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ABSTRACT

Statutory Minimum Wages in the EU: Institutional Settings and Macroeconomic Implications*

This paper analyses some macroeconomic implications of the statutory minimum wage in the member states of the European Union and assesses how its institutional design influences these outcomes. First, the paper looks at the institutional dimensions of statutory minimum wage setting. On the basis of this information, an indicator of institutional stringency is built to characterise the degree of predictability of minimum wage setting. Second, it explores the impact of minimum wage changes on employment, prices, consumption, and poverty.

JEL Classification: J38, J52, E24, I32

Keywords: minimum wage, statutory minimum wage, composite indicator, poverty, in-work poverty, European Union

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1. Introduction

There is a high and increasing interest in the minimum wage as a policy tool to reward work, improve the income distribution and provide families relief from poverty. In the Political Guidelines for the Commission, President Juncker (2014) said "(…) I believe it is necessary for all EU Member States to put in place a minimum wage". Wages (including the minimum wage) is one of the 20 policy domains included in the European Pillar of Social Rights. In the context of the European Semester, several countries have received a Council Recommendation to improve the transparency of their minimum wage setting, or to ensure that their levels are supportive of job creation and competitiveness.

The minimum wage sets a floor to earned labour income and in that way can reduce the risks of in-work poverty associated with low pay. It may also reduce wage inequality, especially at the bottom of the wage distribution. As the labour market gets concentrated and certain types of labour fragmented, the relative bargaining power shifts in favour of the employer. In this case, the minimum wage would re-establish a balance in the bargaining position between the employer and workers. By contributing to levelling the playing field, a minimum wage, if not too high, could lead to higher wages and higher employment. ([1]) It may also provide incentives to search for a job more intensively, thereby overcoming the costs of job-search. On the other hand, if too low, the minimum wage might be an ineffective wage floor.

Yet, it interacts with various aspects of the economic and social situation. If too high, the positive effects on labour incomes of an increase in the minimum wage are offset by the negative effect on employment of those with productivity below the minimum wage, as predicted by the perfectly competitive labour market model (e.g. Cahuc et al. 2014, Manning, 2016).

The minimum wage may affect the broader wage distribution, putting upward pressure in particular on wages slightly above the minimum wage. By compressing the wage distribution, it may create distortions, for instance, reducing the incentives for upskilling or pushing low-wage activities into the informal economy. At the same time, its level and rate of change may also serve as a reference for further wage settlements, thus providing guidance for a significant part of the wage distribution, especially when wage-setting institutions are weak.

Minimum wages affect the broader economic context through their impact on consumer prices and aggregate consumption. In competitive labour and product markets, minimum wage updates increase the cost of labour and consumer prices. This effect is potentially stronger in sectors with a high share of minimum wage earners. Thus, the impact on consumption is ambiguous and depends on the impact of minimum wage increases on consumer prices, wages, employment and the interaction with the tax-benefit system. The negative effects on employment through higher labour costs can however be mitigated by demand effects: increased purchasing power of low-wage earners may increase the demand

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([1]) In the monopsony model (Stigler, 1946), the wage paid to the additional hired worker is below its productivity and wages and employment outcomes are below those of a perfectly competitive labour market. Similarly, the presence of information asymmetries leads workers to refuse a job if the wage is too low.

for labour of other low-wage earners. Overall, the employment effect of the minimum wage is theoretically ambiguous, and it is left for empirical studies to estimate its effect.

The empirical evidence, mainly on the US, concludes that the effects on employment from minimum wage rises are of a small magnitude. Indeed, potential negative effects on the demand for labour are mitigated by a number of possible ways in which labour markets may depart from the hypothetical model of perfect competition, including, for instance, the bargaining of employers in their relationship with employees.

Finally, minimum wages also have an impact on how the economy adjusts to shocks and fluctuations and can contribute to the emergence or narrowing of macroeconomic imbalances. This underlines the importance of the minimum wage as a policy tool, especially considering that governments play a key role in the design of the minimum wage setting and in statutory minimum wage decisions, while they can only indirectly influence, if at all, other private sector wages. In more detail, for example, minimum wages may cushion fluctuations in aggregate demand and help avoiding the risk of wage undershooting, i.e., wages falling below levels warranted by fundamentals, or the risk of deflation. On the other hand, it may also hamper addressing an overshooting of wages, and have a bearing on the adjustment of the economy towards tradable sectors when that is necessary to absorb high unemployment.

This chapter studies various dimensions of the minimum wage. It provides an overview of the institutional framework for minimum-wage setting in the different EU Member States. Then, it studies the impact of minimum wages on employment, wages, prices, consumption and poverty as well as the interactions between minimum wage policies and these variables over time. The last section concludes.

2. Institutional dimension of minimum wage policy

This section provides an overview of the different institutional frameworks for minimum wage setting in place in EU Member States. As a start, it reviews the institutions in place for setting wage floors, distinguishing between countries with and without a statutory minimum wage. Thereafter, it studies the different approaches in statutory minimum wage setting systems in more detail by discussing three important dimensions: (1) the actors involved and the level of government discretion in the decision-making process; (2) the timing of updates, including frequency and predictability; and (3) the criteria that should be taken into account in case of an update. Finally, for countries with a statutory minimum wage, an indicator of institutional flexibility is developed, based on characteristics of the minimum wage setting process.

2.1. Institutional framework for wage floors: Current situation in the EU

### 2.1.1. Countries with statutory minimum wage

In the EU, 22 Member States have a national statutory minimum wage in 2016: this is a legal or regulatory instrument making that wage floor legally binding for all workers in dependent

employment. Some EU countries have introduced it in the recent past: the UK (1999), Ireland (2000), and Germany (2015).

The level of the minimum wage varies widely across countries; this is the case even when controlling for differences in price levels (i.e. by making minimum wage figures comparable across countries in terms of their purchasing power) (Graph 1).

Graph 1:   Minimum wage levels: July 2016 (PPS)
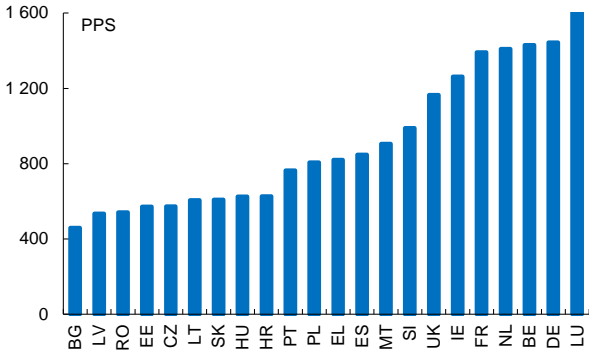
Note: Minimum wage data for Portugal for January 2016. Price levels expressed in purchasing power standard (PPS).
Source: European Commission, Eurostat

There is a substantial variation in the ratio of minimum wage to average, the so-called Kaitz ratio. For instance, while in Spain the proportion of the minimum wage over the mean wage is the lowest in the EU at only 33%, it is around 50% in France, Luxembourg and Slovenia (Graph 2).

Graph 2:   Kaitz index: minimum wage as a proportion of the mean wage in 2015 (%)
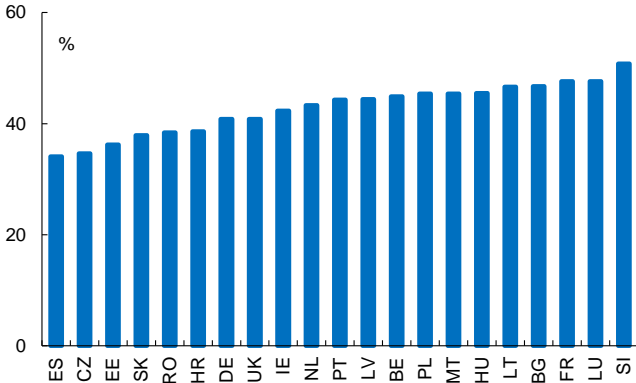
Note: 2016 data for Germany, Malta and Slovenia; 2014 for Belgium, Estonia, France, Latvia, Luxembourg, Hungary, Netherlands and Romania.
Source: European Commission, Eurostat

Some countries allow a differentiation of statutory minimum wage for certain categories of workers; sub-minimum rates or exemptions from minimum wage provisions can be set for certain groups, for instance youth, apprentices, labour market entrants, disabled workers, or

long-term unemployed. Sub-minima tend to be defined as a share of the standard statutory minimum wage and thereby changes to the latter lead also to adjustment of the sub-minima.

This possibility of hiring at rates below the standard minimum wage can be justified to prevent the loss of employment of those groups whose productive capacity is below that of the average minimum wage earner.

Most minimum wage exceptions concern sub- minima for youth or apprentices. At least nine Member States provide for these exceptions. In other countries, the statutory minimum wage is differentiated on the basis of the difficulty of the occupation (e.g., Czech Republic or Slovakia), skills or qualifications (Hungary or Luxembourg), employment tenure (Greece), or on their status of (re-)entrants into the labour market (Ireland, Poland or Germany with sub-minima in the first two cases and exemptions in the third one). For the same worker, these exceptions have a limited duration, either explicitly – e.g. in Germany long-term unemployed are exempted from minimum wage provisions for six months – or implicitly, with the youth sub-minima not being applicable once a certain age is reached.

In other cases, inability-to-pay clauses are foreseen to take into account the employer's financial situation. For instance, in Ireland, Luxembourg, Malta and the Netherlands, employers in difficulties may temporarily undercut the minimum wage if authorised to do so by a public authority (government or court depending on the country) (ILO, 2014). Collective agreements can undercut the statutory minimum wage by 5% in Croatia.

2.1.2. Countries without a statutory minimum wage

Six Member states do not have a nation-wide statutory minimum wage. Instead, wage floors are only set in collective agreements often at sector level, which altogether tend to cover a high share of the labour force. This is the case of Austria, Denmark, Finland, Italy and Sweden. In Cyprus, the government sets statutory minimum wages only for certain occupations where workers are considered to be in a week bargaining position.

The scope of collectively-bargained wage floor regimes depends on the robustness and coverage of collective bargaining. Countries with such bargained wage floor regimes generally have a comprehensive collective bargaining system, with high densities of both unions and employers associations (higher or even much higher than in most other EU Member States). As a result, a large proportion of workers are directly covered by a collective agreement.

Statutory minimum wages and collectively agreed wage floors are not directly comparable. The statutory minimum wage is a single floor for the whole nation, which is under the direct control or influence by national authorities. It is a minimum guaranteed pay for those employees who are not covered by the (higher) wage floors laid down in collective agreements. Collectively-bargained wage floors are the outcome of bi-partite negotiations, which can be related to hundreds or even thousands of different agreements that in turn can, and often do, foresee quite complex and differentiated pay schedules, both at sectoral, firm or territorial level.

Statutory minimum wages and collectively-agreed wage floors can co-exist in the same country: the existence of minimum wage does not prevent sub-national wage bargaining. Instruments like the extension of collective agreements to non-signatory parties can broaden the coverage of collective agreements and wage floors set by those agreements, even in countries with statutory minimum wage and low social partners' density.

The relationships between collective bargaining and statutory minimum wage may be multiple. For instance, a high minimum wage may leave less room for bargaining and lead to lower social partners' density. However, high collective bargaining coverage and high density of social partners can help to make a better informed minimum wage policy.

Recent studies show that collectively bargained wage floors tend to be set higher as a percentage of the average wage than statutory minimum wages. ([2]) High wage floors under collective bargaining may come at the expense of non-coverage. Garnero, Kampelmann and Ryckx (2013) find evidence of a trade-off between high wage floors and more people being paid below those minima under collectively bargained minimum wages regimes.

This may result from low-paying sectors, firms and individuals not covered by collective bargaining. Thus, if a large and increasing share of the workforce is not covered by collectively agreed minima, the case for introducing a statutory minimum wage becomes stronger. In this perspective, discussions on the introduction of a statutory minimum wage took place recently in Cyprus and Germany just introduced it.

2.2. The institutional features of statutory minimum wage setting systems

The mechanism used to fix the minimum wage in EU countries can be characterised along three dimensions: (1) government discretion and actors involved in the decision-making process; (2) timing of updates, including frequency and predictability of updates; and (3) criteria to be taken into account in case of an update. This section looks at these dimensions more in detail before providing a numerical characterisation of Member Sates' minimum wage setting regime.

2.2.1. Role of government and other actors in the decision process

There is a considerable cross-country variation in the role of the government, social partners and other actors in the decision-making process. Decisions on minimum wage levels can come from bilateral negotiations between social partners or tripartite agreements or just unilateral government decisions. In some countries, indexation to prices or wages or both are a dominant element of minimum wage setting.

Based on an extensive study of the national frameworks, three stylized models for minimum wage setting are identified on the basis of the role of government and other actors in the decision making process:

([2]) See studies by Boeri (2012); Kampelmann, Garnero and Ryckx (2013); and Schulten et al (2015). Boeri (2012) states that, especially in countries with high unemployment, governments setting a statutory minimum wage are more likely to internalise macro-economic constraints and fiscal implications of an increase as compared to parties engaged in fragmented collective bargaining. To the extent that membership is more encompassing and collective bargaining is more strongly coordinated, negotiating parties are more likely to take such constraints into account when setting wage floors.

- Institutionalised decisions,
- Indexation to prices or wages, and
- Non-institutionalised processes.

Table 1 summarises the different country cases.

Table 1: Role of the government and other actors in the decision-making process

Statutory minimum wage							Non-statutory minimum wage
Institutionalised decisions					Indexation	Non-institutionalised decisions	
Independent experts-led process	Bilateral / social partners experts led process	Gov't following tripartite consultations process	Gov't after consulting social partners	Bipartite/tripartite negotiations possible, else government decides			
EL	DE	HU	ES	EE	BE	BG	AT
IE		LT	HR	PL	FR	CZ	CY
UK		LV	RO	SK	LU		DK
		PT			MT		FI
					NL		IT
					SI		SE

Source: Own compilation based on national legislation; ILO Working Conditions Laws Database / Minimum wage fixing database.

