

The Elusive Employment Effect of the Minimum Wage

Alan Manning

Alan Manning is Professor of Economics and Director of the Community Programme at the Centre for Economic Performance, both at the London School of Economics, London, United Kingdom. His email address is a.manning@lse.ac.uk.

Abstract

It is hard to find a negative effect on employment effect of rises in the minimum wage: the elusive employment effect. It is much easier to find an impact on wages. This paper argues the elusive employment effect is unlikely to be solved by better data, methodology or specification. The reason for the elusive employment effect is that there are reason why the link between higher minimum wages and higher labor costs are weaker than one might think and because imperfect competition is pervasive in the labor market.

Thirty years ago, Charles Brown (1988) invited readers of the *Journal of Economic Perspectives* to consider the question “Minimum Wage Laws: Are They Over-rated?” and concluded that “the minimum wage is over-rated by its critics as well as its supporters” (p. 144). At that time, there was a strong academic consensus that the minimum wage caused job losses and was not well-targeted on those it set out to help, and that as a result, it was dominated by other policies to help the working poor like the Earned Income Tax Credit. Although the minimum wage still commanded wide support among the general population, policy-makers seemed to be paying attention to the economic consensus of the time: for example, in 1988 the US federal minimum wage had not been raised for almost a decade and only 10 states had higher minima. Minimum wages seemed to be withering away in other countries, too. In 1993, the United Kingdom abolished the Wages Councils that had set minimum wages in some low-paying industries since it was established by Winston Churchill in 1909, leaving only a minimum wage in agriculture. In 1994, the OECD published its view on desirable labor market policies in a prominent *Jobs Study* report, recommending that countries “reassess the role of statutory minimum wages as an instrument to achieve redistributive goals, and switch to more direct instruments” (OECD 1994).

The landscape looks very different today. There is pressure to make more use of minimum wages almost everywhere. In the United States, the logjam in Congress means no change in the federal minimum wage is immediately likely. However, 29 states plus Washington, DC, have higher minima. A number of cities are also going their own way, passing legislation to raise the minimum wage to levels (in relation to average earnings) not seen for more than a generation (in this issue, Dube discusses these sub-state level minimum wages). Outside the United States, countries are introducing minimum wages (for example, Hong Kong in 2011, Germany in 2015) or raising them (for example, the introduction of the UK’s National Living Wage in 2016, a higher minimum wage for those over the age of 25). Professional advice to policymakers has changed, too. A joint report from the IMF, World Bank, OECD and

ILO in 2012 wrote ““a statutory minimum wage set at an appropriate level may raise labour force participation at the margin, without adversely affecting demand, thus having a net positive impact especially for workers weakly attached to the labour market” (ILO 2012). The IMF (2014) recommended to the United States that “given its current low level (compared both to U.S. history and international standards), the minimum wage should be increased.” The updated OECD (2018) *Job Strategy* report recommended that “minimum wages can help ensure that work is rewarding for everyone” (p. 9) and that “when minimum wages are moderate and well designed, adverse employment effects can be avoided” (p. 72).

Central to this change in view is what has sometimes been called the New Minimum Wage Research (perhaps best exemplified by Card and Krueger 1995) that, starting in the early 1990s, cast doubt on the conventional wisdom that the minimum wage inevitably destroyed jobs with the only interesting question being the size of the loss. Disagreement among economists remains: 25 years after this research began, there is no consensus on the employment effects of the minimum wage.¹ However, it does seem fair to say that clear negative impacts on employment of minimum wages are “elusive,” a phrase used in Kennan’s (1995) review of Card and Krueger (1995).

In the large number of papers that try to estimate the effect of minimum wages on employment, there is a danger of losing sight of the “why” question – why is it so hard to find negative employment effects of the minimum wage? Perhaps certain economic factors that explain the small and often ambiguous effects of the minimum wage on employment? Or perhaps labor markets are fundamentally different from other markets? These are the issues discussed by this paper. The conclusion is that the employment effect of the minimum wage is

¹ O’Neill (2015) shows that there are systematic differences in the characteristics of economists who signed the competing petitions for and against the 2013 US Fair Minimum Wage Act

elusive, but that economists should not be surprised by this given the way labor markets operate in which deviations from perfect competition are much larger than in many other markets. Indeed, perhaps it is time for the literature to move on to try to address the question of how high the minimum wage can be raised without significant employment effects appearing.

The Elusive Employment Effect: US Evidence

The employment effect has always constituted the bulk of research on the impact of the minimum wage, and continues to do so, though there is a growing literature about the impacts on other outcomes (as discussed by Clemens in this issue). In many parts of the labor market, the minimum wage is set so low relative to prevailing wages that it is likely to have no detectable effect on any labor market outcome. Thus, it makes sense to confine the search for the employment effect of the minimum wage to segments where one can detect a significant wage effect. For this reason, most studies of the employment effect of the minimum wage focus on groups where the minimum is high in relation to average earnings, including teenagers, low-wage industries, or workers with low education levels.

While this approach is sensible from one perspective, it does create a sample selection problem. There is probably no economist who does not believe that there is some point at which higher minimum wages reduce employment, so it seems as if one should be able to choose samples in which this effect can be found. Even if one discovers such samples, it would not mean that the impact of the minimum wage is everywhere negative. However, the practical problem is that it is very hard to find sub-samples which demonstrate a robust negative effect of minimum wages on employment: the employment effect is elusive.

This essay is not a literature review and will not attempt an encyclopedic survey of the vast literature on the employment effect of the minimum wage: excellent reviews available in Neumark and Wascher (2008), Belman and Wolfson (2013) and Schmitt (2015) as well as a

number of meta-studies (Doucouliagos and Stanley 2009; Leonard, Stanley and Doucouliagos 2014; Chletsos and Giotis 2015). In addition, Andrews and Kasy (2019) report some evidence of modest publication bias: studies with significant negative employment effects seem more likely to be published.

Instead, to illustrate the elusive employment effect, this paper focuses on the most studied group, the American teenager. This is also the group where it has been argued that a negative employment effect is most commonly found—although studies on, for example, fast food restaurants or retail tend to be less conclusive (for example Addison et al. 2009, 2013). Teenagers may hate having adults poking their noses into their business, but their employment and wages have been a fertile field for generations of labor economists. The early literature (reviewed in Brown, Gilroy and Kohen, 1982) largely focused on time series analysis, but for more than 25 years, (starting with Neumark and Wascher, 1992), state-level panel data has been the focus of attention.

There is, of course, some reason for the focus on teens. They are the group most affected by the minimum wage: Table 1 shows that in both 1979 and 2019, slightly more than 25 percent of teens had a reported hourly wage at or below the minimum, though the fraction was somewhat lower in the intervening years.² In several states in 2019, the minimum wage is above the median hourly wage for teens. So while the minimum wage in the United States as a whole is at quite a low level relative to median earnings (directly affecting less than 5 percent of workers), it is often binding in the teen labor market.

But there is also something slightly odd about a research focus on teens, because this group is a small and declining share of total employment, representing only 2 percent of total hours worked in 2019, as also shown in Table 1. The teen share of minimum wage workers has

² The minimum here is the maximum of the federal or state level. Reported wages may be below the minimum because of measurement error, the use of the youth sub-minimum, because they are tipped workers or because the worker is not covered by the minimum wage as coverage is not universal.

been declining as well. In 1979, one in four minimum wage workers was a teen, this is now 1 in 9. In 1979 there were similar number of minimum wage workers who were teens as were aged 20-24 – now the second group is over twice as large as the teen group. Finally, Table 1 shows that almost 60 percent of teens were in education last week (averaged across the whole year) and students' labor supply could plausibly be different from that of the population as a whole. For example, a finding that hours and employment fall when minimum wages rise could be a backward-bending labor supply curve as teenagers seek to earn a certain amount of income to finance their education, but otherwise want to spend as much time as possible on their studies. Clearly, there is some risk in extrapolating the evidence on teens (or other low-paid groups) to the whole labor market, yet this practice is quite common (for example, CBO, 2014, 2019) in producing estimates of the impact of proposed rises in the federal minimum wage on total employment.

In spite of all this, the effect of a minimum wage on teen employment is elusive. To illustrate this point, we present some estimates of the impact of minimum wages on the teenage labor market using quarterly state-level panel for 1979-2019. We do not argue for a “best” specification; instead, we present seven estimates based on those used in Neumark, Salas and Wascher (2014) who are responding in part to Allegretto, Dube and Reich (2011). In some cases, the left-hand dependent variable will be wages; in other cases, it will be the employment/population ratio. In all seven models, the right-hand side explanatory variables include a constant term, the log of the minimum wage defined as the maximum of the state and federal minimum (from Vaghul and Zipperer 2019) and other control variables including state and time fixed-effects (to account for permanent differences across states and aggregate labor market conditions), the prime-age unemployment rate (to account for state differences in business cycles), and the proportion of teens in the population (to account for the fact that labor market outcomes for teens may be affected by how many of them there are), what we call the baseline regressors (other factors like the changing demographics of teenagers are not

commonly controlled for). The estimated models differ according to whether other fixed effects and trends are included, as laid out in Table 2. Model 1 is just the baseline regressors. Model 2 allows for the possibility that states have different trends in the teen labor market by adding state-specific linear trends. Model 3 allows for the possibility that different regions of the US have different aggregate labor market conditions in every year by adding census division time fixed effects. Model 4 includes both the census division effects and the linear trends. Model 5 has a state-specific quadratic trend, model 6 a cubic trend; and model 7 a quartic trend, all intended to capture the possibility that the evolution of labor market conditions may vary across states in a complicated way. Again, these specifications are common in this literature. In the text of this paper, we will summarize results and confidence intervals for the coefficient on the log minimum wage in these regressions; full regression results are available in the Online Appendix available with this paper at the JEP website.

