
Minimum wages in Europe: does the diversity of systems lead to a diversity of outcomes?

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european trade union institute

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1. Introduction

1.1 Leaving the beaten track of minimum wage analysis

Few economic policies have sparked academic debates as long-lasting and as passionate as those on minimum wages. Since 1915, several generations of empirical economists have tabled evidence and counter-evidence on the question of whether a statutory wage floor is harmful for employment at the bottom of the labour market. For a long time the majority of labour economists stuck to the basic model of perfectly competitive labour markets and its prediction that binding minimum wages are inefficient, predicting that they would lead to higher levels of unemployment. But the new measurement techniques (for example, natural experiments) and new datasets (for example, matched employer–employee microdata) that appeared during the 1990s have led many economists to reconsider their verdict on minimum wages. Today, the consensus in much of the literature is that employment effects induced by binding wage floors are, in most cases, so small in relation to other fluctuations in employment that it is difficult to identify them with the available statistical material. Where employment effects are found to be significant they apply only to certain sub-groups that are particularly sensitive to lower-tail wage developments (such as young workers). To some extent, it appears that the impressive volume of the minimum wage debate boils down to much ado about nothing, or rather, to much ado about something too small to be clearly identified.

But since the mid-2000s a new minimum wage debate has stirred up much controversy in Europe, and this time the opposition between different camps of labour economists is mirrored not only by differences in opinions among policymakers from different countries, but also by vivid debates within the trade union movement. The spark for this new debate has not been the employment effect, but the question of whether there is a case for a harmonised minimum wage policy at the European level. While prominent policymakers, leading scholars and parts of the trade union movement support the idea of European concertation on wage floors – including some sort of harmonised minimum rate for all countries – there is also strong resistance from those advocating national autonomy and the preservation of institutional diversity among the Member States of the European Union.

Much of the antagonism brought about by the idea of a harmonised minimum wage policy in Europe stems from the fact that the current minimum wage

arrangements differ widely among European countries. On one hand, a European minimum wage is seen as desirable in countries without effective statutory minima and where collective bargaining agreements also appear to fail in providing sufficient protection from wage dumping – Germany is arguably in such a position. On the other hand, countries with apparently effective collective bargaining institutions perceive a European approach as a threat to an established and functioning system. What both advocates and opponents of a European minimum wage policy lack is empirical evidence comparing the different national arrangements with respect to their impact on the most relevant labour market outcomes that minimum wages are supposed to pursue, such as relative levels of wage floors, effective protection against low wages and income equality. It is the objective of this report to provide not only a conceptual framework that helps us to think about the different issues associated with alternative minimum wage policies, but also to present empirical evidence on the link between policy options and these labour market outcomes.

We believe that an important step towards an evidence-based debate on European minimum wage policies is to acknowledge and frame the institutional diversity of minimum wage systems within the EU. While some experts recognise the methodological difficulties that arise from the patchwork of ‘national arrangements’, extant frameworks that allow us to think about the diversity within Europe still struggle with the multitude of national wage policies. Indeed, focusing on the term ‘minimum wage policy’ is misleading as it tends to narrow down the question to fixing a wage floor at a certain rate. In practice, minimum wage policies include the process in which statutory rates are set (Are they negotiated by social partners? Are the social partners merely consulted? Does the State fix the rate unilaterally?); the level at which the minima are set (Does the same rate apply to all workers in the economy? Are different minima negotiated at the sectoral level?); the legal and quasi-legal extension mechanisms (Are there tools that allow the State to extend negotiated minima to workers who are not directly represented? Does the State make use of these tools?). Because it is the combination of these institutional arrangements that determines jointly the labour market impact of a given minimum rate, it is preferable to think about our task as understanding differences between *minimum wage systems*. Arguably the most disappointing feature of the minimum wage debate that captured so many spirits during the better part of the twentieth century is that it almost completely failed to recognise the importance of institutional diversity. To be fair, this failure can only partially be attributed to the weakness of abstract and atemporal approaches to labour market problems; it is also due to the more practical difficulty of access to datasets that accurately reflect the institutional diversity of minimum wage systems. It is, for example, far more time-consuming to collect data on minimum wages at the sectoral level – which is perhaps one of the reasons why the empirical literature has focused almost entirely on countries in which minima are set at the national level.

In this report we have tried to strike a balance between acknowledging the importance of institutional diversity, on one hand, and the constraints imposed

by the available statistical material and quantitative econometric methods, on the other. To do so, we have left the beaten track of conventional analyses: our empirical results are not only informed by qualitative data on national systems, but we have also collected minimum rates from more than 1,100 sectoral-level agreements across Europe. This effort notably allowed us to assess the labour market performance of the minimum wage systems in Austria, Belgium, Denmark, Finland, Germany and Italy – all countries that are both absent from other empirical studies and among the main protagonists of the minimum wage debate at the European level.

Our results clearly underline the importance of thinking about the European debate as a choice between different minimum wage systems rather than about the choice of a certain rate to be harmonised across the Union. Crucially, we are able to show empirically what many practitioners long suspected: the combination of sectoral minimum rates and high levels of collective bargaining coverage can, at least for certain outcomes, be regarded as constituting a functional equivalent to a binding statutory minimum wage at the national level. Our regression results notably suggest that both higher collective bargaining coverage and a national statutory minimum wage are significantly associated with lower levels of Gini inequality among workers and lower Theil inequality between sectors of activity.

But there are also trade-offs. Minimum wage systems with statutory rates at the national level are related to relatively lower wage floors. This is evidence in favour of an argument frequently put forward by trade unions from the Nordic countries claiming that sectoral-level bargaining allows workers to obtain higher relative minima. We also show that relative rates are positively related to the degree of collective bargaining coverage, another factor that is frequently assumed by scholars and practitioners alike but rarely put to an empirical test.

This, however, is only part of the story. In systems without statutory minima, the higher rates enjoyed by insiders appear to come at a cost for outsiders: we show that, all other things being equal, the higher the level of the minimum wage relative to the median wage, the more workers earn wages that are actually below the prevailing minimum. What is more, our findings indicate that minimum wage systems differ with respect to the proportion of workers that are either uncovered or whose wages violate existing minimum rules. A system with a national statutory minimum fares better in this respect than a system with sectoral-level minima, although higher levels of collective bargaining can offset this difference to some extent. Again, national statutory minima and sectoral-level collective bargaining coverage appear to be functional equivalents.

The central message of our report is that both the academic and the policymaking community could render the European minimum wage debate more relevant if they framed the current discussion as a choice between alternative systems rather than a choice of any particular rate for Europe as a whole. We hope that this report makes two steps in that direction: first, our

framework renders the intra-European diversity with respect to minimum wage systems and the resulting oppositions between Members States more intelligible; and second, our results shed empirical light on a series of equivalences and trade-offs that could inform the debate between alternative systems.

1.2 Structure of this report

The report is structured in terms of conceptual, analytical, and empirical chapters. Chapter 2 introduces some of the main concepts and issues associated with minimum wages in order to clarify the academic and political context of our study – this chapter we start with an apparently naïve but nevertheless crucial question: what do we actually mean when we talk about ‘minimum wages’? In Section 2.1 we argue that, contrary to most of the empirical research – but in line with conventions among practitioners – the expression should refer not only to statutory but also to collectively negotiated minimum wages. Only this wider acceptance of the term allows us to assess the link between the diversity of European minimum wage systems and labour market outcomes. Section 2.2 questions the notion of the ‘bite’ of minimum wages. We argue that this bite can be measured by an appropriately defined Kaitz Index but needs to be complemented with additional information about the wage distribution. Sections 2.3.1 and 2.3.2 deal, respectively, with two issues that have attracted much attention in the academic literature on minimum wages: employment effects and the relationship between minimum wages and inequality. Finally, Section 2.4 summarises the ongoing debate on a European minimum wage that constitutes part of the rationale of the study at hand.

Chapter 3 forms the link between the conceptual and the empirical chapters and presents in more detail our analytical framework linking key features of minimum wage systems (presented in Section 3.1) to certain labour market outcomes (Section 3.2). Section 3.3 presents the sample of eighteen European countries covered by this study and discusses the main features of each country’s minimum wage system.

Finally, Chapter 4 tests empirically the impact of institutional features of minimum wage systems on different measures of the bite of wage floors and on a range of inequality measures. The empirical chapter first describes our database (Section 4.1) and then provides exploratory data analysis of the main variables under study (Section 4.2). We then turn to our regression analysis which examines the relationships between minimum wage systems and five different labour market outcomes (Section 4.3). This section is followed by a series of robustness tests (Section 4.4), a scenario analysis assessing a hypothetical minimum wage at the European level (Section 4.5) and a comparison with other available studies (Section 4.6). The final chapter 5 briefly concludes. In the appendix, we provide: more detailed information on the data collection in countries without statutory minimum wages; an overview of minimum wage systems by country; tables illustrating the wage distribution

and minima by country; and a scenario analysis for each country by sector. More comprehensive country tables summarizing the main results of our quantitative analysis and tables with the results of the robustness tests we have run in the context of this study are available on the ETUI website www.etui.org/Publications/Reports.

2. Concepts and issues

2.1 What do we mean by 'minimum wages'?

One of the key propositions of this study is that the concept of a 'minimum wage' not only refers to statutory wage floors defined at the national level, but also extends to minimum wages that are defined at the sectoral or occupational level. It is unquestionably true that the national statutory minimum wage has received much more attention in the literature in disciplines such as Labour Economics or Industrial Relations, to such an extent that other types of wage floors are hardly ever analysed. Indeed, instead of examining the impact that the difference between nationally and sectorally defined minimum wages might have on a range of labour market outcomes, the literature focuses almost entirely on data collected *within* the group of countries with national statutory minimum wages. This does not mean that no aspect of the process through which minima are determined has ever been scrutinised: scholars such as Tito Boeri have studied the institutional arrangements underpinning the setting of national minimum wages and Boeri (2012), for instance, has shown that national wage floors that are legislated unilaterally by the government are typically lower than those settled with closer involvement of the social partners.

While the process during which national minima are set seems therefore to lead to significantly different outcomes in terms of the relative level of wage floors, most scholars have overlooked the much more fundamental issue of whether the minimum is defined for the entire labour force (in the case of a national statutory minimum wage with no exemptions) or only a part of it (for instance, by a sectoral minimum that binds only trade union members). This is particularly problematic because the impact of the difference between national and sectoral minima on a range of labour market outcomes is potentially much more important, for instance when it comes to their respective influence on the level of wage floors (an issue discussed by Grimshaw and Bosch, 2013) and the number of workers paid at or below it, but also the impact on more general issues, such as overall or inter-sectoral inequality.

In this study, we show that the distinction concerning whether wage floors are set at the national or at the sectoral (occupational) level gives rise to a series of hypotheses regarding their impact on key labour market outcomes. The issues addressed by our hypotheses are admittedly not new: in fact, they correspond to the intuitive understanding of the wage setting process revealed by anecdotic evidence from conversations and published statements by trade unionists, employer representatives and policymakers in the context of the debate on a

European minimum wage (see Section 2.4). For instance, many practitioners are convinced that trade unions are able to obtain higher minimum wages if they negotiate at the sectoral than at the national level. This intuition, however, may or may not be true and so far lacks any empirical proof that we are aware of, the sample used by Grimshaw and Bosch (2013) being too small to allow for econometrically sound conclusions. To be sure, the opposite relationship is also plausible: some trade unions may have lower bargaining power when they negotiate at the sectoral level, so that at least in certain parts of the economy the collectively negotiated wage floors might be lower compared to a situation in which the minimum is determined through a negotiation at the national level. By compiling a representative sample of sector- and national-level minima from different types of minimum wage systems, our study is the first to be able to shed empirical light on these issues.¹

There are strong reasons why the wage floors in sectoral-level collective agreements should be considered minimum wages, the most obvious being that common usage often refers to them explicitly as ‘minimum wages’. To give some examples, the collective agreement signed on 27 June 2007 in the Belgian chemical industry refers to a given amount by stating that *‘ce salaire horaire minimum correspond au niveau le plus bas applicable, à savoir à la fonction de manoeuvre ordinaire.’* Also, the administrators of the German *Mindestlohn datenbank* compiled by the Wirtschafts- und Sozialwissenschaftliche Institut (WSI) clearly state that *‘Tariflöhne sind Mindestlöhne’*. For the case of Austria, Hermann (2005) calls sectoral-level wage floors ‘minimum wages’ by saying that *‘in Österreich stellt der Mindestlohn die niedrigste Lohngruppe in den jeweiligen Kollektivverträgen dar’* (p. 8).

As can be inferred from these examples, practitioners and minimum wage experts refer to sectoral wage floors as ‘minimum wages’. More precisely, it is the wage assigned to the lowest category in collectively negotiated pay scales that should be interpreted as the relevant minimum wage: for all workers covered by a given agreement, it is in principle not possible to pay any of them below the rate that has been negotiated for the very bottom of the pay scale.

While this definition of a sectoral minimum wage is relatively straightforward, it should be noted that the elaborate categorisations that are found in many collective agreements render the identification of a given sectoral minimum wage relatively complicated. Indeed, in most agreements different pay scales co-exist: a separate pay scale is often defined for blue- and white-collar workers; specific scales are included for apprentices or young workers who enter the labour market; and even where a unique pay scale exists it is often differentiated by several variables, such as occupational groups, work-post nomenclatures and seniority levels. In order to come closest to the conception of sectoral minimum wages as ‘the pay rate defined for the lowest wage

1. To be sure, one could of course extend the logic of minimum wages to the company level, or for that matter even to different pay scales within individual plants. We think that such an approach hardly corresponds to the prevailing notion of a minimum wage as providing a *general* wage floor for a *large group of workers*.

category’, our database contains information on the pay rate of the lowest of any category that figures in all of the pay scales in a collective agreement, with the exception of pay scales for apprentices and young workers. In practice, in the vast majority of agreements this boils down to the pay rate that applies to workers with no seniority and who are classified in low-status occupations at the bottom of organisational hierarchies (*‘manoeuvre ordinaire’* in the example from Belgium quoted above).

2.2 The ‘bite’ of minimum wages

When scholars or practitioners evaluate the impact of a given wage floor, they frequently refer to this impact as the ‘bite’ of a minimum wage. In this section we link this notion to two statistical indicators, namely the ‘Kaitz index’ and the share of workers below and near the minimum wage. As we will explain below, the information conveyed by each of these two indicators is different and only a combination of the two allows us to reflect on what is meant by the ‘bite’ of a minimum wage. While this section provides the rationale and definition of the Kaitz index and different employment shares, the empirical applications to European micro-data are presented in Sections 4.3.1 and 4.3.2, respectively.

2.2.1 The Kaitz index

Named after its first formulation in Kaitz (1970), this index is a straightforward method to relate the absolute level of the minimum wage to the overall distribution of wages. Indeed, a direct comparison of absolute levels of minimum wages is not meaningful if countries differ in terms of labour productivity and/or purchasing power. For instance, in 2012 the minimum wage in countries such as Bulgaria and Romania are still below the national equivalents of 1 euro, whereas the minimum wage in Luxemburg and France is above 9 euros. It would be misleading to conclude that the Romanian minimum wage is more than nine times lower than in Luxemburg because the average labour productivity of Romanian workers is also much smaller compared to Luxemburg. As a consequence, wages are substantially lower in Romania – in fact, virtually all Romanian workers earn wages far below the minimum wage in Luxemburg. Conversely, many goods and services in Romania, especially non-tradable services whose main input is Romanian labour, are relatively cheaper than in Luxemburg. Indeed, the purchasing power of the equivalent of 1 euro in Romania is higher: taking into account the purchasing power in the two countries, the Romanian minimum wage increases to 1.66 euros and the wage floor in Luxemburg decreases to 8.64 euros (Schulten, 2012). Due to the international variations in the general levels of productivity, prices, and wages, the impact of a minimum wage of the same absolute amount, say 10 euros, differs widely across countries: such a wage would probably have a minor impact on employment in Luxemburg but would probably render the vast majority of jobs in Romania unprofitable.

In its basic version, the Kaitz index is defined as the ratio of the minimum wage to the average wage of the working population. The Kaitz index is thus a measure of the 'bite' of the minimum wage: small values indicate that the wage floor is a long way from the centre of the earnings distribution and its impact therefore potentially low; conversely, a high Kaitz index reveals that the minimum wage is close to the centre of the distribution and that it potentially affects a larger number of employees. It should be noted, however, that the Kaitz index alone does not allow us to draw any conclusions about whether a given level of the minimum wage is economically desirable or not: this question can be addressed only with additional information, such as the structure of wage costs and the productivity of different types of workers. In addition, as Dolado *et al.* (1996) point out, the Kaitz index may misrepresent the impact of minimum wages in countries where other institutions such as benefit systems act as effective wage floors (*ibid.*, p. 325).

In countries in which minimum wages are determined not at the national but at the sectoral level – such as in Germany, Italy or the Nordic countries – the computation of Kaitz indices is relatively time-consuming due to the existence of numerous minima negotiated at sectoral level. But even for countries with a single national statutory minimum it is often advisable to calculate separate Kaitz indices for different wage or skill groups in order to reflect the fact that the minimum wage bites deeper for lower paid employees (in this case the numerator of the index is the same for all employees, but the denominator decreases if one considers a group of employees with lower average earnings). Indeed, the aggregate Kaitz index may be similar across countries but mask compositional differences (OECD 1998). In this case, comparing the basic index between dissimilar countries might lead to serious misinterpretations. In order to improve its comparability, several adjustments to the basic Kaitz index have been proposed in the literature:

- Although many analysts compute the index with average earnings as denominator, using median earnings might yield more comparable results. The reason for this is that countries with higher wage dispersion also have lower minimum wages (OECD 1998). A Kaitz index based on median earnings is less affected by the shape of the overall wage distribution than an index based on average earnings.
- The composition of the population affected by the Kaitz index might differ across countries; it is therefore sometimes advisable to compare indices for groups with similar characteristics (such as sector of activities, occupation, educational attainment, contract type, age or gender).
- Most European countries apply lower sub-minima for young or inexperienced workers (for example, teenagers), mainly in an attempt to curb potential disemployment effects for these groups. International comparability requires the use of different Kaitz indices if the question at hand focuses on specific groups affected by sub-minima.

- International comparisons of Kaitz indices are sensitive to the inclusion of bonuses, overtime and other additional payments; countries in which the incidence of such payments is large will display a non-adjusted Kaitz index (in other words, excluding additional payments) that overestimates the effective bite of the minimum wage.
- Conversely, the basic Kaitz index can lead to flawed comparisons if gross earnings are used instead of net earnings: the more a country's tax system is progressive, the more the gross Kaitz index understates the effective bite of the minimum wage after taxes.
- Finally, it is important to take institutional differences into account when comparing Kaitz indices. For instance, national labour market institutions differ in the extent to which hikes in the minimum wage are transmitted further up in the wage structure. As a consequence, Dolado *et al.* (1996) argue that it may be advisable to analyse changes over time than cross-country differences, especially in situations of considerable institutional diversity between countries.

To the extent that our data allow, the empirical results presented in Section 4 take these observations into account. First, our Kaitz indices are based on median wages instead of average wages; second, since we analyse the impact of minimum wages at the sectoral level, we calculate Kaitz indices based on the sectoral-level median wage. In the case of countries in which wage floors are determined at the sectoral level, both the numerator and the denominator include sectoral-level information. Third, we tested whether our results are sensitive to the exclusion of young workers, for whom lower minima are defined in most countries. Fourth, our Kaitz indices are based on gross earnings, including social benefits and other benefits. This means that our measures yield information on the impact of the relative size of the minimum wage as it is commonly defined (in other words, including benefits) but before taxes. Fifth, in order to assess differences in national market labour our data on Kaitz indices include not only cross-country variability, but also within-country variability (between sectors and across time).

2.2.2 The share of individuals below and near the minimum wage

The distance between the wage floor and the centre of the earnings distribution is a useful heuristic to measure the bite of minimum wages. This being said, the Kaitz index alone cannot give a complete picture of the impact of minimum wages: a relatively high Kaitz Index does not necessarily mean that many workers are actually paid at or above the minimum wage. There are many factors that could lead to the opposite outcome: an extremely compressed wage distribution; a substantial fraction of jobs that are not covered by prevailing minimum wage rules; or the occurrence of hourly wages that are not compliant with existing legislation or collective agreements. While it is true that a high

Kaitz index is like a potentially sharp tooth indicating a strong ‘bite’ of the minimum wage, one also has to check whether the mouth of minimum wage rules is not empty due to issues such as non-coverage and non-compliance.

A complementary heuristic for the analysis of the bite of minimum wages is therefore to measure the distribution of workers with respect to the minimum wage. Two proportions yield information on the bite of a given minimum wage:

- **The proportion of employment below the minimum wage:** the more workers are paid below the existing wage floor, the lower the bite of the minimum wage. This share can also be interpreted as a measure of non-coverage and/or non-compliance (in practice the two phenomena are often hard to distinguish).
- **The ‘spike’ of employment paid exactly the minimum wage:** the more employees are clustered at the minimum, the higher its bite.

There is little comparative research on the size of these two proportions in different countries; in particular, we are not aware of any research on the impact of characteristics of minimum wage systems on the proportion of workers paid at or below minima. Figures computed by the US Bureau of Labor Statistics, however, give an idea of the size of the two proportions in the United States: according to statistics on the distribution of workers paid at hourly rates in 2011 (a group that comprises around 75 million individuals), 1.7 million earned exactly the prevailing Federal minimum wage of \$7.25 per hour. The number of workers below the minimum wage was 2.2 million. Together, these 3.8 million workers with wages at or below the Federal minimum made up 5.2 per cent of all hourly-paid workers (Bureau of Labor Statistics, 2012). While the bite of the US Fair Labor Standards Act is therefore apparently substantial in light of the spike 1.7 million jobs earning exactly the prevailing minimum wage, the fact that even more workers earn wages below the wage floor qualifies this conclusion.

To be sure, conventional neoclassical models of the labour market do not predict any employment spike near the minimum wage. According to such models, the earnings distribution will be truncated and workers whose marginal productivity falls below the minimum wage will be laid off. The 1.7 million jobs in the United States that are paid *exactly* the prevailing Federal minimum rate suggest that this view is flawed. Possible explanations for this phenomenon are that employers are able to afford at least part of the higher wage costs, either by tapping into existing rents (profits) or by passing on these costs to consumers. An alternative explanation is that the productivity of below-minimum employees can be raised through training or organisational changes so as to make their employment profitable at the minimum wage.

Depending on the research question, one might also be interested in the size and characteristics of the population that is remunerated below certain threshold values, for instance when assessing the impact of a hypothetical rise in the minimum wage (or the Kaitz index) to a higher level. Such a ‘shadow

spike’ can yield information on the bite of the hypothetical rise in the minimum wage by indicating how many and what types of employees would be affected in such a scenario. It should be noted, however, that the ‘shadow spike’ can differ substantially from the employment spike that will be observed if the hypothetical minimum wage increase is actually implemented. The difference between the two spikes might stem from several factors: a higher minimum wage might attract new employees into the labour force, thereby changing its socio-demographic composition; conversely, some employees in the shadow spike might be laid off if the higher minimum wage renders their employment unprofitable.

2.3 Key questions addressed in the economic literature

Economic research has focused extensively on minimum wages. We will focus here on three main questions. The first question is who are the people paid at the minimum wages? As the previous ETUI report (Rycx and Kampelmann, 2012) puts it, ‘compared to the rest of the population, this group is characterised by a lower average age; on average more female employment; lower levels of educational attainment than workers with higher wages; a considerably higher share of employees with temporary work contracts; and a higher share of part-time employment than the sub-population with higher wages. Even more important in terms of the affected individuals’ wellbeing is the finding that in all countries in the sample minimum wage earners live in bigger households that dispose of significantly lower income and that are at a higher risk of living in poverty.’ These are, therefore, the categories of workers that are likely to be directly affected by the minimum wage legislation and have repercussions on the objectives of such legislation. In Austria, for instance, it is common to think about ‘minimum wage policy as women policy’ (Hermann, 2005; see also Rubery, 2003).

The second question concerns differences between alternative setting mechanisms. Among the few studies that address this question empirically is Boeri (2012), which compares different institutional settings by looking at the process of determination of statutory minimum wages and its effect on levels of minimum wages. He finds that a government-legislated minimum wage – that is, a setting characterised by the absence of consultation with the social partners – is lower than the wage floor set after formal consultations. However, given data constraints, he does not analyse the effect of minimum wages set in collective agreements. The study of the impact of different determination mechanisms – notably the difference between statutory minima and collective agreements – is an open question in the literature.

A third key question relates to the impact of minimum wages on employment, redistribution, inequality and poverty. Economic research has devoted considerable attention to the effects of minimum wages, but it has concentrated mainly on the employment effects and on countries with

statutory minimum wages. We will now describe in more detail the evidence on employment effects (Section 2.3.1) and on other social effects of minimum wages (Section 2.3.2).

2.3.1 Employment effects

The theoretical literature offers clear conclusions on the employment effect of minimum wages only in the case of a perfectly competitive labour market: a minimum wage set above the market clearing level reduces employment and some workers who were previously working at a lower wage are displaced. At the same time, other workers who were previously inactive are now willing to work for a higher wage and, as a result, the minimum wage creates unemployment. In a non-competitive framework the effects are less clear. Take, for instance, minimum wages in the presence of a monopsony. In this case, a minimum wage set between the monopsony and the perfectly competitive rate increases both employment and wages. Monopsonistic markets can arise from search frictions and mobility costs (Manning, 2003). Minimum wages may also not have a negative impact on employment in dual labour markets where the minimum wage does not apply to the secondary or informal sector (Boeri and van Ours, 2008) because workers displaced from the covered sector might move to the uncovered sector.

The empirical literature points in both directions: minimum wages can both increase or decrease employment. The first empirical study goes back to 1915 when, as Neumark *et al.* (2013) recall, the US Bureau of Labor Statistics examined the effect of a minimum wage for women introduced in Oregon. Since then the literature has grown dramatically and includes papers using firm-level data, natural experiments, worker biographies and cross-country comparisons (Dolado *et al.* (1996). Until the mid-1980s, the consensus in a literature dominated by studies from the United States was that minimum wages slightly reduced employment (Brown *et al.*, 1982); this viewpoint was, however, challenged by different studies in the United States that found either no (Card, 1992a) or even positive employment effects (Card 1992b; Card and Krueger, 1994). Even the more consensual conclusion that a minimum wage harms employment for low skilled workers (Neumark and Wascher, 2008) has been challenged recently (Dube *et al.*, 2010). Decidedly, the debate on employment effects is far from closed (Neumark and Washer, 2010; Neumark *et al.*, 2013).

It should be noted that employment effects refer not only to the stock of employed and unemployed workers but also to labour flows. Cahuc and Zylbergberg (2004) show that, from a theoretical point of view, a hike in minimum wages has an ambiguous effect on job search efforts: a higher minimum wage increases the rent to be obtained from every job, which gives unemployed individuals an incentive to increase their search efforts; but at the same time it has a negative effect on labour demand and hence on the number of vacant jobs, thereby reducing the gains from job search. Empirical studies of worker flows for Canada (Brochu and Green, 2011), Portugal (Portugal and

Cardoso, 2006) and the United States (Dube *et al.*, 2010) find a dampening effect of minimum wages on hirings and separations, while Bachmann *et al.* (2012) find a positive effect on hirings and separations and a negative one on job-to-job transitions in the construction sector in Germany, but no clear effects on the equilibrium.

To summarise the current state of the literature, it appears that employment effects associated with minimum wages are probably small, if they exist at all, and are mostly related to low-skilled workers.

2.3.2 Effects on welfare, redistribution, inequality and poverty

Minimum wages are typically designed to protect and sustain the wages of the most vulnerable workers. Therefore, they can have a role in sustaining income, reducing in-work poverty and low-wage work and curbing wage inequalities. Moreover, minimum wages can also have other macroeconomic effects: during a grave economic crisis minimum wages buoy up prices, thereby reducing the risk of deflation during economic downturns (European Commission, 2012). They also help in sustaining aggregate demand and boosting wage equality by maintaining an adequate standard of living in the lower tail of the wage distribution (ILO, 2013).

Welfare and redistribution

From a theoretical perspective, minimum wages can have a positive effect on overall welfare if the productivity of the job depends on investment in education and training and if minimum wages provide incentives for employees to acquire education, although this might lead to a higher number of high-productivity jobs (Cahuc and Michel, 1996 and Acemoglu and Pischke, 1999).

Minimum wages can also be an efficient way to redistribute income, as Guesnerie and Roberts (1989) first put forward in a model with underemployment (in the form of reduced hours) but no unemployment; Marceau and Boadway (1994) obtain similar results in a model in which the minimum wage entails unemployment rather than underemployment. These conclusions have been challenged by Allen (1987), who shows that minimum wages are an inefficient tool of redistribution if it is possible to manipulate marginal rates (see also Boadway and Cuff, 2001). Freeman (1996) presents a broader review of the evidence on distributional consequences and concludes that minimum wages, if not too high, can improve the well-being of low wage earners and limit earnings inequality. Overall, Cahuc and Zylberberg (2004) conclude that minimum wages are capable of redistributing income efficiently.

Inequality and poverty

A rise in minimum wages can have opposing effects on income inequality: on one hand, it allows people at the bottom of the distribution to receive a higher wage. On the other hand, it can lead to individuals leaving or partially retreating from the market (unemployed, underemployed or precarious/

undocumented workers in a dual labour market). The empirical literature usually finds that a minimum wage reduces wage inequality (Brown, 1999; OECD, 1998; Rubery, 2003; Manning, 2003). Di Nardo *et al.* (1996) and Lee (1999) find that the fall in the real value of minimum wage explains a large share (respectively, 25–30 per cent and 70 per cent) of the increase of lower tail wage inequality in the United States during the 1980s. Autor *et al.* (2010) reassess this research and, despite revising downward previous estimates, they still find that erosion of the real minimum wage raises inequality in the lower tail of the wage distribution (the 50/10 wage ratio).

Also, the effects on poverty are ambiguous from a theoretical point of view: minimum wages reduce poverty for those working, but might also provoke an increase of total poverty if the group of outsiders increases. From an empirical point of view, Card and Krueger (1995) find some reductions in poverty as a result of the minimum wage, while Addison and Blackburn (1999) suggest that the rises of minimum wages in the United States in the 1990s contributed to reducing poverty among young workers and early-school leavers. Neumark and Wascher (1997) and Adams and Neumark (2005) find small net effects.

Cahuc and Zylbergberg (2004), however, argue that these studies provide limited evidence since minimum wages can also affect job prospects – through reduced hirings, for instance – and therefore lifetime incomes. Empirical research on this effect is, however, still scarce.

In conclusion, previous research has devoted great attention to minimum wages and the effect on employment and on inequalities, low-wage and in-work poverty. The current consensus suggests that employment effects are probably small; there appears to be a benign effect of minimum wages on inequalities, low-wage and in-work poverty. It should be noted, however, that due to data limitations the vast majority of empirical studies has overlooked countries where minimum wages are set in collective agreements; the potentially divergent outcomes between different minimum wage systems are thereby largely ignored in the literature.

2.4 Debate on European minimum wages

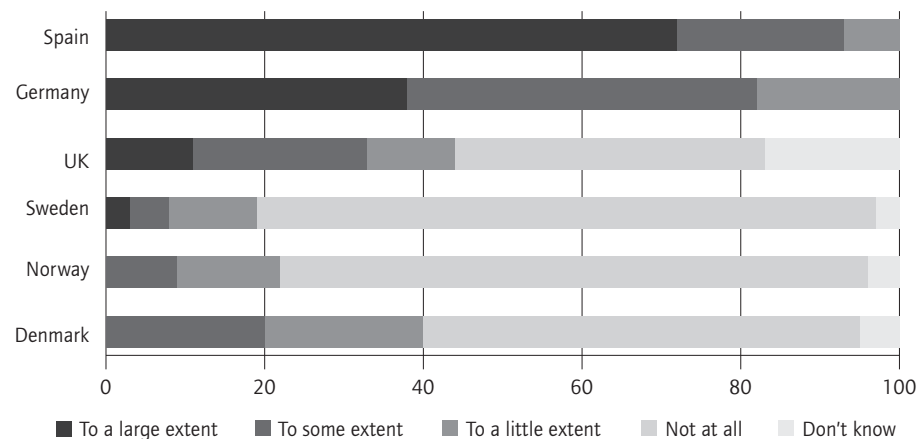
On 10 January 2013, Jean-Claude Juncker, Prime Minister of Luxembourg and outgoing president of the Eurogroup (the group of countries belonging to the Eurozone), told the European Parliament that Europe needs ‘a basis of social rights for workers, minimum social rights for workers, including of course one essential thing, a minimum wage – a legally compulsory minimum wage in the Eurozone member states’. Indeed, the issue of harmonising wage floors among European countries has been on the table in the European institutions for several years. Juncker himself already proposed it in 2006.² A similar

2. Speech to the biennial conference of German Catholics, 27/05/2006. Available at: http://www.gouvernement.lu/salle_presse/discours/premier_ministre/2006/05/27/katholikentag/index.html

argument was put forward by the Party of European Socialists Congress, which called for ‘decent minimum wages’ by introducing an ‘EU target for the minimum wage in terms of GNP per capita’.³ In January 2007, the German EU Presidency published a concluding document of an informal meeting of the EU Ministers for Employment and Social Affairs according to which ‘Member States and the social partners are called upon to ensure that wages are set in a fair and adequate manner’.⁴ More recently, the European Commission again put forward a similar idea in the ‘Employment Package’ in April 2012. A European approach to minimum wage policies is also being discussed within the European Trade Union Confederation.

