimator presented above. Together, the four different approaches all suggest that the introduction of the NLW likely did not have a substantial effect on low-wage employment in the UK, but did raise job quality.

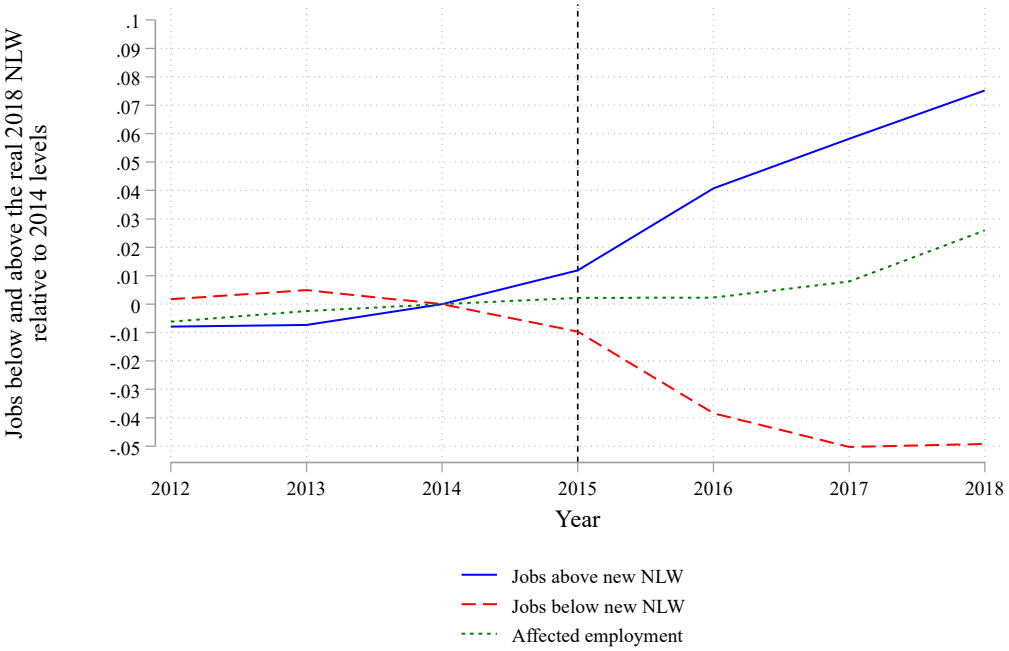
78 The lack of a control group makes the evaluation using this bunching approach less convincing as we consider longer run horizons, as the 2014 frequency distribution of the deflated wages is less likely to be a valid counterfactual over the longer horizon.

## Chart 4.J: Impact of the Introduction of the NLW on the Counts of Jobs by Wage Bins, 2014 to 2018




*Source: Author's calculations based on ASHE (2014-2018) data*

## Chart 4.K: Counts of Jobs paying Below and At-or-just-above the Real 2018 NLW – 2011 to 2018




*Source: Author's calculations based on ASHE (2011-2018) data*

4.59 How do these recent findings from the NLW compare to prospective analysis conducted by the Office for Budget Responsibility (OBR)? In its 2015 report, the OBR

used an OWE of -0.4 when projecting the original introduction of the NLW.[79] This reflected the presumption that the NMW had gone as high as possible without having negative employment effect, leading the OBR to draw from the more general labour demand estimates for predicting the effects of the NLW. Further, in its 2018 report, the OBR assumed an OWE of -0.5 to simulate employment effects (half through hours, half through headcount) of a NLW above 60% of the median wage; this reflected the judgment that perhaps the higher level of NLW would induce additional job losses (from the original assumption of an OWE of -0.4). Both of these estimates were substantially larger in magnitude than the range of estimates from ex post evaluations so far. For example, the implied OWE's from the four approaches discussed above range between -0.04 and -0.17. While the 90 percent confidence interval around the grouping estimator for FTE employment [-0.55, 0.53] contains the -0.5 value, it does so barely. In other words, overall evidence from ex-post evaluations suggest the NLW likely had a much more modest impact on employment than typically assumed in prospective simulation studies.[80]