Preliminaries: The Impact of Minimum Wages on Wages

Before considering the impact of the minimum wage on teen employment, it is important to verify that there is a detectable impact of the minimum wage on actual wages received by workers; failure to demonstrate this in any paper means there should be skepticism about any subsequent findings that the minimum wage has an employment effect. Figure 1 shows the estimated impact of the log minimum wage on mean log hourly wages for the seven different specifications, together with the 95 percent confidence intervals. Figure 1 shows that for teen wages, there is a clear robust and significant impact of minimum wages on the mean log hourly wage for teens. Although the estimates do vary with specification, the range is not very large, between 0.20 and 0.25. The size of the elasticity is slightly larger than the average fraction of teens reporting hourly wages at or below the minimum, which is consistent with modest spillover effects from the minimum wage (Autor, Manning, and Smith 2016).

One problem with the first specification is that it implies that the elasticity of teen wages

with respect to the minimum wage is a constant whatever the level of the minimum wage. This is implausible as a universal model as it predicts that a rise in the minimum wage from \$1 to \$1.10 has the same impact as a rise from \$10 to \$11 dollars. We would expect the marginal effect of changes in the minimum wage on wages to be increasing in the minimum wage – a very low minimum wage relative to the prevailing level of wages (what Lee, 1999, terms the effective minimum) will have little impact and a higher minimum wage a larger impact. The simplest way to investigate non-linearity is to include a quadratic term in the effective minimum, Details of the procedure (which follows Autor, Manning and Smith 2016) and the estimates are in the Online Appendix but, for the wages of teenagers, one can detect a non-linear effect. The estimated elasticity of log wages with respect to the minimum wage is about 0.25 when the minimum wage is 40 percent of the average wage, but about 0.57 when the minimum wage is 60 percent of the average wage.

The bottom line is that the estimated impacts of the minimum wage on the wages of teens is in line with what would be expected and reasonably robust to different specifications. The wage effect from a higher minimum wage is not elusive and estimates seem plausible.

Although most research focuses on teens, Figure 2 reports results for those aged 20-24. Remember, Table 1 showed that this group now accounts for a higher fraction of minimum wage workers than do teens. The estimated impacts of the minimum on wages are significantly different from zero in all models in the range 0.06-0.15, though lower than the estimated effect for teens as should be expected given the bite of the minimum wage is lower for the older age group. Similar regressions for the age group 25-29 (provided in the Online Appendix) show no significant detectable impact on wages.

The Impact of Minimum Wages on Employment

Figure 3 presents estimates for the effect of the log minimum wage on the log employment rate of teenagers; in other words, these are the same seven specifications, and all

that is changing is the dependent variable. Model 1 (which includes only the baseline regressors) produces a significant negative effect with an elasticity of -0.28, a common finding in the literature.³ But unlike the wage effect, this is not at all robust. One other model (Model 3 with census division*time effects, but no state trends) has a significant negative coefficient, but for all the others the estimated effects are positive, though not significantly different from zero.⁴ Figure 4 reports the parallel results for the age group 20-24 which show a similar pattern of results, although, as expected, the estimated elasticities are smaller.

This – in a nutshell – is the elusive employment effect. Even for groups where one can estimate a sizeable, robust wage effect, the employment effect is hard to find and not robust to specification. It seems unlikely that state-level panel data on teens is going to deliver clear evidence on a non-zero employment effect of the minimum wage (if it exists) in the near future. This literature has come to resemble trench warfare (complete with six feet of mud) in which the two sides are fighting over a small patch of ground which is not of much strategic importance in any case given the small size of the teen labor market. It is time to call a truce, acknowledge that no clear evidence of a negative effect on employment has been found, and re-deploy the energy expended on this issue to other areas.

Although the specifications reported here are quite standard in the literature, there are a number of empirical criticisms that could be argued. Perhaps an employment effect can be identified if there is a better specification, a better statistical methodology, and/or better data. I consider these possibilities in the next few sections.

³ Cengiz et al. (2019) argue that this result is sensitive to the inclusion in the data of the 1980s and 1990s when there was little change in the minimum wage.

⁴ This is slightly different from Neumark, Salas, and Wascher (2014) who do estimate a negative effect in some of the later columns for the shorter sample period 1991-2011.

Better Specification?

The estimates reported so far are of a contemporaneous relationship between the level of the minimum wage and the level of wages and/or employment. Meer and West (2016) suggest it is better to estimate the model in first differences. However, when using this approach in this data, the elusive employment effect remains (detailed results are in the Online Appendix). Meer and West (2016) also suggest there may be lags in the impact of the minimum wage. This idea dates back to at least Baker, Benjamin and Stanger's (1999) study of the minimum wage in Canada, but more recently Sorkin (2015) argues that lags are likely to result from sluggish adjustment of capital that has a "putty-clay" technology (that is, a technology where producers can pick a level of capital and labor at the start, but then once the level of capital is chosen, it cannot be changed). Aaronson, French, Sorkin and To (2017) present some evidence on restaurant entry, exit and employment growth consistent with this insight and Meer and West (2016) report finding a negative employment effect using long lags in aggregate employment data (though they do not demonstrate a wage effect). In the context of the teen employment, dynamics do not seem a major issue. Again, the Online Appendix shows some estimates of the long-run impact of the minimum wage on teen employment rates allowing for a lagged impact. The elusive employment effect remains.

Another criticism is of the use of the log of the employment-population rate as the dependent variable. The theory of labor demand might be taken to mean that it is the level of employment that should be affected by the minimum wage. In this case, one might prefer simply the log of employment as the dependent variable: for example, Monras (2019) argues for this in part because he claims inter-state migration responds to the minimum wage in which case the employment-population rate might not fall when the minimum wage rises because the population falls in line with employment. The Online Appendix shows some estimates of the long-run impact of the minimum wage on teen employment levels. The elusive employment

effect remains.

Better Methodology?

A central concern in the estimates reported here is whether one has controlled appropriately for economic conditions affecting employment other than the minimum wage. Failure to do so effectively will lead to bias if the minimum wage is correlated with the omitted economic conditions. The state time trend and census division*time effects in the models reported here are common ways of seeking to address this concern, but there might be better approaches.

As an alternative approach, Neumark, Salas, and Wascher (2014) use a synthetic control effect, arguing that a negative employment effect emerges when that is used. This conclusion is, however, contested by Dube and Zipperer (2015). It seems unlikely a synthetic control approach will deliver clear evidence on a negative employment effect and the method is a bit of a black box. The synthetic controls for a state often vary implausibly with the sample period used, and even with the outcome being studied (e.g. wages or employment) for the same sample. Dube, Lester and Reich (2010) argue that a better way to control for other economic conditions is to use counties that border each other but are in different states and sometimes have different minimum wages as a result (an approach first used in Card and Krueger 1994). They find clear evidence of wages effects from the minimum wage, but not evidence of disemployment effects.

Further support for the conclusion that there are no significant disemployment effects from the existing levels of minimum wages comes from Cengiz et al (2019). Instead of looking at how minimum wages affects the overall level of employment, this study looks at where in the wage distribution changes in employment occur. They show that a rise in the minimum wage causes jobs paid below the new minimum to disappear (unsurprising if there is compliance with the minimum wage), but are almost exactly compensated with higher employment at slightly higher wages. Overall, they find little effect on employment, but do report some disemployment

in tradeable sectors (though few minimum wage workers are to be found there).

Better Data?

If state-level panel data does not provide clear evidence for the dis-employment effect of the minimum wage, perhaps better data is the solution. Studies that focus on aggregate data from low-wage industries or low-educated workers tend to have the same problem of an elusive employment effect as the analysis of the teen employment rates. For example Bailey, DiNardo and Stuart (2020) study the large rise in the minimum wage to a high level associated with the 1966 amendment to the Fair Labor Standards Act, finding it increased wages dramatically but reduced aggregate employment only modestly. They do report a much larger impact on the employment of African-Americans (40 percent of whom were affected by the rise), though another study by Derenoncourt and Montialoux (2020) of the same fails to find any employment effect.

