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

Firm-level evidence from the WDN survey

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Abstract

This paper offers an in-depth analysis of the specific factors behind the jobless recovery in Romania in the aftermath of the crisis. The analysis is based on a unique and rich firm-level dataset stemming from the first labour market survey conducted by the National Bank of Romania in 2014 in cooperation with the WDN, an ESCB research group. The survey focused on assessing labour market adjustments during 2010-2013 and firms' reaction to labour market reforms that have taken place in Romania starting 2011. The results reveal that Romanian companies perceived moderate upward and downward demand shocks. Also, we found evidence of relatively high degrees of both downward nominal and real wage rigidity, which proved to have played a key role in firms' decision to destroy or create a job, based on probit model estimates. However, at least in the early recovery phase of the business cycle, our results suggest that wages of newly-hired employees were more pro-cyclical. Other labour market frictions that led to a more pronounced inefficiency of the search and matching process refer to companies' perception of high payroll taxes, the minimum wage policy, sectoral shifts in the economy, and especially the increasing skill mismatch. As regards the effects of labour market reforms, when asked directly, firms answered they had not perceived any noticeable changes in firing and hiring costs. However, we concluded that some positive developments on the labour market can be associated with structural reforms, mainly those related to reducing working hours due to economic reasons and the use of temporary or fixed-term contracts.

Keywords: wage stickiness, jobless recovery, labour market frictions, survey, WDN

JEL classification codes: J21, J31, J32, J51, J62

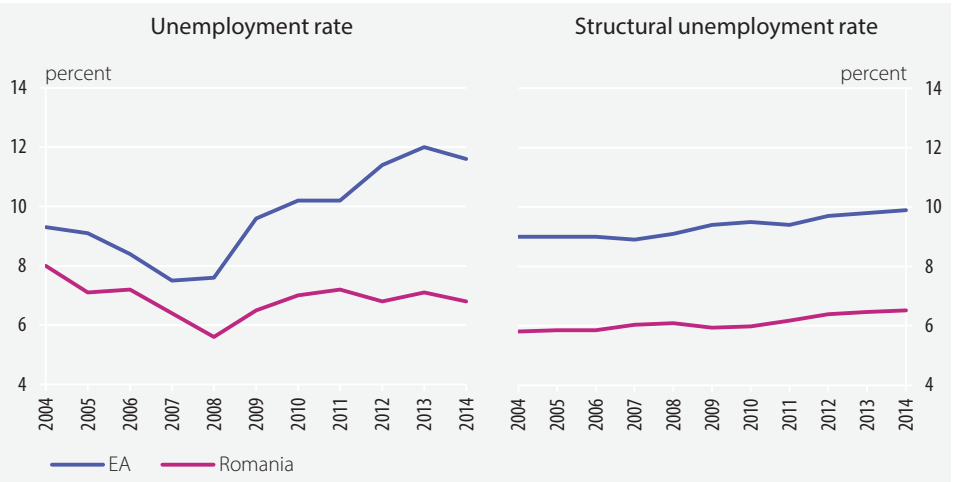
1. Introduction

The persistence of economic slack and high unemployment across Europe in the aftermath of the crisis suggested more than cyclical developments and the need of corrective structural reforms. In this context, the Wage Dynamics Network (WDN), an ESCB research group, launched in 2014 a new wave of surveys, with the aim of assessing recent labour market adjustments and firms' response to various labour market reforms undertaken in the last few years. The survey was conducted by 25 national central banks based on a harmonised questionnaire and covered the 2010-2013 period. Firms were asked about their perception of the sources of shocks driving the European crisis, their response to these shocks in terms of wage and labour force adjustments in the context of national labour market institutions.

The WDN started its research activity in 2006 aiming at identifying the most relevant characteristics of wage and labour cost dynamics from the monetary policy perspective. In this respect, two other waves of surveys have been conducted, the first one in 2007-2008 by 17 NCBs and a follow-up in 2009 by 10 NCBs. A key finding was that nominal wage cuts among European firms were extremely rare (both before and during the crisis), suggesting strong downward nominal and especially real wage rigidity. The most important drivers of wage stickiness were related to work efficiency (drop in work morale and the fear that the most productive workers would leave) and collective agreement coverage. As regards the adjustment to (supply- or demand-driven) shocks, before the crisis most companies declared that cutting labour costs was the most relevant strategy. This behaviour was confirmed by the follow-up survey (2009), as the most common reaction to the fall in demand was to reduce costs rather than to cut prices, margins or output. Moreover, a closer look at firms' answers revealed that costs were mainly contained by reducing the quantity of labour.

The 2014 WDN third wave of surveys had the largest turnout among the national banks, marking also the first participation of the National Bank of Romania. Similar to other EU countries, the global financial and economic crisis had a considerable impact on employment in Romania, the number of employees declining sharply by more than 13 percent during 2009-2010. In this context, the Romanian authorities started implementing labour market structural reforms to promote flexibility and, as a consequence, in 2011, a new Labour Market Code and Social Dialogue Code were prepared. However, this probably addressed only in part the rising frictions on the labour market, given that, even when the economy resumed positive growth, the unemployment rate remained elevated, so that by the end of 2014 output reverted to its pre-crisis level, but only half of the lost jobs were regained. Apart from the rise in cyclical unemployment due to the fall in aggregate demand, the NBR estimates also point to an increase in structural unemployment after the crisis (Chart 1). In contrast, at the aggregate level, the average wages proved more rigid during the whole period, despite the difficult economic environment, as nominal gross wages grew by 5 percent on average in annual terms after the onset of the crisis.

Chart 1. Unemployment rate and structural unemployment rate



Source: Eurostat, Ameco, Iordache, Militaru, Pandioniu (2016)

The unique and rich firm-level dataset stemming from the 2014 survey was very useful in understanding the developments in the Romanian labour market during 2010-2013, a period that marked the end of the crisis and early recovery years. Although no significant shocks were perceived during this time, most companies reported an increase in labour costs, with the recent multiple minimum wage rises fuelling the upward trend in the following years. Adjustment strategies mainly targeted the quantity of labour, both at the intensive and the extensive margins, given the small share of companies that resorted to cutting base wages (7 percent) and the fairly high degree of wage stickiness, both downward nominal (18 percent) and real (32 percent). Similarly to previous WDN survey findings, wage rigidity is best explained in Romania by the efficiency wage and contract theories. Moreover, we found that both types of rigidities, along with other labour market frictions (the minimum wage policy, high payroll taxes, the skill mismatch and also sectoral shifts in the economy) shaped a jobless recovery in Romania. In addition, we identified a certain positive influence coming from the 2011 labour market reform, i.e. the possibility to reduce working hours due to economic reasons or the use of temporary contracts, despite companies' overall perception of no significant changes.