Some academics have also pushed for the introduction of a European minimum wage. Most notably, in 2005 a group of eminent scholars on minimum wages signed a public call for a European minimum wage ‘of at least 60 per cent of the average national wage’ (Schulten *et al.*, 2005). The possibility of a minimum wage – or at least some common rules – at EU level has also been raised and discussed by Vaughan-Whitehead (2010). The magazine *The Economist* recently dedicated a column to the minimum wage debate and, referring to a joint ILO-IMF-OECD-World Bank report (see Section 4.5), concluded that ‘evidence is mounting that moderate minimum wages can do more good than harm [...]The definition of moderate is 30–40% of the median wage.’⁵

Figure 1 Do the trade unions of Europe want European minimum-wage regulations? (%)



Source: Eldring and Alsos (2012).

3. Rasmussen and Delors (2006) ‘The New Social Europe’, Report presented to the 7th PES Congress, Porto, 7–8 December 2006.
4. German EU Presidency (2007) Chair’s Conclusions drafted in cooperation with the two following presidencies Portugal and Slovenia, Informal Meeting of Ministers for Employment and Social Affairs Berlin, 18–20 January 2007.
5. The argument on the floor, 24/11/2012. Available at: <http://www.economist.com/news/finance-and-economics/21567072-evidence-mounting-moderate-minimum-wages-can-do-more-good-harm>

While the EU has no official competence to issue directives or regulations concerning wage policies, it can promote its agenda through recommendations and the Open Method of Coordination (that is, by setting objectives that are politically but not legally binding). The EU therefore has little leverage to implement a European approach to minimum wages, even though the European Commission has used its competence on social issues to recommend the introduction of minimum wages, for instance by recommending wage floors in order to close the gap between male and female wages in Austria (EC, 2005; Hermann, 2005).

In addition to a lack of competence at the European Commission, another factor that has worked against a European approach is the absence of a clear consensus at the European level concerning whether the benefits of harmonising policies in this area outweigh the costs. The trade unions, for instance, are far from unanimous in their support for European legislation that would impose statutory minimum wages everywhere in Europe. In particular, many countries where there is no statutory minimum wage are against a European scheme. Objections are notably very strong in Austria, Italy, and the Nordic countries (see Eldring and Alsos, 2012 for a detailed discussion). On the other hand, trade unions in countries such as Germany and Spain favour a European approach to the issue (see Figure 1).

The usual argument put forward by both employers and the unions against a statutory minimum wage is that it could undermine the autonomy of the social partners and thereby jeopardise the entire bargaining process. Unions in particular fear a weakening of collective bargaining or exposing workers to political arguments in which minimum wages could become one of the adjustment variables. And ultimately, unions fear that a statutory minimum wage, which would probably be closer to wages in the lowest paid sector to avoid negative effects on employment, will reduce wages across the entire economy and therefore also in sectors where unions are strong. Many unions therefore advocate a minimum wage for workers not covered by collective agreements, but often insist more on the extension of collective bargaining than on statutory minima. The most notable exception is Germany where unions and political forces are discussing the adoption of a statutory minimum wage to counterbalance the effect of decreasing coverage of collective agreements and the increase in mini-jobs (low-wage jobs).

Much of the antagonism inspired by the idea of a harmonised minimum wage policy in Europe stems from the fact that the current minimum wage arrangements differ widely among European countries. On one hand, a European minimum wage is seen as desirable in countries without effective statutory minima and where collective bargaining agreements also fail to provide sufficient protection from wage dumping – Germany is arguably in such a position. On the other hand, countries with apparently effective collective bargaining institutions perceive a European approach as a threat to an established and functioning system. What both advocates and opponents of a European minimum wage policy lack is empirical evidence that compares the different national arrangements with respect to their impact on a series of

labour market outcomes. It is the objective of this report to provide not only a conceptual framework that helps us to think about the different trade-offs associated with alternative minimum wage policies, but also to present empirical evidence on the link between policy options and labour market outcomes.

3. The diversity of minimum wage systems in Europe

The previous chapter highlighted a range of relevant concepts and issues linked to minimum wage policies. Some of these issues will be addressed empirically in Chapter 4, notably the minimum wage 'bite' and its relationship to different measures of inequality. Before we turn to our quantitative results, however, in this chapter we present in more detail our analytical framework linking key features of minimum wage systems (presented in Section 3.1) to certain labour market outcomes (Section 3.2). Section 3.3 presents the sample of eighteen European countries covered by this study and discusses the main features of each country's minimum wage system.

3.1 Key features of minimum wage systems

The literatures in Industrial Relations and Labour Economics provide rich traditions in the analysis of minimum wages. The former school tends to frame wage floors as *institutions* that can be analysed as the outcome of interactions between a set of actors (mainly the state, employer representatives and trade unions) and other institutions (wage setting processes, laws and so on). Parts of this literature also take into account the social norms and beliefs that the involved actors have about minimum wages and their impact on different labour market outcomes. By contrast, Labour Economics typically treats minimum wages as *market imperfections* that give rise to a deviation from outcomes that would come about in the absence of 'artificial' wage floors or ceilings. One of the basic predictions of these models is that a binding minimum wage fails to clear the labour market and thereby creates a situation in which more workers would be willing to work (and fewer employers willing to hire) compared to a situation without minimum wages (see our discussion on employment effects in Section 2.3.1).

Our approach is closer to the tradition in Industrial Relations in that we distinguish between different institutional features of minimum wage systems and analyse their relationships with key labour market outcomes. While it is a priori also possible to formulate hypotheses on these relationships with the help of labour market models that treat minimum wages as market imperfections, we show that the observed outcomes can be accounted for by the institutional diversity between minimum wage systems.

As shown in Section 2.1, the institutionalist literature on minimum wages so far has focused almost exclusively on systems in which wage floors are defined by national statutory minimum wage legislations. The focus of this literature

has therefore been to account for different outcomes (such as the relative level of statutory minimum wages) by looking at differences between statutory systems, either across countries or across time. Existing empirical evidence notably shows that in countries with statutory minimum wages a higher level of collective bargaining coverage is associated with relatively higher levels of minimum wages (Grimshaw and Bosch, 2013). This might be due to the fact that countries with higher collective bargaining coverage tend to have more egalitarian wage structures in which the median lies closer to the minimum wage, leading in turn to a higher Kaitz Index. Another explanation is that a higher level of collective bargaining coverage is associated with stronger trade-union influence on the level of the statutory minimum wage (for example, in negotiations by tripartite commissions). On any account, the level of statutory minimum wages tends to be positively related to the degree to which trade unions are involved in the setting process at the national level (Boeri, 2012; Eyraud and Saget, 2005; Funk and Lesch, 2005).

For reasons stated in Section 2.1, this study aims at analysing minimum wages not only in countries with statutory minimum wages at the national level, but also in countries in which wage floors are determined at the sectoral or occupational level through collective bargaining. Even though collectively agreed minimum wages are sometimes considered to be ‘functional equivalents’ of statutory wage floors (Schulten, 2006), we are interested in whether the two types of system lead to different labour market outcomes. Unfortunately, empirical evidence comparing the two systems is extremely rare and our study fills a major gap in this area.

Given the importance of both features, we therefore propose to distinguish European countries with the help of a typology including:

- **Collective bargaining coverage** (we distinguish between low, medium and high coverage): the degree of coverage has been shown to influence the relative level of minimum wages, but also other labour market outcomes (especially inequality and low pay).
- **National statutory minimum wage versus sectoral collectively bargained minima**: whether minimum wages are determined nationally as statutory wage floors or through collective bargaining at sectoral or occupational level might impact on a range of labour market outcomes, including the relative level of minima and different measures of inequality.

It should be noted that these two features of minimum wage systems are not entirely independent of each other. Indeed, a range of studies underline that the centralisation and coverage of collective bargaining tends to be higher in countries without statutory minima (Schulten et al, 2006; Vaughan-Whitehead, 2010; Eldring and Alsos, 2012; OECD, 2012a). This observation is confirmed by our data: collective bargaining coverage is 29 percentage points higher in countries in which minimum wages are determined through collective bargaining at the sectoral level (see Section 4.2.2). One reason for

this might be that statutory minimum wages are indeed functional equivalents protecting workers against low wages in the absence of effective protection through collective bargaining. In other words, statutory minimum wages can be the consequence of low levels of collective bargaining if policymakers see them as an instrument to protect otherwise vulnerable workers. This explanation seems to account for the minimum wage policies adopted by Central and Eastern European countries where collective bargaining institutions were so weak during the transition to capitalist labour markets that almost all countries installed statutory wage floors in order to protect workers against excessive wage dumping.⁶

To be sure, it is possible to build a typology with more features in order to capture more of the institutional diversity between countries. For instance, one might split up the group of countries with statutory minimum wages according to the process through which the wage floors are determined (automatic adjustment to inflation, as in Belgium or France; bi- or tripartite negotiations, as in Estonia or Ireland; and determination by the state after consultation with the social partners, as in Portugal). Some experts on the institutional diversity that underpin minimum wage arrangements indeed stress the heterogeneity of ‘a host of different arrangements and national models’ (Eyraud and Saget, 2005; p. 2). The behaviour of the involved actors might also lead to different outcomes within the same type of minimum wage system. The strategy of the Austrian trade union confederation of defining every four years a universal minimum wage target and, consequently, campaigning for the introduction of this target in sectoral agreements is a case in point (cf. Hermann, 2006). Even though there is no statutory minimum wage and bargaining takes place at the sectoral level in Austria, national campaigns such as the ‘*Kampagne 1.000-Euro-Mindestlohn*’ that was decided by the congress of the trade union confederation in 2003 introduce a degree of centralisation into an otherwise decentralised minimum wage system without necessarily changing the institutional set-up. Indeed, the presentation of the national minimum wage systems in Section 3.3 illustrates considerable heterogeneity among national models.

While therefore somewhat desirable on theoretical grounds, taking all the diversity on board leads inevitably to heavy data requirements when it comes to empirical hypothesis testing: the finer the distinctions between national models, the more observations and inter-category variability are required in order to produce statistically sound results. Confronted with this trade-off, we decided to focus on the two basic features of minimum wage systems cited above (namely, collective bargaining coverage and the opposition between statutory and collectively bargained minima). The main rationale for this choice is that the combination of these two features has not yet been studied –

6. See Section 4.2.2, ‘Collective bargaining coverage across minimum wage systems’, for a more detailed discussion of the link between collective bargaining coverage and the existence of a national statutory minimum wage.

a striking gap in the literature given that many practitioners and scholars of minimum wages would agree that they are likely to give rise to different labour market outcomes.

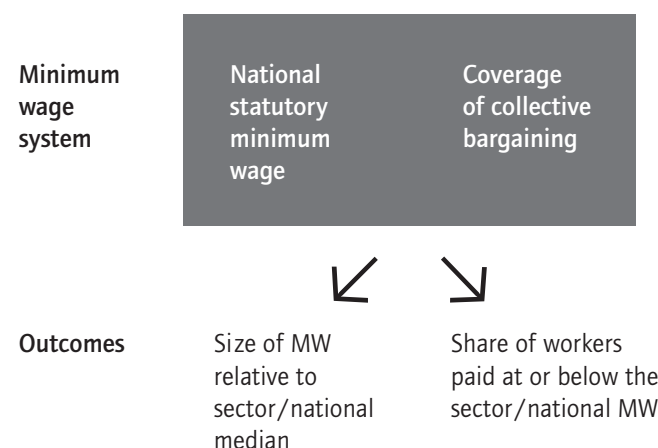
3.2 Minimum wage systems and selected labour market outcomes

In this section we discuss the labour market outcomes that might arise from different configurations of national minimum wage systems. We notably link the diversity of systems to the minimum wage bite, on one hand, and to several inequality outcomes, on the other.

3.2.1 The minimum wage bite

The ‘bite’ of a wage floor can be assessed by computing (i) its level relative to the median wage (that is, the Kaitz index) and (ii) the share of workers that receive wages below or near the minimum wage (see Section 2.1). Based on existing empirical evidence, it is possible to formulate hypotheses on how the two main features of minimum wages systems jointly lead to different labour market outcomes (see Figure 2). As for collective bargaining coverage, existing evidence can be summarised in the hypothesis that more complete coverage is associated with higher relative minimum wages (cf. Grimshaw and Bosch, 2013). A second hypothesis would be that higher collective bargaining coverage leads to fewer workers being paid below negotiated wage floors.

Figure 2 System features and the minimum wage bite



Like many practitioners, we also hypothesise that collectively negotiated minimum wages lead to higher minimum wage levels compared to statutory minimum wages. Another hypothesis would be that the share of workers paid

below minimum wages should be lower if a statutory minimum exists in a country. Indeed, collectively agreed minima apply to all employees only if effective extension mechanisms are in place; in their absence, uncovered workers might be paid below negotiated minima. The extent of coverage of collectively negotiated minima is decreasing in most European countries. Even relatively stable and effective systems such as the Austrian model, in which obligatory membership in the Economic Chambers obliges all employers to adhere to collective bargaining agreements, leaves more and more groups in the labour force uncovered, in particular new kinds of self-employed individuals (Hermann, 2006). It might also be argued that compliance with existing minima might be higher in systems with national minima, given that the information on minimum rates might be more easily available for national than for sectoral minima.

3.2.2 Impact on inequality

One of the policy objectives that are often pursued by setting minimum wages is related to limiting wage inequality, especially at the bottom of the distribution, by providing a minimum floor (see Grimshaw and Rubery, 2013). It is often difficult to define precisely what is meant by 'inequality' and several alternative indicators with more or less different interpretations co-exist (Kampelmann, 2009). In this study we look at three indicators of inequality: the share of workers earning hourly wage below two-thirds of the median wage (so-called 'low-wage workers'); Gini inequality⁷ among all workers and among low-wage workers; and Theil inequality⁸ between sectors of activity (see Figure 3).

How are the different features of minimum wage systems related to these outcomes? In general, one might expect that more inclusive collective bargaining coverage is associated with lower levels of inequality: the compression of the overall wage structure is likely to be related to the share of employment covered by collective agreements. This being said, there are also arguments against a negative relationship between coverage and inequality: if,

7. The Gini index measures the extent to which the distribution of income (or, in this case, wages) among individuals or households within an economy deviates from a perfectly equal distribution. The Gini index measures the area between the Lorenz curve (cumulative distribution of income or wage) and the hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. A Gini index of zero represents perfect equality and 100, perfect inequality.

8. The Theil index is another statistic used to measure inequality. Perfect equality corresponds to each individual receiving the same share of the variable under analysis; complete inequality is defined as the situation in which one person receives all the income and all others receive nothing. The Theil index is widely used to decompose total inequality into within-group and between-group inequality. For example, a given level of wage inequality is typically the result of pay differences between occupations and between individuals within each occupation. In this case, a Theil decomposition is an indicator of how much inequality is due to wage differentials between occupational groups and how much can be attributed to wage inequality within occupations (for a more detailed analysis of the Gini and Theil statistics, see Kampelmann, 2009).

Figure 3 System features and inequality outcomes

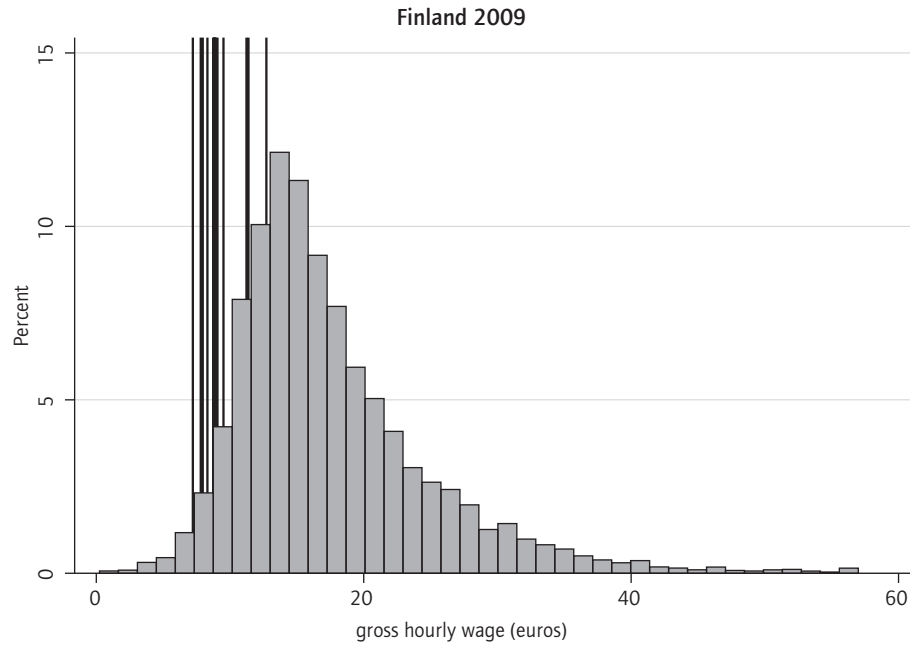


for instance, trade union representatives only bargain for the interests of covered workers and are able to achieve higher wage rates for ‘insiders’ (covered workers) at the expense of lower rates for ‘outsiders’ (uncovered workers), the overall effect on inequality might also be negative. In particular, low levels of coverage might incite union leaders not to take outsider interests into account, which could lead to higher levels of wage inequality in the lower tail of the wage distribution.

As for the relationship between the minimum wage mechanism (statutory or collectively negotiated) and the different inequality measures, it is plausible that a binding national minimum wage has a negative impact on inequality (Grimshaw and Rubery, 2013), given that it limits wage dispersion in the lower tail of the distribution. This idea is largely supported by the empirical literature on statutory minimum wages (Brown, 1999; Di Nardo *et al.*, 1996; Lee, 1999; Autor *et al.*, 2010). The consequences for lower-tail inequality of the two types of systems can easily be illustrated graphically: comparing the examples of Finland and Hungary in 2009, the lower tail of the Finnish wage distribution shown in Figure 4 displays some dispersion around the vertical line representing the average of all the sectoral-level minima; this contrasts with the clean cut due to the statutory minimum rate in the Hungarian wage distribution shown in Figure 5.

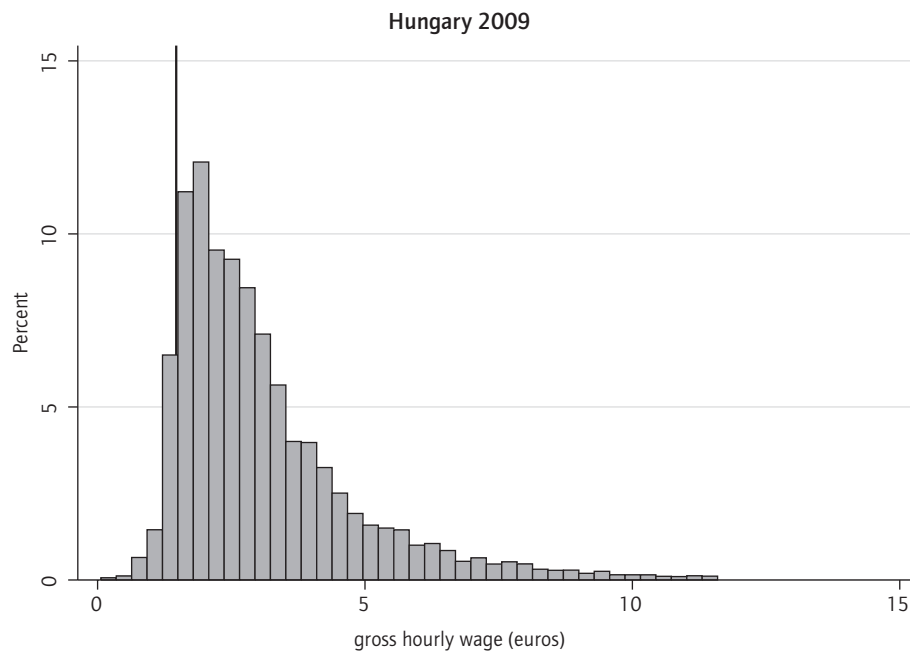
Since a national minimum wage is by definition the same in all sectors of activity, inter-sectoral inequality is expected to be lower than in a system with collectively negotiated wage floors at the sectoral level. Indeed, Hermann (2005) argues that the wage differences between sectors induced by the Austrian system of branch-level agreements leads to considerable inequality between sectors, an outcome that is qualified as a ‘grave disadvantage of the existing system’ in Austria.

Figure 4 Wage distribution and average minimum wage in Finland



Source: FI-SILC; current 2009 euros; vertical lines represent sectoral minima (in Helsinki for those sectors that have subminima outside Helsinki).

Figure 5 Wage distribution and statutory minimum wage in Hungary



Source: HU-SILC; current 2009 euros; vertical line represents national statutory minimum wage.

3.3 Diversity of minimum wage systems in Europe

In order to be able to compare the performance of different types of minimum wage systems, the empirical analysis in this report is based on a representative sample of eighteen European countries. The country sample has been selected in order to include (a) countries with and without national statutory minimum wages; (b) different levels of collective bargaining coverage; (c) countries from different sub-regions (Nordic countries, Southern Europe, Continental Europe, Central and Eastern Europe); and (d) both small and big countries. The complete sample includes Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Portugal, Romania and the United Kingdom.

In this section we operationalise our main explanatory variables and provide a descriptive overview of the minimum wage systems in each of these countries, focussing on the two main features of these systems we identified above (in other words, the level at which the minimum wage is set and the degree of collective bargaining coverage). In other words, we provide qualitative information on how our two main explanatory variables are embedded in specific minimum wage systems in each of the countries under analysis. The qualitative information in these descriptions stems from a range of sources, including the ILO database on minimum wages, the EIRO country profiles on industrial relation systems and the country overviews in Schulten *et al.* (2006), Vaughan-Whitehead (2010), Eldring and Alsos (2012), Grimshaw *et al.* (2013) and a series of other articles cited below. The figures on collective bargaining coverage have been taken from Visser (2011) and refer to total coverage (that is, including coverage at the firm and sectoral levels); information on extension mechanisms has been completed with data from Eurofound (2011). A summary table including all countries is provided at the end of this section.

Given that the micro-data we use in the empirical part of this report refers to labour markets during the period from 2007 until 2009, the description of minimum wage systems also concentrates on this period. Since the financial crisis in 2007–2008 and the ensuing ‘Great Recession’, however, a few countries have implemented legislative and institutional changes that have affected their respective minimum wage systems (OECD, 2012b). Some of these changes have been designed as a response to the crisis and mounting political pressure from international institutions. For instance, the systems in Hungary and Romania recently underwent institutional changes, which we describe below. This being said, the typical response to the crisis since 2009 has consisted in freezing existing minimum wage rates rather than changing the institutional features of the underlying minimum wage systems (cf. Schulten, 2012). This means that our conclusions drawn from our institutional analysis covering data from 2007–2009 are likely to be unaffected by more recent developments.

Austria

Austrian minimum wages are defined in collective bargaining agreements (*Kollektivverträge*) at different levels: local, regional and sectoral. There is a statutory minimum wage in parts of the public sector, but its rate is negotiated between the social partners. Since 1991 the minimum wage included in many collective agreements has been oriented towards a common national target defined by the congress of the trade union confederation (*ÖGB Bundeskongress*), but despite this target the minima continue to differ widely between sectors (Hermann, 2006). Under certain conditions, an agency within the Ministry of Labour (*Bundeseinigungsamt*) can impose wage floors in certain branches and extend collective agreements. The Austrian system is regarded as both stable and effective due to the mandatory membership of all private enterprises in the Austrian Federal Economic Chambers (*Wirtschaftskammern*) that sign the collective agreements, an arrangement in which virtually all workers are covered by sector-specific minima (Eldring and Alsos, 2012). According to the database managed by the main trade union confederation (*KV System ÖGB*), around 450 collective agreements are negotiated every year in Austria.⁹

Belgium

Sectoral-level collective bargaining forms the core of Belgium's minimum wage system, but the country differs from the Nordic or German models in that in Belgium a national statutory minimum wage plays an important role as well. The national minimum wage (*salaire minimum interprofessionnel*) is negotiated between the social partners in national councils (the *Conseil central de l'économie* and the *Conseil national du travail*). The sectoral-level agreements are negotiated in one of more than hundred *Commissions Paritaires*. Given that these commissions are segregated by occupational status (in most sectors blue- and white-collar workers belong to separate commissions), workers at the same firm typically belong to several bargaining commissions and different minima may apply within the same firm. Public-sector employees and apprentices are exempted from the national statutory minimum wage and are covered by specific agreements. At the national level, reduced rates have been defined for workers below 22.5 years (see interprofessional agreements CCT No. 43 and No. 50). Belgium's high collective bargaining coverage (around 96 per cent) stems from the practice that all collective agreements are extended to all workers by Royal Decree.

Bulgaria

The Bulgarian system is based on a national statutory minimum wage determined by the government; its rate is defined after consultation with

9. See: www.kvsystem.at

employers and unions (tripartite agreements) and legislated by decree. No category of workers is exempted from the statutory minimum, but apprentices may receive slightly lower rates during a fixed training period. While the national minimum therefore applies to all workers, collective bargaining coverage is low in Bulgaria (around 20 per cent). The different characteristics of the Bulgarian minimum wage system (national statutory minimum with few exceptions and reduction combined with low bargaining coverage) are typical of central and eastern European countries.

Cyprus

Cyprus has neither a national statutory minimum wage nor sectoral ones. The government (since 1941) sets minimum wage rates for specific occupations in which union density and union coverage are low and employees have weak bargaining power (sales staff, clerical workers, auxiliary health care staff, auxiliary staff in nursery schools, crèches and schools). In July 2008 this rate was extended to guards and caretakers working in clinics, private hospitals and nursing homes. The tripartite Labour Advisory Board, including the government as well as employers' and workers' representatives, makes recommendations on the rates to be adopted by minimum wage legislation. Reduced rates apply during the first six months of employment. Cyprus stands out from most other European countries in that the absence of a statutory minimum wage is not counterbalanced by high collective bargaining coverage (only around 54 per cent of workers are covered). With regard to its minimum wage system the country is therefore similar to Germany.

Denmark

In Denmark, there is no national statutory minimum wage rate. Minimum wages are set in sectoral collective agreements between the employers' association DA (*Dansk Arbejdsgiverforening*) and the confederation of trade union workers LO (*Landsorganisationen*). There are no formal extension procedures for private-sector agreements (Lismoen, 2006). The collective bargaining coverage in Denmark is relatively high (around 80 per cent), but significantly less universal than in other countries with collectively bargained minima, such as Austria, Belgium and Finland. Collective agreements are not extended in Denmark (Eldring and Alsos, 2012).

Estonia

Since 1991 the Estonian state has set a national statutory minimum wage by decree. This national rate is revised annually and based on a bipartite agreement between employers and unions. Even among central and eastern European countries Estonian collective bargaining coverage is very low (around 20 per cent), which means that the national statutory minimum wage is highly relevant for most parts of the economy. Due to the weak coverage of

sectoral bargaining, Grimshaw and Bosch (2013) argue that the Estonian minimum wage has a large impact on the country's wage structure.

Finland

In Finland there is no national statutory minimum wage rate but collective agreements have defined the minimum wages at the sectoral level since the beginning of the 1970s. Members of the employer confederations are obliged to follow the collective agreement signed by their respective confederation. Employers can also make independent agreements with the trade unions. Normally, terms of employment are concluded at sectoral level with *erga omnes* applicability. Non-organised employers have to observe the collective agreement that sets minimum terms and conditions of employment within their area of employment. Such employers are not allowed to pay lower wages than those stipulated in the collective agreements. There are currently around 170 sectoral contracts, each typically defining separate minima for different work posts. There is also some regional variation of minima, with different rates applying outside the Helsinki region. Only 10 per cent of Finnish workers are not covered by collectively agreed minima, a group that consists mainly of self-employed individuals. Contrary to the case of Denmark, extension mechanisms of collective agreements exist and are widely applied in Finland (Eldring and Alsos, 2012).

France

France has had a national statutory minimum wage since the 1950s. The SMIC (*Salaire minimum interprofessionnel de croissance*) is set by legislation and covers all workers except those in the public sector, apprentices, young workers and persons with certain disabilities, for whom different rates apply. There are two ways in which the national minimum wage rate (SMIC) may be adjusted. First, the SMIC is indexed to the consumer price index (CPI): when it increases by at least 2 per cent, the SMIC is increased by the same percentage. Second, and independent of the first method, the government sets a new SMIC by decree on 1 July each year, following the opinion and related report of the National Committee on Collective Agreements. The National Committee on Collective Agreements is made up of four government representatives and an equal number of persons from the most representative workers' and employers' organisations. Despite low union density, collectively agreed wages defined in sectoral agreements (*Conventions collectives de travail*) apply to almost all workers due to the fact that all agreements are extended by the government. However, the specific minimum wages agreed through collective bargaining are in many cases irrelevant since they are often lower than the SMIC (Gautié, 2010; Eldring and Alsos, 2012: 50).

Germany

Similar to the case of Cyprus, the German minimum wage system is characterised by the absence of a national statutory minimum wage and relatively weak collective bargaining coverage: only workers in companies bound to collective agreements (*tarifgebundene Unternehmen*) are effectively protected. The state can, however, intervene in several ways in minimum wage setting: Article 5 of the Collective Agreement Act (*Tarifvertragsgesetz*) makes it possible to extend collectively agreed minima to all workers; the Posted Workers Act (*Arbeitnehmerentsendegesetz*) makes it possible to extend collective agreements that cover more than 50 per cent of employees in a sector, a method that has been applied in cleaning, construction, laundries, electrical work, care services, mining and postal services; if collective agreements cover less than 50 per cent of workers in a sector, the Act relating to minimum working conditions (*Mindestarbeitsbedingungengesetz*) permits introducing minimum wages through an agreement in a tripartite commission. Despite these mechanisms, only 640 of the 64,300 agreements registered in 2008 have been extended (Eurofound, 2011: 2). Collective bargaining coverage continues to weaken and has called the German model of protection against low pay into question: between 1998 and 2010, collective bargaining coverage declined from 73 to 63 per cent in western Germany and from 63 to 50 per cent in eastern Germany. The coverage at sectoral level is even lower, so that more than half of all German workers are not covered by national or sectoral minima. This is why Schulten (2006) argues that the German collective bargaining agreements currently cannot be regarded as functional equivalents of statutory minimum wages.

Greece

Greece has a national statutory minimum wage fixed in a National General Collective Agreement (*Εθνική Γενική Συλλογική Σύμβαση Εργασίας*, EGSSE) that is concluded between the Greek General Confederation of Labour and the Federation of Greek Industries and General Confederation of Greek Small Businesses and Trades. During negotiations on a new EGSSE, the social partners submit their proposals on a wage increase. The two main parameters taken into account in determining the increase are estimated inflation and GDP growth. The minimum wage does not differ by categories of worker. However, a worker's level of education, years of employment and family status are used to determine their total wage. Despite low trade union density (less than 25 per cent), the existence of effective extension mechanisms has led to relatively high coverage rates (around 65 per cent). Recent changes in the legislation have, however, somewhat restricted the scope of extension mechanisms (Eurofound, 2011).

Hungary

Since 1991, the Hungarian government has fixed statutory minimum wages following tripartite agreements in the National Interest Reconciliation Council

(OÉT). Except for a higher rate for skilled workers, there are no exemptions or differentiations (Funk and Lesch, 2005). Collective bargaining agreements can, at least in principle, lead to increases in minimum wages at the sectoral level. However, union density and collective bargaining coverage are both notoriously low (17 and 34 per cent, respectively). What is more, compliance with sectoral-level agreements appears to be weak outside the public sector and utilities (Grimshaw and Bosch, 2013).

Since 2012 there have been changes in way in which the social partners are able to affect the national statutory minimum wage. The Hungarian Parliament passed a law on 4 July 2011 that effectively incorporates the tripartite OÉT along with other institutions in a new National Economic and Social Council (NGTT). According to Komiljovics (2011), council members have no decision-making rights and can only make proposals to the government: ‘In effect, the cabinet alone can now decide on wage and employment-related regulations.’ Even though the NGTT officially functions as an advisory instead of a consultative body, Szabó (2013) also points out that it is ‘toothless’.¹⁰

Ireland

Ireland has a national statutory minimum wage. It is set in an Order by the Minister for Enterprise, Trade and Employment following a national economic agreement among economic and social interests or following a recommendation of the Labour Court (Nolan, 2010). An examination of the national minimum wage rate by the Labour Court must include consultation with representatives of employees and employers in the private and public sector of the economy. If agreement is reached between the parties on the appropriate hourly rate of pay of employees, that rate is recommended to the Minister. If no agreement is reached, the Labour Court may still make a recommendation concerning the hourly rate of pay, based on certain factors. The statutory minima in Ireland are differentiated and lower rates exist for young workers, trainees and newly hired staff. There are only a few sectoral-level agreements, so that for most workers the statutory minimum represents the relevant wage floor, an exception being the construction sector. Collective bargaining coverage is modest (44 per cent).

Italy

There is no national statutory minimum wage rate in Italy. Minimum wage rates are set in binding sectoral collective agreements that generally are valid

10. Even though this change affects the Hungarian minimum wage systems in that it decreases the role of the social partners in the definition of the national statutory minimum wage, it does not affect the explanatory variables in our model. Unlike Boeri (2012), our model does not distinguish between whether statutory minimum wages at the national level are determined through consultative or bargaining processes or whether the government can fix the national wage floor unilaterally.

only for the companies and employees affiliated to the associations that sign the collective agreement; according to Eurofound (2011), there are no extension mechanisms in Italy. That said, courts usually refer to collectively agreed minimum pay rates in order to assess the appropriateness of actual wages in individual disputes, according to Article 36 of the Constitution (Megale *et al.*, 2007). As a result, even workers who are not covered should receive wages at least equal to the minimum rates determined in collective agreements. Indeed, collective bargaining coverage in Italy is high compared to the country's union density (80 percent and 35 percent, respectively). Collective agreements are usually determined for a period of four years and the provisions concerning pay levels are renegotiated every two years.