# Other cases of substantial minimum wage changes

## Germany

4.60 Germany passed a statutory national minimum wage for the first time in 2015. Today, the German minimum wage of €9.19 is around 48% of the median wage of full-time workers. While the bite measured by the Kaitz index is lower in Germany than in the UK, at the time of the introduction of the minimum wage, nearly 15% of the workforce earned below the new minimum—which is quite substantial (Destatis 2016).[81] Prior to the introduction of the minimum wage, a number of prospective analyses suggested that a minimum wage of around €7.50 would lead to large job losses of 800,000 or more, out of around 4 million jobs affected by the policy. These analyses typically assumed a high OWE of around -0.75 (e.g. Knabe and Schob 2008,[82] Ragnitz and Thum 2007).[83] Since the introduction of the minimum wage, a number of high-quality studies have evaluated the effect of the policy. Here I will focus on three studies that provide overall effects of the policy on wages and employment of affected workers. (For a review of the German evidence, see Caliendo et al 2019.)[84]

4.61 Across the three Germany studies, the employment effects are at most modest: the overall OWE ranges between -0.3 and 0.17. This contrasts sharply with some of the prospective analyses that assumed much higher elasticities and predicted much larger employment losses. Bossler and Gerner (2019)[85] uses firm

79 Office for Budget Responsibility, 'Economic and Fiscal Outlook', 2015

80 The Congressional Budget Office (CBO) in the US also assumed an OWE of around -0.38 in their 2019 report projecting the impact of a $15 federal minimum wage. Their estimates were based on a more limited set of studies than in Figure 11 of this report. However, their approach to calculating the elasticity (which they call the "direct elasticity") is somewhat different, and they include some studies that do not report a wage elasticity, and instead impute this with other assumptions. Their estimate also assumes a higher "long run" effect based on a small number of studies that find more negative longer run effects.

81 Destatis, '1.9 million minimum wage jobs in April 2015', 2016

82 Knabe and Schob, 'Minimum Wage Incidence: the case for Germany', 2009

83 Ragnitz and Thum, 'The empirical relevance of minimum wages for the low-wage sector', 2007

84 Caliendo et al., 'The Causal Effects of the Minimum Wage Introduction in Germany – An Overview', 2019

85 Bossler and Gerner 'Employment effects of the new German minimum wage: evidence from establishment-level micro data', 2019

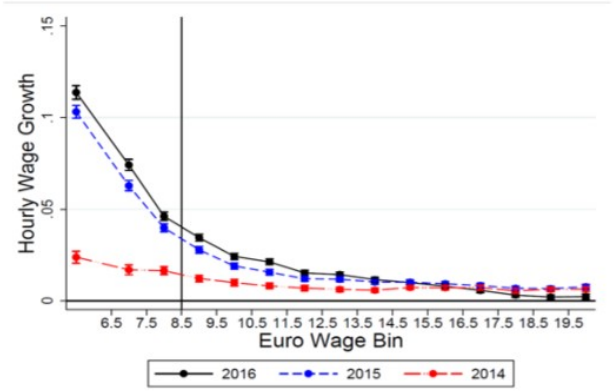
level variation comparing low and high wage firms, and finds a modest negative employment estimate (own-wage employment elasticity of around -0.3). In contrast, Ahlfeldt, Roth and Steidel (2018)[86] uses regional variation and finds a small positive employment estimate, with an implied OWE of 0.1.

4.62 Dustmann et al. (2019)[87] provides arguably the most comprehensive assessment to date using both individual level difference-in-difference estimates on retention by pre-treatment wage levels, as well as by regional variation, using matched employer-employee data. A particularly compelling and transparent analysis shows impact by bins of pre-intervention wages. There is clearly much higher wage growth in the bottom 3 bins below the minimum wage as compared to wage bins above the minimum wage after 2015. In contrast, employment retention probabilities in affected bins do not fall after 2015, as compared to higher wage (unaffected) bins.