This paper aims at summarising the main findings of the WDN survey implemented in Romania and is organised as follows. Section 2 describes the labour market reforms undertaken in 2011. Section 3 provides details on the technical features of the survey, namely the criteria for selecting the sample and its representativeness. Section 4 illustrates the results of the survey regarding the sources and the size of shocks experienced during 2010-2013, the methods of labour cost adjustment and the perceived impact of labour market reforms. Special attention is paid to identifying the factors behind the jobless recovery in Romania. Section 5 offers the main concluding remarks.

2. Labour market reforms

In the aftermath of the financial crisis, the Romanian authorities started implementing labour market structural reforms to promote flexibility and improve the manner in which social dialogue is regulated. Consequently, in 2011 the Law on the unemployment benefit system and the boosting of employment was amended and a new Labour Market Code (LMC) and Social Dialogue Code (SDC) were prepared, with the main changes targeting contract regulation and employment protection.

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 percent 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).

Turning to the unemployment benefit system, the amended law provides for the cut-off of this financial aid if the jobseeker refuses to participate in employment-boosting programmes or rejects a job offer consistent with his/her training or education. In addition, unemployment benefits were cut by 15 percent from July 2010 to December 2011, and, starting January 2011, the level has been set in terms of the national "reference social indicator", instead of the minimum gross wage. Thus, the amount paid to the unemployed was further reduced, as the reference social indicator is considerably lower than the minimum gross wage. On the contrary, the minimum gross wage has increased on a yearly basis since 2011, i.e. by 75 percent cumulatively, reaching RON 1,050 in July 2015.

3. The survey

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.

The survey covers the 2010-2013 period and looks at non-financial corporations in manufacturing, the construction sector, trade and business services that were established before 2010 and operate in both domestic and foreign markets. The sample was designed to be representative at the country level by using a stratified random sampling, where the strata were defined based on the company's main economic activity and size, the latter being 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 percent 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 weights, i.e. each weight indicates the number of firms that each observation represents in the total population.

[1] The questionnaire is available in Appendix 1.

Table 1. Survey and sample population

Economic sector	Survey population		Sample population		Sample coverage (%, no. empl.)	Response rate (%)
	No. firms	No. empl.	No. firms	No. empl.		
Manufacturing	7,904	953,274	1,218	579,281	61	90
Trade	5,576	402,152	343	176,082	44	86
Construction	3,353	243,572	267	95,228	39	82
Services	5,314	534,656	499	313,637	59	86
Total	**22,147**	**2,133,654**	**2,327**	**1,164,228**	**55**	**88**

Source: WDN survey, authors' calculations

The advantage of this kind of approach is that it offers the possibility to directly ask firms about their perception of the economic conditions and their reaction, in terms of employment and wage policy, to various shocks. Moreover, the qualitative data allow 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 macro data can merely indicate its presence.

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. Thus, in order to further strengthen the conclusions drawn from the survey, one should also consider alternative information, whenever possible.

4. Main results

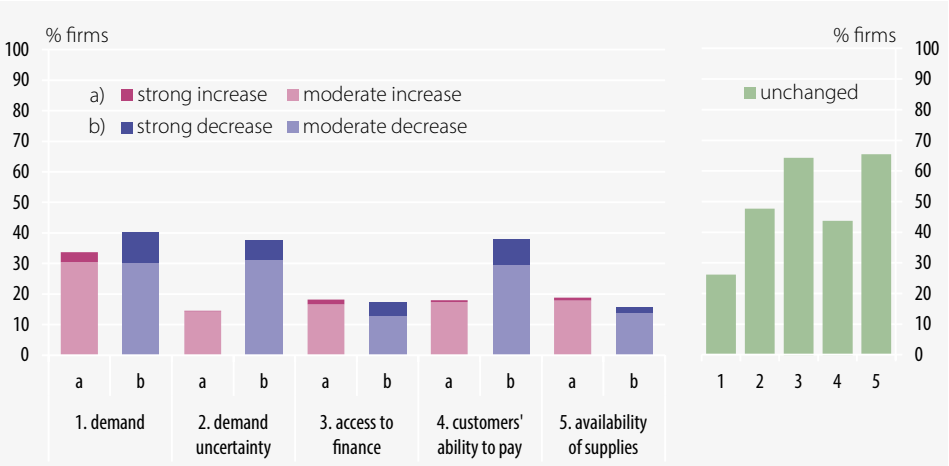
Survey results reveal that Romanian firms faced mixed economic conditions during 2010-2013, specific to early recovery periods, no significant shocks being perceived during this time, as companies reported rather moderate upward and downward changes in demand. However, the majority of firms saw an increase in labour costs and most of them tried to reduce the pressure through the adjustment in the quantity of labour rather than prices. Although the adjustment was mainly at the intensive margin, given that companies were allowed to reduce working hours due to economic reasons (a new provision of the amended LMC), there was significant adjustment at the extensive margin as well. In the latter respect, it is worrying that some of the unemployed were not able to qualify for employment even after the return of the economy to positive growth rates. This was a consequence of both higher skill mismatch and the lower capacity of the economy to create new jobs. Therefore, we took a closer look at the factors influencing a firm's decision to destroy or create a job and we found that wage stickiness, along with other labour market frictions and economic conditions, played a significant role in shaping the jobless

recovery in Romania. As regards the perceived impact of labour market reforms, survey results point to an marginal effect economy-wide, but the responses are heterogeneous at sectoral level.

4.1. SOURCES AND SIZE OF SHOCKS

According to survey answers, the economy did not experience strong shocks during 2010-2013 in terms of demand, customers' ability to pay, access to finance and availability of supplies (Chart 2). Moreover, in the latter two cases the majority of companies perceived the business environment as being fairly unchanged. Almost 40 percent of firms faced a decline in demand (moderate in general) and in customers' ability to pay, while 30 percent experienced more favourable economic conditions (moderate increase in demand).

