How do European Firms adjust their Labour Costs when Nominal Wages are Rigid?

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Abstract

Although workers' nominal wages are seldom cut, firms have multiple options available if they require adjustments in their wage bills. We broaden the analysis of relative in(flexibility) in labour costs by investigating the use of other margins of labour cost adjustment at the firm level beyond base wages. Using data from a unique survey, we find that European firms make extensive use of other components of compensation to adjust the cost of labour. Interestingly, firms facing base wage rigidity are more likely to use alternative margins of labour cost adjustment; therefore there appears to be some degree of substitutability between wage flexibility and the flexibility of other cost components. Changes in bonuses and non-pay benefits are some of the potential margins firms use to reduce costs. We also show how the margins of adjustment chosen are affected by unionisation and firm and worker characteristics.

Keywords: labour costs, wage rigidity, firm survey, European Union
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1. Introduction

Base wages of incumbent workers are seldom cut in nominal terms, even in the face of large negative shocks. During the last few years, a growing body of literature using micro data has documented the importance of nominal wage rigidity (NWR) in several countries and over a range of time periods. In the US, clear signs of resistance to nominal wage cuts are found in all studies (see among others Kahn, 1997; Altonji and Devereux, 2000; and Lebow and Saks, 2003). More recently, a comprehensive cross-country study conducted in the framework of the International Wage Flexibility Project (IWFP) has demonstrated the existence of nominal wage rigidity in many European countries (Dickens et al., 2007, 2008). Babecký et al. (2010) provide survey-based evidence on NWR and its determinants for EU countries.

From a labour market perspective, understanding the links between wage rigidities and unemployment was emphasised by Layard et al. (1991), and most of the empirical micro literature on wage rigidities retained this subject as the main motivation for analysis.[1] However, even if base wages are rigid, does this necessarily imply rigid labour cost structures? Firms have other margins of adjustment beyond base wages to manage their wage bills, including the adjustment of flexible pay components such as bonuses or fringe benefits, the adjustment of labour costs via reorganisation of production, or the use of labour turnover as a tool to adjust labour costs to changes in economic activity. These other margins have hardly been studied in the existing literature. We argue that the assessment of the relative flexibility of labour costs is essential for a better understanding of the workings of the economy at the macro level. From a monetary policy perspective, for instance, it is the adjustment of marginal costs to economic shocks that determines the slope of the Philips curve in New Keynesian models (Galí and Gertler, 1999).

This paper broadens the discussion of the rigidity of wages to include the flexibility that firms may avail of by using other adjustment mechanisms that involve the use of labour inputs. Using a unique survey from a large sample of firms from 12 EU countries, we are able to identify the incidence of nominal wage rigidity – on the basis of nominal wage freezes – and the use of the following labour cost-saving strategies: the reduction or elimination of bonus payments; the reduction of non-pay benefits; changes in shift assignments or shift premia; slow downs or freezes of the rate at which promotions are filled; recruitment of new

[1] See Goette et al. (2007) and the references therein.

employees at a lower wage level than those who left voluntarily; and encouragement of early retirement to replace high-wage employees by entrants with lower wages.

The paper makes three contributions to the literature. First, we document comparable information on nominal wage rigidity and labour cost adjustment practices beyond base wages for a large set of EU countries and sectors. Second, we show how the use of these adjustment practices can be related to firms' experience regarding nominal wage rigidity. Third, we discuss the relative importance of each individual strategy across countries characterised by different sets of laws and institutions governing their labour markets. We examine the characteristics of firms and the environments in which they operate, and discuss how they relate to the relative importance of each type of labour cost adjustment mechanism.

In order to address these questions, we use a novel firm-level survey that contains detailed qualitative information for a large number of firms in 12 EU countries. The survey was carried out within the framework of the Wage Dynamics Network, a research network sponsored by a consortium of EU central banks and coordinated by the European Central Bank.[2] The most important advantage of using qualitative information from a firm survey is the possibility of addressing a broad set of adjustment practices, most of which are typically not observable even in the richest matched employer-employee datasets, and are therefore new to the literature.

Our survey shows that approximately 10% of employees work in firms that have frozen base wages in the recent past and are thereby considered being subject to nominal wage rigidity. On the other hand, the survey reveals that firms fairly commonly use strategies to reduce labour costs other than by reducing base wages – 63% of employees work in firms whose managers said they had used at least one other margin of adjustment in the recent past, and 58% in firms that had used at least one of the six margins explicitly identified in the survey. Perhaps not surprisingly, we find that the use of each of these margins is positively related to the presence of nominal wage rigidities at the firm level. This suggests strong substitutability between the degree of wage flexibility and other forms of flexibility in labour costs. Several firm characteristics, including the firm size or skill distribution, as well as several indicators

[2] The survey provides a wealth of information that enabled the study of other interesting issues beyond the detailed analysis of the different adjustment mechanisms of firms' wage bill presented here. Bertola et.al. (2012) use the survey data to analyse the reaction of firms to cosh-push shocks, disentangling the importance of cost-cutting strategies, pass through to prices or adjustment of firm-level margins. Druant et.al (2012) analyse the nature, including state- vs. time-dependent rules, of wage and price setting in European firms and their interlinkages. Galuščák et. al. (2012) analyse differences in wage setting between newly hired and incumbent employees.

of the economic environment in which firms' operate, appear to be related to the use of some of these cost-cutting margins. In particular, firms in more competitive environments tend to use some of these strategies more heavily. Similarly, the degree and characteristics of union involvement in the wage-setting process shape the need and ability of firms to use the different margins analyzed here.

The paper is organised as follows. Section 2 describes the main characteristics of the survey and the sample used in the paper. Section 3 describes the incidence of wage freezes and the use of various compensation channels – other than base wages – that firms may avail of to reduce labour costs and the frequency with which they are used in different countries and sectors. Section 4 relates the choice of cost reduction methods to NWR, to firm characteristics and to attributes of the economic environment in which firms operate. Section 5 looks at the relationship between these alternative margins of cost-cutting strategies and the institutional characteristics of wage-setting. Section 6 concludes.