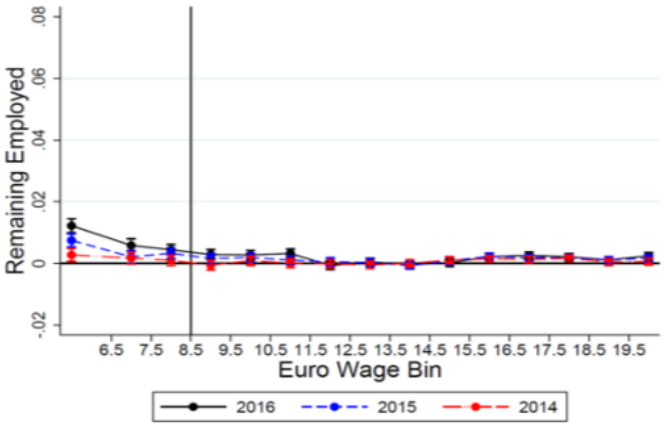
## Chart 4.L: Wage and Employment Effects of the 2015 German National Minimum Wage

86 Ahlfeldt, Roth and Seidel, 'The Regional Effects of a National Minimum Wage', 2018

87 Dustmann et al., 'Reallocation Effects of the Minimum Wage: Evidence From Germany', 2019




(b) Two-Year Hourly Wage Growth by Initial Wage Bin, relative to 2011 vs 2013




(b) Employment Probablity in Year t by Initial Wage Bin, relative to 2013

*Source: Reproduced from Dustmann et al. (2019).*

4.63 Their overall OWE is around 0.17 (S.E. 0.16) using individual-level variation. Importantly, they show that while employment effects are using either method, there is substantial reallocation of workers from low to high wage firms. What this implies is that across-firm comparisons (like those in Bossler and Gerner 2019) are likely to yield a negatively biased estimate of the employment effect, as some of the measured job losses in low-wage firms reflects reallocation to high wage firms and not actual job losses. This strengthens the conclusion that the introduction and subsequent upratings of the German national minimum wage have raised wages with little impact on low-end employment.

4.64 Additionally, Dustmann et al. (2019) find that the regional approach requires accounting for differential pre-existing rends across German regions which they correct using a linear projection (similar to Nadler et al 2019 and Monras 2019, and subject to similar concerns about parametric assumptions). This contrasts with the individual worker approach, where employment probabilities do not exhibit any pre-existing trends. Simply put, low-wage areas in Germany were experiencing slower employment growth prior to 2015. The regional trends raise some additional concerns about some of the findings in the German literature that use regional variation without fully assessing the scope for such violation of the "parallel trends"

assumption.[88] Future work in Germany could benefit from using factor models or other matching strategies to reduce reliance on linear pre-trends.

## Hungary

4.65 In 1999, Hungary enacted a rapid, large and persistent increase in the minimum wage, which went from 35% to 55% of the median wage of full-time workers over 2 years. To put this in perspective, the 55% level of full-time wage is around what a 60% of the median wage level means in the UK, making it highly relevant for understanding the impact of an ambitious NLW.

4.66 Harasztosi and Lindner (2019)[89] provide a comprehensive evaluation of this policy using a variety of methods. First, using across-firm variation in wage levels prior to the intervention, they find a small negative effect on jobs (OWE around -0.2, reported in Figure 11). They find a substantial increase in consumer prices along with some reduction in profits.

4.67 They find somewhat smaller magnitudes of the OWE (around -0.15, and statistically indistinguishable from zero) using region-by-demographic variation. The smaller magnitude using the region-by-demographic variation as compared to the firm variation is consistent with some positive reallocation across firms as found in the German context (Dustmann et al. 2019).