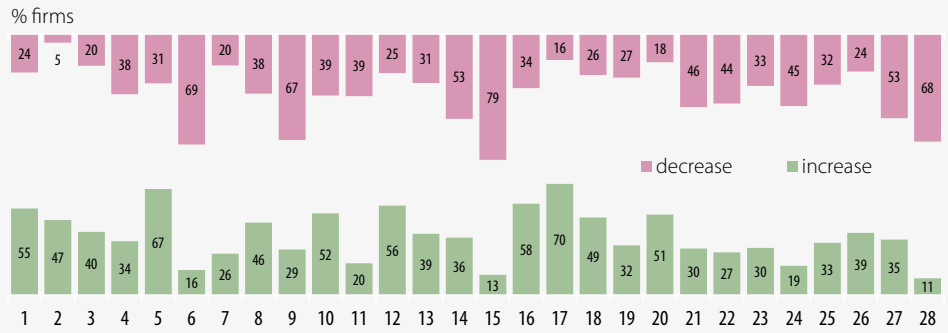
Chart 2. Factors that impacted firms' activity during 2010-2013



Source: WDN survey, authors' calculations

At the sector level, the lower demand affected particularly firms operating in the chemical industry, electronics and electrical equipment. Besides manufacturing, a similar picture can be seen in wholesale and retail trade, construction and business services. At the opposite, more than half of firms in the food industry, manufacture of wood, rubber and plastic products, machinery and equipment, and especially in the automotive industry, saw an increase in demand for their products, i.e. 70 percent in the latter case (Chart 3).

Chart 3. Demand developments at sector level during 2010-2013

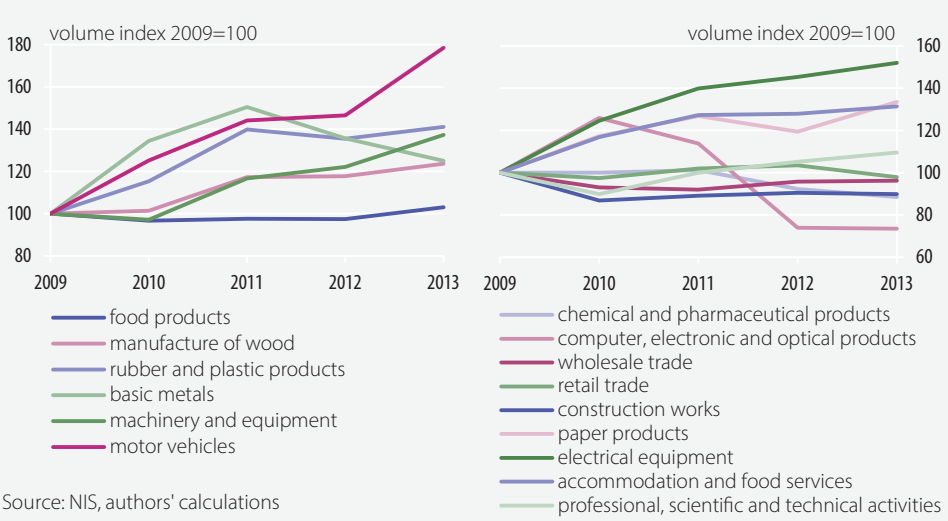


1. Food products
2. Beverages
3. Tobacco products
4. Textiles, wearing apparel, leather and related products
5. Manufacture of wood and of articles of straw and plaiting materials
6. Paper products
7. Printing and reproduction of recorded media
8. Manufacture of coke and refined petroleum products
9. Chemical and pharmaceutical products
10. Rubber and plastic products
11. Other non-metallic mineral products
12. Basic metals
13. Fabricated metal products, except machinery and equipment
14. Computer, electronic and optical products
15. Electrical equipment
16. Machinery and equipment
17. Motor vehicles
18. Furniture
19. Other manufacturing
20. Repair and installation of machinery and equipment
21. Retail trade
22. Construction
23. Transportation and storage
24. Accommodation and food services
25. Information and communication
26. Real estate
27. Professional, scientific and technical activities
28. Other services

Source: WDN survey, authors' calculations

The perceived decrease or increase in demand is confirmed by official National Institute of Statistics-NIS data regarding sectoral turnover dynamics (Chart 4), with some exceptions, namely electrical equipment, paper products, accommodation and food services, and professional, scientific and technical activities. This is partially the result of higher post-crisis competition, given that our sample only covers firms established before 2010, while the number of firms operating in these sectors has increased gradually since 2009. Moreover, as regards the manufacture of basic metals, even though more than 50 percent of companies reported a moderate increase in demand over the whole period, mention should be made that the strong recovery during 2010-2011 was partially reversed in the following two years, due to a sharp drop in global demand.

Chart 4. Turnover dynamics in industry, trade and services and volume of construction works during 2010-2013

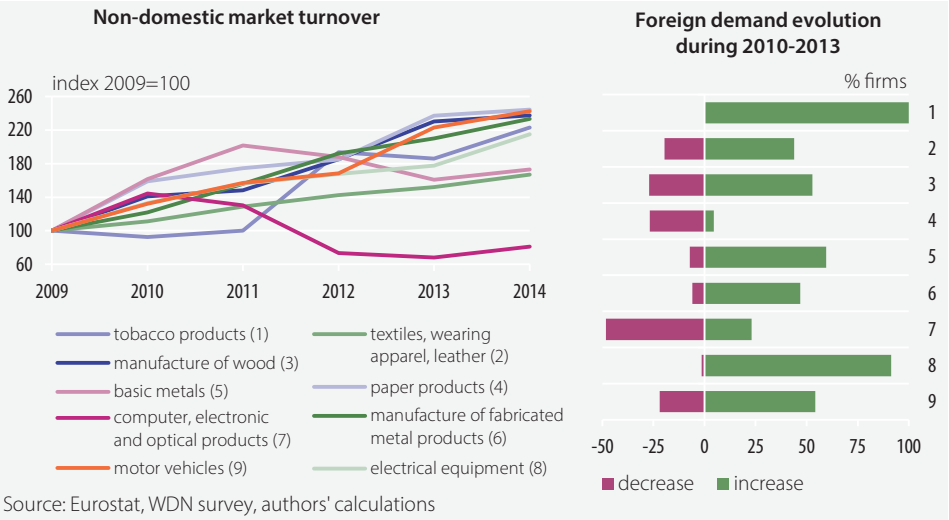


Source: NIS, authors' calculations

In terms of size, the decrease in demand was more pronounced for small-sized and medium-sized enterprises as compared to large companies (more than 200 employees), with the share of firms facing a decline being around 10 percentage points lower in the latter case (around 30 percent).

The survey results show that, in general, companies in the leading exporting industries[2] experienced an increase in foreign demand for their main product between 2010 and 2013, the finding being also confirmed by the rise in the non-domestic market turnover (Chart 5). This was especially the case of firms in the automotive and related industries, which became one of the main drivers of economic growth in Romania in the aftermath of the crisis.

