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The Elusive Employment Effect of the Minimum Wage

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Abstract
There is a huge body of empirical research on the employment effect of the minimum wage that has failed to clearly demonstrate the negative effect that so many economists strongly believe to find. This paper reviews the reasons for this and argues that the literature needs to re-focus to further our knowledge on the topic.

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Introduction

It is over 25 years since Charlie Brown invited readers of the Journal of Economic Perspectives to think about the question 'Minimum Wage Laws: Are They Over-rated?' with the final sentence "the minimum wage is over-rated by its critics as well as its supporters" (p144) (Brown, 1988). At the time, there was a strong academic consensus that the minimum wage caused job losses, was not well-targeted on those it set out to help, and dominated by other policies to help the poor like the EITC. Although the minimum wage often commanded wide support among the general population, policy-makers seemed to be paying attention - the US federal minimum wage had not been raised for almost a decade and only 10 states had higher minima. Outside the US, in 1993 the UK abolished the Wages Councils that had set minimum wages in some low-paying industries since being established by Winston Churchill in 1909 leaving only a minimum wage in agriculture. In 1994, the OECD published its view on desirable labour market policies in the Jobs Study, recommending that countries "reassess the role of statutory minimum wages as an instrument to achieve redistributive goals, and switch to more direct instruments. If it is judged desirable to maintain a legal minimum wage as part of an anti-poverty strategy, consider minimising its adverse employment effects" (OECD, 1994). So, minimum wages seemed to be withering away.

The landscape looks very different today – there is pressure to make more use of minimum wages almost everywhere. In the US, the logjam in Congress no change in the federal minimum wage is likely but 29 states have higher minima and a number of cities are 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. Outside the US, increasing numbers of countries are introducing or raising minimum wages e.g. Hong Kong in 2011, Germany in 2015. Professional advice has changed - a joint report from the IMF, World Bank, OECD and ILO for a G20 Conference 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[1] recommended to the US in October 2014 that "given its current low level (compared both to U.S. history and international standards), the minimum wage should be increased".

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 some doubt on the conventional wisdom that the minimum wage inevitably destroyed jobs with the only interesting question being the size of the loss. To be sure, disagreement remains within the

[1] https://www.imf.org/external/np/ms/2014/061614.htm

profession so that almost 25 years after this research began, there is no consensus on the employment effects of the minimum wage - O'Neill (2014) shows that there are clear characteristics of economists who signed the petition for and against the 2013 Fair Minimum Wage Act. But it does seem fair to say that clear negative impacts on employment of minimum wages are elusive.

In the large number of papers that try to estimate what the effect of minimum wages are 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 there are economic factors that explain the small and often ambiguous effects of the minimum wage on employment? Or perhaps labor markets are fundamentally different from conventional product markets. These are the issues discussed by this paper.

The conclusion is that the employment effect is elusive but that we should not be surprised by this given the way labor markets operate in which deviations from perfect competition are much larger than, say, in some product markets. And that it is perhaps 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 and continues to constitute the bulk of research on the impact of the minimum wage. This paper will not attempt to survey the vast literature on the employment effect of the minimum wage – there are excellent reviews available in Neumark and Wascher (2008), Belman and Wolfson (2013) and Schmitt (2013) as well as a number of meta-studies (Doucouliagos and Stanley, 2009; Leonard, Stanley and Doucouliagos, 2014; Chletsos and Giotis, 2015). We are almost at the point where there are meta-studies of meta-studies. To keep this paper to a manageable length it does not attempt to be encyclopaedic and cite every relevant study on every topic – apologies to those who do not get cited when they have as good a claim as those who do.

Most studies of the employment effect of the minimum wage focus on groups where the minimum is high in relation to average earnings e.g. teenagers, low-wage industries or those with low education. There is a sample selection problem here. There is probably no economist who does not believe that there is a point at which higher minimum wages reduce employment so one should be able to find samples in which this effect can be found. But even if one did find 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.

Of course, there are many parts of the labor market where the minimum wage would be expected to have no detectable effect on any labor market outcome because it is set so low in relation to prevailing wages that it has no impact at all. So 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. But even then the employment effect is often elusive.

To illustrate the elusiveness of the employment effect, this paper will only consider in detail the literature 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 (studies on, for example, fast food restaurants are even less conclusive). Teenagers hate having adults poking their noses into their business but their employment and wages have been pored over by generations of labor economists seeking to answer the question 'what is the impact of the minimum wage on employment?'. The early literature (reviewed in Brown, Gilroy and Kohen, 1982) largely focused on time series analysis but for the last 20+ years (starting with Neumark and Wascher, 1992) it is state-level panels that have been the focus of attention.

