



EUROPEAN CENTRAL BANK

EUROSYSTEM

Working Paper Series

Jan Babecký, Clémence Berson,
Ludmila Fadejeva, Ana Lamo, Petra Marotzke,
Fernando Martins, Paweł Strzelecki

Non-base wage components as a
source of wage adaptability to shocks:
evidence from European firms,
2010-2013

Wage Dynamics Network

No 2158 / June 2018

Disclaimer: This paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

Wage dynamics network

This paper contains research conducted within the Wage Dynamics Network (WDN). The WDN is a research network comprising economists from the European Central Bank (ECB) and the national central banks (NCBs) of the EU countries. It aims to study in depth the features and sources of wage and labour cost dynamics and their implications for monetary policy.

The WDN initially operated from 2006 to 2009 and resumed activities, in part, from 2013-2017. The WDN's most recent research focus is to assess labour market adjustments in the period 2010-13 and firms' reactions to the labour market reforms which took place over this period in EU Member States. For this purpose, in 2014 the network launched an ad hoc survey of firms called the "WDN3 survey".

The refereeing of this paper was coordinated by Juan J. Jimeno (Banco de España, chairperson), Jan Babecký (Česká národní banka), Mario Izquierdo (Banco de España), Stephen Millard (Bank of England), Tairi Rõõm (Eesti Pank), Thomas Mathä (Banque centrale du Luxembourg), and Eliana Viviano (Banca d'Italia).

The paper is hereto released in order to make the results of WDN's research widely available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are those of the authors and do not necessarily reflect those of the ESCB.

Abstract

This paper provides evidence on the role of non-base wage components as a channel for firms to adjust labour costs in the event of adverse shocks. It uses data from a firm-level survey for 25 European countries that covers the period 2010–2013. We find that firms subject to nominal wage rigidities, which prevent them from adjusting base wages, are more likely to cut non-base wage components in order to adjust labour costs when needed. Firms thus use non-base wage components as a buffer to overcome base wage rigidity. We further show that while non-base wage components exhibit some degree of downward rigidity, they do so to a lesser extent than base wages.

JEL Codes: J30, J32, C81, P5

Keywords: downward nominal wage rigidity, bonuses, firm survey, European Union

Non-technical summary

Micro-level data on wage variations and survey-based evidence on wage setting have revealed that even in the face of large negative shocks, not only are workers reluctant to accept cuts in their nominal wages, but also firms seem to be unwilling to carry out such cuts. This is referred to as downward nominal wage rigidity (DNWR). The resistance to cutting wages – when economic conditions justify it – in favour of freezing them is of course a major impediment to labour cost adjustment. In the presence of DNWR, a positive rate of inflation is needed to facilitate the adjustment of relative wages. Hence, an inflation rate which is too low could lead, in the presence of DNWR, to long-term unemployment.

However, the relevance of DNWR depends on whether firms have other margins besides base wages to adjust labour costs when needed. It is possible that rigidity has little effect on aggregate employment simply because firms have made adjustments that could be reflected in variables such as profits or productivity. Another possible explanation for the decorrelation between employment and DNWR is that firms may be able to achieve the necessary flexibility that is prevented by nominal wage rigidity by using more flexible pay components, such as performance-related bonuses, commissions and other benefits. Even though employees are less likely to oppose changes in these benefits than in their wages, from firms' perspective they are also labour costs. That is why the key point when analysing DNWR is whether firms can flexibly adjust total compensation as a whole. It could be the case that the effective degree of DNWR turns out to be lower when one accounts for total compensation, leading to a smaller sacrifice ratio and reduced bending of the Phillips curve.

This paper examines the issue of substitutability and complementarity between the base and non-base wage components raised in the literature. In particular, the paper assesses the role of non-base wage components as a channel of labour cost adjustment in firms facing adverse economic shocks during 2010–2013. It firstly focuses on the relationship between wage rigidities and the use of non-base wage component adjustment. It then analyses the differences in the responses of base wages and non-base wages to shocks.

We use a unique dataset based on a survey of firms from 25 European Union countries undertaken between the end of 2014 and mid-2015 as part of the third wave of the Wage Dynamics Network – a Eurosystem research network created in 2006 and reactivated in 2013 with the main purpose of assessing labour market adjustments in the period 2010–2013.

The main results are the following. About 74% of firms covered in our sample paid bonuses and other performance-related benefits (non-base wage components) in 2013, with an average share of non-base wage components in the total wage bill in 2013 of around 7%. This is lower than in the pre-crisis period (11%). The smaller fraction of non-base wage components in the total wage bill may reflect the slower economic growth in 2013 relative to the pre-crisis period (2002–2007), but it is also suggestive of an increased role of these payments in firms' labour cost flexibility, as reflected in a higher share of firms using non-base wages as part of their remuneration mechanisms. There is significant heterogeneity in the use of non-base wage reductions by sector and size for firms negatively affected by the economic conditions. A total of 13% of firms cut non-base wage components during 2010–2013, which is substantially larger than the percentage that cut base wages (5%). This is not surprising for the majority of countries given the prevalence of DNWR.

The results indicate that firms that are subject to nominal wage rigidities are more likely to cut non-base wages in order to adjust labour costs in the presence of shocks. Thus, bonuses and benefits played a role as shock absorbers during the period 2010–2013.

While firms which experience a fall in demand are more likely to reduce both base wages and non-base wage components than those that do not suffer any shock, we find that the increase in the probability of reducing non-base wages is higher than that of reducing base wages. Similarly, other negative shocks consistently generate negative effects on wages, with non-base wage components reacting more strongly than base wages to negative shocks. Our evidence also suggests that non-base wage components react more frequently in the case of negative shocks, and these reactions are stronger for non-base wage components than for base wages.

1. Introduction

Micro-level data on wage variations and survey-based evidence on wage setting have revealed that even in the face of large negative shocks, not only are workers reluctant to accept cuts in their nominal wages, but also firms seem to be unwilling to carry out such cuts. In some countries, these are quite difficult to implement or even forbidden due to labour legislation. This is referred to as downward nominal wage rigidity (DNWR). The restrictions on nominal wage cuts – when economic conditions justify them – in favour of wage freezes are of course a major impediment to labour cost adjustment.

Besides legal constraints, several reasons have been given in the literature for workers' and employers' resistance to wage cuts. In addition to leading to lower standards of living for workers, such cuts may be considered unfair or demeaning by workers, with subsequent consequences for productivity. Stiglitz (1986) puts forward two main economic explanations for the presence of DNWR: the implicit contract theory, which exploits the role of wages as an insurance-providing mechanism against fluctuations in the cost of living, and the efficiency wage model, according to which wages are regarded as a productivity-enhancing device. Akerlof and Yellen (1990), Bewley (1999), Agell and Lundborg (2003) and Babecký *et al.* (2010), among others, confirm the importance of fairness and efficiency considerations in preventing wage cuts.

The empirical evidence on the prevalence of DNWR is also vast and is based mainly on the analysis of changes in the wage growth distribution. In the U.S., clear signs of resistance to nominal wage cuts are found in studies such as Kahn (1997), Altonji and Devereux (2000) and Lebow *et al.* (2003). More recently, a comprehensive cross-country study conducted as part of the International Wage Flexibility Project has also revealed the existence of nominal wage rigidity in many European countries (Dickens *et al.*, 2007). Babecký *et al.* (2010) provide survey-based evidence on downward wage rigidity and its determinants for EU countries during times of economic stability; Fabiani *et al.* (2010), Izquierdo *et al.* (2017) and Marotzke *et al.* (2017) find that DNWR was prevalent in EU countries even in the strongest phases of the recent crisis.

The extent and implications of DNWR are one of the key long-standing debates in macroeconomics. The issue goes back to Tobin (1972), who argued that DNWR induces a long-term trade-off between inflation and unemployment. In the presence of DNWR, a positive rate of inflation is needed to facilitate the adjustment of relative wages, in particular in recessions. Hence, an inflation rate which is too low could lead, in the presence of DNWR, to long-term unemployment.

Subsequent theoretical research has formalised Tobin's argument in the context of the Phillips curve, which plots the average inflation rate against the average unemployment rate (Akerlof *et al.*, 1996). From the perspective of monetary policy, in the presence of DNWR higher inflation could be a way to promote labour market efficiency by widening the range of real wage cuts accepted by workers, leading to a lower impact on unemployment. Indeed, in the face of negative shocks, employment adjustment is typically higher in the presence of nominal wage rigidity, particularly in low inflation regimes. This is one of the main reasons for having a positive inflation target.

More generally, the degree of wage rigidity determines, among other factors, the speed, nature and cost of adjustment in the presence of economic shocks. In particular, nominal wage rigidity may prevent the proper functioning of a multi-country monetary union with segmented labour markets such as the euro area, where there is significant cross-country heterogeneity in labour market features and performance. The macroeconomic consequences of different types of wage rigidities are analysed for the euro area countries in Fahr and Smets (2010).

