Does the UK Minimum Wage Reduce Employment? A Meta-Regression Analysis

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Abstract

The employment effect from raising the minimum wage has long been studied but remains in dispute. Our meta-analysis of 236 estimated minimum-wage elasticities and 710 partial correlation coefficients from sixteen UK studies finds no overall practically significant adverse employment effect. Unlike US studies, there seems to be little, if any, overall reporting bias. Multivariate meta-regression analysis identifies several research dimensions that are associated with differential employment effects. In particular, the residential home care industry may exhibit a genuinely adverse employment effect.

Keywords: Minimum wage, employment, meta-regression analysis

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1. Introduction

There is a long and rich tradition of investigating the employment consequences of a government mandated minimum wage (Moore, 1971; Lovell, 1972; Welch, 1976; Mincer, 1976; Card and Krueger, 1995a; Neumark and Wascher, 2008). A decrease in employment is the clear implication of the theory of the firm and profit maximization under competition. Few economic relations are more strongly held or more vigorously defended than the adverse employment

dies were divided between those

1994:320). Since the early 1990s and the contributions of several scholars including Card and Krueger (1995a) for the US and Machin

whether minimum wage laws have negative effects or no effects on employment (Machin and Manning, 1994:320).

In 2009, the *British Journal of Industrial Relations* devoted a special issue to the history, effectiveness, and consequences of the first century of minimum wage laws in Britain (Deakin and Green, 2009). One paper offered a comprehensive and statistically rigorous assessment of all the empirical estimates of the employment effects of the minimum wage in the US and found

residential home care industry is more adversely affected by minimum wage increases. Unlike US research, no evidence of any aggregate reporting bias is found in the UK literature.

2. Meta-regression analysis

> Meta-analysis refers to the statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings. It connotes a rigorous alternative to the casual, narrative discussions of research studies that typify our attempt to make sense of the rapidly expanding research literature (Glass, 1976:3).

Meta-analysis is a type of systematic review that employs the full range of statistical methods to summarize and to help researchers understand, deeply, what an entire empirical literature means. Systematic reviews are distinguished from conventional narrative reviews in that they require that all research results be included and identified through an explicit and comprehensive search strategy. Meta-regression analysis (MRA) is the regression analysis of

(M)eta-regression analysis is a form of meta-analysis especially designed to investigate 2001, p.131). By now, many hundreds of MRAs of economics research have been published (Roberts and Stanley, 2005; Nelson and Kennedy, 2009; Stanley and Doucouliagos, 2012).

Meta-regression analysis is designed to model the effects of observed econometric specifications. Its central objective is to directly estimate the associated misspecification biases and thereby filter out these potential distortions from our empirical knowledge (Stanley and Jarrell, 1989). Meta-regression analysis is a systematic and comprehensive review of all comparable econometric findings. It models any potential bias or systematic variation, thereby explaining the excess variation always observed among reported econometric results.

Take, for example, the previous meta-regression of the employment effects of the US minimum wage. Doucouliagos and Stanley (2009) identified 1,474 empirical estimates and their standard errors of the minimum-wage employment elasticity contained in 64 US studies. The simple average of these 1,474 elasticites is -0.19, representing a small adverse employment effect. However, there is also a very clear statistical trace of selective reporting of statistically

reporting is accommodated, no evidence of an adverse employment effect remains. This central finding was further corroborated in several ways through multivariate meta-regression modelling

and robustness checks. Doucouliagos and Stanley (2009) coded 22 factors that were thought to have the potent

effects of the US minimum wage. Thus, it is prudent to accommodate this potential effect in the

Publication Selection Bias

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publication bias was found to be an important contributor to the appearance of an adverse employment effect. Thus, we would be remiss not to investigate the possibility of selective

Publication selection is a widely accepted fact in the social science, medical research, and economics (Rosenthal, 1979; Glass, McGaw and Smith, 1981; Hedges and Oklin, 1985; Begg and Berlin, 1988; DeLong and Lang, 1992; Card and Krueger, 1995b). Publication bias arises from the selection of statistically significant research findings, and it can cause great exaggerations to the size of the empirical phenomena in question (Havranek, 2010; Doucouliagos and Stanley, 2012; Doucouliagos, Stanley, and Giles, 2012). Perhaps, the clearest statement of publication bias in economics comes from Card and Krueger (1995b: 239).