Institutionalised decisions

The key feature here is that the decision making process is well-established with relatively specific roles for the main actors. Still, it can include markedly different variants and combine bargaining, negotiation and consultations to different extents.

For example, the process can be led by a specialised body or emphasis can be put on consultation in a tri-partite format, with the final decision taken by the public authorities. Moreover, in some countries, negotiations between social partners or tri-partite deals have priority over government intervention (e.g. Slovakia in the former case, Poland in the latter), while in others negotiations are an option but a unilateral decision by the government is possible.

Admittedly, the distinction between different models is not so neat, especially once the actual behaviour of the players is taken into account. For example, in some cases requirements on consultation may be formal with consulted actors risking not having real influence on the minimum wage adjustment; the opposite may happen where the eventual decision is carefully prepared, despite a loosely-defined process.

In the UK, an independent specialised body – the Low Pay Commission (LPC) – plays a leading role in making recommendations to the government on the annual minimum wage adjustment. [3] The LPC makes only recommendations, with the final decision staying with the government; yet, if the latter deviates from the recommendations it has to lay a report

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[3] The *LPC* consists of 9 members appointed by the government having a composition balanced between 3 profiles: trade unions, employers and independent experts, but all serving in their personal capacity.

before the Parliament on the reasons for such a decision. So far, the UK government has always followed the LPC proposals. ([4])

Ireland adopted in 2015 an approach similar to the UK's with a LPC which plays the same role as the LPC in the UK. The LPC advises the Minister, who can deviate from the LPC recommendation but has to justify his/her decision before the Parliament.

In Greece, newly adopted legislation (to enter into force as of 2017) foresees that the minimum wage will be set by the government after consultations with and advice from social partners and experts. As in the UK and Ireland, experts would play a specific role in making non-binding proposals after consultation with social partners and research institutions. In addition, consultations with and advice from social partners are foreseen as one of the steps of the procedure. Germany represents another case where a specialised body plays an important role. A committee appointed by social partners will propose updates to the level of the minimum wage. ([5]) The government can adopt or reject the commission's proposal, but it cannot change it. ([6]) The development of average wages laid down in collective agreements is a decisive benchmark to be taken into account. Overall, the minimum wage setting mechanism has a strong bargaining component owing to the bilateral nature of the social partners' committee as well as of the explicit call to take into account developments in recent collective agreements.

Tri-partite approaches with the final decision being with the government characterise the system in Hungary, Lithuania, Latvia and Portugal – in the latter, an institutionalised tripartite body has to be consulted before the government takes a final decision.

Spain, Croatia and Romania share characteristics with the previous group of countries. Yet, the consultations with social partners do not have to take place in an institutionalised setting; instead the requirement is only to consult social partners, with the approach to consultations being left to government will; only in the case of Spain does the law go further and require the government to consult the most representative social partners.

In all, broad public consultations and disclosure of information on minimum wage policies add transparency, predictability and should allow for better consideration of the possible implications of minimum wage policies. Social partners' representatives and other stakeholders are also well-suited to voice the concerns of those more directly affected. Independent experts may be well-placed to make broader economic and social considerations, including on the necessary links between minimum wage choices and other relevant policy areas and their implication for working age groups.

Rule-based indexation

([4]) In April 2017, the UK is introducing a National Living Wage as the pay floor for those aged 25 and over. When announcing it last autumn, the government set as objective to have it at 60% of median earnings by 2020 (GBP 9 per hour) subject to sustained growth. The path to get to such a target will still be proposed by the LPC like the wage floors for those younger than 25.

([5]) The committee is composed of 7 social partners' representatives and 2 no-voting advisors with academic backgrounds and proposed by social partners.

([6]) This process will take place with the first minimum wage update in January 2017; the initial minimum wage level that came into force in 2015 was set by the government.

In 6 Member States, minimum wage updates are largely driven by indexation to prices, wages or both. That is the case at present of Belgium, France, Luxembourg, Malta, the Netherlands and Slovenia. Often, it is also possible to make discretionary changes on top of what is due to indexation.

In Belgium, indexation to consumer prices is the key driver of minimum wage updates and widely used also for other wages, even if the exact modalities vary across sub-national collective agreements. More specifically, the minimum wage is agreed within the framework of a bi-partite national collective agreement every other year (which is automatically extended to the whole economy). A specific consumer price index – the health index - is used (excluding items like tobacco, alcohol, petrol, diesel and the impact of taxes on energy products).

Luxembourg indexes wages to headline consumer price inflation, which is triggered when inflation reaches 2.5%. By law, all wages in the private and public sectors are subject to indexation. Every two years, the government reports on changes to the overall economic conditions and incomes, and on that basis it may propose increasing the minimum wage; the law does not set a role for social partners in these decisions.

In Slovenia, the minimum wage is adjusted every year by at least the increase in consumer prices in the previous year. The exact amount of the minimum wage is determined by the labour minister after prior consultation with the social partners.

Malta has a particular system of wage indexation: each year the government issues a national standard order increasing all salaries, including the minimum wage, by an absolute amount. This fixed pay increase known as the cost-of-living adjustment (COLA) reflects the change in the retail price index applied to a reference base wage, which is somewhat higher than the minimum wage The exact minimum wage level is set by the government after recommendations by the Employment Relations Board (which includes government's representatives as well as social partners and independent experts).

In the Netherlands, the indexation is relative to the average wage increases in recently-signed collective agreements and takes place twice a year (on 1 January and 1 July). However, there is the possibility of not updating the minimum wage rate if either the minimum wage revision implied by the average wage rise in collective agreements is considered too high with the risk of leading to higher unemployment or if the increase would lead to higher expenditure on social benefits (indexed to the minimum wage) with the risks of rising taxes or contribution to ensure financing of higher benefits.

In France, the minimum wage is linked to both price and wage developments: it should at least be indexed to the evolution of the consumer price index (for a consumption basket representative of those at the bottom 20% of the income distribution) plus 50% of the increase in the purchasing power of the wages for workers and employees. There is also the possibility of topping up – so-called coupe de pouce – those increases by government decision after (sequential) opinions by groups of independent experts on the minimum wage and by the tripartite collective bargaining commission where unions and employers representatives seat

(La Commission Nationale de la Négociation Collective – CNNC); the government may also submit its own report to the CNNC.

Indexation can be seen from different perspectives. It protects real wages against increases in the cost of living and may reduce uncertainty and conflict, providing a focal point for (minimum) minimum wage updates negotiations. Yet it makes real wages more rigid with negative implications for low wage employment. Real wage rigidity delays labour market adjustment in the case of temporary aggregate or permanent sector-specific productivity shocks that require, respectively, changes in aggregate or relative wages. This is an issue in particular when the minimum wage level is high and the possibility of inability to pay clauses limited or no-existent in practice. Finally, indexation can lead to wage-price spirals and make nominal shocks (e.g., a change in commodities prices in world markets) more persistent (see also European Commission, 2011).

A rigid indexation can be problematic especially when inflation is far away from the desired rate (from below or above) – risking consolidating deflationary or inflationary expectations respectively – and in times of low productivity and rising unemployment. In addition, indexing minimum wages to average wages may also be problematic, inter alia, when minimum wage earners have productivity developments different from the average.

Non-institutionalised processes

The minimum wage setting is non-institutionalised when governments can determine the adjustment of the statutory minimum wage, without any formal obligation of negotiations or consultation. In Bulgaria and the Czech Republic, the government determines the adjustment of the minimum wage without specific rules and any form of negotiations or institutionalised consultation with the social partners or with experts.

This does not mean that in other countries, notably those with more loosely defined processes, it cannot de facto boil down to unilateral government decision when bilateral negotiations did not bear fruit. At the same time, the lack of tri-partite agreements may also reflect a strategic behaviour whereby some players count more on a fall-back government decision than on consensual solutions.

The lack of transparent principles and guidelines can lead to unpredictability of outcomes. This can introduce too much volatility in minimum wages, making their setting more dependent on the electoral cycle or any other factor that steers minimum wage rates in an unchecked way instead of linked to underlying economic fundamentals. While on the one hand, in a wider discretionary framework, policy makers could be able to design the optimal policy response to unforeseen circumstances, on the other hand too much discretion may raise the risk of opportunistic decisions and no internalisation of economic constraints, with no checks and balances to foster sound decisions.

Thus, a rules-based framework forces the different players (including of course, politicians and social partners) to adhere to a consistent course of action across circumstances. Indeed, if the minimum wage setting regime is insulated from short-term electoral or other motivations,

then the outcomes of minimum wage policies can be time consistent, meaning that the policy setting makes consistent short-term (e.g. income support and poverty alleviation) and broader long-term outcomes (i.e. sustainable job creation and economic dynamism).

2.2.2. Frequency of adjustment

The frequency and predictability of minimum wage adjustments affect how sensitive the minimum wage is to a changing context, while keeping its objectives intact across times and changing circumstances. EU countries differ considerably in their frequency of revising the minimum wage (see Table 2). In most cases, the minimum wage is adjusted once a year, sometimes with precisely set calendars; in other cases, only the annual frequency is prescribed and within this group some member states, prescribe the date of entry into force of the update (often January as for instance in France, Malta or Slovenia).

Table 2: Frequency of the minimum wage adjustments

Infra-annual	Annual			Every 2 years	Other	Not specified
	With set calendar and procedures	*Only date of kick start or of entry into force is set*	*Without calendar or key dates set*			
NL (Jan & July)	EL IE LV PL [1] SK	CZ FR [2] HR MT SI	ES HU PT	DE BE [3] LU [3]	UK [4]	BG EE LT RO

Notes: 1: twice a year (Jan-July) if inflations exceeds 5%;
2: (additional) automatic indexation whenever inflation exceeds 2% from the previous MW update;
3: on the top of indexation to consumer prices;
4: from time to time.
Source: Own compilation based on national legislation; ILO Working Conditions Laws Database / Minimum wage fixing database.

In the Netherlands, the possible update takes place every six months (January and July). Germany sets minimum wage to be revised every two years as of 2017 the same frequency as in Belgium and Luxembourg – on top of the regular indexation. In the UK, the legal provisions require irregular minimum wage updates ("from time to time"), but in practice the minimum wage is revised every October. Finally, a few countries have not set any adjustment frequency (Bulgaria, Estonia, Lithuania, and Romania).

2.2.3. Criteria to be taken into account

The criteria or parameters taken into account for minimum wage updates guide the fixing of the actual minimum pay rates. In that way, they can foster stability of the minimum wage setting process and a balanced and widely-accepted choice of criteria can help in confirming the broad objectives of the minimum wage policy.

Labour market and economic conditions, overall wages and prices developments are the most common criteria in the national legislations (Table 3). In some cases, workers' purchasing power and indexation to past inflation (in the cases of rule-based indexation) or productivity are also considered. On the other hand, social benefits or labour taxation are usually not taken into account. The same holds for minimum wage coverage.

Table 3: Criteria taken into account in the minimum wage setting process

		BE	BG	CZ	DE	EE	IE	EL	ES	FR	HR	LV	LT	LU	HU	MT	NL	PL	PT	RO	SI	SK	UK
Labour market	Employment/ unemployment/ Job creation						*		*	*					*			*			*	*	*
Broad economic situation	Economic developments and situation							*	*	*		*			*			*			*		
	Productivity				*	*	*											*	*				
	Trade, exchange rate, competitiveness, developments in trading partners				*	*						*											*
	Social benefits / Taxes and contributions / Fiscal impacts											*				*	*						
Wages and incomes	Other wages			*				*		*	*							*			*	*	
	Retrospective collective-agreements wage developments				*												*						
	Purchasing power / incomes & needs of MW earners or workers / income & prices policies				*	*	*											*	*		*		
Prices	Consumer prices (other than rule-based indexation)			*				*	*			*						*	*		*		
	Indexation and /or COLA	*							*					*	*						*		
	Consumer prices (next year's)						*										*						

Overall, the requirements are not exhaustive. Minimum wage legislations make only broad reference to them without stating how these parameters have to be used in practice. For instance, there is a general reference to the need of taking into account wage developments, but only for two Member States the legislation makes a link with the outcome of collective bargaining.

2.3. Creating an indicator of institutional stringency of minimum wage setting framework

Table 4 puts together the three dimensions reviewed above (discretion, frequency of revisions, and criteria).

Based on this qualitative information, an indicator of institutional stringency has been developed. This indicator provides a measure of the restrictiveness of the decision making process. Lower values point to more flexibility, higher ones to more stringency (i.e. less room for discretion and more predictability).

Table 4: Summary of the three institutional dimensions of the minimum wage setting framework

		Statutory minimum wage							p.m.: Non-statutory minimum wage
		Taxonomy							
			Institutionalised decisions						
		Non-institutionalised decisions	Gov't after consulting social partners	Gov't following tripartite consultations process	Bipartite/Tripartite negotiations possible, else government decides	Bilateral / social partners experts led process	Independent experts-led process	Indexation	
Frequency of revision	Infra-annual							NL	AT
	Annual — With set calendar and procedures			LV	PL		EL		CY
					SK		IE		DK
	Annual — Only date of kick start or of entry into force is set	CZ	HR					FR	FI
								MT	IT
								SI	SE
	Annual — Without calendar or key dates set		ES	HU					
				PT					
	Every 2 years					DE		BE	
								LU	
	Other						UK		
	Not specified	BG	RO	LT	EE				

Colour legend / number of criteria							
	0	1	2	3	4	5	6 or more

The index is based on the conversion of qualitative information on three components of the legal minimum wage setting framework: government discretion in the decision process, timing of the update (frequency and predictability of the updating process) and the criteria used for the update. The information is collected in the course of an intensive literature review and relates to the institutional framework in place in the 22 EU Member states that have a statutory minimum wage in early 2016. The qualitative information on each of the dimensions is transformed into numbers on a scale (0-6) as indicated in Table 5.