4.68 Finally, they find larger reductions in jobs in the tradable manufacturing sector, which is consistent with other evidence by sector (e.g. Cengiz et al. 2019). At the same time, the relatively small share of minimum workers in the tradable sector implies an overall modest impact on employment from this sector-specific effect.

# Summing up the evidence

4.69 The overall body of evidence suggests a rather muted effect of minimum wages to date on employment. The median OWE across the 48 estimates from various countries and affected groups is around -0.16, which suggests that the minimum wage raises wages much more than it has any effect on jobs. Moreover, for the set of studies that consider broad groups of workers the median OWE estimate is quantitatively close to zero (-0.04). There is, of course, variation across studies. However, the weight of the evidence suggests any job losses are quite small. This conclusion is reinforced when we consider the quality of evidence. A recent set of studies both provide estimates on the impact of the policy and also help rationalize the sometimes divergent estimates in the literature; these studies confirm that any impact of past minimum wage increases on jobs is likely to be small.

4.70 If employment has not been a major margin for absorbing minimum wage increases, what has? Here it's useful to review the more limited evidence on the other margins. First and foremost, price response is an important margin of adjustment. There is a large literature documenting that price response is a major

88 While Caliendo et al. 2017 finds some reduction in hours using a regional approach, Dustmann et al. find no effect on full-time-equivalent workers using a difference-in-difference approach using pre-intervention wages. However, some of the outcomes and specifications in Caliendo et al. fail the falsification or "placebo" tests when considering the year prior to the minimum wage implementation. Overall, it's unclear if the hours findings in Caliendo et al. reflects pre-existing trends of the sort found in Dustmann et al. when using regional variation.

89 Harasztosi and Lindner, 'Who pays for the Minimum Wage?', 2019

margin of adjustment in restaurants (Aaronson 2001;[90] Allegretto and Reich 2018),[91] in retail (Renkin, Montialoux and Siegenthaler 2017;[92] Leung 2018).[93] Harasztosi and Lindner (2019) estimate that around 80% of the large minimum wage increase in Hungary was absorbed by price rises. The price increases do not mean minimum wage increases are ineffective. As Harsztosi and Lindner show, the minimum wage increase in Hungary represented a large transfer of real incomes to low-income families: the consumer price increases were borne broadly while the wage gains were targeted at the bottom. This is also the conclusion reached in Dube (2019) evaluating the impact of minimum wages on the distribution of family incomes in the U.S.[94] In addition, some reductions in profit are also found in Harasztosi and Lindner (2019), as well as in Draca, Machin and Van Reenen (2011);[95] relatedly Bell and Machin (2018) find the announcement of the NLW led to reductions in stock prices of highly exposed firms, consistent with some fall in profitability. [96]

4.71 Another reason for limited employment effects may be due to monopsony power in the labour market, as discussed in Chapter 3. Although limited, a number of studies found evidence consistent with search frictions that underlie models of the labour market with imperfect competition. There seems robust evidence from a variety of contexts that a higher minimum wage reduces worker turnover and separations, including Portugal and Cardoso (2006),[97] Brochu and Green (2014),[98] and Dube Lester and Reich (2016).[99] This is what is predicted by models of the labour market where there are good and bad jobs: as the bad jobs become better, that reduces turnovers rate at the bottom. At the same time, if there is reallocation from low-wage high turnover firms to higher wage lower turnover firms, this composition shift can also reduce overall turnover. These findings suggest search frictions are an important factor that mediate how minimum wages affect employment. There is also evidence from the US that the minimum wage effect on employment is more positive in more concentrated local labour markets (i.e., with few employers), as shown in Azar et al. 2019.[100] (Chart 4.B reports the OWE=0.46 for markets with middle levels of concentration from that study; the estimates are more positive for more concentrated markets and more negative for less concentrated ones.)

