Jobless recovery in Romania: the role of sticky wages and other frictions

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Abstract

After a painful recession, the Romanian economy experienced a jobless recovery, with output returning to its pre-crisis level and only half of the lost jobs being regained. In this paper, we tried to identify the factors driving labour market dynamics in Romania after the crisis, by using a unique and rich dataset, coming from the first labour market survey conducted by the National Bank of Romania in cooperation with the WDN, an ESCB research group in late 2014. The fairly high degree of wage stickiness proved to have an important bearing in Romanian firms' decision to destroy or create a job. However, at least in the early recovery phase of the business cycle, our results suggest more pro-cyclicality of new hires' wages. When looking at the sources of wage stickiness, firms confirmed the efficiency wage theory in the case of downward wage rigidity, while real wage rigidity seems to be strongly associated with collective bargaining agreements coverage. Other frictions that have shaped this jobless recovery relate to minimum wage policy, high payroll taxes, skill mismatch and also sectoral shifts in the economy.

Key words: wage stickiness, labour market frictions, survey, WDN
JEL classification codes: J21, J51, J64

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1 Introduction

The global financial and economic downturn led to a strong contraction of the Romanian economy during 2009-2010, which triggered a substantial decline in the number of employees, almost 700 thousand jobs being destroyed, with the loss being concentrated especially in industry (about one half) and construction; the two sectors hold the largest shares of unskilled workers on their payrolls. The resizing of the pre-crisis overly developed construction sector and the change in production structure in favour of more competitive, technology-intensive sectors (such as the automotive industry and information technology and communication services – IT&C) resulted in a lower capacity of the economy to create jobs. Moreover, it became harder to find a good match even for existing vacancies because of the wider discrepancy between job requirements and worker attributes. As a result, the economy experienced a jobless recovery, with output reverting to its pre-crisis level and only half of the lost jobs being regained.

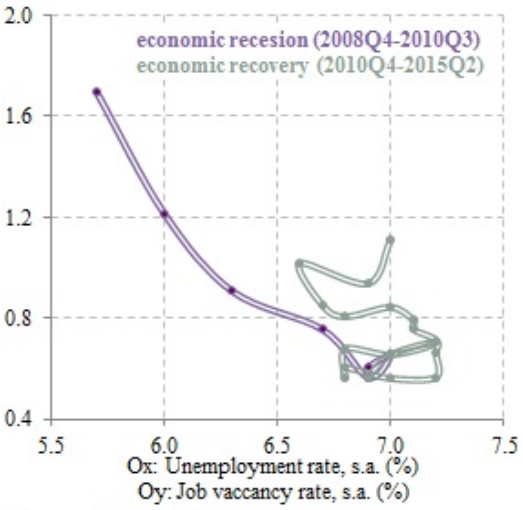
With a view to better understand the response of the Romanian labour market to the crisis and afterwards, this paper aims at identifying the factors shaping firm's decision to destroy or create a job, by turning to the search and matching literature (Diamond, 1982; Mortensen and Pissarides, 1994). Under this framework, both the worker and the firm are actively looking for each other and jointly accept or reject a job match. Conditional on the influence of the business cycle, the decision to destroy or create a job is strictly related to its present or expected net value, given by the difference between productivity and costs, the latter depending not only on the negotiated wage level, but also on taxes and the time necessary to fill in a position - which may be longer in a frictional market. Frictions may refer to skill mismatch, geographical differences, sectoral shifts or communication infrastructure. This two-sided search story is captured by the Beveridge curve, which is shaped by different combinations of vacancies and unemployment rates. As this search and matching process takes time, there will never be a full match on the labour market, which implies a certain level of unemployment.

In the case of Romania's economy, the movements along the curve during 2009-2010, as shown in Figure 1, reflect the influence of the recession, when the unemployment rate and the vacancy rate posted opposite developments. Starting 2011, however, the curve has seen multiple outward shifts, revealed by a simultaneous rise in the two indicators, indicating a more pronounced inefficiency of the search and matching process, triggered by the interference

of frictions, which this paper aims to identify.

More frictions on the labour market generally lead to higher long-term unemployment, which is harder to deal with in the absence of active policies. In our case, the effects of the recession were reflected by a steep increase in short-term unemployment (less than one year) which was only partially reversed as the economy picked up, resulting in higher long-term unemployment (Figure 2). The phenomenon, referred to as "the hysteresis effect" in the literature, is driven by the fact that the longer the period a person seeks a job, the lower the chances to succeed, as a result of both skill depreciation and change in companies' requirements concerning the training of candidates.

Figure 1: Beveridge curve in Romania



Source: Eurostat, authors' calculations

Figure 2: Unemployment rates

Source: Eurostat, authors' calculations

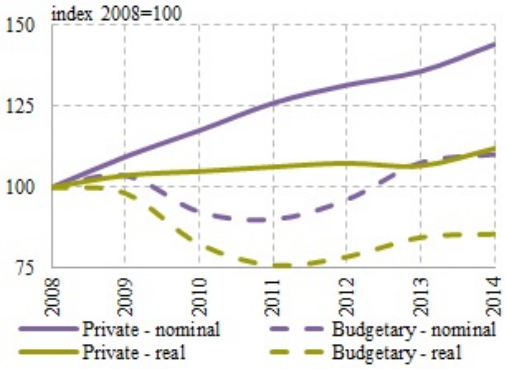
Looking at wages, it's no surprise that they are found to be less pro-cyclical than unemployment, considering that they are closely related to the worker's non-market returns, such as the value of home activities or that of extra leisure (Pissarides, 2011). Indeed, Robert Hall (2005) shows that wages depend to a large extent on the historical median, while demand shocks seem to have a small effect. Thus, it seems natural to further investigate how much of the unemployment volatility comes from wage stickiness. The idea dates back to Keynesian time and was further explored in subsequent labour market theories, but without conclusive results. In this regard, Shimer (2005) argues that the search and matching framework needs to incorporate

some form of wage rigidity to better capture unemployment fluctuations, while Pissarides (2011) stesses the importance of first assessing the degree of wage rigidity for new hires in each phase of the business cycle.

What lies behind wage rigidity? Should we consider downward nominal wage rigidity, real wage rigidity or both? Up until now, there is no clear answer to these questions in the related literature, but we can identify three main streams of thinking about wage stickiness: contract theory, efficiency wages and insider-outsider theory. The contract theory is built on the assumption that workers and firms need some form of insurance when they enter a business relationship, which might be a tacit agreement or a written one, such as collective pay agreements. As pointed out by Stiglitz (1984), the contract theory may explain well the occurrence of wage rigidity, but it fails to replicate the wide cyclical fluctuations of unemployment; in this respect, the efficiency wage theory does a better job, as it directly relates wage rigidity to productivity. In the latter case, reducing a worker's wage might affect his/her morale, rendering him/her less productive, so that in the end the measure might prove inefficient. Another approach for explaining sticky wages refers to the market power of incumbents over the unemployed, which stems from the labour turnover costs incurred by the employer, i.e. the insider-outsider theory proposed by Lindbeck and Snower (1988). All these theories are not mutually exclusive and a thorough understanding of the labour market functioning should take into account elements from each of them.

With the exception of a 25 percent cut in public sector wages in 2010, following the implementation of a series of fiscal measures needed to balance the state budget, average (real and nominal) gross wages remained on an upward path in Romania even in the crisis years (Figure 3). Nevertheless, it is difficult to assess the contribution of wage rigidities only by looking at macro data, since compositional effects may have also played a role in pushing up the average wage, given that firings were concentrated in low-skilled jobs. A microeconomic perspective, however, allows one not only to

Figure 3: Average gross wages



Note: The proxy for the budgetary sector salaries was obtained by aggregating wages in public administration, education, health and recreation.
Source: NIS, authors' calculations

gauge the degree of wage rigidity in the economy, but also to understand the factors behind it. For that matter, any empirical attempt to capture labour market dynamics should ideally be grounded on microeconomic fundamentals.