Latvia

The Latvian statutory minimum wage is determined by the state after consultation with employers and unions. There is some leverage for the government to extend minima negotiated through collective bargaining, notably a law that extends agreements if the employer organisation represents more than 50 per cent of the workers in a sector (Eurofound, 2011). However, the existing extension mechanisms rarely apply, so that the country's low trade union density (15 per cent) translates into weak collective bargaining coverage (25 per cent). As in the other central and eastern European countries, the statutory wage floor represents the most relevant protection against low pay for the vast majority of Latvian workers.

Poland

Poland has a national statutory minimum wage. The minimum wage is negotiated every year within the Tripartite Commission (government, employers and employee representatives) and it is based on a proposal by the government (Wallusch, 2010). The level of the minimum wage is fixed in accordance with the projected global average annual consumer price index. If the level of the minimum wage in the year of negotiations is less than half of the level of average earnings, the minimum wage increases by two-thirds of the projected real GDP growth rate. If the Commission does not reach a consensus, the government sets the minimum wage. The minimum wage level set by the government cannot be less than the level included in the proposal presented to the Tripartite Commission. Like other central and eastern European countries, collective bargaining coverage is relatively low, at an estimated 30 per cent.

Portugal

Portugal has had a national statutory minimum wage (*Salário Mínimo Nacional*, SMN) since 1974. Later, the SMN was renamed the guaranteed monthly minimum payment (*Remuneração Mínima Mensal Garantida*,

RMMG). The government sets the national minimum wage rate after consultation with the Committee for Social Consultation of the Economic and Social Council (*Comissão Permanente de Concertação Social do Conselho Económico e Social*), which is a tripartite body. At first, the SMN was not differentiated for various groups of workers. In 1977–1978, the government created a differentiated SMN with specific minimum wages for agriculture and domestic workers that was considerably below the general SMN. In 1991, the SMN for agriculture was integrated into the general rate and in 2004 the differentiation system was abolished. Extension of collective bargaining agreements is ‘common practice’ in Portugal (Eurofound, 2011), but due to the low trade union density of only 15 per cent the overall collective bargaining coverage remains relatively low (38 per cent).

Romania

In Romania, until 2011 the government set a national statutory minimum wage rate following consultation with the social partners. Within the group of central and eastern European countries, trade union density is the highest in Romania (33 per cent); what is more, the country’s labour law provides for effective and widely used extension mechanisms so that Romania’s collective bargaining coverage is the highest in the region (70 per cent).

In 2011, the Romanian government introduced the so-called Social Dialogue Act (SDA), thereby essentially abolishing cross-sectoral collective agreements, which formerly also defined the terms for minimum wages.¹¹ What is more, the SDA curbed the legal extension of collective agreements so that the relatively high level of bargaining coverage are likely to decrease to the levels observed in neighbouring countries (cf. Trif, 2013).

United Kingdom

The United Kingdom has had a national statutory minimum wage since 1997. The Secretary of State determines the national minimum wage following the Low Pay Commission’s recommendation. This Commission comprises an independent chair and nine members (three employers, three employees and three independents). Before making a recommendation, the Low Pay Commission must consult employers’ representatives, workers’ representatives and any other body or person they think fit. There are lower rates for young workers and apprentices. Collective bargaining agreements at the sectoral level hardly exist and no legal extension mechanism is available. The collective bargaining coverage of 34 per cent mainly stems from firm-level agreements.

11. Similar to the recent institutional change in Hungary, the Romanian SDA would not have affected our explanatory variable. See footnote 1 on page 9.

3.3.19 Summary table

Due to the historical contingencies and the diversity of institutional arrangements at the national level (Eyraud and Saget, 2005), each country in our sample is unique with regard to its minimum wage system. This being said, focusing on the two basic features of these systems – namely, the existence or absence of a national statutory minimum wage and the degree of collective bargaining coverage – allows us to distinguish minimum wage systems in respect of the (potential) protection against low pay that they provide (see Table 1).

Table 1 Overview of minimum wage systems

	Low bargaining coverage	High bargaining coverage
Sectoral/occupational MW	No protection	Equivalent protection
National statutory MW	Equivalent protection	Dual protection

Three types of protection against low pay can be identified:

- (i) **No protection:** a minimum wage system that has neither a statutory minimum wage nor sectoral/occupational agreements that cover most of the workforce is likely to offer no or only weak protection against wage dumping or excessively low wages.
- (ii) **Equivalent protection:** statutory minimum wages and sectoral agreements with high coverage are sometimes regarded as functional equivalents (Schulten, 2006) providing an intermediate level of protection against low pay. Empirical evidence for the equivalence of the two types of minimum wage system is, however, so far not available.
- (iii) **Dual protection:** a combination of a statutory wage floor and wide collective bargaining coverage provides arguably the strongest protection against low wages.

Table 2 Overview of countries according to their minimum wage systems

	Low bargaining coverage	Medium coverage	High coverage
Sectoral/occupational MW	–	Cyprus, Germany	Austria, Finland, Denmark, Italy
National statutory MW	Latvia, United Kingdom, Ireland, Bulgaria, Estonia, Hungary, Portugal, Poland,	Romania, Greece	Belgium, France

Table 2 applies this two-by-two grid to the eighteen countries in our sample. The empty square in the upper left corner means that all European countries provide at least some level of protection against low pay. Twelve of the eighteen countries in our sample are classified into one of the two squares associated

with equivalent levels of protection: Latvia, United Kingdom, Ireland, Bulgaria, Estonia, Hungary, Portugal and Poland have a statutory minimum wage but low levels of collective bargaining coverage, while Austria, Finland, Denmark and Italy have no statutory minima but high coverage. Belgium and France are associated with dual protection, although in practice the French system provides no more protection than the two groups with equivalent protection, given that sectoral-level agreements often contain minimum rates that are actually below statutory wages (see above). The four remaining countries occupy intermediate positions: Romania and Greece arguably provide somewhat stronger protection than the majority of countries with statutory minimum wages due to their relatively high levels of bargaining coverage. Conversely, the low coverage rates in Cyprus and Germany could mean that their minimum wage systems provide lower levels of protection compared to the other countries without statutory minimum wages. The weak position of the German minimum wage system in our table reflects of course the ongoing debate on the introduction of a national minimum wages in this country, but it also illustrates why this debate is probably livelier in Germany than in most other European countries.

4. Quantitative results

In this chapter we will test empirically the impact of institutional features of minimum wage systems on different measures of the bite of wage floors and on a range of inequality measures¹².

4.1 Description of the database

4.1.1 Micro-level data on earnings and individual characteristics

The set of questions raised in Section 3.2 can be addressed most effectively by using harmonised microdata: they notably imply being able to compute sectoral-level Kaitz indices, different Gini coefficients, between-group Theil inequality and indicators regarding the shape of the income distribution (the share of low-wage workers, the share of individuals below the minimum wage and so on). With no available dataset including micro-level data on wages and individual characteristics, on one hand, and information on minimum wages systems, on the other hand, we had to construct a new database combining several existing sources of information.

The representative micro-level data we used stem from the harmonised survey of European Statistics on Income and Living Conditions (SILC). For the eighteen countries in our sample, we used the available waves collected in 2008, 2009 and 2010, containing information on income variables for the years 2007–2009. The EU-SILC data contain labour market information for a range of European countries and are designed as a household-level survey, allowing one to calculate inequality and poverty indicators, in particular the so-called Laeken indicators, such as the poverty rate, in-work poverty or the Gini index (see Atkinson *et al.*, 2002). The EU-SILC data contain detailed information on job characteristics, such as earnings, employment type and employer characteristics. On average, the micro-level information in our sample is based on 6,792 individual observations per country and year (for the number of observations per country see Table 3).

¹² Country tables providing a comprehensive summary of the main quantitative results presented in this chapter are available on the ETUI website: www.etui.org/Publications/Reports

The income variable used in the regression analysis is gross hourly wages. The latter have been calculated at the individual level by dividing gross monthly income – that is, monthly income before the deduction of taxes and including social contributions paid by the employee – by the working hours the individual declared for the corresponding income period. We calculated this variable for all workers in the SILC except for individuals who declared themselves self-employed; our analysis therefore includes individuals working part-time and all salaried employment. This is slightly different from other studies on minimum wages, which look only at full-time workers or focus exclusively on individuals paid hourly wages as opposed to monthly salaries (Schulten, 2006; Vaughan-Whitehead, 2010; US Bureau of Labor Statistics, 2012).

The precision of our earnings measure therefore depends on the quality of both the income and the hours measures. The impact of imperfect information on working hours should not be underestimated: as pointed out by Austrian expert on minimum wages Sepp Zuckerstätter, apparently minor issues such as whether a lunch break is remunerated or not often has a higher impact than a slightly higher monthly income (see quote in Hermann, 2006). In the SILC, both numerator and denominator of the wage variable are self-reported survey data and therefore subject to the usual disclaimers. While sometimes criticised as being less precise than administrative data collected from company records or fiscal authorities, our earnings measure has the merit of corresponding better to the viewpoint of employees: in the end, the information communicated by survey interviewees reflect what individuals think they earn per hour – a source of information that by definition corresponds better to the employee perspective on hourly wages than the hours measured by company records or payroll figures communicated to tax authorities.

4.1.2 Data on statutory and collectively bargained minimum rates

From the overview on minimum wage systems in Section 3.3 we know that 12 countries in our sample have statutory minimum wages. For all countries except Cyprus, information on the level and evolution of these minima has been collected from the March 2012 edition of the *WSI Mindestlohndatenbank*.¹³ The minimum rates have been collected and converted into euro amounts for all years with available SILC microdata. This step leads to 31 country-year observations from countries with statutory minimum wages at the national level.

13. See: http://www.boeckler.de/wsi-tarifarchiv_7052.htm

In light of the institutional set-up of the seven countries in our sample that do not have a national statutory minimum wage (Austria, Belgium,¹⁴ Cyprus,¹⁵ Denmark, Finland, Germany and Italy), access to minimum wage data for these countries is considerably more problematic. Indeed, this information had to be collected manually from sectoral-level collective bargaining agreements in each country. More precisely, we extracted from each agreement the wage assigned to the lowest category in collectively negotiated pay scales. While this definition of a sectoral minimum wage is straightforward, it should be noted that the elaborate categorisations that are found in many collective agreements render the identification of a given sectoral minimum wage relatively complicated. Indeed, in most agreements different pay scales co-exist: a separate pay scale is often defined for blue- and white-collar workers; specific scales are included for apprentices or young workers who enter the labour market; and even where a unique pay scale exists it is often differentiated by several variables, such as occupational groups, work-post nomenclatures and seniority levels. In order to come closest to the conception of sectoral minimum wages as ‘the pay rate defined for the lowest wage category’, our database contains information on the pay rate of the lowest of any category that figures in all the pay scales in a collective agreement, with the exception of pay scales for apprentices and young workers. In practice, in the vast majority of agreements this boils down to the pay rate that applies to workers with no seniority and who are classified in low-status occupations at the bottom of organisational hierarchies (*manœuvre ordinaire*, *Hilfsarbeiter* and so on).

It should be noted that the number of collective agreements signed in most countries is significant: in Germany alone there are around 64,300 valid agreements, although many of them are signed at the company and not at the sectoral level. We therefore decided to collect minimum rates from a representative sample of collective agreements in each country and to use them to compute average minima at the one-digit level of the Statistical Classification of Economic Activities in the European Community (NACE). We notably extracted minimum rates from around 325 collective agreements from Austria (referring to wages in 2009); 150 from Belgium (wages in 2007); 105 from Denmark (wages in 2007, 2008 and 2009); 210 from Finland (wages in 2007, 2008 and 2009); 80 from Germany (wages in 2007); and 240 from Italy (wages in 2007, 2008 and 2009). In order to ensure the representativity of the sectoral-level minima in the final dataset, the calculation of average minimum

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14. Belgium actually has a national minimum wage, but in addition to this statutory floor the collectively bargained minimum wages constitute the relevant minimum for most workers (see the country profile in Section 3.3.2). We have thus collected information on both the interprofessional and the sectoral-level minima and matched each individual to the minimum rate that corresponds to his or her profile. The inclusion of this special case in our sample has no consequences for the conclusions drawn from our empirical analysis (see robustness test in Section 4.4.2).
 15. Cyprus is a special case in that the minimum wage is not defined at the sectoral, but at the occupational level. For the period under analysis a single rate applied to around 10 occupational groups in Cyprus. We used data on these rates for 2007 and 2008 taken from EIRO country reports.

rates at the one-digit level of the NACE takes into account the relative employment shares of the sampled sectors. A detailed description of the country specificities regarding the collection of sectoral-level data is provided in Annex 7.1. The procedure produced 13 country-year observations from countries without statutory minima.

In all, our database therefore contains 44 country-year observations covering the period 2007–2008. Given that we computed sectoral-level variables at the one-digit NACE level distinguishing between 13 sectors, our database includes 572 sector-year observations from 18 European countries.

4.1.3 Data on collective bargaining coverage

The information on collective bargaining coverage was taken from Jelle Visser's ICTWSS data (Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts; version 3.0¹⁶), a standard reference in the literature on labour market institutions that, in turn, compiles information from various international surveys and country-specific sources. We have used ICTWSS data corresponding to all 44 country-year observations in our sample, although it should be noted that the relative stability of coverage rates (or data on coverage rates) means that the temporal variability of this variable is low in most countries.

Since we are interested in the link between collective bargaining coverage and both national and sectoral-level outcomes, it would be ideal to work with information on bargaining coverage at the sectoral level. Unfortunately, this information is not available in the ICTWSS or in any other cross-country database. Our sectoral-level regressions are therefore based on the assumption that collective bargaining coverage is relatively homogeneous across one-digit sectors within each country. Another issue raised by the ICTWSS data is the fact that it does not allow us to identify how many workers are covered at the sectoral level: typically, the figures refer to the share of workers covered at the company and/or at the sectoral level. In the absence of comparative data on sectoral bargaining, our sectoral-level regressions are therefore also based on the additional assumption that the proportions of workers covered only at the company and not at the sectoral level do not differ systematically across sectors and countries.

4.2 Exploratory data analysis

4.2.1 The relative size of minimum wages across countries

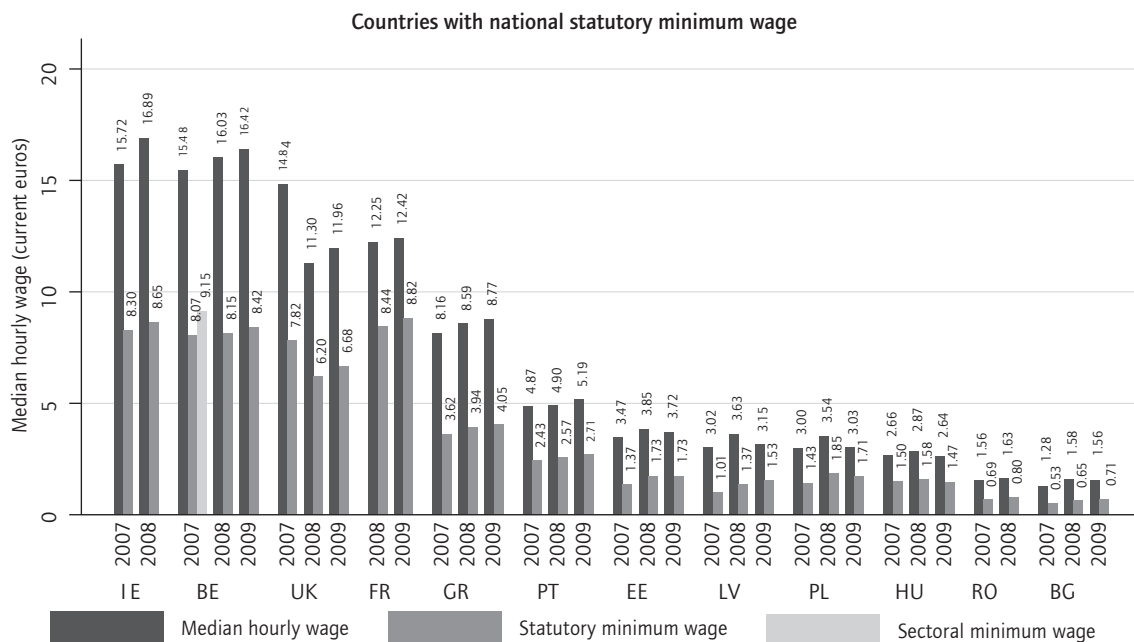
A common observation in comparative studies of minimum wages in Europe is that absolute levels of wage floors differ considerably across countries and

16. See: <http://www.uva-aias.net/208>

that these differences persist even after controlling for the international disparities in purchasing power (Schulten, 2006). We have represented the absolute size of statutory and sectoral minima in Figure 6 (countries with statutory wage floors) and Figure 7 (countries without a statutory floor). We indeed observe a wide span ranging from less than 2 euros per hour in the four Central and Eastern European countries in our sample to minima that are more than five times higher in Denmark and Italy.

It is of course also well-known that some of the absolute differences in minimum rates can be accounted for by intra-European variations in productivity. In the two figures we have also plotted the median wage for each year and each country so as to compare them directly with the prevailing minimum rate. The result is an obvious relationship between the absolute amounts of minimum wages and corresponding minimum wages: wage floors are lowest (highest) in countries where the general wage level as measured by the median wage is also low (high).

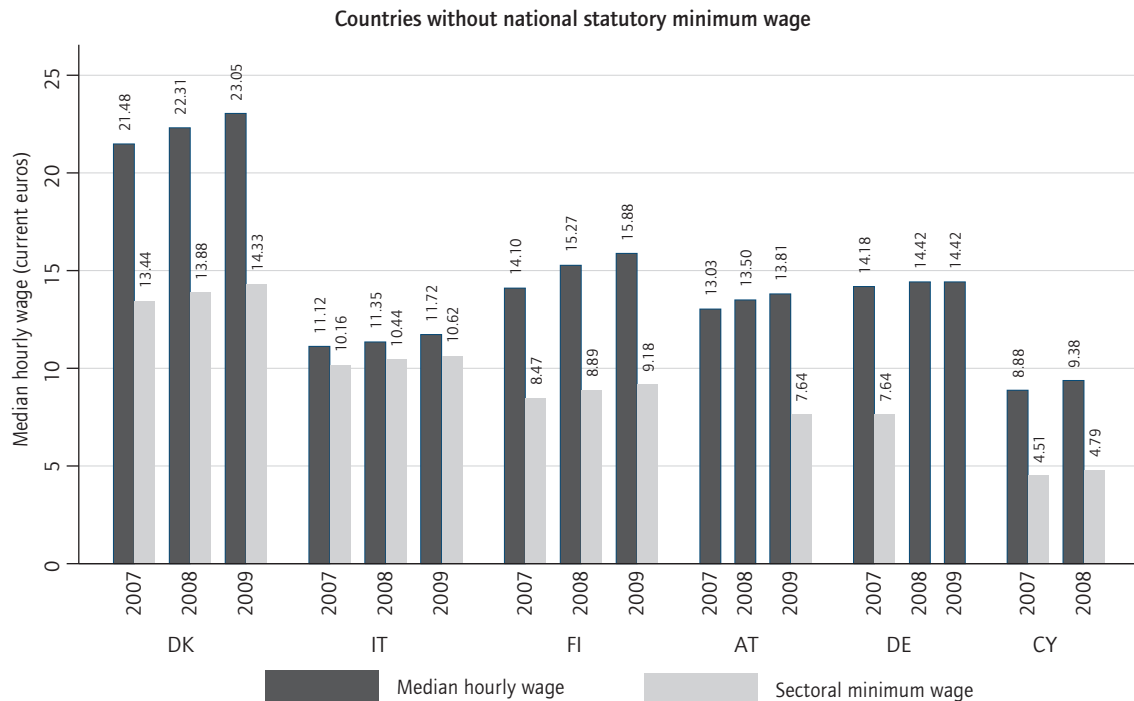
Figure 6 Median hourly wage and minimum wage



Source: SILC waves 2008–2010; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

The Kaitz Index is the ratio between minimum and median wages (see Section 2.2.1) and its values are shown in Figure 8 (countries with statutory wage floors) and Figure 9 (countries without statutory floors). For the latter group of countries the bar shown in the graph corresponds to the weighted average of sectoral Kaitz indices and therefore masks the intersectoral variations of minimum wages in these countries. A first observation from the comparison of Kaitz indices is that their levels are close to each other: the majority of

Figure 7 Median hourly wage and minimum wage



Source: SILC waves 2008–2010; WSI Mindestlohn datenbank for statutory minimum wages; authors' calculations.

national Kaitz Indices lies between 45 and 55 per cent. We also observe that most Central and Eastern countries have the lowest minimum wages in both absolute and relative levels (Kaitz indices below 50 per cent), but the regional differentiation is less clear than for the absolute levels, given that Poland has higher levels in 2008 and 2009, whereas Greece and Ireland (in 2008) also display values below 50 per cent. All observations from countries without statutory minimum wages lie above 50 per cent, including extremely high values for Italy. In fact, the Kaitz indices for Italy of around 90 per cent indicate that sectoral minima appear to lie close to the corresponding median wages.

As explained in Section 2.2, the 'bite' of the minimum wage not only refers to the relative level of wage floors but can also be measured by looking at the number of individuals that are paid below or near the prevailing rates. A graphical representation of these shares can be found in Figure 10 (countries with national statutory minima) and Figure 11 (countries without statutory minima). Depending on the type of minimum wage system, the figures show the share of individuals that receive wages below or exactly equal to the minimum prevailing in their country (black bars) or sector (grey bars). A larger proportion of individuals below the corresponding minimum can be interpreted as an indicator of a lower bite (see Section 2.2.2) due to the existence of imperfect coverage or non-compliance with minimum wage rules.

Contrary to the case of the absolute and relative levels of minimum wages, the graphs suggest that there is no clear regional stratification when it comes to the share of individuals paid at or below minimum wages. The Central and Eastern European countries are scattered across the range in Figure 10, from shares of less than 4 per cent in Bulgaria to around 10 per cent in Poland. The bite of minimum wages in Portugal and Greece seems to be rather high (relatively few people are paid below prevailing minima), while the incidence of employments that are uncovered or in violation of existing rules is apparently higher in France, the United Kingdom and Ireland. As for the countries without national statutory minimum wages, we observe a difference between the two Nordic countries, where the shares are below 5 per cent for most years, and the other countries, with a relatively high proportion of employment with wages below or exactly equal to minimum wages.

Besides non-coverage and non-compliance there is, however, another explanation for wages below prevailing minima, namely errors in the reporting of wages or working hours. Indeed, if we assume that the survey values with respect to both variables fluctuate around their true values, some observations will be falsely recorded as hourly wages below the minimum. While it is difficult to measure the exact incidence of reporting errors, one way to address this issue is to redefine the indicator of the minimum wage bite as the share of individuals earning hourly wages that are below or equal to 75 per cent of the corresponding minimum wage. This measure can therefore be interpreted as an indicator of the share of employment that is paid *significantly below existing wage floors*. The corresponding values are represented by the red bars (countries with statutory minima) or the yellow bars (countries without statutory minima) in Figure 10 and Figure 11. These values are arguably less prone to measurement errors: only if the measurement error in the earnings or hours variable exceeds 25 per cent is an individual erroneously counted as belonging to this group. On average, this definition leads to values that are less than half of the employment shares discussed above, pointing to a substantial proportion of individuals who declare that they are paid within 25 per cent of the minimum wage. The two indicators are, however, closely linked: the correlation coefficient between the two indicators is above 80 per cent. Comparing Figure 10 and Figure 11, we see that the link between the two measures differs between the two types of countries: by and large, the number of jobs with wages significantly below prevailing minimum wages appears to be higher in the group of countries without statutory minimum wages. Indeed, the share of individuals with wages that are at least 75 per cent lower than their corresponding minimum wage is on average 2 percentage points higher in countries without statutory minimum wages. It should be noted, however, that these averages are prone to omitted-variable biases because they fail to account for cross-country variations in the composition of the labour force; as a consequence, the topic of variations in the minimum wage bite will be explored further in our regression analysis in Section 4.3.

Figure 8 Kaitz indices by country and year

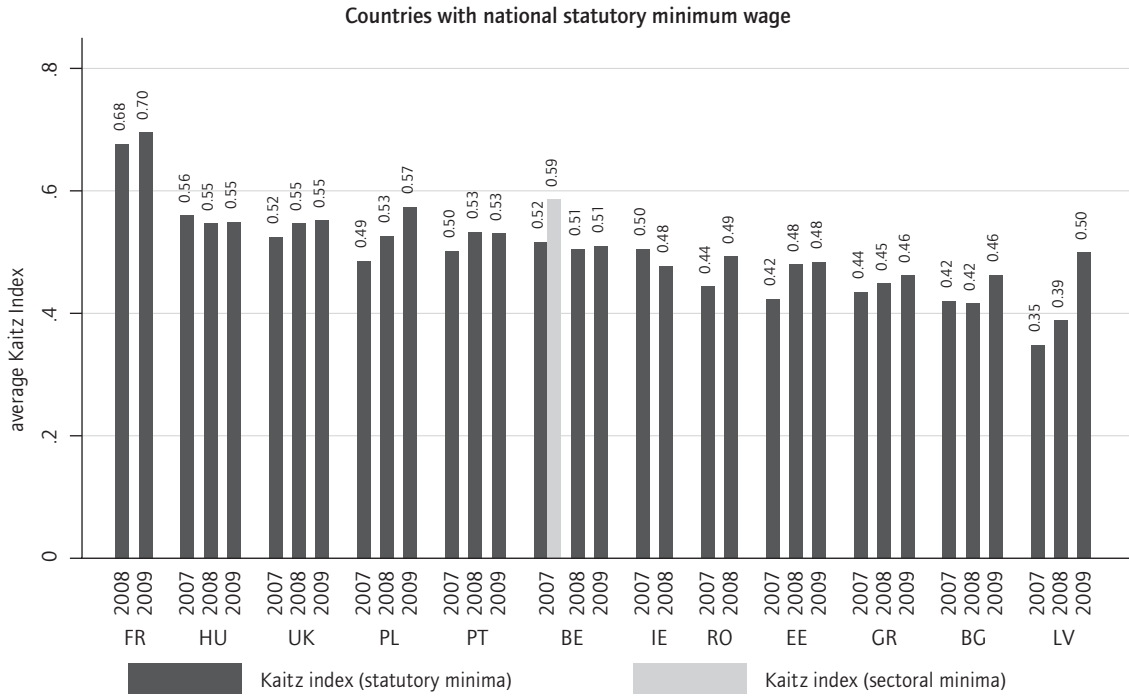
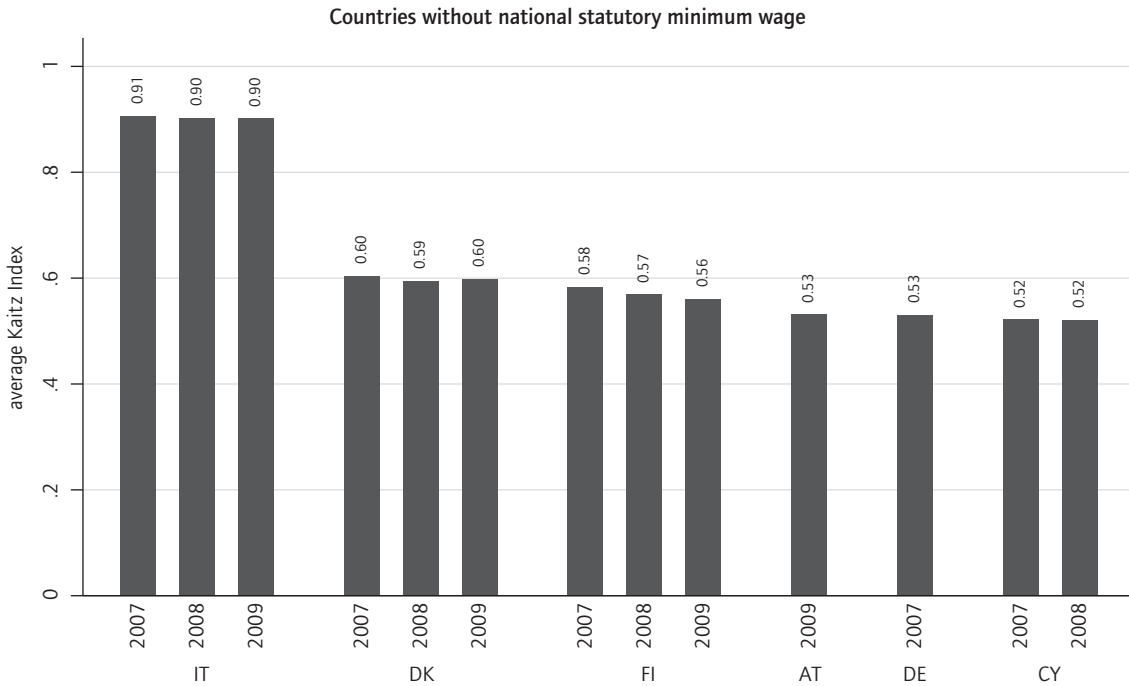


Figure 9 Kaitz indices by country and year



Source: SILC waves 2008–2010; WSI Mindestlohn datenbank for statutory minimum wages; authors' calculations.

Figure 10 Minimum wage earners by country and year

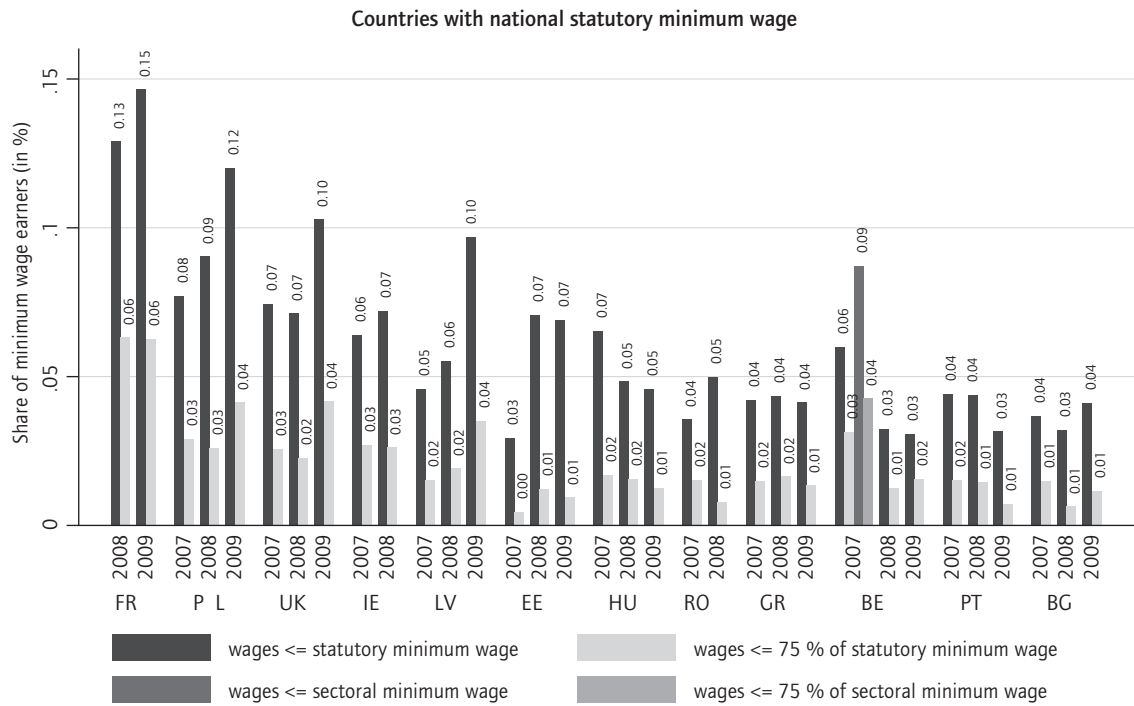
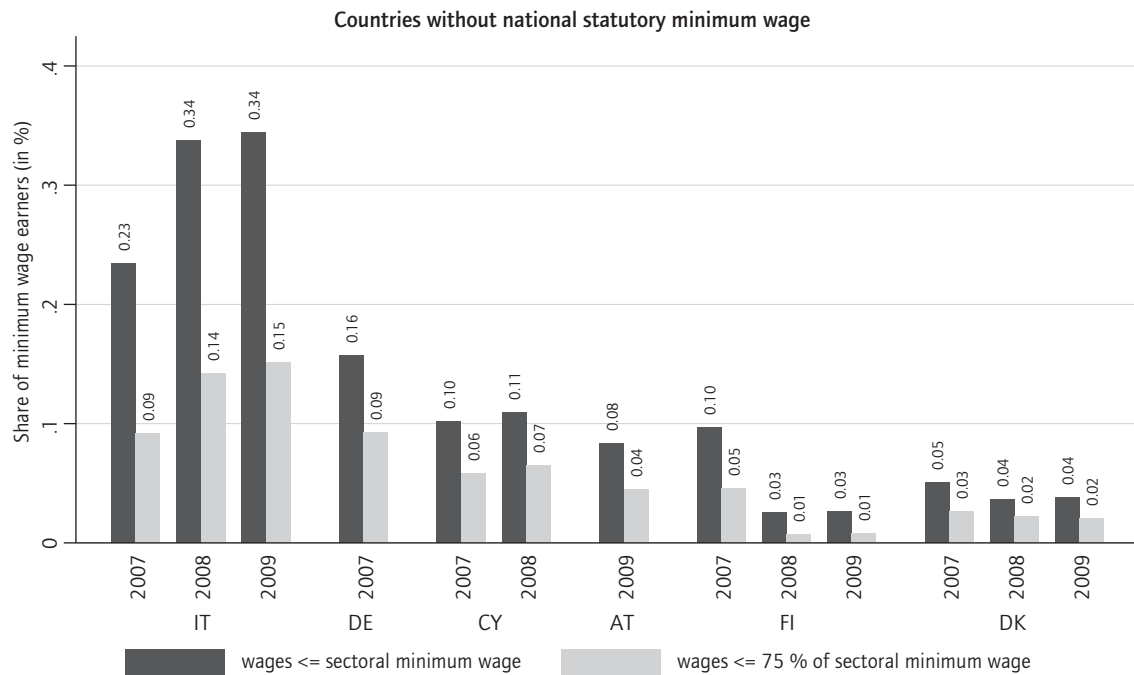


Figure 11 Minimum wage earners by country and year



Source: SILC waves 2008-2010; WSI Mindestlohn Datenbank for statutory minimum wages; authors' calculations.