Chart 5. Non-domestic market turnover and foreign demand for main exporters



Source: Eurostat, WDN survey, authors' calculations

According to the survey, demand uncertainty generated a decrease in firms' activity during 2010-2013, mainly for firms experiencing a moderate decline in demand, in whose case the economic environment was characterised by low and relatively volatile demand. Only 18 percent of companies reported difficulties in accessing external finance, which related primarily to restrictive credit conditions, the percentage being confirmed by another NBR survey dedicated to this particular topic. Also, the high number of firms stating that their access to finance was unchanged (around 60 percent) probably reflects one of the important conclusions of the aforementioned survey, namely the common practice among Romanian companies, including firms that incurred losses, to finance investment from internal sources.

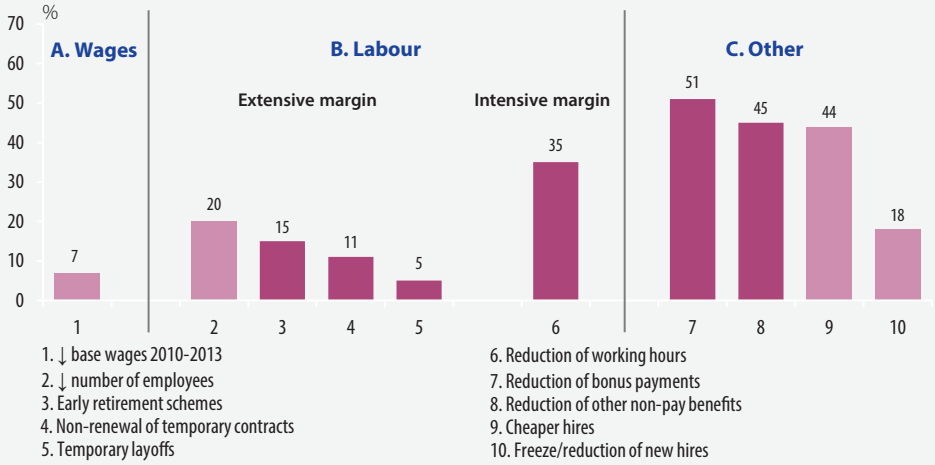
2 Defined as earning more than 50 percent of total revenue from sales in non-domestic markets.

4.2. METHODS OF ADJUSTMENT

Labour costs account for around one third of total costs of firms, with the highest pressure being reported by companies operating in manufacture of textiles, leather and related products, computer, electronic products and electrical equipment, as well as business services. During 2010-2013, more than 70 percent of companies saw an increase in such expenses and it is highly likely that the upward trend continued after 2013, fuelled by the last four hikes in the minimum wage.

Faced with a decline in demand and in customers' ability to pay, companies used different strategies to reduce labour costs or limit their growth (Chart 6). Thus, around half of firms cut or eliminated bonus payments and non-pay benefits and hired new employees (with similar skills and experience) at lower wage levels. On the opposite side, only 7 percent of firms applied base wage cuts, mostly small-sized and medium-sized firms in trade and construction sectors, suggesting a high degree of downward nominal wage rigidity (DNWR). As regards labour force adjustment, this was more pronounced at the intensive margin, a little more than a third of companies implementing changes in shift assignments, which reflected one of the positive effects of the labour market reforms undertaken in 2011. However, there was significant adjustment at the extensive margin as well, with 20 percent of firms using individual and/or collective layoffs. Moreover, 18 percent of companies froze or reduced recruitment, so that by the end of 2014 only half of the jobs lost were regained, despite the full recovery in terms of output.

Chart 6. Strategies used by firms to reduce labour costs



Source: WDN survey, authors' calculations

4.3. JOBLESS RECOVERY IN ROMANIA IN THE AFTERMATH OF THE CRISIS

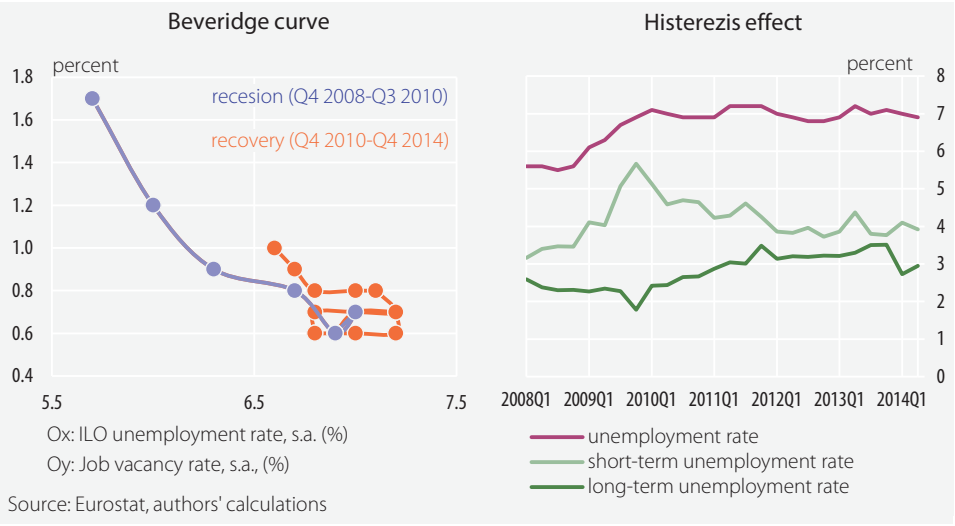
As already mentioned, the global financial and economic downturn led to a strong contraction of the Romanian economy during 2009-2010, which triggered a substantial decline in the number of employees, almost 700 thousand jobs being destroyed, with the loss being concentrated especially in industry (about 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 jobs lost being regained.

With a view to better understanding the response of the Romanian labour market to the crisis and afterwards, this section aims at identifying the factors shaping a 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 actively look 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 job vacancy 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 Chart 7, reflect the influence of the recession, when the unemployment rate and the vacancy rate posted opposite developments. Starting in 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 seeks 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. 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 the change in companies' requirements concerning the training of candidates.