The analysis in this paper builds on a rich and unique data set, stemming from the first labour market survey conducted by the National Bank of Romania in late 2014, as part of a larger European project, initiated by ECB's Wage Dynamics Network research group. For WDN, this was the third wave of surveys that attempted to shed some light on the heterogeneous labour market response of firms in the aftermath of the financial crisis. Results for the Romanian economy indicate fairly high wage rigidities, both in nominal (18% of firms) and real terms (32% of firms). The reluctance to cut nominal base wages is more likely for companies with a larger share of workers with over 5 years of tenure, and is also directly related to employee's morale. As regards real wage rigidity, it appears that collective contracts play a key role, given that 60% of firms have such an agreement in place.

Comparing our results with the ones obtained from the previous WDN survey by Babetcky et al. (2009), we find that Romania's DNWR is somewhat higher than that of Europe, where around 10% of firms were subject to downward nominal wage rigidity, while a little more to real wage rigidity, i.e. 17%. However, during 2010-2013, preliminary data for other European countries from the third wave of WDN surveys reveal that in Romania the degree of DNWR stands around New Member States average. Turning to Babecky et al. (2009), their results showed that the degree of wage stickiness varies significantly across countries mainly due to institutional differences. Similar to the Romanian case, high collective bargaining coverage was found to be positively correlated with real wage rigidity, whilst the relation with nominal wage rigidity was not statistically significant; an important implication of this finding is that labour unions coverage seem to reduce money illusion. As concerns downward nominal wage rigidity, they observed that it is closely related to the extent of permanent contracts and product market competition.

The objective of this paper is to assess the importance of wage rigidities and other influences exerted by the business cycle and labour market frictions in a firm's decision to destroy or create a job. In order to do this, we use the probit model, which allows us to draw inferences from qualitative survey data, by modelling firms' probability of reducing the number of employees or freezing job creation in the early recovery phase of the business cycle.

We find that downward nominal wage rigidity increases the chances for a company to lay off employees by around 20 percentage points. Worsening economic conditions, sectoral shifts in the economy, awareness of a deficit of skilled labour supply and other firm-specific characteristics are also involved in the decision to destroy jobs.

As regards job creation, the high level of taxes, economic uncertainty and skill mismatch have been identified as main obstacles to hiring. Moreover, the occurrence of (downward nominal and real) wage rigidities lowers the chances for a company to create jobs by a cumulative 8 percentage points. A price floor relevant in the case of the jobless recovery in Romania, is related to the minimum wage policy, about one half of the interviewed companies declaring that an increase in minimum wage will limit their future hiring. An additional interesting finding of this paper is related to the wage policy for new employees in a period of early recovery, given that more than 40 percent of firms replaced existing staff with cheaper hires. This result suggests that wages of new hires are more pro-cyclical in this phase of the business cycle and points to a limited market power of incumbents over the unemployed.

The rest of the paper is organised as follows. Section 2 provides details on the technical features of the survey, namely the criteria for selecting the sample and its representativeness, and defines the concept of wage rigidity as well as the variables used in estimations. Section 3 presents the main results regarding firms' behaviour on the labour market during 2010 - 2013 and section 4 concludes and draws some important policy implications.

2 Data and empirical approach

The analysis in this paper is based on a rich firm-level dataset stemming from a survey conducted by the National Bank of Romania in late 2014. The survey was carried out in the context of a broader European project initiated by the WDN and was implemented by 25 national central banks on the basis of a harmonised questionnaire. The main purpose of this survey was to understand firms' heterogeneous response on the labour market in the aftermath of the financial crisis. The questionnaire included a core set of questions referring to the sources of shocks driving the European crisis and to firms' reaction to these shocks in terms of the adjustments made to the labour force size and structure, and of wage policies. This harmonised questionnaire was further adapted by the NCBs to account for

country-specific characteristics and differences in institutional frameworks[1]. Given the importance of the minimum wage (MW) policy for the Romanian economy, the core questionnaire was supplemented with a dedicated section, which offered firm-level information about the share of minimum wage earners and the proportion of employees earning above the threshold who also benefit from the MW increase.

In the case of Romania, the survey covers the 2010-2013 period and looks at non-financial corporations in manufacturing, construction sector, trade and business services that were established before 2010 and operate in both domestic and foreign markets. The survey sample was designed to be representative at the country level by using a stratified random sampling, where the strata were defined based on company's main economic activity and size, the latter measured on the basis of the average number of employees:

- size class 1 (small-sized companies): 20 - 49 employees;
- size class 2 (medium-sized companies): 50 - 199 employees;
- size class 3 (large companies): at least 200 employees.

The broad sample included around 2,300 companies, employing one third of the private sector personnel in 2013. The survey had a considerably high response rate, as 88% of the sample firms, having on their payrolls a little more than 1 million workers, answered the survey questions. Table 1 provides a description of the sectoral distribution of the sample, coverage and response rate.

In order to ensure economy-wide representativeness, the statistics presented in the following sections were constructed using firm-adjusted weights, i.e. each weight indicates the number of firms that each observation represents in the total population. The advantage of this kind of approach is that it offers the possibility to directly ask firms about their perception on economic conditions and their reaction, in terms of employment and wage policy, to various shocks. Moreover, the qualitative data allows us to identify some interesting firm-level institutional features (such as wage indexation, collective bargaining coverage, share of minimum wage earners etc.) and to test several theories about wage stickiness, as quantitative data can merely indicate its presence.

[1]The questionnaire is available in Appendix 1

Table 1: Sample composition by sector

Sector	Sample population no.firms	no.employees	Coverage(%)	Response rate(%)
Manufacturing	1,218	579,281	61	90
Trade	343	176,082	44	86
Construction	267	95,228	39	82
Services	499	313,637	59	86
Total	**2,327**	**1,164,228**	**55**	**88**

Source:WDN survey, authors'calculations

However, such a survey involves certain risks and caution is needed when interpreting the results, given that companies' perceptions are subjective and sometimes strongly reflect recent developments.

The definition of wage rigidity that we use in this paper is that employed by Babecky et al. (2009) and refers to wage adjustment obstacles identified on the basis of the occurrence of wage freezes and indexation with inflation. Thus, our measure of downward nominal wage rigidity is computed as the proportion of firms that froze base wages during 2010 -2013. Given that the majority of firms perceived a fairly high uncertainty of the economic environment, specific to early recovery periods, and that only half of the companies that froze wages saw a decrease in demand, we assumed that all sample firms were likely to be subject to DNWR. As for real wage rigidity (RWR), we used the share of companies that linked wage changes to inflation during 2010 - 2013.

We estimated the probability of a firm being subject to DNWR or RWR by means of probit models[2]. This enabled us to test if different variables regarding firms' characteristics and workers' attributes made it more likely for a company to exhibit this kind of stickiness. We looked at the share of workers with a permanent open-ended contract, labour force composition in terms of skills and tenure, reasons preventing companies from cutting wages, collective pay agreements coverage and market competition.

Another source of wage rigidity is related to the minimum wage (MW) policy, especially in Romania where the minimum gross wage economy-wide has increased by 75% since 2010. The evolution was not a matter of concern until

[2]A list with all the variables used in estimations is provided in Appendix 2.

end-2013, as the rise was correlated with inflation developments and benefited from an improvement in labour productivity. However, in the recent period, the growth pace of the minimum wage has accelerated, surpassing consumer price dynamics, amid insufficient productivity support, and led to a more compressed distribution of wages at the bottom.

In order to investigate the factors driving Romania's jobless recovery, we extended our dataset with the number of employees of each sample firm for the whole survey period, which had been obtained from the Ministry of Finance database. We constructed two binary variables: the first one takes the value 1 if job destruction was higher than job creation at firm-level during 2010-2013 (i.e. the total number of employees decreased) and 0 otherwise, and the second one was computed in a similar way,being equal to 1 if the net number of jobs created was marginal (no more than 1% change). Next, we estimated the likelihood of each event happening as a function of dummy variables for: a contraction in demand, lower access to finance, economic uncertainty, the presence of (downward nominal and real) wage stickiness and other labour market frictions linked to high payroll taxes, shortage of skilled staff, or sectoral shifts in the economy. At the same time, several continuous variables were considered, such as the share of flexible contracts (temporary, fixed-term and part-time) and labour costs.