4.2.2 Collective bargaining coverage across minimum wage systems

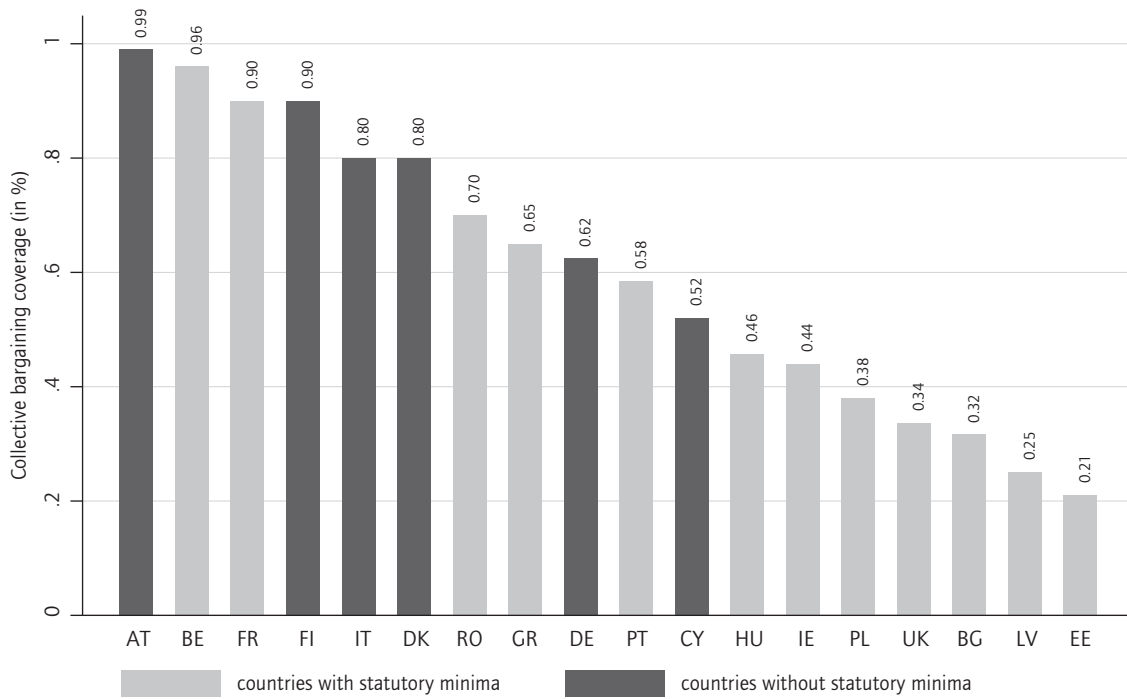
A range of studies underlines that the coverage of collective bargaining tends to be higher in countries without statutory minima (Schulzen et al, 2006; Vaughan-Whitehead, 2010; Eldring and Alsos, 2012; OECD, 2012a). This observation is confirmed by our data: the collective bargaining coverage is 29 percentage points higher in countries in which minimum wages are determined through collective bargaining at the sectoral level.

One explanation for this difference might be that statutory minimum wages are indeed functional equivalents protecting workers against low wages in the absence of effective protection through collective bargaining. In other words, statutory minimum wages can be the consequence of low levels of collective bargaining coverage if policymakers see them as an instrument to protect otherwise vulnerable workers. This reasoning seems to account for the minimum wage policies adopted in central and eastern Europe, where collective bargaining institutions were so weak during the transition to capitalist labour markets that almost all countries adopted statutory wage floors in order to protect workers against excessive wage dumping. Indeed, Hungary, Poland, Bulgaria, Latvia and Estonia are situated at the lower tier in Figure 12 showing the average collective bargaining coverage between 2007 and 2009 in each of the eighteen countries in our sample.

The relationship between the type of minimum wage system and the extent of collective bargaining coverage depends, however, on many factors; in a simple regression it indeed accounts for only around 26 per cent of the cross-country variation in our data. As can be seen in Figure 12, Belgium and France have high bargaining coverage but also statutory minima. In general, very high coverage is first and foremost related to effective extension mechanisms in the countries situated at the top of Figure 12: membership of the *Wirtschaftskammern* is obligatory for all employers in Austria; all agreements in any of the Belgian *Commission Paritaires* are extended by Royal Decree; France and Finland also have effective and widely applied extension mechanisms that account for the high levels of collective bargaining coverage in these countries.

Even if coverage and statutory floors may be historically related, over short time periods they can arguably be treated as being independent since it is costly and politically difficult to switch from one system to another (witness the slow progress towards implementation in the German debate on the introduction of a national minimum wage since the mid-2000s). This short-run exogeneity is relevant for this study because the regressions presented in Section 4.3 include both the coverage rate and the existence of a national minimum rate as explanatory variables. Since our sample includes three years (2007–2009), any potential long-run interdependence between coverage rates and statutory minima does not bias our econometric results.

Figure 12 Average collective bargaining coverage by country (2007–2009)



Source: Visser (2011), ICTWSS version 3.0; WSI Mindestlohndatenbank.

4.2.3 Cross-country differences in labour force composition

The empirical part of this study links a range of labour market outcomes to institutional variations in minimum wage systems across Europe. Table 3 shows the national averages over the observation period (2007–2009) for some of the explanatory variables used in our regression analysis, namely the Kaitz Index, the share of workers below minimum wages and the share of low-wage workers. The table also shows the average values for the two types of minimum wage systems. As can be seen, average Kaitz indices are 15 percentage points higher in countries without national statutory minimum wages; but the share of workers that are paid below prevailing rates is also around 7 percentage points higher in these countries, suggesting that there might be a trade-off between higher rates and higher coverage/compliance. By contrast, the share of low-wage workers (defined as individuals earning less than two-thirds of the national median wage) is 2 percentage points higher in countries with statutory minima at the national level.

It should of course be noted that the usual disclaimers regarding cross-country comparisons apply also in our case: the variations between the countries might not represent genuine differences between the two types of systems but instead be related to other types of heterogeneity. The variation in collective bargaining coverage is one source of heterogeneity, but there are many others, such as differences in other institutional arrangements related to the minimum wage

(national idiosyncrasies in the wage setting mechanism, extension rules and centralisation of bargaining) and cross-country variations in the composition of the labour force (for instance, in terms of occupational composition and educational attainment). The latter are notably related to inequality indicators and the Kaitz Index because the wage distribution (including the median wage), a factor that some empirical studies are not able to address due to lack of data (the cross-country analysis in Boeri (2012), for instance, does not control for variations in occupational and educational composition). Our regressions control for variations in the respective shares of blue-collar workers, white-collar workers and managers based on ISCO categories and three levels of educational attainment based on ISCED categories (for the exact definitions see Table 3).

In light of the fact that many minimum wage earners are women (see Rycx and Kampelmann, 2012), it is also important to account for intra-European variations in the share of women within the labour force, a measure that ranges in our sample from 44 per cent in Italy to 53 per cent in Estonia (see Table 3). Other compositional factors that vary across countries and for which we control in the regression analysis in the next section are: the distribution of workers across sectors of activity at one-digit level of the NACE; the share of the public sector employment in the country; the share of fixed-term contracts; the age composition (we distinguish between six age groups: 15 to 24 years; 25 to 29; 30 to 34; 35 to 44; 45 to 59; and above 60 years); finally, since part-time workers are more likely to receive minimum wages in certain countries (see Rycx and Kampelmann, 2012), we also control for variations in the national share of jobs with less than 35 working hours per week.

4.3 Regression analysis

The regression results presented in this section form the core of our empirical analysis. The presentation of our results is structured in terms of five models, with each model including a different dependent variable. The first two models are related to the minimum wage bite: the dependent variable in the regressions in Section 4.3.1 is the level of Kaitz indices; Section 4.3.2 presents results for models with the share of workers at or below the minimum wage as dependent variable. The remaining three sections are concerned with inequality outcomes. The model in Section 4.3.3 addresses the issue of low-wage workers; the dependent variables in Section 4.3.4 are Gini coefficients measuring inequality between all workers, as well as the dispersion among low-wage workers. Finally, Section 4.3.5 presents models that account for wage inequality between sectors.

The dependent variables in the models on the bite of the minimum wage use sectoral-level data. Kaitz indices differ from one sector to another: in systems without statutory wage floors both the numerator and the denominator vary across sectors; in countries with statutory wage floors only the denominator fluctuates. The regressions accounting for the share of workers below minimum wages are also run at sectoral level in order to exploit the full

Table 3 Descriptive statistics of main variables at the country level (2007–2009)

	Ob-serv. per year	SILC waves used in empirical analysis	National statutory min. wage	Collective bargaining coverage	Average Kaiz index	Average min. wage	Share of workers at or below min. wage	Share of low-wage workers	Share of women	Average age	Occupational composition			Educational attainment		
											Blue collar (ISCO 11-34)	White collar (ISCO 41-52)	Managers (ISCO 61-93)	ISCED levels 0,1,2	ISCED levels 3,4	ISCED levels 5,6
Austria	5409	2010	no	0.99	7.64	0.08	0.18	0.47	39.98	0.35	0.31	0.34	0.17	0.65	0.18	
Belgium	5438	2008	yes	0.96	9.15	0.09	0.14	0.47	40.63	0.41	0.30	0.29	0.19	0.39	0.42	
Bulgaria	5399	2008-2010	yes	0.32	0.43	0.04	0.18	0.47	41.64	0.24	0.24	0.51	0.16	0.61	0.23	
Cyprus	3429	2008-2009	no	0.52	0.51	0.11	0.19	0.49	40.49	0.38	0.30	0.32	0.19	0.42	0.39	
Germany	10744	2008	no	0.63	0.54	0.16	0.26	0.49	41.77	0.51	0.24	0.24	0.08	0.52	0.40	
Denmark	4373	2008-2010	no	0.80	0.62	0.04	0.14	0.48	42.55	0.43	0.23	0.34	0.23	0.45	0.32	
Estonia	5453	2008-2010	yes	0.21	0.44	0.06	0.17	0.53	42.61	0.40	0.18	0.42	0.10	0.54	0.36	
Finland	9399	2008-2010	no	0.90	0.59	0.05	0.11	0.51	41.23	0.42	0.26	0.32	0.15	0.48	0.37	
France	9863	2009-2010	yes	0.90	0.70	0.14	0.13	0.50	40.90	0.40	0.26	0.34	0.21	0.46	0.33	
Greece	4365	2008-2010	yes	0.65	0.45	0.04	0.19	0.45	40.25	0.30	0.35	0.36	0.22	0.44	0.34	
Hungary	7690	2008-2010	yes	0.45	0.56	0.05	0.18	0.48	40.86	0.30	0.24	0.46	0.15	0.64	0.22	
Ireland	3681	2008-2009	yes	0.44	0.52	0.07	0.24	0.50	39.58	0.39	0.35	0.26	0.23	0.38	0.39	
Italy	13450	2008-2010	no	0.80	0.91	0.31	0.16	0.44	41.56	0.32	0.27	0.41	0.37	0.47	0.16	
Latvia	5644	2008-2010	yes	0.25	0.40	0.07	0.22	0.52	41.96	0.38	0.21	0.41	0.14	0.58	0.28	
Poland	10730	2008-2010	yes	0.38	0.52	0.10	0.20	0.49	39.50	0.34	0.23	0.43	0.07	0.67	0.26	
Portugal	4216	2008-2010	yes	0.58	0.52	0.04	0.13	0.48	40.27	0.23	0.29	0.49	0.65	0.19	0.16	
Romania	5269	2008-2009	yes	0.70	0.47	0.04	0.18	0.44	39.50	0.31	0.22	0.47	0.11	0.69	0.20	
UK	6866	2008-2010	yes	0.34	0.54	0.08	0.19	0.51	41.18	0.43	0.33	0.24	0.12	0.52	0.37	
Countries without a national minimum wage	8052	–	no	0.78	0.65	0.13	0.16	0.48	41.44	0.39	0.27	0.34	0.22	0.48	0.30	
Countries with a national minimum wage	6263	–	yes	0.47	0.50	0.06	0.18	0.49	40.82	0.34	0.26	0.40	0.20	0.52	0.29	
Total	6792	–	–	0.56	0.55	0.08	0.17	0.48	41.00	0.35	0.26	0.38	0.20	0.51	0.29	

variability of this variable in our sample. By contrast, the three models dealing with inequality outcomes have been regressed at country level (it would be difficult to interpret the Gini and Theil coefficients or the incidence of low-wage workers if these indicators were calculated at the sectoral instead of the national level). This means that the first two sections are based on 572 sectoral-level observations and the last three sections on 44 country-level observations.

All regression results report robust standard errors. The tables present results with and without the set of control variables described in Section 4.2.3 above, although space constraints do not allow us to report all coefficients. The models including control variables also contain year dummies in order to capture business cycle effects.

The main explanatory variables on which we will focus in the discussion are the two key features of minimum wage systems, namely the existence of a national statutory minimum wage and the degree of collective bargaining coverage. Indeed, all models are designed to detect statistical relationships between the different types of minimum wage systems and the five labour market outcomes, which we now discuss in turn.

4.3.1 The minimum wage bite I: the level of the Kaitz index

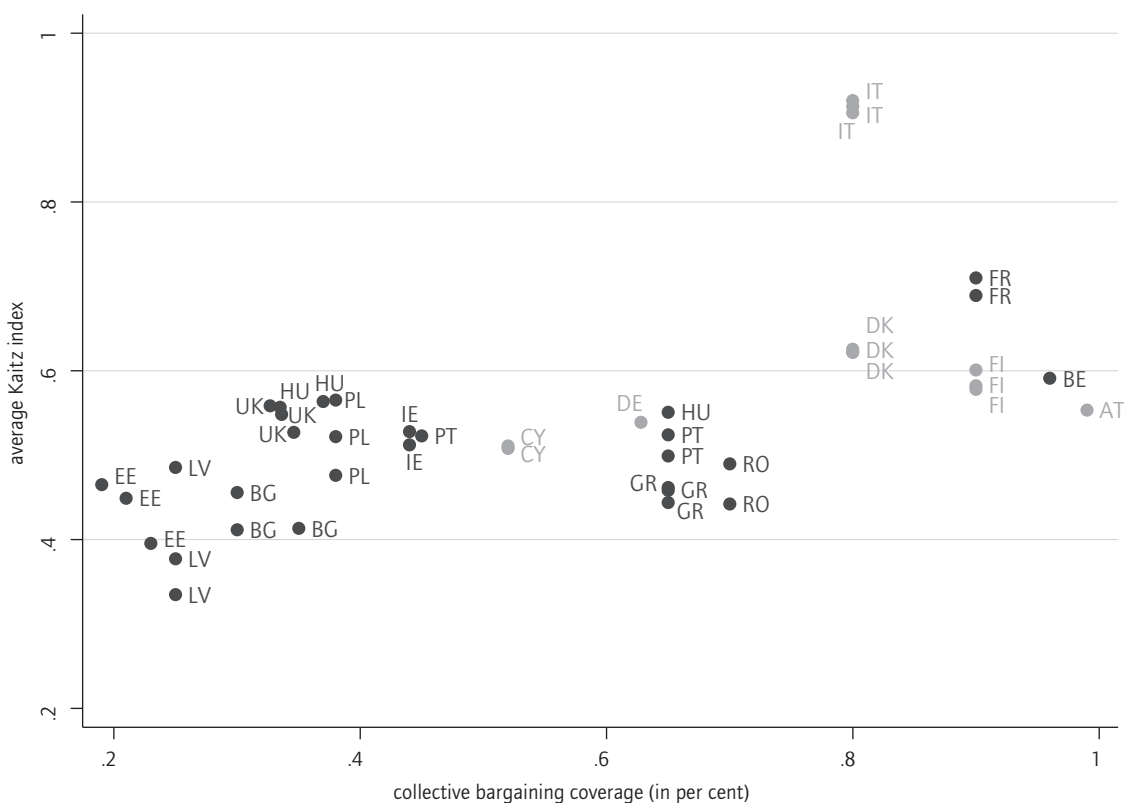
The first outcome we analyse is the level of the Kaitz index. As mentioned in Section 3.2.1, this measure is likely to be positively correlated with the extent of collective bargaining coverage; by contrast, many trade unionists would expect that the Kaitz index is lower in systems with a national statutory minimum wage. The results presented in this section provide empirical facts in order to test these claims.

Looking at the country level, Figure 13 illustrates a positive relationship between collective bargaining coverage and the average Kaitz index. But the figure also reminds us that the countries without statutory minimum wages have generally higher levels of collective bargaining coverage. We will use a simple regression framework to isolate the two effects; the dependent variable in this model is the Kaitz index at the sectoral level, the main independent variables are the existence of a national statutory minimum wage and collective bargaining coverage (see Table 4). The regression results indicate that both hypotheses mentioned above cannot be refuted: the existence of a national statutory minimum wage is indeed negatively related to sectoral-level Kaitz indices: the statistically significant difference between the two systems lies around 10 percentage points. Secondly, higher collective bargaining coverage is associated with higher Kaitz indices. The effect is somewhat smaller in the Model 1 controlling for labour force composition and sector dummies, but the statistically significant coefficient suggest that a 10 per cent increase in bargaining coverage is associated with a Kaitz index 1.4 percentage points higher. It should be noted, however, that it is unclear whether collective bargaining coverage affects the numerator or the denominator of the Kaitz index: on one hand, higher coverage is likely to be associated with higher

bargaining power and more favourable terms in collective agreements defining sectoral bargaining; in some countries with statutory minima wider bargaining coverage might also improve trade union power in the process of setting the national minimum wage. But higher coverage also increases the share of workers falling under collective agreements and therefore leads to a more compressed wage distribution in general.

On any account, the results in Table 4 provide empirical backing for the standard narrative put forward by trade union representatives, according to which (a) relatively higher levels of minimum wages can be obtained by boosting the coverage of collective bargaining and (b) national statutory minima are associated with relatively poor outcomes from the employee perspective.

Figure 13 Collective bargaining coverage and average Kaitz indices by country and year



Note: Black dots represent sectors in countries with a statutory minimum wage, grey dots represent sectors in countries without a statutory minimum wage.

Source: SILC waves 2008–2010; ICTWSS version 3.0; WSI Mindestlohn datenbank; authors' calculations.

Table 4 Sectoral-level regression with Kaitz index as dependent variable

	Model 1	Model 2	Model 3
National minimum wage (NMW)	-0.10*** (0.02)	-0.10*** (0.02)	-0.09*** (0.02)
Collective bargaining coverage (CBC)	0.14*** (0.03)	0.14*** (0.03)	0.22*** (0.03)
Sex ratio	yes	yes	
Share of part-time work	yes	yes	
Public sector	yes	yes	
Age controls	yes	yes	
Education controls	yes	yes	
Occupation controls	yes	yes	
Sector controls	yes		
Year dummies	yes	yes	
Constant	0.50*** (0.13)	0.92*** (0.13)	0.50*** (0.03)
R-squared	0.66	0.61	0.22
Observations	572	572	572
F	48.49	57.83	76.52
p	0.00	0.00	0.00

Note: Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Robust standard errors.

Source: SILC waves 2008-2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

4.3.2 The minimum wage bite II: share of workers at or below wage floors

A higher Kaitz index is often interpreted as indicating that the underlying minimum wage has a larger bite. The information on the relative size of the minimum wage should, however, be complemented with information on the shares of employees who are paid above, at or below the minimum wage. In this section, we focus on the share of workers who are paid exactly at or below the minimum wage. The higher this share in the country, the lower is the effective bite of the minimum wage.¹⁷

How are our two indicators of the minimum wage bite related to each other? Figure 13 plots the shares of employees at or below the corresponding

17. As it turns out, relatively few workers are paid exactly the minimum wage in the countries in our sample and none of the wage distributions shown in the Annex reveal a sizable employment spike around the minimum wage (most of the wage distributions in countries with statutory minima are truncated at the minimum wage). This may indicate that wages equal to the minimum wage are rare, but could also stem from imprecision in the measurement of income and/or working hours in the SILC. On any account, the shares of employees paid exactly minimum wages are much smaller and more volatile compared to the shares of employees at or below the minimum wage. From an econometric viewpoint it is therefore preferable to focus on the latter share as indicator of the minimum wage bite (see Section 2.2.2).

minimum wage against the Kaitz index in each sector. We observe a clearly positive relationship between the two variables. This suggests that a higher relative level of the minimum – an outcome typically favoured by trade unions – might have a downside if it is systematically associated with a higher share of individuals who are paid below the minimum wage (the share of workers paid *exactly* at the minimum wage is quite low in our sample – see footnote 16). This trade-off between a higher relative minimum wage and higher coverage is hardly ever discussed by either practitioners or scholars, arguably because data on this phenomenon have not been available. We believe that this is a serious shortcoming and could lead to flawed policies: the graphical relationship but also our estimation results suggest that the trade-off is quite substantial (in our model a 10 percentage point increase in the Kaitz index is associated with up to 8.2 percentage points higher shares of workers who are either uncovered or whose wages violate existing minima¹⁸).

Turning to our regression results, Table 5 shows estimations for models including the share of individuals earning wages below the prevailing minima as dependent variable. Models 2, 3 and 4 suggest that this share is between 9 and 15 percentage points lower in countries with statutory minimum wages. The estimated coefficients for collective bargaining coverage are, however, not conclusive in these three models. In light of the apparent link between the Kaitz index and non-coverage/non-compliance suggested by Figure 13, models 2, 3 and 4 might suffer from an omitted variable bias. Indeed, the coefficient of determination in a specification including the Kaitz index among the explanatory variables (model 1 in Table 5) is, at 36 percentage points, higher than the previously discussed models; the statistically significant coefficient of the Kaitz index is 0.82.

The estimated coefficients for model 1 suggest that, *ceteris paribus*, the share of individuals at or below minimum wages is higher in countries with statutory minima. This result is somewhat surprising given that the theoretically complete coverage of a statutory wage floor should allow for less downward deviations than sectoral-level agreements with incomplete coverage. Our robustness described in Section 4.4 suggests that this result should be interpreted with care as it is somewhat sensitive to alternative specifications. By contrast, our robustness tests confirm that a higher degree in collective bargaining coverage is associated with lower levels of individuals below the prevailing minimum, a fairly intuitive result.

Given that we are interested in the differences between minimum wage systems, model 1 also checks whether the effect of collective bargaining coverage and of the Kaitz index varies in countries with and without statutory

18. It is also possible that the individual is counted as earning less than the minimum wage if there is a measurement error in the earnings and/or hours measures. In order to address this issue, we have also run the regressions presented in this section with an alternative dependent variable, namely the number of individuals with wages equal to or less than 75 per cent of the prevailing minimum (see the robustness test in Section 4.4.3).

Table 5 Sectoral-level regression with Kaitz index as dependent variable

	Model 1	Model 2	Model 3	Model 4
National minimum wage (NMW)	0.11*** (0.03)	-0.15*** (0.05)	-0.10*** (0.01)	-0.09*** (0.01)
Collective bargaining coverage (CBC)	-0.20*** (0.03)	-0.07 (0.06)	-0.02 (0.02)	0.05*** (0.02)
Interaction NMW*CBC	0.17*** (0.03)	0.06 (0.07)		
Kaitz index	0.82*** (0.03)			
Interaction NMW*Kaitz index	-0.45*** (0.03)			
Sex ratio	yes	yes	yes	
Share of part-time work	yes	yes	yes	
Public sector	yes	yes	yes	
Age controls	yes	yes	yes	
Education controls	yes	yes	yes	
Occupation controls	yes	yes	yes	
Sector controls	yes	yes	yes	
Year dummies	yes	yes	yes	
Constant	-0.03 (0.07)	0.27** (0.13)	0.21** (0.11)	0.14*** (0.02)
R-squared	0.88	0.52	0.52	0.16
Observations	572	572	572	572
F	116.86	16.92	16.89	34.65
p	0.00	0.00	0.00	0.00

Note: Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

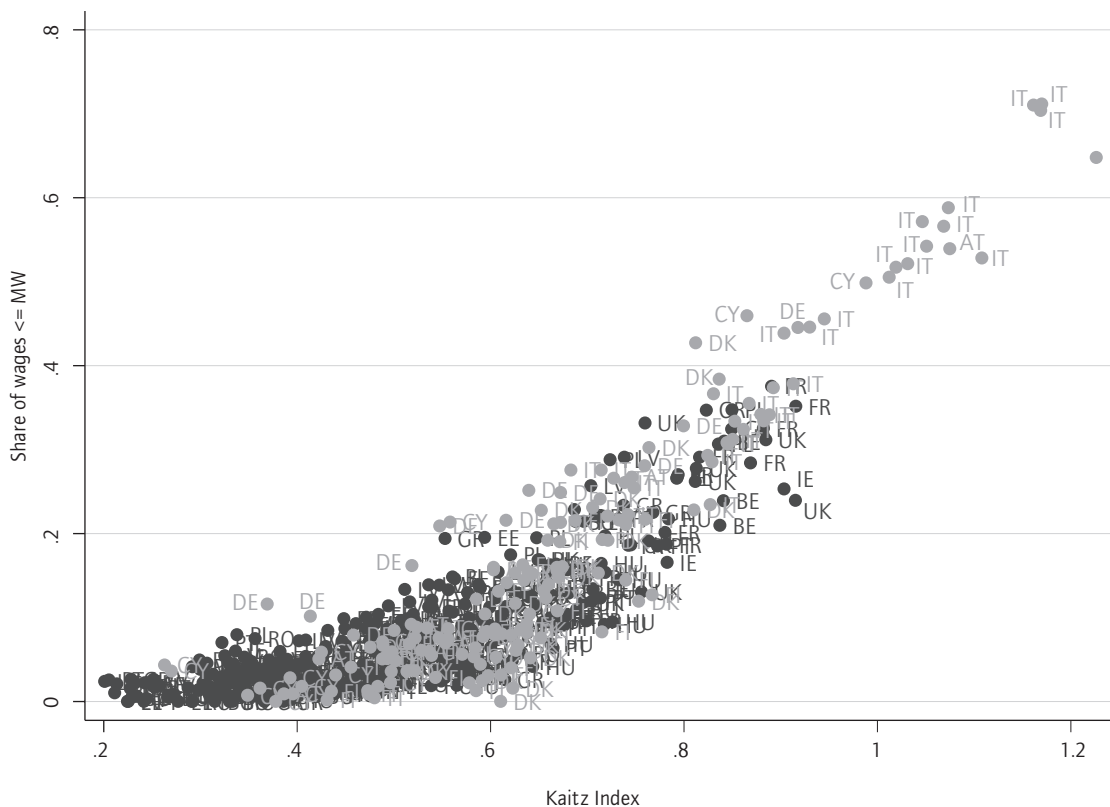
Source: SILC waves 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

minima. These tests are performed by means of an interaction variable between collective bargaining coverage (the Kaitz index) and the dummy variable, indicating the presence of a national minimum wage. In light of the different institutional arrangements in both types of minimum wage systems, it is fairly intuitive that the impact of collective bargaining coverage and of the Kaitz index is expected to be greater in countries without statutory minima. This intuition is confirmed by our regression results: the interaction variable for the Kaitz index is statistically significant and equal to -0.45 . Whereas a 10 percentage point increase in a country without a statutory minimum is associated with an increase in the share of jobs paid below minima of around 8.2 percentage points, the same hike in the Kaitz index in a country with a statutory minimum is related to an increase of only 3.7 percentage points $((0.82 - 0.45) \cdot 0.1)$. Conversely, an increase of 10 percentage points of collective bargaining coverage reduces the share of individuals below the minimum wage by 2 percentage points in countries without a statutory minimum, but only by 0.3 percentage points $((-0.2 + 0.17) \cdot 0.1)$ in countries with a statutory minimum wage.

All in all, the results presented in this section illustrate with empirical data a series of trade-offs. These trade-offs are relatively intuitive but have so far not received sufficient attention in debates on minimum wages:

- Higher relative levels of wage floors are associated with a higher share of individuals paid below these minima, an effect that is more than twice as strong in countries without statutory minima.
- Another trade-off is that this effect of a statutory minimum wage is offset by two factors: we observe a generally higher level of individuals paid below the minimum in these countries (although this effect does not stand up to the robustness tests presented in Section 4.4); and that the otherwise negative effect of collective bargaining coverage on non-coverage/non-compliance all but disappears in countries with statutory minimum wages.

Figure 14 Sectoral-level shares of workers with wages at or below minimum wages and average Kaitz indices



Note: Black dots represents sectors in countries with a statutory minimum wage, grey dots represent sectors in countries without a statutory minimum wage.

Source: SILC waves 2008–2010; WSI Mindestlohn datenbank; authors' calculations.

4.3.3 Low-wage earners

We now discuss the observed relationships between minimum wage systems and a series of inequality measures at the country level. The first inequality outcome we analyse is the share of workers with wages equal to or below two-thirds of the national median wage, a statistic that corresponds to the conventional 'low-wage' threshold. We will refer to this group as 'low-wage earners'.

Figure 15 shows the average incidence of low-wage earners at the country level for the years 2007–2009. No clear pattern regarding the two types of minimum wage systems emerges: countries without statutory minima are found at the top, the middle and the bottom of the figure. This rudimentary analysis might lead into error because it does not account for differences in collective bargaining coverage and labour force composition. The regression results presented in Table 6 underline the importance of the variables omitted in Figure 14 (the coefficient of determination increases from 25 per cent in model 4 to 49 per cent in model 3). The coefficient of collective bargaining coverage is statistically significant and equal to -0.16 in models 1 and 2, suggesting that a 10 percentage point increase in collective bargaining coverage is associated with a small decrease of low-wage jobs of 1.6 percentage points.

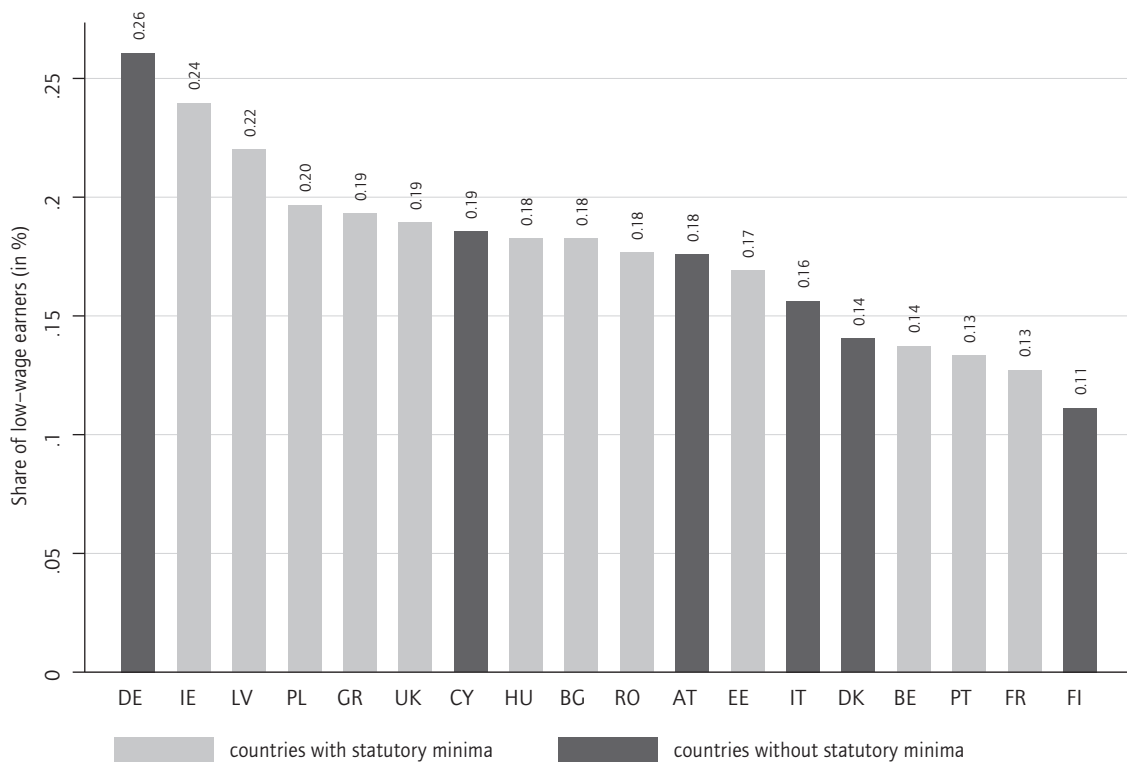
By contrast, the existence of a national statutory minimum wage does not appear to be significantly related to the proportion of low-wage earners in the economy: the corresponding coefficient is negative in models 1 and 2 but not significantly different from zero. Similar to the case of the share of individuals paid below the prevailing wage floors, the impact of collective bargaining coverage on the incidence of low-wage work might depend on the existence of a statutory minimum wage. We test this hypothesis with the help of an interaction variable between collective bargaining coverage and the dummy for statutory minimum wages (model 1 and 2). Estimation results do not provide evidence that the effect of collective bargaining coverage differs across minimum wage systems.

Finally, we also included the average Kaitz index among the explanatory variables, given that a higher Kaitz index should be associated with a smaller low-wage sector. The significant coefficient of -0.1 in model 1 indicates that a 10 percentage point increase in the Kaitz index indeed reduces the share of low-wage workers by 1 percentage point.