The use of longitudinal individual data offers another approach. Using data prior to an increase in the minimum wage, one can identify workers likely to be affected by it and examine their subsequent employment outcomes. Care needs to be taken to find an appropriate control group, as it is well-known that low-wage workers are more likely to leave employment even absent any minimum wage. Using this approach, Clemens and Wither (2016) estimate large negative employment effects, but Zipperer (2016) argues that this conclusion is not robust to reasonable changes in model specification.

In many parts of labor economics, administrative data, from both government and firms, has been very useful. Social Security data is often hard to use in research on the impact of the minimum wage because this data often contains only earnings, not hours, making it difficult to identify minimum wage workers. The use of payroll data from firms (pioneered by Neumark and Wascher 2000) may be of more use. Such studies are rare, but some recent studies (Giuliano, 2013, Hirsch, Kaufman and Zelenska, 2015, and Coviello, Deserranno and Persico,

2019) all find clear wage effects but no negative employment effects.

The Elusive Employment Effect: International Evidence

The elusive employment effect of the minimum wage in the United State may be the result of the fact that minimum wages are quite low in relation to prevailing wages. Perhaps evidence from other countries with higher minimum wages is more conclusive.

Table 3 presents OECD statistics on how high is the minimum wage in member countries in relation to full-time median earnings.⁵ The United States is an outlier in having a relatively low level of minimum wages in relation to median earnings. In some middle-income countries, the statutory minimum wage is extremely high, though enforcement is probably weak in many cases. However, some high- income countries have minimum wages in the region of 50-60 percent of median earnings, so we might hope to look to these other countries where the minimum wage is higher to search for the employment effect. We will briefly consider a number of cases, selected to focus on where there is a large body of empirical research and the minimum wage seems much higher than in the United States.

The United Kingdom

After the United States, the country with the most research on the employment impact of

⁵ These figures are often lower than those from other sources, because they exclude part-time workers who tend to be lower-paid than full-time workers. This obviously has a larger effect on countries with a higher proportion of part-time workers. One should also exercise some caution in making comparisons across countries: for example, Askenazy (2014) discusses how the treatment of tips in the minimum wage is very different in the United States, United Kingdom, and France. Also, many countries have lower rates for younger workers in a way that the US does not. Finally, employer payroll taxes may also be important: for example, the French minimum wage does not appear as high in relation to average earnings when earnings are computed as total labor costs for the employer because payroll taxes are high in France but higher at the median than for a minimum wage worker (the introduction of this differential was studied by Kramarz and Philippon 2001).

the minimum wage is the United Kingdom. The UK example is particularly interesting because in the period 1993-1999⁶ it had no minimum wage, except in agriculture, leading to some very low job offers—as one example, for a security officer to be paid £2 per hour who must provide their own dog (an example given in Low Pay Commission 1998). In 1999, the National Minimum Wage was introduced. Unlike in the United States there is age variation in the form of lower minimum wage rates for workers aged less than 21 and for apprentices. In 2016, the UK government introduced what was termed the National Living Wage, essentially a higher minimum wage for the over-25 age group.⁷

The UK National Minimum Wage was initially set at a low level (about 46 percent of median hourly earnings), but subsequently increased to now be about 58 percent for the over 25s (Dube, 2019). In 2019, the Conservative government (in what may come as a surprise to some American readers given the attitudes of many Republicans to raising the minimum wage) announced the ambition to raise this to 60 percent, economic conditions allowing.

The body responsible for making recommendations on the level of the minimum wage to the government, the Low Pay Commission, has always commissioned research on the employment effects (for its latest report, see Low Pay Commission 2015) and, apart from a few studies in specific sectors (as in Machin, Manning and Rahman, 2003, which studied a sector where 30 percent of workers were paid the minimum), has found little or nothing. The National Minimum Wage is what it says, a national minimum wage, so investigation of the employment effect has concentrated on comparing groups where the minimum wage differs in its impact. For example, the National Minimum Wage has had more impact on younger than older workers, on women than men and in low-wage regions of the United Kingdom.

A useful review of the evidence was commissioned by the UK Treasury (Dube 2019).

⁶ Prior to 1993 the United Kingdom had Wages Councils, which set minimum wages in a number of low-paid sectors, although some large low-paid sectors were excluded.

⁷ This announcement was announced unexpectedly. See Bell and Machin (2018) for a study of the impact of the announcement on the share price of firms likely to be affected.

For example, the report shows (chart 4.I) that the introduction of the National Living Wage in 2016 raised wages in those segments of the labor market most affected, but had no effect on employment. The effect of the minimum wage on employment in the UK has also been elusive.

France

France is often held up as the model of what happens when the minimum wage, known as the SMIC (for *salaire minimum de croissance*), is set too high. France has had high unemployment in general, and youth unemployment in particular, for a very long time. The SMIC is currently €10.15 per hour (about \$11.30) and 13.4 percent of workers directly benefitted from the 2019 increase (DGT 2019, 36), much higher than the proportions directly affected by minimum wage increases in the United States or the United Kingdom. This suggests that the French minimum wage is at a relatively high level. However, the cost of a minimum wage worker relative to a worker on median earnings is not that high, because France has very progressive payroll taxes: The DGT (2019) expert group reports that once this factor is taken into account, the French minimum wage relative to average labor costs is quite similar to the international median.

Since the inception of the DGT expert committee in 2008, it has never recommended increasing the minimum faster than the minimum required by the law, reflecting the view of the economists on it that the minimum wage in France is too high. However, the fact that the minimum wage is increased every year according to a formula with only small variation relative to average earnings means that it is very difficult if not impossible to clearly identify the impact of the minimum wage in France. One study that does consider a large change is Kramarz and Philippon (2001), who consider a change in 1996 that reduced the payroll tax on minimum wage workers at the same time that the minimum wage itself was increased. That study found an increase in teen employment, but because the cost of labor to the employer was reduced at the same time as the incentive to work was raised one would expect both the demand and the

supply for labor to increase (as explained below) so employment would be expected to rise.

This is not the same as a general cut or rise in the minimum wage.

It may be that the minimum wage is set in France at a level where it results in sizeable job losses, but we don't have the studies to back up such an assertion.

Australia

Minimum wages in Australia are complicated. Although Australia does have a Federal Minimum Wage (currently set at AUS\$19.49, approximately US\$12.50), it also has a system of “Modern Awards” that sets minimum wages by industry, occupation, and seniority. As a result, there are over 1500 different minimum wages in total, and the federal minimum wage is just an absolute floor. But even the federal minimum is at a relatively high level relative to average earnings— around 16 percent of workers are currently paid the minimum wage (Plunkett and Borland 2014). Unlike France, the Australian labor market has not been plagued by persistently high unemployment rates (in the year or so leading up to the pandemic, its monthly unemployment rate was a bit above 5 percent).

Like in France, the nature of the minimum wage variation in Australia does not lend itself to a high-quality research design when it comes to investigating the impact of minimum wages on employment. However, Bishop (2018) concluded that there was an impact on wages but none on employment or hours. The Fair Wage Commission, an expert body that advises on the appropriate level of awards, is also of the view that the prevailing level of minimum wages is not harmful to employment. The Australian experience is a useful counterpoint to the argument that all the countries with the highest minimum wages have a clear unemployment problem.

Germany

Germany introduced a National Minimum Wage in 2015, replacing a previous system

that had set minimum wages in a small number of sectors. It is currently at €9.35 per hour (about \$10.40). An increasing number of papers have sought to estimate the effect on wages and employment: for example, see the summary of the expert commission in Mindestlohn Kommission (2018), or the surveys by Caliendo et al. (2019), Bossler and Garner (2019), and Dustmann et al (2020). As Germany has a national minimum wage, these studies have to compare groups where the minimum wage has small or large effects, as in the UK studies. While all studies agree there has been an impact on wages, there is less agreement about the impact on employment, reminiscent of the debates in the United States and the United Kingdom. The employment effect of the minimum wage in Germany also seems elusive.

Other Countries

There are many studies of minimum wages in other countries, far too many to summarize here. Consider two recent papers that do report evidence that rises in minimum wages have reduced employment.

Looking at a large rise in minimum wages in Hungary in 2001 from 35 percent of median earnings to 50 percent, Harasztosi and Lindner (2019) find evidence that wages rose faster in more affected firms, but these firms had slower employment growth, though the implied elasticity was small (somewhat larger in tradeable sectors). Most of the impact occurred soon after the rise, so lags did not seem important. The estimated employment effects are based on the identifying assumption that there is no impact of the minimum wage on unaffected firms, which assumes no reallocation effect of the kind that Dustmann et al (2020), find for Germany.

Looking at the 40 percent rise in Danish minimum wages when workers turn 18 and become eligible to the adult rate (which is set at a level comparable to a \$15 minimum in California) and using a regression discontinuity design and administrative data, Kreiner et al (2019) document a 33 percent fall in the employment rate and a 45 percent fall in hours. The size of this effect could represent the high elasticity of substitution between workers around

their 18th birthday.