However, it is important to note that the macroeconomic effects of DNWR are not unambiguous. In fact, the relevance of DNWR depends on whether firms have other margins besides base wages to adjust labour costs when needed. It is possible that rigidity has little effect on aggregate employment simply because firms have made adjustments that could be reflected in variables such as profits or productivity. For instance, Nickell and Quintini (2003) find that despite some rigidity at zero nominal wage changes, the macroeconomic impact of such distortion is very modest. Gordon (1998) finds a positive correlation between the estimate of the time-varying NAIRU and inflation. One possible justification for this puzzle is that firms may be able to achieve the necessary flexibility that is prevented by nominal wage rigidity by using more flexible pay components, such as performance-related bonuses, commissions and other benefits.

Bonuses play an important role in personnel economics as a performance incentive (Lazear and Oyer, 2007). Bonus payments are usually seen as a way of motivating employees to make more effort in the moral hazard problem on the agents' side (Harris and Raviv, 1979; Hölmstrom, 1979). Admittedly, efficiency wages can also address this problem, but they do so in a less efficient way if a worker's productivity is observable to some extent (Maestri, 2012). Bonus payments outperform fixed wage contracts and piece rates in multitask jobs when only some task results can be monitored (Holmstrom and Milgrom, 1991; Fehr and Schmidt, 2004). The signalling effect of bonuses is also important in giving credible feedback to junior staff and preventing the best workers from looking for outside options (Fuchs, 2015). However, the application of bonuses can in some situations also lead to adverse effects on motivation (Klor *et al.*, 2014; Nafziger, 2011). Thus, there is no universal and optimal method of remuneration and different theories explain only some aspects of the various methods used by firms (Brown, 1990; Hasnain *et al.*, 2014).

Most firms use a combination of different remuneration methods and motivation, so despite the fact that base or bargained wages typically display features of downward rigidity, it is possible that firms are able to vary other forms of remuneration – which may be less important or less visible to workers than base wages – to achieve desired adjustments in total labour costs. In many firms, particularly larger ones, performance-related benefits such as bonuses and commissions account for a large and growing share of total compensation. Even though employees are less likely to oppose changes in these benefits than in their wages, from the firms' perspective they are also labour costs. That is why a key point when analysing DNWR is whether firms can flexibly adjust total compensation as a whole. It could be the case that the effective degree of DNWR turns out to be lower when one accounts for total compensation, leading to a smaller sacrifice ratio and reduced bending of the Phillips curve.

There is evidence suggesting that the effects of nominal base wage rigidity are at least partly overcome in this way. For instance, Lebow *et al.* (1999) measure the extent of DNWR using

the microdata underlying the BLS employment cost index. They show that the number of nominal wage cuts is around one half of what would happen in the absence of this rigidity, but firms are able to mitigate at least a part of this rigidity by changing benefits: total compensation displays about one-third less rigidity than do wages alone. Dwyer and Leong (2003) show that broad measures of earnings also display downward rigidity, but to a lesser extent than wages. Bewley (1999), who interviewed the managers of companies in the U.S., found that bonuses were frequently used as a way of flexibly reducing expenses when firms were most in need of money. However, he also found that this strategy, similarly to base wage cuts, was connected with some disadvantages: damage to morale and productivity, and increased turnover of better workers. This is also in line with the earlier similar survey findings of Campbell and Kamlani (1997).

On the other hand, the decision to extensively use non-base wage components can be seen as a wage cushion strategy – keeping a difference between the contractual and actual wage. In many countries, this strategy (margin) is frequently used to offset collective bargaining, granting firms the possibility of setting wage changes below those negotiated under collective agreements while keeping wages above the bargained floors (Cardoso and Portugal, 2005). In Germany, Jung and Schnabel (2011) found evidence that firms bound by multi-firm agreements paid higher wage premiums on average in order to overcome the restrictions imposed by the rather centralised bargaining system.

The evidence of the relationship between changes in wage components and other channels of labour cost adjustment has been based mainly on detailed surveys addressed to firms' managers. Non-base wage components seem to be considered by managers as important in the case of serious macroeconomic shocks. Babecký *et al.* (2012) examine the importance and determinants of a variety of strategies that firms might use to cut labour costs, particularly when base wages are rigid. They show that firms subject to nominal wage rigidity are much more likely to use these strategies, suggesting the presence of some degree of substitutability between base wage flexibility and the flexibility of other labour cost components. Messina *et al.* (2010) show that moderate or high use of non-base wage components in firms negatively influences DNWR, but “the complementarity between flexibility in base wages and flexible pay components casts serious doubts on the notion that rigidity in base wages might be circumvented using bonuses and other flexible components of pay”. Dias *et al.* (2013) provide evidence that in the face of negative shocks, the availability of alternative labour cost margins is likely to reduce the detrimental effect on employment that results from the presence of DNWR. There is also evidence that non-base wage components were frequently adjusted during the first period of the economic crisis in 2008–2009 (see ECB, 2009, and Fabiani *et al.*, 2015). In fact, in some countries it appears to have been the only channel for wage adjustment in reaction to shocks.

In this paper, we want to shed light on the issue of substitutability and complementarity between base and non-base wage components raised in the literature described above. In particular, the paper examines the role of non-base wage components as a channel of labour cost adjustment in firms facing adverse economic shocks during 2010–2013. It firstly focuses on the relationship

between wage rigidities and the use of non-base wage component adjustment.¹ It then analyses the differences in the responses of base wages and non-base wages to shocks.

We use a unique dataset based on a survey of firms from 25 European Union countries undertaken between the end of 2014 and mid-2015 as part of the third wave of the Wage Dynamics Network – a Eurosystem research network created in 2006 and reactivated in 2013 with the main purpose of assessing labour market adjustments in the period 2010–2013.

Our results reveal that bonuses and other performance-related benefits (non-base wage components) were an important adjustment mechanism for firms in the period 2011–2013. About 75% of the firms used this margin to reduce labour costs in 2013. The reported average share of non-base wage components is 7%, which is somewhat lower than the figure obtained for 2007 in the context of a similar survey. However, these are average shares and the degree of country and sector heterogeneity is considerable. The share of non-base wages in the total wage bill is higher in Portugal (25%) and lower in Luxembourg and Ireland (4% in both cases). It is also much higher in financial intermediation and lower in construction. There is significant heterogeneity in the use of non-base wage reductions by sector and size for firms negatively affected by the economic conditions. The percentage of firms that cut non-base wage components during 2010–2013 (13%) is substantially larger than the percentage that cut base wages (5%). This is not surprising for the majority of countries given the prevalence of downward nominal wage rigidity.

The results also indicate that non-base wage components played a role as shock absorbers during the period 2010–2013. Firms that are subject to nominal wage rigidities are more likely to cut non-base wages in order to adjust labour costs. Shocks are associated with an increased reduction of non-base wage components as a means to adjust costs.

While firms which experience a fall in demand are more likely to reduce both base wages and non-base wage components than those that do not suffer any shock, we find that the increase in the probability of reducing non-base wages is higher than that of reducing base wages. Similarly, other negative shocks consistently generate negative effects on wages, with non-base wage components reacting more strongly than base wages to negative shocks. Our evidence also suggests that non-base wage components react more frequently in the case of negative shocks, and these reactions are stronger for non-base wage components than for base wages.

The rest of the paper is structured as follows. Section 2 briefly describes the data and the main stylised facts; Section 3 examines the relationship between non-base wage component adjustment and (base) wage rigidities; Section 4 looks in detail at base wage and non-base wage component adjustment in the presence of various combinations of shocks. The last section concludes.

¹ Our focus is on the role played by wage components. Firms have other margins to make changes in their non-wage labour costs, such as changes in overtime work or shifts policy. These margins are not considered in the paper.

2. Data and stylised facts

2.1 The WDN3 Survey

The data used in this paper were collected in the third wave of the Wage Dynamics Network survey (WDN3) coordinated by the European Central Bank.² The survey was carried out between 2014 and the beginning of 2015 by 25 EU national central banks³ based on a harmonised questionnaire referring to the period 2010–2013. The WDN3 survey provided a unique cross-country dataset of labour market adjustment practices and wage and price setting mechanisms of firms with exceptional value in terms of both geographical and sectoral coverage. The data allow recent labour market adjustments to different shocks, such as change in demand, customers' ability to pay and credit availability, to be assessed.

Although the national surveys were organised and carried out by each national central bank separately, the questionnaire and the target population of firms were very similar across countries. A “core questionnaire” was developed in a coordinated fashion within the WDN. To further harmonise the findings across countries, we restrict our sample to firms employing more than five employees and operating in manufacturing, electricity and gas, construction and services (trade, market services and financial intermediation).