The ranking is built to reflect the degree of discretion of the government in setting the minimum wage: lower ratings are assumed to reflect more flexibility (full flexibility at the extreme) while higher readings reflect less room for discretion, in other words, more stringency. Whereas there is of course some subjectivity in this choice of indicators and their weighting, the index allows a holistic view and especially a systematic way of characterising the flexibility or stringency of the minimum wage setting. The ratings just reflect the restrictiveness of the framework and do not have a normative value attached.

Table 5: Detailed items used to compile the stringency indicator

1. Government discretion, weight: 33.3 (in %)		Ratings
Non-institutionalised decisions		0
Institutionalised	Gov't after consulting social partners	1
	Gov't following tripartite consultations process	2
	Bipartite / tripartite negotiations possible, else	3
	Bilateral / social partners experts led process	4
	Independent experts-led process	5
Rules-based indexation to past prices or wages inflation or both		6

2. Timing of update, weight: 33.3 (in %) consisting of:

2a. Frequency of update, weight: 16.6 (in %)

Not specified	0
Infra-annual	2
Annual	4
Every 2 years	6

2b. Predictability of updating process, weight: 16.6 (in %)

Without set calendar	0
Only data of entry into force is set	3
With set calendar (and procedures)	6

3. Number of criteria called for a decision on the update, weight: 33.3 (in %)

|	
0	0
1	1.5
2	3
3	4.5
4	6

Graph 3 presents the value of the indicator for the EU Member States with a statutory minimum wage. On the basis of this indicator, the minimum wage setting process is more tightly regulated in Greece, Slovenia, Ireland, France and Poland. In contrast, it is the most flexible (i.e. less predictable) in Estonia, Lithuania, Romania and Bulgaria.

Graph 3: Indicator for the stringency of the minimum wage decision-making framework
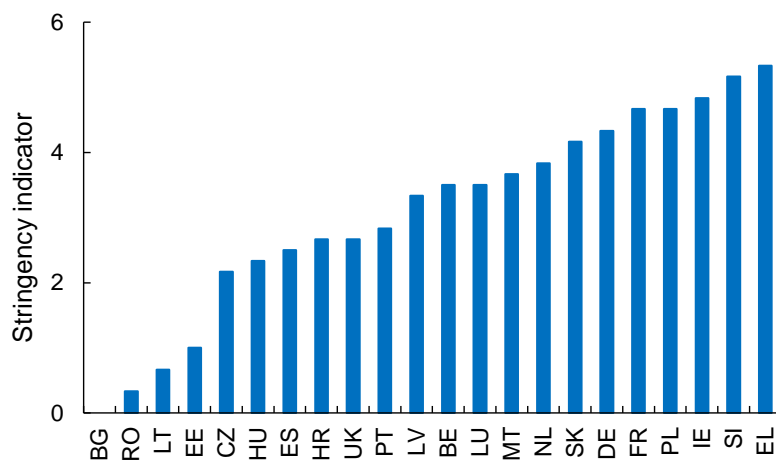
Intermediate values of the indicator may reflect a trade-off between the different dimensions of the indicator with stringency or flexibility in one or two dimensions being offset by stringency or flexibility in other dimensions.

2.4. Effects of the institutional stringency of the minimum-wage setting framework: *prima facie* evidence

This subsection provides some *prima facie* evidence on the determinants and effects of the institutional stringency of the minimum-wage setting framework. Graph 4 shows the relationship between stringency and the Kaitz index (i.e., the level of the minimum wage as a ratio of the average wage). At a first glance, countries with higher minimum wages (in terms of the Kaitz index) have more rigid minimum wage setting systems. ([7])

([7]) The correlation coefficient between the Kaitz index and the indicator of institutional stringency of the minimum wage setting system is 0.5. Moreover, about ¼ of the difference across countries in the Kaitz index is explained by the indicator of institutional stringency. These are simple correlations, which do not provide any information on the causality.

Graph 4: Correlation between the stringency indicator and the level of the minimum wage
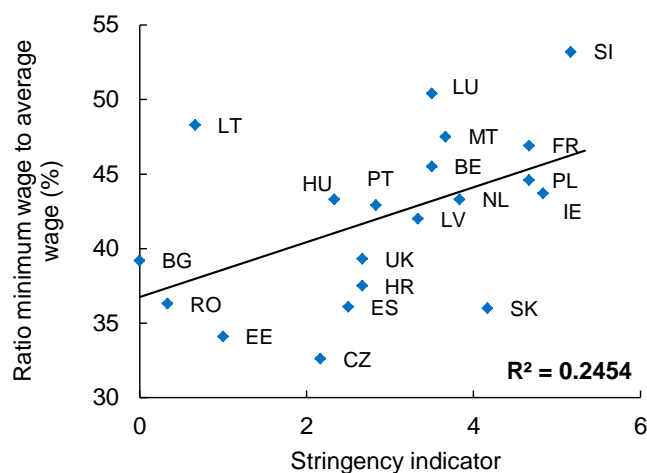

Table 6 shows the correlation between the Kaitz index and various sub-components of the minimum wage stringency index. Only the correlation with government discretion (0.7) is statistically significant, while the other categories have small but statistically insignificant values. A positive correlation implies that the minimum wage is higher (relative to the median) when there is limited discretion by the government (i.e. or the minimum wage setting is mainly rule based).

Table 6: Correlation among sub-indices of indicator of minimum wage setting stringency and with Kaitz index

	Flexibility of Minimum wage setting regime - sub-indexes			
	Government discretion	Frequency of Update	Predictability	Criteria called for a decision
Government discretion	1			
Frequency of Update	0.4	1		
Predictability	0.2	0.4	1	
Criteria called for a decision	0.3	0.5	0.6	1
Kaitz index	0.7	0.3	0.04	0.2

Notes: High values of the Kaitz index imply a high minimum wage as percentage of the median wage. For sub-indices of minimum wage stringency, a low value means high discretion, low frequency and predictability of updating, and a low number of criteria to be considered when updating the minimum wage.

The high correlation between the Kaitz index and the overall index of institutional stringency of the minimum wage setting is driven by the high correlation with the sub-complement government discretion in minimum wage setting. The relation between low government discretion and high levels of the minimum wage is influenced by the fact that the Kaitz index is high in countries where updates of the minimum wage occur mainly via indexation (e.g.,

Slovenia, Luxembourg and Malta). In addition, with intermediate degrees of institutionalisation, having more players and less discretion might lead to more moderate minimum wage changes as the interest of wide groups of workers are taken into account. Thus, in cross-country comparisons more rule-based minimum wage updating systems lead to a higher Kaitz index. ([8])

Table 7 explores how the increase of minimum wage responds to changes in underlying macroeconomic variables (column 1) controlling for the political cycle (column 2) and for the characteristics of the minimum wage setting process identified on the basis of the stringency indicator (columns 3-10). ([9]) Values of the indicator below median represent regimes where the discretion in setting minimum wage is relatively high and the predictability low. A number of facts emerge from these estimates based on a panel of EU countries.

Table 7: Determinants of minimum wage changes

Dependent variable: Minimum wage growth	(1) Basic specification	(2) Years following legislative elections	(3) higher than median	(4) lower than median	(5) higher than median	(6) lower than median	(7) higher than median	(8) lower than median	(9) higher than median	(10) lower than median
			Countries with Institutional stringency index							
Average wage growth	0.39 ***	0.48 ***	0.013	0.49 ***	0.012	0.55***	0.019	0.48 ***	-0.20	0.58***
	(0.13)	(0.23)	(0.16)	(0.17)	(0.16)	(0.18)	(0.15)	(0.17)	(0.13)	(0.16)
average wage growth in the year following elections									0.89***	-0.09
									(0.16)	(0.32)
Consumer price Inflation	0.39***	0.28	1.03***	0.29 *	1.02***	0.16	1.03***	0.28*	1.3 ***	0.12
	(0.13)	(0.23)	(0.15)	(0.16)	(0.16)	(0.17)	(0.15)	(0.16)	(0.15)	(0.16)
Consumer price inflation in the year following elections					0.013	0.13			-1.14 ***	0.21
					(0.11)	(0.08)			(0.21)	(0.81)
Lagged employment growth	0.33***	0.015	0.22**	0.35 *	0.22**	0.33*	0.44***	0.15	0.30 ***	0.14
	(0.12)	(0.27)	(0.11)	(0.18)	(0.12)	(0.18)	(0.13)	(0.23)	(0.12)	(0.23)
Lagged employment growth in the year before the elections							-0.48***	0.60***	-0.32***	0.52
							(0.17)	(0.35)	(0.16)	(0.35)
Constant	0.021 ***	0.028 ***	0.015 ***	0.028 ***	0.015***	1.3***	0.013 ***	0.028 ***	0.015 ***	0.029 ***
	(0.004)	(0.007)	(0.004)	(0.004)	(0.004)	(0.63)	(0.004)	(0.004)	(0.004)	(0.005)
Observations	383	103	192	163	192	163	192	163	192	163
R-squared	0.80	0.85	0.72	0.82	0.71	0.83	0.72	0.82	0.77	0.83
Number of countries	18.0	18.0	9.0	8.0	9.0	8.0	9.0	8.0	8.0	8.0

Notes: (1) Robust standard errors in parentheses. (2) Asterisks mark estimated coefficients which are statistically significant at the 10% (*), 5% (**) or the 1% level (***). (3) The sample includes Belgium, Czech Republic, Estonia, Spain, France, Hungary, Ireland, Lithuania, Luxembourg, Latvia, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia and the UK. (4) Wage growth is measure by the rate of change of nominal compensation per employee.

Minimum wage changes reflect, with approximately the same weight, changes in wage growth, consumer price inflation, and in the employment conditions (column 1). Controlling for the political cycle, as captured by the year of the elections, modifies the relative importance of the underlying macroeconomic conditions for minimum wages updates.

This is visible from the larger effect of wage growth and the lower impact of consumer price inflation (which also statistically insignificant, i.e. imprecisely estimated) (column 2). Thus, in electoral years governments take more into account redistribution (i.e. the wage distribution becomes more compressed when the minimum wage increases);

([8]) Yet the correlation between the relevant institutional indicator and the Kaitz index is not statistically significant. Less compelling is the evidence for the other characteristics.

([9]) The political cycle is identified as a binary variable that equals 1 in the year of election and 0 otherwise. It is obtained from the Database of Political Institutions 2015 update Cruz et al. (2016). The effect in the year that follows elections is obtained lagging the dummy variable by one year.

Columns 3 to 10 look more in detail at various specifications splitting the sample on the basis of value of their indicator of stringency of their minimum wage setting regime. The framework used to revise the minimum wage influences the size of its average change – visible from the size of the constant - and the relative weight of the variables usually taken into account for its update. Rules-based systems have an underlying growth of the minimum wage which is half as much as the average growth in more discretionary minimum wage setting frameworks.

Relative high government discretion in minimum wage setting raises the effect of average wage increase and of employment growth on minimum wage updates. Thus, distributional concerns and the overall growth of employment take a prominent role in the decision of changing the minimum wages, when governments have more direct control of their setting; with these effects becoming more important in electoral years (columns 3-10).

3. A look at the macro-evidence

3.1. Employment

3.1.1. Introduction

The employment effect of the minimum wage is one of the most debated issues related to it. While there is no consensus in the literature, most studies find negative effects of the minimum wage on employment of low-wage groups (see, e.g., Neumark, 2014). These studies often focus on young workers or specific low-wage sectors in a particular country (often the US). Standard estimates of the employment elasticity of the minimum wage for young workers is between –0.1 and –0.2, which means that a 10% increase in the minimum wage is estimated to reduce the youth employment by about 1 or 2% (see, e.g., the overview of Neumark, 2014). Nevertheless, a number of studies find results that are close to zero or statistically not significant, and some have even found a positive employment effect of minimum wage increases in some sectors. The uncertainty about the employment effects of the minimum wage can well be explained by economic theory by invoking various labour market frictions as well as demand effects stemming from the increased consumption of minimum wage workers (see, e.g., Manning, 2016).

While there is a large literature on the employment effects of the minimum wage based on specific countries (see, e.g., the surveys of Brown, 1999; Neumark and Wascher, 2006; Belman and Wolfson, 2014, esp. Chapters 2 and 4; and Neumark, 2014), there are relatively few cross-country analyses. Virtually all existing work focuses on a sample of OECD countries. Early cross-country analyses include Dolado et al. (1996) and OECD (1998). In a seminal study, Neumark and Wascher (2004) found negative employment elasticities between –0.1 and –0.2 in most specifications for the age group 15-24. Dolton and Rosazza-Bondibene (2012) find an elasticity of about –0.2 for youth (ages 15-24) and of about –0.05 of adults (ages 25-54) in their baseline estimations. They also find that the negative employment effect of the minimum wage is exacerbated in recessionary times for youth, but not for adults.

Addison and Ozturk (2012) study the effect of the minimum wage on the employment of prime-aged women and find an elasticity of about –0.079 in a baseline specification, among a broad range of elasticities between –0.04 and –0.35 in various alternative specifications. Finally, Christl et al. (2015) find that the effect of the minimum wage on youth employment is non-linear: it turns negative only at a certain level, estimated to be at around 40% of the average wage. All contributions emphasise that the findings are sensitive to specification decisions (see discussion below on the specification).

The aim of this section is to provide estimates of the employment effects of the statutory minimum wage for a panel of EU Member States. The focus on EU countries allows the extension of the analysis to a number of members not in the OECD or recent members that were not included in earlier analyses. It also allows a comparison across a set of countries which are arguably more homogeneous, and whose economic data are more harmonised, than it is the case across the OECD at large.

The findings of this analysis are broadly consistent with the previous literature. First, it is documented that results are sensitive to the specification, in particular to how secular country-specific time trends in the employment rate of the relevant groups are controlled for. ([10]) Second, the effect of the minimum wage on the overall employment rate (age group 15-64) is negative but small and estimated with a degree of uncertainty that makes it statistically not significant in the most reliable specifications. Third, negative employment elasticities consistent with standard results in the literature are estimated for young workers, in particular for the age group 20-24, while results are not stable for the age group 15-24. Finally, statistically weakly significant negative effects, of a magnitude that is comparable to that for young age groups, are found for low-skilled workers, a group that has not been studied before in the literature.