There is, of course, some reason for this attention. Teens are the group which is most affected by the minimum wage – Table 1 shows that in both 1979 and 2014, slightly more than 25% of teens had a reported hourly wage at or below the minimum though the fraction was somewhat lower in the intervening years[2]. And in some states in 2014 the minimum wage is very close to the median hourly wage for teens. So, while the minimum wage in the US as a whole is at quite a low level relative to median earnings (directly affecting less than 5% of workers), it is binding in the teen labor market. But there is also something slightly odd about the focus on teens as this group is a small and declining share of total employment, representing only 2% of total hours worked in 2014 (Table 1). The teen` share of minimum wage workers has 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 are over twice as large as the teen group. And Table 1 shows that almost 60% of teens were in education last week (this is averaged across the whole year)and students' labor supply could 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

[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.

amount of income to finance their education but otherwise want to spend as much time as possible on their studies. All of this means that there is something odd about extrapolating the evidence on teens to the whole labor market yet this is what a recent CBO report did (CBO, 2014) in producing estimates of the impact of proposed rises in the federal minimum wage on total employment.

In spite of all this the employment effect on teens is elusive. Table 2 starts by presenting some estimates of the impact of minimum wages on teen wages using a state-level panel as a first check there is some effect on wages. There is considerable dispute in the literature on the appropriate controls in these regressions that has varied over time. We do not seek to argue for a 'best' specification - instead we present a variety of estimates based on those used in Neumark, Salas and Wascher (2014) who are responding in part to Allegretto, Dube and Reich (2011)[3]. Our sample period is 1979-2014. We define the minimum wage as the maximum of the state and federal minimum.

All of these regressions control for the prime-age unemployment rate and the proportion of teens in the population. The reported specifications differ according to the fixed effects and trends that are included. The first column just includes state and time fixed effects, column (2) adds state-specific linear trends, column (3) census division time fixed effects, column (4) the both the census division effects and the linear trends, column (5) has a state-specific quadratic trend, column (6) a cubic trend and column (7) a quartic trend.

Table 2 shows that for teen wages, there is a clear robust 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. The size of the elasticity is slightly larger than the fraction of teens reporting hourly wages at or below the minimum which is consistent with modest spill-over effects from the minimum wage (Autor, Manning and Smith, 2015).

One problem with these specifications is that they imply that the elasticity of teen wages with respect to the minimum wage is a constant whatever the level of the minimum wage. While this may be all that could be identified for the observed range of variation in minimum wages, it 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 to be increasing in the minimum wage – a very low minimum wage will have no impact and a higher minimum wage a larger impact. Non-linearity has not been investigated

[3] We do not address in detail here a recent debate that uses synthetic control methods – Neumark, Salas and Wascher (2014), Dube and Zipperer (2015). But, it seems unlikely this will deliver clear evidence on a negative employment effect.

much in the literature on employment effects (though it is in the literature on the impact of the minimum wage on inequality – Lee, 1999; Autor, Manning and Smith, 2015) , perhaps because it is thought hard enough to detect a linear effect. But for the wages of teenagers, one can detect such an effect as is demonstrated in the 'quadratic' part of Table 2, Panel A. This includes a quadratic term in the minimum wage normalized by the mean log hourly wage of prime-age workers in the state and then instrumented using the controls in the regression interacted with the minimum to deal with the quadratic term. The quadratic term is centred so that the coefficient on the linear term is the marginal effect at the mean value of the normalized minimum wage – details are in the Appendix.

As one can see, the quadratic term for teens has the expected positive coefficient in all specifications as one would expect, is significantly different from zero and reasonably robust.

Although most research focuses on teens, Table 2 also reports results for those aged 20-24 and 25-29 . Table 1 showed that both of these groups now account for a higher fraction of minimum wage workers than do teens though the impact of the minimum wage is lower for these groups. For the 20-24 age group most of the estimated impacts of the minimum on wages are significantly different from zero especially in the quadratic specification, though lower than the estimated effect for teens. So, it is not just teens where one can detect a significant impact on wages. And for the 25-29 group, there are also some significant effects with the quadratic estimates not being very different from those found for the 20-24 age group. Detectable wage effects seem to extend beyond the teen years.