In the WDN3 survey, firms were asked questions pertaining to the different margins of labour cost adjustment, including a reduction of employees, both permanent and temporary, base wage freezes, changes in the non-base wage components and cuts in the number of hours worked. Using these answers together with information on firms' size, sector, institutional background and shocks gives us an opportunity to assess the effect of shocks on labour cost adjustment.

As regards the components of labour costs, firms were asked the following question: “Please indicate how each one of the components of labour costs listed below has changed during 2010–2013. Please choose ONE option for each line”. The list included the following options:

- 1) Base wages or piece work rates;
- 2) Non-base wage components (bonuses, fringe benefits, etc.);
- 3) Number of permanent employees;
- 4) Number of temporary/fixed-term employees;
- 6) Working hours per employee;
- 7) Other components (please specify).

Firms participating in the survey were required to report for each option listed above whether they observed: (a) Strong decrease; (b) Moderate decrease; (c) Unchanged; (d) Moderate increase; or (e) Strong increase. In the analysis below, we classify a firm as having cut the corresponding component of labour costs if the answer was strong or moderate decrease.

² This was a follow-up to the two previous WDN survey waves carried out in 2007 (WDN1, which covered the period 2002–2007) and 2009 (WDN2, which covered the period 2008–2009)

³ Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom.

The survey also provides relevant information on the nature of the shocks faced by firms during the period 2010–2013. For the purposes of this paper, we consider shocks to:

- i) Level of demand for products/services;
- ii) Access to external financing through the usual financial channels;
- ii) Customers' ability to pay and meet contractual terms.

Firms were required to report for each option whether they observed: (a) Strong decrease; (b) Moderate decrease; (c) No change; (d) Moderate increase; or (e) Strong increase. We use this question to identify how firms were affected by different shocks. For instance, we use changes in the level of demand (both moderate and strong) to identify firms that were hit by demand shocks and changes in access to external financing (both moderate and strong) to detect firms that were hit by credit shocks. Of course, these shocks could be positive if firms reported an increase, negative if firms reported a decrease or non-existent if firms reported no change in activity.

We use a question on the use of base wage freezes in the given year (a yes/no answer) to construct the DNWR measure at the firm level. We regard firms that froze base wages during 2010–2013 as confronting DNWR.

2.2 Stylised facts

About 74% of the firms covered in our sample paid bonuses and other performance-related benefits (non-base wage components) in 2013 (see Table 1). There is some cross-country heterogeneity, ranging from more than 90% of firms in Slovakia and Portugal to less than 55% in Luxembourg, Ireland and Cyprus (see Table A1 in the Appendix).

The average share of non-base wage components in the total wage bill in 2013 was around 7% when calculated by averaging over all the firms sampled and 9.5% when calculated only across companies that pay non-base wages. Underlying this average there is large cross-country heterogeneity. While the share of non-base wage components in the total bill in 2013 is 25% on average in Portugal, it is about 4% in Luxembourg and Ireland. When compared with the pre-crisis period, the average share of non-base wage components in the total wage bill of the firms sampled in 2007 was 11.3%, falling to 7.4% in 2013 for the subset of countries that participated in the WDN1 survey and 6.9% for the 25 WDN3 countries⁴ (see Table A1). The smaller fraction of non-base wage components in the total wage bill in 2013 may reflect the slower economic growth in 2013 relative to the pre-crisis period (2002–2007), but it is also suggestive of an increased role of non-base wage cuts as a means of adjusting the wage bill during the crisis, in line with the higher share of companies paying bonuses and other performance-related benefits in 2013 (75%) compared to 2007 (72%).

Larger firms are more likely to use non-base wage components (85% of firms with more than 200 employees vs. 55% of firms with 5–19 employees; see Table 1). The smaller firms using non-base wages, on the other hand, dedicate a larger share of total pay to this wage component

⁴The WDN1 survey was the first wave of WDN and was carried out in 17 EU countries between the end of 2007 and the first half of 2008. Conditional on firms paying non-base wages, the figures are 15.6% in 2007 and 9.7% in 2013.

(12%, compared to about 9% in firms of other sizes). The use of non-base wage components is also quite sector-specific. More than 92% of firms in financial intermediation sector use it and pay higher non-base wage shares compared to other sectors. At the other extreme, only 60% of firms in the construction sector pay a part of their wages as non-base wage components.

Table 1: Non-base wage components by firm size and sector in 2013

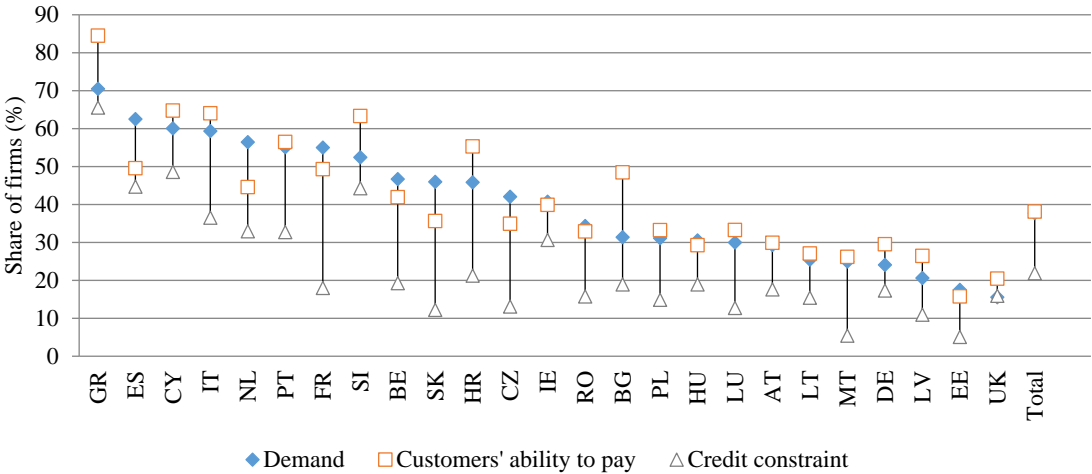
Size	Firms using non-base wage components (%)	Non-base wage in total pay, unconditional (%)	Non-base wage in total pay, conditional (%)
5–19 employees	54.9	6.8	12.4
20–49 employees	64.1	6.1	9.5
50–199 employees	73.7	6.3	8.5
> 200 employees	84.9	7.7	9.1
Sector			
Manufacturing	75.9	6.4	8.4
Electricity, gas, water	82.9	8.3	10.0
Construction	59.8	6.0	10.1
Trade	75.0	8.1	10.8
Business services	73.6	6.3	8.6
Financial intermediation	92.7	14.9	16.0
Total	74.2	6.9	9.4

Source: WDN3, authors' calculation.

Note: The data are weighted to reflect overall employment and rescaled to exclude non-response.

To understand the role that non-base wages played as a means of adjusting labour costs, we cannot ignore the incidence of different adverse shocks faced by firms during 2010–2013. The WDN results show that the share of firms affected by different shocks varies largely depending on the country and the nature of shock (Figure 1). As expected, countries that were more affected by the sovereign debt crisis (Greece, Spain, Portugal and Italy) are also those where a larger share of firms reported facing negative shocks during 2010–2013. Importantly, firms in 14 out of the 25 countries viewed a decline in customers' ability to pay as more severe than a decline in demand, though the two shocks are very much related. Unavailability of external finance (a credit constraint shock) was faced by a smaller share of firms in all countries.

Figure 1: Share of firms facing negative demand, customers’ ability to pay and credit shocks in 2010–2013



Source: WDN3, authors’ calculation.

Note: The data are weighted to reflect overall employment in the country and rescaled to exclude non-response.

Combining the information on negative economic shocks perceived by firms with that on changes in non-base wage components provides some hints on whether firms use non-base wage components as a shock absorber (see Table 2). The percentage of firms having cut non-base wages was larger in countries in which the percentage of firms experiencing either a strong or a moderate decline in any of the observed shocks was also larger. In the majority of countries, stronger negative shocks implied that more firms reduced non-base wage components.

Table 2: Percentage of firms having cut non-base wage components in 2010–2013 by country

Country	Unconditional	Conditional on having faced		
		negative shocks (either strong or moderate)	at least one strong negative shock	only strong negative shocks
AT	6.1	6.1	9.0	
BE	2.8	2.9	3.1	
BG	21.1	34.1	42.9	44.1
CY	52.2	63.4	64.7	52.4
CZ	21.6	32.1	43.7	70.4
DE	4.3	6.7	14.6	58.9
EE	5.8	18.5	40.3	
ES	23.7	28.4	22.3	26.7
FR	12.1	13.8	17.9	35.7
GR	50.9	53.8	59.2	72.7
HR	24.2	33.4	42.3	86.4
HU	20.0	28.5	33.1	51.7
IE	27.7	39.4	49.3	58.6
IT	19.9	22.4	28.4	53.0
LT	11.2	19.0	35.1	74.5
LU	15.5	23.5	29.7	
LV	10.6	24.0	45.5	26.7
MT	0.4	1.0	5.6	
NL	28.1	35.5	37.4	48.3
PL	11.8	11.6	24.0	16.5
PT	21.7	25.3	30.2	40.3
RO	11.2	20.6	30.1	49.0
SI	30.4	35.1	44.5	61.9
SK	17.4	20.6	23.9	46.2
UK	9.3	14.9	14.7	
Total	13.0	18.2	25.0	41.4

Source: WDN3, authors' calculation.

