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Labour market institutions and youth labour markets: Minimum wages and youth employment revisited

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Employment Policy Department
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Preface

The primary goal of the ILO is to work with member States towards achieving full and productive employment and decent work for all. This goal is elaborated in the ILO Declaration 2008 on *Social Justice for a Fair Globalization*, which has been widely adopted by the international community. Comprehensive and integrated perspectives to achieve this goal are embedded in the Employment Policy Convention of 1964 (No. 122), the *Global Employment Agenda* (2003) and – in response to the 2008 global economic crisis – the *Global Jobs Pact* (2009) and the conclusions of the *Recurrent Discussion Reports on Employment* (2010 and 2014).

The Employment Policy Department (EMPLOYMENT) is engaged in global advocacy and in supporting member States in placing more and better jobs at the center of economic and social policies and growth and development strategies. Policy research and knowledge generation and dissemination are essential components of the Employment Policy Department's activities. The resulting publications include books, country policy reviews, policy and research briefs, and working papers.

The *Employment Policy Working Paper* series is designed to disseminate the main findings of research on a broad range of topics undertaken by the branches of the Department. The working papers are intended to encourage the exchange of ideas and to stimulate debate. The views expressed within them are the responsibility of the authors and do not necessarily represent those of the ILO.

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Foreword

Across the globe, young women and men are making an important contribution as productive workers, entrepreneurs, consumers, citizens, members of society and agents of change. All too often, the full potential of young people is not realized because they do not have access to productive and decent jobs. Although they are an asset, many young people face high levels of economic and social uncertainty. A difficult transition into the world of work has long-lasting consequences not only on youth but also on their families and communities.

The International Labour Office has long been active in youth employment, through its normative action and technical assistance to member States. One of the means of action of its Youth Employment Programme revolves around building and disseminating knowledge on emerging issues and innovative approaches.

In 2012, the International Labour Conference issued a resolution with a call for action to tackle the unprecedented youth employment crisis through a set of policy measures. The resolution provides guiding principles and a package of inter-related policies for countries wanting to take immediate and targeted action to address the crisis of youth labour markets. This paper is part of follow-up action under which the ILO's Youth Employment Programme (YEP) has been implementing knowledge building efforts.

The issue of interactions between labour market institutions and policies and their effects on youth labour markets are the main focus of this paper which is primarily concerned with issues grouped under pillars 1 and 3 of youth employment policy as identified by the 2012 resolution. Such institutions also have implications for pillar 5, young people's rights at work. The paper reports the results of a meta-analysis of the youth employment effects of minimum wage legislation. This confirms that, for the most part, the dis-employment effects of minimum wages are either small or nil. This finding is in line with the review of minimum wages undertaken under similar circumstances nearly two decades ago (O'Higgins, 2001, ch. 5).

The main contribution of the paper, however, concerns the role of other labour market institutions in determining the size of the dis-employment effects of minimum wages in youth labour markets. In addition to the small average size of the dis-employment effect, one of the main characteristics of estimates of the effects of minimum wages on youth employment is their substantial heterogeneity across location and time. In seeking to explain some of this variation, a meta-analysis[1] is used to explicitly consider the role of interactions between labour market institutions in determining the youth employment effects of minimum wages. It finds that any dis-employment effects that do exist are moderated in countries that have more protective employment legislation, and also – in High Income Countries (HICs) – where collective bargaining is both more coordinated and less centralized.

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[1] For those not familiar with the term, meta-analysis and its rather grander sister, systematic review, are forms of quantitative literature review where the findings of single studies are used as observations in a statistical analysis of an aggregation of studies on a particular issue which meet specific criteria. It is a very useful tool, inasmuch as it allows one to use statistical analysis to make sense of the variety of findings related to a specific case, such as here.

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1. Introduction: Labour market institutions and youth labour markets

Boeri (2010, p. 1182) defines a labour market institution as "a system of laws, norms or conventions resulting from a collective choice, and providing constraints or incentives which alter individual choices over labor and pay". For the most part, labour market institutions serve to protect the more vulnerable participants in the labour market, typically guaranteeing certain rights and providing workers with some basic protections from harm and/or loss of income. But labour market institutions themselves are just part of the larger institutional setting which determines what actually goes on in labour markets. Berg and Kucera (2008) make the further distinction between labour institutions, which comprise formal and informal rules, practices and policies affecting how the labour market works, and a subset of these, labour market institutions, which include employment protection legislation (EPL) but explicitly excludes "non-market" institutions such as trade unions and the work ethic. All these factors have important implications for the quality and quantity of work available to, and performed by, young people. In this paper, the concern is primarily with the quantitative youth employment effects of labour market institutions, in particular the systems of rules and regulations governing labour markets – as encapsulated in, for example, EPL, statutory minimum wages and organizational arrangements concerning collective bargaining. This is because it is often argued, with or without evidence, that there is a trade-off between the protections offered to (young) workers by legislative provisions and the disincentive effects of such provisions on potential employers.

Many labour market institutions are likely to influence the labour market experiences of young people more than those of other groups. For example, young people are usually, by virtue of their age, either new or relatively recent labour market entrants, and are consequently more likely to be affected by EPL *inasmuch as* this has an effect on the newly employed. Similarly, they are likely to be disproportionately represented among the low paid, and so are more likely than other age-groups to be employed or looking for employment in jobs directly affected by minimum wage legislation.

The influence specific labour market institutions have on labour market outcomes is likely to depend *inter alia* on the characteristics of other institutions that are present as well as on broader contextual characteristics.[2] The broader approach to labour institutions mentioned above leads naturally to the explicit recognition that labour (market) institutions are endogenous and evolve over time, interacting with each other as well as with the economic environment; there is a rich literature taking this approach which focuses on groups of institutional "regimes". Among others, the volume on *Varieties of capitalism* edited by Hall and Soskice (2001) has given rise to a large body of literature in its own right, as has Esping-Andersen's earlier (1990) analysis in the *Three worlds of welfare capitalism*.