As the MW is seen as an additional barrier to job creation (especially for young and low-skilled workers), the dedicated section included an explicit question regarding the importance of the MW increase in freezing new hires, by rating it from 1=not relevant to 4=very relevant. By means of an ordered probit model, we used this ordinal variable to estimate the probability of limiting job creation in the event of a MW rise, conditional on: (i) firm-specific factors, such as the share of employees directly and indirectly affected, the share of labour costs in total expenses, perceived competition, the share of workers with over 5 years of tenure, and the size of the firm; (ii) labour market institutional features such as the existence of a collective pay agreement and the perception of the burden from payroll taxes, as well as (iii) factors associated with the economic context during 2010-2013, namely the fall in demand, price cuts, business environment uncertainty, the increase in costs of supply and finance, and the adjustment in the number of employees via dismissals or temporary layoffs, as well as in non-pay benefits.

With a view to gaining some insight on the wage flexibility of new hires in the early recovery phase of the business cycle, the survey also included a question asking firms to score their recourse to replacing incumbents with

new employees with similar skills and experience at lower wages on a scale from 1=not at all to 4=strongly. In this case as well, the likelihood of cheaper hires was investigated by estimating an ordered probit model looking at firms' characteristics (their size, share of employees with a flexible contract and export orientation), economic conditions, wage stickiness of incumbents and other frictions, especially taxation.

3 Results

In this section we analyse the factors behind wage and employment policies adopted by Romanian companies in the aftermath of the crisis. Most of all, we are interested in finding how sticky wages are, why this rigidity occurs, and also how do these rigidities, along with other factors (economic conditions and labour market frictions) influence the decision of a company to destroy or create a job.

3.1 Wage policy

During 2010-2013, the wage policy of firms was rather inflexible, with only 7% of them cutting base wages as a strategy to reduce labour costs. This is also suggested by the fairly high degree of DNWR, given that a somewhat large share of firms, i.e. 18%, decided to freeze wages. At the same time, real wage rigidity was more pronounced, 32% of firms declaring that they adapted wage changes to past inflation. The wage-setting behaviour was also influenced by the multiple MW rises, at least 22% of the private sector employees being directly targeted and another 9% indirectly impacted, as some firms stated that they also grant increases to above-minimum wage earners.

Downward wage rigidity

DNWR seems relatively high in Romania, as 18% of firms froze base wages during 2010-2013. When asked about the reasons behind the decision to freeze base wages, 75% of the companies pointed to the fear of a negative impact on employee's morale and of productivity losses, thus confirming the efficiency wage theory (Figure 4). As mentioned previously, in addition to the said theory, several other theories about DNWR were investigated by means

of a probit model. In Table 2 we describe the factors (average marginal effect included) that were found to be relevant for the Romanian firms. Our estimations revealed two factors with a statistical significant positive influence on DNWR, namely the fear of losing the most productive employees (+8 percentage points) and the share of workers with over 5 years tenure (+20%). Tenure was also one of the main reasons behind DNWR in EU (Babecky et al., 2009). Nevertheless, associating this finding with a certain theory is less straight forward than the case of losing productive employees. The fact that a company with a higher share of long-term employees is more reluctant to cut wages might confirm the role of implicit contracts and could also indicate a wider market power of incumbents over the unemployed. However, this last implication is disproved when looking at the large share of companies (44%) that replaced existing employees with cheaper ones during 2010-2013. The finding also suggests that the wages of new hires were more pro-cyclical during the early recovery phase of the business cycle.

Figure 4: Reasons behind DNWR

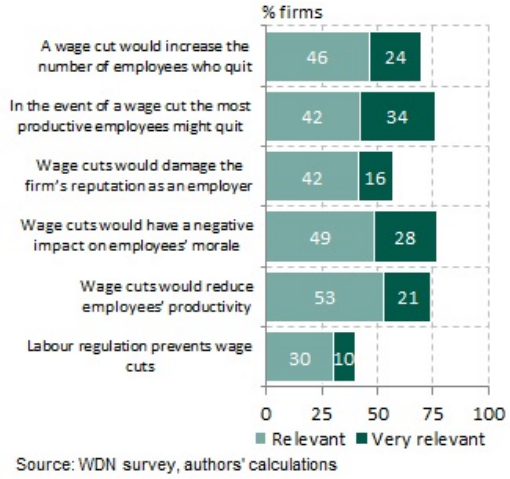


Table 2: Downward nominal wage rigidity- probit estimates

Variable	Coefficient	AME
C	-1.80**	
% of workers with over 5 years tenure	0.90***	19.58
High-performing employees resign	0.46***	7.80
Number of observations:	2035	
Psedo R^2	0.04	

Note: *, ** and *** stand for significance at 10%, 5% and 1% respectively; AME stands for average marginal effect.
Source: WDN survey, authors' estimations

An earlier study on downward nominal labour costs rigidity in Romania (Iordache, Militaru, Pandioniu, 2013) revealed a lower degree of nominal stickiness (4%), when testing the shift in the shape of the distribution of

yearly changes in labour costs in the aftermath of the financial and economic crisis. That measure seemed to have underestimated wage rigidity, given that labour costs include, besides base wages, a more cyclical flexible component. As a matter of fact, when asked about strategies adopted in order to reduce labour costs, 51% of companies responded that they have cut bonus payments and 45% said that they have lowered other non-pay benefits.

Real wage rigidity

Wage stickiness is even more pronounced when looking at RWR, 32% of companies declaring that they had indexed wages to inflation both prior to 2010 and during 2010-2013. The main reason behind this form of wage stickiness is related to the bargaining power of labour unions, our estimations (Table 3) revealing that the probability of adapting wage changes to inflation is 14% higher for firms applying a collective pay agreement.

Table 3: Downward real wage rigidity- probit estimates

Variable	Coefficient	AME
C	-0.73***	
% of collective agreements	0.40***	14.00
Number of observations	2041	
Psedo R^2	0.01	

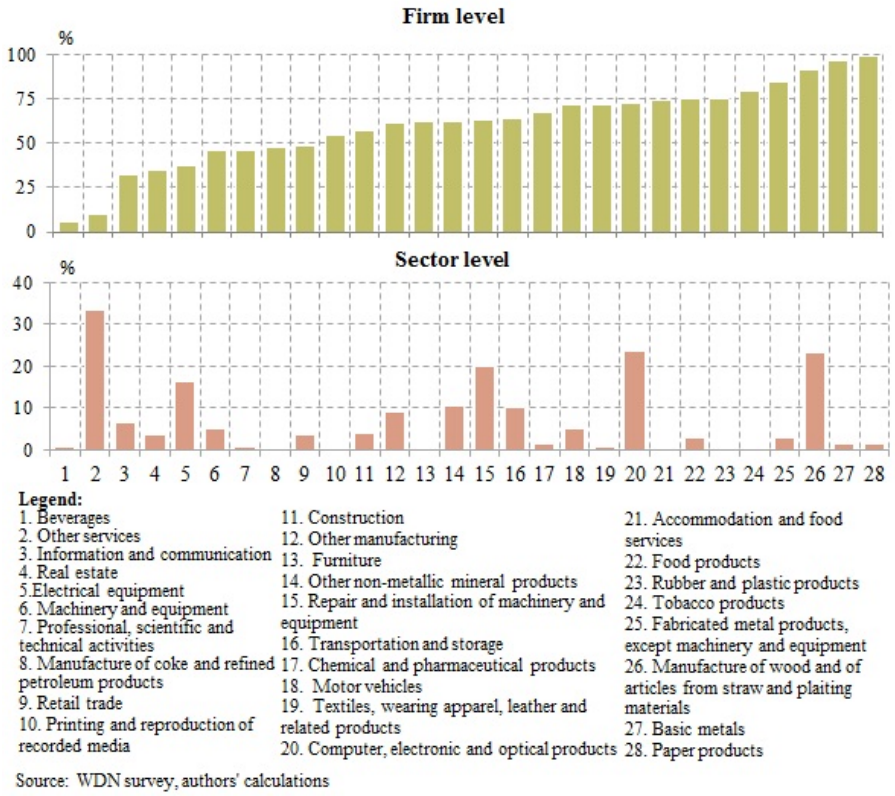
Note: *, ** and *** stand for significance at 10%, 5% and 1% respectively.
Source: WDN survey, authors' estimations