2. Survey design and sample characteristics

The firm survey was conducted during the second half of 2007 and the first quarter of 2008 in 16 European Union countries, 12 of which included the questions on alternative margins of labour cost adjustment analysed here: Belgium, the Czech Republic, Estonia, France, Greece, Hungary, Ireland, Italy, Lithuania, Poland, Portugal and Slovenia.[3] The survey was carried out by the national central banks, and all countries used as the basis for the survey a harmonised questionnaire developed in the context of the Eurosystem Wage Dynamics Network, a research network analysing wage and labour cost dynamics. The collection of information varied across countries – the survey was conducted in most cases by mail, but phone and face-to-face interviews were also used. The survey was directed at the company's CEO or senior-level manager(s) of human resources.

The harmonised questionnaire contained a core set of questions – referring to general firm characteristics and the firms' price and wage-setting strategies – that were included in all countries' questionnaires.[4] An enlarged questionnaire including the relevant questions for this study was used in 12 countries. This harmonised questionnaire was further adapted by some

[3] Luxembourg also conducted the survey and the data was made available to the network's researchers at a later stage. The questions on alternative margins are however not fully compatible with those for the 12 countries of our sample.

[4] Firms were instructed to answer the wage-setting questions with reference to their main occupational group.

countries to account for specific country characteristics and different institutional frameworks, but it retained its comparability in all the dimensions covered in this paper.

The sample frame in each country was based on firms with at least five employees. The sectors covered are manufacturing, energy, construction, market services, non-market services, trade and financial intermediation; there are, however, differences in the sectoral coverage of individual countries.[5] The sample used here covers around 12,000 firms representing around 37.2 million employees. A description of the distribution of the sample by country, sector and size is provided in Appendix 2.

In order to make the results representative of the total population of private sector firms, the sample statistics presented in the following sections use employment-adjusted weights. For each firm observation these weights indicate the number of employees each observation represents in the population. Strata refer to the sampling categories into which the population of firms is divided in order to do the sampling. In most cases they are defined by sector and size. For example, one sampling category is firms with 5–19 employees in manufacturing. The employment-adjusted weights account for the unequal probabilities across strata of receiving and responding to the questionnaire as well as for the number of employees by firm in the population in each stratum (average firm size).

3. Non-wage cost-cutting strategies

Apart from adjusting base wages, firms can use other ways of reducing labour costs when faced by negative exogenous shocks, for example cutting bonuses and benefits, encouraging earlier retirement and hiring workers at lower wages than those who have recently quit. The adjustment of non-wage labour costs has gained attention in the policy debate for two main reasons. First, non-wage labour costs represent a substantial (and rising) part of total compensation (see, for example, Oyer, 2005, and Chen and Funke, 2003). Since firms are primarily concerned with total compensation per employee, assessment of the flexibility of non-wage labour costs is as important as evaluation of the degree of wage flexibility (Lebow and Saks, 2003). Second, in an environment of sticky prices and wages, non-wage labour costs become an important tool of adjustment to exogenous shocks, allowing the effects of negative demand shocks on the firm's employment to be dampened (Chen and Funke, 2005).

Non-wage labour costs can be divided into two broad categories – statutory and non-statutory. Statutory non-wage labour costs, for example employers' social security contributions, are

[5] Detailed information on the survey characteristics is available at: www. ….

imposed by law; a firm cannot change them with respect to a particular worker. Non-statutory non-wage labour costs are either determined by collective agreements or set at the discretion of the employer. Private pension schemes, bonuses and benefits belong to this category. Hence, firms have a certain amount of freedom to use non-statutory non-wage labour costs (or at least a part of them) to adjust to shocks. It is these non-statutory labour costs "addressable" at the firm-level that we intend to study from the survey data. Additionally, firms might use labour turnover or internal reorganisation as a tool to achieve labour cost flexibility. These include voluntary or involuntary resignations or retirements of high-tenure (and hence high-wage) workers, and their replacement for younger workers who are willing to work at a lower wage. Similarly, firms might limit the extent of promotions or use shift work as a cost-cutting strategy during an economic downturn. Our focus is on understanding how important these different strategies are, and how they relate to the much more investigated question of the rigidity of base wages. The extent to which the use of the various margins might vary with the economic cycle unfortunately cannot be investigated due to the cross-sectional nature of the survey.

In our survey, we asked firms: "*Over the last five years, has the base wage of some employees in your firm ever been frozen?*"[6] Following the identifying assumption in some of the micro literature on downward nominal wage rigidity (see, for instance, Nickell and Quintini, 2003), we regard firms that froze wages at any point during this period as showing evidence of nominal wage rigidity. Most probably this reflects downward nominal wage rigidity, since an analysis of more than 360 yearly wage change distributions for individuals who stayed in the same job in a large number of countries suggests that upward nominal wage rigidity, as suggested by "menu costs", is not an important element of wage setting (Dickens et al., 2007). However, our data does not allow us to disentangle symmetric from asymmetric nominal wage rigidity, so we cannot rule out that some of these wage freezes reflect pure menu costs. Nonetheless, they constitute a symptom of rigid wage structures and we define firms answering positively to the above question as "downward nominally rigid" (DNR).

An important element to take into account is that this measure refers to the previous five years. Since the survey was conducted in late 2007 and early 2008, in most cases the firms were responding about the incidence of wage freezes in an upswing, or a period of relatively favourable conditions. Hence, we are most probably underestimating the importance of

[6] Firms were provided with the following definition of a freeze in base wage: "A base wage freeze describes a situation where the base wage remains unchanged after the usual period of revision". In addition, they were asked to indicate the share of employees whose wages were frozen (see Appendix 4).

downward nominal wage rigidity as we are not able to account for the firms that are potentially subject to downward wage rigidity but did not need to freeze wages during the last five years. In this case, to the extent that the latent association between downward nominal wage rigidity and the use of alternative margins of labour cost adjustment is positive, our estimates would be a lower bound of the true impact.