Note: The shocks considered are change in demand, customers' ability to pay and access to external finance. The data are weighted to reflect overall employment in the country and rescaled to exclude non-response

Table 3 presents the percentage of firms adjusting non-base wages by sector and firm size. The percentage of firms that cut non-base wage components is larger in financial intermediation, in line with the larger prevalence of non-base wage components in this sector (see Table 1). This share is lower in other sectors, particularly the electricity and gas sector. The shares of firms having cut non-base wage components by firm size are more even. However, large firms more often use reductions in non-base wage components as shock absorbers. Firms facing negative shock use reductions of non-base wage components more frequently in all sectors and firm size categories.

Table 3: Percentage of firms having cut non-base wage components in 2010–2013 by sector and size

Sector	Unconditional	Conditional on having faced		
		negative shocks (either strong or moderate)	at least one strong negative shock	only strong negative shocks
Manufacturing	10.7	16.1	24.0	40.1
Electricity, gas	3.6	6.6	29.5	
Construction	15.0	20.0	28.2	43.8
Trade	14.8	20.5	23.6	41.2
Business service	13.3	17.6	25.0	40.3
Financial intermediation	18.2	31.4	37.8	64.6
Size				
5–19 employees	12.7	16.3	22.9	39.6
20–49 employees	11.9	16.7	25.7	38.6
50–199 employees	12.0	16.6	23.6	36.5
> 200 employees	14.1	20.7	27.1	48.5
Total	13.0	18.2	25.0	41.4

Source: WDN3, authors' calculation.

Note: As in Table 2

The adjustment of non-base wage components is not the only labour cost adjustment channel potentially used by firms in response to negative shocks. In fact, previous studies find that firms use several adjustment channels simultaneously when reducing labour costs (Messina *et al.*, 2010). Table 4 presents the sample conditional proportions of several adjustment margins, such as base and non-base wage components, hours and employment, both for all firms in the sample and for those firms that were affected by negative shocks in the three dimensions considered (demand, customers' ability to pay and access to external financing).

Regardless of the strength of the shocks, the proportion of firms that cut the number of employees is larger than the proportion of firms that cut hours or wages. A larger share of firms report base wage freezes compared to cuts in either base or non-base wage components. However, in the subsample of firms facing only strong negative shocks, the share of firms using base wage freezes or non-base wage cuts is similar.

Table 4: Sample conditional proportions of negative change in labour cost margins in 2010–2013 (proportions calculated as weighted relative frequencies)

	Cut base wages	Cut non-base wages	Cut number of employees	Cut number of hours	Freeze base wages
P(.)	0.053	0.130	0.329	0.114	0.262
Having faced negative shocks (either strong or moderate)					
P(.)	0.075	0.182	0.423	0.162	0.296
P(. cut non-base wages)	0.260	1.000	0.745	0.270	0.471
P(. cut base wages)	1.000	0.631	0.784	0.293	0.508
P(. cut non-base and base wages)	1.000	1.000	0.862	0.331	0.580
Having faced at least one strong negative shock					
P(.)	0.108	0.250	0.552	0.226	0.365
P(. cut non-base wages)	0.319	1.000	0.783	0.313	0.491
P(. cut base wages)	1.000	0.739	0.854	0.352	0.548
P(. cut non-base and base wages)	1.000	1.000	0.879	0.389	0.604
Having faced only strong negative shocks					
P(.)	0.209	0.414	0.704	0.302	0.449
P(. cut non-base wages)	0.441	1.000	0.819	0.337	0.529
P(. cut base wages)	1.000	0.875	0.893	0.426	0.559
P(. cut non-base and base wages)	1.000	1.000	0.905	0.455	0.542

Source: WDN3, authors' calculation.

Note: The shocks considered are change in demand, customers' ability to pay and access to external finance. The measure of change in a firm's (internal) number of employees combines permanent and temporary employees. The results are weighted to reflect overall employment in the country and rescaled to exclude non-response.

In every country in our sample except Greece and, to a lesser extent, Cyprus (see Table A2), the proportion of firms that cut non-base wage components during 2010–2013 is larger than the proportion that cut base wages. This is not surprising and points to possible substitution between the two adjustment channels, in line with the findings of Babecký *et al.* (2012), Lebow *et al.* (1999) and Bewley (1999), among others. Substitution between base and non-base wages is particularly relevant for firms in France, Portugal, Luxembourg and Spain, where it is harder to reduce base wages for permanent employment. In the Baltic countries (Estonia, Latvia and Lithuania) and Poland and Croatia, firms are more flexible in the choice of adjustment margin due to generally lower base wage rigidity.⁵

Table 4 shows the proportions of firms using some labour cost-cutting margin both for all firms in the sample and for those firms that were negatively affected by shocks. As expected, the proportion of firms using any labour cost-cutting margin increases within the sample of firms that were negatively affected by at least one shock. For instance, the share of firms that cut the

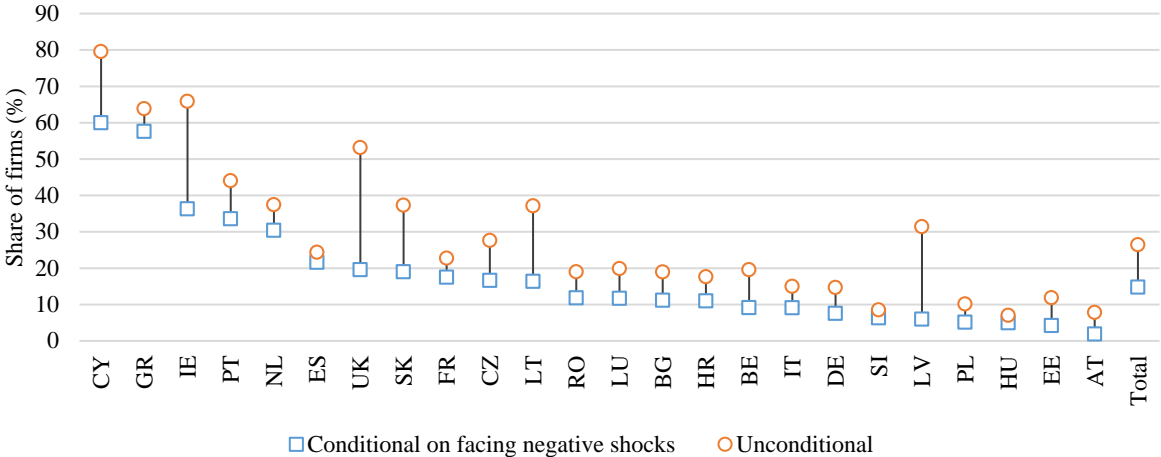
⁵ The *de facto* enforcement of wage adjustment restrictions is loose in these countries despite their high EPL scores. These conclusions are confirmed by a large survey of institutional features of wage bargaining (Du Caju *et al.*, 2008).

number of employees, either permanent or temporary, increases from 33% in the whole sample to 42% in the sample of firms facing shocks. Perhaps more interesting is that the proportion of firms cutting employment reaches 75% among firms that also cut non-base wages, 78% among those that also cut their base wages and 86% for those that cut both. These percentages are even higher if any of the shocks was deemed to be strong. This suggests that firms tend to use several available cost-cutting margins, the more so the more strongly they are hit by the crisis.

3. Do firms use non-base wage components as a buffer to overcome base wage rigidity?

Are firms subject to nominal base wage rigidity more likely to respond to shocks by cutting the non-base component of wages? Do firms thus use non-base wage components as a buffer to overcome base wage rigidity (DNWR)? Does the presence of unions affect firms’ decisions regarding non-base wages?

Figure 2: Share of firms freezing wages in 2010–2013, %



Source: WDN3, authors’ calculation.
 Note: The data are weighted to reflect overall employment in the country and rescaled to exclude non-response. In this section, we explore the decision to cut non-base wage components as a buffer to alleviate base wage rigidity. To construct a measure of DNWR, we use the information contained in the WDN3 survey about base wage freezes. The survey asked managers of firms directly if they ever froze wages during the period 2010–2013. Wage freezes indicate that base wage cuts were prevented from taking place due to DNWR, and more so in a downturn, when economic conditions are likely to necessitate a cut in base wages. Then, following Dickens *et al.* (2007) and Dias *et al.* (2015) (see also Nickell and Quintini, 2003), we regard firms that froze wages at any point during this period as facing nominal base wage rigidity. We assume that in those

firms, everyone whose base wages were frozen would have had a nominal wage cut in the absence of DNWR.⁶

The ranking of the countries by the share of firms freezing base wages during 2010–2013 is mainly in line with the share of countries experiencing negative shocks (see Figures 1 and 2). The exception is the UK – it ranks the last by the share of firms experiencing negative shocks and at the same time has a relatively large share of firms freezing wages. Similarly, a large share of firms in Ireland report wage freezes despite a lower level of firms facing negative shocks on average. Another interesting observation is that in these countries, along with Cyprus, Slovakia, Lithuania and Latvia, the share of firms reporting wage freezes without facing negative shocks is substantial (between 10% and 30%, as indicated by the vertical lines in Figure 2). This could be related to firms using the opportunity to reduce labour costs by exploiting the low overall level of economic sentiment without actually facing negative shocks at the time.