3.1.2. Analytical approach

The analysis follows previous cross-country studies. As in most studies of the minimum wage, the employment rate (employment-to-population ratio) is chosen, as dependent variable. Regressions are run separately for various groups: the overall working-age population (age group 15-64); youth (age groups 15-24 and 20-24); and the low-skilled (ISCED level 0-2, i.e., those without an upper secondary education; age group 15-64). The main explanatory variable is the ratio of the minimum wage to the median wage (the Kaitz index).

The minimum wage is not the only determinant of employment and to avoid biased estimates it is usual control for others as well. These control variables include: (1) *Variables reflecting the economic environment at large:* the output gap (in specifications explaining the overall employment rate) or the unemployment rate of prime-age males (in specifications for particular groups); (2) *demographic variables and variables relevant for the specific group studied:* the share of the specific age or skill group in the overall working-age population; the

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([10]) This means that the *disemployment* effects of minimum wage are spurious and reflect pre-existing negative trends (e.g. skill-biased technological change) that pre-date the policy change (see also Dube et al., 2010).

share of the relevant youth age group in formal or informal education or training; and (3) *labour market institutions:* spending on Active Labour Market Policies (ALMPs) as a percentage of GDP; the indicator for the strictness of Employment Protection Legislation (EPL) of regular workers; the replacement rate of unemployment benefits; tax wedge; union density.

Country and year fixed effects are added to each specification to control respectively for time-invariant differences between countries and for common trends across EU countries, as is standard in similar studies. Finally, each empirical relationship is studied both with and without the inclusion of a country-specific time trend. Including country-specific time trends helps account for country-specific factors that drive employment rates (e.g., industrial or cultural changes), beyond those explicitly captured by the other control variables included in the regressions. If country-specific employment trends are relevant but ignored, the resulting statistical findings can be spurious. For this reason it seems prudent to place more trust in the specifications with country-specific trends. ([11])

As discussed in the previous section, minimum wage updates are influenced by economic variables and by the institutional setting. This raises the question whether simple regressions estimating the relationship between the minimum wage and economic outcomes might be biased due to the possible endogeneity of minimum wages. This issue is addressed here, as in most of the literature, by lagging these variables by one year. ([12])

3.1.3. Variables and data

Information on the Kaitz index (the statutory minimum wage as a percentage of the median wage) is taken from the OECD earnings database (2015). The database has information on 18 EU countries: Belgium, Czech Republic, Estonia, France, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the UK. Germany introduced a statutory minimum wage only in 2015 and is thus not included in the analysis as data are insufficient for a macro panel analysis. The database has no information on Bulgaria, Croatia, and Malta.

Employment rates and population shares are from Eurostat; output gap is from the AMECO database of the European Commission. Labour market institutions (ALMP spending, EPL, replacement rate of unemployment benefits, tax wedge, union density) are from the OECD. ALMP spending was complemented from the Eurostat labour market policy database. Union density is from the ICTWSS database (Visser, 2015). In the case of the other OECD variables, long historical (but discontinued) series have been complemented by up-to-date (but shorter) series also collected by the OECD.

Taking institutional characteristics of the labour market into account among the explanatory variables reduces the size of the sample. First, recent observations are lost because some institutional variables are not available for latest years. Second, the EPL indicator for the time

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([11]) The literature is not unequivocal on this specification issue: while most previous contributions have included country-specific time trends, some (e.g., Dolton and Rosazza-Bondibene, 2012) did not.

([12]) Only few contributions, e.g., Dolton and Rosazza-Bondibene (2012) attempted to solve this potential problem by an instrumental variable approach.

period considered is not available for Latvia, Lithuania and Romania. In view of these data limitations, the robustness of the results is assessed running regressions with and without institutional variables, both on a restricted sample (15 countries and those years for which institutional variables are available) and on an unrestricted sample (18 countries and all available years).

3.1.4. Results

Results are presented for four socio-economic groups: the overall employment rate (age group 15-64), youth (age groups 15-24 and 20-24), and the low-skilled. Table 8 provides a summary of the estimated elasticities. ([13]) The first four columns in the table show results from specifications excluding country-specific time trends, while the last four columns show specifications including trends. All five institutional control variables are included in columns (1) and (5). Only significant control variables are kept in columns (2) and (6). All institutional controls are excluded in columns (3) and (7). Finally, columns (4) and (8) repeat the regressions shown in columns (3) and (7), but for an unrestricted sample (i.e., a sample that is not restricted to the 15 countries, and to the years for which institutional controls are available).

Table 8: The employment effect of the minimum wage: Summary of estimated elasticities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No country-specific time trend				Country-specific time trend			
	Restricted sample			Unrestr'd	Restricted sample			Unrestr'd
Dependent variable	All controls	Stat. sign. controls	No controls	sample, no controls	All controls	Stat. sign. controls	No controls	sample, no controls
Employment rate, overall working-age population (15-64)	-0.182*	-0.168**	-0.254*	-0.102	-0.047	-0.046	-0.055	-0.106
Employment rate, youth (15-24)	-0.268*	-0.199	-0.465	-0.308*	-0.137	-0.115	-0.104	-0.135
Employment rate, youth (20-24)	-0.130	-0.103	-0.246*	-0.228**	-0.151	-0.194**	-0.178**	-0.137**
Employment rate, low-skilled (ISCED 0-2; age group 15-64)	-0.217**	-0.201*	-0.212	-0.157	-0.173*	-0.162*	-0.162*	-0.193*

Notes: (1) The table lists elasticities, calculated by scaling the relevant estimated regression coefficients. (2) All regressions estimated by Fixed-Effects panel estimation with robust standard errors. (3) The minimum wage indicator used in all regressions is the minimum wage to median wage ratio. (4) "Controls" refer to five variables controlling for labour market institutions: ALMP spending as a percentage of GDP; the strictness of Employment Protection Legislation; the replacement rate of unemployment benefits; the tax wedge; and union density. (5) Asterisks mark estimated coefficients which are statistically significant at the 10% (*), 5% (**) or the 1% level (***).

Overall employment rate. The first row of Table 8 summarises the results for the age group 15-64. A number of conclusions can be drawn. First, in all specifications, the effect of the minimum wage on employment is estimated to be negative, but in the majority of the specifications it is not statistically significant.

Second, the results are sensitive to whether country-specific time trends are controlled for. The estimated elasticity is sizeable (between –0.18 and –0.26) and statistically significant at least at the 10% level in the restricted sample when country-specific time trends are not

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([13]) Estimated coefficients are transformed into elasticities to ease comparability with previous findings of the literature.

included, regardless of the inclusion of institutional controls. In contrast, the elasticity falls to around −0.05 and is never statistically significant when country-specific time trends are included. ([14])

Finally, since the results are more stable when country-specific trends are controlled for, and in view of the theoretical arguments presented discussing the analytical approach, the specifications that control for these trends are more reliable. Thus, in the most reliable estimates, the effect of the minimum wage on the overall employment rate appears to be small, and is not estimated precisely enough to be statistically significant. The point estimate is consistent with a fall in employment of about 0.5% to 1% after a 10% increase in the minimum wage.

Youth. The second and third row of Table 8 summarise the results for the age group 15-24 and 20-24, respectively. All the regressions on youth employment control for the size of the youth cohort relative to the working age population, and the enrolment rate of the youth cohort in training or education, besides the lagged prime-age male unemployment rate, which reflects the common economic cycle. Two observations can be made.

First, the estimated elasticities are in all cases negative, but they are only robust for the age group 20-24, while the results for the 15-24 age group are uncertain. The elasticities range from −0.1 to −0.5 for the age group 15-24, but in most cases they are not statistically significant. Elasticities fall in a narrower range of −0.1 to −0.25 and are in most cases statistically significant for the age group 20-24. The fact that results are more robust for this age group suggests that there are other determinants of teenage employment (ages 15-19), that are relevant beyond those that are already controlled for. This might introduce noise into the estimation for the cohort including teenagers.

Second, point estimates of the elasticity for the age group 20-24 are in the range of −0.13 and −0.2 when country-specific time trends are controlled for, and are in most cases statistically significant at the 5% level. Results for this age group are relatively robust to the exclusion of country-specific time trends, but the increased stability of results when these trends are controlled for lends further support to the view that their inclusion is necessary to isolate the effect of minimum wages from those of other factors affecting employment. ([15])

Low-skilled workers. The last row of Table 8 summarises the results for the low-skilled. Control variables include, beyond the unemployment rate of prime-aged males as a cyclical variable, the share of low- and high-skilled in the working age population.

The point estimates for the employment elasticity of the minimum wage are within a range of −0.15 and −0.22, and the estimations are fairly robust to alternative specifications. In the specifications with country-specific time trends, the range of estimated elasticities is between −0.16 and −0.2. The estimated effect is in most cases statistically significant at the 10% level. This provides some evidence for the hypothesis that high minimum wages have a negative employment effect on the low-skilled.

([14]) Allegretto et al. (2015) found for the US that including state-specific trends produces small and insignificant elasticities for teens.
([15]) Statistical tests strongly reject the hypothesis that country-specific time trends can be excluded.

Conclusions. This section presented some estimations of the employment effect of the statutory minimum wage for various groups in 18 EU countries (15 in the restricted sample). The most reliable specifications found elasticities between –0.13 and –0.2 for young adults (age group 20-24) and elasticities between –0.16 and –0.2 for low-skilled workers. Results were not robust for the broader youth group (15-24) which included teenagers, while for the overall working age population, the estimated elasticities were small and negative (around –0.05) and estimated with a degree of uncertainty which made them statistically not significant. Overall, these findings support the view that, at conventional levels, minimum wages do not have a large negative employment effect, but may have some negative effects on the employment of low-wage groups. The method applied in this analysis did not allow identifying non-linearities in the relationship between employment and minimum wage. Thus, it is likely that policy-makers in most cases have to weigh the social benefits of a higher minimum wage against its social costs.

3.2. Prices

3.2.1. Literature review

Little attention has been paid to the implications of minimum wage increases on consumer prices, which is a topic that has been largely ignored in the analysis of minimum wage policies.

Theoretically, the impact of the minimum wage on prices depends on the structure of the labour market. On the one hand, under the assumption of a competitive labour market, an increase of the minimum wage above the market-clearing wage is entirely shifted to consumers as higher consumption prices. ([16]) On the other hand, under the assumption that employers have dominant position in the labour market and do not face competition in labour market for hiring employees, employers have some discretion in setting wages. As a consequence, the level of wages would be too low and the incentives to accept a job offer weak; a moderate increase in the minimum wage (above the wage paid by the monopsonist but below the wage paid by in perfect competition) increases the firm's average labour cost, but decreases the marginal cost of hiring an extra employee (as firms will not have to hire the wage level to attract more employees). The fall in the cost of employing an additional worker (marginal cost) reduces the price of producing an additional unit of output.

The first empirical studies on price pass-through using data on restaurants in New Jersey and Pennsylvania (Katz and Krueger, 1992; Card and Krueger, 1994) found no effect of minimum wage changes on consumer prices, confirming the hypothesis of monopsony in the fast-food industry in US. An important shortcoming of these studies was the small dataset and limited number of minimum wage changes used to identification the effects.

More recently, Aaronson (2001) exploits variation in minimum wages across time and states using data on fast-food prices from the US and Canada in 1978-1995. He finds an elasticity of

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([16]) The increase in the minimum wage is expected to lead to higher marginal cost per worker; firms will respond by shedding labour and increasing prices. Yet, the effect on employment is small if the elasticity of substitution between low-wage employment and capital is low.

fast-food prices to minimum wage which ranges between 0.07 and 0.16 depending on the dataset used. Subsequent studies (eg Aaronson et al., 2008; and Allegretto et al., 2015) found a small impact on prices, with elasticity in a ballpark of 0.06 ([17])

Outside the US or Canada, few studies have analysed the impact of minimum wage changes on prices. Compared to the US, the impact of minimum wage changes in France on prices of restaurants is slightly higher, with an elasticity of about 0.10 (e.g. Fougère et al., 2010). Harasztosi and Lindner (2015) found for Hungary that firms in the manufacturing sector responded to the 2001 large and persistent increase in the minimum wage by raising output prices. In contrast, no significant impact on prices in the residential home care sector was found for the UK (Machin et al., 2003), partly owing to the effect of price regulation in the sector.

3.2.2. Data and econometric approach

This section provides an original analysis of the impact of the minimum wage on consumer prices for 12 product categories ([18]) in 20 EU Member States ([19]) with statutory minimum wage; the analysis on monthly data covers the period January 2005-March 2016. It follows a similar approach as Aaronson et al. (2008). The analysis proceeds in two steps.

First, descriptive evidence on price changes following an increase in minimum wage is presented. Price changes (increases and decreases) after an increase in the minimum wage are tabulated. Two cases are considered: (1) an increase in the minimum wage in the last two months and (2) no increase in the minimum wage in the last two months.

Second, the impact in a specific month of a minimum wage change on price is estimated using an econometric model lining the percentage change in consumer prices for a specific product category in a given country on the percentage change in the national statutory minimum wage of that country.

In addition to the contemporaneous and lagged percentage changes in the minimum wage, the model also includes the change in the minimum wage of the following year to control for potential expectations firms may have on *future* changes in the minimum wage. Further, the model controls for the lagged change in prices (to account for persistency overtime of price changes) and product–country, month–country, month-product and year fixed effects. These fixed effects are introduced to net out the remaining unobserved components affecting price changes and isolate the effects due to minimum wage changes.

Finally, the analysis also estimates the impact of minimum wage hikes on the price of the consumer basket by income level.

([17]) Aaronson et al. (2008) analyse the impact of a federal minimum wage increase on restaurant prices in the US in the period 1996-1997 using detailed store-level micro-data. Allegretto and Reich (2015) used information on restaurant prices before and after a 25% increase in the minimum wage in San Jose.