1. Reviewers and editors may be predisposed to accept papers consistent with the conventional view.
2. Researchers may use the presence of a conventionally expected result as a model selection test.
3. favorably.

Fortunately, a simple meta-regression model has been shown to be effective in identifying and filtering publication selection bias (Egger et al., 1997; Stanley, 2008; Stanley and Doucouliagos, 2012).

$$effect_i \quad _0 \quad _1 SE_i \quad _i \qquad (1)$$

MRA model (1) accommodates selective om8>n

Table 2 gives the estimated results for MRA model (1). Heteroskedasticity is always an issue for meta-regression, because estimates, which are the dependent variable, come from very different datasets with different sample sizes and different estimation techniques. Thus, some version of weighted least squares (WLS) should always be employed. Furthermore, authors in this literature typically report multiple estimates; therefore, estimates within a study cannot be assumed to independent from one another. To account for these data complexities, Table 2 only reports WLS estimates that adjusts for this within-study dependence, through cluster-robust standard errors and random-effects unbalanced panels. Typically, we prefer fixed-effects panel MRA models, because random-effects are quite likely to be correlated with the MRA independent variables (for example, SE_i) (Stanley and Doucouliagos, 2012). Here, however, the Hausman test for choosing between fixed-and random-effects panel models allows us to accept random-effects ($^2(1) = \{0.04; 0.08\}$; p-values>>.05). See Feld and Heckemyer (2011) and Stanley and Doucouliagos (2012) for a more detailed discussion of these issues.

difference-in-difference quasi-experiment. No doubt, this is a very rich research literature, and if we drill down into this research we will find other differential employment effects and research dimensions that affect the reported estimates. To identify potential differential employment effects, we next turn to multiple meta-regression analysis.

Multiple MRA

To accommodate a potentially complex employment effect, misspecification biases and differential propensities to report adverse employment effect, the simple MRA model (1) can be greatly expanded.

$$effect_i = \beta_0 + \sum_k \gamma_k Z_{ki} + \beta_1 SE_i + \sum_j \delta_j SE_i K_{ji} + \varepsilon_i \quad (2)$$

In effect, β_0 is replaced by $\beta_0 + \sum_k \gamma_k Z_{ki}$. The Z-variables allow for heterogeneity and misspecification biases, and the $SE_i K_{ji}$ terms may represent any factor that is associated with the

not add K-variables because we can find no net publication bias in this research. Besides adding K-variables causes very large multicollinearity (VIF > 10^8). See Stanley and Doucouliagos (2012) for a more detailed discussion of this Z/K MRA model and Table 4 for a list of coded moderator variables.

But which variables should we use for these Z-variables? First, we begin with all those research dimensions that Doucouliagos and Stanley (2009) found to be relevant for the US research literature. Second, to their multiple MRA model we added three new research dimensions: *DID, WageCouncil* and *HomeCare*. Third, as an additional control we add a labour market regulation variable. The effect of a minimum wage on employment could be conditioned by the degree of labour market regulation. *Regulation* is the overall measure of labour market

Economic Freedom of the World 2011 Annual Report). This is a composite measure of regulation comprising the minimum wage bite, hiring and firing regulations, centralized collective bargaining, unemployment insurance and mandated costs of worker dismissal. See Table 4 for a list of all the variables coded.

multicollinearity, especially as the UK and regulation variables are added, some accommodation must be made to identify the more important research dimensions. All along the way, weighted least squares with cluster-robust standards errors were used. The resulting cluster-robust WLS-MRA models are shown in column 2 of Tables 5 and 6. Column 3 of Tables 5 and 6 add the specific variables that we coded for the UK research literature (*DID*, *WageCouncil* and *HomeCare*). Lastly, *Regulation* is added to all of these previous moderator variables to see if the severity of regulation provides any further explanation of the variation seen among the reported employment effects of the UK minimum wage.