In order to identify the potential determinants of the probability of cutting non-base wage components and in particular its relationship with DNWR, we consider a number of firm characteristics, such as size or skill distribution, collective bargaining, bargaining coverage and labour cost share, together with our measure of DNWR, and control for the various types of shocks explained in the stylised facts section. The result of the probit estimations is summarised in Table 5, where the dependent variable takes the value of one if the firm cut non-base wage components over the period 2010–2013. We find that firms subject to nominal rigidity are more likely to cut non-base wage components, in line with the larger share of firms reducing various labour cost margins in the presence of DNWR (see Table A2). This result is robust to the choice of other control variables, including the type of shocks and the interaction terms between shocks and nominal wage rigidity (Table 5, column 3). Interestingly, while non-base wage cuts are correlated with shocks and with freezes of base wages, the effects do not stem from the interactions.⁷

Regarding other determinants influencing the decision to adjust non-base wage components, it turns out that, as suggested by the descriptive analysis in Section 2, larger firms are more likely to use non-base wage components (Table A3). Similarly, firms with a higher labour cost share and a higher share of tenured workers, as well as firms in construction and financial intermediation, are more likely to adjust non-base wage components than firms in manufacturing.

⁶ Of course, some of these freezes could have been due to menu cost or might have been optimal responses to changing conditions.

⁷ This may be driven by multicollinearity between the shocks and DNWR itself.

Table 5: Relationship between cuts in non-base wage components and base wage rigidity

	(1)	(2)	(3)
Base wage rigidity			
DNWR base wage freezes	0.117*** (0.010)	0.086*** (0.008)	0.084*** (0.016)
Shocks			
Demand shock		0.109*** (0.013)	0.114*** (0.015)
Finance shock		0.058*** (0.007)	0.062*** (0.008)
Customers' ability to pay shock		0.032*** (0.008)	0.019** (0.009)
Availability of supplies shock		0.028*** (0.006)	0.033*** (0.008)
DNWR * Shocks			
Base wage freezes & demand shock			-0.019 (0.021)
Base wage freezes & customer pay shock			0.038*** (0.012)
Base wage freezes & credit shock			-0.014 (0.013)
Base wage freezes & availability of supplies shock			-0.015* (0.009)
Observations	19,234	18,582	18,582

Note: Marginal effects reported. Probit estimation. The dependent variable is equal to one if the firm reduces non-base wage components. Standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1. The estimation is controlled for sectors, firm size, labour cost share, share of manual workers, workers' tenure, multi-establishments and country fixed effects. See Table A3 in the Annex for the full set of results.

Next, we explore the effect of unions on firms' use of non-base wage components. Table A4 shows that unionisation and the type of wage bargaining have no significant effects. Moreover, different combinations and interactions of variables, sectors and collective bargaining characteristics are not significant and do not affect the main results. Thus, substitutability between base and non-base wages to overcome DNWR is not limited by the presence of unions. In fact, collective wage bargaining and coverage do not appear relevant as regards the decision to cut non-base wage components. In addition, the higher likelihood of adjusting non-base wage components when DNWR is prevalent persists no matter what type of shocks the firm is facing. See Table A4 in the Annex.

To sum up, at the margin, firms affected by DNWR are more likely to reduce non-base wage components than those not showing base wage rigidities. Hence, there is evidence of non-base wages being used as a buffer to overcome base wage rigidity.

However, firms combine several adjustment channels when needed. The next section explores the relationship between base and non-base wage component adjustments more generally and compares their degree of downward rigidity.

4. Adjustment of base wages and non-base wage components to shocks

In order to explore the relation between the adjustment of base wages and non-base wage components, we start by reporting the frequencies of different base wage and non-base wage reactions to changing economic conditions. Then we estimate their probabilities.

4.1 Incidence of base wage and non-base wage component reductions

We consider four possible combinations of base and non-base wage adjustment by firms in response to negative shocks:

1. Reduce neither base nor non-base wage components (base = 0, flex = 0);
2. Reduce only non-base wage components (base = 0, flex = 1);
3. Reduce both base and non-base wage components (base = 1, flex = 1);
4. Reduce only base wages (base = 1, flex = 0).

We find that firms are reluctant to reduce wages and mostly choose the first option (Table 6). This is also the case when we consider various subsamples of firms which are hit by a fall in demand, a fall in demand or customers' ability to pay, and additionally a fall in credit access. For all groups considered, the second most frequent option is to reduce solely the non-base wage component. It is chosen approximately three times more often than the joint reduction of base wages and non-base wage components. Base wage reductions without reducing non-base wage components are rare.

The option not to reduce wages is chosen by 82.6% of all firms. The fraction is lower for firms which experience a fall in demand (72.5%). The fraction of firms which reduce non-base wage components only or which additionally reduce base wages increases substantially from 11.6% to 18.7% and from 3.7% to 6.1%. The fraction of firms which reduce base wages alone rises only from 2.0% to 2.7%. The evidence suggests that non-base wage components are more reactive in the case of negative shocks.

Table 6: Incidence of wage reductions

Subsample of firms	Wage adjustment options (%)				Total	Obs.
	(1)	(2)	(3)	(4)		
	base = 0 flex = 0	base = 0 flex = 1	base = 1 flex = 1	base = 1 flex = 0		
Total	82.6	11.6	3.7	2.0	100	18,503
Decline in demand	72.5	18.7	6.1	2.7	100	8,416
Decline in demand or in customers' ability to pay	76.0	15.9	5.2	2.9	100	11,172
Decline in demand or in customers' ability to pay and credit restrictions	75.4	16.3	5.7	2.6	100	8,995

Source: WDN3, authors' calculation.

Note: The data are weighted to reflect overall employment. Estimation sample of Section 4.2.

4.2 Response of base wages and non-base wage components to changes in demand

In order to compare the likelihood and determinants of changes in base and non-base wage components, we estimate ordered probit models, related through the error terms (Seemingly Unrelated Regressions – SUR). The underlying latent variable models are as follows:

$$base = X \beta_b + u_b$$

$$flex = X \beta_f + u_f$$

where *base* and *flex* reflect the adjustment of base and non-base wages respectively (decrease, unchanged, increase), *X* are the firm's characteristics and u_b and u_f are the related error terms. The firms' characteristics include its structure, ownership, autonomy level, size, country and sector as well as the change in economic conditions.

We find that firms which are hit by negative demand shocks are more likely to reduce base wages and non-base wage components compared to the reference category of unchanged demand (Table 7). However, the increase in the likelihood of wage reduction is stronger for non-base wage components than for the base wage. When facing positive demand shocks, firms increase both base wage and non-base wage components and they do so to the same extent, or, to be more precise, the increase in the likelihood is not significantly different. We find a stronger upward response of wages to an increase in demand than a downward response to a fall in demand for both base wages and non-base wage components. Further, a fall in demand significantly increases the probability that wages remain unchanged, while an increase in demand lowers the probability of unchanged wages. This asymmetry is evidence of downward rigidity (see Marotzke *et al.*, 2017). The effect of a fall in demand on unchanged wages is larger for base wages than for non-base wage components. We conclude from the comparison of marginal effects that downward rigidity is stronger for base wages than for non-base wage components.⁸

⁸ We conducted z-tests to compare marginal effects.