In the context of the school-to-work transition and integration of youth into the labour market, a number of authors have proposed groupings of countries unified by similar combinations of institutional arrangements relevant to youth labour markets.[3] One such classification of countries according to their institutional arrangements has been suggested by Eichhorst et al. (2009), whose analysis provides an analytical and empirical basis for the identification of country groupings according to a variety of explicit forms of labour market

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[2] Such as the state of a country's economy and its level of development, to name just two among many other factors.

[3] Perhaps the most well known of these is the classification proposed by Pohl and Walther (2007). Hadjivassiliou et al. (2016) present a recent application of this classification, while Raffe (2011) provides a review and overview of the main issues.

flexibility. Specifically, they distinguish between internal (to companies) and external (labour market level) flexibility on the one hand, and between numerical (variation of the workload) and functional (organizational adaptability) flexibility on the other; wage flexibility is further considered as a separate category. In their empirical application of this model, Eichhorst and colleagues use factor and cluster analyses to divide European countries into four groups according to the external and wage flexibility criteria. O'Higgins (2014) uses these country groupings to look in detail at the reactions of a variety of youth labour market indicators to variations in economic conditions, allowing for a structural break before and after the great recession.

This paper seeks to offer a contribution on the effects of interactions between labour market institutions on the youth labour market, focusing on the employment effects of the minimum wage. Recognizing that youth employment programmes and policies are not implemented in a void, it is reasonable to suppose that outcomes arising as a consequence of any specific policy or programme choice will be influenced by existing institutional arrangements. Specific complementarities among labour market institutions have arguably received *relatively* little attention in the literature, notwithstanding the contributions mentioned above. Notable exceptions are the papers by Bassanini and Duval (2006, 2009) which examine in some detail the role of interactions in aggregate labour markets.[4] Estimating empirical panel models of aggregate unemployment, they find that labour market institutions are complementary in that the effects of specific institutions such as EPL and unemployment benefits reinforce one another. This contrasts with a more recent analysis from O'Higgins and Pica (2017) which, looking explicitly at young people, finds that in both a theoretical matching model and its empirical counterpart, Active Labour Market Policies (ALMPs) mitigate the effects of stronger (or weaker) EPL, dampening the positive (negative) stimulus to youth employment arising from weaker (stronger) legislation.

Here the emphasis is on the contribution of specific institutional interactions to the substantial heterogeneity of youth employment effects associated with the introduction of, or increases in, the minimum wage. In this respect, this paper is close in spirit, albeit not methodology, to the analysis of Bassanini and Duval (2009). The meta-analysis of the youth employment effects of minimum wages undertaken in the following section shows that any negative (positive) employment effects of minimum wage legislation are reduced (increased), or even the sign inverted, in the presence of strong EPL. The finding is plausible in that EPL makes it more costly for firms to fire workers, so that they may be less likely to react to an increase in the minimum wage by laying off workers. On the other hand, firms may well adjust to changes in EPL by reducing hiring – in anticipation of higher firing costs in the event of a reduction in the workforce – and hence there is also a potential impetus in the opposite direction.[5]

As regards the analysis of the specific institutional determinants of youth employment, Bassanini and Duval (2006) find a strong negative effect of EPL on youth employment, but a positive and statistically significant effect of minimum wages on youth employment rates. On the other hand, neither Jimeno-Serrano and Rodriguez-Palenzuela (2002) nor Bertola et

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[4] Boeri et al. (2012) also explicitly treat interactions among labour market institutions, although they are primarily concerned with the trade-off between two such institutions (unemployment benefits and EPL) as an outcome of the political process, rather than its labour market effects per se. The impact of labour market institutions themselves has been the subject of an extensive literature. In addition to the papers cited in the text, see also De Serres et al. (2012) and OECD (2007, ch. 4), among many others.

[5] This double effect on both the firing and hiring practices of firms is the main reason why the net effect of the strength of EPL on employment levels is indeterminate in principle (and, as it turns out in many analyses, also in practice).

al. (2007) find a statistically significant role for EPL in depressing youth employment; but the former do report a negative impact of minimum wages on youth employment.

Thus there is little agreement on the effects of labour market institutions on youth employment and unemployment, and estimates of the impact of specific labour market institutions on youth employment either are highly heterogeneous in size and direction (as with minimum wages and youth employment) or have thus far produced no unequivocal theoretical or empirical conclusions as to the direction of possible effects (as with EPL).[6] Precisely because this is the case, it is important to develop our understanding of the effects of different labour market institutions in different circumstances.

The purpose of this paper is thus to provide some clear and specific policy-relevant results on the impact of specific complementarities on the youth labour market effects of minimum wages, so as to provide concrete indications on the implications of different policy and programme choices. The next section reports the results of a meta-analysis of the youth employment effects of minimum wage legislation. A number of possible institutional and economic complementarities are considered, and the main finding is that across a broad range of high- and middle-income countries[7] minimum wages and EPL are mutually supportive institutions. That is, the minimum wage is less likely to have a negative impact on youth employment in countries with strong EPL.

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[6] Although it may be argued that the case in favour of negative employment effects of EPL is stronger – both theoretically and empirically – for young people than for workers as a whole, since the former constitute a high proportion of new labour market entrants.

[7] For fairly obvious reasons, minimum wage legislation is not common in Low Income Countries (LICs), and we found no studies of the impact of minimum wages on youth employment in such countries.