([18]) The product categories (COICOP categories - one digit) included are alcoholic beverages, tobacco and narcotics; clothing and footwear; communications; education; food and non-alcoholic beverages; furnishings, household equipment and routine household maintenance; health; housing, water, electricity, gas and other fuels; miscellaneous goods and services; recreation and culture; restaurants and hotels; and transport.

([19]) The EU Member states included are Belgium, Bulgaria, Czech Republic, Estonia, France, Croatia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain and UK.

Data on the monthly consumer prices by product category are from Eurostat. Data on the monthly minimum wages are collected from Eurostat and national statistics. Data on consumer baskets refer to 2005 and are obtained from Eurostat.

3.2.3. Results

Table 9 presents the results of the descriptive evidence on price changes following an increase in the minimum wage. The results show that in case there was an increase in the minimum wage in the two months before, there were significantly more increases in prices (60.1%) compared to periods when there was no increase in the minimum wage in the past two months (53.4%). The reverse hold for price decreases (ie price decreases are less frequent in two months that follow minimum wage rises). With respect to the magnitude of the price changes, the results suggest that price changes (both increases and decreases) are larger after minimum wage hikes but quite rare compared to the case of no minimum wage change.

Table 9: Descriptive evidence: Impact of minimum wage increases on consumer prices

Minimum wage increase in the past two months	Yes	No
A. Share of price changes		
Percent increases	60.1	53.4***
Percent decreases	27.5	29.7***
B. Size of the price changes		
Mean price change (%) increase	0.74	0.82**
Mean price change (%) decrease	-1.72	-1.09***

Note: Asterisks indicate estimated effects that are statistically significant at 1% (***), 5% (**), or 10% (*) level.

Table 10 presents the results of the regressions for different specifications of the baseline model. The results are relatively robust across the estimations. [20] The effect of the contemporaneous change in the minimum wages on prices is significant in all specifications except model A which includes the least control variables and can therefore be considered as less reliable. When it is significant its effect ranges between 0.021 (model including month-country fixed effects) and 0.062 (model including month-product fixed effects). In addition, in case of model E, which includes month-country effects, the effects of the lagged and lead minimum wage increase are also found to be significant. The combined effect of a 10% increase in the minimum wage is expected to lead to a price increase of roughly 0.4% (0.02+0.01+0.01). [21] Hence, overall the results imply that a 10% increase in the minimum wage leads to 0.4% to 0.6% increase in consumer prices.

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[20] In an additional robustness check, the probability of a price increase is used at the place of the price increases as outcome variable. Results are in line with expectations; an increase in the minimum wage significantly lowers the probability of a price increase.

[21] Note that in the model that includes month-country fixed effects, the effect of a minimum wage increase is lower than in the other models. Month-country fixed effects allow controlling for country-specific seasonality of prices. However, in case for example minimum wage increases happen in January and price increases also mainly happen in January, this specification will attribute price increases to the seasonal price change (ie occurring every 1st January), rather than to an increase in the minimum wage.

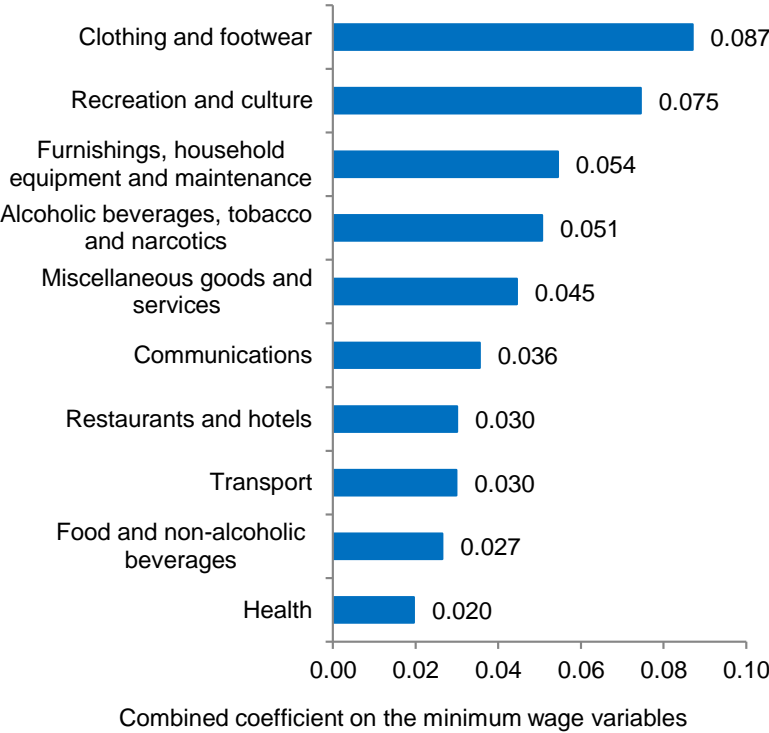| Table 9:	Econometric evidence: Impact of minimum wage increases on consumer prices				
	(1) Model A	(3) Model B	(2) Model C	(5) Model D	(4) Model E
Lagged consumer prices, % change		-0.052	-0.153	-0.049	-0.148
		(0.11)	(0.12)	(0.11)	(0.12)
Minimum wage, % change	0.0048	0.021***	0.062***	0.021***	0.061***
	(0.012)	(0.0070)	(0.013)	(0.0070)	(0.012)
Lagged minimum wage, % change				0.010**	-0.012
				(0.0047)	(0.0085)
Two period lagged minimum wage, % change				-0.0012	-0.013
				(0.0046)	(0.0086)
Future minimum wage, % change				0.0051*	0.0044
				(0.0031)	(0.0042)
Product-country fixed-effects	Yes	Yes	Yes	Yes	Yes
Month-country fixed-effects	No	Yes	No	Yes	No
Month-product fixed-effects	No	No	Yes	No	Yes
Year fixed-effects	No	Yes	Yes	Yes	Yes
	0.202***	-0.099	0.089*	-0.087	0.108*
Constant	(0.0052)	(0.121)	(0.054)	(0.123)	(0.056)
Observations	32158	32158	32158	31439	31439
R-squared	0.000	0.073	0.335	0.073	0.337

Note: Asterisks indicate estimated effects that are statistically significant at the 1% (***), 5% (**), or 10% (*) level. Robust standard errors in parentheses.
Source:

In order to provide some insights on the impact of minimum wage increases on prices for specific goods and services, the analysis is performed per product category. Graph 5 presents the results of the combined (including the coefficients for the contemporaneous time period, lagged time period and lead period if significant) effect of a minimum wage increases on prices of particular product categories using a regression that include month and year fixed effects and is equivalent to model E.

The combined impact ranges from 0.087 for clothing and footwear to 0.020 for health. No significant effect is been found for education and housing, water, electricity, gas and other fuels. The effect of the minimum wage on consumer prices is found to be the highest for the following three product categories: clothing and footwear; recreation and culture; and furnishings, household equipment and routine household maintenance. This is not surprisingly as minimum wage earners are likely to represent a high share of the work force involved in the production and sales of these product categories. Unfortunately, there are no comparable cross-country data available on the exact share of minimum wage earners involved in the production or sales of each product category.

Graph 5: Combined effect of the minimum wage variables on prices by product category

Product category	Combined coefficient
Clothing and footwear	0.087
Recreation and culture	0.075
Furnishings, household equipment and maintenance	0.054
Alcoholic beverages, tobacco and narcotics	0.051
Miscellaneous goods and services	0.045
Communications	0.036
Restaurants and hotels	0.030
Transport	0.030
Food and non-alcoholic beverages	0.027
Health	0.020

Combined coefficient on the minimum wage variables

Notes: Based on an estimation of Table 10, equation (1) that includes month-country fixed effects and year fixed effects. Only effects significant at 10% (*) or lower levels or included in the combined effect.

These findings suggest that an increase in the minimum wage is only partly offset by increases in consumption prices. Yet, since there are differences in the consumption patterns of households depending on their income level, the overall impact of a minimum wage increase on household budgets may differ between income groups. Depending on whether low-income households consume relatively more or less products susceptible to price increases following a minimum wage change, the impact of minimum wage increase can be smaller or bigger for low-income households compared to high-income households. Simulations based on the average share of each product category in the 2005 consumption basket for the 20 countries included in the analysis show that those at the bottom of the income distribution will face a proportionally lower increase in consumer expenditures than those with a higher income level, but the differences are small. In the first quintile, a 10% increase in the minimum wage will lead to a 0.28% increase in price of their consumption basket, while in the last quintile this is 0.33%.

In summary, there is evidence of a positive pass-through of minimum wages to consumer prices, but the effect does not make the minimum wage an ineffective tool to protect purchasing power of workers at the end of the income distribution. The impact is the largest in the sectors that employ a relatively high share of minimum wage workers, such as clothing and footwear; recreation and culture; and routine household maintenance.

3.3. Consumption

3.3.1. Literature review

Few studies have looked at the impact of minimum wage on aggregate consumption. Theoretically, the impact is ambiguous and will depend on the interaction between the employment, wage and price effects of a minimum wage increase as well as the interaction with the tax and benefit system. The effect is likely to be larger when *disemployment* effects and price increases are small.

Using detailed US micro-data, Aaronson et al. (2012) analyse the implications of minimum wage increases on household spending and debt. They find that following a minimum wage hike spending and debt substantially increases for low-income households. A $1 minimum wage increase is expected to increase household incomes by approximately $250 and spending by $700 per quarter in the year following the minimum wage hike. The increase in spending is mainly driven by an increase in collateralized debt to buy durables such as vehicles.

Tonin (2011) finds that a minimum wage increase can even decrease consumption for groups of workers who likely earn part of their wage in an undeclared way. In their case, the minimum wage increase results in increased declared wages and an increased tax burden rather than an increased net income.

3.3.2. Data and econometric approach

This analysis provides a tentative estimate of the impact of minimum wage on mean consumption expenditure by consumption quintile for 18 Member States. ([22]) Data on the percentage change in mean consumption expenditure per adult equivalent (in PPS) between 2005 and 2010 by quintile and country is obtained from the Household Budget Surveys. The main variable of interest is the percentage change in the monthly minimum wage in PPS. In order to test whether the effect of an increase in the minimum wage varies between consumption quintiles, interaction terms between quintile dummies and minimum wage growth are included. Finally, to isolate the effect of minimum wage changes from changes due to average wage, the percentage change between 2005 and 2010 in annual net earnings (in PPS) for a single individual earning 100% of the average wage is introduced in the regression as control variable. As a robustness check, the average wage is replaced with the percentage change in GDP per capita (in PPS) between 2005 and 2010 obtained from Eurostat.

3.3.3. Results

Table 11 shows the results obtained from four different specifications. The first two columns present the result of a simple model that includes no interaction effects with the consumption quintile, but controls for respectively the average wage growth (Model A) and GDP per capita growth (Model B). The last two columns present estimations of the full model, including

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([22]) The Member States included are Belgium, Bulgaria, Czech Republic, Estonia, Greece, Spain, France, Ireland, Lithuania, Latvia, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia and the UK.

interaction terms with the consumption quintiles and respectively average wage growth (Model C) and GDP per capita growth (Model D). Interaction terms allow identifying the effect that is specific to each quintile.

Table 11: Econometric evidence: Impact of the minimum wage on consumption by income quintile

Dependent variable: Mean consumption expenditure per adult equivalent, % in change in PPS	(1) Model A	(2) Model B	(3) Model C	(4) Model D
Minimum wage (MW), % in change in PPS	0.48**	0.33**		
	(0.19)	(0.14)		
Average wage, % in change in PPS	0.73***		0.73***	
	(0.20)		(0.19)	
GDP per capita, % in change in PPS		1.16***		1.16***
		(0.17)		(0.11)
First quintile* MW			0.80***	0.67***
			(0.20)	(0.13)
Second quintile* MW			0.67***	0.53***
			(0.21)	(0.11)
Third quintile* MW			0.48*	0.31***
			(0.25)	(0.11)
Fourth quintile* MW			0.34	0.19*
			(0.25)	(0.11)
Fifth quintile* MW			0.12	-0.04
			(0.26)	(0.12)
Constant	-0.087**	-0.059**	-0.087***	-0.059***
	(0.033)	(0.026)	(0.032)	(0.024)
Observations	80	90	80	90
R-squared	0.56	0.64	0.63	0.73

Notes: OLS estimates. Robust standard errors. Model A and C which include the percentage change in the average wage as an explanatory variable does not include Estonia and Slovakia because of missing data. Asterisks indicate estimated coefficients that are statistically significant at the 1% (***), 5% (**), or 10% (*) level.

The results indicate that there is a positive impact on aggregate consumption. Yet, this impact is more precisely estimated when the response of aggregate consumption is conditional to different income quantiles. The effect of a minimum wage increase is found to be larger for the lowest quintile and gradually decreasing across the income distribution. The results presented by Model C and D show that a 1% increase in the minimum wage leads to an increase in consumption in the ballpark of 0.7% in the bottom quintile and of 0.6% in the second quintile. The effect decreases rapidly to respectively 0.4%-0.3% in the third quintile. There is no significant effect of minimum wage hikes on consumption for the two highest quintiles of the consumption distribution at a 5% significance level. Graph 6 summarizes the impact of the minimum wage showing the effect per quintile and the corresponding confidence interval.

A potential caveat of the analysis is that it does not include some time-varying factors that differ between countries, such as budgetary restrictions, which may affect both consumption and minimum wage. This may create endogeneity bias. An additional bias could come from

the exclusion of factors that affect consumption in a specific quintile, such as indexation of benefits in line with minimum wage changes affecting incomes in the lowest quintiles. As result, the estimates can be biased and potentially overestimate the effect of the minimum wage. Yet, they show that minimum wage changes have a stronger impact on consumption at the bottom rather than at the higher part of the consumption distribution.