Table 7: Base wage and non-base wage adjustment, SUR estimates

	(1)	(2)	(3)
	Base wages	Base wages	Base wages
	Decrease	Unchanged	Increase
Demand			
<i>Decrease</i>	0.027*** (0.003)	0.039*** (0.005)	-0.066*** (0.009)
<i>Unchanged</i> (reference)	-	-	-
<i>Increase</i>	-0.041*** (0.003)	-0.096*** (0.006)	0.137*** (0.009)
Finance shock	0.024*** (0.003)	0.036*** (0.005)	-0.060*** (0.008)
Customers' ability to pay shock	0.008*** (0.003)	0.013*** (0.004)	-0.021*** (0.007)
Availability of supplies shock	0.009** (0.004)	0.013** (0.005)	-0.022** (0.009)
	Non-base wages	Non-base wages	Non-base wages
	Decrease	Unchanged	Increase
Demand			
<i>Decrease</i>	0.068*** (0.006)	0.019*** (0.002)	-0.087*** (0.008)
<i>Unchanged</i> (reference)	-	-	-
<i>Increase</i>	-0.069*** (0.004)	-0.071*** (0.004)	0.140*** (0.008)
Finance shock	0.045*** (0.005)	0.018*** (0.002)	-0.063*** (0.007)
Customers' ability to pay shock	0.019*** (0.004)	0.009*** (0.002)	-0.027*** (0.007)
Availability of supplies shocks	0.017*** (0.006)	0.007*** (0.002)	-0.025*** (0.008)
p-value	0.000		
Rho	0.6		
Observations	18,326		

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The results are obtained using Stata command *cmp* written by Roodman (2011). Details on the estimation of fully observed recursive mixed-process models with *cmp* are provided in Stata Journal 11(2): pp. 159–206. Control variables include structure, ownership, autonomy level, size and sector. Country and sector dummies are also included.

4.3 Effect of various types of negative shocks

Next, we explore the effect of various types of negative shocks on wage adjustment. We include the strength and persistency of the demand shock, which gives us five different categories of negative demand changes.

Table 8 (to be continued): Base wage and non-base wage adjustment, SUR estimates

	(1)	(2)	(3)
	Base wages Decrease	Base wages Unchanged	Base wages Increase
Demand			
<i>No decrease</i> (reference)	-	-	-
<i>Moderate decrease</i>	0.043*** (0.003)	0.080*** (0.005)	-0.122*** (0.008)
<i>Strong transitory decrease</i>	0.072*** (0.013)	0.113*** (0.014)	-0.185*** (0.027)
<i>Strong partly persistent decrease</i>	0.070*** (0.007)	0.111*** (0.008)	-0.181*** (0.015)
<i>Strong long-lasting decrease</i>	0.081*** (0.007)	0.121*** (0.007)	-0.202*** (0.013)
Finance shock	0.021*** (0.003)	0.033*** (0.005)	-0.054*** (0.008)
Customers' ability to pay shock	0.008*** (0.003)	0.014*** (0.004)	-0.022*** (0.007)
Availability of supplies shock	0.006* (0.003)	0.010* (0.005)	-0.016* (0.009)

The results in Table 8 show that all categories of the fall in demand exhibit consistent effects. Firms which are hit by a negative demand shock are more likely to reduce both base wages and non-base wage components. A strong fall in demand induces a stronger marginal effect than a moderate fall in demand. The largest marginal effect is in response to a strong, long-lasting negative demand shock. The strength and persistence of a fall in demand does not affect the marginal effect of a fall in demand on the probability of unchanged non-base wages. However, the marginal effect of a fall in demand on the probability of base wages remaining unchanged is higher when the shock is strong, which might reflect stronger downward rigidity of base wages. We find that the marginal effect on the probability of reducing non-base wages is stronger than in the case of base wages (see the first column in Table 8).

The other negative shocks (finance, customers and supplies) exhibit very consistent negative effects on wages. Non-base wage components react more strongly than base wages to negative shocks. Further, the marginal effect of all types of negative shocks on the probability of keeping base wages unchanged is larger than that on the probability of base wages being reduced, while it is the other way around for non-base wage components. This means that firms find it easier to reduce non-base wage components.

Table 8 (continued): Base wage and non-base wage adjustment, SUR estimates

	Non-base wages Decrease	Non-base wages Unchanged	Non-base wages Increase
Demand			
<i>No decrease</i> (reference)	-	-	-
<i>Moderate decrease</i>	0.091*** (0.005)	0.053*** (0.003)	-0.143*** (0.007)
<i>Strong transitory decrease</i>	0.135*** (0.022)	0.056*** (0.003)	-0.190*** (0.022)
<i>Strong partly persistent decrease</i>	0.164*** (0.012)	0.052*** (0.003)	-0.217*** (0.011)
<i>Strong long-lasting decrease</i>	0.178*** (0.011)	0.050*** (0.003)	-0.228*** (0.010)
Finance shock	0.039*** (0.005)	0.017*** (0.002)	-0.056*** (0.007)
Customers' ability to pay shock	0.019*** (0.004)	0.010*** (0.002)	-0.029*** (0.007)
Availability of supplies shock	0.014** (0.006)	0.006** (0.003)	-0.020** (0.008)
p-value	0.000		
Rho	0.6		
Observations	18,187		

Note: As in Table 7.

5. Concluding remarks

Bonuses and other performance-related benefits declined considerably during 2010–2013 in comparison with the pre-crisis period. The average share of performance-related benefits in the total wage bill of the firms sampled in 2007 was 11.3%. The figure fell to 7.4% in 2013 for the subset of countries that participated in the first WDN survey, while for the 25 countries participating in the third WDN survey, the average was 6.9%. The smaller fraction of bonuses and benefits in the total wage bill may reflect the slower economic growth in 2013 relative to the pre-crisis period (2002–2007), but it is also suggestive of an increased role of bonuses in firms' labour cost flexibility, as reflected in a higher share of firms using non-base wages as part of their remuneration mechanisms. This paper explores the behaviour of non-base wage components as a possible adjustment channel available to firms.

We first find that firms facing DNWR are more likely to use bonuses and benefits to reduce labour costs. This finding confirms that in the presence of DNWR during the period 2010–2013, non-base wage components acted as a buffer to overcome DNWR, which prevents firms from cutting base wages. Similar results were found for the period 2002–2007 with data from the first WDN survey. These results have implications for monetary policy. In particular, they suggest that the wage rigidity associated with the overall wage bill may be lower than base wage rigidity alone. Thus, the presence of non-base wage components helps achieve overall wage flexibility. In fact, the results indicate that bonuses and benefits played a role as shock absorbers during the period 2010–2013. In particular, demand and credit shocks are both associated with increased use of non-base wage components as a means to adjust costs. Moreover, regression analysis supports the view that the use of bonuses and benefits is not influenced by unionisation; cutting bonuses is thus likely to be a strategy developed outside

formal collective bargaining. Larger firms and firms in financial intermediation are among the most likely to adjust non-base wage components.

Then, when comparing adjustment via base wages and non-base wage components, we find that firms which are hit by negative and persistent demand shocks are more likely to reduce wages, with the marginal downward effect on non-base wages being stronger than that on base wages. Other negative shocks (such as finance constraints, customers and supplies) exhibit very consistent negative effects on wages. Non-base wage components react more strongly than base wages to all the types of negative shocks analysed. To sum up, firms use non-base wage components as a buffer to overcome base wage rigidity.

References

- Agell, Jonas, and Per Lundborg. 2003. "Survey Evidence on Wage Rigidity and Unemployment: Sweden in the 1990s." *Scandinavian Journal of Economics* 105(1): 15–29.
- Akerlof, George A., William R. Dickens, and George L. Perry. 1996. "The Macroeconomics of Low Inflation." *Brookings Papers on Economic Activity* 27(1): 1–76.
- Akerlof, George, and Janet L. Yellen. 1990. "The Fair Wage-Effort Hypothesis and Unemployment." *Quarterly Journal of Economics* 105(2): 255–283.
- Altonji, Joseph G., and Paul J. Devereux. 2000. "The Extent and Consequences of Downward Nominal Wage Rigidity." In *Research in Labor Economics*, 383–431.
- Babecký, Jan, Philip Du Caju, Theodora Kosma, Martina Lawless, Julián Messina, and Tairi Rõõm. 2012. "How Do European Firms Adjust Their Labour Costs When Nominal Wages Are Rigid?" *Labour Economics* 19(5): 792–801.
- Babecký, Jan, Philip Du Caju, Theodora Kosma, Martina Lawless, Julián Messina, and Tairi Rõõm. 2010. "Downward Nominal and Real Wage Rigidity: Survey Evidence from European Firms." *Scandinavian Journal of Economics* 112(4): 884–910.
- Bewley, Truman F. 1999. *Why Wages Don't Fall During a Recession*. Cambridge, Mass. [u.a.]: Harvard Univ. Press.
- Brown, Charles. 1990. "Firms' Choice of Method of Pay." *Industrial and Labor Relations Review* 43(3): 165S–182S.
- Campbell, Carl M., III, and Kunal S. Kamalani. 1997. "The Reasons for Wage Rigidity: Evidence from a Survey of Firms." *Quarterly Journal of Economics* 112(3): 759–789.
- Cardoso, Ana Rute, and Pedro Portugal. 2005. "Contractual Wages and the Wage Cushion under Different Bargaining Settings." *Journal of Labor Economics* 23(4): 875–902.
- Dias, Daniel A., Carlos Robalo Marques, and Fernando Martins. 2013. "Wage Rigidity and Employment Adjustment at the Firm Level: Evidence from Survey Data." *Labour Economics* 23(C): 40–49.
- Dias, Daniel A., Carlos Robalo Marques, and Fernando Martins. 2015. "A Replication Note on Downward Nominal and Real Wage Rigidity: Survey Evidence from European Firms." *Empirical Economics* 49(3): 1143–1152.
- Dickens, William T., Lorenz Goette, Erica L. Groshen, Steinar Holden, Julian Messina, Mark E. Schweitzer, Jarkko Turunen, and Melanie E. Ward. 2007. "How Wages Change: Micro Evidence from the International Wage Flexibility Project." *Journal of Economic Perspectives* 21(2): 195–214.
- Du Caju, Philip, Erwan Gautier, Daphne Momferatou, and Melanie Ward-Warmedinger. 2008. "Institutional Features of Wage Bargaining in 23 European Countries, the US and Japan." *Working Paper Series* 974. European Central Bank.
- Dwyer, Jacqueline, and Kenneth Leong. 2003. "Nominal Wage Rigidity in Australia." *Australian Journal of Labour Economics* 6(1): 5–24.
- European Central Bank. 2009. "Wage Dynamics in Europe. Final Report of the Wage Dynamics Network (WDN)." http://www.ecb.int/home/html/researcher_wdn.en.html.
- Fabiani, Silvia, Claudia Kwapil, Tairi Rõõm, Kamil Galuscak, and Ana Lamo. 2010. "Wage Rigidities and Labor Market Adjustment in Europe." *Journal of the European Economic Association* 8(2–3): 497–505.