The regulations on collective pay agreements in Romania were substantially modified in 2011, when two new codes, i.e. the Labour Market Code and the Social Dialogue Code, were prepared, in an effort to launch structural reforms aiming at a more flexible labour market. Measures for stimulating job creation envisaged the reduction in hiring costs by extending the trial period for a new employee from 30 to 90 calendar days. Also, the employer may now successively hire workers on probation for the same position for 12 months, while the former law did not allow more than three successive fixed-term contract employees to fill the same position. Another facility regarded the one-year extension of fixed-term and temporary contracts, i.e. to 36 months and 24 months respectively. At the same time, the wage floor for temporary employees was set to equal the minimum gross wage, instead of the amount paid to an existing employee with similar duties. Furthermore,

the new legislation introduced the possibility of reducing working hours from five to four days a week, with a corresponding wage cut, due to economic reasons (a temporary interruption of the activity for economic, technological, structural or similar reasons over a period exceeding 30 days).

Another important provision to increase labour market flexibility was related to the collective bargaining system. As such, the so-called "national collective bargaining agreement" was eliminated and only company, multi-employer and sectoral level agreements remained in force. At the same time, the definition of economic sectors for which a collective agreement applies changed and the number of such sectors was reduced. Changes also targeted trade union regulations, as eligibility criteria for firm-level representation became more restrictive (at least 50% plus 1 of the total number of the company's employees, instead of one-third, as set forth previously). Moreover, the establishment of a trade union now requires at least 15 employees of the same company (not industry, as stipulated in the former legislation).

Figure 5: Share of firms that implemented collective pay agreements



Source: WDN survey, authors' calculations

As a consequence, only 5% of companies concluded collective pay agreements

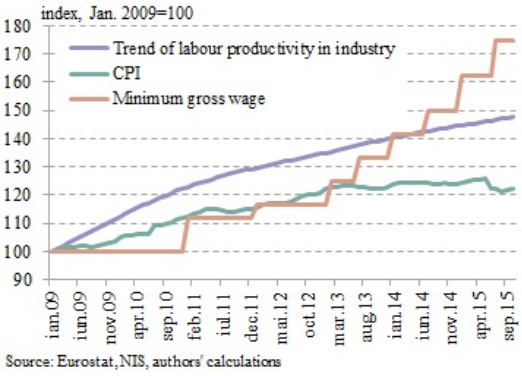
at the sector level in 2013, while many more contracts (around 60%) were agreed at the firm level (Figure 5), most employees being covered by such an agreement in both cases. The contracts were renegotiated and amended yearly or every two years in almost 75% of cases. Turning to RWR, our survey results also indicate that these agreements incorporate explicit or implicit indexation with past inflation as well, thus offering protection against the erosion of the value of money.

Minimum wages

In recent years, an additional pressure on increasing labour costs has been exerted by the multiple minimum gross wage rises. Whilst during 2009-2013 the minimum gross wage increased cumulatively by 33%, in line with inflation developments, amid a steady improvement in the labour productivity trend in industry, starting in 2014 the path has been quite different. As shown in Figure 6, in the context of a reduction in consumer prices and poor productivity performance, the minimum wage grew by 31%.

Based on our survey data, we were able to estimate that a raise in the minimum gross wage directly affected at least 22% of employees in the private sector in Romania. There are also indirect effects, as companies stated that they had also granted raises to above-minimum wage earners, in which case at least another 9% of the personnel were affected.

Figure 6: Minimum gross wage economy-wide increases



Source: Eurostat, NIS, authors' calculations

As expected, the most vulnerable firms seemed to be the small- and medium-sized enterprises. At the sector level, companies operating in the light industry, the food industry, manufacture of wood products, manufacture of other non-metallic mineral products, transportation and storage, accommodation and food services, as well as construction saw higher pressure on profit margins from minimum wage increases, given that more than 40 percent of employees in these subsectors are paid the MW. The result was a wider gap in terms of competitiveness, both between sectors and between large companies and SMEs. Moreover, there are also negative effects on employment driven by

the minimum wage raises. The higher the minimum threshold, the higher the barrier to labour market entry or re-entry, especially for young and low-skilled workers, in whose case mismatches are already more pronounced.

3.2 Personnel policy

Romanian firms faced mixed economic conditions in the 2010-2013 period, with 30% of them experiencing an increase in demand, while around 40% faced a decrease, a situation which is characteristic to an early recovery phase of the business cycle. More than 70% of respondents said that they incurred an increase in labour costs and most of them tried to reduce this pressure through quantities. Labour force adjustment strategies were both on the intensive margin, with 35% of the companies reducing the number of hours worked, and on the extensive one, 20% of the firms opting for layoffs. There were also other manners to adjust on the extensive margin: early retirement schemes (15%), non-renewal of temporary contracts at expiration (11%) and temporary layoffs (5%). As regards other strategies, we already mentioned the small percentage of firms that cut base wages (i.e. 7%) or the intensively used (more than 40%) bonus and other non-pay benefits reductions, and replacement of the existing employees with cheaper ones. Moreover, another reaction to an increase in labour costs was to freeze hiring (18% of the firms).

In this paper, we are mostly interested in identifying the factors (wage rigidities, labour market frictions and economic conditions) that influence a firm's decision to destroy or create a job. In addition, we look more closely at the case of cheaper hires, as they give an insight into the degree of wage rigidity of new employees, an important feature when designing a structural labour market model that aims at better capturing cyclical fluctuations.

Job destruction

Around 20% of companies dismissed workers during 2010-2013 as a strategy to reduce labour costs. As expected, the probability to destroy a job is positively correlated with unfavourable business conditions, namely a decline in demand, lower access to finance and economic uncertainty (Table 4). However, downward nominal wage rigidity also played a role, increasing by about 20 percentage points the likelihood that a company would resort to downsizing. Firms applying temporary and fixed-term contracts showed more flexibility and presented a lower probability to reduce the labour force size via individual or collective layoffs; in the same direction acted the awareness

of the difficulty of finding skilled staff.