2. Minimum wages and youth employment: Previous evidence

A minimum wage establishes a price floor below which wages cannot – legally – fall. Thus, the purpose of the minimum wage is to increase the incomes of especially low-wage workers and hence reduce inequality and poverty (Eyraud and Saget, 2008; Berg, 2015). Since young people are disproportionately represented among the low-paid, given their lack of experience and perceived lack of job-related skills, they are also likely to be disproportionately affected by the establishment of a minimum wage. There is much evidence to support the idea that the minimum wage increases firm-level training, productivity and wages, and reduces wage inequality.[8] However, this may come at a cost. Specifically, it is often argued that minimum wages are likely to "price young people out of jobs". Analyses of the effects of minimum wages on youth employment have produced a wide range of estimates, from strongly negative to moderately positive. The determinants of this heterogeneity are the main focus of the meta-analysis reported below. Specifically, the focus is on the role of interactions between labour market institutions in determining the size and direction of the effects of minimum wages on the employment of young people.

Despite the apparent plausibility of the argument that high levels of minimum wages tend to discourage the employment of (in particular) young people, the available evidence on the issues is rather mixed. The comprehensive review undertaken by Neumark and Wascher (2007) found estimates of teenage employment elasticity with respect to the minimum wage ranging from below −1 to above 0. The authors concluded overall that the existing evidence points towards negative employment effects of minimum wages for young people. Of 102 studies considered, nearly two-thirds found negative (albeit often not statistically significant) estimated employment effects of minimum wages, while only eight found "convincing" positive effects. However, an emphasis on demonstrating that the effects are generally negative rather than positive rather misses the central point, which is that the effects of minimum wages in the vast majority of cases are found to be small. In this sense, these results are in line with the review of evidence presented by O'Higgins (2001, ch. 6), which found small or zero (i.e. not statistically significant) employment effects of minimum wages for young people.[9] Furthermore, Neumark and Wascher (2004) suggested that the effects of minimum wages on aggregate employment vary considerably (from negative to positive) according to the presence of other labour market institutions (EPL, ALMPs etc.); and, in particular, that the negative effects are most pronounced in unregulated labour markets. Allegretto et al. (2011) and Dube et al. (2010) have argued, however, that the methodologies typically employed to identify minimum wage effects are downward biased – hence more likely to find a negative employment effect even where none exists – because they ignore unobserved heterogeneity which, once controlled for, produces no negative employment effect of minimum wages on young people.[10]

Over the past two decades, a number of meta-analyses of the aggregate employment effects of minimum wages have been produced. The first of these, by Card and Krueger (1995b), undertook a meta-analysis of published time-series papers. Their main conclusion

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[8] Recent evidence on minimum wages and productivity is provided by Riley and Bondibene, (2017). Acemoglu and Pischke (1999, 2003) have shown that minimum wages stimulate training, and the positive effects on wages and negative effects on wage inequality have been dealt with by, inter alia, DiNardo et al. (1996) and, more recently, Autor et al. (2016).

[9] Similar findings are reported also by Kolev and Saget (2005). Thus, it is not unreasonable to suggest that two further decades of research have confirmed the enduring veracity of Richard Freeman's assertion that "the debate over the employment effects of the minimum wage is a debate of values around zero" (Freeman, 1996, p. 647).

[10] On the other hand, Neumark et al. (2013) have argued that the approach of these two papers essentially takes too much account of heterogeneity, hence leading to insignificant coefficients.

was that the time-series literature had been affected by a combination of specification searching and publication bias, leading to a tendency for statistically significant results to be over-represented in the published literature. Doucouliagos and Stanley (2009) reported the results of a meta-analysis of the employment elasticity of the minimum wage; in their opinion, once publication bias had been corrected, little or no evidence of a negative association between minimum wage and employment remained. They concluded that the minimum wage had either no effect or only a very small effect on employment; on the basis of the 64 studies and 1,500 estimates in their sample, they judged that they had "reason to believe that if there is some adverse employment effect from minimum-wage rises, it must be of a small and policy-irrelevant magnitude" (Doucouliagos and Stanley, 2009, p. 423).

Boockmann (2010) reported the results of a meta-analysis of 55 empirical studies estimating the employment effects of minimum wages in 15 industrialized countries. Two-thirds of the estimates in the sample indicated negative effects; however, the findings also strongly supported the notion of heterogeneous effects of minimum wages across countries. This paper was a rare example of the approach – also adopted here – in which the source of heterogeneity is sought in labour market institutions; in Boockman's case, with particular attention to the unemployment benefit replacement ratio, employment protection and the collective bargaining system. Boockman's study is also of interest in that it included analyses from several countries, in contrast to its predecessors, which had looked exclusively at the United States.

More recently, meta-analyses of the employment effects of minimum wages have been undertaken by Belman and Wolfson (2014) and Leonard et al. (2014) in HICs, and by Chletsos and Giotis (2015) in both HICs and LICs, while Nataraj et al. (2014) has examined two LICs (India and Indonesia) and Broecke et al. (2015) a broader range. In none of these cases do the results lead to a substantial modification of the conclusion arising from previous studies that the effect of minimum wages on aggregate employment is small or zero.

Almost all of the evidence cited above was collected in higher-income, industrialized countries. In LICs there is relatively little evidence on the impact of minimum wages on young people; however, in the new millennium there have been a number of studies looking more generally at the effects of minimum wages, above all in Latin America.[11] For the most part the estimated size of the employment effect is in the −1/0 range; mostly smaller rather than larger (in absolute terms).

Few studies have looked at the interactions between the effects of the minimum wage and other labour market institutions. One notable exception is the analysis by Neumark and Wascher (2004), mentioned above. Although this is not its main focus, the paper does include a specification with interactions between minimum wages and other labour market institutions. It finds that the two institutions which consistently have statistically significant interactions with minimum wages are strong EPL and expenditure on ALMPs, both of which offset the estimated negative employment effects of minimum wages on young people as a whole (15–24) and on teenagers (15–19). That is, increasing employment protection and increasing expenditure on ALMPs tend to reduce any negative employment effects for young people arising as a consequence of an increase in the minimum wage.