4.72 Another margin of adjustment is productivity. Coviello, Deserranno and Persico (2019)[101] use a border discontinuity research design and data from a large

90 Aaronson, 'Price Pass-Through and the Minimum Wage', 2001

91 Allegretto and Reich, 'Are local minimum wages absorbed by price increases? Estimates from internet-based restaurant menus', 2018

92 Renkin, Montialoux and Siegenthaler, 'The Pass-through of Minimum Wages into US Retail Prices: Evidence from Supermarket Scanner Data', 2017

93 Leung, 'Minimum wage and real wage inequality: Evidence from Pass-Through to Retail Prices', 2018

94 Dube, 'Minimum Wages and the Distribution of Family Incomes', 2019

95 Draca, Machin and Van Reenen, 'Minimum Wages and Firm Profitability', 2011

96 Bell and Machin, 'Minimum Wages and Firm Value', 2018

97 Portugal and Cardoso, 'Disentangling the Minimum Wage Puzzle: An Analysis of Worker Accessions and Separations', 2006

98 Brochu and Green, 'Minimum wages: the effects on employment and labour-force turnover', 2014

99 Dube, Lester and Reich, 'Minimum Wage Shocks, Employment Flows and Labor Market Frictions', 2016

100 Azar et al, 'Minimum Wage Employment Effects and Labor Market Concentration', 2019

101 Coviello, Deserranno, Persico, 'Minimum Wage and Individual Worker Productivity: Evidence from a Large US Retailer', 2019

US retailer and find productivity gains (sales per hour) that are concentrated among low-productivity workers, and are particularly high during high unemployment periods - which together are consistent with an efficiency wage model. Riley and Bondibene (2017)[102] use evidence from UK firms and find evidence of increased Total Factor Productivity (TFP) which they argue is consistent with theories of efficiency wage and training. Finally, as discussed above, there is evidence that higher minimum wages reduce worker turnover. Lower turnover costs (from recruitment and training) also translates into higher productivity per worker; moreover, lower turnover can increase firm incentives to provide general training and raise productivity (Acemoglu and Pischke 1999).[103]

4.73 A somewhat different channel for productivity increase comes from the evidence on reallocation – that minimum wages appear to shift employment composition towards higher wage and/or larger firms (Dustmann et al. 2019; Aaronson, Sorkin and French 2018).[104] There is a large body of evidence showing that higher wage firms (and larger firms) have higher levels of worker productivity – which suggests that such reallocation can partly raise the level of productivity of low-wage workers. Overall, while the evidence on productivity impact is still limited, both within-firm and across-firm evidence suggests at least some productivity offsets to minimum wage increases.

4.74 What does this overall body of evidence suggest about guiding future policy? It is always difficult to extrapolate from the past evidence to predict the likely effects of more ambitious policies. But it is unlikely that employment effects would exhibit something like a falling off a sharp cliff if you go too far; they are more likely to resemble climbing down a rounded hill. Therefore, it is quite instructive to see if we can detect larger job losses when considering cases where the minimum wage had the biggest bite in the current evidence base. While the evidence from such cases is still limited and incomplete, the estimates from the highest minimum wages in both the UK and other countries paints a broadly consistent picture. In particular, when we consider the evidence from the introduction of the NLW, from the seven U.S. states that have recently implemented large increases in the minimum wage, the large 1966 FLSA expansion in the US during the time the bite was at its peak, and the large increase in the Hungarian minimum wage, the employment effects estimated using these episodes (median OWE) are not very different from the broader evidence base. This is encouraging, as it suggests some additional increase in the "frontier" minimum wage is unlikely to lead to much larger reductions in employment. Of course, this does not mean one can say with certainty there will not be some effects on employment, or that the impact will be negligible for all subgroups. This is why it will be critical to design any exploration of a more ambitious policy with caution, as discussed in the next section.