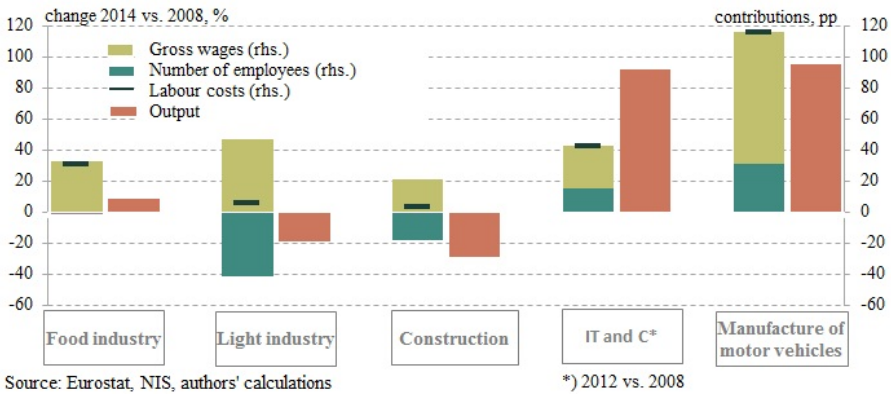
Table 4: Factors affecting firms' decision to lay off employees - probit estimates

Variable	Coefficient	AME
C	-0.60***	
Company faced a fall in demand	0.57***	20.83
Uncertain envrionment	0.18**	6.35
Lower access to finance	0.33***	11.76
DNWR	0.52***	18.64
Firm size	0.12**	7.96
Shortage of skilled staff	-0.15*	-5.08
% of unskilled staff	-0.98***	-33.69
% of temporary and fixed-term staff	-0.82***	-28.14
Food industry	0.24**	8.42
Light industry	0.35***	12.02
Construction	0.21**	7.37
IT and C	-0.67**	-21.37
Number of observations	1791	
Psedo R^2	0.12	

Note: *, ** and *** stand for significance at 10%, 5% and 1% respectively.
Source: WDN survey, authors' estimations

At the sector level, we observe that companies operating in the food industry, the light industry and construction were more likely to dismiss employees,

Figure 7: Labour costs and output

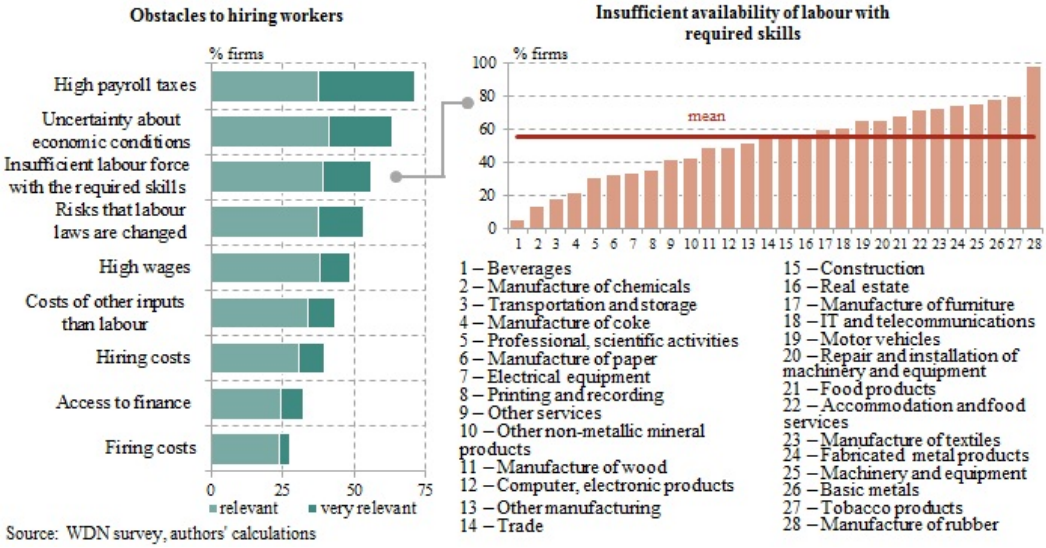


while the opposite holds true for IT&C. In the latter case, mention should be made that the Romanian economy has been boosted by this sector's performance in recent years and the rapid growth pace of jobs created after 2011 helped to surpass the pre-crisis employment level. A closer look at the aforementioned sectors reveals that labour market frictions amplified intersectoral differences with respect to competitiveness, as suggested by the evolution of unit labour costs (Figure 7). In the food industry, the light industry and construction, the growth of labour costs during 2009-2014 was faster than output dynamics due solely to wage increases (partly explained by the minimum gross wage increase economy-wide). At the opposite, IT services gained competitiveness, as the rise in output, driven by higher foreign demand, was twice the increase in labour costs.

Job creation

Although economic activity has picked up starting in 2011, with GDP recently reverting to its pre-crisis level, employment has been recovering slowly, as only half of the jobs destroyed during the recession were regained.

Figure 8: Obstacles to hiring workers with a permanent, open-ended contract



In this respect, the survey included a question that asked firms directly about their perception of the main obstacles to hiring. As shown in Figure 8, almost 75% of companies pointed to high payroll taxes as the most important factor limiting job creation. The second most cited obstacle to hiring refers to the difficulties brought about by the recession, as many firms found the

uncertainty of the economic environment to be a drawback to developing their business.

The lack of skills was also considered an important barrier by the majority of companies, difficulties being encountered in finding both highly-skilled non-manual and manual workers. Thus, a pronounced shortage of available skilled workers was identified in the most competitive sectors that boosted economic growth (IT&C services and the automotive industry), as well as in sectors facing competitiveness losses, i.e. the food and light industries, and accommodation and food services.

We further investigated other possible factors that might have prevented firms from creating jobs through the lens of a probit model (Table 5). As expected, our results show that the pressure exerted by labour costs (both their share in total costs and their increase during 2010-2013) limited a firm's ability to hire workers. Moreover, the opening of a new vacancy is strongly affected by sticky wages, firms that face downward nominal and/or real wage rigidity being more likely (by 8 percentage points cumulatively) to reduce recruitment.

Table 5: Probability of reduction of new hires -probit estimates

Variable	Coefficient	AME
C	-1.31***	
Rise in labour costs	0.24***	4.98
RWR	0.14*	3.11
DNWR	0.21**	4.93
% of labour costs	0.40**	8.76
% of exports	-0.17*	-3.72
% of temporary and fixed-term staff	-1.18***	-25.88
% of part-time staff	-0.72*	-15.84
Number of observations	1925	
Psedo R^2	0.02	

Note: *, ** and *** stand for significance at 10%, 5% and 1% respectively.
Source: WDN survey, authors' estimations

Yet, in the context of higher foreign demand, the chances for exporters to limit job creation drop by 4 percentage points. At the same time, if companies have a greater share of temporary/fixed-term or part-time employees, their potential to create more jobs will be less affected (-26 percent).

In the context of the rapid increase in the minimum gross wage in the recent period, studying its impact on job creation has become more of a concern. The survey addressed this issue directly, by asking firms to rate the relevance of the rise in the minimum wage in the decision to reduce new hires. In this regard, almost half of the companies admitted that they would have to cut back on hiring in the event of such an increase. The likelihood of a company exhibiting this kind of behaviour is, of course, higher for firms with a larger share of minimum wage earners (Table 6).

Table 6: Probability of cutting back on hiring in the event of a minimum wage increase – ordered probit estimates

Variable	Coefficient
Removal of non-pay benefits	0.20***
The company laid off employees	0.18*
Temporary layoffs	0.26**
Uncertain environment	0.40***
High payroll taxes	0.56***
% of workers with over 5 years of tenure	0.19*
% of employees earning above MW	0.38***
% of employees earning MW	0.86***
Number of observations	2010
Psedo R^2	0.08

Note: *, ** and *** stand for significance at 10%, 5% and 1% respectively.
Source: WDN survey, authors' estimations

Furthermore, the pressure of labour costs on total costs and a longer relationship with incumbents, reflected by the greater share of workers with more than 5 years of tenure, raises the probability of a halt in hiring. The same goes for high payroll taxes and the economic uncertainty perceived by employers. In addition, if the company dismissed employees (even only temporarily) during 2010-2013, the likelihood of cutting back hiring is higher. At the opposite site, large companies (defined in this paper as having over 200 employees) were, as expected, less affected.

Cheaper hires

Understanding the role of wage stickiness in the unemployment volatility puzzle remains a key issue in labour economics. Given that so far the macroeconomic approach has proved inconclusive (Pissarides, 2009), a thorough study of the phenomenon calls for a microeconomic perspective as well, which may allow the identification of interesting behaviour patterns in different phases of the business cycle or in different economies. As we have already shown, our estimations suggest that the presence of (real and/or downward nominal) wage rigidity of incumbent employees increased the likelihood for a firm to have laid off workers or to have frozen hiring in the 2010-2013 period. But what about the stickiness of wages of new hires? Since 44% of firms replaced existing employees with cheaper ones, we concluded that the wages of new hires were more pro-cyclical than those of incumbent employees.