Boockmann's (2010) meta-analysis also looks explicitly at the role of labour market institutions in determining cross-country differences in the estimated employment effects of minimum wages. His analysis differs from that of Neumark and Wascher (2004) in that the dependent variable is the effect of the minimum wage on labour market outcomes, rather than the labour market outcome itself. In this respect it is closer to the meta-analysis

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[11] See e.g. the review by Freeman (2010) and the studies cited therein.

presented in this paper.[12] He finds that more generous unemployment benefits reduce any negative employment effects of minimum wages, as does, albeit to a lesser extent, centralized collective bargaining; on the other hand, in direct contrast to the findings of Neumark and Wascher (2004), Boockmann's results suggest that strong EPL increases the negative employment effects of minimum wages. He suggests that a possible explanation lies in a difference between short- and long-run complementarities – or substitutability – between EPL and the minimum wage. Boockmann (2010) argues that Neumark and Wascher (2004) are concerned with short-run effects, in respect of which, he argues, it is plausible that strong EPL primarily reduces dismissals (more than appointments) and hence impedes the operation of any negative employment effects, whereas his own analysis (Boockmann, 2010) covers both short- and long-run effects, in which any EPL-based obstacles to dismissal are weaker.[13] One might also note, however, that the negative effect found by Boockmann is not very robust; it emerges only when other institutional variables are included in the model,[14] disappearing completely when the strength of employment protection is the only institutional influence considered. Hence, it is sensible to agree with Boockmann himself when he says that the institutional variables "taken together may describe the countries' regulation system but it is unclear [from this analysis] whether they have a separate impact on the estimated minimum wage effects" (Boockmann, 2010, p. 178).

2.1. What are the mechanisms underlying the effects – or their absence

In their seminal study on minimum wages in the fast-food industry in New Jersey, Card and Krueger (1995a) found that minimum wages had positive effects on employment. How can this be explained? A simple competitive model of the labour market suggests unequivocally that increasing minimum wages will lead to employment losses. If the demand for labour equals its supply and firms compete to hire young people from a large pool of homogeneous potential workers, raising minimum wages above the market equilibrium will unequivocally lead to a reduction in employment and an increase in unemployment. The only possible alternative is that the minimum wage is set below the market clearing rate and will thus be irrelevant since market equilibrium will in any case lead to a wage which is above the legal minimum.

If, however, employers have some market power in setting wages – a rather more realistic scenario in practice – they may well be able to set wages at below the market clearing rate. In this situation, increasing minimum wages may actually lead to an increase in employment, as was found by Card and Krueger. So long as the minimum wage is set below the competitive market clearing rate, raising minimum wages will increase

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[12] Boockmann's analysis differs from the current approach, however, in that he includes many different types of analysis and outcome. In particular, Boockmann includes studies which look at the effects of minimum wages on unemployment as well as on employment. Including the impact on unemployment means implicitly also incorporating supply-side effects – that is, if raising the minimum wage encourages some people to actively search for work, then unemployment will rise even if the demand for labour and hence employment is unaffected by the minimum wage.

[13] An alternative explanation could be that while the analysis of Neumark and Wascher (2004) includes a variable representing countries' adoption of labour standards, that of Boockmann (2010) does not. If the adoption of labour standards and the strictness of EPL are strongly correlated across countries, as is plausible, then this might explain the divergence in results. Another source of the divergence might be the countries and/or time period covered; Neumark and Wascher (2004) consider a slightly different group of countries and a completely different time period (1975–2000 as opposed to post-1995) from Boockmann (2010), which would also have implications for the quality of the EPL (and other) explanatory variables, as noted by Howell et al. (2007).

[14] Specifically, a measure of the generosity of unemployment benefits (the benefit-replacement ratio) and a measure of the degree of coordination of collective bargaining systems.

employment by eliciting a positive labour supply response; above the market clearing rate, further increases in the minimum wage will lead to employment losses. A further reason why higher minimum wages may not necessarily reduce employment – even in an otherwise competitive setting – lies in arguments of the "efficiency wage" type which suggest that productivity may be positively related to the wage paid for a variety of reasons: for example, because higher wages allow employers to hire more productive workers (sorting), or because higher wages induce greater effort from existing employees (gift exchange and/or less shirking).

In fact, then, the employment effects of a minimum wage may be positive or negative; however, the higher the level at which the minimum wage is set – relative to some benchmark such as the average wage – the more likely there is to be a negative effect on employment. Following a similar reasoning, workers on low earnings are more likely to be negatively affected by minimum wage provisions; and since young people tend to earn less than older workers on average, they too are more likely to be negatively affected. Indeed, studies that have considered the issue (e.g. Broecke et al., 2015) have found that the employment effects for young people are more strongly negative (or more weakly positive) than for older workers.

3. Empirical Approach

3.1. Studies included

Our sample is drawn from papers including econometric estimates of the effects of minimum wages on the employment of young people in single countries made publicly available between 1990 and 2015. We conducted a google scholar search as well as collecting papers analysed in previous meta-analyses. We include studies using different methodologies to estimate the youth employment effect of changes in the minimum wage although the majority of our estimates were based on the estimation of some form of employment elasticity; one fifth were based on a difference in difference approach whilst another one fifth simply estimated the absolute change in aggregate employment caused by a change in the minimum wage.