Table 3 presents estimates of similar equations for the effect of the minimum wage on the employment rate of teenagers. For teens the specification which includes only state and time fixed effects (Panel A, column 1) produces a significant negative effect in both the linear and the quadratic specification. But, unlike the wage effect, this is not at all robust to other specifications. The estimated effects are generally not significantly different from zero and positive coefficients are as common as negative ones[4]. For the older groups where the estimated wage effect is not as robust but still often present, one never finds significant negative effects and most of the estimated effects are small and positive.

[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.

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.

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. It is time to call a truce with it being acknowledged 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.

But the difficulty of establishing a clear employment effect is a puzzle to many and why this should be the case is discussed in the next section.

Why is the Employment Effect so Elusive?

Suppose we have a very simple model based on a competitive labor market for the analysis of the wage and employment effects of the minimum wage. We assume that the minimum wage affects actual wages according to an equation:

$$\ln w = \alpha_0 + \alpha \ln w^{\min} + \alpha_1 x + \varepsilon_w \tag{1}$$

In turn the wage affects the marginal cost of labor to the employer according to:

$$\ln w^c = \beta_0 + \beta \ln w + \beta_1 x + \varepsilon_c \tag{2}$$

And, in turn, there is a labor demand curve relating employment to the cost of labor to the employer so that we have:

$$\ln n = \gamma_0 + \gamma \ln w^c + \gamma_1 x + \varepsilon_n \tag{3}$$

Combining (1)-(3) we end up with a reduced-form equation relating employment to the minimum:

$$\ln n = \delta_0 + \alpha\beta\gamma \ln w^{\min} + \delta_1 x + u \tag{4}$$

If one can detect a significant effect of the minimum on wages in the estimation of (1) but fail to find one in (4), there are a number of possible explanations for this. First, it may simply be harder to find an equal-sized impact on employment than wages (which would correspond to a labor demand elasticity of 1) because employment has more residual variation leading to larger standard errors. Looking at Tables 1 and 2 one can see that, for teens, the standard errors on the employment

estimates are typically larger than on the wage estimates. But, for the older groups, the standard errors on wage and employment equations are very similar.

To the extent that there is something to the argument that it is harder to get a precise employment estimate than a wage estimate, the solution is better quality data. In this regard, the literature could perhaps make more use in future of administrative and payroll data, the use of which was probably pioneered by Neumark and Wascher (2000). Studies using payroll data are surprisingly rare but two recent studies, Giuliano (2013) and Hirsch, Kaufman and Zelenska (2015) both found large wage effects but no negative employment effects.

Secondly, it may be that the impact of the minimum wage on employment is weaker than on wages because β or γ or both are small i.e. because the pass-through from minimum wages to the cost of labor is low or because 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? It may be the case that employers can off-set the impact of 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 or training. The feature of offsets is that workers are made worse-off, possibly by more than the increase in the minimum wage. Evidence for this is decidedly weak (see the review in Neumark and Wascher, 2008, or Belman and Wolfson, 2014) but it is a theoretical possibility. 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 - turnover and monitoring costs. Consider turnover costs - suppose that each worker costs H to hire and train and that the turnover rate is given by $q\left(w_f, w\right)$ where w_f is the wage paid by this firm and w is the wage paid by other firms. We would expect that a high own-wage lowers quits, a high other wage raises it but the effect of raising both own and other wages is to reduce quits as work as a whole becomes more attractive relative to non-work. 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, 2015; Dube, Giuliano and Leonard, 2015). Total labour costs in firm f will be given by:

$$w_f^c = w_f + q\left(w_f, w\right)H \tag{5}$$

Firms will choose their own wage to minimize labor costs leading to a first order condition:

$$1-\phi+\phi\frac{\partial \ln q}{\partial \ln w_f}=0 \tag{6}$$

Where ϕ is the share of turnover costs in total labor costs[5]. Now consider the imposition of a minimum wage that just binds in firm f and raises wages in all firms with an elasticity of λ. The elasticity of labor costs with respect to the wage can then be written as:

$$\frac{\partial \ln w_f^c}{\partial \ln w^{\min}}=(1-\phi)+\phi\frac{\partial \ln q}{\partial \ln w_f}+\lambda\phi\frac{\partial \ln q}{\partial \ln w}=\lambda\phi\frac{\partial \ln q}{\partial \ln w} \tag{7}$$

Where the second equality follows from the use of (6). The final term may be very small e.g. many estimates of the share of turnover costs in total costs are around 0.05 (though could conceivably be higher for low-wage workers with very high turnover rates). This is for the effect of a just-binding minimum wage- the effects will be larger for infra-marginal firms. But the important point is that they may still be a long way below unity that the simplest models would imply. The intuition is that a model like (6) implies an interior solution for the own-wage so that a small change in it has a zero effect on total labor costs and, hence, on employment.