It may be tempting to conclude that studies like these clearly show that minimum wages clearly harm employment when minimum wages are in the region of 50-60 percent of median earnings. However, it is important to note that minimum wages are this high relative to median earnings in the US teen labor market. Also, studies from many other countries with similarly high levels of minimum wages often fail to find a clear employment effect: for example, studies of the UK jumps in minimum wages at different ages have failed to uncover anything like the clear effects found in the Danish study. One could also point to studies of large changes in minimum wages in countries where the level of minimum wages are relatively high that fail to find clear evidence of negative employment effects: for example, in New Zealand (Hyslop and Stillman, 2007, 2011), Ireland (O'Neill, Nolan and Williams, 2006) and Portugal (Portugal and Cardoso 2006).

The conclusion is that the employment effect remains – for the moment – elusive. But it may be that we are about to learn more about how high one can push the minimum wage before there are clear adverse employment effects as a number of jurisdictions are pushing minimum wages higher and higher (see Dube in this issue).

Why is the Employment Effect so Elusive?

The difficulty of establishing a clear employment effect at moderate levels of the minimum wage now seems relatively well-established. What are some possible reasons for this pattern?

Start with a very simple model based on a competitive labor market for the analysis of the wage and employment effects of the minimum wage. In this model, when a minimum wage is enacted, some workers who had been receiving a lower wage now get a higher wage, while other workers who had been receiving the lower wage become unemployed. As noted earlier, a

common pattern in the empirical literature is that the minimum wages does seem to result in a wage increase, but not to a fall in employment.

One possibility is that in econometric terms, it may be harder to find an equal-sized impact on employment than wages, perhaps because employment has more residual variation leading to larger standard errors. Looking at Figures 1-4 one can see that, for teens, the standard errors on the employment estimates are considerably larger than those on the wage estimates meaning that the employment effect is less precisely estimated. On the other hand, for the age group 20-24, the standard errors in the employment equations are only slightly larger than those in the wage equations.

Secondly, it may be that the impact of the minimum wage on employment is weaker than on wages: one possibility is that for some reason the pass-through from minimum wages to the cost of labor to employers is low; another possibility is that the labor demand curve has a low elasticity. We consider arguments for this in turn.

Low Pass-Through

Why might the link between wages and employer labour costs be weak? Perhaps employers will react to higher minimum wages by being less generous with other aspects of the employment contract – what Brown (1988) called “offsets” – such as meal breaks, fringe

Benefits, health benefits or training (see Clemens in this issue for more discussion of this). Such offsets would mean that the overall gain to workers from a higher minimum wage is lower than the wage gain. Depending on the value that workers place on the offsets, it is theoretically possible that workers could be made worse-off with a combination of a higher wage and additional offsets though the fact that minimum wage workers support raises in the minimum wage suggests we are not at that extreme. But although offsets are a theoretical possibility, evidence for such offsets is decidedly weak (see the review in Neumark and Wascher, 2008; or see Belman and Wolfson, 2014).

But there are other reasons why labor costs may not rise as fast as wages which do not depend on workers being made worse-off: specifically, turnover and monitoring costs as in Rebitzer and Taylor's (1995) application of the Shapiro and Stiglitz (1984) efficiency wage models. Say that an employer faces turnover costs, in the form of a fixed cost to hire and train a new worker. In addition, say that the higher the wage, the lower the rate at which workers leave the firm (a view supported by lots of evidence) so the less hiring the firm needs to do to maintain employment at its desired level. Indeed, we have accumulating evidence that increases in the minimum wage are associated with lower labor turnover even if total employment is unchanged (Portugal and Cardoso 2006; Brochu and Green 2013; Dube, Lester, and Reich 2016; Dube, Giuliano, and Leonard, 2019).

In this model, a firm faces a trade-off in deciding on the appropriate level of wages. Higher wages means higher direct labor costs but lower turnover and associated costs. An employer unconstrained by any minimum wage will set the wage to minimize total labor costs

Now consider how a firm with turnover costs will adjust its hiring with the imposition of a minimum wage. The minimum wage raises the wage that the firm needs to pay, but also reduces turnover costs for the firm. The effect of a higher minimum wage on total labor costs will be less—and perhaps substantially less—than the rise of the minimum wage itself. For an employer for which the minimum wage is only slightly higher than the wage it would choose

when constrained, one can show that the rise in total labor costs would be zero. Because of turnover costs, a small change in the minimum wage can have a zero effect on total labor costs and, hence, on employment.

Higher wages may also raise productivity, implying that a rise in the minimum wage has a smaller effect on the cost of an efficiency unit of labor than one might expect. Coviello, Deserranno, and Persico (2019) finds for a sample of workers from a large US retailer with outlets across a number of states who are paid a mixture of base pay and commission that higher minimum wages lead to higher productivity. Their proposed model is that a minimum wage increases the value of the job and workers increase effort in order to avoid bearing the costs of being fired. Consistent with this, they find that the effect is concentrated on the least productive workers who might be at greater risk of job loss. Although they find clear impacts on wages and productivity, they find no effect on employment or terminations—another example of the elusive employment effect.

The Elasticity of the Labor Demand Curve

Another possibility for why the employment effect is elusive is that the elasticity of the labor demand curve is low. Competitive market theory would predict that a higher minimum wage will lead to a move away from the use of minimum wage labor in the production of a given level of output, and a fall in the level of output produced. The labor elasticity of demand for minimum wage workers depends on several underlying parameters: the share of minimum wage workers in total costs for the firm, the elasticity of substitution of minimum wage workers with other inputs, and the price elasticity of demand for the final product.

For most firms, the share of minimum wages in total costs is small. Teulings (2000) provides a theoretical explanation for a very low value for the elasticity of substitution. Haratoszi and Lindner (2019) distinguish between the elasticity between minimum wage labor on capital and materials. They suggest that materials are the most important non-labor input and

they are complementary to labor. The literature on the impact of minimum wages on prices (for example, Aaronson, 2001) typically does find some pass-through at a level consistent with the impact on total costs. Some have inferred from price rises that output and employment must fall (for example, Aaronson and French, 2007), but in the sectors in which minimum wages have the biggest impact, quality of service is obviously variable as well breaking any simple link between prices, output and employment. Taking these factors together, it seems plausible that the elasticity of labor demand with for low-wage labor in many sectors is not very large.

Another set of complications arises in the distinction between non-traded goods and services, often provided in local markets, and tradeable sectors of the economy. In the case of non-traded goods and services provided mostly in local markets, a change in local or state-level minimum wage laws will affect all firms in the industry. As a result, the relevant product demand elasticity is then that for the (local) industry demand curve which may be low. Additionally, there may be positive effects on local demand if minimum wage workers have a higher propensity to consume than the owners of firms. However, for production of goods and services traded outside a given area, firms that face a higher minimum wage must compete with firms that do not face this higher minimum wage, and so their elasticity of demand for minimum wage labor may be larger. Some evidence for a more negative employment effect in tradeable sectors can be found in Haratoszi and Lindner (2019), and Dube (this issue). But most minimum wage workers in countries like the US are not in tradeable sectors because wages are higher than in other countries for reasons other than the minimum wage.

Imperfectly Competitive Labor Markets

The strong a priori belief held by many that a rise in the minimum wage must cost jobs ultimately derives from the assumption that the low-wage labor market is close to perfectly competitive. The basic theoretical argument is straightforward. There is a frictionless market with a downward-sloping labor demand curve and an upward-sloping labor supply curve. In a

frictionless market, the equilibrium wage is where the demand for labor equals supply. In this setting, one immediately reaches the conclusion that a binding minimum wage must put us in the region where the quantity of labor supplied exceeds the quantity of labor demanded, so increases in the minimum reduce employment with an elasticity given by the elasticity of the labor demand curve. Of course, there are more sophisticated competitive analyses—recognizing there are many interconnected labor markets and there will be effects on the demand for different goods and general equilibrium effects that might (as is their wont) conceivably be quite complicated. But in a frictionless and perfectly competitive labor market, the basic insight that a minimum wage will reduce employment for low-wage workers typically continues to hold.

Although this analysis is regarded by many as “conventional” (a word used to describe it in, for example, CBO, 2014) when applied to the analysis of minimum wages, it is not conventional when applied to other labor market phenomena, like unemployment. After all, the frictionless competitive market model implies that involuntary unemployment cannot exist, except when created by institutions like the minimum wage. This view is not “conventional” at all. Even introductory courses discuss reasons why unemployment exists at the macroeconomic level. The tensions between these views come up in various ways: for example, some opponents of a higher minimum wage emphasize that employment is determined by the demand-side of the labor market alone alone, when analyzing the impact of minimum wages, but when looking at the effect of extensions to unemployment insurance, they argue that labor supply decisions affect employment. To summarize, labor economists frequently use a different model of the labor market when analyzing minimum wages from the one they use when analyzing unemployment.

Most contemporary analyses of unemployment assume that the labor market has frictions, such that – at prevailing wages - not all workers who want a job manage to get one and that not all employers who want to hire a worker manage to find one. The consequence is

that unemployment and vacancies co-exist simultaneously in the labor market. The existence of the unemployment means that actual employment is below the quantity that workers would be willing to supply at the given wage. The existence of job vacancies means that actual employment is below the quantity that employers are willing to demand, at the given wage. The observed level of employment can, somewhat loosely, be thought of as being influenced both by the amount of labor employers would like to hire and the amount that workers would like to supply.