Figure 1: Source of estimates and source papers
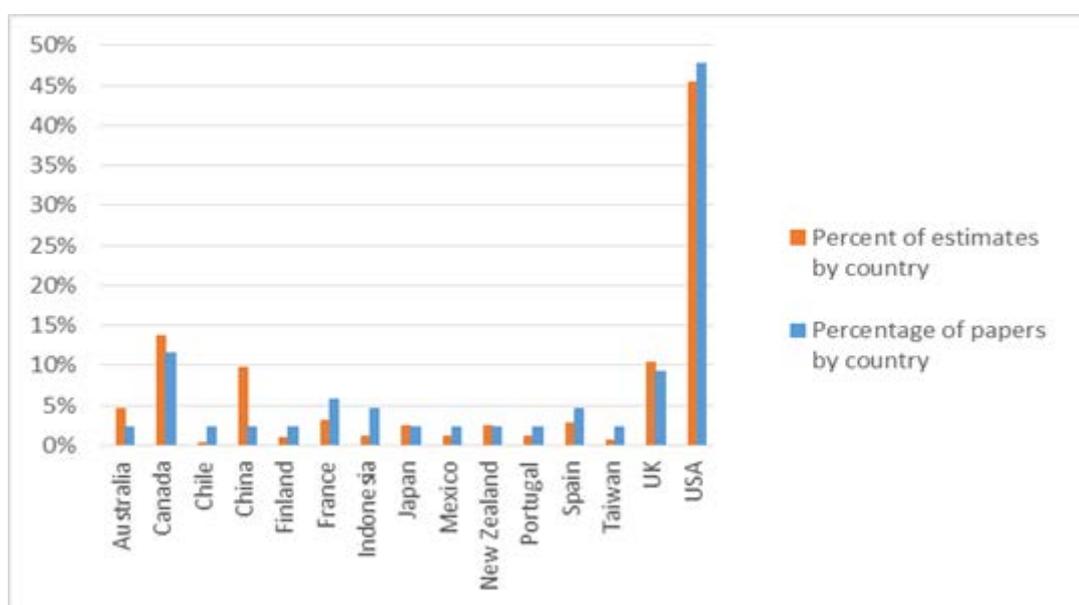
The analysis presented here is based on 328 estimates from 15 countries.[15] Naturally, the biggest source of data for this study was the United States which accounts for a little under half (c. 45%) of the estimates. The UK and Canada account for another 10% each of the included estimates. Although these days there are more studies which look at the effects of labour market institutions in general, and minimum wages in particular, in lower and middle income countries (MICs), still relatively few look at the employment effects specifically for young people; hence the number of estimates drawn from (low and) middle income countries is relatively small. Only 43 out of the 328 estimates fall in to this category (figure 1).

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[15] See the appendix for a full list of the studies included.

3.2. Publication Bias

Publication bias is a well-known issue which can create problems for the reliability of meta-analyses. It can arise where analyses reporting some types of result are more likely to be published than others reporting, for example, less statistically significant and/or opposite signed effects. Before proceeding to the analysis proper, it is worth looking at this issue briefly here in order to determine whether it is likely to impact on any of the conclusions of this analysis.

There are several more or less formal tests of publication bias. In general the analysis of publication bias is based on the logic that the size of the estimated effect should not depend on the precision of the estimate. Thus, for example, in an equation of the form:

$$Estimated\ Effect = \beta + \alpha SE + \varepsilon \tag{1}$$

Where SE stands for standard error and α and β are the estimated parameters, if there is no publication bias the standard error will not be associated with the estimated effect and the estimated parameter, α, will consequently not be statistically significant. Dividing through by the standard error itself gives a modified form:

$$t = \alpha + {}^{\beta}/_{SE} + \epsilon \tag{2}$$

And the logic remains so that in the regression of the t-ratio (of the estimated effect = estimate/SE) on the inverse of the standard error, a t-test on the statistical significance of α provides a test of publication bias. In both forms (1) or (2), a t-test on the statistical significance of β tells us also whether the effect of – in this case minimum wages – is positive or negative and whether it too is statistically significant. There are various forms that the specification of this test might take, in particular, one may include other explanatory variables likely to influence the effect of minimum wages on youth employment (Doucouliagos & Stanley, 2012).

The form of the test given in (2) is convenient also because it allows us to compare effects of different types, such as estimated elasticities and difference in difference estimates and so since the dependent variable is scaled so as to make it comparable. Table 2 reports the results of estimating four slightly different specifications and models to analyse publication bias.

Table 1: Estimates of publication bias

Variables/specification	1	2	3	4
Intercept (α)	-0.97***	-3.55*	-3.55***	-3.35*
	(0.202)	(1.856)	(1.794)	(1.896)
Precision (β)	-0.04***	-0.06***	-0.06***	-0.06***
	(0.006)	(0.007)	(0.012)	(0.008)
Weighted Estimate	YES	YES	NO	NO
Variables in Spec	1	10	10	10
R^2	0.12	0.56	0.54	-
Observations	293	250	250	250

Notes: 1) Statistical significance is indicated as follows: * = p <.10; ** = p < .05; *** = p < .01.

2) Column (1) reports the results of applying OLS to the simplest specification described by equation (2) above; Column (2) reports those related to the same method only adding also the other explanatory variables used below in the meta-analysis; column (3) uses the same specification only using a robust specification; and, column (4) reports the results of applying a random-effects multi-level model.

3) The analysis of publication bias was carried out on all studies for which standard errors were reported in the original papers. In several instances this was not the case leading to a smaller number of observation for this analysis than was employed for the meta-analysis below.

The results are not uniform across specifications. For two out of the four, (strongly) statistically significant negative publication bias is detected with a strong level of statistical significance ($p < .01$), in the other two, the estimate of publication bias is only marginally statistically significant ($p < .10$). Although not central to our purpose, since the reliability of the estimation method increases as we move from left to right with our preferred specification reported in column (4), we prefer to interpret the verdict on publication bias as 'not proven'.[16] In as much as it is present, the consistently negative sign on α suggests that, if anything, the negative impact of minimum wages on youth employment tends to be overstated as a consequence of publication bias. The other result emerging from the table is that the estimated average effect of minimum wages on youth employment is consistently small, negative and, despite controlling for publication bias, statistically significant. One might also observe that the different specifications used to identify publication bias do not greatly alter the estimate of the impact of minimum wages on youth employment which remains small, negative and statistically significant in all of the models reported in the table.