Table 7: Cheaper hires - ordered probit estimates

Variable	Coefficient
DNWR	0.16**
% of employees earning MW	0.27**
Company faced a fall in demand	0.20***
% of part-time staff	0.61**
% of temporary and fixed term staff	0.49***
Size	0.08*
Company is an exporter	-0.11**
High payroll taxes	0.23***
Adjustment in working hours	0.72***
Number of observations	2010
Psedo R^2	0.06

Note: *, ** and *** stand for significance at 10%, 5% and 1% respectively.
Source: WDN survey, authors' estimations

Our analysis of the factors that might have led to a higher probability for a firm to use this strategy reveals that DNWR increased the likelihood for a company to replace some employees with new workers at lower wages (Table 7). In the same direction acts the share of minimum wage earners, which might suggest two – not mutually exclusive – types of behaviour. First, a company hiring many MW earners probably does not search for high-skilled personnel, making it easier to replace, for instance, just above minimum wage

earners with cheaper employees, given the excess supply of low-skilled workers observed in the aftermath of the crisis. Second, the multiple minimum wage raises, which are another source of wage rigidity, put pressure on firms' profit margins, urging them to find strategies to reduce costs.

With regard to other factors, we have also found that the likelihood of cheaper hires increased for firms that faced a fall in demand, perceived a high level of taxes or used part-time, fixed-term and temporary contracts. In the latter respect, the use of cheaper temporary hires reflects, to some extent, one of the amendments of the 2011 Labour Market Code, which lowered the wage floor for temporary workers from the one corresponding to existing employees with similar skills and duties to the minimum level economy-wide.

4 Concluding remarks

After a painful recession that cost the Romanian economy almost 700 thousand jobs, economic activity shifted to a more competitive structure targeting technology-intensive sectors, which led to a full output recovery by the end of 2014, whereas employment remained well below pre-crisis levels. The slow job recovery was a result of a more inefficient search and matching process, as signalled by the multiple outward shifts in the Beveridge curve starting 2011. In this context, this paper aimed at identifying, from a microeconomic perspective, the main sources of frictions affecting labour market dynamics during 2010 – 2013, by using a rich firm-level dataset stemming from a representative survey with a high response rate conducted by NBR in late 2014 in cooperation with the WDN, an ESCB research group.

We found that wage stickiness together with other labour market frictions (skill mismatch, taxation, sectoral shifts, and minimum wage policy) played a key role in the decision to destroy or create a job in the early recovery phase of the business cycle.

The degree of wage rigidity is relatively high in Romania, both nominal (18% of firms freezing base wages) and real (32% adapted wage changes to inflation). From a policy maker's perspective, a higher degree of rigidity adds to the costs that disinflation entails in terms of employment and constrains the flexibility of the economy, which plays an important part, especially ahead of the euro adoption. The efficiency wage theory explains best the reluctance of Romanian firms to cut wages for fear of demotivating employees, which

further leads to productivity losses. The presence of real wage rigidity is strongly associated with the bargaining power of labour unions, as companies applying a collective pay agreement were found more likely (by 14%) to index wages to past inflation. Another price floor relevant for the wage setting behaviour of Romanian firms during 2010–2013 is related to the minimum wage policy, given the multiple increases that directly affected at least 22% of private sector employees and indirectly at least another 9% of above the minimum threshold earners. As a result, the wage earnings distribution squeezed at the bottom with the MW acting as a barrier to entry on the labour market for low-skilled and unskilled workers (the young), in whose cases the mismatches are already the largest.

Turning to firms' staff policy, the survey revealed that labour force adjustment was extensively used as a strategy to reduce labour costs and wage rigidity seemed to magnify this type of behaviour. Our estimates revealed that the likelihood of laying off employees is 20 percentage points higher in the presence of DNWR. The decision to destroy a job was also related to sectoral shifts in the economy, with dismissals being more probable in the food industry, the light industry and construction sector, while the opposite holds true for IT&C. A closer look at these sectors revealed high discrepancies in terms of competitiveness, that were further amplified by the MW policy, as minimum wage earners in the first three industries account for more than 40% of employees.

Although economic activity picked up in 2011, employment has been recovering slowly so that only half of the jobs lost during the recession were regained until present. The economy's ability to create jobs was limited by the pressure exerted by high labour costs (including companies' perception of high payroll taxes) and the shortage of skilled staff, both for highly skilled non-manual and manual workers. Sticky wages also played a role in limiting job creation, the chances to reduce recruitment increasing by 8 percentage points cumulatively for firms facing nominal or real wage rigidity. Moreover, firms with a higher share of MW earners were more likely to reduce hiring in the context of the recent rapid increase in the gross MW economy-wide.

Wage stickiness remains a key factor in understanding labour market dynamics, however there is no clear answer in the existing literature about its role in the unemployment volatility puzzle. In our paper, besides quantifying the degree of wage rigidity for incumbents, we were also able to conclude that wages for new hires are more pro-cyclical, at least in the early recovery phase of the business cycle, as around 44% of the firms replaced existing

employees with cheaper ones. Interestingly, among other labour market frictions (minimum wage, taxes), DNWR seems to also influence the decision of the firm to lay-off some employees and hire new ones at lower wages.

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Appendix 1

WDN survey – Romania questionnaire

I. Information about the firm

I.1 What was the first year of operation of your firm? _____

I.2 What was the structure, ownership status and autonomy of your firm at the end of 2013?

Structure:		Ownership:		Autonomy:	
Single establishment firm	□	Mainly domestic	□	Parent company	□
Multi-establishment firm	□	Mainly foreign	□	Subsidiary/affiliate	□
				Does not apply	□

II. Changes in the economic environment

This section aims at assessing the main changes in economic environment your firm suffered during 2010-2013.
When answering the questions please refer to "the most significant changes" taking place over this period.

II.1 How did the following factors affect your firm's activity during 2010-2013? *Please choose ONE option for each line.*

	Strong decrease	Moderate decrease	Unchanged	Moderate increase	Strong increase
The level of demand for your products/services	□	□	□	□	□
Volatility/uncertainty of demand for your products/services	□	□	□	□	□
Access to external financing through the usual financial channels	□	□	□	□	□
Customers' ability to pay and meet contractual terms	□	□	□	□	□
Access of supplies from your usual suppliers	□	□	□	□	□

II.1.A For those factors which affected your firm strongly, were the effects transitory, partly persistent or long-lasting for 2010-2013? *Please choose ONE option for each line.*

	Transitory (one year)	Only partly persistent (2-3 consecutive years)	Long-lasting (the whole period)
The level of demand for your products/services	□	□	□
Volatility/uncertainty of demand for your products/services	□	□	□
Access to external financing through the usual financial channels	□	□	□
Customers' ability to pay and meet contractual terms	□	□	□
Access of supplies from your usual suppliers	□	□	□

II.2 With regard to finance, please indicate for 2010-2013 how relevant were for your firm each one of the following happenings? *Please choose ONE option for each line.* **Note: credit here refers to any kind of credit, not only bank credit**

	Not relevant	Of little relevance	Relevant	Very relevant
Credit was not available to finance working capital	□	□	□	□
Credit was not available to finance new investment	□	□	□	□
Credit was not available to refinance debt	□	□	□	□
Credit was available to finance working capital, but conditions (interest rate and other contractual terms) were too onerous	□	□	□	□
Credit was available to finance new investment, but conditions (interest rate and other contractual terms) were too onerous	□	□	□	□
Credit was available to refinance debt, but conditions (interest rate and other contractual terms) were too onerous	□	□	□	□

II.3 How did these components of total costs evolve during 2010-2013? *Please choose ONE option for each line.*

	Strong decrease	Moderate decrease	Unchanged	Moderate increase	Strong increase
Total costs	□	□	□	□	□
Labour costs	□	□	□	□	□
Financing costs	□	□	□	□	□
Costs of supplies	□	□	□	□	□
Other costs (please specify_____)	□	□	□	□	□