Chart 7. Unemployment rate and Beveridge curve

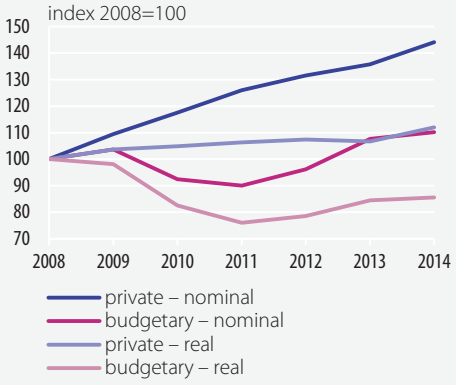


Source: Eurostat, authors' calculations

Looking at wages, it is no surprise that they were 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 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) stresses 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: the contract theory, the efficiency wage theory and the insider-outsider theory respectively. The contract theory is built on the assumption that workers and firms need some form of insurance when they enter into 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 the occurrence of wage rigidity well, 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 to explaining sticky wages refers to the market power of the 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 labour market functioning should take into account elements from each of them.

Chart 8. 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

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 (Chart 8). 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 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 objective of this section 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 the 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 the 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 the wages of new hires are more pro-cyclical in this phase of the business cycle and points to a limited market power of the incumbents over the unemployed.

4.3.1. Empirical approach

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 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 two probit models[3]. 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 agreement coverage and market competition.

Another source of wage rigidity is related to the minimum wage policy, especially in Romania, where the minimum gross wage economy-wide has increased by 75 percent since 2010. The evolution was not a matter of concern until 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 the jobless recovery in Romania, 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 took the value 1 if 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, and the second was computed in a similar way, being equal to 1 if the net number of jobs created was marginal (no more than ±1 percent change). Next, we estimated the likelihood of each event happening as a function of discrete 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

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

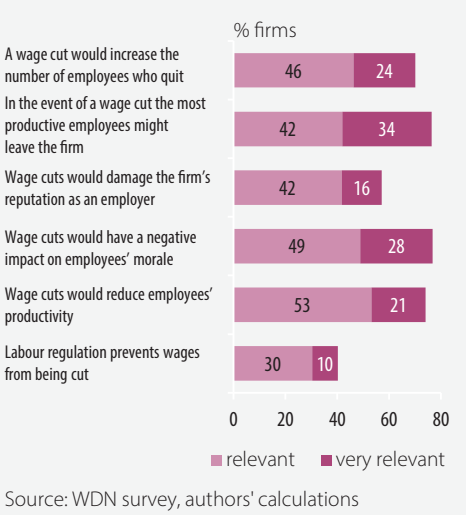
the importance of the MW increase in freezing new hires, which was rated from 1 = not relevant to 4 = very relevant. By means of an ordered probit model, we used this ordinal variable to estimate the probability of limiting job creation in the event of a MW rise, conditional on: (i) firm-specific factors 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 insights into 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.

4.3.2. Wage policy

During 2010-2013, the wage policy of firms was rather inflexible, with only 7 percent 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 percent, decided to freeze wages. At the same time, real wage rigidity was even more pronounced, 32 percent 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 percent of private sector employees being directly affected and another 9 percent indirectly impacted, as some firms stated that they also grant increases to above-minimum wage earners.

Chart 9. Reasons behind DNWR



Source: WDN survey, authors' calculations

Downward nominal wage rigidity

DNWR seems relatively high in Romania, as 18 percent of firms froze base wages during 2010-2013. When asked about the reasons behind this decision, 75 percent of companies pointed to their fear of a negative impact on employee morale and of productivity losses, thus confirming the efficiency wage theory (Chart 9). 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.

Table 2. Factors affecting the occurrence of DNWR – probit estimates

Variable	Coefficient	AME
C	-1.80**	
% of workers with over 5 years of tenure	0.90***	19.58
High-performing employees resign	0.46***	7.80
pseudo R-squared	0.04	
No. obs.	2,035	

Note: *, ** and *** mark coefficients significantly different from zero at 90%, 95% and 99% respectively; AME stands for average marginal effect.

Source: WDN survey, authors' estimations

Our estimations revealed two factors with a statistically 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 of tenure (+20 percent). Tenure was also one of the main reasons behind DNWR in the EU (Babecky *et al.*, 2009). Nevertheless, associating this finding with a certain theory is less straightforward 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 the incumbents over the unemployed. However, this last implication is disproved when looking at the large share of companies (44 percent) 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.

An earlier study on downward nominal labour cost rigidity in Romania (Iordache, Militaru, Pandioniu, 2013) revealed a lower degree of nominal stickiness (4 percent), 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 to reduce labour costs, 51 percent of companies responded they had cut bonus payments and 45 percent answered they had lowered other non-pay benefits.

Real wage rigidity

Wage stickiness is even more pronounced when looking at RWR, 32 percent of companies declaring they had indexed wages to inflation both prior to 2010 and during 2010-2013. The main reason behind this type 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 percent higher for firms applying a collective pay agreement.

Table 3. Real wage rigidity – probit estimates

Variable	Coefficient	AME
C	-0.73***	
% of colective agreements	0.40***	14.00
pseudo R-squared	0.01	
No. obs.	2,041	

Note: *, ** and *** mark coefficients significantly different from zero at 90%, 95% and 99% respectively; AME stands for average marginal effect.

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. As a consequence, only 5 percent of companies concluded collective pay agreements at the sector level in 2013, while many more contracts (around 60 percent) were agreed at the firm level (Chart 10), 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 percent 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.

Chart 10. Share of firms that implemented collective pay agreements

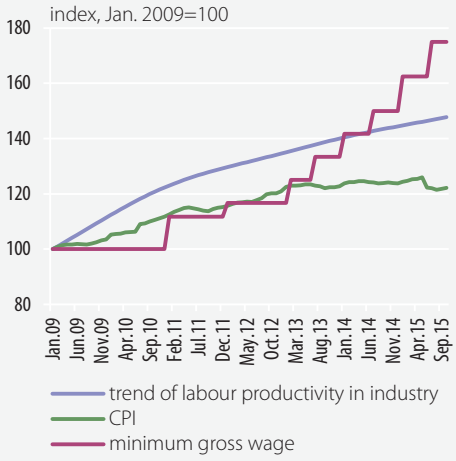
1. Beverages
2. Other services
3. Information and communication
4. Real estate
5. Electrical equipment
6. Machinery and equipment
7. Professional, scientific and technical activities
8. Manufacture of coke and refined petroleum products
9. Retail trade
10. Printing and reproduction of recorded media
11. Construction
12. Other manufacturing
13. Furniture
14. Other non-metallic mineral products
15. Repair and installation of machinery and equipment
16. Transportation and storage
17. Chemical and pharmaceutical products
18. Motor vehicles
19. Textiles, wearing apparel, leather and related products
20. Computer, electronic and optical products
21. Accommodation and food services
22. Food products
23. Rubber and plastic products
24. Tobacco products
25. Fabricated metal products, except machinery and equipment
26. Manufacture of wood and of articles of straw and plaiting materials
27. Basic metals
28. Paper products

Source: WDN survey, authors' calculations

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

Chart 11. Increase in the minimum gross wage economy-wide



Source: Eurostat, NIS, authors' calculations

gross wage increased cumulatively by 33 percent, 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 Chart 11, in the context of a reduction in consumer prices and poor productivity performance, the minimum wage grew by 31 percent.