102 Riley and Bondibene, 'Raising the Standard: Minimum Wages and Firm Productivity', 2017

103 Acemoglu and Pischke, 'The Structure of Wages and Investment in General Training', 1999

104 Aaronson, French and Sorkin, 'Industry Dynamics and the Minimum Wage: A Putty-Clay Approach', 2018.

# Chapter 5

# Guidelines for considering more ambitious wage policies

5.1 Given the review of international evidence summarised in this report—especially the evidence from recent, higher minimum wages in several US jurisdictions, along with early experience with the UK's NLW—there appears to be room for exploration of a more ambitious remit in the UK, in the range of 60% to two-thirds of the median wage. For comparability with the OECD estimates, this would fall roughly between 55% and 60% of the median wage of full-time workers, placing the UK among the top seven or eight countries in terms of the resulting bite as measured by the Kaitz index (Cominetti, Henehan and Clarke 2019).[1]

5.2 At the same time, it is important to stress that the evidence on high minimum wages is still incomplete and early. For this reason, crucially, there needs to be a clear mandate for the LPC to pause and reconsider if the evidence suggests substantial losses in jobs for those affected by the policy. The precise pace of the upratings is best delegated to the LPC, who have the technical expertise and participation of social partners that allow it to balance various competing factors. Here we consider several important factors that are worth keeping in mind when choosing the pace of upratings.

5.3 Since lowering the nominal NLW is highly unlikely for a variety of reasons, the main revision would occur through allowing inflation to erode the value of the NLW were it to exceed the desirable target level based on the evidence. A corollary is that the pace of the increase in the NLW would have to be sufficiently moderate to allow for the background earnings growth to reduce the real NLW within a reasonable time if that were deemed necessary. For example, Cominetti, Henehan and Clarke (2019) argue that in "normal" times with around a 3% overall nominal wage growth, if NLW upratings are around 6%, it would take at most 2 years to reach the "ideal" level if there is overshooting. This suggests that, to the extent a faster revision is desirable, the NLW increase should not dramatically exceed average wage growth.

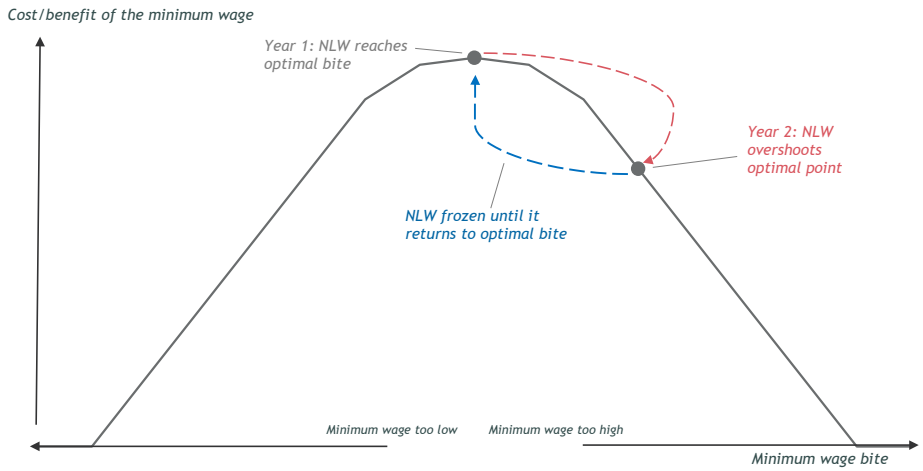
5.4 At the same time, small upratings are unlikely to be sufficiently powered to allow informative evaluations. If the NLW increases by 6% while nominal wages are rising by 3% generally, the real NLW increase is of around 3%; it is highly unlikely we would learn much about the employment effects of such an uprating - whatever they may be. Such evaluations may yield more noise than signal.