II.4 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.*

	Strong increase	Moderate increase	Unchanged	Moderate decrease	Strong decrease
Base wages or piece work rates	□	□	□	□	□
Flexible wage components (bonuses, fringe benefits, etc.,)	□	□	□	□	□
Number of permanent employees	□	□	□	□	□
Number of temporary/fixed-term employees	□	□	□	□	□
Number of agency workers and others (free-lance work, etc., not hired under employment contracts)	□	□	□	□	□
Working hours per employee	□	□	□	□	□
Other components of labour costs (please specify_____)	□	□	□	□	□

II.5 Has any of the following strategies ever been used in your firm to reduce labour costs over 2010-2013? *Please choose ONE option for each line.*

	Not at all	Marginally	Moderately	Strongly
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 wages	□	□	□	□
Use of early retirement to replace high wage employees by entrants with lower wages	□	□	□	□
Other, please specify_____	□	□	□	□

II.6 How did prices and demand for your main product evolve during 2010-2013? *Please choose ONE option for each line.*

	Strong decrease	Moderate decrease	Unchanged	Moderate increase	Strong increase
Domestic demand for your main product/service	□	□	□	□	□
Foreign demand for your main product/service	□	□	□	□	□
Prices of your main product/service in domestic markets	□	□	□	□	□
Prices of your main product/service in foreign markets	□	□	□	□	□

III. Labour force adjustments

III.1 How many employees did your firm have on the payroll at the end of 2013? How many agency workers and others workers did your firm have at the end of 2013?

Total number of employees _____

Total number of agency workers and others _____

Of which:

Permanet full-time _____

Permanent part-time _____

Temporary ir fixed-term _____

III.2 How many employees did your firm have on the payroll at the end of 2013? How many agency workers and others workers did your firm have at the end of 2013?

OCCUPATIONAL GROUPS

Higher skilled non-manual (ISCO: 1, 2, 3) ____%

Lower skilled non-manual (ISCO: 4 and 5) ____%

Higher skilled manual (ISCO: 7 and 8) ____%

Lower skilled manual (ISCO: 9) ____%

TOTAL (= 100%)

JOB TENURE

Below 1 year ____%

Between 1 and 5 years ____%

More than 5 years ____%

TOTAL (= 100%)

III.3 During 2010-2013 did you need to significantly reduce your labour input or to alter its composition?

Need to reduce labour cost or alter its composition YES □ NO □

III.3.A If YES, which of the following measures did you use to reduce your labour input or alter its composition when it was most urgent? *Please choose ONE option for each line.*

	Not at all	Marginall	Moderately	Strongly
Collective layoffs	□	□	□	□
Individual layoffs	□	□	□	□
Temporary layoffs	□	□	□	□
Subsidised reduction of working hours	□	□	□	□
Non-subsidised reduction of working hours (including reduction of overtime)	□	□	□	□
Non-renewal of temporary contracts at expiration	□	□	□	□
Early retirement schemes	□	□	□	□
Freeze or reduction of new hires	□	□	□	□
Reduction of agency workers and others	□	□	□	□

III.4 Have any of the following actions become more or less difficult, compared to the situation in 2010?
Please choose ONE option for each line.

	Much less difficult	Less difficult	Unchanged	More difficult	Much more difficult
To lay off employees for economic reasons (collectively)	□	□	□	□	□
To lay off employees for economic reasons (individually)	□	□	□	□	□
To dismiss employees for disciplinary reasons	□	□	□	□	□
To lay off employees temporarily for economic reasons	□	□	□	□	□
To hire employees (cost of recruitment, including administrative costs)	□	□	□	□	□
To adjust working hours	□	□	□	□	□
To move employees to positions in other locations	□	□	□	□	□
To move employees across different job positions	□	□	□	□	□
To adjust wages of incumbent employees	□	□	□	□	□
To lower wages at which you hire new employees	□	□	□	□	□

III.4.A. ONLY FOR THOSE REPORTING CHANGES IN III.4 – To what factors would you attribute the changes reported in Question III.4? *Please choose ONE option for each line.*

	Reforms of labour laws	Jurisprudence/ law enforcement	Changes in trade unions behaviour	Changes in individual behaviour
To lay off employees for economic reasons (collectively)	□	□	□	□
To lay off employees for economic reasons (individually)	□	□	□	□
To dismiss employees for disciplinary reasons	□	□	□	□
To lay off employees temporarily for economic reasons	□	□	□	□
To hire employees (cost of recruitment, including administrative costs)	□	□	□	□
To adjust working hours	□	□	□	□
To move employees to positions in other locations	□	□	□	□
To move employees across different job positions	□	□	□	□
To adjust wages of incumbent employees	□	□	□	□
To lower wages at which you hire new employees	□	□	□	□

III.5 How relevant are each of the following factors as obstacles in hiring workers with a permanent, open-ended contract? *Please choose ONE option for each line.*

	Not relevant	Of little relevance	Relevant	Very relevant
Uncertainty about economic conditions	□	□	□	□
Insufficient availability of employees with the required skills	□	□	□	□
Acces to finance	□	□	□	□
Firing costs	□	□	□	□
Hiring costs	□	□	□	□
High payroll taxes	□	□	□	□
High wages	□	□	□	□
Risks that labour laws are changed	□	□	□	□
Costs of other inputs complementary to labour	□	□	□	□
Other (please specify _____)	□	□	□	□

IV. Wage adjustments

This section collects information on wage setting and the frequency of wage changes. Most of the questions refer to 2013, but some questions aim at assessing differences between 2010 and 2010-2013.

IV.1 In 2103: What percentage of your firm's total costs (all operating expenses) was due to labour costs (wages, salaries, bonuses, social security contributions, training, tax contributions, contributions to pension funds, etc.)?

Labour cost / Total cost _____ %

IV.2 What percentage of your total wage bill in 2013 was related to individual or company performance related bonuses and benefits?

_____ %

IV.3 In 2013, did your firm apply a collective pay agreement bargained and signed inside of the firm(at the firm level) ? and signed outside of the firm (at the national, regional, sectoral or occupational level)?

	At the firm level	Outside the firm
No, such an agreement does not exist	□	□
No, the agreement exists but the firm opted-out	□	□
Yes, such an agreement is in effect	□	□
Proportion of employees covered by such an agreement (approx.)	_____ %	_____ %

IV.4 What is the proportion of your employees covered in 2013 by any collective pay agreement?

Proportion of employees covered by such an agreement (approx.) _____ %

IV.4.A. Compared to the situation before 2010, how has this percentage changed over 2010-2013? *Please choose ONE option.*

Increased	◻
Unchanged	◻
Decreased	◻
Not applicable	◻

IV.5 How often does the collective pay aggrement applied at you firm typically change?

More than once a year	Once a year	Between one and two years	Every two years	Less frequently than every two years	Never/ Not applicable
◻	◻	◻	◻	◻	◻

IV.6 What was the percentage of employees belonging to a union in your firm in 2013?

_____ %

IV.6.A. Compared to the situation before 2010, how has this percentage changed over 2010-2013? *Please choose ONE option.*

Increased	◻
Unchanged	◻
Decreased	◻
Not applicable	◻

IV.7 Did your firm adapt changes in base wages to inflation before 2010? And during 2010-2013?

	Before 2010		During 2010-2013
Yes	◻	Yes	◻
No	◻	No	◻
a) Inflation was too low so that indexation rules were not operative	◻	a) Inflation was too low so that indexation rules were not operative	◻
b) There were no legal or other types of indexation rules specifying such an adjustment	◻	b) There were no legal or other types of indexation rules specifying such an adjustment	◻

IV.8 What is the percentage of your employees earning the minimum wage in 2013? _____%

IV.9 In the event of an increase in the minimum wage, do you raise the wages of your employees earning more than the minimum wage?