The Elasticity of the Labor Demand Curve

The other possibility for why the employment effect is elusive is that the elasticity of the labor demand curve, γ, is low. Competitive market theory would predict a move away from minimum wage labor in the production of a given level of output and a fall in the level of output produced. If production function has constant returns to scale we would expect the elasticity of labor demand for a group of workers to be given by:

$$\gamma=-s\eta-(1-s)\sigma \tag{8}$$

Where s is the share of the group of interest in total costs, η the elasticity of product demand and σ is the elasticity of substitution with respect to other inputs. It is quite plausible that the impact through changes in the level of output (the first term in (8)) is small because the share of minimum

[5] This first-order condition is not without its problems as Matt Rognlie has made me aware. Most estimates suggest ϕ is low (Manning, 2011) and the elasticity of quits not that high. This can be reconciled by assuming firms face increasing marginal costs of recruitment but one is then in models where the minimum wage might increase employment (Manning, 2006).

wage labor in total costs is small[6] and because most minimum wage workers are in non-traded goods sectors so that all firms in the industry will be affected and the relevant product demand elasticity is then that for the industry demand curve. Additionally there may be positive effects on local demand if minimum wage workers have a higher propensity to consume than the owners of firms.

The second term in (8) relates to the substitution away from minimum wage labor - for a small overall employment effect this would suggest a very low value for the elasticity of substitution though the reason for this is not entirely clear (see Teulings, 2000, for the best attempt to explain this).

Imperfectly Competitive Labor Markets

The strong a priori belief held by many that a rise in the minimum wage must cost jobs derives from the assumption that the labour market is perfectly competitive. The theoretical argument can be understood very simply. For a wage W there is a downward-sloping labor demand curve $N^d(W)$ and an upward-sloping labor supply curve $N^s(W)$ - think of this latter curve as being based on the extensive margin so we don't have to worry about complications like backward-bending labor supply curves. In a frictionless market we have that actual employment, N, is determined by the short side of the market i.e.:

$$N = \min\left[N^d(W), N^s(W)\right] \tag{9}$$

We also need a theory of wage determination and let us assume that, in the absence of minimum wages or other institutions, the wage is at the market-clearing level i.e. the equilibrium wage, W^*, satisfies:

$$N^d(W^*) = N^s(W^*) \tag{10}$$

Combining the assumption of frictionless markets, (9), with the assumption that wages clear the labor market, (10) and one immediately reaches the conclusion that a binding minimum wage must

[6] The small literature on the impact of minimum wages on prices (e.g. Aaronson, 2001) typically does find some pass-through at a level consistent with the impact on total costs. Some (e.g. Aaronson and French, 2007) have inferred from price rises that output and employment must fall but in the sectors in which minimum wages have the biggest impact, quality of service is obviously variable as well breaking a simple link between prices, output and employment.

put us in the region where labor demand exceeds labor supply so increases in the minimum reduce employment with an elasticity given by the elasticity of the labor demand curve[7].

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 labour market phenomena, in particular, unemployment. The model of (9) and (10) implies that involuntary unemployment cannot exist (except when created by institutions like the minimum wage) and inclines to the view that sees the 'great depression/recession as the great vacation'. This view does exist but is not 'conventional' at all. And there is a tension between assuming that employment is determined by demand alone when it comes to analysing the impact of minimum wages and believing, for example, that extensions to UI lead to lower employment, a view that labor supply has some impact on employment. To summarize, labor economists frequently use a different model of the labor market when analyzing minimum wages from the one they use when analysing unemployment.