Graph 6: Impact of the minimum wage on consumption by income quintile
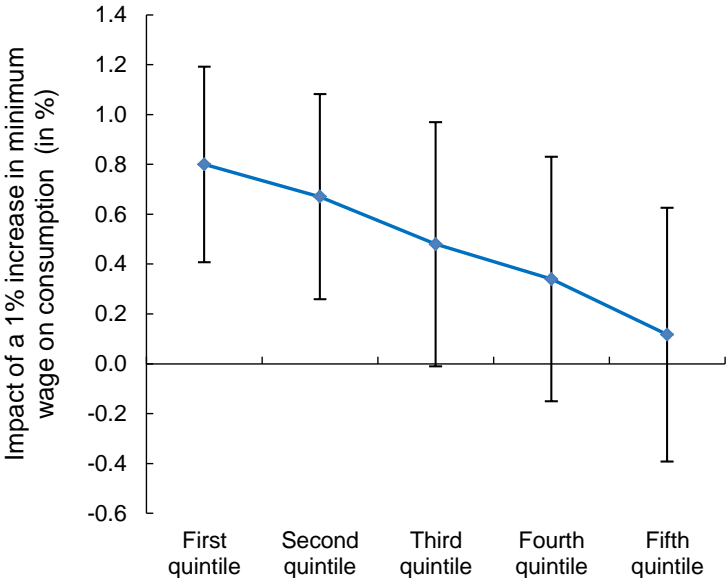
Notes: OLS estimates based on the results reported in Model C in Table 11, using the percentage change in the average wage as an explanatory control variable.

In summary, there is a positive relation between minimum increases and consumption. The impact differs across the consumption distribution and is the highest for the bottom of the consumption distribution and gradually increases across the distribution. This is not surprising as the low-income households are mostly affected by the minimum wage hike and most likely to be concentrated at the bottom of the consumption distribution.

3.4. The macroeconomic effects: A general framework

As evidenced in previous sections, the employment effects of minimum wage are often elusive, resulting in imprecise estimates for many working age groups. This may happen for a number of reasons. Low shares of minimum wage workers, low price elasticity of the product demand and low substitution with respect to other inputs may cause a weak response of labour demand to minimum wage changes. Thus, even when the average wage changes in response to minimum wage updates, the estimates of the employment effects may be small and highly uncertain (Manning, 2016, Cahuc et al 2014).

Accounting for the possible interactions between minimum wage, average wages, employment and consumption, including the lagged effects of these variables on minimum

wage and of the latter on the former, provides a better representation of the relation linking minimum wages to employment.

3.4.1. Data and econometric approach

In this section, a more general specification is adopted to estimate the employment effects of minimum wage increases. A Vector Auto Regressive (VAR) model is a standard tool to take into account dynamic interrelationships between variables of interest. In particular, the aim is to assess the response of employment, wages and consumption to a discretionary minimum wage change (henceforth *shock*). One limitation of VAR is that the response to a shock is linear in the shock, i.e. it does not take into account the possibility of thresholds effects. This technical limitation is quite relevant as there is a consensus that negative effects on employment may emerge at high levels of minimum wage.

A VAR with 1 lag has been estimated for the following variables: the minimum wage level, the median wage, the total number of employees, the consumption-GDP ratio. ([23]) Excluding the self-employed helps to control for the effects of minimum wage on total employment stemming from substitution between employees and self-employed. The median wage is chosen instead of the average wage as the former is more stable with respect to changes in the extreme values. Consumption as a percentage of GDP captures the effect of minimum wage on consumption, while netting out the effect of trends in total expenditure.

Annual data are used to estimate a VAR model using the panel of available countries over the period 1985-2015; the panel is unbalanced. Panel VAR allows considering the interactions between the variables, while controlling for heterogeneity across countries in the level of variables. The analysis will describe the impulse-response functions, which show the dynamic response of one variable of interest (wages, employment, consumption) to a shock in the minimum wage. Shocks are identified based on the assumptions that a minimum wage shock affects the median wage, employment and consumption within the same year, while it responds to a shock to one of these variables only with a lag of 1 year. ([24]) Within the same year, wage shocks affect both employment and consumption, while shocks to these may affect wages with lag only. The causal structure implies that the minimum wage is the most exogenous variable, while consumption is the most endogenous.

Next, the availability of indicators describing the institutional flexibility of the minimum wage setting allows exploring whether the regime for minimum wage setting affects the response to discretionary minimum wage changes. The sample is split in two groups based on the median of the sub-components of the indicator describing the institutional flexibility of the minimum wage setting framework. In practice, countries are divided in two samples on the basis of predictability and frequency of discretionary changes in the minimum wage and the impulse responses are compared for the two groups. Two groups are formed according to

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([23]) All variables are in logs; the panel is estimated with GMM method.
([24]) By orthogonalising the impulse response, it is possible to identify the effect of a shock while keeping the other shocks equal to zero. Shocks are identified with Choleski decomposition of the variance-covariance matrix of reduced form residuals with the order: minimum wage, median wage, employment and consumption.

whether the indicator of predictability and frequency of updates has value below or above the median; we called the first group *low* and *high* predictability. ([25])

3.4.2. Results

Graph 7 shows the responses of the median wage, total number of employees and consumption to one-standard-deviation positive shock to the minimum wage; the panel with the minimum wage response displays the persistency of the minimum wage shock. In the chart, the horizontal axis represent years after the shock, while the vertical the changes in the variable of interest. Bands represent the confidence interval, so that all values within the bands have the same probability. When the band includes zero, the estimated values are considered statistically non different form zero.

Graph 7: Response to a minimum wage shock
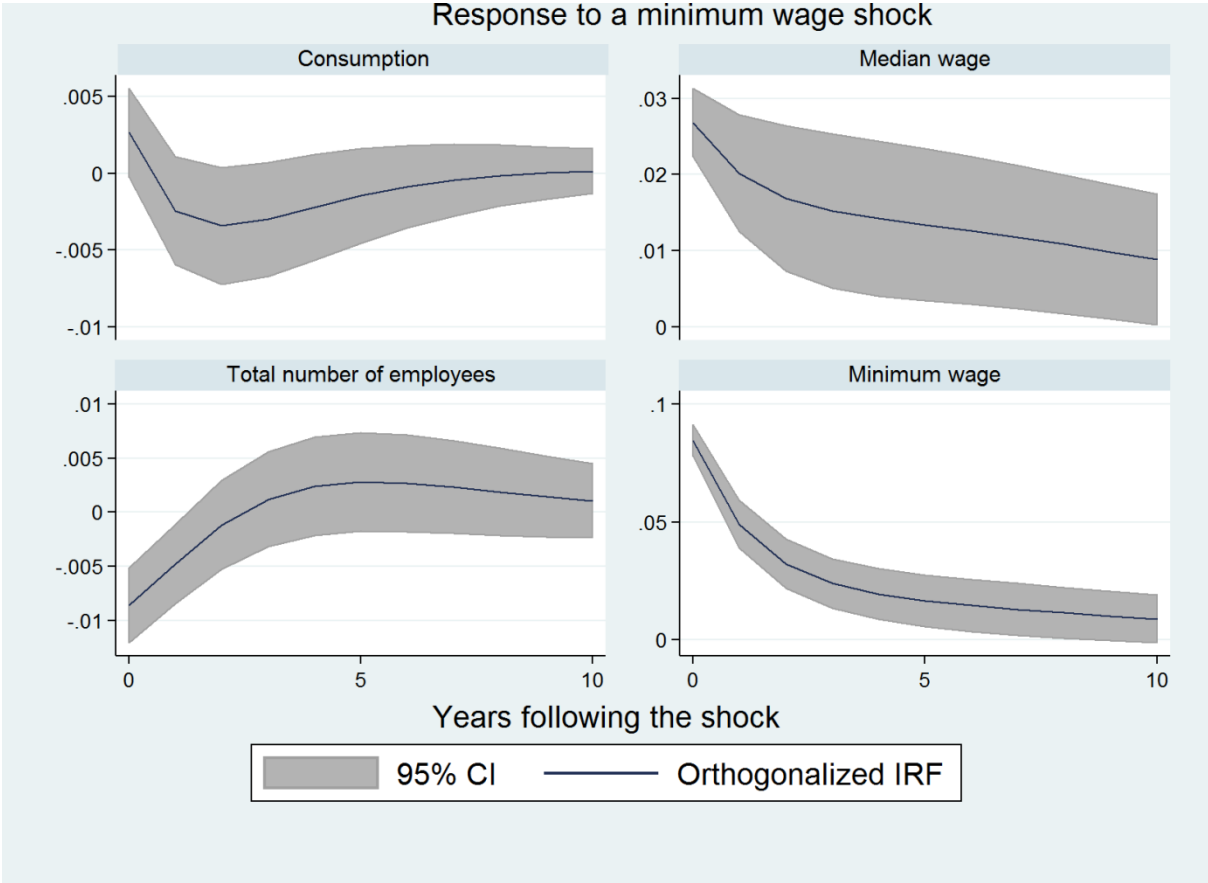
Notes: The horizontal axis represents years after the shock. The vertical axis represents log points. Bands represent the 5% confidence interval generated by Monte Carlo simulations. When 0 is included in the confidence band, it cannot be excluded that the effect is zero.

The results suggest the following: A minimum wage shock results in a variation of median wages, consumption and employment within the same year; the size of the minimum wage

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([25]) Countries belonging to the first group include Bulgaria, Estonia, Lithuania, Romania, UK, Spain, Hungary, Portugal, Netherlands; Belgium and Luxermbourg coincide with the median.

shock is about 10%. The shock is the minimum wage change not explained by past changes in the underlying variables, and can be interpreted as discretionary change.

Employment falls by less than 0.1% within one year, while the median wage rises by 0.3%. Consequently, the small increase in consumption by 0.03 reflects the offsetting effect of a temporary decline in employment and increase in median wage. This suggests that the increase in consumption for those in employment after the increase in the minimum wage offsets its fall for those who have lost a job after the increase of the minimum wage. ([26])

The effect on employment and consumption dissipates quite quickly. In contrast, the effect on median wages is more persistent. Thus, the minimum wage is quite effective in improving the wage distribution at the cost of small and transitory negative effects on employment.

Graph 8 reports the dynamic response of employment, consumption and the minimum wage, splitting the countries on the basis of the frequency of updates and predictability of minimum wage changes. On impact, the response of consumption is higher in the group with low predictability and frequency of updates; but the effects die out rapidly with no major differences across the two samples. The median wage increases on impact in response to the minimum wage in both samples; the pattern of response is very similar, although the median wage rises more (i.e. the wage distribution becomes more compressed) for the group with low predictability and frequency of minimum wage updates.

Finally, in response to a minimum wage shock, employment drops temporarily in countries where changes in the minimum wage are infrequent and unpredictable, while it remains unchanged in the rest of the countries. Thus, it is likely that whenever minimum wage changes are predictable and frequent, the size of discretionary minimum wage changes (i.e. unexpected shock) is smaller than in countries where the minimum wage policy is more *erratic*. This is visible in the size of the shock which is higher in the former group of countries. Thus, unexpected changes of minimum wage reduce the gap between low and median wages; yet, the bigger size of the shock in countries with less frequent and predictable minimum wage changes lowers (temporarily) employment. Thus, minimum wage policy is better attuned with the underlying macroeconomic variables in countries where minimum wage changes are predictable.

([26]) Another other offsetting factor may include the effect of increasing the minimum wage on consumption those that were unemployed before the increase.
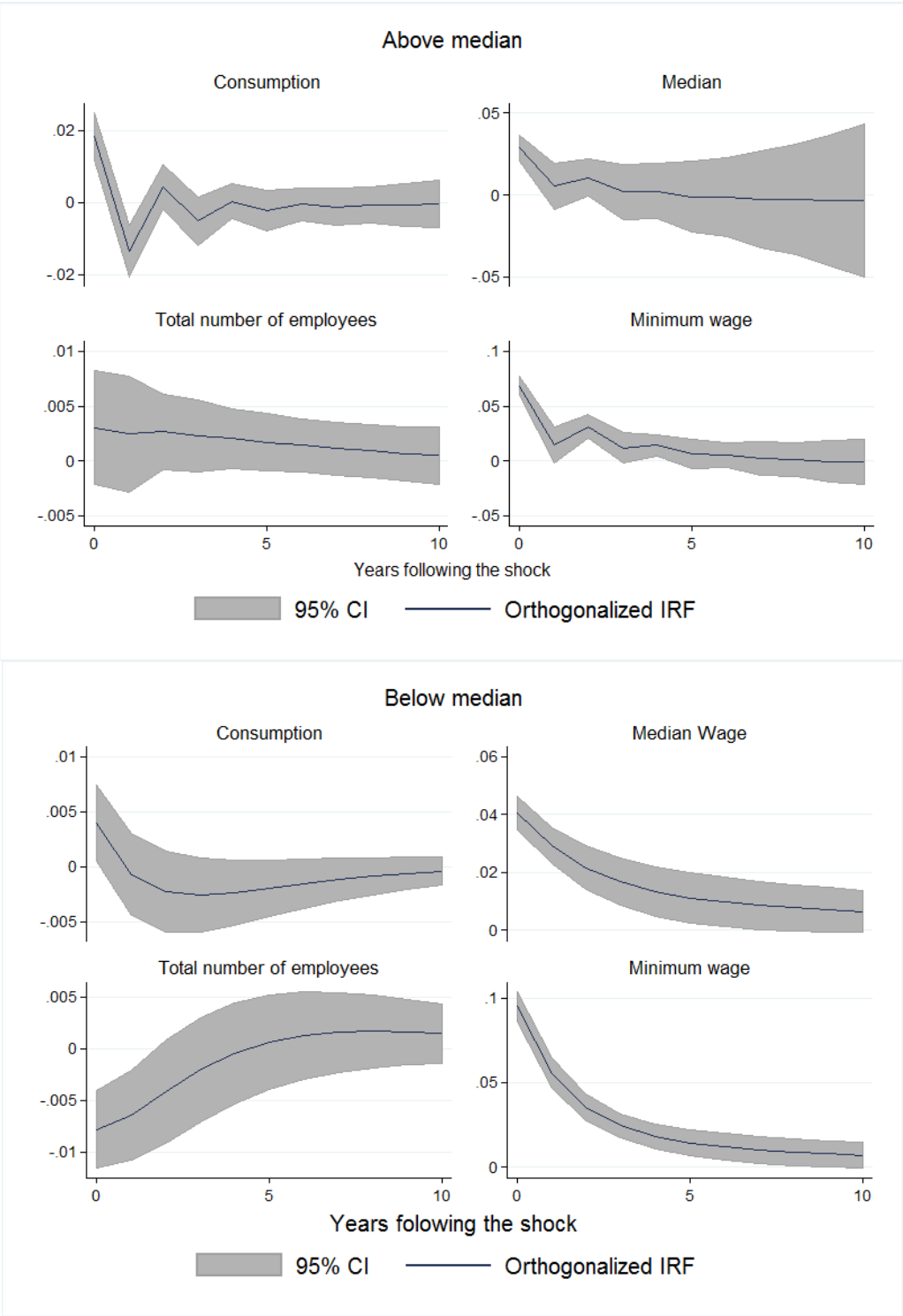
Notes: The horizontal axis represents years after the shock. The vertical axis represents log points. Bands represent the 5% confidence interval generated by Monte Carlo simulations. When 0 is included in the confidence band, it cannot be excluded that the effect is zero.