Based on our survey data, we were able to estimate that a raise in the minimum gross wage directly affected at least 22 percent 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 percent of the personnel were affected.

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.

4.3.3. Personnel policy

Given the jobless recovery in Romania, in this subsection we tried to identify the factors (wage rigidities, labour market frictions and economic conditions) that influenced a firm's decision to destroy or create jobs. In addition, we looked more closely at 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 percent 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 companies' decision to lay off employees – probit estimates

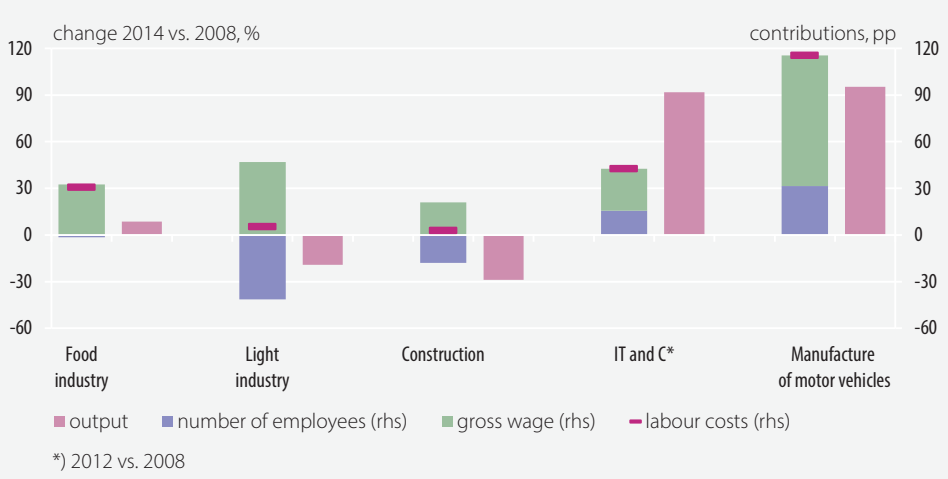
Variable	Coefficient	AME
C	-0.64***	
Company faced a fall in demand	0.57***	20.83
Uncertain environment	0.18**	6.35
Lower access to finance	0.33***	11.76
DNWR	0.52***	18.64
Firm size	0.12**	7.96
Shortage of skilled staff	-0.15*	-5.08
% of unskilled staff	-0.98***	-33.69
% of temporary and fixed-term 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
pseudo R-squared	0.12	
No. obs.	1,791	

Note: *, ** and *** mark coefficients significantly different from zero at 90%, 95% and 99% 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, 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 (Chart 12). 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.

Chart 12. Labour costs and output



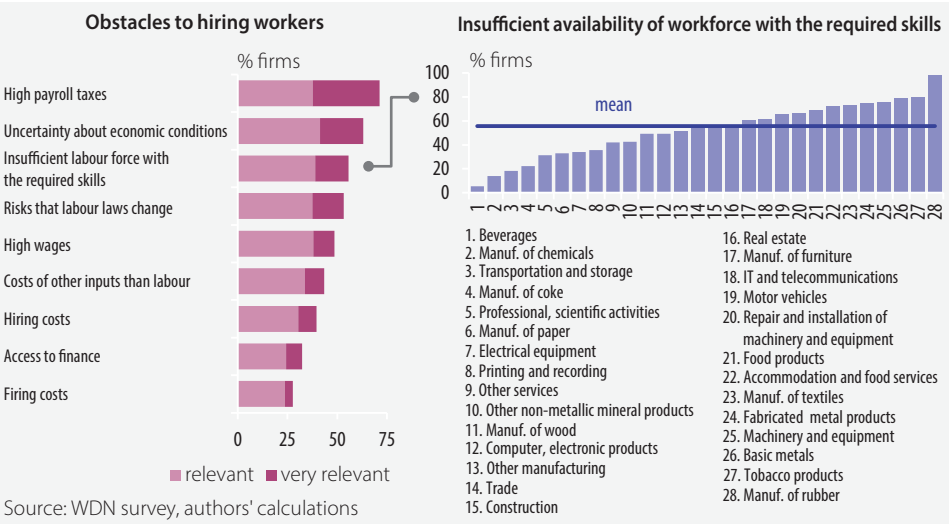
Source: Eurostat, NIS, authors' calculations

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.

Given that the survey included a question that asked firms directly about their perception of the main obstacles to hiring, we were able to identify the factors driving this jobless recovery (Chart 13). In this respect, almost 75 percent 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.

Chart 13. Obstacles to hiring workers with a permanent, open-ended contract



Source: WDN survey, authors' calculations

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***	
↑ Labour cost	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
pseudo R-squared	0.02	
No. obs.	1,925	

Note: *, ** and *** mark coefficients significantly different from zero at 90%, 95% and 99% 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).

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.

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

Variable	Coefficient
Removal of non-pay benefits	0.22***
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***
pseudo R-squared	0.08
No. obs.	2,010

Note: *, ** and *** mark coefficients significantly different from zero at 90%, 95% and 99% respectively.

Source: WDN survey, authors' estimations

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 aggregate 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 percent 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.

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.

Table 7. Factors influencing 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***
Firm size	0.08*
Company is an exporter	-0.11**
High payroll taxes	0.23***
Adjustment in working hours	0.72***
pseudo R-squared	0.06
No. obs.	2,020

Note: *, ** and *** mark coefficients significantly different from zero at 90%, 95% and 99% respectively.