Most contemporary analyses of unemployment assume that there are some frictions i.e. that – at prevailing wages - not all workers who want a job manage to get one and that employers who want to hire a worker manage to find one. The consequence is that vacancies and unemployment co-exist simultaneously in the labor market. The existence of vacancies means that actual employment, N, is below labor demand, $N^d(W)$, and the existence of unemployment means actual employment, N, is below labor supply, $N^s(w)$. But we would expect both labor demand and supply to influence employment which means that (9) is modified to:

$$N = f\left[N^d(W), N^s(W)\right] < \min\left[N^d(W), N^s(W)\right] \tag{11}$$

To explain a labour market with the co-existence of both unemployment and vacancies one has to believe in a reduced-form function that has something like the form of (11). Of course one has to have a model of wage determination to replace (10) and a variety of models are available from bargaining models (e.g. Pissarides, 2000) to monopsony models (e.g. Burdett and Mortensen, 1998;

[7] There are more sophisticated competitive analyses e.g. recognising there are many inter-connected labor markets and there will be effects on the demand for different goods and general equilibrium effects that – as is their wont – might conceivably be quite complicated.

Manning, 2003)[8]. Most of these models would have the feature that the wage is higher, the higher is labor demand relative to labor supply i.e. we have something like:

$$W = g\left[\frac{N^d(W)}{N^s(W)}\right] \tag{12}$$

Where $g'(>0)$. Now consider a change in the wage. The important point is that employment in (11) is plausibly increasing in both demand and supply so that the impact of an increase in the wage on employment is theoretically ambiguous. There is no a priori reason why the economy should be in a position where a rise in the wage above the free market equilibrium necessarily reduces employment.

The treatment of frictional markets here has more than been a little casual and I am sure will offend purists– the demand and supply functions would not be the same in (11) as in (9) but it would still be the case that a higher wage means employers latent demand is lower and that more workers would like a job. But this over-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.

However, all of these explanations imply that there will come a point at which the minimum wage is so high that it reduces employment significantly. Perhaps the minimum wage in the US is set at such a low level that we are not close to that point. Then one should look elsewhere for evidence of the impact of minimum wages when they are set at higher levels. The next section goes in search of such evidence.

The Elusive Employment Effect: International Evidence

Table 4 presents OECD figures on how high is the minimum wage in member countries in relation to full-time median earnings[9]. According to these figures, the US does have a relatively low level of

[8] It is well-known that minimum wages can possibly raise employment even if the labor markets is frictionless if one assumes that employers have some monopsony power – one would retain (9) but relax (10). But most credible accounts of monopsony power are based on frictions so we do not pursue those models here.

[9] These figures are often lower than 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 exercize some caution in making comparisons across countries e.g. Askenazy (2014) discusses how the treatment of tips in the minimum wage is very different in the US, UK and France. And many countries have lower rates for younger workers in a way that the US does not. And employer payroll taxes may also be important e.g. the French minimum wage does not appear as high in relation to average earnings when earnings are computed as total labour costs 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).

minimum wages in relation to median earnings. So we might hope to look to 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 the minimum wage seems much higher than in the US and where we have good research designs for investigating the employment impact.

The UK

After the US, the country with the most research on the employment impact of the minimum wage is the UK It is particularly interesting because in the period 1993-1999[10] it had no minimum wage except in agriculture leading to some startling job offers e.g. for a security officer for £2 per hour who must provide their own dog. In 1999 the National Minimum Wage was introduced, initially at a low level (about 46% of median hourly earnings), but subsequently increased to now be about 55%. Unlike the US it does have sizeable age variation – there are lower rates for workers aged less than 21 and for apprentices. 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 (see LPC, 2015, for its latest report) and, apart from a few studies in specific sectors (e.g. Machin, Manning and Rahman, 2003, which studied a sector where 30% of workers were paid the minimum), has found nothing. Here I will simply present a summary of that research. The NMW 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. It obviously has had more impact on younger than older workers, on women than men and in low-wage regions of the UK.

Here we will just consider the long-period impact of the minimum wage from 1997 (before it was introduced) to 2007 (before the financial crisis). We divide the labour market into segments by gender, age groups and regions. We compute the fraction of workers who would be expected to be affected by the minimum wage using data from 1996. We then consider how wages and employment have changed in the different segments after controlling for gender, age and region effects. Figure 1a plots the residualized change in wages against the residualized bite of the minimum wage. One can see very clearly the impact of the NMW on wages – wage growth has been stronger in low-wage segments of the UK labour market – this is consistent with the fall in wage inequality in the bottom half of the distribution in this period (Butcher, Dickens and Manning, 2012). Figure 1b does the same exercize but for employment – the lack of a relationship is very clear. We

[10] Prior to 1993 it had Wages Councils which set minimum wages in a number of low-paid sectors though some large low-paid sectors were excluded.

see in the UK, although the minimum wage is at a higher level than in the US, a clear impact on wages but an elusive effect on employment.