All in all, the regression results suggest that the share of low-wage earners is related to (i) the coverage of collective bargaining and (ii) the Kaitz index. Somewhat surprisingly, the existence of a national statutory minimum does not appear to have an impact on the size of the low-wage sector, nor does it appear to interact with the effect of collective bargaining coverage. The coefficients that correspond to the latter two effects have, however, the expected sign (respectively, a negative coefficient for the variable indicating the presence of a national statutory minimum and a positive coefficient of its interaction with collective bargaining coverage) and their insignificance could

be merely due to the small sample size or a lack of variability in the relatively stable shares of low-wage earners. Some evidence that points in this direction is a robustness test that we computed with data on the low-wage sector from an alternative source (Eurostat’s Structure of Earnings Survey): the outcome of this alternative measurement suggests that the existence of a statutory minimum wage is significantly related to around a 17 percentage points lower share of low-wage employment and that the impact of collective bargaining coverage is significantly higher in countries without a statutory minimum at the national level (see Section 4.4.4).

Figure 15 Shares of low-wage workers at country and sectoral level (2007–2009)



Note: Low-wage workers defined as earning hourly wages below two-thirds of the national median wage.
Source: SILC wages 2008-2010, authors’ calculations.

4.3.4 Overall inequality and inequality among low-wage workers

The second type of inequality outcome we analyse comprises two variants of the Gini coefficient: the first is the standard coefficient calculated over the entire sample in each country and year, the second is calculated by including only the sample of low-wage workers defined in the previous section. The

Table 6 Country-level regression with share of low-wage workers as dependent variable

	Model 1	Model 2	Model 3	Model 4
National minimum wage (NMW)	-0.05 (0.05)	-0.04 (0.05)	0.00 (0.01)	0.00 (0.01)
Collective bargaining coverage (CBC)	-0.16*** (0.05)	-0.16** (0.06)	-0.11*** (0.02)	-0.09*** (0.02)
Interaction NMW*CBC	0.07 (0.07)	0.06 (0.07)		
Kaitz index	-0.10** (0.04)			
Sex ratio	yes	yes	yes	
Occupation controls	yes	yes	yes	
Education controls	yes	yes	yes	
Year dummies	yes	yes	yes	
Constant	0.76*** (0.22)	0.49** (0.22)	0.51** (0.23)	0.22*** (0.02)
R-squared	0.52	0.48	0.49	0.25
Observations	44	44	44	44
F	9.86	9.19	10.75	11.49
p	0	0	0	0

Note: Significance levels: * p<0.1, ** p<0.05, ***p<0.01.

Source: SILC waves 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

rationale for this choice is that minimum wage policies are often not only aimed at reducing overall inequality, but also and specifically inequalities at the lower tail of the wage distribution. Besides its policy relevance, the relationship between minimum wages and lower-tail inequality has also inspired some academic papers, such as Autor *et al.* (2012).

We first show graphically how the two inequality measures are related to each other. Figure 16 plots the Gini inequality among low-wage workers on the vertical axis against overall Gini inequality on the horizontal axis for each year and country. An interesting pattern emerges: the black dots representing country-year observations from countries with statutory minima are clustered in the south-eastern corner of the diagram, suggesting not only *higher* levels of overall inequality but also *lower* levels of inequality among low-wage earners. Our regression analysis verifies whether this pattern holds up once we control for differences in collective bargaining coverage, differences in the Kaitz index and variations in the labour force composition.

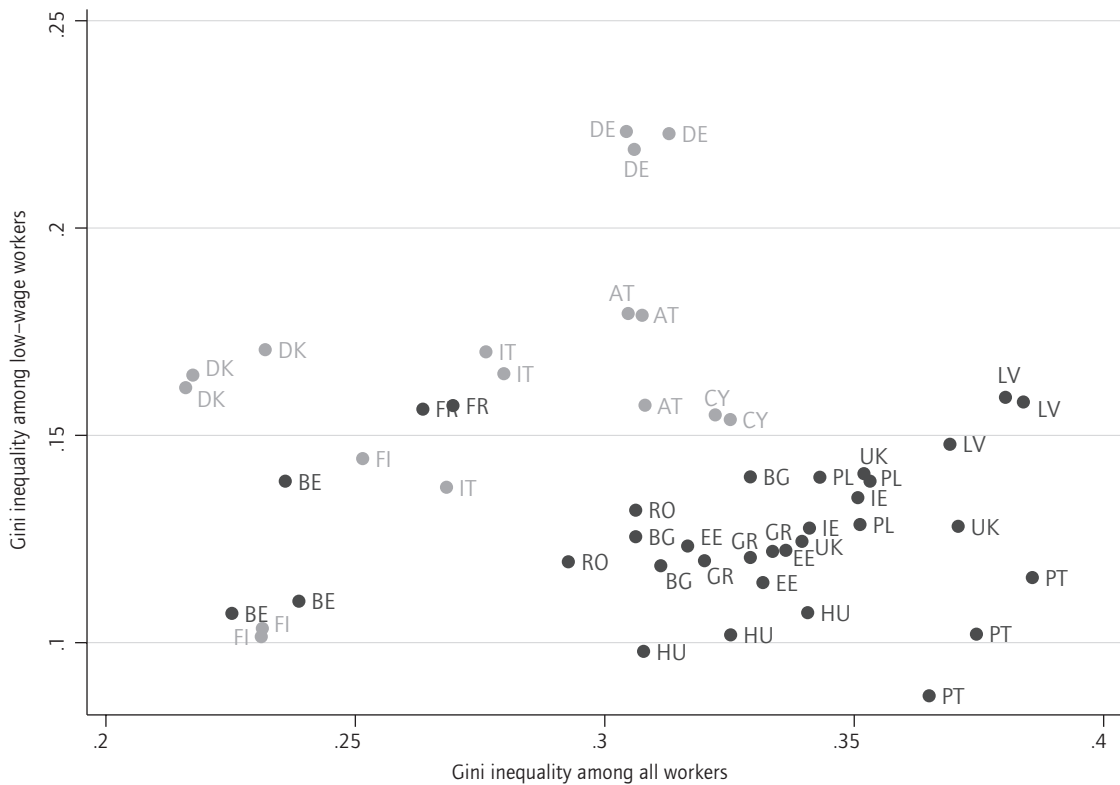
Table 7 shows results for regressions with the overall Gini inequality as dependent variable. The estimated coefficients for the two main variables of interest are highly significant except in the model without control variables (model 5). The interaction between collective bargaining is also significant in models 1 to 3. The estimated coefficients suggest that the negative impact of collective bargaining coverage on inequality is much stronger in countries

without a statutory minimum wage at the national level, a fairly intuitive result. The existence of a statutory minimum wage is significantly associated with 0.10 to 0.11 lower values of the Gini coefficient. Moreover, a 10 percentage point increase in the collective bargaining coverage is associated with a decrease of Gini inequality of around -0.023 . This suggests that both the existence of a statutory minimum wage and higher collective bargaining coverage significantly reduce wage inequality. The two can be regarded as functional equivalents in this respect: in countries where the coverage is low, the presence of a statutory minimum wage helps to reduce inequality; conversely, in countries without a national statutory minimum wage, higher bargaining coverage can curb inequality.

Finally, we note that a higher national Kaitz index is negatively correlated with overall inequality (model 1 suggests that the relationship is quadratic). This means that, all other things being equal, a higher relative level of the minimum wage is associated with less wage inequality.

The results for regression with inequality among low-wage workers as dependent variable are presented in Table 8. The estimated coefficients are strikingly similar to the results regarding the overall Gini inequality in Table 7:

Figure 16 Gini coefficients among low-wage workers and among all workers



Note: Black dots represent sectors in countries with a statutory minimum wage, grey dots represent sectors in countries without a statutory minimum wage. Source: SILC wages 2008–2010, authors' calculations.

again, the existence of a statutory minimum wage is associated with lower inequality, whereas higher collective bargaining coverage can compensate partially for effects in countries without statutory minima.

Table 7 Country-level regression with overall Gini coefficient as dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5
National minimum wage (NMW)	-0.11*** (0.03)	-0.10*** (0.03)	-0.10*** (0.03)	0.02** (0.01)	0.02 (0.01)
Collective bargaining coverage (CBC)	-0.23*** (0.03)	-0.24*** (0.03)	-0.24*** (0.03)	-0.13*** (0.02)	-0.12*** (0.02)
Interaction NMW*CBC	0.19*** (0.04)	0.17*** (0.04)	0.16*** (0.05)		
Kaitz index	-0.47** (0.19)	-0.13*** (0.03)			
Kaitz index squared	0.26* (0.14)				
Sex ratio	0.66** (0.24)	0.54** (0.24)	0.83*** (0.24)	0.43** (0.18)	
Occupational controls	yes	yes	yes	yes	
Educational controls	yes	yes	yes	yes	
Year dummies	yes	yes	yes	yes	
Constant	0.52** (0.19)	0.48** (0.19)	0.10 (0.12)	0.25* (0.15)	0.37*** (0.02)
R-squared	0.81	0.80	0.77	0.73	0.52
Observations	44	44	50	50	50
F	24.74	23.71	19.33	19.01	22.81
p	0.00	0.00	0.00	0.00	0.00

Note: Significance levels: * p<0.1, ** p<0.05, ***p<0.01.

Source: SILC waves 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

4.3.5 Intersectoral inequality

The last set of results we examine is related to inequality between sectors of activity, an outcome likely to be higher in minimum wage systems with different sectoral-level minima and no statutory minimum wage at the national level (see Section 3.2.2). We computed two alternative versions of this indicator. The first in the between-group Theil wage inequality for the whole sample, taking one-digit NACE sectors as grouping variable.¹⁹ The second indicator is identical to the first, except that the Theil statistic is calculated only among low-wage workers in each sector. The rationale for defining the second

19. We computed intersectoral Theil inequality as a share of total inequality in each country. This step is necessary given that only relative values of Theil inequality are comparable across countries. For an exposition of the Theil statistic and its axiomatic base, see Kampelmann (2009).

Table 8 Country-level regression with Gini coefficient among low-wage workers as dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5
National minimum wage (NMW)	-0.15*** (0.03)	-0.14*** (0.03)	-0.12*** (0.02)	-0.03** (0.01)	-0.04*** (0.01)
Collective bargaining coverage (CBC)	-0.18*** (0.04)	-0.17*** (0.04)	-0.12*** (0.03)	-0.03 (0.02)	-0.02 (0.02)
Interaction NMW*CBC	0.20*** (0.04)	0.18*** (0.04)	0.12*** (0.03)		
Kaitz index	-0.32* (0.17)	0.00 (0.02)			
Kaitz index squared	0.17* (0.09)				
Sex ratio	-0.02 (0.05)	-0.04 (0.05)	0.01 (0.06)	-0.05 (0.06)	
Occupational controls	yes	yes	yes	yes	
Educational controls	yes	yes	yes	yes	
Year dummies	yes	yes	yes	yes	
Constant	0.91*** (0.14)	0.73*** (0.10)	0.60*** (0.08)	0.55*** (0.10)	0.18*** (0.02)
R-squared	0.65	0.63	0.66	0.58	0.35
Observations	44	44	50	50	50
F	13.92	15.97	32.90	11.02	9.88
p	0.00	0.00	0.00	0.00	0.00

Note: Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Source: SILC waves 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

indicator is that minimum wages mainly affect the lower tail of the wage distribution in each sector and not inter-sectoral inequality in general. But the Theil statistic calculated on the entire sample might not pick up the effect of minimum wages but only differences in the level of hourly earnings between sectors. The second indicator therefore looks explicitly at the portion of the sectoral wage distribution where the impact of minimum wages is likely to be the greatest and is based on between-group Theil inequality among the population of individuals with wages equal to or below two-thirds of the corresponding median wage in each sector.

Our regression results suggest that the impact of minimum wage systems on intersectoral inequality is indeed larger if the Theil inequality is computed with the low-wage sample in each sector. The algebraic signs and significance of the effects are, however, independent of the choice between the two indicators and the relationship between the two appears to be linear (see Figure 17).

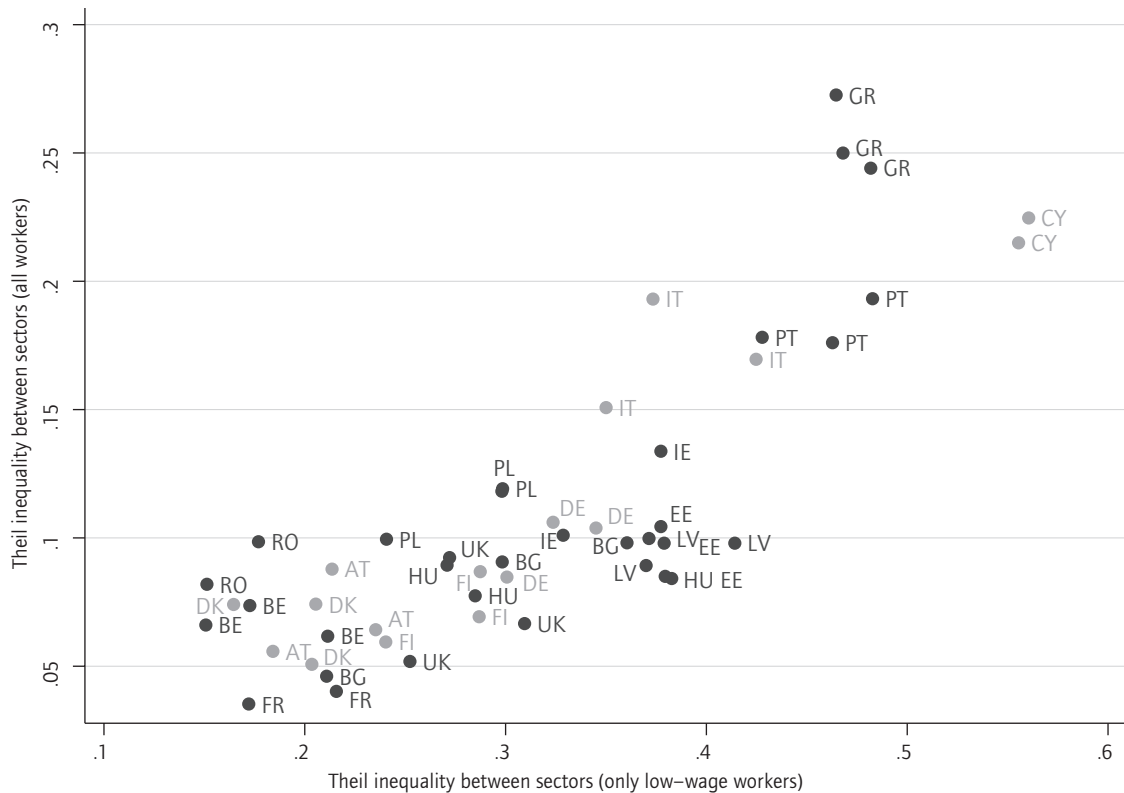
The regression results for the models with intersectoral Theil inequality are shown in Table 9 (entire sample) and Table 10 (only low-wage workers in each sector). With the exception of the poorly performing model without control variables (model 1), the estimated relationships are in line with expectations:

the existence of a national statutory minimum wage is associated with around 6 to 16 percentage points less intersectoral inequality if the latter is computed for the entire sample. Looking only at the intersectoral inequality among low-wage workers, the estimated effect rises to 11–25 percentage points.

Collective bargaining is also related to lower levels of intersectoral inequality: a 10 percentage point increase is associated with a significant decrease in Theil inequality ranging from 1.5 to 2 percentage points for the entire sample and from 3.5 to 4.7 points among low-wage workers only. These results correspond well to the negative relationship that can be observed graphically in Figure 13. In models 1 and 3 in Table 9 (entire sample) the interaction variable between collective bargaining and the dummy indicating the existence of a statutory minimum wage is positive and statistically significant (it is also positive but not significant in model 2 in Table 9 and in all models in Table 10). This is some evidence in favour of the idea that the effect of collective bargaining coverage on intersectoral inequality is less substantial in countries with statutory minima.

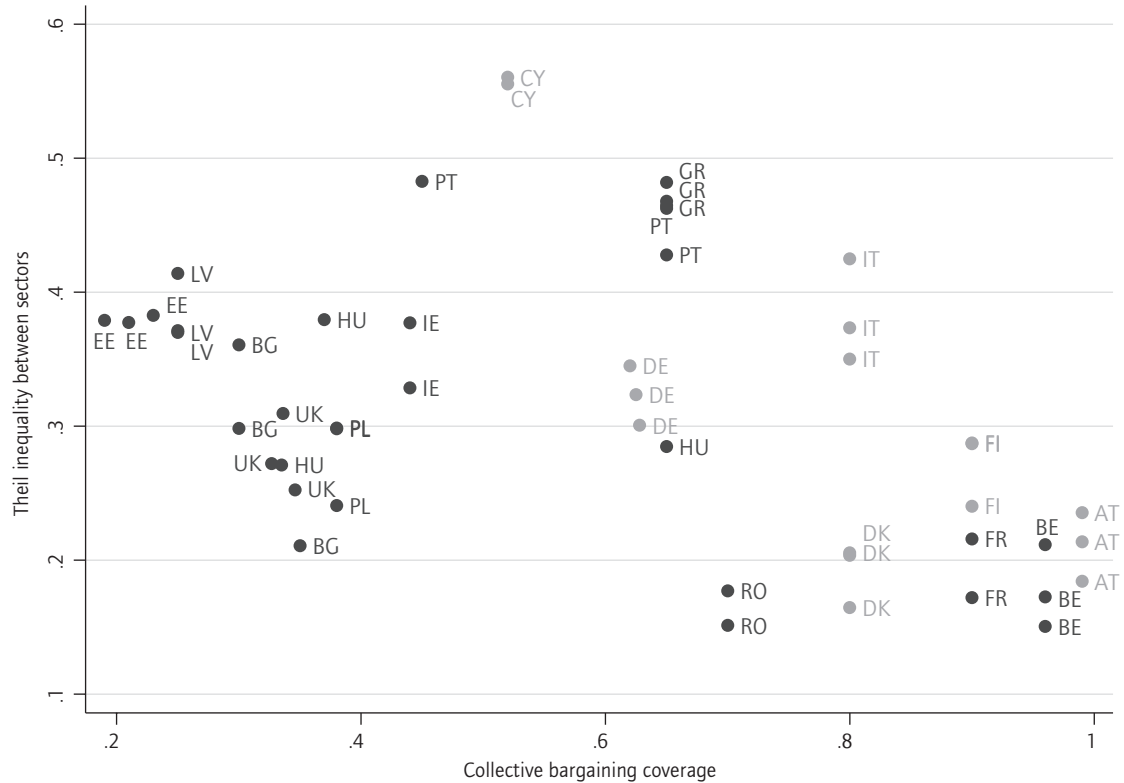
Finally, we observe that the inclusion of the Kaitz index and its square improve the fit of the model based on the entire sample (model 1 in Table 9). The

Figure 17 Between-sector Theil inequality among all workers and only low-wage workers



Note: Black dots represent sectors in countries with a statutory minimum wage, grey dots represent sectors in countries without a statutory minimum wage. Source: SILC wages 2008–2010, authors' calculations.

Figure 18 Collective bargaining coverage and between-sector Theil inequality



Note: Black dots represent sectors in countries with a statutory minimum wage, grey dots represent sectors in countries without a statutory minimum wage.
 Source: SILC wages 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; authors' calculations.

estimated coefficients suggest that a higher level of the Kaitz index is associated with significantly lower levels of intersectoral inequality: for instance, an increase in the Kaitz index from 0.4 to 0.5 is related to a ceteris paribus decrease in Theil inequality of around 2.5 percentage points.

4.4 Robustness tests

We have run a series of robustness tests and alternative specifications that cannot be reported here²⁰. Especially the number of plausible combinations of control and interaction variables is very large. None of these tests modifies substantially the estimation results presented above. In this section we focus on what are arguably the most relevant robustness tests and examine whether conclusions are modified once apprentices and very young workers are excluded from the sample (Section 4.4.1); if regressions are run without countries with outlying values or systems (Section 4.4.2); if we use an alternative indicator for the minimum wage bite (Section 4.4.3).

²⁰ The results of the various robustness text we have run are available on the ETUI website [\(insert link\)](#)

Table 9 Country-level regression with between-sector Theil inequality as dependent variable (entire sample)

	Model 1	Model 2	Model 3	Model 4	Model 5
National minimum wage (NMW)	-0.16*** (0.05)	-0.12** (0.06)	-0.14*** (0.05)	-0.06*** (0.01)	-0.01 (0.02)
Collective bargaining coverage (CBC)	-0.20*** (0.05)	-0.20*** (0.05)	-0.22*** (0.04)	-0.14*** (0.02)	-0.03 (0.03)
Interaction NMW*CBC	0.16** (0.08)	0.10 (0.08)	0.12* (0.07)		
Kaitz index	-0.96*** (0.33)	-0.03 (0.07)			
Kaitz index squared	0.71*** (0.25)				
Sex ratio	-0.78* (0.43)	-1.09** (0.45)	-0.87** (0.36)	-1.16*** (0.23)	
Occupational controls	yes	yes	yes	yes	
Educational controls	yes	yes	yes	yes	
Year dummies	yes	yes	yes	yes	
Constant	0.67* (0.37)	0.56 (0.39)	0.38* (0.22)	0.48** (0.19)	0.14*** (0.03)
R-squared	0.59	0.54	0.57	0.56	-0.03
Observations	44	44	50	50	50
F	27.07	34.74	44.09	25.55	0.60
p	0.00	0.00	0.00	0.00	0.55

Note: Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Source: SILC waves 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

4.4.1 Impact of young workers

Many countries and sectors differentiate applicable minima according to the employment status and age of individuals. This is notably the case for apprentices and employees younger than 18 and reflects the opinion shared by many policymakers and social partners that lower rates for these groups could curb negative employment effects. The reasoning behind the differentiation is that applying the same minimum rate to all employees would harm apprentices and young workers whose lack of experience is arguably associated with lower productivity compared to the rest of the workforce.

Due to the practical difficulty of identifying reduced rates for apprentices and young workers in all country- and sectoral-level minima included in our database, the regressions presented in the previous section might be biased the higher the incidence of differentiated rates. For instance, Kaitz indices might be overestimated if reduced rates apply for a substantial part of the labour force.

Table 10 Country-level regression with between-sector Theil inequality as dependent variable (entire sample)

	Model 1	Model 2	Model 3	Model 4	Model 5
National minimum wage (NMW)	-0.25** (0.12)	-0.17 (0.12)	-0.21** (0.09)	-0.11*** (0.03)	-0.06 (0.04)
Collective bargaining coverage (CBC)	-0.47*** (0.13)	-0.41*** (0.13)	-0.44*** (0.09)	-0.35*** (0.05)	-0.24*** (0.05)
Interaction NMW*CBC	0.27 (0.17)	0.11 (0.15)	0.14 (0.13)		
Kaitz index	-1.78* (0.98)	0.05 (0.12)			
Kaitz index squared	0.93* (0.49)				
Sex ratio	0.31 (0.47)	-0.09 (0.48)	-0.06 (0.37)	-0.14 (0.33)	
Occupational controls	yes	yes	yes	yes	
Educational controls	yes	yes	yes	yes	
Year dummies	yes	yes	yes	yes	
Constant	1.12* (0.62)	0.22 (0.62)	0.44** (0.21)	0.42* (0.24)	0.49*** (0.05)
R-squared	0.48	0.43	0.50	0.51	0.20
Observations	44	44	50	50	50
F	8.97	16.79	25.91	32.29	14.47
p	0.00	0.00	0.00	0.00	0.00

Note: Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Source: SILC waves 2008–2010; ICTWSS version 3.0 for collective bargaining coverage; WSI Mindestlohndatenbank for statutory minimum wages; authors' calculations.

In order to examine the scope of this issue, we have rerun all regressions after excluding apprentices and workers younger than 18 years from the SILC. While this procedure does not directly measure the impact of reduced rates on indicators such as the Kaitz index, it has the merit of assessing whether our conclusions regarding the rest of the labour force are robust.

The regression outputs of all robustness tests are included in the Appendix (Table 30 until Table 36). The estimations underline that the results presented in the previous section are hardly affected if apprentices and young workers are eliminated from our sample: the size and significance of all coefficients remains virtually unchanged. The only difference in significance is observed in Table 36 concerning the model with intersectoral Theil inequality among low-wage workers as dependent variable. Contrary to the baseline model, the estimation without apprentices and young workers yields a significantly positive interaction variable between collective bargaining coverage and the statutory minimum wage dummy. This divergence from the baseline regression confirms the result obtained for Theil inequality based on the entire sample, namely that the collective bargaining coverage has a lower negative impact on Theil inequality in countries without statutory minimum wages.

4.4.2 Exclusion of observations from outlier countries

While all countries in our sample are marked by their particular national arrangements, some of these idiosyncrasies are peculiar enough to warrant treatment as outliers with respect to the rest of the sample. Two candidates for such treatment are Italy and Belgium.

The Italian case is particular in that the country's mechanisms for extending collective bargaining agreements to the majority of workers seem not to be very effective in practice. Although the nominal values of collective bargaining coverage in Italy are quite high (around 80 per cent), the SILC shows that much more than 20 per cent of Italian workers are paid below the rates fixed by sectoral-level agreements: the average value between 2007 and 2009 of 31 per cent is almost twice as high as in Germany, the country with the second largest proportion of workers at or below minimum wages (see Table 3). It therefore appears that the high Kaitz indices we observe for Italy should be interpreted with caution because their effective impact is relatively small compared to all other countries in our sample.

As for Belgium, the specificity of this country's minimum wage system is that it is the only one offering effective dual protection against low wages: it combines a national statutory minimum with high levels of collective bargaining coverage and binding wage floors defined in sectoral agreements. While the French system also combines a national minimum with sectoral bargaining, collective agreements in France often fail to increase the minima above the national level – indeed, many collective agreements include wage floors *below* the SMIC that are therefore not relevant minima (see Section 3.3.8). The interpretation of the Belgian figures on sectoral minima is therefore slightly different compared to other countries in our sample, a difference that makes it worthwhile to test whether our conclusions change if Belgium is dropped from the sample.

The regression results for the estimations without either Belgium or Italy are listed in the Appendix (Table 30 until Table 36). Almost all coefficients remain within close distance of the values corresponding to our baseline regressions. In particular, the elimination of the observations from Belgium does not have any sizable impact on the estimated coefficients or their level of significance.

The only notable difference with respect to the baseline regression is observed when we drop Italy from the sample: this elimination changes the coefficients for the dummy variable indicating the presence of a national statutory minimum wage in the models accounting for the Kaitz index and the share of workers paid at or below minimum wages, respectively. The baseline model suggested that the existence of a statutory minimum wage is associated with lower levels of the Kaitz index and a higher share of workers below minimum wages. In the estimation without Italy neither of these two effects is significantly different from zero (see Table 30 and Table 31), meaning that the high Kaitz indices and the substantial share of workers below minimum wages we observe in Italy are mainly responsible for the significant difference

between countries with and without statutory minimum wages in the baseline model. To the extent that the Italian model is an outlier, a more conservative interpretation of our results therefore boils down to the conclusion that there is no significant direct effect of the statutory minimum wage on either the relative size of the minimum wage or on the share of individuals paid at or below these rates. It should be noted, however, that the exclusion of the observations from Italy affects only modestly the *indirect* effect of the statutory minimum wage: the interaction variables remain significant and indicate that the impact of collective bargaining coverage and the Kaitz index on the share of workers below minimum wages is significantly lower in countries with statutory minimum wages.

4.4.3 Alternative indicator for the minimum wage bite

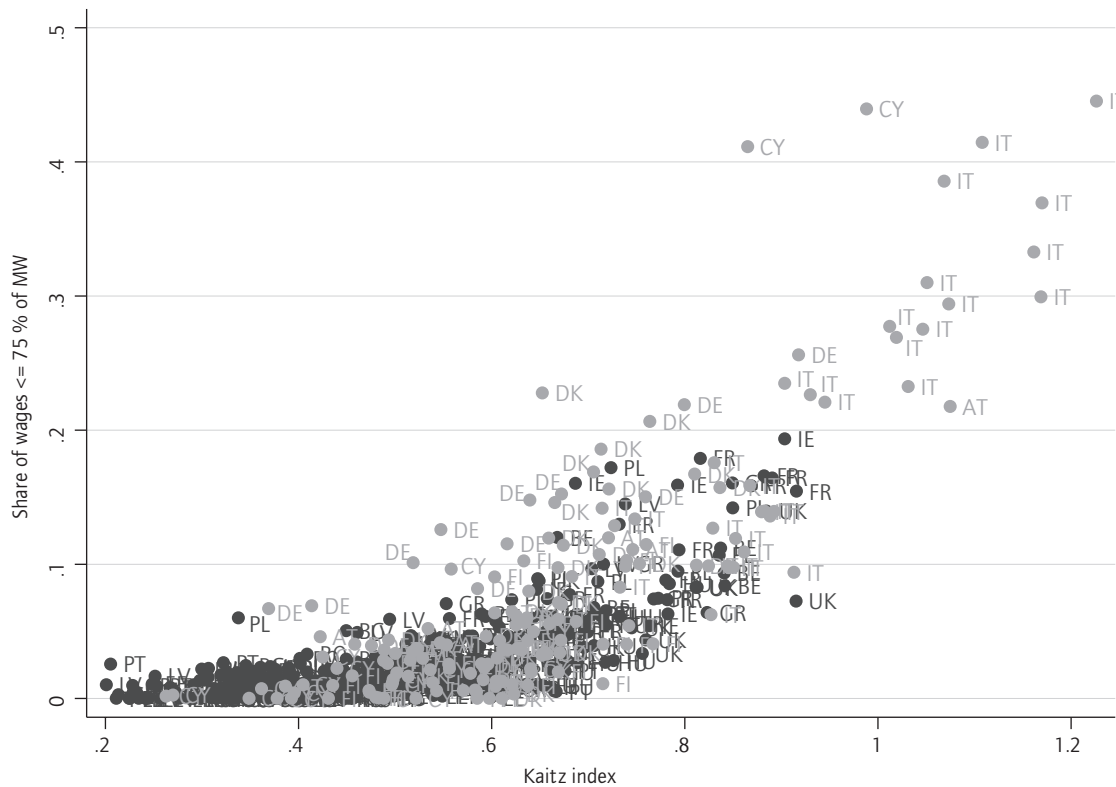
The third robustness test reported here is concerned with the validity of our indicator for the minimum wage bite, namely the share of workers paid exactly at or below the prevailing wage floors. To the extent that both income variables and the hours measure are prone to measurement errors, some of the individuals declaring below-minimum wages might simply represent misreported values and interpreting these observations as either non-compliant wages or uncovered employment might be erroneous. This phenomenon might be quantitatively important in countries with binding statutory minima given that the wage distribution in these countries is typically truncated at the national wage floor (see the wage histograms in Appendix 7.3.1). Because relatively more people in these countries are situated close to the wage floor compared to countries with collectively bargained minima, the number of individuals who are falsely classified as earning below the minimum is also likely to be higher: this could lead to a bias when comparing the two types of minimum wage systems.

To address this issue, we have also experimented with an alternative indicator for the share of jobs that are either uncovered or not compliant, namely the share of individuals with wages equal to or less than 75 per cent of the prevailing minimum wage. For two reasons this indicator might be less prone to misinterpretations: first, in none of the wage distributions do we observe a truncation at 75 per cent of the minimum wage, so that the likelihood of individuals being falsely classified as earning slightly below minimum wages is much lower; second, the indicator allows for an error margin of 25 per cent before workers are falsely counted as being not covered and/or not compliant.

Replacing the dependent variable discussed in Section 4.3.2 with this alternative indicator leads to very similar results. Figure 19 shows the relationship between, on one hand, the share of workers earning equal to or less than the minimum wage, and the sectoral-level Kaitz index, on the other hand. Similar to our baseline definition, the graphical analysis reveals a clear positive relationship between the two variables. This result is also confirmed by our regression results (see last column in Table 31 in the Appendix). The coefficients of the other explanatory variables are also hardly affected by the

alternative indicator of the minimum wage bite. A small exception to this statement is the coefficient for the dummy variable indicating the existence of a statutory minimum wage: while the underlying effect is measured to be 11 percentage points in the baseline model it drops to only 4 points in the regression based on the alternative indicator. Similar to the exclusion of observations from Italy, this can be seen as evidence against the idea that there is a strong positive relationship between statutory minimum wages and a larger share of individuals earning less than the prevailing wage floor.

Figure 19 Sectoral-level shares of workers with wages below 75 per cent of minimum wages and Kaitz index



Note: Black dots represent sectors in countries with a statutory minimum wage, grey dots represent sectors in countries without a statutory minimum wage.
 Source: SILC waves 2008–2010; WSI Mindestlohn datenbank for statutory minimum wages; authors' calculations.

4.4.4 Alternative data on low-wage workers

The final robustness test reported here concerns the data on low-wage workers. Low-wage earners are defined as those employees earning two-thirds or less of the national median gross hourly earnings. Hence, the thresholds that determine low-wage earners are relative and specific to each Member State and can change according to the sample of the survey. We have computed data using the EU-SILC. Eurostat usually computes official low-wage statistics using the four-yearly Structure of Earnings Survey (SES).

Figure 19 shows the share of low-wage earners as computed by us using EU-SILC and the official statistics by Eurostat using the SES. The correlation coefficient between the values we computed and those by Eurostat is 0.65 (significant at 1 per cent). Indeed, there are some differences between the two surveys: first SES covers only the sectors from B (mining) to S (other services) excluding O (Public administration and defence and social security) and A (agriculture, forestry and fishing). Our computations using EU-SILC cover all sectors. Secondly, the SES covers only enterprises with 10 employed persons or more, while the EU-SILC surveys all household members disregarding the size of the firm at which they work. Finally, the SES is done every four years (the last two waves are 2006 and 2010), while our data cover the period 2007–2009. Therefore in Figure 19 we compare EU-SILC earning data for 2007 with SES data for 2006 and EU-SILC earning data for 2009 with 2010.