5.5 One implication is that if the real annual upratings are moderate (e.g. two times the nominal wage growth), it is best to plan and conduct a major evaluation

[1] Cominetti, Henehan and Clarke, 'Low Pay Britain', 2019

at least after several (e.g. three) annual upratings to ensure what is learnt is sufficiently informative. This approach has some precedence. For example, the 2019 Raise the Wage Act which was passed by the US House of Representatives proposes six upratings over the next six years. But it specifies that a comprehensive evaluation of the policy be conducted after the first three years, looking at impact on wages, employment, business formation, and other outcomes. The Act also specifies the US Congress would take such findings into account in deciding on the future trajectory of the policies, including potentially delaying the planned upratings if the evidence were to warrant such an action.

## Chart 5.A: Hypothetical example of overshooting and revision of the real NLW




*Source: Reproduced from Cominetti, Henehen and Clarke (2019, Resolution Foundation).*

5.6 The risk of overshooting also depends crucially on effective program evaluation. And an effective evaluation, in turn, depends on the availability of timely data. ASHE is one of the most common data sources currently used for evaluations of minimum wage policies in the UK, and this is likely to continue in the foreseeable future. The ASHE is collected in April of each year and has a lag time of around 6 months. This means that when the LPC issues its advice each October it has access to the ASHE, but would not have much time to have conducted scientific evaluations using that data prior to issuing its advice. **However, this could be remedied by ensuring that the LPC has access to the ASHE at least 2-3 months before making their recommendation** (more on this below).

5.7 **Changing the month when the NLW/NMW are increased can also help.** It is unfortunate that the ASHE data is collected in April, which is also the same month when the NLW is increased. Since employers may not immediately change wages or other outcomes, this makes the ASHE from say 2019, not very informative about what employers did in response to the 2019 NLW or NMW increase. For example, if the NLW/NMW upratings were to occur in January, the ASHE would provide more timely and informative evidence.

5.8 In addition, the UK lags behind other peer countries - especially from continental Europe – in providing access to administrative data from the labour

market. One promising avenue is to make the HM Revenue and Customs (HMRC) Real Time Information (RTI) administrative database on earnings available for conducting evaluations of labour market policies, like the NLW upratings, in a timely manner. Employers and pension providers are required to tell HMRC earnings, income tax, national insurance contributions and other payroll deductions, when or before the payments to the employees or pensioners are made. While the database does not collect information on hours, the ability to link worker and employer level information and earnings can be very helpful regarding the number of low-earnings jobs, the retention probability by pre-treatment wages, firm characteristics of low-wage workers, and the comparison of trends in low-earnings employment by regions with different bites, and trends in low-wage sectors (e.g. hospitality, retail, care homes). If more ambitious policies are to be pursued, it is critical to provide the LPC and researchers with all ammunition they need to conduct the endeavour in the most effective fashion.

5.9 Besides data availability, timely evaluations can also be aided if the LPC establishes a set of "off the shelf" methods that it can use to evaluate the policy in-house. Historically, the LPC has commissioned most of the evaluative research from independent researchers. This practice has worked well in the past, but it makes a rapid response plan more difficult. While the LPC should certainly continue to commission research, it would be useful to have some standardized evaluation tools that have already been stress-tested based on past research. The most common of these tools is the difference-in-differences by pre-intervention wage levels, which can be used to study both overall employment effects, as well as for specific groups. In addition, using across-region or across region-by-demographic group variation (e.g. Manning 2016) can be easily implemented using the ASHE. Having the code to implement this in place allows a very quick turnaround to get updated results, using a pre-specified research design as soon as the ASHE is made available to the LPC researchers. At the same time, when it comes to major evaluations, it makes sense to conduct these less frequently (to avoid over-interpreting noise and instead focus more on the signal), and to commission leading independent researchers to conduct such analysis.

5.10 There are also a number of future research projects which can help us better understand the full impact of the NLW on wellbeing. First, there is limited evidence from the UK on how the minimum or living wage affects the family income distribution, using both pre and post-tax concepts. This is important, because the link between low-wage workers and low-income families is imperfect as there may be multiple earners in a family. In addition, minimum wages interact with tax-and-transfer programs including in-work credit. This means part of the increased earnings are absorbed as increased revenue to the government, as opposed to increased purchasing power for families. Quantifying this using quasi-experimental variation is an important area for future research in the UK, as it can guide how further increases in the in-work credit generosity can help compensate for losses in credits from a higher NLW.