In this setting, higher minimum wages lead to both a decrease in the quantity of labor demanded and a rise in the quantity of labor supplied— with the overall impact on employment depending on which effect is larger. This means that the impact of an increase in the minimum wage on employment is theoretically ambiguous. There is no a priori reason why an imperfect labor market with frictions should necessarily be at a current equilibrium where a rise in the wage of low-skill labor above the current equilibrium necessarily reduces employment.

The treatment of imperfect labor markets with frictions here is admittedly brief and casual and I am sure will offend purists. Those interested in digging into these types of models in more detail might usefully look at bargaining models (for example, Pissarides 2000) or monopsony models (for example, Burdett and Mortensen, 1998; Manning, 2003, 2011, 2020; Flinn, 2006).⁸ But for present purposes, this high degree of simplification is justified in terms of making it very clear that an empirical finding that the minimum wage does not reduce employment should not be regarded as breaking some fundamental law of economics.

Summary

The ideas discussed here are summarized in Figure 5. In the simple textbook model a rise in the

⁸ It is well-known that minimum wages can theoretically raise employment even if the labor markets is frictionless if one assumes that employers have some monopsony power. Just as a profit-maximizing monopolist will want to raise its selling price, in which case a price ceiling below that level can cause the monopolist to increase output, a profit-maximizing monopsonist will want to reduce its buying price, and a price floor above that level can cause the monopsonist to increase purchases. . But most credible accounts of monopsony power are based on frictions, and we do not pursue those models here.

minimum wage has a direct strong link to labor costs, which is linked to reduced labor demand and employment. This is the process represented by the arrows down the middle of Figure 5. But there may be increased offsets, reduced turnover costs and increased productivity that mitigate the impact of rises in the minimum wage on labor costs. This is represented by the box on the left-hand side of Figure 5. And, in imperfect labor markets, the impact of rising minimum wages in raising labor supply also needs to be taken into account in the overall impact on employment, as represented by the box on the right-hand side of Figure 5. That the employment effect is elusive should not be much of a surprise.

Conclusion

Much of the literature on the employment minimum wage focuses on the question of “what is the employment effect of the minimum wage” using an empirical specification in which the effect is always negative, zero or positive. This approach has reached the point of diminishing returns. A balanced view of the evidence makes it clear that any evidence of a negative employment effect is not robust to reasonable variation in specification, even when the wage effect is robust. This might mean that the labor demand elasticity is very small (and this paper has discussed some reasons why that might be the case) but it might mean that the effect of a higher minimum wage on employment (within the existing range of minimum wages) is not negative at all. The claim that the employment effect might not be negative continues to be met with incredulity in some quarters, or to be euphemistically described as “non-conventional.” But as soon as one acknowledges that efficiency wage effects might be important or labor markets have frictions—ideas that appear in mainstream introductory-level textbooks and can hardly be described as unconventional—one has to acknowledge that the impact of the minimum wage on employment is theoretically ambiguous.

Of course, there is some level of the minimum wage at which employment will decline

significantly. The empirical literature on the minimum wage should re-orient itself towards investigating the determinants of that point. The observed range of minimum wages apparently does not include the turning-point, but recent initiatives suggest we may be about to observe the impact of much higher minimum wages in the near future in the US and elsewhere (as I finish writing this, the residents of Geneva have just voted for a \$25 minimum wage). Together with an increased use of high-quality data, we may in this way be entering a new chapter of minimum wage research.

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I would like to thank James Bishop, Jeff Borland, Gaia Dossi, Arin Dube, Stephanie Koo, David Mare, the editors of JEP and particularly Vincenzo Scrutinio, for help with this paper. Financial support from ESRC Grant Number ES/M010341/1 made this research possible.

Table 1: The Diminishing Importance of the Teen

		Age 16-19	Age 20-24	Age 25-29	Age 30-49	Age 50-64
% at or below minimum wage	1979	26.4	10.4	5.5	5.1	6.5
	1990	15.6	5.3	2.7	2.2	2.8
	2000	15.8	6.5	3.3	2.5	2.8
	2019	25.0	12.7	6.4	4.3	4.4
% of total hours	1979	6.81	15.94	15.73	41.81	19.71
	1990	4.22	11.96	15.71	52.26	15.85
	2000	3.67	9.96	12.44	54.05	19.88
	2019	2.29	9.21	13.18	46.96	28.36
% of total hours of minimum wage workers	1979	23.22	21.54	11.25	27.38	16.61
	1990	19.94	19.12	13.04	34.22	13.67
	2000	16.12	18.20	11.64	38.27	15.77
	2019	9.57	19.13	14.23	35.54	21.52
% in HS/college last week	1984	47.2	18.7			
	1990	50.7	18.9			
	2000	57.4	23.0			
	2019	59.1	25.5			

Source: Author's computations from the Merged Outgoing Rotation Groups of the Current Population Survey (CPS-MORG). See Online Appendix available at the JEP website for details.

**Table 2
Explanatory Variables in the Seven Specifications**

Explanatory variables	Specification						
	1	2	3	4	5	6	7
Constant term	Y	Y	Y	Y	Y	Y	Y
Log of minimum wage	Y	Y	Y	Y	Y	Y	Y
Prime-age unemployment rate	Y	Y	Y	Y	Y	Y	Y
% of teens in population	Y	Y	Y	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y	Y	Y	Y
State time trend	N	linear	N	linear	quadratic	cubic	quartic
Census division x time fixed effects	N	N	Y	Y	N	N	N

Note: In this paper, the dependent variable for these seven specifications will in some cases be mean log wages; in other cases, it will be the log employment/population ratio.

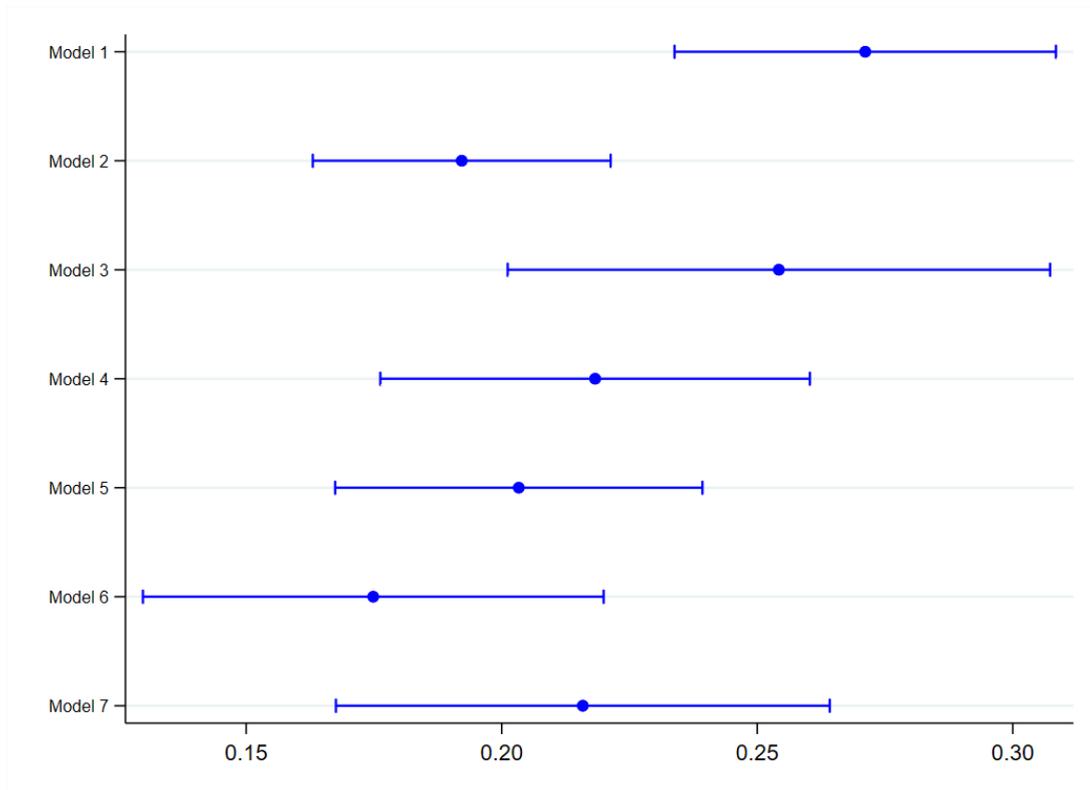
Table 3: The Level of Minimum Wages in OECD Countries, 2018

Country	Minimum Wage/Median FT Earnings
United States	33%
Spain	41%
Czech Republic	42%
Japan	42%
Mexico	42%
Estonia	43%
Germany	46%
Belgium	46%
Netherlands	47%
Ireland	48%
Greece	48%
Slovak Republic	49%
Latvia	50%
Lithuania	51%
Canada	51%
Hungary	52%
Poland	53%
Luxembourg	54%
Australia	54%
United Kingdom	54%
Romania	58%
Korea	59%
Slovenia	59%
Israel	59%
New Zealand	61%
Portugal	61%
France	62%
Chile	69%
Costa Rica	69%
Turkey	71%
Colombia	89%

Notes: Source: OECD.