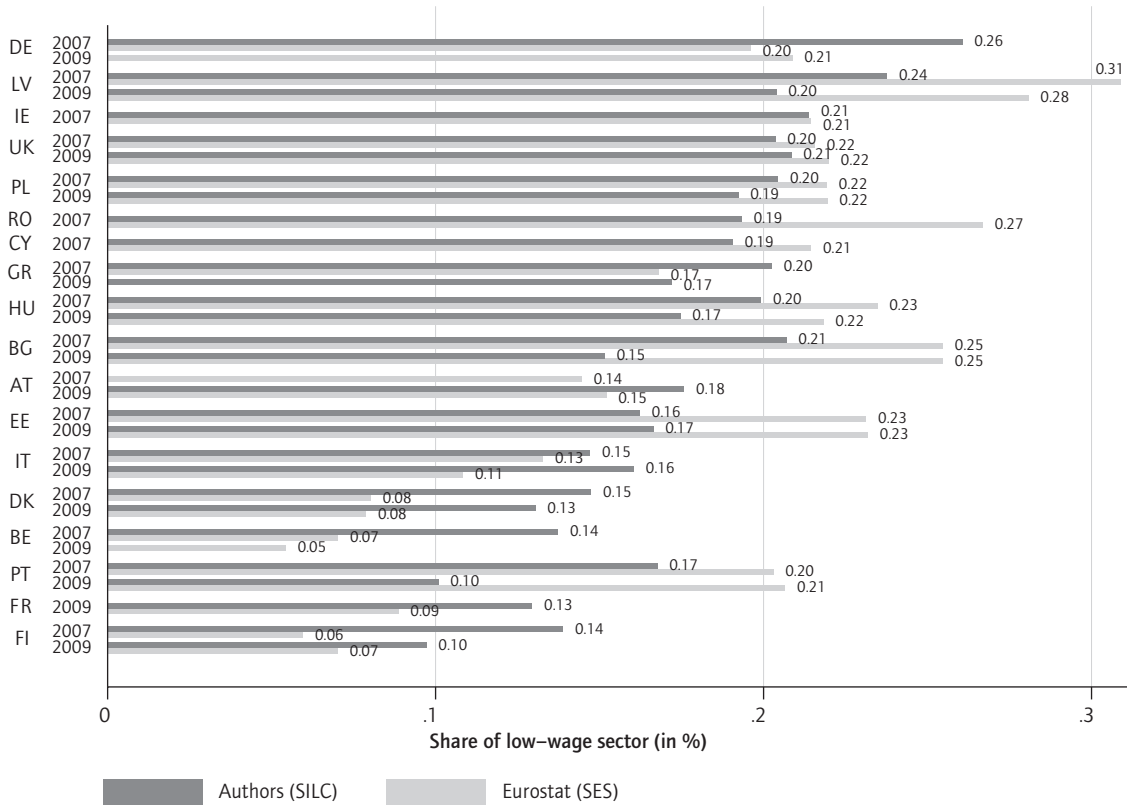
Table 32 shows the results discussed in Section 4.3.3 using Eurostat official statistics. Column 1 shows results using the share of low-wage earners computed using EU-SILC, as presented in Table 6, while column 4 shows estimates using Eurostat official statistics available for two years leading to a drop of one-third of the sample size). On top of the significance of collective bargaining coverage already found in Table 6, column 4 of Table 32 also shows a significant effect of the existence of a national statutory minimum wage on the proportion of low-wage earners in the economy: the corresponding coefficient is negative, meaning that having a national statutory minimum wage reduced the share of low-wage earners by 17 percentage points. However, similar to the case of the share of individuals paid below the prevailing wage floors, the two institutional settings might be interrelated. We test this hypothesis with the help of an interaction variable between collective bargaining coverage and the dummy for statutory minimum wages. Estimation results show evidence that the effect of collective bargaining coverage differs across minimum wage systems, in other words, being lower in countries where there is a national statutory minimum wage in place.

Overall, this robustness check confirms that the share of low-wage earners is related to the coverage of collective bargaining. Compared to estimates using EU-SILC data, the existence of a national statutory minimum appears to have an impact on the size of the low-wage share, as well as the interaction with the effect of collective bargaining coverage. These results should be treated with caution, however, since they are not strictly comparable because SES data do not cover agriculture and the public sector, exclude workers in firms with less than 10 employees and refer to different years.

4.5 Scenario analysis of an EU-wide minimum wage at 60 per cent or 40 per cent of the median wage

In Section 2.4 on the European debate on minimum wages we have seen that not all unions are in favour of common rules across the EU. On top of historical reasons that might lead some countries to prefer collective bargaining to

Figure 20 Sectoral-level shares of workers with wages below 75 per cent of minimum wages and Kaitz index



Note: SES data refer to earning year 2006 and 2010 and are official Eurostat statistics.
Source: SILC data refer to earning year 2007 and 2009 and are authors' calculations.

statutory minimum wages, an EU minimum wage would not have the same effects in all countries. To evaluate all the potential effects we have highlighted in the literature review on employment, welfare, inequalities and poverty we would need a general equilibrium model.

In this section, we simply show what would be the value of minimum wages in EU countries, using for the simulation EU-SILC data for 2009 (2007 for Belgium and Germany and 2008 for Cyprus). We simulate two different setting mechanisms with two different values: in the first, minimum wages are set at 40 per cent or at 60 per cent of the national median wage. In the second, minimum wages are set at 40 per cent or 60 per cent of the sectoral minimum wage. Why do we take these values? In their 'theses', Schulten *et al.* (2005) call for European minimum wage 'of at least 60 per cent of the average national wage'. More recently, the joint ILO-IMF-OECD-World Bank report submitted to the G20²¹ in June 2012 suggested setting the minimum wage at around 30–

21. 'Boosting jobs and living standards in G20 countries'. A joint report by the ILO, OECD, IMF and the World Bank, June 2012.

40 per cent of the median wage.²² However, it is not clear if this should be done with respect to the national median wage or the sectoral one: this can yield very different results.

Table 11 shows the two scenarios with a minimum wage set at 40 per cent and 60 per cent of the national median wage compared to the value of the minimum wage (either statutory or sectoral) currently in place.

Table 11 Simulation of minimum wage at 60 per cent and 40 per cent of the national median wage

	Current MW	60% of median wage	Difference 60%	40% of median wage	Difference 40%
AT	7.76	8.63	0.87	5.75	-2.01
BE*	9.22	9.37	0.15	6.25	-2.97
BG	0.71	0.92	0.21	0.61	-0.10
CY**	4.79	5.51	0.72	3.68	-1.11
DE*	7.63	8.65	1.02	5.86	-1.77
DK	14.69	14.39	-0.30	9.59	-5.09
EE	1.73	2.15	0.42	1.44	-0.29
FI	9.27	9.83	0.56	6.56	-2.72
FR	8.82	7.61	-1.21	5.07	-3.75
GR	4.05	5.26	1.21	3.51	-0.54
HU	1.47	1.61	0.14	1.07	-0.40
IE**	8.65	10.88	2.23	7.25	-1.40
IT	10.90	7.07	-3.83	4.71	-6.19
LV	1.53	1.84	0.31	1.23	-0.30
PL	1.71	1.79	0.08	1.19	-0.52
PT	2.71	3.07	0.36	2.05	-0.66
RO**	0.96	0.97	0.01	0.65	-0.31
UK	6.68	7.26	0.58	4.84	-1.84

Note: * 2007; ** 2008.

A statutory minimum wage at 60 per cent of the *national* median wage would increase the minimum wage in all countries in our sample except Denmark (workers would lose 30 cents), France (a decrease of 1.21 euros) and Italy (a decrease of 3.83 euros). The increase would be negligible in Romania (just 1 cent more), but it would be substantial in Ireland (2.23 euros more) and Germany (1.02 euros more). By contrast, a minimum wage at 40 per cent of the national median wage would reduce the minimum wage in all countries, from 10 cents in Bulgaria to more than 6 euros in Italy. These results are also reflected at sectoral level in countries without a statutory minimum wage (see Appendix): in Italy, minimum wages in all sectors are lower if set at 60 per

22. The magazine *The Economist* on November 24th 2012 has also discussed the possibility of a moderate minimum wage at around 30-40% of the median.

cent of the national median wage. On the other hand, in Denmark, despite the average negative value some sectors would benefit from a statutory minimum wage at 60 per cent of median wage: in particular, mining and quarrying (b–e), retail trade (g), accommodation and food services (i), public administration (o), health (q) and other sectors (r–u) would see an increase in the minimum wage. By setting a statutory minimum wage at 40 per cent of the national median wage all sectors in all countries would face a reduction in minimum wage except for accommodation and food services (i) and health (q) in Germany.

Table 37 through Table 54 in the Annex show the two other scenarios where the minimum wage is set at 40 per cent and 60 per cent of the *sectoral* median wage compared to the value of the minimum wage (either statutory or sectoral) currently in place. Results vary across sectors and across countries, however again most sectors in Denmark and France and all sectors in Italy would lose even with a minimum wage set at 60 per cent of the sectoral median wage. The biggest increases in all countries would be registered in financial and insurance activities (k) where the median wage is significantly higher than the national average. On the contrary, accommodation and food services (i) would see a decrease of the minimum wage in all countries but Bulgaria, given that the median wage is below the national average. A minimum wage set at 40 per cent of the sectoral median wage would mean a decrease in most sectors in all countries. Only Financial and insurance activities (k) and Information and communication services (j) would in most countries still see an increase in the minimum wage if set at 40 per cent of the sectoral median wage because their median wages are well above the national median wage.

Overall, our simulations using EU-SILC data for 2009 (2007 for Belgium and Germany and 2008 for Cyprus) show that a European minimum wage set at 60 per cent of national median wage, as Schulten *et al.* (2005) suggest, would consist in an increase in most countries except Denmark, France and Italy. On the other hand, a minimum wage at 40 per cent, as discussed by *The Economist*, would mean a decrease compared to current levels. However, there are marked differences across sectors: high-wage sectors such as ICT and finance would see an increase even from a minimum wage at 40 per cent, while low-wage sectors such as hotels and restaurants would always face a decrease compared to current levels.

In conclusion, the simulations clearly show that a European minimum wage would benefit some workers in terms of wages in some countries. Defining the exact mechanism and value involve a trade-off between countries and sectors, which might be another reason why unions in Italy and the Nordics fiercely oppose a common European regulation, preferring to keep their national systems. Let us also note that the static simulation does not take into account possible ‘wave effects’ on the rest of the wage distribution.

4.6 Comparison with other datasets and studies

4.6.1 The relative level of minimum wages

By and large, available sources consistently report the same absolute levels of minimum wages in countries with statutory wage floors: in general, the absolute minimum rates reported by the WSI Mindestlohndatenbank, Eurostat and the OECD coincide.

Figures on the relative level of minimum wages across countries are, however, more divergent, for several reasons: first, the denominator used to compute Kaitz indices is not the same in all data sources. Eurostat presents minimum wages relative to the average wage,²³ while the OECD also uses median wages as denominator; second, the reference group for which the relative level of minimum wages is calculated may also differ. Eurostat uses the average wages of the entire labour force as denominator, while the OECD figures are based only on full-time workers. The Kaitz index is sensitive to these changes since the inclusion of part-time workers is typically associated with lower average (and median) wages and therefore to relatively higher levels of the index. In general, the level of minimum wages appears to be lower if compared to the average than to the median wage.

The definition of the Kaitz index we used in our regression analysis contains elements from both the OECD and the Eurostat definition: we compute the index using median wages (like the OECD), but we include all workers and not only full-time workers (like Eurostat). While the first choice is preferred practice in the empirical literature given that the median wage is less sensitive to outlying values (Boeri, 2012), the second reflects our concern to examine the impact of minimum wages for the entire labour force and not only for full-time workers. Ignoring part-time workers is particularly problematic when discussing minimum wage policy as part-time workers represent a significant share of minimum wage earners (Rycx and Kampelmann, 2012).

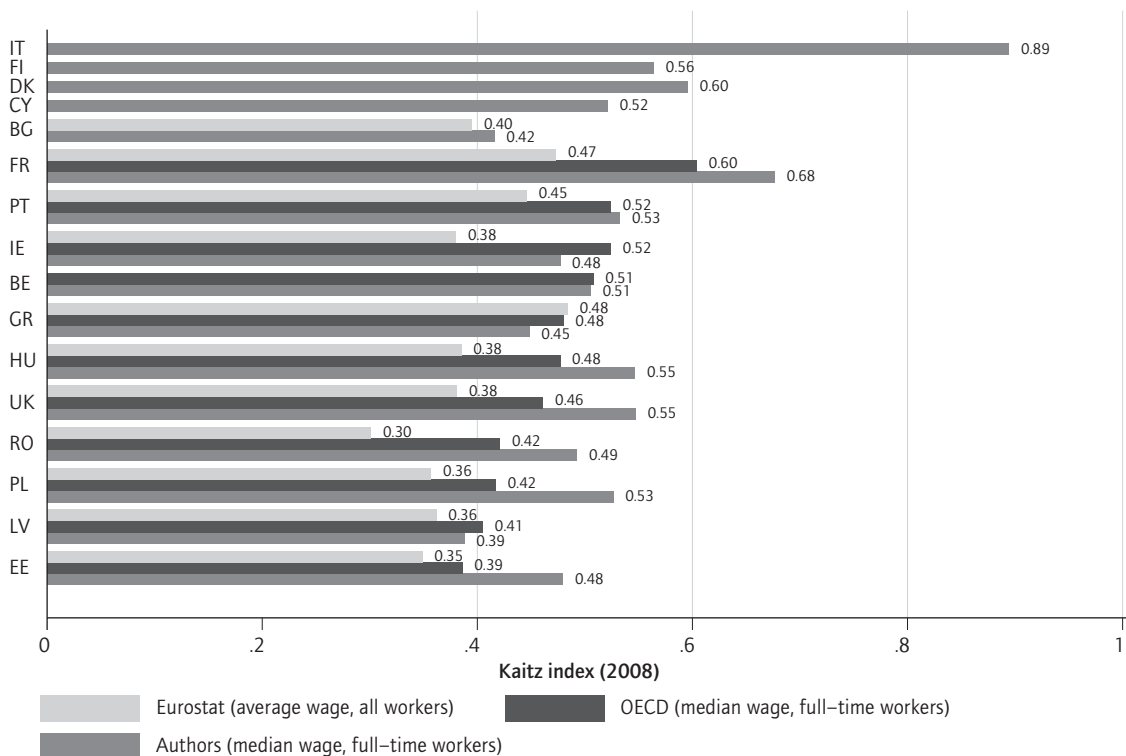
Figure 21 compares the values of Kaitz indices according to three sources: Eurostat, OECD and our own calculations based on a combination of data from EU-SILC, the WSI Mindestlohndatenbank and hand-collected information from collective agreements. All indices refer to 2008. Unsurprisingly, the Eurostat figures are consistently smaller compared to the two other sources, a finding that can be attributed to the use of average instead of median wages as denominator.

For the sake of comparability, the figures from the OECD and our own calculations are based on the same definitions, namely, median wages as denominator and full-time employees as reference group. Even so, the two sources do not coincide: six of the 11 countries for which we can compare Kaitz

23. See Eurostat's definition of this indicator : http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/earn_minw_esms.htm

indices in 2008 differ by more than 5 percentage points. However, only two countries (Poland and Estonia) display indices that differ by more than 10 percentage points. The correlation coefficient between the Kaitz index in the two sources is 0.68, which indicates that, by and large, the two sources point in the same direction and the observed differences of 5–10 percentage points can probably be attributed to differences between the underlying earnings surveys.

Figure 21 Relative levels of minimum wages according to different sources



While many papers compare the relative level of Kaitz indices across different countries, very few of them estimate models that could account for the observed differences. Boeri (2012) is one of the few studies that models differences in the Kaitz index based on a large sample of countries from all over the world. Due to data availability most of Boeri’s estimation results are based on a Kaitz index with average instead of median wages as denominator. But even for the countries for which Boeri is able to use median wages we cannot compare our results to his database, given that his paper only includes average values over several years. We will therefore focus our comparison on the performance of Boeri’s and our model in explaining international variations in the relative level of minimum wages.

The first main difference between Boeri’s and our approach concerns the country sample. While Boeri’s sample only looks at countries with *statutory*

minimum wages but includes countries from all over the world, our sample is restricted to European countries but also includes minimum wage systems in which minima are collectively negotiated at the sectoral level. While the geographical scope of Boeri's study is therefore wider, all countries display relatively similar minimum wage systems.

A second and closely related difference between the two approaches is the main explanatory variable used in each study. Boeri distinguishes between three types of mechanisms with which statutory wages are fixed at the national level: (a) a bargaining process; (b) a consultation process; and (c) a unilateral decision of the government. The full-fledged model including these variables accounts for less than one-third of the total variability in Kaitz indices. Moreover, a bargaining or a consultation process is found to be associated with around 10 percentage points higher Kaitz indices compared to statutory wage floors fixed unilaterally by the government.

Although our sample includes only European countries, the variability of Kaitz indices in our sample is relatively high due to the fact that we cover both national and sectoral minimum wages: the average Kaitz indices are 0.5 (with a standard deviation of 0.08) and 0.65 (with a standard deviation of 0.15) in countries with and without a national statutory minimum wage, respectively. Compared to the regressions in Boeri, our model explains much more of the variability: the coefficient of determination in our preferred specification (model 1 in Table 4) is more than twice as high. This difference in explanatory power persists even if we compare our model to Boeri's regression of a restricted model applied only to OECD countries. This difference might stem from at least two factors: either our control variables have more explanatory power or our minimum wage setting variables capture more of the variability in the Kaitz index. A comparison of the respective regression outputs of the model without control variables suggests that both factors seem to be at play: the bargaining variable alone explains only 3 per cent of the variability in Boeri's OECD sample, while the features of minimum wage systems alone explain more than 20 per cent of intra-European variability (see model 3 in Table 4). That said, the size of the underlying effect is similar since the existence of a statutory minimum wage is related to a decrease of around 10 per cent in the Kaitz index.

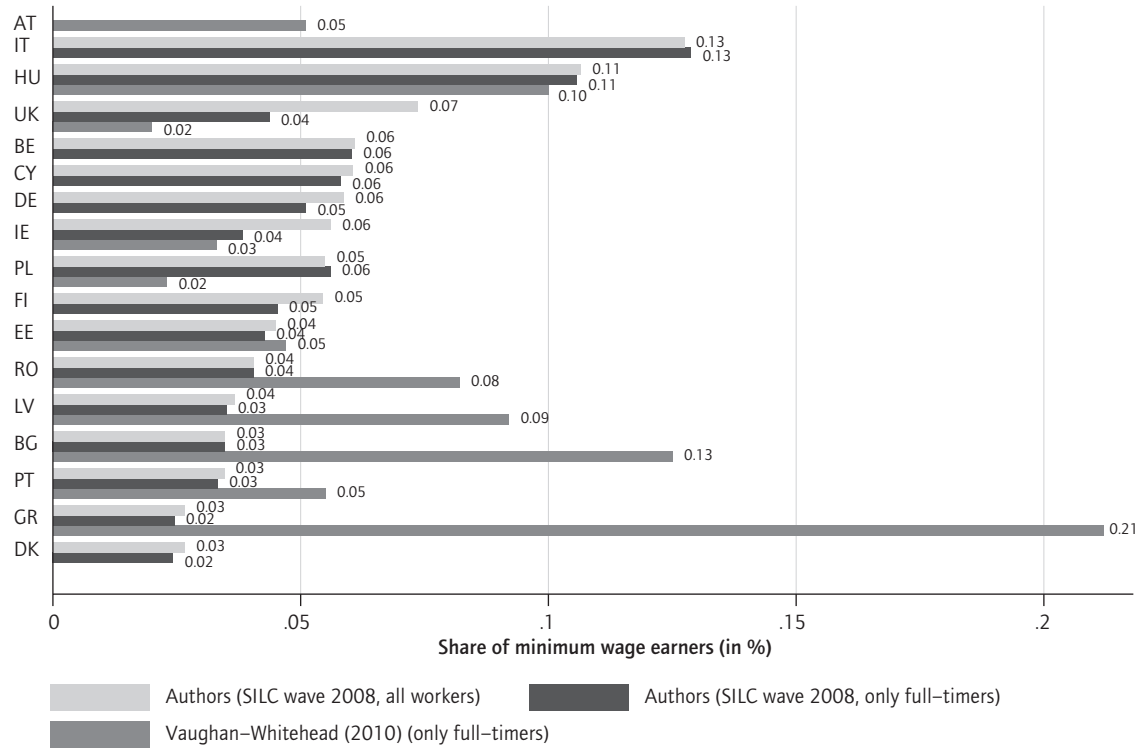
In light of the differences in the sample and the explanatory variables, we consider Boeri's and our study to be complementary: while our results help us to understand a considerable share of intra-European variability across different types of systems, Boeri is able to account for some of the international variability within the group of countries with statutory wage floors at the national level. A useful way to exploit this complementarity would be to extend either of the two models in order to integrate the institutional diversity both within and among minimum wage systems.

4.6.2 Proportion of employees paid at or below minimum wages

Contrary to the availability of different Kaitz indices in large international data sources (Eurostat, OECD), comparative statistics on the proportion of workers paid at or below minimum wages are scarce. A rare overview presenting relatively recent figures from 2007 and 2006 is Vaughan-Whitehead (2010) who includes a figure on the proportion of full-time employees receiving minimum wages. In order to compare these figures to our sample, we have computed the share of employees that earn wages that are within 10 per cent of the prevailing minimum wage. This margin arguably captures small errors in the reporting of earnings and/or hours in the SILC and does not require that individuals earn *exactly* the corresponding minimum wage. We have computed this indicator for two reference groups: all workers (the sample used in our regression) and only full-time workers (the reference group in Vaughan-Whitehead (2010)). Figure 21 compares the three series for all countries with available statistics in 2007. While the figures are relatively close for Hungary, Ireland and Estonia (at least if we compare the two series based on full-time workers), other countries show wide differences: it is notably difficult to account for the 19 percentage points we observe for Greece. In general, we observe that the figures reported by Vaughan-Whitehead (2010) are much more volatile between the different countries, a feature that probably indicates that the proportions have not been calculated from a harmonised survey of income data, such as the EU-SILC. To verify this hypothesis we would need, however, more information on the comparability of the figures presented by Vaughan-Whitehead.

The only source of comparison would be data produced in the United States. The US Bureau of Labor Statistics provides estimates for workers paid at the minimum wage and below. In 2011, 73.9 million American workers age 16 and over were paid at hourly rates, representing 59.1 per cent of all wage and salary workers. Among those paid by the hour, 1.7 million earned exactly the prevailing Federal minimum wage of \$7.25 per hour. About 2.2 million had wages below the minimum. Together, these 3.8 million workers with wages at or below the Federal minimum made up 5.2 per cent of all hourly-paid workers (Bureau of Labor Statistics, 2012); 2.3 per cent of workers paid at hourly rates are paid at the minimum wage and 2.9 per cent are paid below: this is probably an underestimation because salaried and other non-hourly workers are excluded. Research has shown that a relatively small number and share of salaried workers and others not paid by the hour have earnings that, when translated into hourly rates, are at or below the minimum wage. However, the US BLS does not routinely estimate hourly earnings for non-hourly paid workers.

Figure 22 Share of minimum wage earners by country in 2007



5. Conclusions

Minimum wages have re-appeared on policy agendas across Europe. A number of factors have contributed to this trend. First, in the richer EU countries the successive waves of enlargement have led to streams of low-wage immigration which are sometimes perceived as a threat to existing wage differentials. A more aggressive wage policy at the national or European level is seen by many as an attractive tool to curb the downward pressure on wages that is caused by low-wage immigration. Second, the proportion of workers that are covered by collective agreements is dwindling in most Member States. Advocates of statutory minimum wages see them as an alternative tool that could substitute collective bargaining in protecting workers against low wages. Third, minimum wages are increasingly associated with other policy objectives, such as pay equality between men and women, and therefore attract attention from policymakers and lobbyists who were previously less concerned by wage floors.

These developments have fuelled an ongoing debate at the European level as to whether it is desirable to implement a harmonised rate in all EU Member States. We have argued that this debate so far lacks not only a framework that renders the opposing positions between different minimum wage institutions more intelligible, but also crucial empirical evidence concerning the labour market outcomes associated with different minimum wage systems. In this report, we have left the beaten track of conventional analyses: our empirical results are not only informed by qualitative data on national systems, but we have also collected minimum rates from more than 1,100 sectoral-level agreements across Europe, including Austria, Belgium, Denmark, Finland, Germany and Italy.

Our results clearly underline the importance of thinking about the European debate as a choice between different minimum wage systems rather than the choice of a certain rate to be harmonised across the Union. Crucially, we are able to show empirically what many practitioners long suspected: the combination of sectoral minimum rates and high levels of collective bargaining coverage can, at least for certain outcomes, be regarded as constituting a functional equivalent to a binding statutory minimum wage at the national level (Schulten *et al.*, 2006: 12). Our regression results notably suggest that both higher collective bargaining coverage and a national statutory minimum wage are significantly associated with lower levels of Gini inequality among workers and lower Theil inequality between sectors of activity.

But there are also trade-offs. Minimum wage systems with statutory rates at the national level are related to relatively lower wage floors. This is evidence

in favour of an argument frequently put forward by trade unions from the Nordic countries claiming that sectoral-level bargaining allows workers to obtain higher relative minima. We also show that relative rates are positively related to the degree of collective bargaining coverage, another factor that is frequently assumed by scholars and practitioners alike but rarely put to an empirical test.

This, however, is only part of the story. In systems without statutory minima, the higher rates enjoyed by insiders appear to come at a cost for outsiders: we show that, all other things being equal, the higher the level of the minimum wage relative to the median wage, the more workers earn wages that are actually below the prevailing minimum. What is more, our findings indicate that minimum wage systems differ with respect to the proportion of workers who are either uncovered or whose wages violate existing minimum wage rules. A system with a national statutory minimum fares better in this respect than a system with sectoral-level minima, although higher levels of collective bargaining coverage can offset this difference to some extent. Again, national statutory minima and sectoral-level collective bargaining coverage appear to be functional equivalents.

A system with neither a national statutory minimum nor high collective bargaining coverage is unlikely to produce minimum wages with a strong bite: as the case of Italy highlights, even sharp teeth (that is, high sectoral Kaitz indices) do not automatically lead to a strong bite if the mouth of bargaining coverage is empty. Another conclusion from our data is that non-coverage and non-compliance are empirically important phenomena in almost all countries. It is therefore worthwhile to reflect upon policies that could render minimum wages easier to monitor and to enforce. The research we conducted for this study made us painfully aware of the practical difficulties associated with gathering information on prevailing minimum rates in a given country, in a given sector and for a particular sector of employment. In many cases, even relatively straightforward operations such as transforming monthly into weekly or hourly minimum rates can be complicated and time consuming. One way to reduce non-compliance and non-coverage might therefore be simply to reduce the informational, search and compliance costs associated with minimum wage rules. These costs are today borne almost entirely by employers and employees and there might be a case for the state to facilitate the dissemination of information about existing minima in all parts of the labour market.

More generally, an important conclusion of this study is that the range of policy options related to minimum wages is much larger than the choice of any particular rate. Governments could not only render information on existing rates less costly, but we think that in general they stand to gain from looking at minimum wage policies as influencing a complex system with many adjustment variables: minimum wage systems differ with respect to the degree to which bargaining agreements are extended; extensions can be issued by Courts, by obligatory membership in Confederations, *erga omnes* clauses, and so on; either sectoral or national minima can predominate; in some systems

statutory wages are negotiated, in others they are fixed unilaterally. All these factors represent policy options that require a minute understanding of how the different features of minimum wage systems combine and produce the observed labour market outcomes.

We think that this study has made some progress in that direction, but we are also aware that we were not able to cover all institutional complexities and intra-European diversity that renders this topic so interesting. There are many ways in which the empirical research could be pursued in order to improve our understanding of minimum wage systems. We will conclude by mentioning only two of them. First, the sectoral minimum wage data that we collected from collective agreements could be exploited at the two- or even three-digit level of the NACE, whereas the use of the SILC in this study forced us to aggregate the information at the one-digit NACE level. This leaves scope for future research that could make more of the intra-country diversity of minimum wages, especially in the context of in-depth studies on individual countries whose minimum wage systems have so far received insufficient attention (for example, the Nordic countries). Second, an interesting extension of our framework would be to further refine the distinctions between minimum wage systems in order to reflect more of the diversity within the group of countries with statutory minima. Boeri (2012) has shown that the process through which statutory minima are determined at the national level has a significant impact on the relative level of wage floors. It would be worthwhile to examine whether this finding is also borne out by European data, including controls for labour force composition, which is absent from Boeri's study. Another line of research could be to assess whether the wage setting mechanism of statutory minima also influences other labour market outcomes besides the Kaitz index.

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7. Appendix

7.1 Description of data collection in countries without statutory minima

Austria

Collectively negotiated minimum wages in Austria have been extracted from the ÖGB KV database, which includes most of the Austrian *Kollektivlohnverträge*. In each of the agreements that we analysed, we collected information on the lowest pay category (*‘Unterste Lohngruppe’*). Where these amounts were indicated as monthly minima, we also collected information on the conventional working hours in the sector covered by the agreement in order to calculate hourly minimum rates. The more than 300 sectors were then grouped together at the one-digit NACE available in the SILC. In order to account for the differences in employment between sectors, we weighted each sector according to the sum of weights within each sector using the Austrian *Tariflohnindex*, an index containing a representative sample of job categories from each bargaining sector. All data on minimum wages refer to 2009.

Belgium

In Belgium, the *Conventions Collectives de Travail* are negotiated at more or less irregular intervals within the different *Commissions Paritaires*; We have in particular collected information on minimum wages from collective agreements that were signed in 2007, thereby circumventing the issue of older agreements that might still be binding but subject to indexing (which is a widespread phenomenon in Belgium). For the case of Belgium, we collected information for around 150 *Commission* or *Sous-Commission Paritaires*.

Denmark

Data on minimum wages in Denmark have been extracted from collective agreements available in the LO archive. LO provided us with collective agreements for 2007, 2008 and 2009 on top of those available online. The 105 sectors were then grouped together at the one-digit NACE available in the SILC. In order to account for the differences in employment between sectors, we weighted each sector according to the sum of weights within each sector provided by DA.

Finland

Data on minimum wages in Finland have been extracted from collective agreements available in Finlex and from unions. Missing data (for some sectors in some years) have been extrapolated using the index of wage and salary earnings. The 210 sectors were then grouped together at the one-digit NACE available in the SILC. In order to account for the differences in employment between sectors, we weighted each sector according to the sum of weights within each sector provided by SAK.

Germany

In Germany, the data had to be collected from the collective agreements (*Tarifverträge*) that are negotiated among the social partners at the regional and sectoral level.²⁴ For Germany, we recorded the 2007 minimum wages in more than 70 sectors (*Tarifbranchen*). In light of the marked wage inequality between the *Länder* of the former GDR and FRG, we included both the level of the lowest wage category in both eastern and western Germany, which means that we have collected information on around 150 different minima in Germany. As a consequence, the average minimum wages reflect the range of sectoral (and regional) minima and the distribution of total employment among these different minima.²⁵

Italy

Data on minimum wages in Italy are extracted from the ISTAT database of collective agreements used to build the index of the evolution of wages and salaries (per employee or per hour) determined by contractual provisions set by collective agreements. Consistently with ISTAT, average sectoral minimum wages are calculated with reference to the fixed employment structure of the base period (December 2005). In order to account for the differences in employment between sectors, we weighted each sector according to the sum of weights within each sector provided by ISTAT.

24. Although clearly relevant for empirical wages in most of the countries in our study, after consultations with experts from the European Trade Union Institute in October 2011, we decided to ignore any further renegotiation of minima that occurs at the firm level.

25. Unfortunately, it was not possible for the case of Germany to calculate the employment weight for each *Tarifbranche* because the SOEP data on sector of activity is based on the NACE and not on the system of *Tarifbranchen*. The weighted average is therefore based on the distribution of employment among NACE and the correspondence between NACE 2-digit sectors and *Tarifbranchen*. More detailed information on the weighting procedure can be obtained from the authors.