◻ Yes

Please specify the percentage of employees affected _____%

◻ No

IV.10 How does an increase in the minimum wage affect your company? *Please choose ONE option for each line.*

	Not relevant	Of little relevance	Relevant	Very relevant
The company has to lay off people	◻	◻	◻	◻
The company has to hire less people	◻	◻	◻	◻
The company has to increase prices	◻	◻	◻	◻
The company has to reduce other costs	◻	◻	◻	◻
Other, please specify_____	◻	◻	◻	◻

IV.11 How frequently was the base wage of an employee belonging to the main occupational group in your firm (largest group in Question III.2) typically changed in your firm? *Please choose ONE option for each line*.

	More than once a year	Once a year	Between one and two years	Every two years	Less frequently than every two years	Never/Not applicable
Before 2010	□	□	□	□	□	□
During 2010-2013	□	□	□	□	□	□

IV.12 Over 2010-2013, did you freeze or cut base wages in a given year (please indicate in which years)?

	Wages were frozen		Wages were cut			Wagese were neither frozen nor cut
	YES	% workers affected	YES	% workers affected	(average wage cut)	YES
2010	□	_____%	□	_____%	(%)	
2011	□	_____%	□	_____%	(%)	
2012	□	_____%	□	_____%	(%)	
2013	□	_____%	□	_____%	(%)	□

IV.12.A. A If you froze/reduced base wages over 2010-2013, what was the main reason? *Please choose ONE option.*

Profitability and/or sales went down	□
Other costs increased	□
Jobs were at risk	□
It was imposed by legislation or a higher collective agreement	□
Worker performance was not satisfactory	□
Other reasons, please specify _____	□

III.13 How relevant is each one of the following reasons in preventing base wage cuts? *Please choose ONE option for each line.*

	Not relevant	Of little relevance	Relevant	Very relevant
Labour regulation/collective agreements prevent wages from being cut	□	□	□	□
It would reduce employees' efforts, resulting in less output or poorer service	□	□	□	□
It would have a negative impact on employees' morale	□	□	□	□
It would damage the firm's reputation as an employer, making it more difficult to hire workers in the future	□	□	□	□
In presence of a wage cut the most productive employees might leave the firm	□	□	□	□
A wage cut would increase the number of employees who quit, increasing the cost of hiring and training new workers	□	□	□	□

V. Information about the firm's main markets

V.1 In 2013 what share of the revenues from your firm's main products, activity or service was due to sales in domestic markets and what share in foreign markets?

Domestic market _____ %

Foreign markets _____ %

V.2 How would you characterise the degree of competition in the main markets (domestic and foreign) for your main product? *Please choose ONE option for each line.*

	Weak	Moderate	Strong	Very severe	Not applicable
Domestic market	□	□	□	□	□
Foreign markets	□	□	□	□	□

Appendix 2

Variables used in estimations

Notation		Short description
Dependent variables:	DNWR	Binary variable, 1 – the firm froze base wages during 2010-2013 and 0 otherwise.
	RWR	Binary variable, 1 – the firm indexed wages to inflation during 2010-2013 and 0 otherwise.
	Layoffs	Binary variable, 1 – job destruction was higher than job creation at the firm level during 2010-2013 (i.e. the total number of employees decreased) and 0 otherwise.
	Cheaper hires	Variable that captures the extent to which firms replaced incumbents with new employees with similar skills and lower wages. It ranges from 1 – not at all to 4 – strongly.
	Reduction in new hires	Binary variable, 1 – the net number of jobs created was marginal (no more than ±1 percent change) and 0 otherwise.
	Rise in prices/MW increase	Binary variable, 1 – the firm would increase prices in the event of a minimum wage increase (i.e. the answer ranged from 2 – of little relevance to 4 – very relevant) and 0 otherwise.
	Reduction in new hires/MW increase	Variable that captures the relevance of reducing new hires as a consequence of a minimum wage increase, ranging from 1 – not relevant to 4 – very relevant.
Explanatory variables:	% of workers with over 5 years of tenure	Share of workers with over 5 years of tenure.
	High-performing employees resign	Binary variable, 1 – firms found the resignation of most productive employees to be relevant in preventing base wage cuts (i.e. the answer ranged from 2 – of little relevance to 4 – very relevant) and 0 otherwise.
	% of collective pay agreements	Share of workers covered by a collective pay agreement in 2013.
	Company faced a fall in demand	Binary variable, 1 – firms experienced a moderate or strong fall in demand during 2010-2013 and 0 otherwise.
	Uncertain environment	Binary variable, 1 – firms found the uncertainty of economic conditions to be a relevant obstacle in hiring workers with a permanent, open-ended contract (i.e. the answers ranged from 2 – of little relevance to 4 – very relevant) and 0 otherwise.
	Lower access to finance	Binary variable, 1 – firms experienced a moderate or strong decrease in the access to external financing during 2010-2013 and 0 otherwise.
	Firm size	Variable that ranges from 1 – small-sized companies (20-49 employees) to 3 – large companies (at least 200 employees).
	Shortage of skilled staff	Binary variable, 1 – firms found the insufficient availability of employees with the required skills to be a relevant obstacle in hiring workers with a permanent, open-ended contract (i.e. the answers ranged from 2 – of little relevance to 4 – very relevant) and 0 otherwise.
	% of unskilled staff	Share of low-skilled manual workers.
	% of temporary and fixed-term staff	Share of temporary and fixed-term staff.
	Food industry	Binary variable, 1 – firms operate in the food industry and 0 otherwise.
	Light industry	Binary variable, 1 – firms operate in the light industry (manufacturing of textiles, wearing apparel, leather and related products) and 0 otherwise.
	Construction	Binary variable, 1 – firms operate in the construction sector and 0 otherwise.
	IT and C	Binary variable, 1 – firms operate in IT and communication services and 0 otherwise.
	% of employees earning MW	Share of employees receiving the minimum wage.
	% of part-time staff	Share of part-time staff.
	Company is an exporter	Binary variable, 1 – more than 50 percent of the firm's revenues in 2013 were due to sales in foreign markets and 0 otherwise.

Notation		Short description
Explanatory variables:	High payroll taxes	Binary variable, 1 – firms found high payroll taxes to be a relevant obstacle in hiring workers with a permanent, open-ended contract (i.e. the answers ranged from 2 – of little relevance to 4 – very relevant) and 0 otherwise.
	Adjustment in working hours	Binary variable, 1 – the number of working hours per employee decreased (strongly or moderately) during 2010-2013 and 0 otherwise.
	↑ Labour cost	Binary variable, 1 – labour costs increased (strongly or moderately) during 2010-2013 and 0 otherwise.
	% of labour costs	Share of labour costs in total costs.
	% of exports	Share of revenues due to sales in foreign markets in 2013.
	% of employees earning above MW	Share of employees earning above the minimum wage who also benefit from minimum wage increase according to companies' answers.
	↓ Price	Binary variable, 1 – the price of firms' main products decreased (strongly or moderately) during 2010-2013 and 0 otherwise.
	↓ Q	Binary variable, 1 – the demand for firms' main products decreased (strongly or moderately) during 2010-2013 and 0 otherwise.
	↑ Csup	Binary variable, 1 – firms' costs of supplies increased (strongly or moderately) during 2010-2013 and 0 otherwise.
	↑ Cfin	Binary variable, 1 – firms' financing costs increased (strongly or moderately) during 2010-2013 and 0 otherwise.
	Collective pay agreement	Binary variable, 1 – firms applied a collective pay agreement in 2013 and 0 otherwise.
	Strong competition	Binary variable, 1 – firms perceived a strong competition and 0 otherwise.
	Removal of non-pay benefits	Binary variable, 1 – firms reduced or eliminated non-pay benefits during 2010-2013 as a strategy to reduce labour costs and 0 otherwise.
	The company laid off employees	Binary variable, 1 – firms laid off employees (collectivelly or individually) during 2010-2013 as a strategy to reduce labour input and 0 otherwise.
	Temporary layoffs	Binary variable, 1 – firms laid off employees temporarily during 2010-2013 as a strategy to reduce labour input and 0 otherwise.