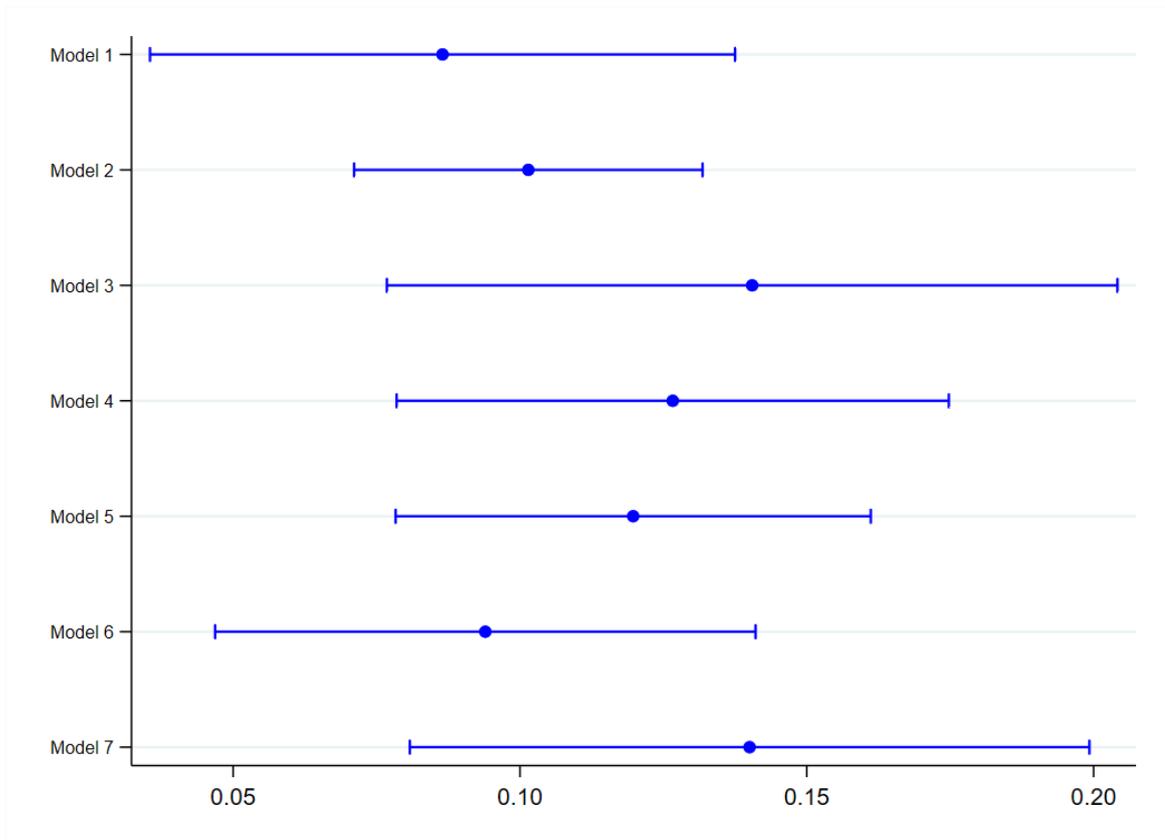
This is national minimum wage as a % of median hourly earnings for full-time workers. Because part-time workers are more likely to be low-paid, these figures are typically lower than those that report the minimum wage as a % of median hourly earnings for all workers.

Figure 1: The Sensitivity of Mean Log Hourly Wages with respect to the Log Minimum Wage for those aged 16-19



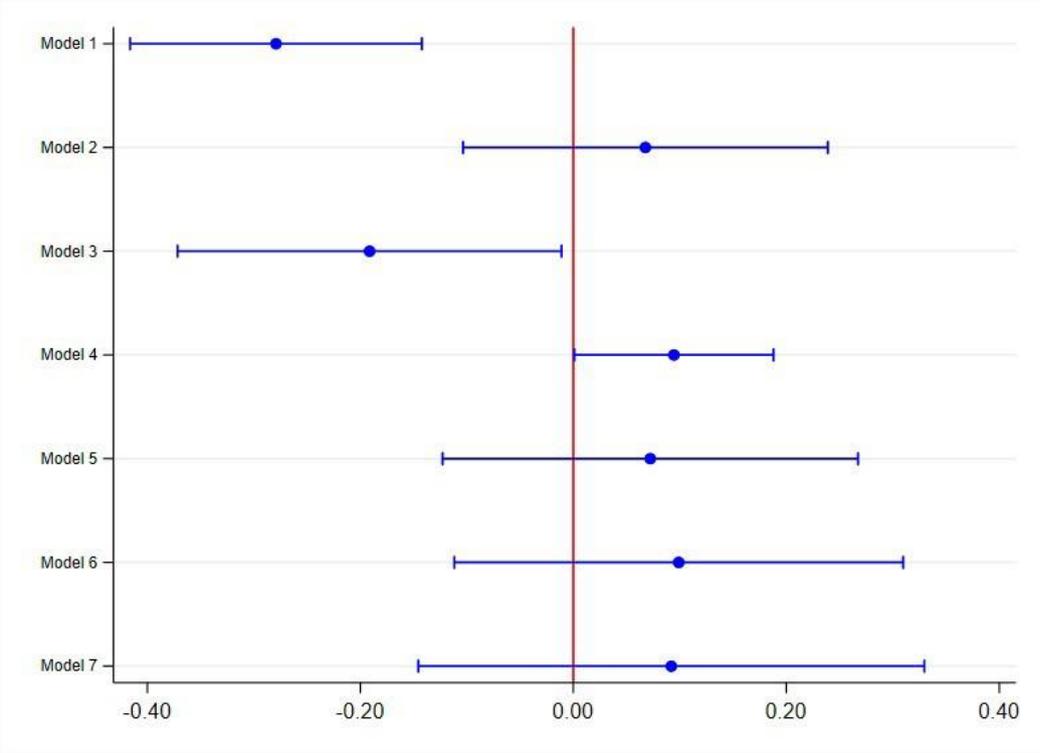
Notes: This is the estimated coefficient from a regression of the mean log hourly wage on the log of minimum wage and other controls detailed in the text. The seven models are described in the text. 95% confidence intervals are marked. Actual estimates reported in the Online Appendix.

Figure 2: The Sensitivity of Mean Log Hourly Wages with respect to the Log Minimum Wage for those aged 20-24



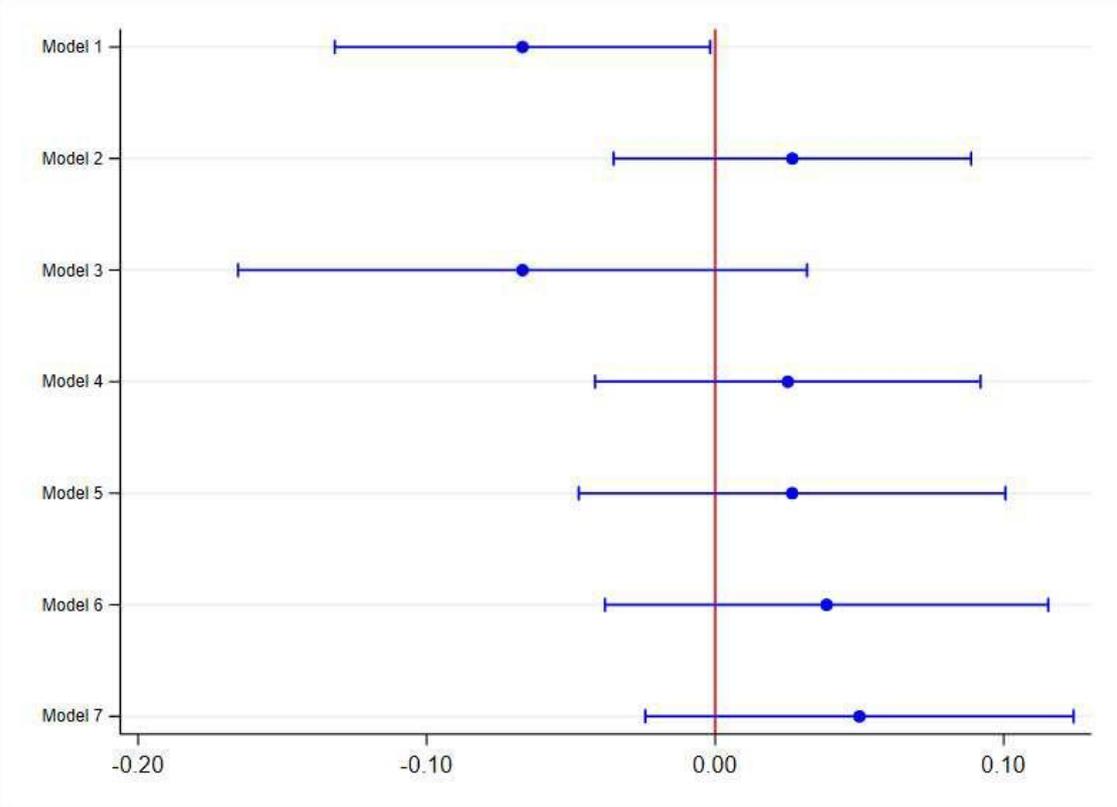
Notes: as for Figure 1.