Although our measure of NWR presents some limitations, it is highly correlated with other empirical evidence derived from household surveys and administrative data on individuals. The correlation between the country averages of downward NWR in Dickens et al. (2007) and the country averages of NWR in our survey is 0.68.[7] Messina et al. (2010) report measures of downward NWR for 13 sectors in 3 countries also covered by our study: Belgium, Spain and Portugal. We have tabulated our measures of rigidity for those sectors and find that the correlation with the average rigidity in each sector and country is 0.82.

The survey also asked what percentage of the total wage bill is related to bonuses, whether based on individual or company performance, i.e., variable wage components other than the base wage. More importantly, our survey further asked firms' managers directly about their use of other policies to adjust labour costs in the recent past. In this paper we use factual questions about what types of margins firms have used in the recent past. Specifically, we identified the following potential strategies to cut labour costs (other than wages) reported by the majority of national surveys (see question 18 in Appendix 4) by asking: "*Has any of the following strategies ever been used in your firm to reduce labour costs?"* Firms were allowed to choose as many options as they wished from the following list:

- reduce or eliminate bonus payments;
- reduce or eliminate non-pay benefits;
- change shift assignments or shift premia;
- slow or freeze the rate at which promotions are filled;
- recruit new employees at a lower wage level than those who left voluntarily;
- encourage early retirement to replace high wage employees by entrants with lower wages;
- use other strategies.

In all cases, the response variable is a "yes" or "no" answer to the question whether a particular strategy has been used. The survey instrument used, which contained questions on

[7] Evaluated for six countries: Austria, Belgium, France, Greece, Italy and Portugal.

a range of other issues, did not allow for detailed questioning on the magnitudes of changes involved in applying any of the strategies. Obviously, different margins are likely to be used in response to different shocks. As an example, changing the workforce composition could be used following a permanent shock to the firm, while changing shift assignments or shift premia might be a more common reaction to a temporary shock. This is beyond the scope of the detailed factual survey questions on which this paper is based. Using hypothetical questions from the same survey, Bertola et al. (2012) look into the reaction of firms to cost-push shocks, distinguishing the adjustment of wages, prices, margins, output and employment.

Table 1 presents summary statistics showing the percentage of employees working in the companies which have frozen base wages, pay bonuses, and/or use at least one of the six strategies listed above. There are sizeable differences between the EU countries in the occurrence of wage freezes. Wage freezes appear more common than average in the Czech Republic and Estonia. They are considerably rarer than average in Italy and Slovenia. Overall, we find that the non-euro member states of the EU are more likely to experience wage freezes compared to the euro area member states. In parallel, flexible pay schemes are more common outside the euro area. While bonuses account, on average, for 13% of the total wage bill, this percentage is 11% in the euro area and 16% outside the euro area.[8] Therefore, at first sight, non base wage labour cost components constitute a non-negligible part of the overall labour cost bill.

Firms make extensive use of different cost-cutting strategies in Europe, although there is substantial variability across countries. In Lithuania all workers have seen how at least one of the strategies has affected their labour relations, whereas in Portugal the percentage of affected workers falls to 40%. On average, 63% of the workers in our sample have been affected by at least one of these six cost cutting strategies, and differences in the incidence of these adjustment mechanisms between euro area and non-euro area countries do not seem to be particularly relevant.

Perhaps the most striking feature of Table 1 is that the prevalence of individual strategies varies quite substantially across countries. The reduction of bonus payments is the most common method used by firms outside the euro area: in the Czech Republic it affected 32% of employees, in Estonia 40%, in Lithuania 41% and in Poland 24%. The western European countries appear less likely to use bonuses in order to reduce costs, with the exception of

[8] Estonia is included in the group of non-euro area countries as it was not a member of the euro area at the time the survey was conducted.

Italy, where almost a quarter of employees work in firms that report using this method. Labour turnover instead seems to be an important element of adjustment in Western Europe. Hiring new employees at lower rates than those who left the company is the most important adjustment mechanism in Belgium (26%), France (39%), Italy (46%) and to some extent Portugal, where it affects 16% of employees. Similarly, while using early retirement as an adjustment tool is never the main method of adjustment, it is fairly commonly used in these countries. In Belgium (19%), France (30%) and Italy (20%), the average use of early retirement is above the total mean (16.5%).

A third group of countries shows substantial flexibility regarding internal work organisation. This is the case, for instance, in Hungary, where more than 73% of the workers in our sample have been affected by at least one of the following strategies: shift changes and the slowing down of promotions, as an attempt by their employers to cut labour costs. This is also the case in Italy, where 50% of employees have been affected by at least one of these practices.

The strategy least used is the reduction of benefits. This demonstrates that benefits are a less flexible labour cost component than bonuses (affecting 15% of workers in total, as against 23% in the case of bonuses).

In addition to the variation across countries, we find that the incidence of NWR and the choice of strategies also tend to differ across sectors (Table A1 in Appendix 1) and between small and large firms (Table A2 in Appendix 1). Services sectors are more subject to NWR. Regarding the six cost cutting strategies considered here, the use of cheaper hires to replace workers who leave the firm is the dominant strategy in most sectors. Firms in manufacturing report a relatively even spread across the different strategies. The energy and financial intermediation sectors are the most likely to target bonuses and benefits when trying to reduce costs. Early retirement is the strategy least likely to be followed: this is similar to the pattern in Table 1, where France was the only country with a significant proportion of employees being affected by this strategy. Interestingly, the non-market services sector presented the lowest usage of non-wage cost-cutting strategies.

Regarding firm characteristics, there is no clear size-related pattern in the percentage of the wage bill that is due to bonuses (see Table A2 in Appendix 1). However, most of the alternative cost-cutting strategies are relatively more common in larger firms, although slow promotions and cheaper hires also appear to be widely used by smaller firms.