- Fabiani, Silvia, Ana Lamo, Julian Messina, and Tairi Rõõm. 2015. "European Firm Adjustment During Times of Economic Crisis." *IZA Journal of Labor Policy* 4(1): 1–28.
- Fahr, Stephan, and Frank Smets. 2010. "Downward Wage Rigidities and Optimal Monetary Policy in a Monetary Union." *Scandinavian Journal of Economics* 112(4): 812–840.
- Fehr, Ernst, and Klaus M. Schmidt. 2004. "Fairness and Incentives in a Multi-task Principal-Agent Model." *Scandinavian Journal of Economics* 106(3): 453–474.
- Fuchs, William. 2015. "Subjective Evaluations: Discretionary Bonuses and Feedback Credibility." *American Economic Journal: Microeconomics* 7(1): 99–108.
- Gordon, Robert J. 1998. "Foundations of the Goldilocks Economy: Supply Shocks and the Time-Varying NAIRU." *Brookings Papers on Economic Activity* 29(2): 297–346.
- Harris, Milton, and Artur Raviv. 1979. "Optimal Incentive Contracts with Imperfect Information." *Journal of Economic Theory* 20(2): 231–259.
- Hasnain, Zahid, Nick Manning, and Jan Henryk Pierskalla. 2014. "The Promise of Performance Pay? Reasons for Caution in Policy Prescriptions in the Core Civil Service." *World Bank Research Observer* 29(2): 235–264.
- Hölmstrom, Bengt. 1979. "Moral Hazard and Observability." *Bell Journal of Economics* 10(1): 74–91.
- Holmstrom, Bengt, and Paul Milgrom. 1991. "Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design." *Journal of Law, Economics, & Organization* 7: 24–52
- Izquierdo Mario, Juan F. Jimeno, Theodora Kosma, Ana Lamo, Stephen Millard, Tairi Rõõm, and Eliana Viviano. 2017. "Labour Market Adjustment in Europe During the Crisis: Microeconomic Evidence from the Wage Dynamics Network Survey." *Mimeo*.
- Jung, Sven, and Claus Schnabel. 2011. "Paying More than Necessary? The Wage Cushion in Germany." *LABOUR* 25(2): 182–197.
- Kahn, Shulamit. 1997. "Evidence of Nominal Wage Stickiness from Microdata." *American Economic Review* 87(5): 993–1008.
- Klor, Esteban F., Sebastian Kube, Eyal Winter, and Ro'i Zultan. 2014. "Can Higher Rewards Lead to Less Effort? Incentive Reversal in Teams." *Journal of Economic Behavior & Organization* 97(C): 72–83.
- Lazear, Edward P., and Paul Oyer. 2007. "Personnel Economics." *National Bureau of Economic Research Working Paper Series* No. 13480.
- Lebow, David E., Raven E. Saks, and Beth Anne Wilson. 1999. "Downward Nominal Wage Rigidity: Evidence from the Employment Cost Index." Finance and Economics Discussion Series 1999–31. Board of Governors of the Federal Reserve System (U.S.).
- Lebow, David, Raven Saks, and Beth Wilson. 2003. "Downward Nominal Wage Rigidity: Evidence from the Employment Cost Index." *B.E. Journal of Macroeconomics* 3(1): 1–30.
- Maestri, Lucas. 2012. "Bonus Payments versus Efficiency Wages in the Repeated Principal-Agent Model with Subjective Evaluations." *American Economic Journal: Microeconomics* 4(3): 34–56.
- Marotzke, Petra, Robert Anderton, Ana Bairrao, Clémence Berson, and Peter Tõth. 2017. "Asymmetric Wage Adjustment and Employment in European Firms." *Working Paper Series* 2103. European Central Bank.

- Messina, Julián, Philip Du Caju, Mario Izquierdo, Cláudia Filipa Duarte, and Niels Lynggård Hansen. 2010. “The Incidence of Nominal and Real Wage Rigidity: An Individual-Based Sectoral Approach.” *Working Paper Series* 1213. European Central Bank.
- Nafziger, Julia. 2011. “Motivational Job Assignments.” *Economica* 78(312): 676–96.
- Nickell, Stephen, and Glenda Quintini. 2003. “Nominal Wage Rigidity and the Rate of Inflation.” *Economic Journal* 113(490): 762–681.
- Oyer, Paul. 2005. “Salary or Benefits?” *NBER Working Paper* 11817.
- Roodman, David. 2011. “Estimating Fully Observed Recursive Mixed-Process Models with *cmp*.” *Stata Journal* 11(2): 159–206.
- Stiglitz, Joseph E. 1986. “Theories of Wage Rigidity.” *Keynes’ Economic Legacy: Contemporary Economic Theories*, eds James L. Butkiewicz, Kenneth J. Koford, and Jeffrey B. Miller, pp. 153–206. New York: Praeger Publishers.
- Tobin, James. 1972. “Inflation and Unemployment.” *American Economic Review* 62(1): 1–18.

Annex

Table A1: Bonuses by country

Country	WDN1 2007			WDN3 2013		
	Companies using non-base wage components (%)	Non-base wage components in total pay, unconditional (%)	Non-base wage components in total pay, conditional (%)	Companies using non-base wage components (%)	Non-base wage components in total pay, unconditional (%)	Non-base wage components in total pay, conditional (%)
Austria	70.6	9.0	12.8	79.4	5.0	6.3
Belgium	100.0	7.6	7.6	61.0	3.2	5.3
Bulgaria	-	-	-	55.8	5.2	9.4
Cyprus	-	-	-	54.2	4.2	7.7
Czech Republic	99.1	20.6	20.8	84.1	10.1	12.0
Germany	-	-	-	72.9	5.2	7.2
Estonia	78.4	14.0	17.9	79.6	12.9	16.3
Spain	40.9	3.7	9.1	60.4	4.3	7.2
France	69.1	11.3	16.4	79.2	5.6	7.1
Greece	-	-	-	59.6	4.9	8.2
Croatia	-	-	-	54.8	4.5	8.1
Hungary	73.9	10.9	14.8	69.2	9.2	13.4
Ireland	65.5	11.9	18.1	53.6	4.0	7.4
Italy	72.4	6.9	9.6	77.3	5.6	7.3
Lithuania	73.4	17.2	23.4	83.2	13.1	15.7
Luxembourg	-	-	-	51.3	4.0	7.7
Latvia	-	-	-	76.4	9.1	12.4
Malta	-	-	-	61.7	3.5	5.7
Netherlands	74.7	11.2	15.0	64.6	4.9	7.7
Poland	78.6	15.5	19.7	86.7	13.1	15.1
Portugal	95.9	32.4	33.7	99.0	24.9	25.1
Romania	-	-	-	59.4	5.8	9.8
Slovenia	86.9	17.3	19.9	85.3	10.4	12.2
Slovakia	-	-	-	93.2	15.1	16.2
United Kingdom	-	-	-	75.3	7.7	10.2
Non-euro area	-	-	-	75.2	8.7	11.5
Euro area	-	-	-	73.8	6.2	8.4
Total	-	-	-	74.2	6.9	9.4
Total (WDN 2007 countries)	72.2	11.3	15.6	75.2	7.4	9.7

Note: The data are weighted to reflect overall employment and are rescaled to exclude non response. The unconditional percentage share of non-base wage in total pay is calculated across all firms (including those not paying bonuses). The conditional percentage share of non-base wage in total pay is calculated only across companies that use non-base wage components.