Figure 3: The Sensitivity of Log Employment Rate with respect to the Log Minimum Wage for those aged 16-19



Notes: This is the estimated coefficient from a regression of the mean log employment rate on the log of minimum wage and other controls detailed in the text. The seven models are described in the text. 95% confidence intervals are marked. Actual estimates reported in the Online Appendix.

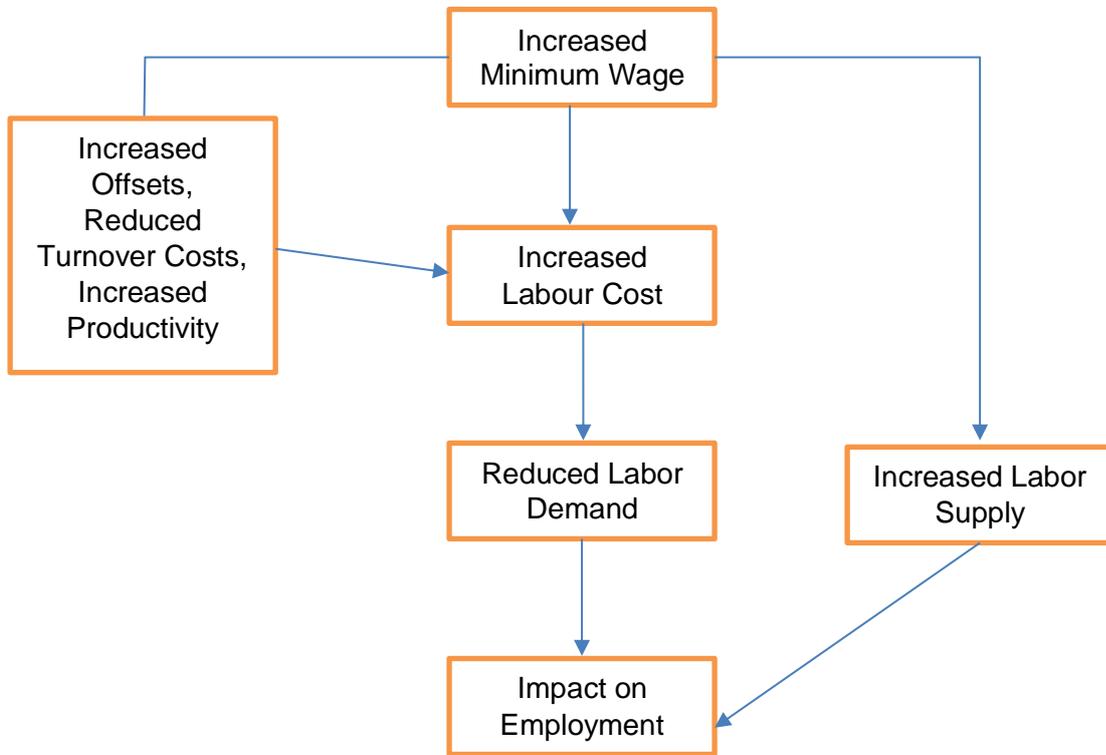
Figure 3: The Sensitivity of Log Employment Rate with respect to the Log Minimum Wage for those aged 20-24



Notes: As for Figure 3.

Figure 5

A Stylized Representation of the Impact of the Minimum Wage on Employment



References

- Aaronson, Daniel (2001) "Price pass-through and the minimum wage", *Review of Economics and Statistics*, 83, 158–69.
- Aaronson, Daniel and Eric French (2007) "Product Market Evidence on the Employment Effects of the Minimum Wage", *Journal of Labor Economics*, 25, 167-200.
- Aaronson, Daniel, Eric French, Isaac Sorkin and Ted To (2018) "Industry Dynamics and the Minimum Wage: A Putty-Clay Approach," *International Economic Review*, 59, 51–84.
- Addison, John, Blackburn, McKinley and Cotti, Chad, (2009), "Do minimum wages raise employment? Evidence from the U.S. retail-trade sector", *Labour Economics*, 16, 397-408.
- Addison, John T., McKinley L. Blackburn, and Chad D. Cotti, (2013) "Minimum Wage Increases in a Recessionary Environment," *Labour Economics*, 23, 397-408.
- Allegretto, Sylvia A., Arindrajit Dube, and Michael Reich (2011) "Do minimum wages really reduce teen employment? Accounting for heterogeneity and selectivity in state panel data", *Industrial Relations*, 50, 205–40.
- Andrews, Isaiah, and Maximilian Kasy (2019) "Identification of and Correction for Publication Bias", *American Economic Review*, 109, 2766-94.
- Askenazy, Philippe (2014) "The Parameters of a National Minimum Hourly Wage", IZA Policy Paper No. 86.
- Autor, David, Alan Manning and Christopher Smith (2016) "The Contribution of the Minimum Wage to U.S. Wage Inequality over Three Decades: A Reassessment", *American Economic Journal (Applied)*, 8, 58-99.
- Baker, M., Benjamin, D., and S. Stanger (1999). "The Highs and Lows of the Minimum Wage Effect: A Time Series-Cross Section Study of the Canadian Law." *Journal of Labor Economics*, 17, 318–350.
- Bailey, Martha J., John DiNardo, and Bryan A. Stuart (2020) "The Economic Impact of a High National Minimum Wage: Evidence From the 1966 Fair Labor Standards Act" NBER Working Paper No. 26926.
- Belman, Dale and Paul J. Wolfson (2014) "*What Does the Minimum Wage Do?*", Upjohn Institute for Employment Research, Kalamazoo, Michigan.
- Bell, B. and S. Machin, (2018). "Minimum wages and firm value", *Journal of Labor Economics*, 36, 159-195.
- Bishop, James (2018) "The Effect of Minimum Wage Increases on Wages, Hours Worked and Job Loss", *Bulletin of Reserve Bank of Australia*, September 2018.
[h https://www.rba.gov.au/publications/bulletin/2018/sep/the-effect-of-minimum-wage-increases-on-wages-hours-worked-and-job-loss.html](https://www.rba.gov.au/publications/bulletin/2018/sep/the-effect-of-minimum-wage-increases-on-wages-hours-worked-and-job-loss.html)
- Bossler, M., & Garner, H.-D. (2019) "Employment Effects of the New German Minimum Wage: Evidence from Establishment-Level Microdata", *Industrial and Labor Relations Review*.

Brochu, Pierre and David Green (2013) "The Impact of Minimum Wages on Labour Market Transitions", *Economic Journal*, 123, 1203-135.

Brown, Charles. (1988) "Minimum Wage Laws: Are They Overrated?" *Journal of Economic Perspectives*, 2, 133-145.

Brown, Charles, Charles Gilroy, and Andrew Kohen (1982) "The effect of the minimum wage on employment and unemployment", *Journal of Economic Literature*, 20, 487–528.

Burdett, Kenneth, and Dale T. Mortensen, (1998) "Wage Differentials, Employer Size, and Unemployment", *International Economic Review*, 39, 257-73.

Caliendo, Marco, Carsten Schröder and Linda Wittbrodt (2019) "The Causal Effects of the Minimum Wage Introduction in Germany – An Overview", *German Economic Review*, 20, 257-292.

Card, David E. and Alan B. Krueger (1995) "*Myth and measurement: The new economics of the minimum wage*", Princeton: Princeton University Press, 1995.

Cengiz, D., Dube, A., Lindner, A., and Zipperer, B., (2019) 'The Effect Of Minimum Wages On Low-Wage Jobs: Evidence From The United States Using A Bunching Estimator', *Quarterly Journal of Economics*, 134, 1405-1454.

Chletsos, Michael & Giotis, Georgios P (2015) "The employment effect of minimum wage using 77 international studies since 1992: A meta-analysis," MPRA Paper 61321, University of Munich.

Clemens, J., and Wither, M., (2019) 'The minimum wage and the Great Recession: Evidence of effects on the employment and income trajectories of low-skilled workers', *Journal of Public Economics*, 170, 53-67.

Congressional Budget Office (2014) "The Effects of a Minimum-Wage Increase on Employment and Family Income"

Congressional Budget Office (2019) "The Effects on Employment and Family Income of Increasing the Federal Minimum Wage", Washington DC: CBO <https://www.cbo.gov/publication/55410>.

Coviello, Decio, Erika Desarranno and Nicola Persico (2019) "Minimum Wage and Individual Worker Productivity: Evidence from a Large US Retailer", <https://drive.google.com/file/d/0B1g6WDc8t1zLUVpEU0ZSdFUySUE/view>

Ellora Deroncourt and Claire Montialoux, (2018) "Minimum Wages and Racial Inequality", <https://tinyurl.com/y5hnwp3w>.