Table 1: NWR, bonuses and non-wage labour cost adjustment strategies – country-level statistics

Country	Wage freezes	% of workers affected by freezes	Reduce bonuses	Reduce benefits	Change in shifts	Slow promo-tions	Cheaper hires	Early retirement	Use at least one strategy	% of wage bill due to bonuses
Belgium	0.118	0.167	0.184	0.079	0.072	0.150	0.264	0.189	0.460	0.076
Czech Republic	0.265	0.485	0.322	0.075	0.111	0.019	0.087	0.089	0.679	0.206
Estonia	0.217	0.373	0.402	0.205	0.211	0.062	0.162	0.026	0.936	0.140
France	0.071	0.708	0.147	0.061	na	0.154	0.390	0.303	0.586	0.113
Greece [(a)]	0.125	0.704	0.204	0.124	na	na	na	na	0.835	na
Hungary	0.059	0.537	0.227	0.119	0.383	0.351	0.265	0.102	0.672	0.109
Ireland	0.087	0.790	0.169	0.078	0.160	0.094	0.370	0.098	0.909	0.122
Italy	0.039	0.306	0.256	0.218	0.260	0.340	0.456	0.202	0.712	0.069
Lithuania	0.199	0.195	0.410	0.250	0.199	0.106	0.179	0.027	1.000	0.172
Poland	0.100	0.821	0.236	0.163	0.124	0.128	0.237	0.109	0.505	0.155
Portugal	0.150	0.516	0.137	0.084	0.107	0.140	0.162	0.000	0.395	0.322
Slovenia	0.029	0.815	0.135	0.128	0.091	0.189	0.158	0.089	0.575	0.173
Total	**0.091**	0.551	**0.226**	**0.147**	**0.191**	**0.206**	**0.323**	**0.165**	**0.631**	0.127
Non euro area	0.134	0.608	0.267	0.149	0.163	0.134	0.207	0.097	0.604	0.160
Euro area	0.067	0.489	0.205	0.146	0.212	0.246	0.387	0.203	0.645	0.109

Notes: The figures presented in the Table (except the last column) present the proportion of employees (in sectors covered by the survey) that are affected by a given strategy. [(a)] In Greece the question on the use of alternative margins was formulated in a different way. Therefore, the column on the use of at least one strategy refers to the proportion of employees who work in firms that have reduced bonuses, non-pay benefits, overtime hours and number of employees and have engaged in restructuring (the former three options replaced the change in shifts, slow promotion, cheaper hires and early retirement options). Also, the question on bonuses was formulated in a different way and thus figures for Greece are not reported for comparability purposes.

The cost reduction strategies are obviously not mutually exclusive and we find that firms will relatively frequently use more than one of the methods. Half of the employees in the sample worked in firms that reported having used non-wage cost reductions at some point. Of these, slightly less than half (49%) worked in firms that used one margin of adjustment only, 30% in firms that used a combination of two methods and 14% in firms that used a combination of three. The remaining 8% of employees worked in firms which used more than three of the six methods identified.[9] This leads us to ask if certain combinations of the strategies are more likely to be used than others.

Table 2 reports correlation coefficients for the pairings of different strategies and nominal wage rigidity. To begin with, it appears that the importance of bonus payments and the use of all non-wage cost-cutting strategies considered are positively and significantly (except for early retirement) correlated with the firm being subject to nominal wage rigidity. This is a first piece of evidence suggesting that rigid base wages might not tell the whole story of firms' (lack of) ability to adjust labour costs.

As might be expected due to their complementary nature, reductions in benefits and bonuses have one of the highest correlations (0.28), suggesting that some firms favour achieving flexibility through flexible pay components. A second group of firms use strategies associated with labour turnover. Cheaper hires to replace workers who left voluntarily and encouragement of early retirement to create vacancies for lower-paid, more junior staff is another pairing with a high correlation (0.29). Finally, a third strategic combination regards the use of the company's internal wage structure, with changes in shift patterns and slowing of promotions presenting the highest correlation (0.32).

[9] It may be important to note that the question asked if these methods had "ever been used". Therefore, firms reporting more than one did not necessarily use the methods simultaneously.

Table 2: Correlations between NWR and non-wage labour cost reduction strategies

	Wage freeze	% of wage bill due to bonuses	Reduce bonuses	Reduce benefits	Change in shifts	Slow promotions	Cheaper hires	Early retirement
Wage freeze	1							
% of wage bill due to bonuses	0.0317*	1						
Reduce bonuses	0.1145*	-0.0039	1					
Reduce benefits	0.0597*	0.0003	0.2792*	1				
Change in shifts	0.0293*	-0.0320*	0.1073*	0.1327*	1			
Slow promotions	0.0849*	-0.0246	0.1507*	0.1866*	0.3175*	1		
Cheaper hires	0.0429*	-0.0478*	0.1192*	0.1263*	0.1329*	0.1895*	1	
Early retirement	0.0094	-0.0701*	0.0826*	0.0852*	0.1376*	0.1504*	0.2889*	1

Note:* indicates significance at 1% level.

4. Nominal wage rigidity and non-wage cost-cutting strategies

Are firms subject to wage rigidity more likely to use the alternative margins of adjusting labour costs? Why are firms using some of these strategies and others not? Our survey can provide some guidance regarding the determinants of engaging in each of the cost-cutting strategies identified above. In the previous section, a positive correlation appeared between wages freezes and the use of cost-cutting strategies other than adjusting the base wage. Hence, it is natural to ask in our framework if firms subject to nominal wage rigidity are more likely to use any of the other margins of adjustment, controlling for other characteristics of the firm.

As control variables, we consider a set of firm characteristics such as the structure of its labour force (the share of high and low-skilled blue and white collars and the share of workers holding a temporary versus an open-ended contract), indicators of firm size, and the share of labour costs in total costs. We also consider an indicator of perceived product market competition, which ranks the degree of competition according to the managers' answers to a direct question: *To what extent does your firm experience competition for its main product?* in four categories: severe, strong, weak and no competition.