This contrasts somewhat with the findings of, for example, the meta-analysis of Doucouliagos & Stanley (2012) who report the presence of publication bias which, in itself, accounts for any estimated negative impact on minimum wages on aggregate employment. Given the difference in samples – young people in our case as opposed to all labour market participants in the aforementioned paper – these results appear plausible. It is fairly natural that any dis-employment effects of minimum wage which do exist are likely to be stronger for young people than for labour market participants as a whole since they are more likely to be (potentially) employed at lower wages on average and so any constraint arising from the minimum wage is more likely to binding for young people.

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[16] Although it is clear that, in as much as publication bias is present, it is clearly negative. Applying the trim and fill approach to detecting and correcting publication bias suggested by Duval & Tweedie (2000) suggests the absence of publication bias in this case, further supporting our 'not proven' verdict.

3.3. Empirical model and results

In order to be able to compare the results of studies employing different methodologies we divided estimates of minimum wages on youth employment into one of four possible outcomes: i) negative and statistically significant; ii) negative but not statistically significant; iii) positive but not statistically significant; and, iv) positive and statistically significant[17] (table 3.1). We then applied an ordered probit model to the resultant integer dependent variable (taking values from 1 to 4). This is a similar approach to that adopted inter alia by Card et al. (1995b) and Boockmann (2010). Organizing the estimates in this way leads to a straightforward intuitive interpretation of the results. Also, where necessary, the explanatory variables were rescaled to lie between 0 and 1 so as to make the reported coefficients broadly comparable in size too. Given the large variability in the number of estimates in each paper, following usual practice, we also weighted the estimates by the reciprocal of the number of estimates in each paper.

Table 2: Distribution of estimates of the effects of minimum wages on youth employment across outcomes

	No. of estimates	%
Negative; statistically significant	133	40.6
Negative; not statistically significant	132	40.2
Positive; not statistically significant	52	15.9
Positive; statistically significant	11	3.4
Total	328	100

The distribution of the four outcomes is in line with those reported in the literature in both reviews and meta-analyses.[18] That is, the estimates are primarily negative but the majority (around 57 per cent) of them are not significantly different from zero. Put another way, around four out of five of the estimates are negative – and two out of five are negative and statistically significant; around one in five of the estimates are positive although only 11 (or just over three per cent of all estimates) are positive and statistically significant.

The explanatory variables included are:

The Kaitz Index: this is the ratio of the minimum wage relative to the 'average' (mean or median) wages of full time workers. Specifically, the ratio of the minimum wage to the median wage is used here. As noted above, whether labour markets are monopsonistic or closer to perfect competition, one would expect the likelihood of a negative employment effect of minimum wages to increase the higher is the minimum with respect to the average wage.

Employment protection: We employ the ILO's EPLex summary index of employment protection.[19] This is a composite index which takes into account various aspects of legal protection of employees in the case of dismissals at the initiative of the employer. We prefer this index over the analogous OECD index for several reasons. In particular, it

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[17] We employ a 5% level of statistical significance.

[18] In addition to the meta-analyses mentioned already in the text, the reviews in O'Higgins (2001) and Neumark and Wascher (2007) are also worth mentioning. Although interpreted somewhat differently, the distribution of estimates is similar to those reported here; specifically, mostly negative but small and/or not statistically significant.

[19] http://www.ilo.org/dyn/eplex/termmain.home. For further details on the index including a comparison with the OECD's index of employment protection, see ILO (2015).

covers some additional relevant areas of employment protection; it has also been consistently calculated by the ILO for a wider range of countries. One possible drawback is that it has only been calculated for recent years, whilst some of the studies in the meta-analysis include estimates of effects going back three or four decades. However, the difficulty is more apparent than real. Employment protection legislation – with the partial exception of recent years in the EU (and explicitly covered by the EPLex index), tends to change rarely and incrementally. For example, regarding the USA, which accounts for 45 per cent of the estimates and which has the broadest time span of estimates, the OECD index has not changed during the period 1985-2013.[20] In four other countries in our study it has also not changed over the period of interest and in those countries where the value of the OECD index did change over the period of study, usually this is in a very minor way.[21] As to the direction of the effect, this is not determined a priori. On the one hand, a higher level of employment protection would make it is harder for employers to react to the introduction or raising of minimum wages by firing workers; however, it has been argued that an anticipation effect associated with stronger employment protection (and higher minimum wages) might discourage hires.[22] If such an effect is present at all, it is likely to be particularly pronounced amongst young people. The two papers which include consideration of this explicitly – Neumann and Wascher (2004) and Boockmann (2010) – find opposing effects; as noted above, the former find a positive 'mitigating' effect of stronger employment protection legislation, whilst the latter find a negative 'reinforcement' effect. It is plausible, however, that Boockmann's results suggest the existence of interactions between EPL and other labour market institutions in determining the employment impact of minimum wage legislation, rather than a negative reinforcement effect of EPL per se.

Prevalence of vulnerable employment (Vulnerability): This is defined as the sum of own account workers and unpaid family workers as a proportion of the employed. It was suggested by the ILO as a simple proxy for informal employment which is rather harder to calculate or indeed define in an agreed fashion.