Direction générale du Trésor (2019) "Salaire Minimum Interprofessionnel de Croissance: Rapport du Groupe d'Experts", Paris : Direction générale du Trésor.
<https://www.tresor.economie.gouv.fr/Articles/2018/12/21/rapport-annuel-du-groupe-d-experts-smic>

Doucoulagos, Hristos and T. D. Stanley (2009) "Publication Selection Bias in Minimum-Wage Research? A Meta-Regression Analysis." *British Journal of Industrial Relations*, vol. 47, no. 2, pp. 406-428.

Dube, Arindrajit (2019) "Impacts of minimum wages: review of the international evidence", London: HM Treasury [h https://www.gov.uk/government/publications/review-of-the-international-evidence-on-the-impacts-of-minimum-wages](https://www.gov.uk/government/publications/review-of-the-international-evidence-on-the-impacts-of-minimum-wages)

Dube, Arindrajit, Laura Giuliano and Jonathan Leonard (2019) "Fairness and Frictions: The impact of unequal raises on quit behaviour", *American Economic Review*, 109, 620-63.

Dube, A., T. William Lester and M. Reich (2010), "Minimum Wage Effects across State Borders: Estimates Using Contiguous Counties", *Review of Economics and Statistics*, 92, 945–964.

Dube, Arindrajit, T. William Lester, and Michael Reich (2016) "Minimum Wage Shocks, Employment Flows and Labor Market Frictions." *Journal of Labor Economics*, 34, 663-704.

Dube, Arindrajit and Ben Zipperer (2015) "Pooling Multiple Case Studies using Synthetic Controls: An Application to Minimum Wage Policies" *IZA Discussion Paper 8944*.

Dustmann, C., Lindner, A., Schönberg, U., Umkehrer, M., and vom Berge, P., (2020) 'Reallocation Effects of the Minimum Wage: Evidence From Germany', UCL CREAM Working Paper 07/20.

Flinn, C. (2006) "Minimum Wage Effects on Labor Market Outcomes under Search, Matching, and Endogenous Contact Rates", *Econometrica*, 74, 1013-1062.

Giuliano, Laura (2013) "Minimum Wage Effects on Employment, Substitution, and the Teenage Labor Supply: Evidence from Personnel Data," *Journal of Labor Economics*, 2013, 31, 155-194.

Harasztosi, Péter and Attila Lindner (2019) "Who Pays for the Minimum Wage?", *American Economic Review*, 109, 2693-2727.

Hirsch, Barry, Bruce E. Kaufman and Tetyana Zelenska (2015) "Minimum Wage Channels of Adjustment", forthcoming, *Industrial Relations*.

Hyslop, D. and S. Stillman (2007). "Youth minimum wage reform and the labour market in New Zealand." *Labour Economics*, 14, 201-230.

Hyslop, D and Stillman, S. (2011), The Impact of the 2008 Youth Minimum Wage Reform, The Department of Labour, Wellington.

ILO (2012) "Boosting jobs and living standards in G20 countries: A joint report by the ILO, OECD, IMF and the World Bank", <http://www.oecd.org/g20/topics/framework-strong-sustainable-balanced-growth/Boosting%20jobs%20and%20living%20standards%20in%20G20%20countries.pdf>.

IMF. 2014. 2014 Article IV Consultation with the United States of America Concluding Statement of the IMF Mission." June 16, <https://www.imf.org/external/np/ms/2014/061614.htm>.

Kennan, John (1995) "The Elusive Effects of Minimum Wages." *Journal of Economic Literature*, 33, 1950–1965.

Kramarz, Francis and Thomas Philippon (2001) "The impact of differential payroll tax subsidies on minimum wage employment", *Journal of Public Economics*, 82, 115-146.

Kreiner, C., Reck, D., and Skov, P., (2019) "Do Lower Minimum Wages for Young Workers Raise Their Employment? Evidence from a Danish Discontinuity", *Review of Economics and Statistics*, forthcoming.

Lee, David (1999) "Wage Inequality in the United States During the 1980s: Rising Dispersion or Falling Minimum Wage?" *Quarterly Journal of Economics*, 114, 977-1023.

Leonard, Megan, Thomas Stanley & Hristos Doucouliagos, (2014). "Does the UK Minimum Wage Reduce Employment? A Meta-Regression Analysis," *British Journal of Industrial Relations*, 52, 499-520.

Low Pay Commission (1998) "The National Minimum Wage: First Report of the Low Pay Commission report 2015".

Machin, Stephen, Alan Manning and Lupin Rahman (2003) "Where the Minimum Wage Bites Hard: The Introduction of the UK National Minimum Wage to a Low Wage Sector", *Journal of the European Economic Association*, 1, 154-180

Manning, Alan (2003) "*Monopsony in Motion: Imperfect Competition in Labor Markets*", Princeton: Princeton University Press.

Manning, Alan (2011) "Imperfect Competition in Labour Markets", in O.Ashenfelter and D.Card (eds) *Handbook of Labor Economics*, volume 4, North-Holland: Amsterdam, 2011.

Manning, Alan (2020) "Monopsony in Labor Markets: A Review", *Industrial and Labor Relations Review*, forthcoming.

Meer, J., and West, J., (2016) "Effects of the Minimum Wage on Employment Dynamics", *Journal of Human Resources*, 51, 500-522.

Monras, J., (2019) "Minimum Wages and Spatial Equilibrium: Theory and Evidence", *Journal of Labor Economics*, 37, 853-904

Mindestlohn Kommission (2018) "Zweiter Bericht zu den Auswirkungen des gesetzlichen - Mindestlohns", <https://www.mindestlohn-kommission.de/DE/Bericht/pdf/Bericht2018.html?nn=7916938>

Monras, Joan (2019) "Minimum Wages and Spatial Equilibrium: Theory and Evidence," *Journal of Labor Economics*, 37, 853–904.

Neumark, David , Ian Salas & William Wascher (2014) "Revisiting the Minimum Wage-Employment Debate: Throwing Out the Baby with the Bathwater?," *Industrial and Labor Relations Review*, 67, 608-648.

Neumark, David, and William Wascher (1992) "Employment effects of minimum and subminimum wages: Panel data on state minimum wage laws", *Industrial and Labor Relations Review*, 46, 55–81.

Neumark, David, and William Wascher (2000) "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Comment." *American Economic Review*, 90, 1362-1396.

Neumark, David, and William Wascher (2008) "*Minimum Wages*". Cambridge, MA: MIT Press.

OECD (2004) "OECD Jobs Study", Paris: OECD. <https://www.oecd.org/els/emp/1868601.pdf>

OECD (2018) "Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy", Paris: OECD. <http://www.oecd.org/publications/good-jobs-for-all-in-a-changing-world-of-work-9789264308817-en.htm>

Pissarides, Christopher A. (2000) "*Equilibrium Unemployment Theory*", .2nded., Cambridge (MA): MIT Press

O'Neill, Donal (2015) "Divided Opinion on The Fair Minimum Wage Act of 2013: Random or Systematic Differences", *Economics Letters*, 136, 175-178.

O'Neill, Donal and Nolan, Brian and Williams, James, (2006) "Evaluating the Introduction of a National Minimum Wage: Evidence from a New Survey of Firms in Ireland" *Labour*, 20, 63-90.

Plunkett, James and Jeff Borland (2014) "Aussie Rules: A briefing note on Australia's approach to the minimum wage and lessons for UK policymakers", London: Resolution Foundation.

Portugal, P. and Cardoso, A. R. (2006), "Disentangling the minimum wage puzzle: an analysis of worker accessions and separations", *Journal of the European Economic Association*, 4, 988–1013.

Rebitzer, J.B. and L.J. Taylor (1995). "The Consequences of Minimum Wage Laws: Some New Theoretical Ideas", *Journal of Public Economics*, 56, 245-255.

Schmitt, J., (2015) 'Explaining the Small Employment Effects of the Minimum Wage in the United States', *Industrial Relations*, 54, 547-581.

Shapiro, Carl, and Joseph, E. Stiglitz, (1984) "Equilibrium Unemployment as a Worker Discipline Device", *American Economic Review*, 74, 433-44.

Sorkin, I., (2015) 'Are there long-run effects of the minimum wage?', *Review of Economic Dynamics*, 18, 306-333.

Teulings, Coen N., 2000, "Aggregation Bias in Elasticities of Substitution and the Minimum Wage Paradox", *International Economic Review*; 41 (2), May, pages 359-98.

Vaghul, Kavya and Ben Zipperer (2019) "Historical State and Sub-state Minimum Wages." Version 1.2.0, <https://github.com/benzipperer/historicalminwage/releases/tag/v1.2.0>.

Zipperer, Ben (2016) "Did the minimum wage or the Great Recession reduce low-wage employment? Comments on Clemens and Wither (2016)", <https://equitablegrowth.org/working-papers/comments-on-clemens-and-wither/>