We start by analysing in more detail the determinants of using *any* of the six labour cost adjustment strategies proposed by the survey. The analysis is based on the results of probit regressions, where the dependent variable is 1 if the firm has used at least one of the labour cost adjustment strategies at any time in the past and 0 otherwise. Importantly, all the specifications include country fixed effects, which eliminate possible biases due to idiosyncrasies in the country questionnaires (e.g. due to language differences in the formulation of the questions or data collection methods) and institutional differences across countries. Similarly, all specifications include sectoral dummies.

Given that firms are asked whether they have used alternative cost adjustment strategies at any time in the past, whereas the question about freezes refers to the last five years, we cannot claim that firms that froze wages also adjusted other margins in the same period. The aim of the probit regressions is to examine the conditional correlations i.e., we assess whether firms facing constraints in adjusting their base wages downwards are more likely to organize their work or remuneration structure in a way that allows them to have some flexibility in terms of other margins of labour cost adjustment.

The first column of Table 3 highlights the relationship between nominal wage rigidity and the tendency of firms to have used any labour cost-cutting strategy, controlling for firm

characteristics. Having experienced a wage freeze during the preceding five years increases the likelihood of using other margins of labour cost cutting by 22 percentage points (pp). The effect is significant at the 1% level. This effect is relatively large, especially taking into account that it is likely to represent a lower bound of the true relationship between the two variables[10].

Table 3: NWR and non-wage margins of labour cost adjustment: probit regressions

Dependent variable equals one if the respective margin is used							
		Flexible wage components		Internal Flexibility		External Flexibility	
	Any margin	Reduce bonuses	Reduce benefits	Change shifts	Slow promotions	Cheaper hires	Early retirement
Nominal wage rigidity	0.222***	0.129***	0.059***	0.068***	0.151***	0.105***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Occupational categories (reference: high skilled white collar)							
Low-skilled blue collar (%)	-0.026	-0.027	-0.031**	0.073***	-0.054***	-0.022	0.025
	(0.349)	(0.187)	(0.033)	(0.001)	(0.003)	(0.343)	(0.238)
High-skilled blue collar (%)	-0.010	-0.029	-0.060***	0.056**	-0.009	0.005	0.023
	(0.761)	(0.231)	(0.000)	(0.027)	(0.679)	(0.847)	(0.358)
Low-skilled white collar (%)	0.047	0.051*	-0.024	0.030	0.040	-0.031	0.091***
	(0.233)	(0.081)	(0.249)	(0.358)	(0.142)	(0.365)	(0.002)
Exporting firm	0.026*	0.018*	0.009	-0.011	-0.004	0.014	-0.007
	(0.060)	(0.080)	(0.257)	(0.339)	(0.692)	(0.225)	(0.421)
Share of labour costs (%)	0.056*	0.037	0.004	-0.029	0.034	0.050*	0.004
	(0.078)	(0.111)	(0.799)	(0.238)	(0.103)	(0.054)	(0.857)
Temporary workers (%)	0.016	0.015	0.027	0.062**	0.026	0.029	-0.078***
	(0.630)	(0.569)	(0.124)	(0.019)	(0.254)	(0.325)	(0.004)
Size categories (reference: 5 – 19 employees)							
20–49 employees	0.106***	0.047***	0.024**	0.048***	0.047***	0.099***	0.069***
	(0.000)	(0.002)	(0.030)	(0.003)	(0.001)	(0.000)	(0.000)
50–199 employees	0.168***	0.067***	0.037***	0.083***	0.070***	0.114***	0.092***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
200+ employees	0.231***	0.106***	0.060***	0.077***	0.097***	0.171***	0.194***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Perceived product market competition (reference: no competition)							
Weak competition	0.093**	0.029	0.049*	0.027	0.002	0.113***	-0.017
	(0.025)	(0.392)	(0.072)	(0.423)	(0.939)	(0.008)	(0.499)
Strong competition	0.129***	0.038	0.039*	0.029	0.026	0.113***	-0.044*
	(0.001)	(0.188)	(0.076)	(0.327)	(0.295)	(0.002)	(0.073)
Severe competition	0.149***	0.027	0.047**	0.062**	0.025	0.134***	-0.009
	(0.000)	(0.353)	(0.042)	(0.039)	(0.326)	(0.000)	(0.709)
Observations	7531	7531	7531	5717	7207	7207	6028

[10] In the regressions, nominal wage rigidity is proxied by an indicator variable taking value 1 if the firm froze wages for at least one worker during the previous five-year period. As a robustness check, we replaced this variable with an alternative measure – the share of workers whose wages were frozen during this time period. The regression results were not qualitatively different when the alternative measure was used and are therefore not reported.

Notes: Robust p values in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Marginal effects are reported. Regressions include country and sector fixed effects.

Perhaps not surprisingly, we find that larger firms make more extensive use of all margins of labour cost-cutting strategies. According to the estimates presented in column 1 of Table 3, in large firms (above 200 employees) the probability of using non-wage strategies increases by 23 pp with respect to the baseline category (firms employing 5-19 employees). We also find that firms which have a higher share of labour costs in total costs have a tendency to use labour cost-cutting strategies more heavily.

The message about competition is broadly consistent, indicating a positive association between the use of labour cost-cutting strategies and the intensity of competition. The relationship between the indicator of perceived competition and the use of at least one strategy is also monotonically increasing, with weak competition increasing the use of the margins by 9 pp, strong competition by 13 pp and severe competition by 15 pp with respect to the reference category of no competition. The impact of competition is reinforced by the positive and statistically significant association between exporting activity and the use of any of the cost-cutting margins, since firms operating in international markets are expected to face even higher competitive pressures.

When we move to the analysis of each margin considered separately, we find that a positive significant relationship between each margin and nominal wage rigidity applies across the board. The marginal effects in Table 3 range from 15 pp in the case of slowing down promotions to 5 pp in the case of using early retirement to replace high wage workers with new entrants at lower wages. In all cases the marginal effects are statistically significant at the 1% level. Hence, our results are highly suggestive of complementarities between rigidity of base wages and other forms of flexibility in labour costs.