4. Effect of minimum wage on poverty

4.1. Literature review

There is a large literature examining the effect of minimum wages on inequality and poverty. Theoretically, the impact of an increase in the minimum wage on income inequality and poverty is ambiguous. On the one hand, an increase in the minimum wage compresses the bottom of the wage distribution and as such reduces income inequality. In addition, it allows employees at the bottom of the wage distribution to receive a higher wage and reduces their risk of poverty. On the other hand, a higher minimum wage may lead to individuals leaving or partially retreating from the formal labour market as they become unemployed, underemployed or start working in the informal labour market. [27] This may result in increased income inequality and poverty for those individuals excluded from the labour market.

Empirical studies analysing the impact of minimum wages on poverty have mainly used relative poverty rates as indicators of poverty (e.g. Card and Krueger, 1995; Gundersen and Ziliak, 2004), with some also assessing the impact on the poverty gap (e.g. Dube, 2013). [28] The impact of minimum wage changes is measured as an elasticity, which is the percentage change in poverty due to the percentage change in the minimum wage. A positive elasticity implies that an increase in the minimum wage leads to an increase in poverty; a negative elasticity implies that an increase in the minimum wage leads to a decrease in poverty.

Available evidence suggests that, if the effect is at all significant, an increase in the minimum wage leads to a small decrease in poverty (e.g. Addison and Blackburn, 1999; Stevans and Sessions, 2001; Neumark and Wascher, 2011; Gunderson and Ziliak, 2004; Dube, 2013). The effect is likely to depend on demographic factors such as age, education and family composition of minimum wage earners. In a detailed review of 11 studies, Dube (2013) finds that a simple average of 53 minimum wage elasticities across different demographic groups yields an elasticity of -0.20 and an average elasticity of -0.15 in case only overall poverty rates (as opposed to for narrow subgroups) are taken into account. [29] This implies that a 10% increase in the minimum wage would decrease the poverty rate by about 2%.

4.2. Data and empirical approach

The empirical analysis presented in this section consists of two parts. First, the analysis sheds light on the relationship between the minimum wage and the poverty rate. In this respect the following two questions are considered: Are minimum wage earners poor? Are the poor earning the minimum wage? Second, the analysis simulates what happens to poverty in case

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[27] However, in a search and matching framework, an increase in the minimum wage rises workers' outside option in the informal sector rising labour costs and lowering employment (eg Moser and Stahler 2009).

[28] Some studies also evaluate the impact on hardship and food security (Heflin, 2009; Sabia and Nielsen, 2015).

[29] Elasticities are more precisely estimated for youngsters and low-skilled workers (between -0.50 and -0.21 - found by Addison and Blackburn, 1999) and children (elasticities between -0.46 and -0.35 found by Morgan and Kickham, 2001 and Defina, 2008). Others find no significant impact on poverty (Card and Krueger, 1995; Neumark and Wascher, 2002; Burkhauser and Sabia, 2007; Sabia, 2008; Sabia and Burkhauser, 2010; Sabia and Nielsen, 2015).

the minimum wage is increased under three different scenarios. Poverty rates are compared before and after the increase in the minimum wage, assuming constant as well as adjusted poverty lines.

The data cover 21 Member States ([30]) and are based on the 2013 micro-level data of the European Statistics on Income and Living Conditions (EU-SILC). EU-SILC data are complemented with information on national statutory minimum wages from Eurostat.

4.3. Results

4.3.1. Are minimum wage earners poor?

In order to explore the likelihood of being poor for minimum wage earners, poverty outcomes for minimum wage earners are compared with poverty outcomes for other population groups. Five groups are considered: employees who earn a wage above 105% of the minimum wage; minimum wage earners ([31]); self-employed, unemployed and inactive individuals. Two poverty variables are considered: the poverty rate and the poverty gap. The first measures the incidence of poverty based on the share of individuals in the population with an equivalised disposable household income below 60% of the national median income (referred as the "poverty line").. The second is an indicator for the depth of poverty and is measured as the difference between the median equivalised household income of households below the poverty line and the poverty line itself, expressed as a percentage of the poverty line.

Graph 9 shows that the poverty rate for minimum wage earners is at the same level or higher than aggregate poverty rates. The poverty rate for minimum wage earners is the lowest (15% or below) in Ireland and the Netherlands, and highest (30% and up) in Bulgaria, Greece, Spain, Luxemburg and Latvia. Poverty among minimum wage earners is considerably higher than for higher wage earners, but at the same time significantly lower than for unemployed individuals. In several countries, the poverty rate for unemployed is (more than) twice as high as for minimum wage earners. Poverty rates for minimum wage earners are similar to those for self-employed and inactive individuals in most countries. ([32])


([30]) The Member states included are Belgium, Bulgaria, Czech Republic, Estonia, Greece, Spain, France, Croatia, Hungary, Ireland, Lithuania, Luxemburg, Latvia, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia and United Kingdom.

([31]) Minimum wage earners are defined as the employees (older than 15 years) who earn not more than 105% of the national statutory minimum wage (in full-time equivalents).

([32]) Exceptions are Portugal and Romania where poverty among self-employed individuals is almost as high as among the unemployed. In particularly, for Romania this finding could be related to a high share of self-employment on semi-subsistence farms in the agricultural sector.

**Graph 9: Incidence of poverty by employment status**

Source: EU-SILC 2013
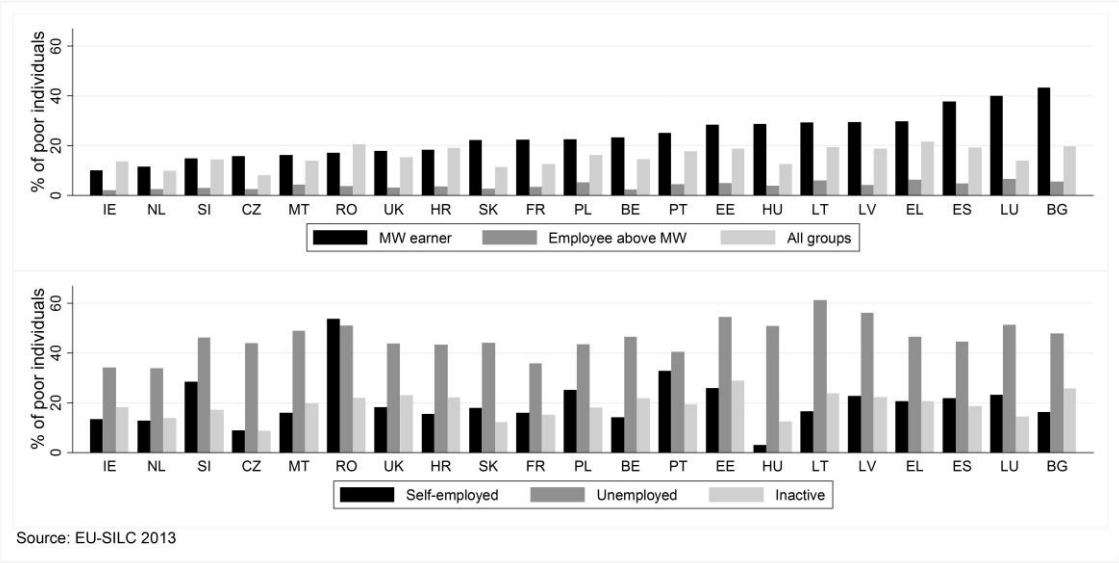
Notes: The poverty rate measures the incidence of poverty which is the share of individuals in the population with an equivalised disposable household income below 60% of the national median equivalised disposable household income. It is measured at the household level. The figures should be interpreted as follows: in Ireland 10% of the employees earning the minimum wage are living in a household that is poor; 2% of the employees earning a wage above the minimum wage are living in a household that is poor and there is an overall poverty rate of 14%. The employment status of an individual (older than 15 years) is determined based on the status of the individual in most of the months during the income reference period.

Source: Own calculations based on EU-SILC.

Graph 10 shows that for most countries, the poverty gap for minimum wage earners is in the same range as for the inactive, while the poverty gap for the unemployed and self-employed is in general higher. The poverty gap for those earning the minimum wage is the lowest in Slovakia (14%) and Czech Republic (15%), implying that the income of poor minimum wage earners in these countries is just below the poverty line. In combination with the low observed poverty rate, these findings suggest that poverty-related problems among minimum wage earners are less of a concern for these countries. In contrast, in Bulgaria, Greece or Spain, both the poverty rate and the poverty gap are high, implying that a large share of the minimum wage earners are poor and that their incomes are well below the poverty line. While poverty-related problems among minimum wage earners are more pertinent in these countries, the likelihood that an increase of the minimum wage would lift them out of poverty will be lower.

Graph 10: Depth of poverty by employment status

Source: EU-SILC 2013
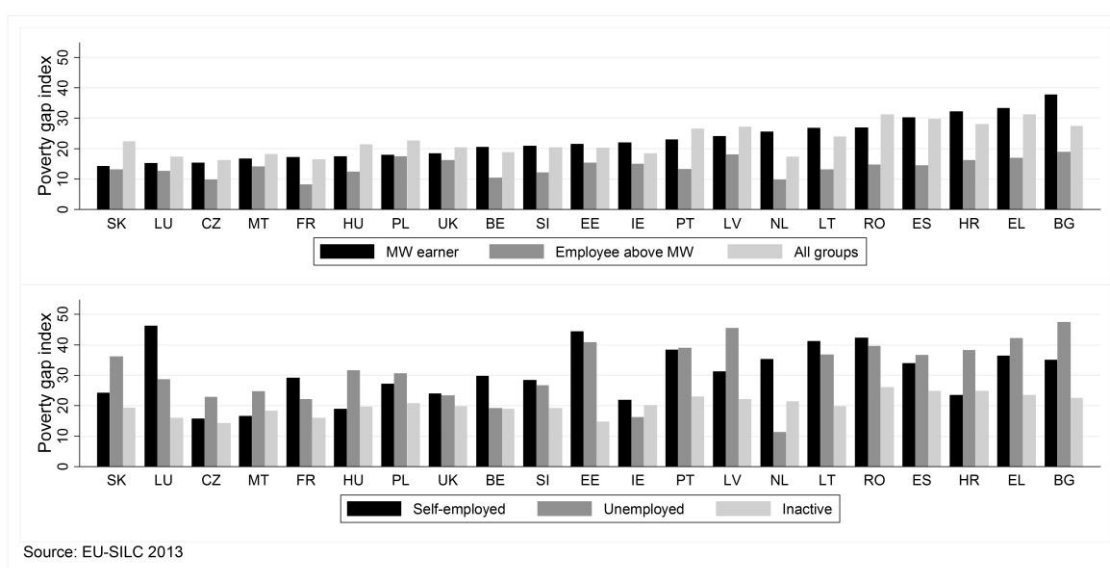
Notes: The poverty gap measures the depth or intensity of poverty and provides complementary information to the incidence of poverty. It is measured at the household level. It looks at how far below the poverty line the income of the poor is, and is measured as the difference between the median equivalised household income of households below the poverty line and the poverty line itself, expressed as a percentage of the poverty line. The poverty gap is a useful measure to assess how much extra income would be required to lift a poor household over the poverty line and reduce poverty. If the poverty gap is small, a relatively small income increase can be sufficient to lift a household out of poverty. The figures should be interpreted as follows: in Slovakia the median equivalised income of poor households with a minimum wage earner is 19% lower than the equivalised household income of those households at the poverty line. The employment status of an individual (older than 15 years) is determined based on the status of the individual in most of the months during the income reference period.

Source: Own calculations based on EU-SILC.

### 4.3.2. Are the poor earning the minimum wage?

Overall, the share of minimum wage earners in the total number of poor individuals is relatively low, notably below 18% in all EU Member States (Graph 11). The majority of the poor are either inactive or unemployed. Minimum wage earners constitute the largest share of the poor in France (16%), Luxembourg (17%), and United Kingdom (16%). This is the result of the interplay between the weight of different population groups in the population, and the poverty rates among these population groups.

For example, in Luxembourg, the high share of minimum wage earners is being driven by the poverty rate among minimum wage earners, which is relatively high as compared to other population groups. In France and UK, the difference in poverty rates between minimum wage earners and the rest of the population is less pronounced, but these have a higher share of minimum wage earners among employees, as well as in the overall population. Conversely, in Bulgaria, one of the countries with the most severe poverty outcomes, the minimum wage

earners make up only 3.3% of all poor individuals; and the vast majority of the poor (82%) are either unemployed or inactive.