7.2 Overview of minimum wage systems by country

Determination of minimum wages	Extension of collective agreements possible	Scope of extension	Extension mechanism	Exemptions	Differentiation	Level of minimum wage in 2007	Weekly full-time working hours	Collective agreement coverage 2008/2009	Trade union density 2008/2009	Proportion of full-time employees receiving min. wages (2007)	Min. wage as prop. of median wages for full-time work, 2010	National minimum wage (from Visser's database)	References for country papers
Austria													
<i>Kollektivverträge</i> negotiated at different levels: local, regional, branch, etc. Statutory (but bargained) minimum wage in the public sector. Since 1991 many collective agreements include a MW fixed at ÖGB Bundeskongress; Bundeseinigungsamt can define MW in certain branches	Yes	Low	Bundeseinigungsamt may extend collective agreements					99% (all employers have to be organised in the Wirtschaftskammer Österreichs)	29%	5.10%	–	0	Hermann, C. (2007) 'Minimum wages in Austria', In Schulten (2006)
Belgium													
Collective agreement (interprofessional in <i>Conseil central de l'économie</i> or <i>Conseil national du travail</i> ; sectoral in <i>Commission Paritaire</i>)	Yes	High	Collective agreements are extended to all workers by Royal Decree	Public sector employees and apprentices (Funk and Lesch, 2005)	Reduced rates for 16-20 year-olds (plus seniority rules for 21.5 and 22.5 year-olds) (CCT N° 43, 50)	1258.91 (until 1/4/07) and 1283.91 euros per month (after 1/4/07)	38 hours per week, 165 hours per month	96%	52%	n.a.	52%	2	

Determination of minimum wages	Extension of collective agreements possible	Scope of extension	Extension mechanism	Exemptions	Differentiation	Level of minimum wage in 2007	Weekly full-time working hours	Collective agreement coverage 2008/2009	Trade union density 2008/2009	Proportion of full-time employees receiving min. wages (2007)	Min. wage as prop. of median wages for full-time work, 2010	National minimum wage (from Visser's database)	References for country papers
Bulgaria													
Government sets the national minimum wage rate by Decree (Tripartite agreements)	Yes	Not used	Erga omnes	No exemptions (ILO minimum wage database)	During an apprentice's training period, which cannot exceed 6 months, an apprentice's remuneration may not be less than 90% of the national min. wage rate. (ILO min. wage database)	180 lew per month	40 hours per week, 173 hours per month	30%	20%	12.50%	—	2	Tsanov (2010)
Cyprus													
Statutory minimum wage	No	—	—	No minimum wage for all employees, just those in six occupations (sales staff, clerical workers, auxiliary healthcare staff, auxiliary staff in nursery schools, crèches and schools, and also as of July 2008 guards and caretakers working in hospitals and nursing homes. Lower rates during first six months of employment. (EIRO)	MWs only for five occupations: sales staff, clerical workers, auxiliary healthcare staff, auxiliary staff in nursery schools, crèches and schools, and also as of July 2008 guards and caretakers working in hospitals and nursing homes. Lower rates during first six months of employment. (EIRO)	—	—	54%	52%	—	—	1	—
Denmark													
Industry-level collective bargaining	No	—	—	—	—	—	—	80%	69%	—	—	0	Lismoen, H. (2006), 'Low-wage regulation in Scandinavia', in: Schulten (2006), Eldring and Alsos (2012).

Determination of minimum wages	Extension of collective agreements possible	Scope of extension	Extension mechanism	Exemptions	Differentiation	Level of minimum wage in 2007	Weekly full-time working hours	Collective agreement coverage 2008/2009	Trade union density 2008/2009	Proportion of full-time employees receiving min. wages (2007)	Min. wage as prop. of median wages for full-time work, 2010	National minimum wage (from Visser's database)	References for country papers
Estonia													
Statutory minimum wage after bargaining at national level	Yes	Low (and often referring to the statutory minimum wage, FAFO 2012, p. 53)						19%	7%	4.70%	41%	2	Masso and Krillo (2010)
Finland													
Industry-level collective bargaining	Yes	High	Erga omnes instruments, all national agreements that cover more than 50% of an industry are extended (158 of the 198 national agreements)					90%	69%	–	–	0	Seip, A.A. (2010). 'Allmenningjoring i Finland', in: Stokke Eldring and Alsos (2012)
France													
Statutory minimum wage; consultations with national bargaining institution, Commission nationale de la négociation collective; system of indexation with additional 'coups de pousse'	Yes	High (but collective agreements are often lower than the SMIC: Fafo 2012 p.50)		Public sector employees and apprentices	Age (16 years (80%), 19 years, 17 years (90%)) and disability status, Apprentices receive reduced rates until 25 years			90% (98% according to FAFO 2012, p. 50)	8%	12.90%	60%	2	Gautié (2010)

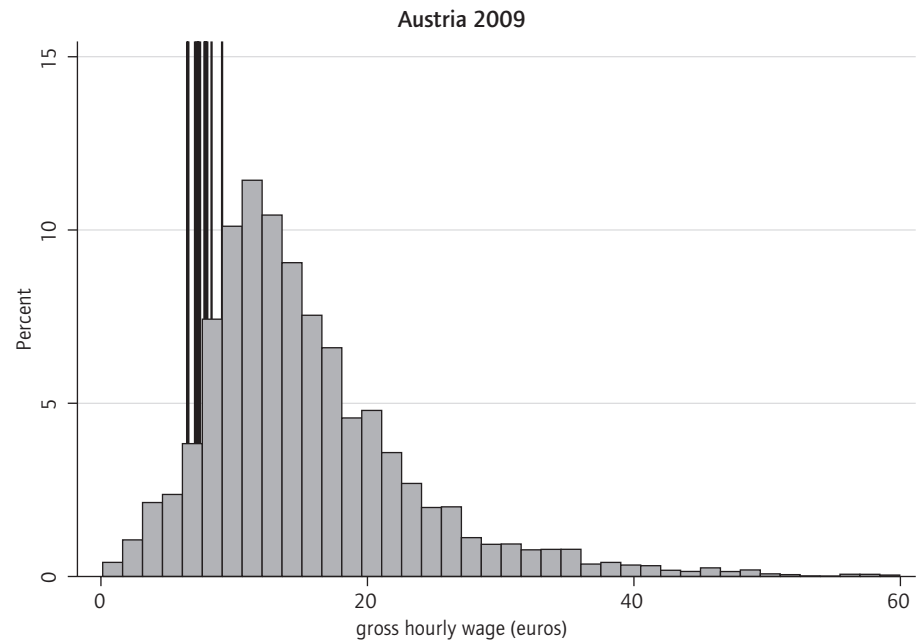
Determination of minimum wages	Extension of collective agreements possible	Scope of extension	Extension mechanism	Exemptions	Differentiation	Level of minimum wage in 2007	Weekly full-time working hours	Collective agreement coverage 2008/2009	Trade union density 2008/2009	Proportion of full-time employees receiving min. wages (2007)	Min. wage as prop. of median wages for full-time work, 2010	National minimum wage (from Visser's database)	References for country papers
Germany													
Collective agreements negotiated at different levels: local, regional, branch, etc	Yes	Low (1.5% of all active agreements in 2010, FAFO 2012, p. 57)	Erga omnes only if government applies § 5 Tarifvertrags-gesetz or AEntG (WSI-Mindestlohn-datenbank)	Unless collective agreement is extended or AEntG applies, only trade workers in firms bound to collective agreements (<i>tarifgebundene Unternehmen</i>) are covered	Collective agreements often differentiate according to age	–	Differ across firms, industries, regions: 35-42 hours per week	62%	19%	–	–	1	Schulten, T., R. Bispinck, C. Schäfer (eds) (2006); Bosch and Kallina (2010)
Greece													
Statutory minimum wage after bargaining at national level	Yes	High (until recently)			Age differentiation (15-24 get 84%); reduced rates for apprentices; differentiated by worker/manager and marital status			65%	23%	21.20%	49%	2	Fotoniata and Moutos (2010)
Hungary													
Government with the agreement of National Council for the Reconciliation of the Interest (before 2012); the role of social partners in setting the minimum wage has been reduced since	Yes	Low	Erga omnes	No exemptions (Funk and Lesch, 2005)	No differentiation (Funk and Lesch, 2005)	65,500 HUF per month	40 hours per week, 173 hours per month	34%	17%	10.00%	47%	2	Szabó (2013)

Determination of minimum wages	Extension of collective agreements possible	Scope of extension	Extension mechanism	Exemptions	Differentiation	Level of minimum wage in 2007	Weekly full-time working hours	Collective agreement coverage 2008/2009	Trade union density 2008/2009	Proportion of full-time employees receiving min. wages (2007)	Min. wage as prop. of median wages for full-time work, 2010	National minimum wage (from Visser's database)	References for country papers
Ireland													
National minimum wage rate set in an Order made by the Minister for Enterprise, Trade and Employment	Yes	Low	erga omnes	No exemptions (Funk and Lesch, 2005)	Lower rates for employees under 18 and employees in education (European Industrial Relations Observatory)	8.30 euros per hour (until 1/7/07) 8.65 (after 1/7/07)	39 hours per week, 169 hours per month	44%	37%	3.30%	52%	2	Nolan (2010)
Italy													
Collective bargaining through industry-, regional-, and enterprise-level agreements. Industry-level bargaining predominates.	No (but in practice workers can mobilise Art 36(1) of Constitution 'fair pay', typically defined collective agreements)	–						80%	35%	–	–	0	Megale, A., Birindelli, L. and D'Alcova, G. (2007). 'Salari e contratti in Italia e in Europa: 2005-2006', Rapporto IRES.
Latvia													
Statutory minimum wage	Yes	Not used						25%	15%	9.20%	54%	1	
Portugal													
Statutory minimum wage	Yes	High		No exemptions.	20% reduction for apprentices, differentiation by disability status			38%	15%	5.50%	56%	2	
Poland													
Statutory minimum wage negotiated in Tripartite Commission	Yes	Not used	Erga omnes	No exemptions.	Lower rates for employees who enter the labour market (80% first year, 90% second year)	936 zloty per month	40 hours per week, 173 hours per month	38%	15%	2.30%	45%	2	Wallusch (2010)

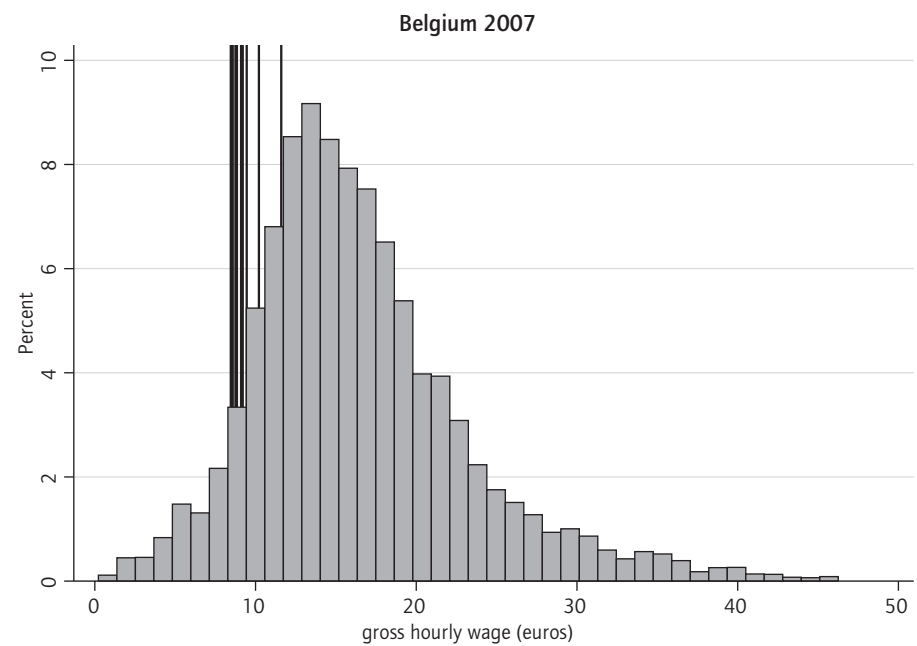
Determination of minimum wages	Extension of collective agreements possible	Scope of extension	Extension mechanism	Exemptions	Differentiation	Level of minimum wage in 2007	Weekly full-time working hours	Collective agreement coverage 2008/2009	Trade union density 2008/2009	Proportion of full-time employees receiving min. wages (2007)	Min. wage as prop. of median wages for full-time work, 2010	National minimum wage (from Visser's database)	References for country papers
Romania													
The government sets a national minimum wage rate following consultation with the social partners. The Social Dialogue Act from 2011 has weakened the role of social partners in the min. wage setting.	Yes	High (until 2011)	Erga omnes	No exemptions.	Different rates according to educational attainment (European Industrial Relations Observatory)	390 lei per month	39.2 hours per week, 170 hours per month	70%	33%	8.20%	44%	2	Triff (2013)
United Kingdom													
The Secretary of State determines the national minimum wage	No	—	Erga omnes	No exemptions.	Reduced rates for younger employees and employees in training. Other categories of workers who are exempt include au pairs, share fishermen, members of the clergy, those in the armed forces, prisoners and some people working in family businesses. (European Industrial Relations Observatory).	5.35 pounds per hour (until 1/10/07), 5.52 pounds per hour (after 1/10/07)	38 hours per week, 165 hours per month	34%	28%	2.00%	46%	2	Grimshaw (2010)
Source													
ILO minimum wage database	Eldring and Alsos (2012)	Eldring and Alsos (2012)			ILO minimum wage database	WSI-Mindestlohn-datenbank		Visser, J. (2012), http://www.uva-aias.net/ 208	Visser, J. (2012), http://www.uva-aias.net/ 208	Vaughan-Whitehead (2010)	OECD cited by FAFO		

7.3 Statistical annex

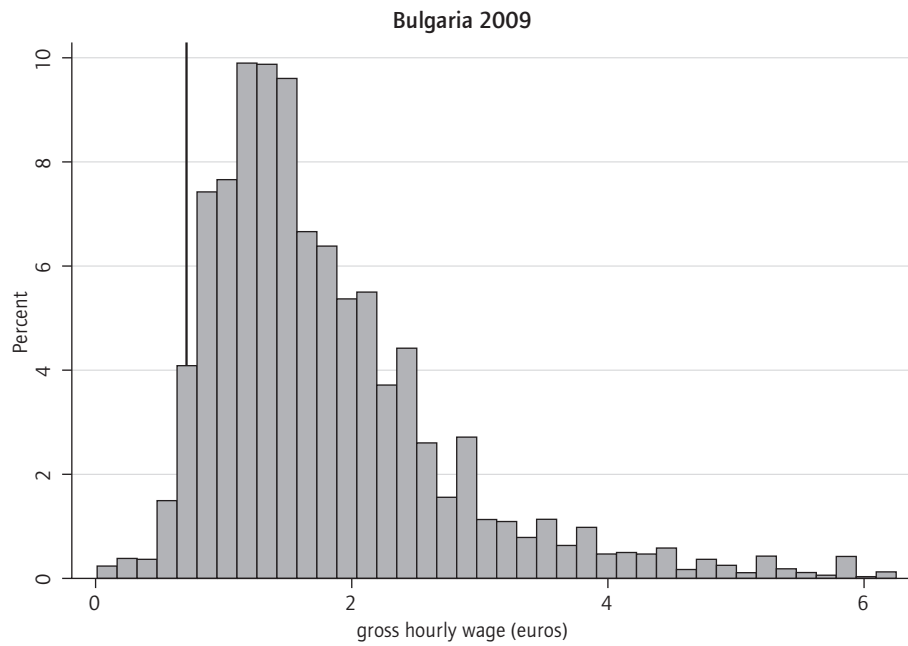
7.3.1 Wage distribution and minima per country



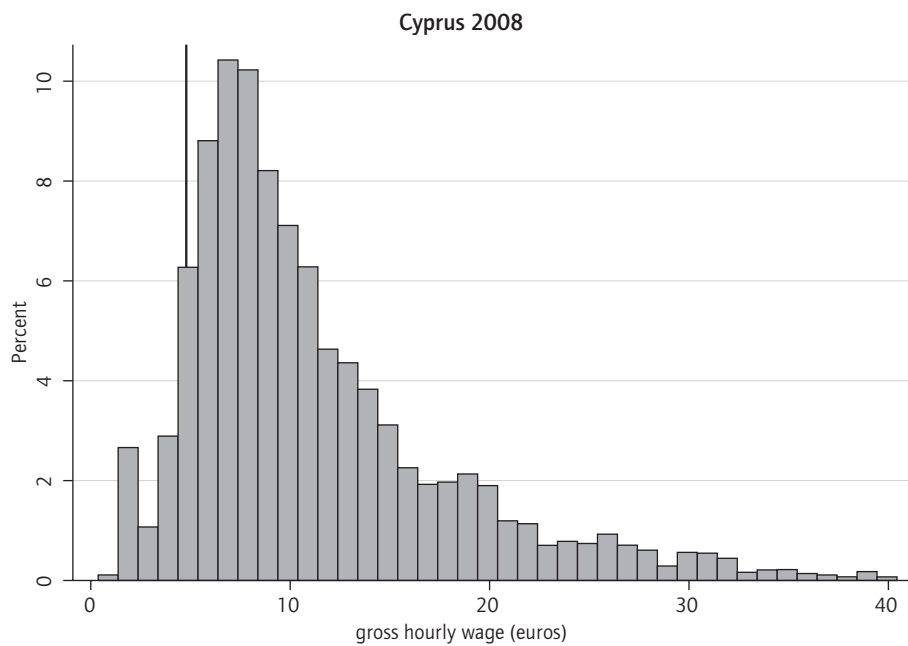
Note: Current 2009 euros; vertical lines represent sectoral minima.
Source: AT-SILC.



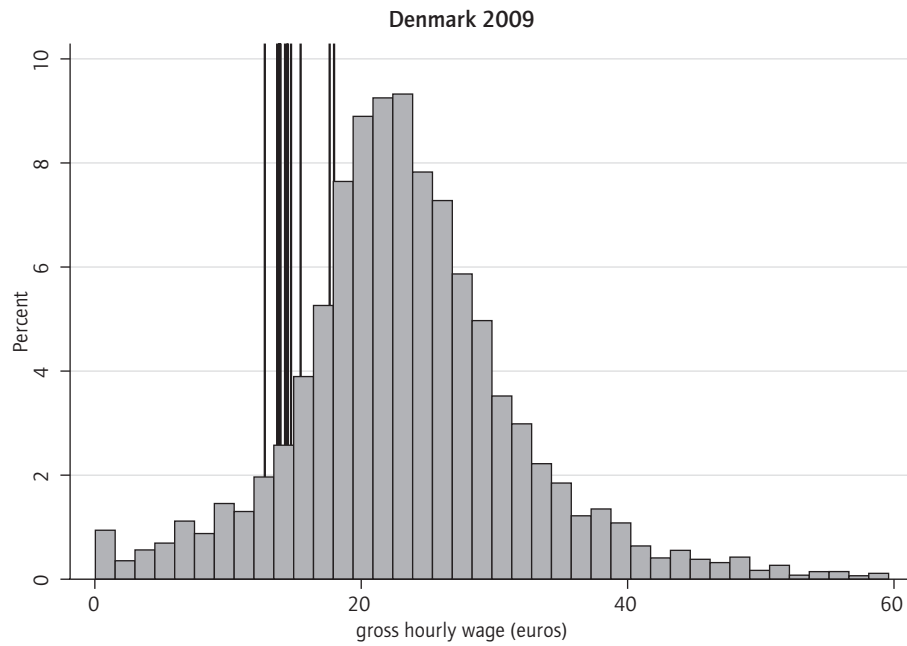
Note: current 2007 euros; vertical lines represent sectoral minima.
Source: BE-SILC.



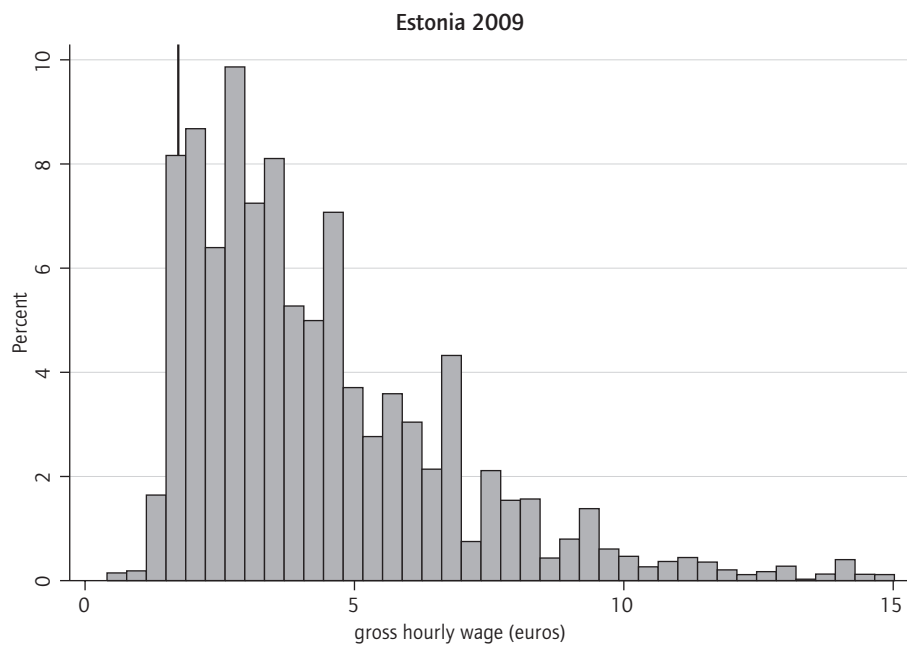
Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: BG-SILC.



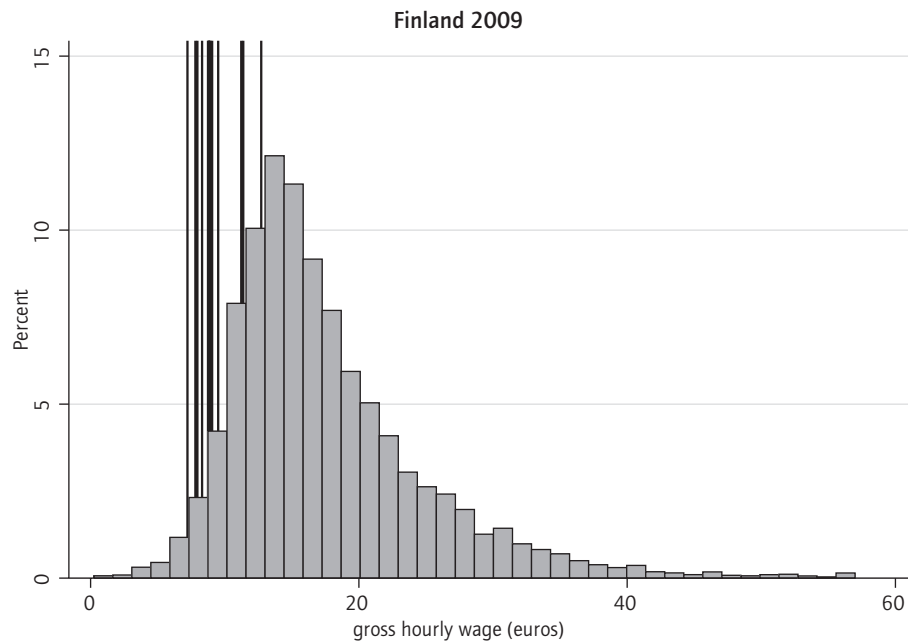
Note: current 2009 euros; the vertical line represents the average of occupational minimum wages.
Source: CY-SILC.



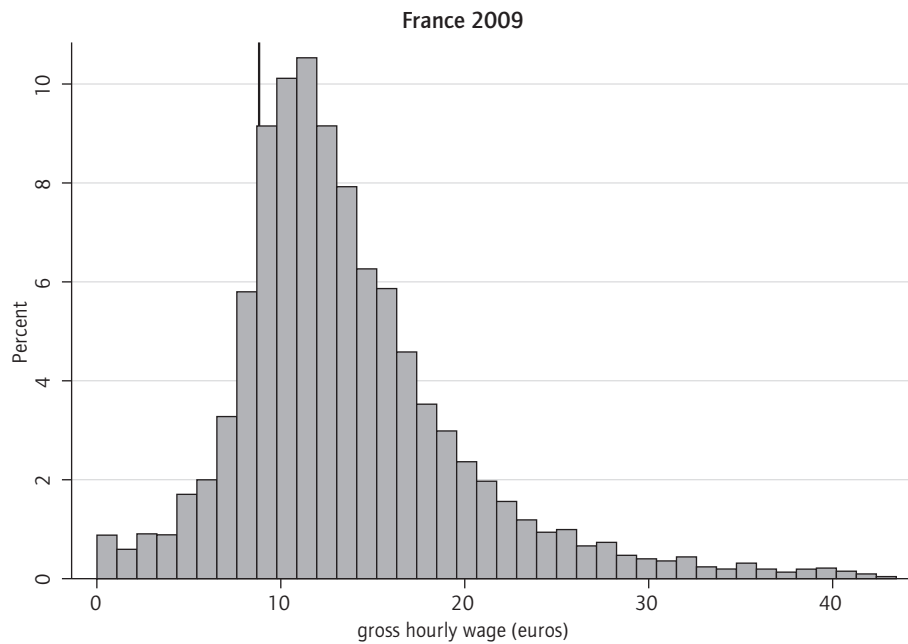
Note: Current 2009 euros; vertical lines represent sectoral minima.
Source: DK-SILC.



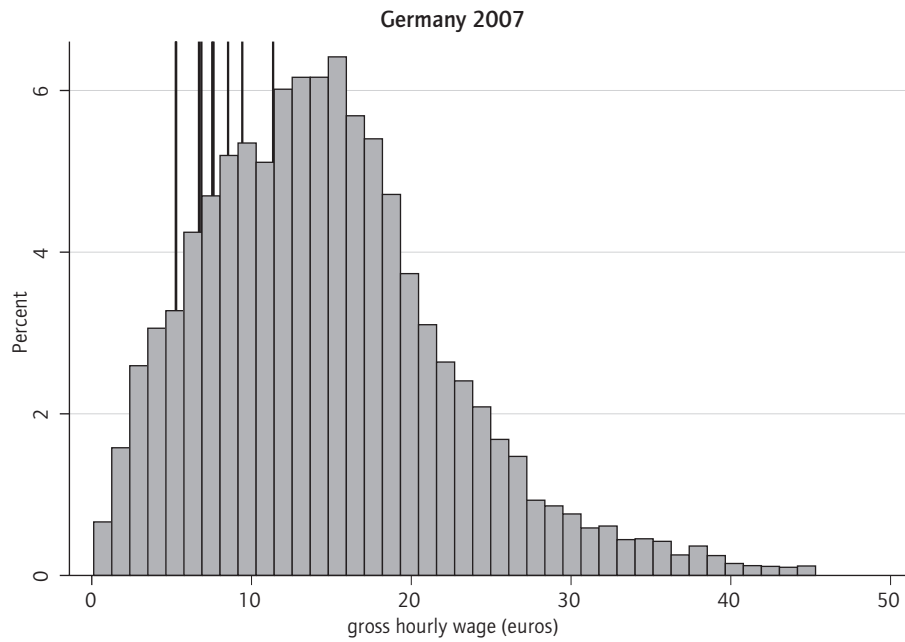
Note: current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: EE-SILC.



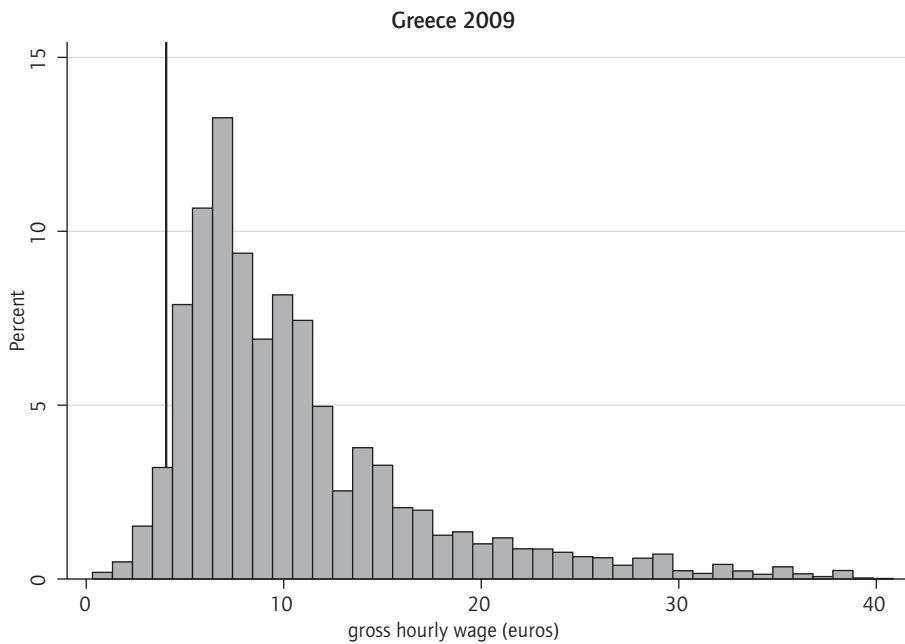
Note: Current 2009 euros; vertical lines represent sectoral minima.
Source: FI-SILC.



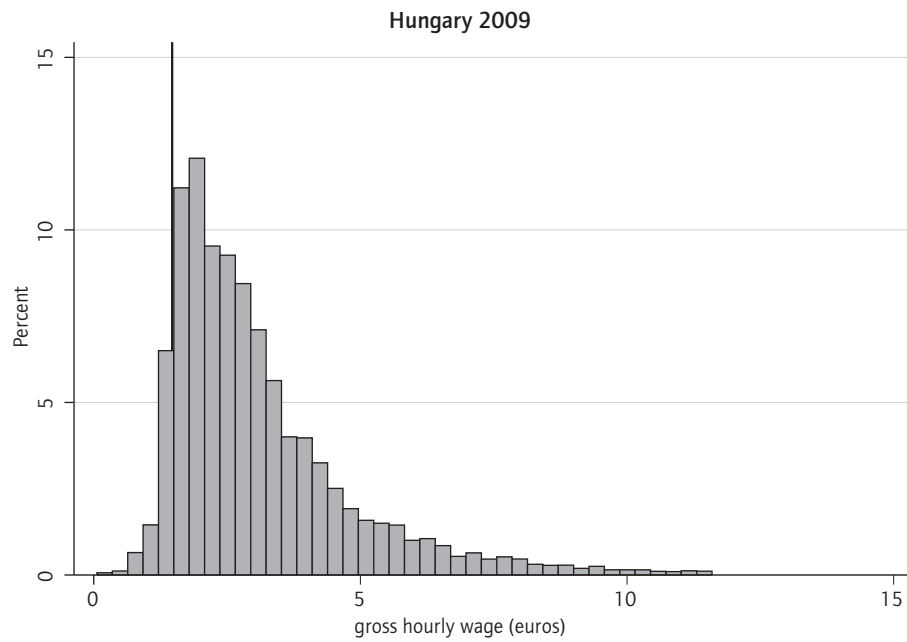
Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: FR-SILC.



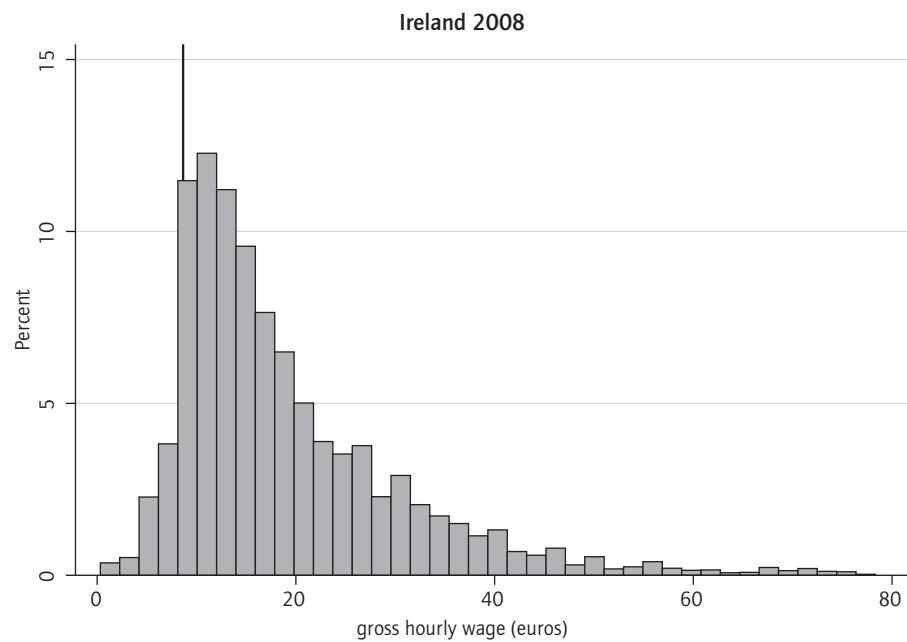
Note: Current 2007 euros; vertical lines represent sectoral minima.
Source: DE-SILC.



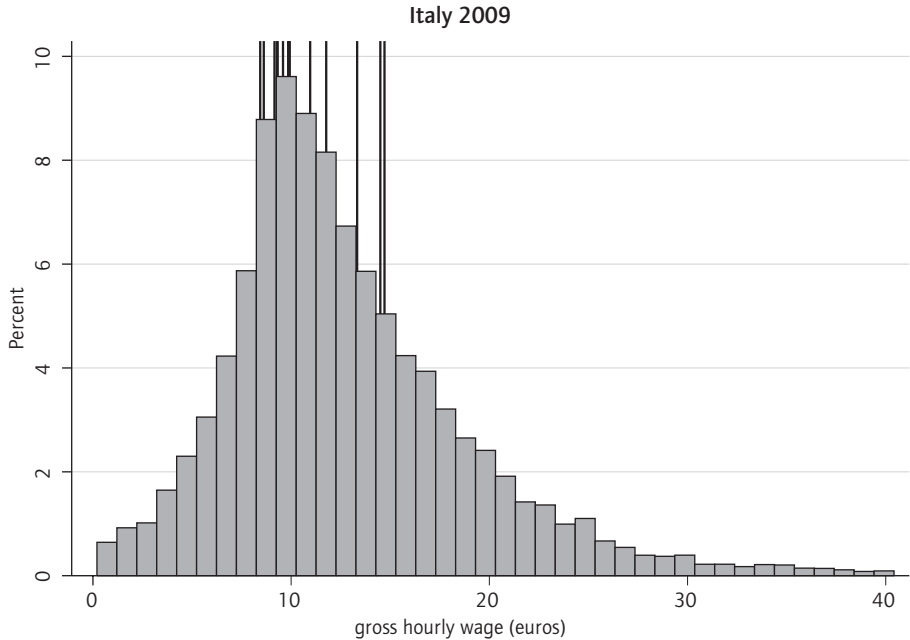
Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: EL-SILC.