Some of the effects identified in the first column go in essentially the same way for all of the margins. Firm size is a clear example, being positively related to the probability of using each individual margin. Worker characteristics, on the other hand, have different effects on the likelihood of choosing each of these margins. Firms with higher percentages of blue-collar workers are less likely to use benefit reduction than those with a high proportion of high-skilled white-collar workers, probably reflecting greater use benefit components among the latter group. The choice of slowing promotions is also negatively related to the percentage of low-skilled blue-collar workers, suggesting that white-collar workers are more frequently involved in tournaments for promotions. Such competitions can be slowed down by firms during downturns or periods of restructuring. On the other hand, firms using a higher

proportion of blue-collar workers are significantly more likely to use changes in shifts if they want to reduce costs. This is easy to rationalise if we think that shift work is more common among blue- than white-collar workers. Firms with a higher share of temporary workers are associated with a greater probability of the firm choosing to change shifts as a cost-cutting strategy. We do not find significant differences in the use of bonus payments among firms with relatively more permanent workers, which is an unexpected result. In line with our expectations, early retirement is a tool more commonly used among firms with a greater proportion of workers with open-ended contracts. [11]

As regards product market competition, we find that the effects outlined above are mainly driven by three margins: reduction in benefits, the replacement of voluntary leavers with the recruitment of new employees at lower wages, and changes in shift assignments. Some competition is associated with a significant increase in the first two adjustment strategies, while changing shifts is only pushed as an alternative adjustment mechanism by severe competition.

5. Unionisation and flexibility in wage bills

There is an ample literature (e.g. Dickens et al., 2007, Holden and Wulfsberg, 2008, Knoppik and Beissinger, 2009 and Babecký et al., 2010) suggesting a prominent role for collective bargaining in the determination of downward (nominal or real) wage rigidity. Babecký et al., (2010) find that unions are more likely to protect real wages, as suggested by a positive correlation between measures of downward real wage rigidity and several indicators of unionization, while Dickens et al., (2007) also find a correlation between downward real wage rigidity and union density. Holden and Wulfsberg, (2008), find downward nominal wage rigidity to be positively related to union density while the analysis by Knoppik and Beissinger (2009) implies that downward nominal wage rigidity is positively related to the extent of coordination of wage-setting in the economy.

What is the role of unionization in the adjustment of the other components of the wage bill? The answer to this question is in principle ambiguous and is likely to depend on the structure

[11] We have also included the % of wage bill due to bonuses in our baseline regression. Our results regarding the impact on nominal wage rigidity are not affected by this control. Interestingly, the share of bonuses is not significantly related with the use of flexible wage components margins, as one may have expected. A positive relationship, however, exists between the share of bonuses and slowing promotions and changing shifts (Table A7, Appendix 5). This suggests that pay setting systems based on a high share of bonuses are not sufficient to achieve the desired flexibility in labour costs. Hence, additional channels are put in use.

of wage bargaining. When bargaining takes place at the firm level, unions may understand the likely negative effects of downward wage rigidity on firm level profitability and future employment, and allow for some trading-off between downward rigid wages and the flexibility in other margins. However, substantial flexibility in the other margins studied here would render downward wage rigidity ineffective from the point of view of workers, and this would certainly be considered during bargaining. If instead bargaining takes place outside the firm, at the sector or national level, the ability of unions to limit the use of these alternative margins appears to be more limited.

In order to address some of these questions, we consider two different sets of indicators of union activity. First, we asked managers about the percentage of workers that were covered by collective agreements. We label this variable "coverage". Second, we asked managers about the predominant form of wage setting that applies to their firms, which allows us to differentiate four categories: individual negotiations, firm-level agreements with unions, sectoral/national wage-bargaining agreements and both (firm-level and sectoral/national agreements). Summary statistics of all the variables used in the analysis are presented in Table A6 in Appendix 2.

Table 4 considers the role of wage bargaining on the use of labour cost-cutting margins. We consider two specifications, one including union coverage and the standard set of controls described in the preceding section, and another replacing union coverage with the set of dummies describing the level of wage bargaining. Perhaps as expected, the marginal effects presented in column 1 of Table 4 imply that firms characterised by higher union coverage are more likely to use at least one such margin of labour cost adjustment.[12] A similar message is obtained when we replace the indicator of union coverage by the three dummies that characterise the type of union contracts applying to the firm: firm level, sectoral/national level, and both.

Importantly, the positive impact of nominal wage rigidity retains a very similar magnitude and is significant at standards levels of testing. This has two important implications. First, this suggests that the indicator of nominal wage rigidity is capturing constraints at the time of wage setting that are not explained by unionisation. Second, the positive impact of union coverage on the use of these adjustment strategies does not work through our measures of

[12] It should be noted that the variable for union coverage has a fairly large number of missing values in our survey, resulting in a reduction of sample size of almost 15%. This renders the relatively small variation in the coefficient of downward wage rigidity perhaps even more remarkable.

downward wage rigidity. This may be related to the fact that, as we discussed previously, we are most likely underestimating the extent of downward nominal wage rigidity in wage setting. An alternative interpretation is that unions may introduce real, rather than nominal wage rigidity. In this interpretation, unions would be trading off the protection of real wages for some flexibility in the other margins of labour costs.