France

France is often held up as the model of what happens when the minimum wage is set too high. It has had high unemployment in general, and youth unemployment in particular, for a very long time. The expert committee that reports on the minimum wage estimates (DGT, 2014, p52) that 11.4% of workers are paid the in the neighborhood of the minimum much higher than the proportions directly affected in the US or the UK. And the expert committee has never recommended since its inception in 2008, increasing the minimum faster than the minimum required by the law, reflecting the view of the economists on it that the minimum 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 . The 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 (see (11)) so employment would be expected to rise. This is not the same as a general cut or rise in the minimum wage.

It may well be the case 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$16.87, approximately US$13.5) it also has a system of 'Modern Awards' which 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 simply an absolute floor. But even the federal minimum is at a relatively high level relative to average earnings- around 16% of workers are currently paid the minimum wage (Plunkett and Borland, 2014). In fact, the OECD statistics suggested that in the late 1990s they were higher than those in France and. But, unlike France, the Australian labour market has not been plagued by persistently high unemployment rates (it is currently 6.1%).

Like 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 and the literature is small. But it is a useful counterpoint to the argument that all the countries with the highest minimum wages have a very clear unemployment problem.

Other Countries

New Zealand also has high minimum wages, and an official body to review the evidence on its impact (see MBIE, 2014). The research based on the best variation in the minimum wage is Hyslop and Stillman (2007, 2011) who investigate the impact of large changes in the youth minimum wage, finding – at best – weak evidence of job losses even though the minimum wages are high in relation to average earnings.

One could also point to studies of Ireland (O'Neill, Nolan and Williams, 2006), Portugal (Portugal and Cardoso, 2006) or Hungary (Harasztosi and Lindner, 2015) for 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.

The conclusion is that the employment effect remains – for the moment – elusive. But it may be that we are about to learn more. A number of US cities are phasing in sizeable rises in minimum wages that are estimated to affect much higher proportions of workers in the labor market as a whole – over 20% - than we have experienced. In the case of Los Angeles, the proposed 50% increase over 5 years is estimated to directly affect 35% of workers by 2019 (Reich et al, 2015). Seattle started its increase in the minimum wage to $15 on 1 April 2015 and already newspapers and the tweetosphere are full of stories about the impacts though it will be some time before we have enough data to make a considered judgment. It would, however, be extraordinary if minimum wages at this level do not provide clear evidence of job losses and would almost certainly lead to another revision in professional opinion. And, outside the US, the new minimum wage in Germany is also set at quite a high level (need to get an estimate) and there will undoubtedly be economists poring over the results from that as well.

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, and focusing heavily on the evidence for American teens. We have reached the point of diminishing returns to this. A balanced view of the evidence on teen employment 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 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 euphemistically described as 'non-conventional'. But the 'conventional' view is based on a model of the labor market in which all unemployment is voluntary leisure. To be internally consistent those who argue that the minimum wage must reduce employment need to sign up for the 'great recessions as a great vacation' hypothesis. As soon as one acknowledges that labor markets have frictions (hardly an unconventional view) one has to acknowledge that the impact of the minimum wage on employment is theoretically ambiguous – this paper has tried to explain why in the simplest possible terms.

Of course there is some level of the minimum wage at which employment will decline significantly. The literature should re-orient itself towards trying to find that point. One cannot when the observed range of minimum wages 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. Together with, hopefully, an increased use of high-quality payroll data, we may be about to learn more.

Table 1: The Diminishing Importance of the Teen

		Age 16-19	Age 20-24	Age 25-29	Age 30-49	Age 50-64
% 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
	2014	2.04	9.29	12.09	47.47	29.12
% 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
	2014	11.40	23.30	12.89	33.44	18.97
% in HS/college last week	1984	47.2	18.7			
	1990	50.7	18.9			
	2000	57.4	23.0			
	2014	58.1	26.0			
% 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
	2014	27.3	12.3	5.2	3.4	3.2

Notes.