To these three key variables we also report specifications to which further economic and institutional factors were added. In the first place:

Gross National Income (GNI) per capita: expressed in Purchasing Power Parity (PPP) constant United States Dollar (USD) basis. This is included to capture the level of development of a country.[23]

Gini Index: We include Gini indices of income inequality calculated by Branko Milanovic of the World Bank[24] from household surveys. Here the expectation is of a negative – or null - interaction between the Gini and the employment effects of minimum wages. Broadly speaking, the more unequal incomes are, ceteris paribus, the more low wage/low productivity jobs in an economy, and hence the larger the number of jobs that will be affected by an increase in (or introduction of) the minimum wage. Simply stated, any negative employment effects associated with minimum wage increases are likely to be stronger where more people are directly affected by it. Hence, we would expect a negative

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[20] The period for which historical OECD data is available.

[21] It might also be observed that the EPLex and OECD indices have a correlation coefficient of 0.8 for the period 2009-13 and, in support of the relative lack of change of the index, the 1985/2013 correlation for the OECD index is over 0.9.

[22] This, of course, is the intuition underlying the indeterminacy of the employment effects of EPL in general, since greater protection provided by EPL will tend to discourage both hires and fires.

[23] Taken from the IMF World Economic Outlook database,
 http://www.imf.org/external/ns/cs.aspx?id=28 .

[24] Available at,
http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:22301380~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html .

coefficient on this variable, a higher Gini (and hence a greater degree of inequality) would tend to be associated with a more negative youth employment effect.

The third set of three indicators represent the structures related to collective bargaining; although important, these variables are only available for a relatively limited number of countries and, in particular, limit the number of lower and middle income countries included in the estimates. The specific variables included are:

Trade Union (TU) Density: The proportion of workers who are members of trade unions provided by OECD.

Co-ordination: This is a dummy variable taking the value of one for highly co-ordinated wage setting systems. It is derived from a categorical variable (taking 5 values) calculated by the Amsterdam Institute for Advanced Labour Studies (AIAS).

Degree of Centralization: is a summary index (varying between 0 and 1) capturing the degree of centralisation of collective bargaining taking into account both union authority and union concentration at multiple levels;[25]

We focus here on the results of estimating the ordered probit model of the estimates as illustrated above (table 3). We report four sets of results on the basis of three different specifications with the second and third columns reporting the same specification but on a different sample. This is for illustrative purposes and is due to the different samples used. A complete set of collective bargaining indicators is only available for a more limited set of countries meaning that the model is estimated using 285 – as oppose to 328 - observations. The two specifications, 2a and 2b, differ only in the number of observations included and are reported so that one can observe any differences arising from the different samples,[26] which is returned to below.

As is usual in meta-analyses not very much is strongly statistically significant, which makes the key result all the more striking. The EPLex index has a consistently statistically significant positive interaction with minimum wages. That is, stronger employment protection legislation reduces the negative impact (or, as the case may be, increases the positive impact) of increased minimum wages on youth employment. This is line with the findings of Neumark and Wascher (2004) cited above and, in contrast to the negative impacts found by Boockmann (2010), the effect is statistically significant for all the specifications and is resistant to the inclusion also of control variables. Moreover, the value of the coefficient changes relatively little across specifications. This provides strong evidence to support the idea that in countries with stronger employment protection legislation, employers are less prone to reducing their workforce in reaction to higher minimum wages.

The Kaitz index on the other hand is not ever statistically significant, however, it too has a consistently negative sign and its value also does not vary greatly across specifications. Income per capita and the Gini index also have the expected signs although again they are not typically statistically significant. Income per capita becomes marginally statistically significant (at 10 per cent) only in the last specification with the inclusion of 'collective bargaining' related variables. Our interpretation is that variations in per capita income are more influential for high income countries.

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[25] Data for the creation of the Centralization and Coordination variables are from the AIAS, University of Amsterdam, Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts in 34 countries between 1960 and 2012, http://www.uva-aias.net/208.
[26] Specifically, the larger sample includes more middle income countries, hence the smaller sample used in the last two columns is dominated by high income countries.

Table 3: Results of the ordered probit model

Variables	Spec. 1	Spec. 2a	Spec. 2b	Spec. 3
Kaitz index	-0.88	-1.28	-0.30	-0.70
	(0.93)	(0.92)	(1.17)	(1.40)
EPLex	2.07***	2.18***	2.28***	2.15***
	(0.72)	(0.78)	(0.80)	(0.82)
Vulnerability	1.03*	1.56**	0.32	-0.02
	(0.61)	(0.63)	(1.09)	(1.46)
GNI per capita (PPP)		1.21	3.10	3.65*
		(1.06)	(2.06)	(2.10)
Gini index		-1.58	-2.58	-3.36
		(1.36)	(2.64)	(3.03)
Centralization				-2.66**
				(1.07)
Trade union density				3.19**
				(1.31)
Coordination dummy				1.12**
				(0.53)
(Pseudo) R²	0.04	0.04	0.04	0.06
(Pseudo) log likelihood	-53.62	-53.40	-48.03	-46.86
Observations	328	328	285	285

Note: standard errors in parenthesis and statistical significance is indicated as follows: * = $p < .10$; ** = $p < .05$; *** = $p < .01$.

Finally, the last three variables appear to have an interesting role. Specifically, the role of trade unions and collective bargaining more generally emerges as more nuanced than has been captured in other analyses (e.g. Boockmann, 2010). Indeed inserting only one of these variables at a time produces coefficients which are not singly statistically significant.[27] Taken together, however, they suggest that whilst co-ordination and high union membership tend to mitigate any negative employment effects of minimum wages for young people, highly centralised wage bargaining systems seem to reinforce any such negative effects. This would be consistent with the notion that strong co-ordination and strong unions compress the wage schedule from below; in other words, reduce wage inequality. A reduction in the numbers of (young) employees on low wages would, other things being equal, reduce any negative effects of a minimum wage since it would be binding for fewer workers. On the other hand, highly centralised wage bargaining systems are, on the other hand, likely to be associated with less geographical variation in wages able to take into account local conditions; this, in turn, is likely to lead to a greater (negative) impact of minimum wages.