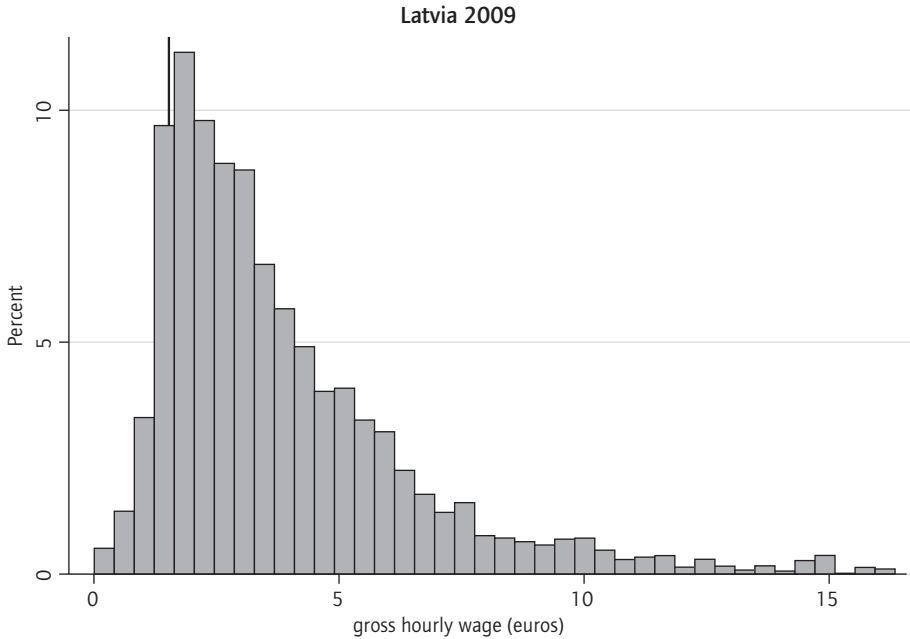
Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: HU-SILC.



Note: Current 2008 euros; the vertical line represents the level of the national statutory minimum wage.
Source: IE-SILC.

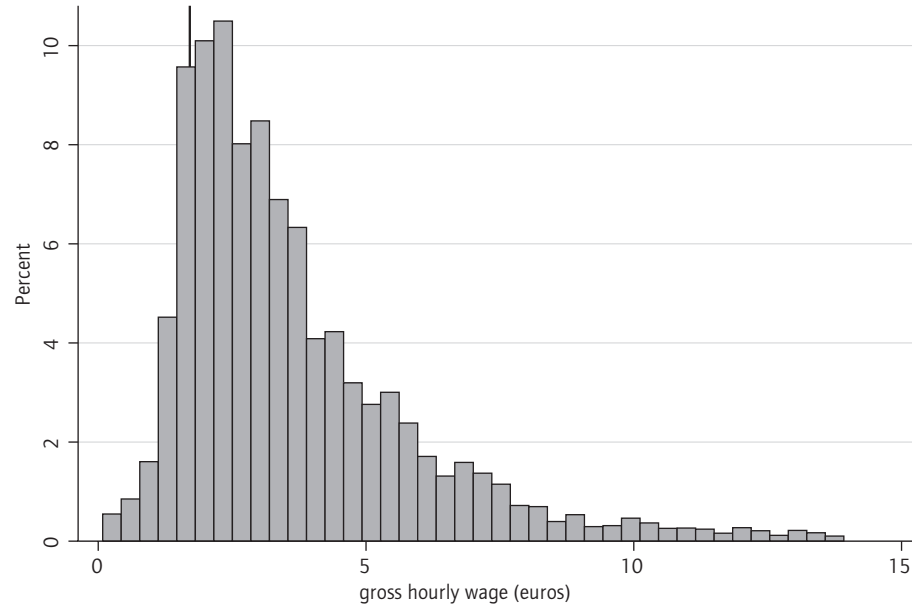


Note: Current 2009 euros; vertical lines represent sectoral minima.
Source: IT-SILC.



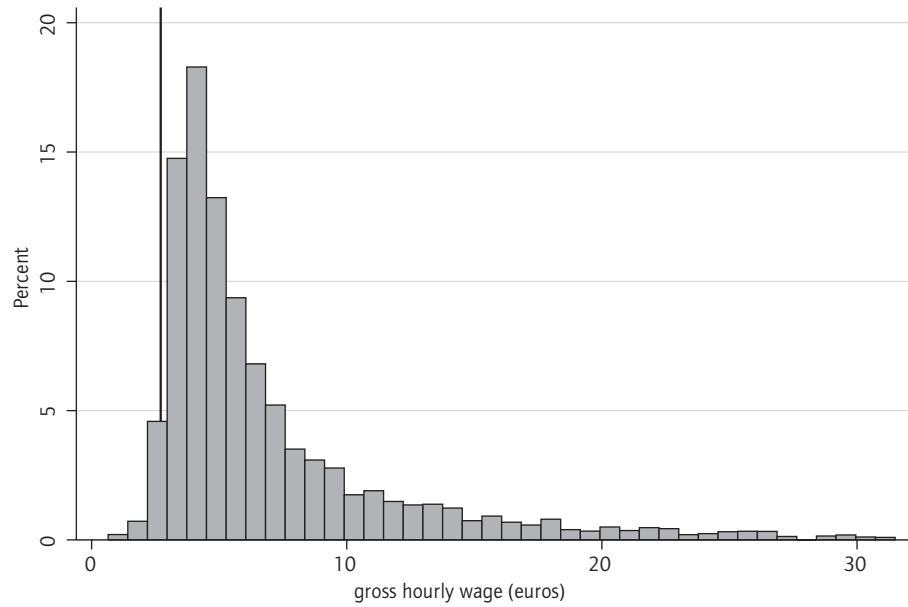
Source: LV-SILC; current 2009 euros; the vertical line represents the level of the national statutory minimum wage.

Poland 2009

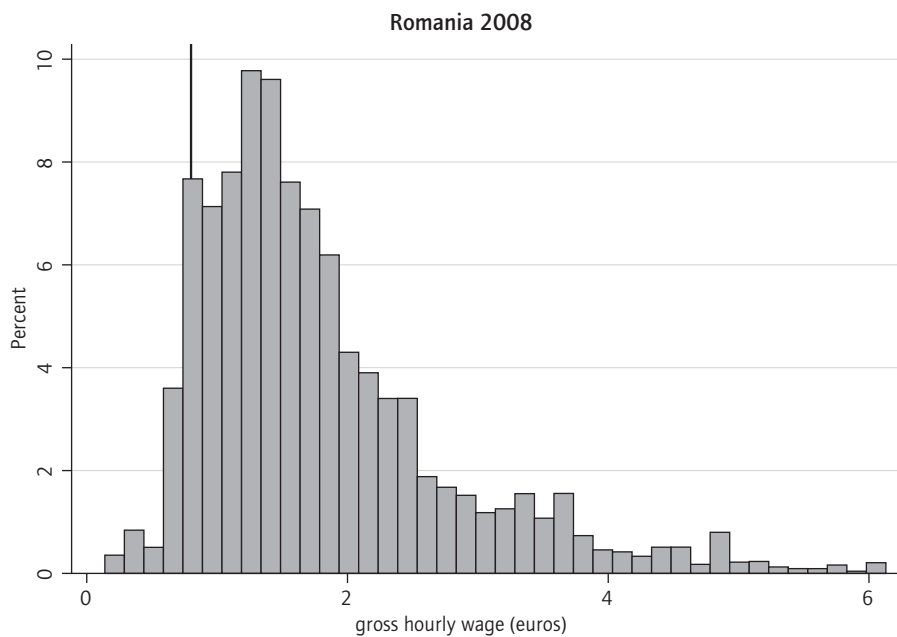


Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: PL-SILC.

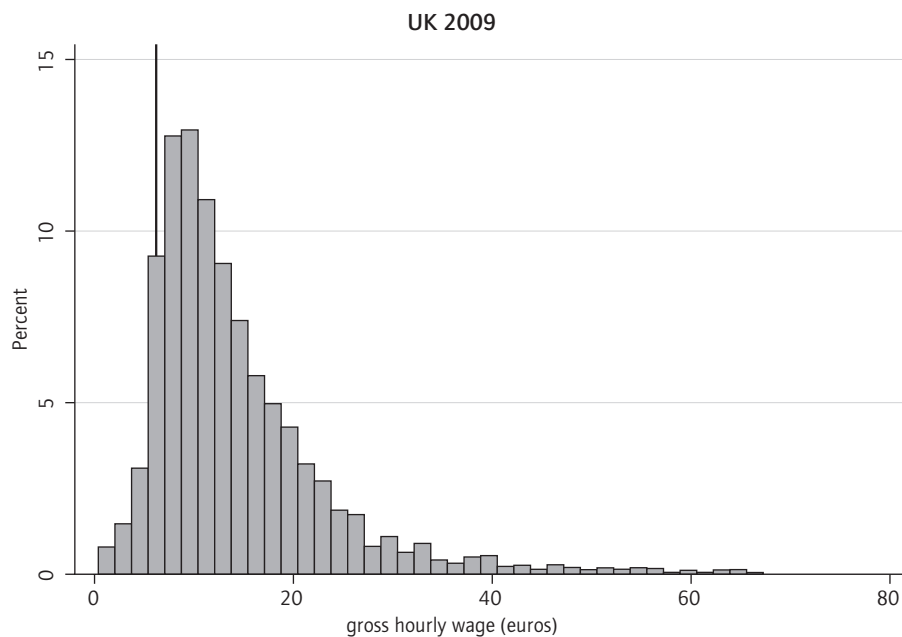
Portugal 2009



Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: PT-SILC.



Note: Current 2008 euros; the vertical line represents the level of the national statutory minimum wage.
Source: RO-SILC.



Note: Current 2009 euros; the vertical line represents the level of the national statutory minimum wage.
Source: UK-SILC.

7.3.2 Scenario analysis by sector

Simulation results of minimum wage at 60% and 40% of national and sectoral median wages.

Table A.1 Austria (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	7.44	8.63	1.19	5.75	-1.69	4.65	-2.80	3.10	-4.34
b-e	7.98	8.63	0.65	5.75	-2.22	9.21	1.23	6.14	-1.84
f	8.30	8.63	0.33	5.75	-2.54	8.31	0.91	5.54	-2.75
g	6.47	8.63	2.16	5.75	-0.71	7.48	1.85	4.99	-1.48
h	7.28	8.63	1.35	5.75	-1.52	8.69	0.20	5.80	-1.48
i	6.56	8.63	2.07	5.75	-0.80	5.50	2.14	3.67	-2.89
j	7.29	8.63	1.33	5.75	-1.54	11.35	-1.80	7.56	0.27
k	7.77	8.63	0.86	5.75	-2.01	12.39	3.58	8.26	0.50
l-n	7.06	8.63	1.56	5.75	-1.31	8.32	5.33	5.55	-1.51
o	7.89	8.63	0.73	5.75	-2.14	9.90	0.43	6.60	-1.30
p	9.09	8.63	-0.46	5.75	-3.34	11.31	0.81	7.54	-1.55
q	7.82	8.63	0.81	5.75	-2.07	8.69	3.49	5.79	-2.02
r-u	7.19	8.63	1.44	5.75	-1.44	7.35	1.50	4.90	-2.29

Table A.2 Belgium (2007)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	9.17	9.37	0.20	6.25	-2.92	6.98	-2.19	4.65	-4.52
b-e	8.75	9.37	0.62	6.25	-2.50	9.98	1.23	6.65	-2.10
f	11.60	9.37	-2.23	6.25	-5.35	8.32	-3.28	5.55	-6.05
g	8.58	9.37	0.79	6.25	-2.33	8.23	-0.35	5.48	-3.10
h	9.18	9.37	0.19	6.25	-2.93	9.21	0.03	6.14	-3.04
i	9.45	9.37	-0.08	6.25	-3.20	7.16	-2.29	4.77	-4.68
j	10.21	9.37	-0.84	6.25	-3.96	11.17	0.96	7.44	-2.77
k	8.46	9.37	0.91	6.25	-2.21	12.83	4.37	8.55	0.09
l-n	10.21	9.37	-0.84	6.25	-3.96	8.59	-1.62	5.72	-4.49
o	9.18	9.37	0.19	6.25	-2.93	9.67	0.49	6.44	-2.74
p	9.10	9.37	0.27	6.25	-2.85	10.66	1.56	7.11	-1.99
q	8.84	9.37	0.53	6.25	-2.59	9.29	0.45	6.19	-2.65
r-u	8.75	9.37	0.62	6.25	-2.50	8.20	-0.55	5.46	-3.29

Table A.3 Bulgaria (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	0.71	0.92	0.21	0.61	-0.10	0.61	-0.10	0.41	-0.30
b-e	0.71	0.92	0.21	0.61	-0.10	0.89	0.18	0.59	-0.12
f	0.71	0.92	0.21	0.61	-0.10	0.99	0.28	0.66	-0.05
g	0.71	0.92	0.21	0.61	-0.10	0.80	0.09	0.54	-0.18
h	0.71	0.92	0.21	0.61	-0.10	1.06	0.35	0.71	0.00
i	0.71	0.92	0.21	0.61	-0.10	0.83	0.12	0.56	-0.16
j	0.71	0.92	0.21	0.61	-0.10	1.30	0.59	0.87	0.16
k	0.71	0.92	0.21	0.61	-0.10	1.54	0.83	1.02	0.31
l-n	0.71	0.92	0.21	0.61	-0.10	0.89	0.18	0.59	-0.12
o	0.71	0.92	0.21	0.61	-0.10	1.22	0.51	0.81	0.10
p	0.71	0.92	0.21	0.61	-0.10	1.05	0.34	0.70	-0.01
q	0.71	0.92	0.21	0.61	-0.10	0.91	0.20	0.60	-0.11
r-u	0.71	0.92	0.21	0.61	-0.10	0.89	0.18	0.59	-0.12

Table A.4 Cyprus (2008)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	4.79	5.51	0.72	3.68	-1.11	5.59	0.80	3.72	-1.07
b-e	4.79	5.51	0.72	3.68	-1.11	5.14	0.35	3.43	-1.36
f	4.79	5.51	0.72	3.68	-1.11	5.91	1.12	3.94	-0.85
g	4.79	5.51	0.72	3.68	-1.11	4.38	-0.41	2.92	-1.87
h	4.79	5.51	0.72	3.68	-1.11	5.61	0.82	3.74	-1.05
i	4.79	5.51	0.72	3.68	-1.11	4.60	-0.19	3.07	-1.73
j	4.79	5.51	0.72	3.68	-1.11	7.77	2.98	5.18	0.39
k	4.79	5.51	0.72	3.68	-1.11	9.01	4.22	6.01	1.22
l-n	4.79	5.51	0.72	3.68	-1.11	5.20	0.41	3.47	-1.32
o	4.79	5.51	0.72	3.68	-1.11	7.22	2.43	4.81	0.02
p	4.79	5.51	0.72	3.68	-1.11	10.97	6.18	7.31	2.52
q	4.79	5.51	0.72	3.68	-1.11	6.61	1.82	4.40	-0.39
r-u	4.79	5.51	0.72	3.68	-1.11	1.27	-3.52	0.85	-3.94

Table A.5 Germany (2007)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	6.86	8.65	1.79	5.86	-1.00	4.61	-2.25	3.07	-3.79	
b-e	8.53	8.65	0.12	5.86	-2.67	10.03	1.50	6.68	-1.85	
f	9.42	8.65	-0.77	5.86	-3.56	7.61	-1.81	5.07	-4.35	
g	7.62	8.65	1.03	5.86	-1.76	6.82	-0.80	4.54	-3.08	
h	6.71	8.65	1.94	5.86	-0.85	7.69	0.98	5.12	-1.59	
i	5.26	8.65	3.39	5.86	0.60	4.03	-1.23	2.68	-2.58	
j	6.71	8.65	1.94	5.86	-0.85	10.99	4.28	7.32	0.61	
k	11.35	8.65	-2.70	5.86	-5.49	11.58	0.23	7.72	-3.63	
l-n	7.54	8.65	1.11	5.86	-1.68	7.41	-0.13	4.94	-2.60	
o	7.54	8.65	1.11	5.86	-1.68	9.64	2.10	6.42	-1.12	
p	7.54	8.65	1.11	5.86	-1.68	10.11	2.57	6.74	-0.80	
q	5.28	8.65	3.37	5.86	0.58	7.78	2.50	5.19	-0.09	
r-u	8.53	8.65	0.12	5.86	-2.67	8.45	-0.08	5.63	-2.90	

Table A.6 Denmark (2009)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	14.46	14.39	-0.08	9.59	-4.87	12.56	-1.90	8.37	-6.09	
b-e	13.92	14.39	0.47	9.59	-4.33	13.88	-0.04	9.25	-4.66	
f	14.73	14.39	-0.34	9.59	-5.13	12.90	-1.83	8.60	-6.13	
g	13.69	14.39	0.70	9.59	-4.10	12.47	-1.22	8.32	-5.37	
h	14.28	14.39	0.11	9.59	-4.68	13.12	-1.16	8.75	-5.53	
i	13.83	14.39	0.56	9.59	-4.24	10.28	-3.55	6.85	-6.98	
j	17.63	14.39	-3.24	9.59	-8.04	17.01	-0.62	11.34	-6.29	
k	17.96	14.39	-3.57	9.59	-8.36	17.34	-0.62	11.56	-6.40	
l-n	14.47	14.39	-0.08	9.59	-4.87	14.04	-0.43	9.36	-5.10	
o	12.76	14.39	1.63	9.59	-3.17	16.13	3.37	10.75	-2.01	
p	15.45	14.39	-1.06	9.59	-5.85	15.69	0.24	10.46	-4.99	
q	13.91	14.39	0.47	9.59	-4.32	14.58	0.67	9.72	-4.19	
r-u	13.85	14.39	0.54	9.59	-4.25	14.98	1.13	9.99	-3.86	

Table A.7 Estonia (2009)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	1.73	2.15	0.42	1.44	-0.28	1.80	0.07	1.20	-0.53	
b-e	1.73	2.15	0.42	1.44	-0.28	2.02	0.29	1.35	-0.38	
f	1.73	2.15	0.42	1.44	-0.28	2.72	0.99	1.81	0.08	
g	1.73	2.15	0.42	1.44	-0.28	1.86	0.14	1.24	-0.49	
h	1.73	2.15	0.42	1.44	-0.28	2.43	0.71	1.62	-0.10	
i	1.73	2.15	0.42	1.44	-0.28	1.59	-0.14	1.06	-0.67	
j	1.73	2.15	0.42	1.44	-0.28	3.65	1.93	2.43	0.71	
k	1.73	2.15	0.42	1.44	-0.28	3.75	2.03	2.50	0.78	
l-n	1.73	2.15	0.42	1.44	-0.28	2.01	0.29	1.34	-0.38	
o	1.73	2.15	0.42	1.44	-0.28	2.72	0.99	1.81	0.08	
p	1.73	2.15	0.42	1.44	-0.28	2.20	0.48	1.47	-0.26	
q	1.73	2.15	0.42	1.44	-0.28	2.11	0.38	1.41	-0.32	
r-u	1.73	2.15	0.42	1.44	-0.28	1.61	-0.11	1.08	-0.65	

Table A.8 Finland (2009)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	7.22	9.83	2.61	6.56	-0.67	7.13	-0.10	4.75	-2.47	
b-e	8.31	9.83	1.52	6.56	-1.76	11.17	2.86	7.45	-0.87	
f	8.80	9.83	1.03	6.56	-2.25	9.65	0.84	6.43	-2.37	
g	9.51	9.83	0.32	6.56	-2.96	8.87	-0.64	5.91	-3.60	
h	11.23	9.83	-1.40	6.56	-4.67	9.40	-1.83	6.27	-4.96	
i	9.06	9.83	0.77	6.56	-2.50	7.60	-1.46	5.07	-3.99	
j	8.92	9.83	0.91	6.56	-2.37	13.05	4.13	8.70	-0.22	
k	11.38	9.83	-1.54	6.56	-4.82	11.71	0.33	7.81	-3.57	
l-n	7.81	9.83	2.02	6.56	-1.26	9.79	1.98	6.53	-1.29	
o	7.96	9.83	1.87	6.56	-1.41	11.35	3.39	7.57	-0.39	
p	12.72	9.83	-2.89	6.56	-6.16	11.84	-0.88	7.89	-4.83	
q	8.87	9.83	0.96	6.56	-2.32	8.86	-0.01	5.91	-2.97	
r-u	8.75	9.83	1.08	6.56	-2.19	8.63	-0.12	5.75	-2.99	

Table A.9 France (2009)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	8.82	7.61	-1.21	5.07	-3.75	5.98	-2.84	3.99	-4.83	
b-e	8.82	7.61	-1.21	5.07	-3.75	8.38	-0.44	5.59	-3.23	
f	8.82	7.61	-1.21	5.07	-3.75	7.22	-1.60	4.81	-4.01	
g	8.82	7.61	-1.21	5.07	-3.75	6.85	-1.97	4.57	-4.25	
h	8.82	7.61	-1.21	5.07	-3.75	7.92	-0.91	5.28	-3.54	
i	8.82	7.61	-1.21	5.07	-3.75	5.85	-2.97	3.90	-4.92	
j	8.82	7.61	-1.21	5.07	-3.75	9.93	1.11	6.62	-2.20	
k	8.82	7.61	-1.21	5.07	-3.75	9.94	1.12	6.63	-2.20	
l-n	8.82	7.61	-1.21	5.07	-3.75	7.73	-1.09	5.15	-3.67	
o	8.82	7.61	-1.21	5.07	-3.75	7.99	-0.83	5.33	-3.50	
p	8.82	7.61	-1.21	5.07	-3.75	8.22	-0.60	5.48	-3.34	
q	8.82	7.61	-1.21	5.07	-3.75	7.23	-1.59	4.82	-4.00	
r-u	8.82	7.61	-1.21	5.07	-3.75	6.76	-2.06	4.51	-4.32	

Table A.10 Greece (2009)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	4.05	5.26	1.21	3.51	-0.54	3.00	-1.05	2.00	-2.05	
b-e	4.05	5.26	1.21	3.51	-0.54	5.04	0.99	3.36	-0.69	
f	4.05	5.26	1.21	3.51	-0.54	4.29	0.24	2.86	-1.19	
g	4.05	5.26	1.21	3.51	-0.54	4.09	0.04	2.73	-1.32	
h	4.05	5.26	1.21	3.51	-0.54	6.32	2.27	4.21	0.16	
i	4.05	5.26	1.21	3.51	-0.54	3.85	-0.20	2.57	-1.48	
j	4.05	5.26	1.21	3.51	-0.54	6.54	2.49	4.36	0.31	
k	4.05	5.26	1.21	3.51	-0.54	7.51	3.46	5.01	0.96	
l-n	4.05	5.26	1.21	3.51	-0.54	3.98	-0.07	2.66	-1.40	
o	4.05	5.26	1.21	3.51	-0.54	7.15	3.10	4.77	0.72	
p	4.05	5.26	1.21	3.51	-0.54	10.64	6.59	7.09	3.04	
q	4.05	5.26	1.21	3.51	-0.54	5.93	1.88	3.96	-0.09	
r-u	4.05	5.26	1.21	3.51	-0.54	4.29	0.24	2.86	-1.19	

Table A.11 Hungary (2009)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	1.47	1.61	0.14	1.07	-0.40	1.24	-0.23	0.82	-0.64	
b-e	1.47	1.61	0.14	1.07	-0.40	1.54	0.08	1.03	-0.44	
f	1.47	1.61	0.14	1.07	-0.40	1.36	-0.11	0.91	-0.56	
g	1.47	1.61	0.14	1.07	-0.40	1.34	-0.13	0.89	-0.57	
h	1.47	1.61	0.14	1.07	-0.40	1.76	0.29	1.17	-0.29	
i	1.47	1.61	0.14	1.07	-0.40	1.24	-0.23	0.82	-0.64	
j	1.47	1.61	0.14	1.07	-0.40	2.61	1.14	1.74	0.27	
k	1.47	1.61	0.14	1.07	-0.40	2.46	0.99	1.64	0.17	
l-n	1.47	1.61	0.14	1.07	-0.40	1.67	0.20	1.11	-0.35	
o	1.47	1.61	0.14	1.07	-0.40	1.98	0.51	1.32	-0.15	
p	1.47	1.61	0.14	1.07	-0.40	2.05	0.58	1.37	-0.10	
q	1.47	1.61	0.14	1.07	-0.40	1.57	0.11	1.05	-0.42	
r-u	1.47	1.61	0.14	1.07	-0.40	1.55	0.08	1.03	-0.43	

Table A.12 Ireland (2008)

	Minimum wage	National 60%	Difference		Difference		Difference		Difference	
			National 60%	National 40%	National 40%	Sectoral 60%	Sectoral 60%	Sectoral 40%	Sectoral 40%	
a	8.65	10.88	2.23	7.25	-1.40	6.14	-2.52	4.09	-4.56	
b-e	8.65	10.88	2.23	7.25	-1.40	10.17	1.52	6.78	-1.87	
f	8.65	10.88	2.23	7.25	-1.40	9.87	1.22	6.58	-2.07	
g	8.65	10.88	2.23	7.25	-1.40	8.61	-0.04	5.74	-2.91	
h	8.65	10.88	2.23	7.25	-1.40	11.48	2.83	7.65	-1.00	
i	8.65	10.88	2.23	7.25	-1.40	7.05	-1.60	4.70	-3.95	
j	8.65	10.88	2.23	7.25	-1.40	14.47	5.82	9.65	1.00	
k	8.65	10.88	2.23	7.25	-1.40	13.87	5.22	9.25	0.59	
l-n	8.65	10.88	2.23	7.25	-1.40	10.60	1.95	7.07	-1.58	
o	8.65	10.88	2.23	7.25	-1.40	14.73	6.08	9.82	1.17	
p	8.65	10.88	2.23	7.25	-1.40	15.83	7.18	10.55	1.90	
q	8.65	10.88	2.23	7.25	-1.40	11.45	2.80	7.63	-1.02	
r-u	8.65	10.88	2.23	7.25	-1.40	8.37	-0.28	5.58	-3.07	

Table A.13 Italy (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	8.44	7.07	-1.37	4.71	-3.73	4.90	-3.54	3.26	-5.17
b-e	9.59	7.07	-2.52	4.71	-4.88	6.74	-2.85	4.49	-5.10
f	11.77	7.07	-4.70	4.71	-7.06	6.05	-5.72	4.03	-7.73
g	9.29	7.07	-2.22	4.71	-4.58	6.36	-2.93	4.24	-5.05
h	10.96	7.07	-3.90	4.71	-6.25	7.76	-3.21	5.17	-5.79
i	9.31	7.07	-2.24	4.71	-4.60	5.11	-4.20	3.41	-5.90
j	9.85	7.07	-2.78	4.71	-5.14	8.95	-0.90	5.96	-3.89
k	14.50	7.07	-7.43	4.71	-9.79	11.73	-2.77	7.82	-6.68
l-n	9.16	7.07	-2.10	4.71	-4.45	6.38	-2.78	4.25	-4.91
o	13.33	7.07	-6.26	4.71	-8.61	9.49	-3.84	6.32	-7.00
p	14.71	7.07	-7.64	4.71	-10.00	10.05	-4.66	6.70	-8.01
q	9.93	7.07	-2.87	4.71	-5.22	8.17	-1.76	5.45	-4.48
r-u	8.62	7.07	-1.55	4.71	-3.91	5.16	-3.46	3.44	-5.18

Table A.14 Latvia (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	1.53	1.84	0.31	1.23	-0.30	1.27	-0.26	0.84	-0.69
b-e	1.53	1.84	0.31	1.23	-0.30	1.66	0.13	1.11	-0.43
f	1.53	1.84	0.31	1.23	-0.30	1.78	0.25	1.18	-0.35
g	1.53	1.84	0.31	1.23	-0.30	1.46	-0.07	0.97	-0.56
h	1.53	1.84	0.31	1.23	-0.30	2.21	0.68	1.47	-0.06
i	1.53	1.84	0.31	1.23	-0.30	1.28	-0.25	0.85	-0.68
j	1.53	1.84	0.31	1.23	-0.30	2.95	1.42	1.97	0.44
k	1.53	1.84	0.31	1.23	-0.30	3.62	2.08	2.41	0.88
l-n	1.53	1.84	0.31	1.23	-0.30	1.72	0.19	1.15	-0.38
o	1.53	1.84	0.31	1.23	-0.30	2.47	0.93	1.64	0.11
p	1.53	1.84	0.31	1.23	-0.30	2.18	0.65	1.45	-0.08
q	1.53	1.84	0.31	1.23	-0.30	1.78	0.25	1.19	-0.34
r-u	1.53	1.84	0.31	1.23	-0.30	1.67	0.14	1.11	-0.42

Table A.15 Poland (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	1.71	1.79	0.08	1.19	-0.51	1.30	-0.41	0.86	-0.84
b-e	1.71	1.79	0.08	1.19	-0.51	1.77	0.06	1.18	-0.53
f	1.71	1.79	0.08	1.19	-0.51	1.55	-0.15	1.03	-0.67
g	1.71	1.79	0.08	1.19	-0.51	1.39	-0.31	0.93	-0.78
h	1.71	1.79	0.08	1.19	-0.51	1.88	0.18	1.26	-0.45
i	1.71	1.79	0.08	1.19	-0.51	1.21	-0.50	0.80	-0.90
j	1.71	1.79	0.08	1.19	-0.51	2.83	1.13	1.89	0.18
k	1.71	1.79	0.08	1.19	-0.51	2.67	0.97	1.78	0.08
l-n	1.71	1.79	0.08	1.19	-0.51	1.61	-0.10	1.07	-0.63
o	1.71	1.79	0.08	1.19	-0.51	2.41	0.70	1.61	-0.10
p	1.71	1.79	0.08	1.19	-0.51	2.84	1.13	1.89	0.19
q	1.71	1.79	0.08	1.19	-0.51	1.97	0.26	1.31	-0.39
r-u	1.71	1.79	0.08	1.19	-0.51	1.43	-0.27	0.95	-0.75

Table A.16 Portugal (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	2.71	3.07	0.36	2.05	-0.66	2.34	-0.37	1.56	-1.15
b-e	2.71	3.07	0.36	2.05	-0.66	2.77	0.06	1.85	-0.86
f	2.71	3.07	0.36	2.05	-0.66	2.91	0.20	1.94	-0.77
g	2.71	3.07	0.36	2.05	-0.66	2.89	0.18	1.93	-0.78
h	2.71	3.07	0.36	2.05	-0.66	4.09	1.38	2.73	0.02
i	2.71	3.07	0.36	2.05	-0.66	2.46	-0.25	1.64	-1.07
j	2.71	3.07	0.36	2.05	-0.66	5.30	2.59	3.53	0.82
k	2.71	3.07	0.36	2.05	-0.66	8.67	5.96	5.78	3.07
l-n	2.71	3.07	0.36	2.05	-0.66	3.25	0.54	2.16	-0.55
o	2.71	3.07	0.36	2.05	-0.66	4.33	1.62	2.89	0.18
p	2.71	3.07	0.36	2.05	-0.66	7.02	4.31	4.68	1.97
q	2.71	3.07	0.36	2.05	-0.66	3.30	0.59	2.20	-0.51
r-u	2.71	3.07	0.36	2.05	-0.66	2.42	-0.29	1.61	-1.10

Table A.17 Romania (2008)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	0.96	0.97	0.02	0.65	-0.31	0.80	-0.16	0.53	-0.42
b-e	0.96	0.97	0.02	0.65	-0.31	0.95	-0.01	0.63	-0.33
f	0.96	0.97	0.02	0.65	-0.31	1.02	0.06	0.68	-0.28
g	0.96	0.97	0.02	0.65	-0.31	0.88	-0.08	0.58	-0.38
h	0.96	0.97	0.02	0.65	-0.31	1.02	0.06	0.68	-0.28
i	0.96	0.97	0.02	0.65	-0.31	0.77	-0.19	0.51	-0.45
j	0.96	0.97	0.02	0.65	-0.31	1.34	0.38	0.90	-0.06
k	0.96	0.97	0.02	0.65	-0.31	1.42	0.46	0.94	-0.02
l-n	0.96	0.97	0.02	0.65	-0.31	1.04	0.08	0.69	-0.27
o	0.96	0.97	0.02	0.65	-0.31	1.27	0.31	0.85	-0.11
p	0.96	0.97	0.02	0.65	-0.31	1.22	0.26	0.81	-0.15
q	0.96	0.97	0.02	0.65	-0.31	1.05	0.09	0.70	-0.26
r-u	0.96	0.97	0.02	0.65	-0.31	1.02	0.06	0.68	-0.28

Table A.18 United Kingdom (2009)

	Minimum wage	National 60%	Difference	National 40%	Difference	Sectoral 60%	Difference	Sectoral 40%	Difference
			National 60%		National 40%		Sectoral 60%		Sectoral 40%
a	6.68	7.26	0.58	4.84	-1.84	4.93	-1.75	3.29	-3.39
b-e	6.68	7.26	0.58	4.84	-1.84	7.47	0.79	4.98	-1.70
f	6.68	7.26	0.58	4.84	-1.84	8.33	1.65	5.55	-1.13
g	6.68	7.26	0.58	4.84	-1.84	5.27	-1.41	3.51	-3.17
h	6.68	7.26	0.58	4.84	-1.84	6.99	0.31	4.66	-2.02
i	6.68	7.26	0.58	4.84	-1.84	4.37	-2.31	2.91	-3.77
j	6.68	7.26	0.58	4.84	-1.84	11.66	4.98	7.77	1.09
k	6.68	7.26	0.58	4.84	-1.84	9.62	2.94	6.41	-0.27
l-n	6.68	7.26	0.58	4.84	-1.84	7.89	1.21	5.26	-1.42
o	6.68	7.26	0.58	4.84	-1.84	8.80	2.12	5.87	-0.81
p	6.68	7.26	0.58	4.84	-1.84	8.06	1.38	5.37	-1.31
q	6.68	7.26	0.58	4.84	-1.84	7.13	0.45	4.75	-1.93
r-u	6.68	7.26	0.58	4.84	-1.84	6.46	-0.22	4.30	-2.38