Table 4: Margins of labour cost adjustment, wage rigidities and unionisation

Dependent variable equals one if the respective margin is used							
		Flexible wage components		Internal Flexibility		External Flexibility	
	Some Margin	Reduce bonuses	Reduce benefits	Change shifts	Slow promotions	Cheaper hires	Early retirement
Specification 1: with bargaining coverage							
Nominal wage rigidity	0.215***	0.124***	0.066***	0.070***	0.159***	0.105***	0.046***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Coverage	0.046***	0.021	0.027***	0.032*	-0.014	0.038***	0.020*
	(0.005)	(0.111)	(0.005)	(0.052)	(0.244)	(0.006)	(0.060)
Observations	6423	6423	6423	4621	6111	6111	5035
Specification 2: with types of collective agreements							
Nominal wage rigidity	0.223***	0.130***	0.061***	0.067***	0.153***	0.106***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Only outside agreement	0.059***	0.028	0.028**	0.051***	-0.022	0.015	0.042**
	(0.006)	(0.106)	(0.029)	(0.008)	(0.150)	(0.411)	(0.030)
Only firm agreement	0.076***	0.011	0.034**	0.017	0.017	0.039*	0.072***
	(0.002)	(0.515)	(0.010)	(0.347)	(0.324)	(0.065)	(0.000)
Firm and outside agreement	0.072***	0.032	0.038**	0.088***	-0.010	0.011	0.100***
	(0.007)	(0.133)	(0.028)	(0.002)	(0.611)	(0.625)	(0.000)
Observations	7431	7431	7431	5650	7107	7107	5949

Notes: Robust p values in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Marginal effects are reported. Regressions include country and sector fixed effects, three indicators of labour force characteristics, three firm size dummies, the share of temporary contracts and labour costs in total costs and three dummies of perceived competition.

Considering each cost-cutting strategy separately may help shed some light on the role of the extent and nature of union wage bargaining in the relative rigidity or flexibility of the wage bill of firms. Columns 2 to 7 of Table 4 present the results for each strategy using the two specifications previously discussed. The first aspect worth noting is that, as before, downward nominal wage rigidity retains its sign and significance in all six margins, confirming the fact that there is some complementarity between nominal wage rigidity and the flexibility in other margins of labour costs. Similarly, the presence of unions in the wage-setting process is associated with more intensive use of all margins, with the exception of bonus reductions and the slowing down of promotions. This is the case even when wage bargaining takes place only

at the firm level, which actually in some cases tends to facilitate, rather than obstruct the use of some of these adjustment mechanisms. This is especially true in the case of promoting early retirement.

Outside union agreements are associated with a 4.2 pp increase in the use early retirement as a cost-cutting mechanism, while in firms with predominantly firm-level union agreements the effect increases to 7.2 pp with respect to firms who bargain with workers individually. Having instead a firm and a sectoral/national-level agreement applying jointly reinforces this effect by up to 10 pp with respect to individual negotiations. There is only one case in which the presence of firm level bargaining appears to dampen the use of one adjustment mechanism with respect of other forms of worker representation. This is the case for changes in shift assignments, where outside agreements increase their use by 5.1 pp, and this is reinforced by the joint occurrence of firm and higher-level agreements. However, firms that apply firm-level agreements only do not use this strategy differently than firms characterised by individual negotiations. An implication of our results is that bargaining at the firm level, apart from giving workers the ability to trade some flexibility in wages with the use of other margins, would give them the ability to state a 'preference' over the use of certain margins. Interestingly, firm level agreements are associated with greater use of external flexibility than sectoral or national agreements; i.e., the incidence of cheaper hires and early retirement strategies is higher among firms having some form of firm-level collective negotiation. A possible interpretation of this finding is that firm level agreements tend to put more weight on insiders' interest.

6. Conclusions

We examine the importance and determinants of a variety of strategies that firms might use to cut their labour costs, particularly when base wages are rigid. Using a unique survey of European firms from 12 EU countries, six possible strategies are examined: reduce or eliminate bonus payments; reduce non-pay benefits; change shift assignments or shift premia; slow down or freeze the rate at which promotions are filled; recruit new employees at a lower wage level than those who left voluntarily; and encourage early retirement to replace highly paid employees with entrants earning lower wages.

We find that firms subject to nominal wage rigidity are much more likely to use each of the six cost-cutting strategies. This indicates that there is some degree of substitutability between base wage flexibility and the flexibility of other labour cost components. This has potentially

important policy implications. The strong signs of substitutability between alternative labour cost cutting strategies and wage rigidity suggest that the impact of downward wage rigidity on labour costs might be lower than previous research has suggested. However, further research is needed. The qualitative nature of the questions we examine shows that these substitution mechanisms are at play, but do not enable us to assess the quantitative dimension of this process of substitution, and ultimately the extent to which the wage bill is affected by downward wage rigidities.

There is substantial heterogeneity in the use of each of these strategies across countries, sectors and firms. Not surprisingly, larger firms show greater room for manoeuvre with respect to using any of these strategies in order to adjust labour costs. Similarly, firms in more competitive environments are more likely to engage in several of these strategies. The presence of unions in wage setting is associated with greater use of most of the cost-cutting strategies under examination, even after the effect of rigid base wages is taken into account. A possible interpretation is that while unions may limit the flexibility of wages in dimensions different than those considered here, they also seem to facilitate the use of alternative labour cost-cutting strategies.

Understanding how firms' use of non-base-wage cost-cutting strategies might vary across the economic cycle could shed light on how firms use flexible work practices and/or compensation to adjust to shocks, and hence constitute an important avenue for further research.

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Appendix 1: Labour cost adjustment: additional survey statistics

Table A1: Nominal wage rigidity, bonuses and non- wage labour cost adjustment strategies – differences across sectors

Sector	Wage freezes	% of workers affected by freezes	Reduce bonuses	Reduce benefits	Change in shifts	Slow promo-tions	Cheaper hires	Early retirement	Use at least one strategy	% of wage bill due to bonuses
Manufacturing	0.092	0.590	0.209	0.135	0.189	0.204	0.319	0.177	0.615	0.113
Energy	0.004	0.673	0.301	0.216	0.040	0.127	0.182	0.253	0.667	0.127
Construction	0.106	0.609	0.210	0.149	0.113	0.130	0.166	0.058	0.521	0.199
Trade	0.076	0.470	0.250	0.173	0.220	0.216	0.374	0.109	0.648	0.128
Market services	0.096	0.526	0.233	0.147	0.212	0.219	0.330	0.189	0.662	0.130
Financial intermediation	0.116	0.529	0.300	0.149	0.050	0.229	0.365	0.294	0.620	0.155
Non-market services	0.116	0.715	0.096	0.045	0.118	0.118	0.183	0.041	0.426	0.188

Notes: The figures presented in the Table (except the last column) present the proportion of employees that are affected by a given strategy.