Table 5: Multiple MRA of UK Minimum-Wage Partial Correlations: Cluster-Robust WLS

Moderator Variables:	*Column 1: D&S (2009)*	*Column 2: G-to-S*	*Column 3: +UK variables*	*Column 4: +Regulation*
		Heterogeneity (Z-variables)		
Un	-0.24 (-5.52)	-016 (-13.4)	-0.23 (-14.9)	-0.24 (-12.1)
Toughness	0.049 (2.58)	0.052 (2.22)	0.035 (3.38)	0.034 (3.65)
Lag	-0.004 (-4.04)	-0.004 (-3.38)	-0.004(-3.99)	-0.004(-3.86)

for elasticities and -.16 to -

As further robustness checks, we include additional low-wage industrial sectors (*Agriculture* and *Food*) and measures of employment (*Hours*) with the multiple MRA models reported in Tables 5 and 6 see Appendix Table 1. For the partial correlation research data, *Food* has a very similar adverse employment effect as does the home care industry; thus it too might deserve special consideration. As theory would suggest, hours worked (*Hours*) gives a small, but significantly greater, adverse employment effect than does the number of workers employed, which is the conventional dependent variable in this literature. Otherwise, the same overall results apply to these expanded meta-regression models.

Best Practice Research

Perhaps most importantly, these multivariate results are consistent with the simple MRA findings that there is no meaningful adverse employment effect from minimum wage raises. To see this, substitute plausible values for the moderator variables. Although it seems rather clear to us that this will not lead to a practically meaningful adverse employment effect, one must at some point di

research. While reasonable researchers might have some differences in their judgments, our

minimum wage

these multiple MRAs, one must always substitute 0 in for SE. The SE terms represent publication or selection bias, therefore these biases need to be driven to zero, and secondly, as we have more and more information (n 0).
In other words, SE=0 represents the perfect study. This leaves the question of which values of the Z-variables should be substituted into the MRA. So what are the best values to use for these Z-variables?

As discussed above, there are several good reasons for not including the unemployment rate into the employment equation. Following 99% of the UK minimum-wage research literature, one must regard the omission of the unemployment rate (*Un*=0) as one dimension of

Toughness needs to be set to one. Labour economists agree that some allowance must be made for the effectiveness of the minimum wage (*i.e.*, its size relative to market wages); doing so is coded as *Toughness* =1. The only real question is whether the

This is the reason why we have added a measure of regulation in the last column of Table 5 and 6. Although the time trend is so small that it will not be important, we will assume that *AveYear*

HomeCare=0, but will also consider *HomeCare*=1, below. *HomeCare* needs to be zero if we wish to generalize to most occupations and industries rather than this one small industry. There are several moderator variables: *Double, Published, WageCouncil and DID* that have positive coefficients. Although we could easily make the case that most of these moderator variables should be one for best practice research, we will assume that all are zero to give the possibility of an adverse employment effect its best chance. Lastly, we make *Adults* =1, because this too will give the adverse employment effect its best chance (the MRA coefficient for *Adults* is negative). Because *Regulation* is insignificant, we use the MRA model that does not include it, column 3 of Tables 5 and 6. Besides, its MRA coefficients are so small that its value will have no material effect on this assessment.