1. Computations from MORG

Table 2: The Impact of the Minimum Wage on the Wages of Youth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Linear							
Log Min	0.154***	0.154***	0.188***	0.218***	0.156***	0.205***	0.204***
	[0.0291]	[0.0222]	[0.0484]	[0.0433]	[0.0273]	[0.0356]	[0.0311]
Quadratic							
Log Min	0.171***	0.211***	0.220***	0.310***	0.219***	0.280***	0.309***
	[0.0368]	[0.0345]	[0.0538]	[0.0524]	[0.0381]	[0.0414]	[0.0294]
Log Min	0.350**	0.453***	0.210*	0.509***	0.434***	0.507***	0.705***
Squared	[0.141]	[0.145]	[0.110]	[0.134]	[0.143]	[0.136]	[0.0925]
Panel B. : Aged 20-24							
Linear							
Log Min	0.0111	0.0692***	0.0653	0.0835**	0.0653**	0.113***	0.0963***
	[0.0361]	[0.0224]	[0.0428]	[0.0383]	[0.0302]	[0.0317]	[0.0226]
Quadratic							
Log Min	0.0193	0.113***	0.0887*	0.172***	0.104**	0.160***	0.156***
	[0.0422]	[0.0375]	[0.0454]	[0.0454]	[0.0455]	[0.0460]	[0.0301]
Log Min	0.144	0.347**	0.172*	0.522***	0.264	0.328**	0.412***
Squared	[0.165]	[0.166]	[0.104]	[0.143]	[0.164]	[0.152]	[0.115]
Panel C. : Aged 25-29							
Linear							
Log Min	-0.019	0.0309	0.0568	0.0559	0.0313	0.0883***	0.0739***
	[0.0416]	[0.0252]	[0.0490]	[0.0377]	[0.0292]	[0.0304]	[0.0245]
Quadratic							
Log Min	-0.00139	0.0920**	0.086	0.132***	0.108**	0.148***	0.143***
	[0.0468]	[0.0389]	[0.0524]	[0.0431]	[0.0466]	[0.0427]	[0.0303]
Log Min	0.273	0.484***	0.22	0.453***	0.517***	0.430***	0.488***
Squared	[0.176]	[0.156]	[0.136]	[0.137]	[0.176]	[0.138]	[0.0899]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Notes: Sample period is 1979q1 to 2014q4 inclusive. Sample is 50 states. Total observations are 7200. Standard errors are clustered by state. All regressions include state and time fixed effects. Dependent variable is the mean of log hourly earnings for the relevant age group from the MORG.

Table 3: The Impact of the Minimum Wage on the Employment of Youth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. : Aged 16-19							
Linear							
Log Min	-0.245***	0.0618	-0.112	0.083	0.066	0.0369	0.00477
	[0.0479]	[0.114]	[0.105]	[0.0581]	[0.126]	[0.120]	[0.125]
Quadratic							
Log Min	-0.264***	0.06	-0.161	0.0659	0.0967	0.0891	0.0546
	[0.0515]	[0.109]	[0.106]	[0.0606]	[0.116]	[0.121]	[0.119]
Log Min	-0.415*	-0.0129	-0.365	-0.119	0.208	0.390*	0.363*
Squared	[0.242]	[0.192]	[0.222]	[0.154]	[0.199]	[0.201]	[0.206]
Panel B. : Aged 20-24							
Linear							
Log Min	-0.0225	0.0314	-0.0032	0.0398	0.0459	0.0303	0.0276
	[0.0315]	[0.0366]	[0.0394]	[0.0327]	[0.0406]	[0.0399]	[0.0434]
Quadratic							
Log Min	-0.0287	0.0254	-0.0151	0.0188	0.0603*	0.041	0.044
	[0.0344]	[0.0366]	[0.0436]	[0.0326]	[0.0330]	[0.0374]	[0.0414]
Log Min	-0.115	-0.0479	-0.0971	-0.137	0.0982	0.0718	0.112
Squared	[0.103]	[0.0811]	[0.0859]	[0.0859]	[0.0793]	[0.0733]	[0.0708]
Panel C. : Aged 25-29							
Linear							
Log Min	0.0293	0.0135	0.0488*	0.0497**	0.0288*	0.0223	0.0156
	[0.0316]	[0.0176]	[0.0261]	[0.0238]	[0.0151]	[0.0153]	[0.0158]
Quadratic							
Log Min	0.0349	0.00911	0.0570**	0.0469*	0.0470***	0.0363**	0.0310**
	[0.0339]	[0.0216]	[0.0281]	[0.0274]	[0.0149]	[0.0146]	[0.0143]
Log Min	0.102	-0.0351	0.0512	-0.0291	0.123**	0.101	0.109*
Squared	[0.0755]	[0.0712]	[0.0745]	[0.0755]	[0.0598]	[0.0653]	[0.0623]
State trends	None	Linear	None	Linear	Quadratic	Cubic	Quartic
Division*Time effects	No	No	Yes	Yes	No	No	No

Notes: As for Table 2 except that dependent variable is now the log of the employment-population ratio taken from the monthly CPS.