5.11 Another area to explore further is the question of compliance, and whether the compliance rate is affected by the level or bite of the NLW. **Additional research, including using randomised audit studies, can help develop better data to assess both the level of noncompliance and its incidence by the bite of the policy using quasi-experimental variation.**

5.12 The question of youth rates was outside of the remit of this report, whose focus is the NLW. However, the gap between the NLW and youth minimum wages has expanded over time. For example, the minimum wage for 18-20 year-olds was around 83% of the adult rate in 2010, while it is 75% in 2019 (see Table 1.A). Large gaps in the minimum wages for similar workers may be problematic if it leads employers to substitute older workers with slightly younger ones, as some research has found (Kreiner, Reck and Skov, forthcoming).[2]

5.13 Finally, in some low wage sectors like care homes, the funding for a higher NLW or NMW comes from public expenditure. Here insufficient adjustments to the budgets can have negative consequences on a host of important outcomes. Some research has found that the introduction of the NLW may have reduced quality of care in care homes (Giupponi and Machin, 2018)[3] and increased the use of zero-hours contracts in that sector (Datta, Giupponi and Machin, 2018),[4] although Care Quality Commission ratings show overall quality in the sector has increased since 2015.[5] **Any future NLW increases should be combined with adequate funding in sectors reliant on public funding. In addition, future research should closely monitor such effects to ensure the adequacy of such funding.**

5.14 The NMW and the NLW have been important success stories in the UK, and the Low Pay Commission has been an essential part of that success. In summary, the weight of existing evidence is consistent with exploring a more ambitious NLW in the UK. Such a decision is not only a technocratic one, as it requires the political process to weigh various considerations. At the same time, any such exploration should be conducted with caution and with technocratic guidance—and improvements in the data and evaluation infrastructure can help reduce potential risks associated with a more ambitious remit for the NLW beyond 2020.

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2 Kreiner, Reck and Skov, 'Do Lower Minimum Wages for Young Workers Raise Their Employment? Evidence from a Danish Discontinuity', Forthcoming

3 Giupponi and Machin, 'Changing the Structure of Minimum Wages: Firm Adjustment and Wage Spillovers', 2018

4 Datta, Giupponi, Machin, 'Zero Hours Contracts and Labour Market Policy', Forthcoming

5 Care Quality Commission, State of Care reports 2015, 2016, 2017, and 2018, available at https://www.cqc.org.uk/publications.

# Annex A

# Terms of reference

The terms of reference of this review are:

1. The objectives of the office holder are: to review the international evidence on the impacts of minimum wages, with a particular focus on innovative and ambitious minimum wage models; and to consider the role of individual labour market characteristics in determining such effects. The review should consider the implications for UK minimum wage policy, in particular assessing whether the employment effects of minimum wages in the UK could be different to other countries, given differences in labour market characteristics.

2. The office holder will draw on wider expertise in labour market economics, including through engagement with other academics and the Low Pay Commission. The review will consider the latest evidence on minimum wages internationally, the potential impacts on employment (volume and structure), productivity and economic growth, the ability of the labour market to absorb future minimum wages rises, and the wider macroeconomic context.

3. In particular, the office holder will be asked to consider the implications for future minimum wage policy in the UK, bearing in mind the aspirations the government set out in Budget 2018, to end low pay in the UK.

4. The review will not attempt to consider the structure of minimum wage rates in the UK (e.g. youth rates) nor the causes of low wage employment.

5. Its conclusions will inform work underway in HM Treasury and the Department for Business, Energy and Industrial Strategy considering the future remit of the Low Pay Commission after 2020. This wider work will include broad consultation with a range of stakeholders.

# Annex B

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# Annex C

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