Graph 11: Distribution of poor individuals by employment status
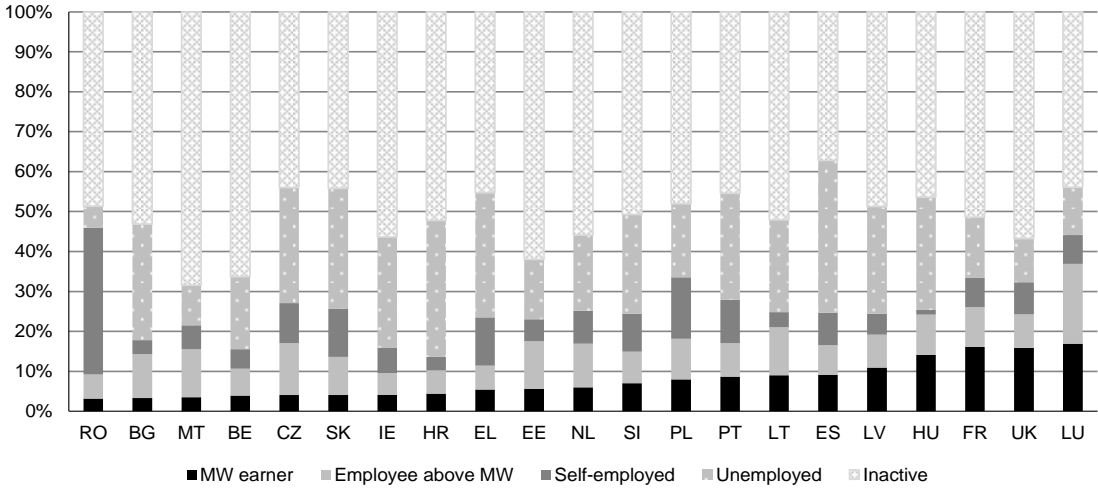
*Notes:*The distribution includes only individuals older than 15 years for whom the employment status was given. The figure should be interpreted as follows: in Luxemburg 17% of the poor are minimum wage earners, 20% are employees earning a wage above the minimum wage, 7.2% are self-employed and 44% are inactive. The employment status of an individual (older than 15 years) is determined based on the status of the individual in most of the months during the income reference period.

Source: Own calculations based on EU-SILC.

It is easier to understand the drivers of the share of minimum wage earners among the poor (which determines the magnitude of the expected impact of a minimum wage increase on aggregate poverty) by disaggregating the share of minimum wage earners among the poor into two components as follows:

$$Share\ of\ MW\ among\ poor$$

$$= \frac{Poverty\ rate\ MW}{Overall\ poverty\ rate} * \frac{MW\ earners}{Population}$$

The first term in this formula is an indicator for relative poverty among minimum wage earners, measured as the ratio of the poverty rate for minimum wage earners over the aggregate poverty rate. This is referred to as the "probability-effect", as it relates to the likelihood of minimum wage earners being poor. Graph 12 presents the correlation between the share of minimum wage earners and the ratio of the poverty rate for minimum wage earners over the overall poverty rate.

Graph 12: Main drivers of the impact of the minimum wage on overall poverty: Probability effect
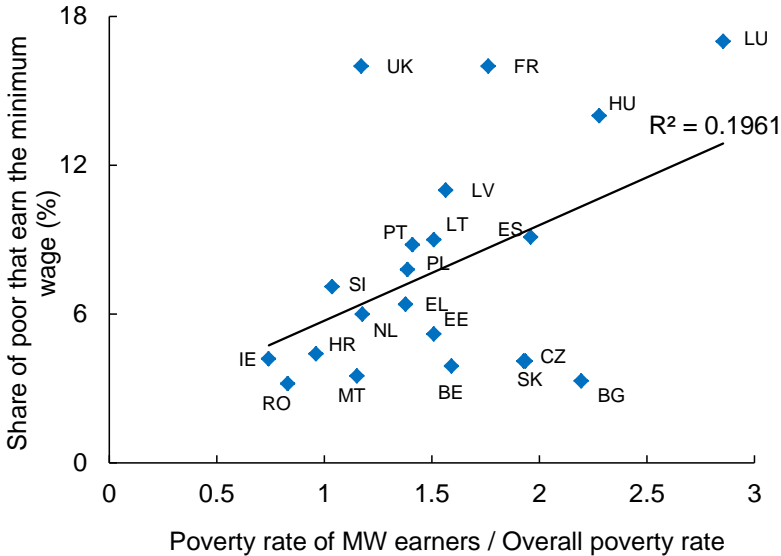
The second term measures the share of minimum wage earners in the total population. It provides an indication of the relative importance of the affected individuals in the population; therefore it is referred to as the *volume-effect*.

Graph 13 presents the correlation between the share of minimum wage earners in the population and the share of minimum wage earners among the population. These charts reveal that differences across countries in the share of poor earning the minimum wages are more strictly related to differences in the relevance of the *volume effect* than to differences across countries in the *probability effect*; indeed, simple correlations suggest that the *volume-effect* outweighs the *probability-effect*.

Graph 13: Main drivers of the impact of the minimum wage on overall poverty: Volume effect
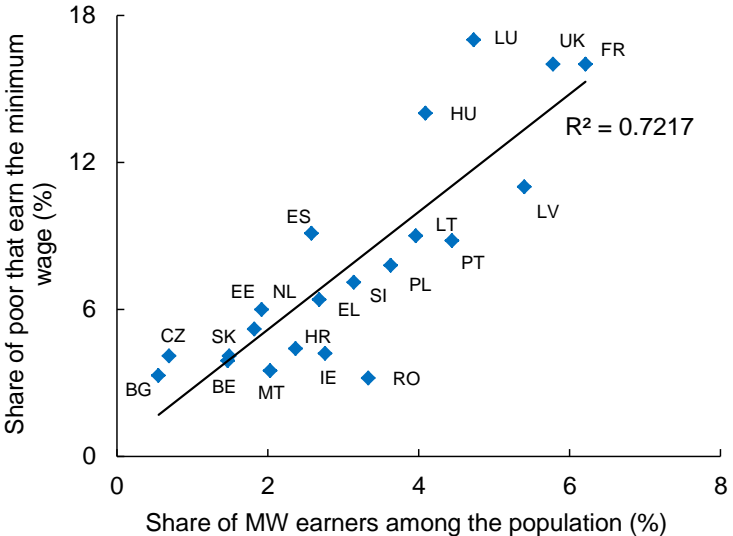
4.3.3. Simulations: What is the impact of an increase in the minimum wage on poverty?

The impact of an increase in the minimum wage is simulated under three different scenarios: (A) an increase in the monthly minimum wage for all countries by 10%; (B) an increase in the monthly minimum wage to 40% of the average wage for those countries where the ratio was below 40%; and (C) an increase in the monthly minimum wage to 50% of the median wage for those countries where the ratio was below 50%.

First, *in case the poverty line is kept unadjusted*, aggregate poverty rate is expected to decline, as household incomes increase for a part of the population, and some households will be lifted over the poverty line. ([33]) The simulations show that aggregate poverty outcomes significantly decline across all scenarios and across all countries (except for Czech Republic) (Table 12). The table shows the poverty rate in the population and the percentage point change under different assumption of minimum wage increases and under the assumption of no effects on employment.

Table 12: Impact on the aggregate poverty rate (unadjusted poverty line)

	Baseline	Scenario 1: 10% increase	Scenario 2: Min. 40% of average wage	Scenario 3: Min. 50% of median wage
Belgium	14.66	-0.14	-	-0.14
Bulgaria	19.78	-0.08	-	-0.08
Czech Republic	8.18	0	-0.01	-0.05
Estonia	18.86	-0.17	-0.31	-0.28
Greece	21.66	-0.27	-	-
Spain	19.32	-0.37	-0.35	-0.45
France	12.7	-0.83	-	-
Croatia	19.12	-0.05	-	-
Hungary	12.63	-0.44	-	-
Ireland	13.65	-0.11	-0.11	-0.07
Lithuania	19.46	-0.29	-0.28	-0.28
Luxemburg	14.03	-0.64	-	-0.49
Latvia	18.9	-0.68	-0.52	-
Malta	14.06	-0.15	-	-0.11
Netherlands	9.92	-0.11	-0.11	-0.18
Poland	16.25	-0.31	-	-
Portugal	17.78	-0.39	-	-
Romania	20.63	-0.21	-	-
Slovenia	14.42	-0.31	-	-
Slovakia	11.52	-0.16	-	-0.07
United Kingdom	15.36	-0.36	-	-

Note: Poverty line is unadjusted compared to the baseline scenario. The impact is measured in percentage points.

([33]) The impact on the aggregate poverty gap is not clear ex ante, as it depends on the income distribution among the poor households. More detailed analysis can be found in Van Herck and Vandeplas (2017).

The overall impact on aggregate poverty is however rather small as minimum wage earners only represent a small share of the poor. In fact, the majority of the poor are unemployed or inactive and therefore not affected by the increase in the minimum wage. Still, there are differences in the impact on poverty between countries. For the first scenario, the largest impact on the poverty rate is observed in France (-0.83 pps or -6.5%), Luxemburg (-0.64 pps or -4.6%) and Latvia (-0.68 pps or -3.6%). The smallest impact is found in the Czech Republic (0.0 pps or 0.0%), Croatia (-0.05 pps or -0.3%) and Bulgaria (-0.08 pps or -0.4%). Not surprisingly the impact of minimum wage increase is positively correlated with the share of minimum wage earners among the poor and in particular with the share of minimum wage earners among the population (*volume effect*).

Second, *in case the poverty line is allowed to adjust* to the new wages received, the impact of a change in the minimum wage on the poverty rate becomes unclear a priori and will depend on the income distribution in the country. In case the minimum wage increases, the income of minimum wage earners increases, and they may be lifted over the poverty line. However, the poverty line in itself is expected to shift upwards, as the national median equivalised disposable household income will increase. This may offset the former effects.

The results show that the impact differs between countries (Table 13). For Romania the poverty rate slightly increases compared to the baseline under the relevant scenarios. Also in Belgium, Croatia and Ireland, there was an increase with respect to the baseline scenario, although this increase was not statistically significant. In the other countries, the poverty rate decreases under the relevant scenarios. However, the impact is relatively modest and in most countries the change in the poverty rate compared to the baseline is lower than 1%. A larger impact than 1% is being found in Greece, France, Hungary, Luxemburg, Latvia (scenario 1), Portugal and Slovakia. The impact is the largest in France, where as a result of a minimum wage increase of 10% the poverty rate decreases by 0.55 percentage points or 4.33%.

Table 13: Impact on the aggregate poverty rate (adjusted poverty line)

	Baseline	Scenario 1: 10% increase	Scenario 2: Min. 40% of average wage	Scenario 3: Min. 50% of median wage
Belgium	14.66	0.06	-	0.04
Bulgaria	19.78	-0.08	-	-0.08
Czech Republic	8.18	0	-0.01	-0.05
Estonia	18.86	-0.17	-0.16	-0.13
Greece	21.66	-0.23	-	-
Spain	19.32	-0.18	-0.17	-0.25
France	12.7	-0.55	-	-
Croatia	19.12	0.03	-	-
Hungary	12.63	-0.4	-	-
Ireland	13.65	-0.01	0	0.02
Lithuania	19.46	-0.08	-0.08	-0.08
Luxemburg	14.03	-0.57	-	-0.39
Latvia	18.9	-0.38	-0.27	-
Malta	14.06	-0.12	-	-0.09
Netherlands	9.92	-0.03	-0.03	-0.1
Poland	16.25	-0.23	-	-
Portugal	17.78	-0.31	-	-
Romania	20.63	0.15	-	-
Slovenia	14.42	-0.05	-	-
Slovakia	11.52	-0.16	-	-0.07
United Kingdom	15.36	-0.09	-	-

Notes: Poverty line is adjusted in each scenario compared to the baseline scenario. The impact is measured in percentage points.

Overall, these simulations show that in general increases in the minimum wage may reduce aggregate poverty. The impact differs between member states and is especially higher in countries where the minimum wage earners represent a higher share of the population. However, it is important to acknowledge that this analysis does not take into account the negative impact that an increase in the minimum wage may have on employment.

5. Conclusions

Statutory minimum wages are a policy tool to guarantee a *fair* wage for those in low pay jobs and address cases in which workers are in a weak bargaining position. As evidenced by this chapter, the minimum wage is an effective tool to improve distribution and support consumption of low wage earners, with small negative effects on employment that disappear over time.

EU countries differ in their minimum wage setting regime. Differences concern not only the level of minimum wage as proportion to the average wage, but also its institutional setting for minimum wage updates. Differences are considerable in the role played by the government and factors taken into account when adjusting the minimum wage. Systems where

governments can reset the minimum wage without early consultation of social partners and other stakeholders and clear criteria may allow responding to unexpected shocks, but at the cost of making the updating unpredictable and at the mercy of the electoral cycle. Irregular increases of the minimum wage may lead to larger revisions than more regular and gradual updates. Rule-based systems reduce the *political bias* and, being *predictable* and *transparent*, allow employers and employees to make their plans. Yet, rule-based systems may introduce real wage rigidity for low wage earners and lead to excessive rippling (spill over) effects on wages close to the minimum.

A properly designed institutional setting has to balance the need of achieving the objectives of a minimum wage policy with the uncertainty that an unclear and unpredictable framework may entail. Moreover, institutional arrangements that allows some flexibility in the minimum wage setting policy (e.g. through inability-to-pay clauses or consensual suspensions of minimum wage payments by bipartite or tri-partite agreements) could provide the additional lever to deal with shocks that hit the most vulnerable more strongly.

The chapter leaves open a number of questions that may be taken on for future analysis. First, the minimum wage is one policy lever to reduce in-work poverty and redistribute income. The design of the tax and benefit system and the availability of in-work benefits can also be alternative tools. The relative effectiveness of these two policy levers will have to assessed against the design of minimum wage policies and the tax and benefit systems. Second, the effect of the minimum wage on profits, in particular of companies employing a large number of low-wage workers, is less prominent. The study of the effect of minimum wage on profitability is relevant to determine the role of the minimum wage in determining international costs competiveness.

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