Table 4: The Level of Minimum Wages in OECD Countries, 2013

Country	Value	Country	Value
Turkey	69.4%	Ireland	47.9%
Chile	67.8%	Netherlands	47.4%
France	62.8%	United Kingdom	46.9%
Slovenia	61.2%	Slovak Republic	45.5%
New Zealand	59.5%	Greece	44.7%
Israel	57.7%	Canada	44.1%
Portugal	55.8%	Luxembourg	41.4%
Australia	54.0%	Spain	41.3%
Hungary	53.9%	Korea	40.1%
Lithuania	51.6%	Japan	39.0%
Belgium	50.0%	Estonia	38.8%
Poland	49.7%	United States	37.4%
Romania	49.6%	Mexico	36.8%
Latvia	48.2%	Czech Republic	36.4%

Notes: 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 1a: The Impact of the UK National Minimum Wage on Wages, 1997-2007

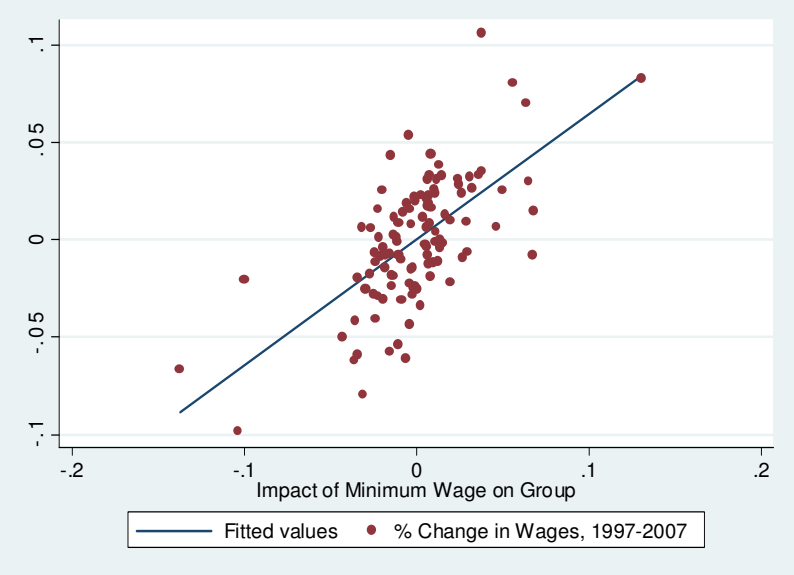

Figure 1b: The Impact of the UK National Minimum Wage on Employment, 1997-2007

Notes: Each point on these graphs represents an age-gender-region cell. 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 minimum wage in 1997.

Appendix: Estimation Methods

This describes our estimation method for the 'quadratic' models reported in Tables 2 and 3. In these models we normalize the minimum wage in each state and quarter by the mean log hourly wage for the 30-49 age group that we think is not affected by the minimum wage. The quadratic term is then centred around the mean value of the normalized minimum wage in the sample so that the coefficient on the linear term can be interpreted as the marginal effect at the mean.

The resulting model can be then be written as:

$$y_{st} = \beta x_{it} + \beta_1 \left(w_{st}^{\min} - w_{st}^{30-49} \right) + \beta_2 \left(w_{st}^{\min} - w_{st}^{30-49} - \omega \right)^2 + \varepsilon_{st} \qquad (13)$$

Where x_{st} are the other controls. Because the prime-age wages will evolve according to local labor market conditions the normalized minimum wage variables are likely subject to an endogeneity problem. As a result we instrument them using the following procedure. First, we estimate a model for the prime-age wage as a function of x_{st}. We then take the predicted value from this equation and form the linear and squared normalized minimum wage using the predictions rather than the actual. We then use these predicted values as the instruments – the first stages are always very strong.

If the model (13) contains only the linear minimum wage term this is identical to using the minimum wage alone as the predicted variable is a linear function of the regressors. But where the quadratic term is included using IV does make a difference – effectively one is using the interaction between the regressors and the minimum wage as instruments.

Data and programs are available on request.

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