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[27] This result is analogous to that found by Boockmann regarding labour market institutions as a whole, where EPL (or indeed either of the two other labour market institutions included) when considered separately does not have a statistically significant impact on the employment effects of minimum wages, the negative impact of EPL arises when the institutions are considered together strongly suggesting complementarity between labour market institutions.

3.4. Summary

Although it is true that the vast majority of estimates included in the analysis here find negative employment effects associated with the introduction or raising of minimum wages, around half of these estimates are not significantly different from zero, and the vast majority of the statistically significant effects are small; hence, the evidence presented here provides no reason to modify the viewpoint expressed 15 years ago that minimum wages seem to have either a small or a not statistically impact on youth employment or both.[28]

There is a large degree of heterogeneity in the estimates of the effects of minimum wages on youth employment and the analysis presented here shows that this variation can, to some extent, be accounted for by difference in labour market institutions. Specifically,

- The evidence supports the notion that strong employment protection legislation mitigates any negative youth employment effects associated with raising young people's minimum wages.
- There is also somewhat weaker evidence to support the notion that strong and co-ordinated albeit decentralised collective bargaining also mitigates any negative youth employment effects of minimum wages rises. Clearly this second point deserves further investigation;

The fact that both of these key findings can be related to plausible underlying mechanisms, as well as their persistence across specifications tends to strengthen the conviction that the meta-analysis presented here has indeed identified important complementarities between minimum wages and other labour market institutions which should be taken into account when designing legislation.

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[28] O'Higgins (2001, Chapter 5).

4. Conclusions and policy recommendations

This paper has discussed the impact of labour market institutions on youth labour market outcomes, concentrating on the youth employment effects of minimum wage changes. It has also taken into account, in particular, the role of interactions between different labour market institutions in determining the effects that minimum wages have on the labour market outcomes of young people.

Some specific implications of the analysis for policy are as follows:

1. Employment effects of minimum wages

o The analysis reported in this chapter has confirmed earlier findings[29] that, on average, minimum wages slightly reduce the employment of young people.

o In the overwhelming majority of cases, however, the estimated youth employment effects of minimum wages are either zero (i.e. not statistically significant) or very small: in cases where the elasticity of youth employment with respect to the level of the minimum wage could be estimated, this was almost always well below 1.

o In some situations, raising minimum wages may even increase the employment of young people.

The implications for policy are:

o The introduction of, or an increase in, a minimum wage is unlikely to harm youth employment to any significant degree. Even where the minimum wage does have a negative impact on the employment of young people, this is typically small in percentage terms compared to the increase in minimum wages.

o Similarly, reducing or removing the minimum wage is unlikely to have a significant positive impact on youth employment.

o Moreover, although few studies have looked explicitly at the effects of setting minimum wages for young people at a lower rate than for older workers, reasoning analogous to that applied above suggests that lowering minimum wages for young people is unlikely to be an effective tool for improving the employment prospects of the young.

2. Interactions and complementarities

Interactions

o The effects of minimum wages do tend to increase as they approach the level of average wages. Hence:

o There is a case to be made for not setting the minimum wage at excessively high levels compared to average wages.

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[29] See e.g. O'Higgins, 2001.

i. ***Minimum wages and average wages***
- o The effects of minimum wages do tend to increase as they approach the level of average wages. Hence:
- o There is a case to be made for not setting the minimum wage at excessively high levels compared to average wages.

ii. ***Minimum wages and average wages***
- o The analysis here suggests that the dis-employment effects of minimum wages fall with the level of GDP per capita. A point to which we shall return below is that although evidence on the youth employment effects of minimum wages in MICs is limited and for LICs practically absent, taken at face value the meta-analysis suggests that minimum wages are more likely to have negative youth employment effects in MICs than in HICs.

Complementarities

The meta-analysis in this chapter has confirmed the presence of strong complementarities between minimum wages and other labour market institutions. It is important to take these into account when designing an appropriate policy framework to promote the integration of young people into employment.

iii. ***Minimum wages and employment protection legislations***
- o The effects of minimum wages on youth employment in HICs and MICs are very heterogeneous and depend inter alia on the strength of EPL: the stronger the EPL, the smaller the negative effects (if any) on youth employment.
- o *Minimum wages and EPL are mutually supportive institutions and the introduction or raising of minimum wages will have less of a negative impact on youth employment in the presence of strong EPL. It is advisable to use EPL and minimum wage legislation as complementary labour market measures to improve the quality of work for young people.*

iv. ***Minimum wages and collective bargaining***
- o For HICs, the analysis suggests that minimum wages will have a smaller dis-employment effect in the presence of the appropriate collective bargaining arrangements – specifically in the presence of strong worker representation, accompanied by coordinated but decentralized collective bargaining arrangements.
- o More generally, the findings on the importance of other labour market institutions in determining the youth employment effects of minimum wages, coupled with the finding that minimum wages tend to have more detrimental effects on youth labour markets in LICs where, inter alia, labour market institutions are weaker, suggests that the minimum wage is best established where other effective protective labour market institutions are already in place.
- o This provides a plausible explanation for the finding referred to above that the youth dis-employment effects of minimum wages decrease with a country's average per capita income (and hence level of development). That is, minimum wages work best (and have fewest dis-employment effects) in the presence of a well-developed system of labour market institutions. This is consistent with the findings of, for example, Rani et al. (2013), who document the lower compliance with minimum wages observable in LMICs. Hence:
- o The development of a minimum wage needs to take account of the existence and functioning of other labour market institutions in the country.

Appendix: Studies used in the meta analysis

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