Table A2: Use of labour cost adjustment channels

Share of firms (%) having faced negative shocks (either strong or moderate) and having cut								
Country	base wage	non-base wage	hours	employees	base wage	non-base wage	hours	employees
	unconditional				conditional on DNWR			
AT	1.5	6.1	11.1	27.6	0.0	11.4	20.9	13.2
BE	2.1	2.9	24.2	45.5	0.7	3.3	27.1	63.4
BG	22.2	34.1	10.7	55.7	34.2	44.2	23.4	87.6
CY	64.8	63.4	22.0	64.9	68.5	67.4	26.0	76.4
CZ	12.7	32.1	17.2	52.7	17.2	51.4	25.1	69.1
DE	4.7	6.7	11.4	22.4	12.7	18.4	20.5	32.4
EE	16.3	18.5	9.7	28.2	29.8	44.8	10.7	36.4
ES	8.1	28.4	18.7	49.8	14.0	42.9	18.1	63.5
FR	2.4	13.8	13.0	44.4	2.1	26.0	18.2	57.9
GR	63.0	53.8	18.5	54.4	70.8	55.6	20.7	65.2
HR	32.8	33.4	5.1	55.4	43.0	45.5	6.5	64.5
HU	9.1	28.5	8.3	38.4	16.9	41.9	9.1	49.2
IE	21.7	39.4	21.2	41.6	23.5	43.0	23.8	48.7
IT	6.9	22.4	34.1	48.0	1.9	46.4	32.0	52.2
LT	12.8	19.0	9.0	36.8	20.5	29.4	12.6	43.4
LU	3.3	23.5	18.1	46.0	4.8	42.5	32.6	80.3
LV	22.0	24.0	12.9	48.5	24.2	23.0	11.4	50.8
MT	2.3	1.0	9.8	35.1				
NL	15.3	35.5	17.1	71.5	26.4	49.3	13.5	82.0
PL	7.0	11.6	4.1	33.5	16.0	32.6	0.0	49.4
PT	11.0	25.3	14.1	49.6	13.2	32.8	18.5	66.0
RO	10.5	20.6	10.7	52.1	12.6	33.1	15.9	70.3
SI	19.6	35.1	14.2	55.6	36.3	63.9	21.0	70.4
SK	5.8	20.6	15.9	45.2	10.3	35.9	35.7	49.7
UK	4.9	14.9	11.7	38.0	8.1	14.3	18.4	45.1
Total	7.5	18.2	16.2	42.3	13.2	30.2	19.0	55.5

Source: WDN3, authors' calculation.

Note: The shocks considered are change in demand, customers' ability to pay and access to external finance.

The data are weighted to reflect overall employment in the country and rescaled to exclude non-response.

Table A3: Relationship between cuts in non-base wage components and base wage rigidity

	Coefficients			Marginal effects		
DNWR, base wage freezes	0.534*** (0.040)	0.421*** (0.038)	0.411*** (0.088)	0.117*** (0.010)	0.086*** (0.008)	0.084*** (0.016)
DNWR * shocks						
Base wage freezes & demand shock			-0.091 (0.103)			-0.019 (0.021)
Base wage freezes & customer pay shock			0.188*** (0.053)			0.038*** (0.012)
Base wage freezes & credit shock			-0.069 (0.063)			-0.014 (0.013)
Base wage freezes & supplies shock			-0.071* (0.041)			-0.015* (0.009)
Shocks						
Demand shock		0.534*** (0.052)	0.561*** (0.065)		0.109*** (0.013)	0.114*** (0.015)
Finance shock		0.284*** (0.027)	0.305*** (0.033)		0.058*** (0.007)	0.062*** (0.008)
Customers' ability to pay shocks		0.154*** (0.042)	0.094** (0.047)		0.032*** (0.008)	0.019** (0.009)
Availability of supplies shocks		0.135*** (0.028)	0.162*** (0.035)		0.028*** (0.006)	0.033*** (0.008)
Sectors						
Elect gas water	0.087 (0.272)	0.091 (0.256)	0.091 (0.256)	0.019 (0.059)	0.019 (0.052)	0.018 (0.052)
Construction	0.387*** (0.079)	0.261*** (0.064)	0.262*** (0.064)	0.085*** (0.020)	0.053*** (0.015)	0.053*** (0.015)
Trade	0.145*** (0.033)	0.104*** (0.036)	0.105*** (0.037)	0.032*** (0.009)	0.021** (0.009)	0.022** (0.009)
Services	0.168*** (0.046)	0.177*** (0.043)	0.177*** (0.043)	0.037*** (0.011)	0.036*** (0.010)	0.036*** (0.010)
Financial intermediation	0.391*** (0.109)	0.361*** (0.112)	0.361*** (0.113)	0.086*** (0.025)	0.074*** (0.024)	0.074*** (0.024)
Size						
20–49 employees	0.053 (0.033)	0.115*** (0.036)	0.117*** (0.036)	0.012 (0.007)	0.023*** (0.007)	0.024*** (0.007)
50–199 employees	0.100* (0.052)	0.194*** (0.056)	0.196*** (0.056)	0.022* (0.012)	0.039*** (0.012)	0.040*** (0.012)
+200 employees	0.143** (0.071)	0.287*** (0.062)	0.289*** (0.063)	0.031* (0.017)	0.058*** (0.015)	0.059*** (0.015)
Other features						
Labour cost share	0.260*** (0.076)	0.182** (0.080)	0.181** (0.079)	0.057*** (0.018)	0.037** (0.017)	0.037** (0.017)
Manual workers %	-0.002** (0.001)	-0.002*** (0.001)	0.002*** (0.001)	-0.000** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
High tenure workers (+5y) %	0.005*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Multi-establishment firm	0.160*** (0.023)	0.143*** (0.023)	0.144*** (0.023)	0.035*** (0.005)	0.029*** (0.005)	0.029*** (0.005)
Observations	19,234	18,582	18,582	19,234	18,582	18,582

Note: Marginal effects reported. Probit estimation. The dependent variable is equal to one if the firm reduces non-base wage components. Standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A4: Relationship between non-base wage cuts and wage rigidity – the role of unions

DNWR – Firms froze base wages	0.573*** (0.053)	0.561*** (0.049)	0.574*** (0.047)	0.560*** (0.049)
% of workers covered by coll. agreement	0.001 (0.001)	0 (0.002)		
Collective agreement of any kind		0.077 (0.128)		0.066 (0.045)
Collective agreement outside of the firm	-0.022 (0.101)			
Collective agreement at the firm	-0.019 (0.047)		0.046 (0.032)	
Observations	9,288	10,194	10,172	10,277

Note: Probit estimates. Coefficients. The dependent variable is equal to one if the firm reduces non-base wage components. Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Other covariates include firm size, sector and firm characteristics as in Table A3.

Acknowledgements

The work was conducted within the framework of the Wage Dynamics Network coordinated by the European Central Bank. We thank Michal Franta, Eva Hromádková, Juan Francisco Jimeno, Theodora Kosma, Pedro Martins, Daniel Münich, an anonymous referee of the ECB WP series and the participants of the WDN meetings and a seminar at the Czech National Bank for helpful comments. The opinions expressed in this paper are solely those of the authors and do not necessarily reflect the views of their institutions.

Jan Babecký

Czech National Bank, Prague, Czech Republic; email: jan.babecky@cnb.cz

Clémence Berson

Banque de France, University Paris 1, Paris, France; email: clemence.berson@banque-france.fr

Ludmila Fadejeva

Latvijas Banka, Riga, Latvia; email: ludmila.fadejeva@bank.lv

Ana Lamo

European Central Bank, Frankfurt am Main, Germany; email: ana.lamo@ecb.europa.eu

Petra Marotzke

Bundesbank, Frankfurt am Main, Germany; email: petra.marotzke@bundesbank.de

Fernando Martins

Banco de Portugal, Universidade Lusíada de Lisboa, REM - Research in Economics and Mathematics, Lisbon, Portugal; email: fmartins@bportugal.pt

Paweł Strzelecki

Narodowy Bank Polski, Szkoła Główna Handlowa, Warsaw, Poland; email: pawel.strzelecki@nbp.pl

© European Central Bank, 2018

Postal address 60640 Frankfurt am Main, Germany

Telephone +49 69 1344 0

Website www.ecb.europa.eu

All rights reserved. Any reproduction, publication and reprint in the form of a different publication, whether printed or produced electronically, in whole or in part, is permitted only with the explicit written authorisation of the ECB or the authors.

This paper can be downloaded without charge from www.ecb.europa.eu, from the [Social Science Research Network electronic library](#) or from [RePEc: Research Papers in Economics](#). Information on all of the papers published in the ECB Working Paper Series can be found on the [ECB's website](#).

PDF

ISBN 978-92-899-3263-9

ISSN 1725-2806

doi:10.2866/077482,

QB-AR-18-038-EN-N