Source: WDN survey, authors' estimations

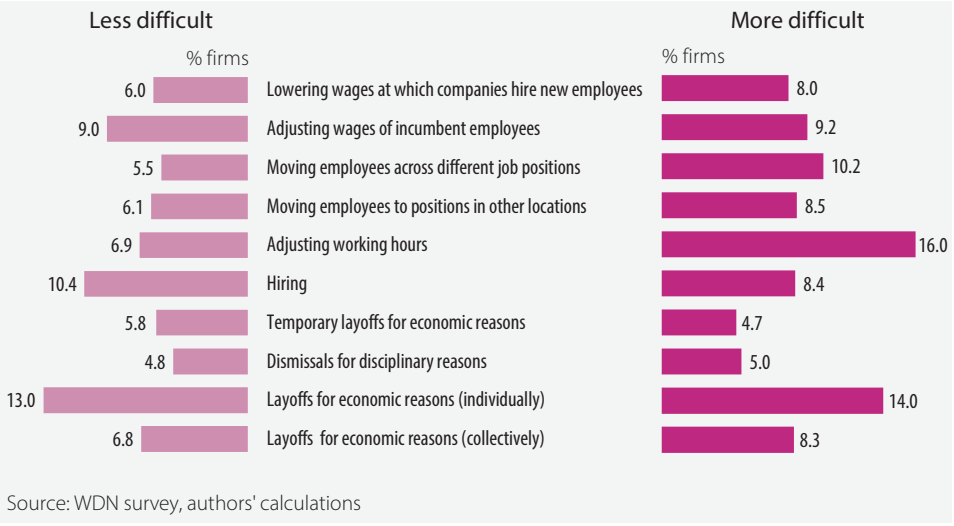
With regard to other factors, we have also found that the likelihood of cheaper hires increased for firms that faced a fall in demand, perceived a high level of taxes or used part-time, fixed-term and temporary contracts. In the latter respect, the use of cheaper temporary hires reflects, to some extent, one of the amendments of the 2011 LMC, 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.

4.4. PERCEIVED IMPACT OF LABOUR MARKET REFORMS

As a response to the strong impact of the global financial and economic crisis on employment in Romania, the authorities started to implement a series of labour market reforms in 2011, as detailed in Section 2. However, survey results point to an increase in structural unemployment during 2010-2013, as revealed by the high share of companies that froze job creation in the early recovery phase of the business cycle (18 percent) and that of firms which could not match existing vacancies to suitable candidates (more than 50 percent). The evolution is consistent with the empirically-observed rise in structural unemployment at the aggregate level. In this context, the question that naturally arises is to what extent the aforementioned reforms softened the adjustment at the firm level or stimulated job creation.

When asked directly, firms answered they had not perceived any noticeable changes in firing and hiring costs (Chart 14), although at sectoral level the picture seems more heterogeneous. However, as pointed out in the previous two sections, some positive effects on the labour market can be indirectly associated with structural reforms.

Chart 14. Firms' perception of labour market reforms



Source: WDN survey, authors' calculations

At the aggregate level, the only strategy that was perceived as being somewhat less difficult to implement was related to firing, namely laying off employees individually for economic reasons (13 percent). The share of firms is even higher if we look only at companies that significantly needed to adjust labour input and used this strategy (40 percent, as compared with just 10 percent that perceived it to be more difficult), the reason being related, according to firms' answers, to law enforcement. This is especially the case of companies operating in the manufacture of wood products, chemical and pharmaceutical products, rubber and plastic products, computer, electronic and optical products, as well as of other non-metallic mineral products, which were sectors that experienced significant declines in the number of employees during 2010-2013.

Moreover, the new legislation allowed firms to lay off employees temporarily or to reduce working hours due to economic reasons with a corresponding wage cut. As a result, out of over one quarter of firms that needed to significantly reduce labour input or alter its composition during 2010-2013, approximately 40 percent used this particular type of adjustment. The evolution was mainly driven by two sectors that faced sharp drops in demand, namely the manufacture of chemical and pharmaceutical products and the manufacture of basic metals. As a matter of fact, firms operating in these sectors also noticed a positive effect stemming from the implementation of reforms related to temporary layoffs.

Turning to hiring, companies' answers suggest increased difficulty in creating jobs during 2010-2013 (Chart 14). This was mainly due to the higher skill mismatch on the labour market, given the high percentage of companies (Chart 13) reporting difficulties in finding qualified staff when the economy returned to positive growth rates. However, reforms related to temporary and fixed-term work seemed to have had some positive effects on the labour market, which can nevertheless be observed only indirectly, by means of probit model estimates. As shown in the previous section, the use of such types of agreements played a key role in smoothing job flows, by reducing both the likelihood of job destruction and limiting job creation. Moreover,

lowering the wage floor for temporary workers (to the minimum level economy-wide) allowed companies to adjust labour costs by replacing existing employees with cheaper hires.

With respect to the wages of incumbents, firms found it more difficult to adjust them during 2010-2013, which is consistent with the previous findings about fairly high degrees of downward nominal and especially real rigidity. According to our estimates, both types of rigidities hindered job creation (the likelihood to cut back on hiring increases cumulatively by 8 percentage points) and their occurrence is related to efficiency wage and contract theories. From the perspective of labour market reforms, the measures implemented in 2011 targeted a more decentralised bargaining system, through the removal of the "national collective bargaining agreement". Although this triggered a shift in bargaining from country to firm level (with the potential to better link wages to overall company performance), it appears that the impact on wage flexibility was marginal, according to firms' answers.

5. Concluding remarks

The global financial and economic crisis has left deep scars across Europe, with unemployment persisting at relatively high levels, in some instances even when the economy returned to positive growth rates, Romania being a case in point. These developments warned about the structural nature of labour market dynamics, partly addressed in several countries through corrective reforms.

In this context, the WDN, an ESCB research group, launched in 2014 a third wave of surveys with the goal of identifying the main strategies used by firms to adjust on the labour market and the role played by structural reforms in shaping different patterns of adjustment. The survey was implemented in a large number of countries on the basis of a harmonised questionnaire, marking also Romania's first participation in this kind of research project. This paper summarises the survey results for Romania and offers an in-depth analysis of the specific factors behind the jobless recovery that took place after the crisis, in spite of the labour market reforms undertaken in 2011.

After the painful recession that cost Romania's 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. According to survey results, during 2010-2013 Romanian firms did not perceive any significant shocks, the majority of them reporting rather moderate upward and downward changes in demand. Almost 40 percent of companies faced a decline in demand and in customers' ability to pay (mostly small and medium-sized enterprises), while 30 percent saw more favourable economic conditions. In the latter case, a moderate increase in demand was experienced in the leading exporting sectors, especially in the automotive and related industries, which became one of the main drivers of economic growth in Romania in the aftermath of the crisis.

During the same period, companies saw an increase in labour costs and most of them tried to reduce the pressure through the adjustment in the quantity of labour rather than prices. This adjustment was mainly at the intensive margin, but there was significant adjustment at the extensive margin as well, with some of the unemployed being unable to qualify for employment even when the economy started to recover.