When these values are substituted into the MRA that is represented by column 3 in

sticity and partial

correlation (0.31; 0.018, respectively). Needless to say, this represents a very sizeable, policy-relevant, *positive* association for employment elasticities, but a practically insignificant one for partial correlations. Even more importantly, the absence of a relevant adverse employment effect results no matter what values we substitute into the MRA, as long as *SE* and *Un* are held to zero.[5] Even for the residential home care industry, we still have a positive employment elasticity. On the other hand, for partial correlations, employment in the residential home care industry is assessed to have negative correlation with minimum wage, -0.082. Although this is indust2o66[ )]TJ>3(re)7(l)-11material

confirm the absence of a practically significant adverse employment effect. Our results are consistent with a previous meta-analysis of the larger US minimum-wage research literature (Doucouliagos and Stanley, 2009). However, unlike the US minimum-wage research, there is no evidence of reporting bias in the UK research literature.

What explains this lack of the expected negative employment response to a rise in mandated wages? Several explanations can be offered. First there is the issue of endogeneous policy. It appears that policy makers have implemented minimum wage adjustments in a fashion that minimized their employment effect (Low Pay Commission 2000: vii). Second, Metcalf (2008) argues that any adverse employment effects were probably offset by movements in productivity, prices, profits, and adjustments to hours worked. Lemos (2008) finds that the minimum wage has a small effect on prices. conjecture remains to be proven through further independent replications or meta-analyses. Another explanation is that perhaps the competitive labour market model is not an accurate representation of the UK labour market. Lester (1946), Card and Krueger (1995a), OECD (1998), and Metcalf (2008), among others, discuss how monopsonistic power in the labour market might easily be responsible for the

There is one potentially important exception to this overall finding of the absence of an adverse employment effect. Our MRA discovers clear evidence that the employment effect is significantly more negative in the residential home care industry, and this might also be true for retail food. Perhaps, these differential employment effects may be large enough to suggest special treatment?

Of course, the full story of this area of research is more complex and nuanced than any simple overall summary. Our MRA identifies several research dimensions that affect the magnitude of the reported employment effect. Aside from the home care and food industries, the use of a relative measure of minimum wage (*Toughness*), and the inclusion of the unemployment rate in the employment equation have relatively large consequences for the employment effect. As discussed above, we have reason to believe that the effect of including the unemployment rate represents misspecification bias and/or the signal of selective reporting bias. There may also be several other important differential effects, including *WageCouncil*; however, these effects are not as robust and have a smaller impact on the employment effect.

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Appendix Table 1: Multiple MRA with Hours and Sectors, Cluster-Robust WLS

Moderator Variables:	*Partial Correlations*	*Elasticities*
	Heterogeneity (Z-variables)	
Un	-0.25 (-16.5)*	-0.25 (-4.97)*
Toughness	0.023 (10.2)	0.20 (1.14)
Lag	-0.004 (-4.23)	
Published	0.024 (2.69)	
Adults	-0.009 (-0.71)	
AveYear		

Appendix Table 2: Multiple MRA of UK Minimum-Wage Elasticities: Robustness Checks

Notes: t- or z-

Appendix Table 3: Multiple MRA of UK Minimum-

[1] In addition to various search engines, we also conducted a cited reference search on the papers that we found to have viable estimates and we cross-referenced the references of relevant studies. The search for studies ended in June 2012.

[2]

$$r \quad \frac{t}{\sqrt{t^2 \quad df}}$$

Where *t* is the t-value of the regression coefficient on the minimum-wage variable, and *df* is its degrees of freedom.

[3] If we were to take these simple descriptive statistics at face value, then we could be 95% confident that there is a marginally positive average employment effect from the minimum wage (t=1.83; one-tail p-value<.05).

[4] We do not advocate throwing out all contrary evidence, or any relevant, comparable research result, from a meta-analysis. We do so only to take our tests of the overall findings to their farthest extreme to see if they can still hold up.

[5] SE must be set to zero because it reflects selection bias. Because only one study in this literature uses the unemployment rate in the employment equation, it would not seem to be appropriate to set Un = 1 to derive an overall estimate of the employment effect. Nonetheless, we still find a *positive* employment elasticity effect even when Un=1.