Table A2: Nominal wage rigidity, bonuses and non- wage labour cost adjustment strategies – differences by firm size

Size	Wage freeze	% of workers affected by freezes	Reduce bonuses	Reduce benefits	Change in shifts	Slow promo-tions	Cheaper hires	Early retire-ment	Use at least one strategy	% of wage bill due to bonuses
5-19	0.083	0.716	0.154	0.107	0.129	0.115	0.185	0.047	0.506	0.137
20-49	0.082	0.551	0.202	0.122	0.154	0.205	0.327	0.062	0.595	0.099
50-199	0.114	0.603	0.233	0.139	0.188	0.190	0.269	0.116	0.620	0.153
200+	0.085	0.438	0.267	0.183	0.247	0.250	0.404	0.300	0.711	0.123

Notes: The figures presented in the Table (except the last column) present the proportion of employees that are affected by a given strategy.

Appendix 2: Sample characteristics

Table A3: Country composition of the sample

Country	Number of observations	Percent of total
Belgium	1,431	12.01
Czech Republic	399	3.35
Estonia	366	3.07
France	2,029	17.02
Greece	402	3.37
Hungary	2,006	16.83
Ireland	985	8.26
Italy	953	8
Lithuania	337	2.83
Poland	908	7.62
Portugal	1,436	12.05
Slovenia	666	5.59
Non euro area	4,016	33.7
Euro area	7,902	66.3
Total	**11,918**	**100**

Table A4: Sectoral composition of the sample

Sector	Number of firms	Percent of total
Manufacturing	5,057	42.66
Energy	107	0.9
Construction	932	7.86
Trade	2,277	19.21
Market services	3,064	25.85
Financial intermediation	225	1.9
Non-market services	192	1.62
Total	**11,854**	**100**

Table A5: Size composition of the sample

Size	Number of firms	Percent of total
5–19	2,895	24.29
20–49	2,829	23.74
50–199	3,793	31.83
200+	2,401	20.15
Total	**11,918**	**100**

Table A6: Type of union contracts

	Only outside agreement	Only firm agreement	Both agreements
Belgium	0.641	0.015 (N)	0.337
Czech Republic	0.024	0.363 (D)	0.151
Estonia	0.017	0.087 (D)	0.017
France	0.413	0.001 (D)	0.585
Greece	0.726	0.076 (N)	0.133
Hungary	0.000	0.190 (D)	0.000
Ireland	0.407	0.036 (N)	0.278
Italy	0.568	0.001 (N)	0.428
Lithuania	0.005	0.234 (D)	0.003
Poland	0.015	0.182 (D)	0.032
Portugal	0.517	0.030 (N)	0.069
Slovenia	0.743	0.257 (N)	0.000
Euro area	0.535	0.016 .	0.402
Non euro area	0.014	0.216 .	0.046
Total	**0.352**	**0.086 .**	**0.276**

Notes: The Table presents the percentage of workers employed in unionized firms. Country-level institutional information from Du Caju et al. (2009) in brackets: firm-level agreements: D = company level is dominant in the country, N = company level is not dominant in the country.

Appendix 3: Sample statistics

Variable	Mean	Number of observations
At least one strategy (of the following 6 strategies)	0.581	11,483
Reduce bonuses	0.226	11,483
Reduce benefits	0.147	11,483
Change shifts	0.191	9,170
Slow promotions	0.206	11,086
Cheaper hires	0.323	11,086
Early retirement	0.165	11,086
Low-skilled blue collar (%)	0.383	11,688
High-skilled blue collar (%)	0.217	11,688
Low-skilled white collar (%)	0.172	11,688
High-skilled white collar (%)	0.228	11,688
Exporting firm	0.505	10,511
Share of labour costs (%)	0.336	10,537
Only outside agreement	0.352	11,665
Only firm agreement	0.086	11,665
Firm and outside agreement	0.276	11,665
Temporary workers (%)	0.114	11,722
Coverage (%)	0.616	9,880
Perceived comp = severe	0.399	9,256
Perceived comp = strong	0.500	9,256
Perceived comp = weak	0.073	9,256
Perceived comp = none	0.029	9,256

Note: Sample statistics are employment weighted.

Appendix 4: Questions used for the creation of the variables

Question 14 *– Over the last five years, has the base wage of some employees in your firm ever been frozen? (Definition of freeze in base wage – base wage in nominal terms remains unchanged after the usual period of revision).)*

- No □
- Yes (indicate for what percentage of your employees) _____%

Question 18 *– Has any of the following strategies ever been used in your firm to reduce labour costs?*

Please choose as many options as apply to your firm.

Reduction or elimination of bonus payments	□
Reduction or elimination of non-pay benefits	□
Change in shift assignments	□
Slowdown or freeze of the rate at which promotions are filled	□
Recruitment of new employees (with similar skills and experience) at lower wage than those who left (e.g. due to voluntary quits and retirement)	□
Use of early retirement to replace high wage employees by entrants with lower wages	□
Other strategies (please specify) _____	□

Appendix 5: Controlling for bonuses in the baseline regression

Table A7.Dependent variable equals one if the respective margin is used							
		Flexible wage components		Internal Flexibility		External Flexibility	
	Any margin	Reduce bonuses	Reduce benefits	Change shifts	Slow promotions	Cheaper hires	Early retirement
Nominal wage rigidity	0.227***	0.135***	0.064***	0.065***	0.147***	0.107***	0.040***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)
% of wage bill due to bonuses	0.038	0.014	-0.005	0.076***	0.035*	0.021	0.001
	(0.237)	(0.573)	(0.792)	(0.004)	(0.079)	(0.415)	(0.964)
Observations	6889	6889	6889	5400	6889	6889	5827

Notes: Robust p values in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Marginal effects are reported. Regressions include country and sector fixed effects.