On the opposite side, with the exception of a 25 percent cut in public sector wages in 2010, average (real and nominal) gross wages remained on an upward path in Romania even in the crisis years. Besides compositional effects, with firings being concentrated in low-skilled jobs, our results also point to a relatively high degree of downward nominal wage rigidity, as shown by the large share of firms, i.e. 18 percent, that froze wages during 2010-2013. The presence of DNWR is best explained by the efficiency wage theory, the reluctance of Romanian firms to cut wages being strongly related to the fear of demotivating employees, which further leads to productivity losses. At the same time, real wage rigidity was even more pronounced, 32 percent of firms stating that they had adapted wage changes to past inflation. This type of wage stickiness is associated with the bargaining power of labour unions. Moreover, the wage-setting behaviour was also affected by the multiple minimum wage rises, given that at least 22 percent of private sector employees were directly targeted and another 9 percent indirectly impacted by such an increase, as some firms stated that they also had granted increases to above-minimum wage earners.

Using the qualitative survey data and extending our dataset with the number of employees of each sample firm obtained from the Ministry of Finance database, we estimated several probit models to identify the specific factors that played a key role in companies' decision to destroy or create a job during 2010-2013.

Our findings reveal that wage rigidities increased the chances for a company to lay off employees by around 20 percentage points. The likelihood of job destruction was also influenced by worsening economic conditions and sectoral shifts in the economy. Firms applying temporary and fixed-term contracts were more flexible and had 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 qualified staff.

As regards job creation, the high level of taxes, economic uncertainty and skill mismatch have been identified as the main obstacles to hiring. Moreover, the occurrence of both downward nominal and real wage rigidities increases the chances for a company to limit job creation by a cumulative 8 percentage points. Similarly to job destruction, companies with a larger share of temporary and fixed-term employees were less affected (26 percent lower probability to limit hiring). Thus, the use of such types of agreements, which were subject to reforms undertaken in 2011, appeared to have smoothed job flows during the recovery. Another factor that was found to negatively impact job creation was related to the rise in the minimum wage. 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, with the probability of a company exhibiting this kind of behaviour being larger in the case of firms experiencing a higher pressure of labour costs in total costs or perceiving high payroll taxes or economic uncertainty, among others.

A strategy that was extensively used to reduce labour costs during 2010-2013 regarded cheaper hires. Around 44 percent of firms replaced existing employees with cheaper ones, signalling that, at least in the early recovery phase of the business cycle, the wages of new hires were more pro-cyclical than those of existing employees. Our analysis of the factors that might have influenced the chances for a firm to use this strategy reveals that DNWR played a key role in this respect as well, alongside other factors related to difficult economic conditions, the perception of high payroll taxes and the use of part-time, fixed-term or temporary contracts.

Turning to the impact of labour market reforms, it seems that, when asked directly, firms answered they had not perceived any noticeable changes in firing and hiring costs. However, as pointed out previously, some positive developments on the labour market can be indirectly associated with structural reforms, of which one is related to the use of temporary and fixed-term contracts, which lowered the probability of job destruction and of inhibiting job creation when the economy returned to positive growth rates.

At the aggregate level, the only strategy that was perceived as being somewhat less difficult to implement was to lay off employees individually for economic reasons. This was especially the case of firms operating in sectors that experienced significant declines in the number of employees during 2010-2013.

As regards hiring, despite some positive effects stemming from the reforms undertaken, companies' answers suggest increased difficulty in creating jobs mainly due to the higher skill mismatch on the labour market.

References

Babecky, J., Du Caju, P., Kosma, T., Lawless, M., Messina, J., Room, T. — *Downward Nominal and Real Wage Rigidity. Survey Evidence from European Firms*, ECB Working Paper Series No. 1105, Wage Dynamics Network, 2009

Banerjee, B., Vodopivec, M., Sila, U. — *Wage Setting in Slovenia: Interpretation of the Wage Dynamics Network (WDN) Survey Findings in An Institutional and Macroeconomic Context*, Bank of Slovenia Working Papers, No. 3, 2013

Barlevy, G. — *Evaluating the Role of Labor Market Mismatch in Rising Unemployment*, Federal Reserve Bank of Chicago Economic Perspectives Third Quarter, 2011

Boz, E., Durdu, B.C., Li, N. — *Emerging Market Business Cycles: The Role of Labor Market Frictions*, IMF Working Paper No. 237, 2012

Cervena, M. — *Base Wage Rigidities. Evidence from a Survey of Slovak Firms*, National Bank of Slovakia Working Paper No. 3, 2012

Christoffel, K., Linzert, T. — *The Role of Real Wage Rigidity and Labor Market Frictions for Unemployment and Inflation Dynamics*, IZA Discussion Paper No. 1896, 2005

Dabusinskas, A., Room, T. — *Survey Evidence on Wage and Price Setting in Estonia*, Bank of Estonia Working Paper Series No. 6, 2011

Deutsche Bundesbank — *Wage Setting in Germany – New Empirical Findings*, Monthly Report, April 2009

Diamond, P. — *Wage Determination and Efficiency in Search Equilibrium*, Review of Economic Studies, 49(2), pp. 217-227, 1982

Cyclical Unemployment, Structural Unemployment, IMF Economic Review, Palgrave Macmillan, 61(3), pp. 410-455, 2013

Dias, D.A., Marques, C.R., Martins, F. — *Wage Rigidity and Employment Adjustment at the Firm Level: Evidence From Survey Data*, Labour Economics, 23, pp. 40-49, 2013

Druant, M., Fabiani, S., Kezdi, G., Lamo, A., Martins, F., Sabbatini, R. — *How Are Firms' Wages and Prices Linked? Survey Evidence in Europe*, ECB Working Paper Series No. 1084, 2009

European Central Bank — *Monthly Bulletin*, February 2009

Wage Dynamics in Europe. Final Report of the Wage Dynamics Network (WDN), December 2009

Gertler, M., Sala, L., Trigari, A. — *An Estimated Monetary DSGE Model with Unemployment and Staggered Nominal Wage Bargaining*, Journal of Money, Credit and Banking, 40 (8), pp. 1713-1764, 2008

Guerazzi, M., Meccheri, N. — *From Wage Rigidities to Labour Market Rigidities: A Turning-Point in Explaining Equilibrium Unemployment?*, University of Pisa Discussion Papers No. 94, 2009

Haefke, C., Sonntag, M., Van Rens, T. — *Wage Rigidity and Job Creation*, IZA Discussion Paper No. 3714, 2008

Hall, R. — *The Rigidity of Wages and the Persistence of Unemployment*, Brookings Papers on Economic Activity, 2, pp. 301-335, 1975

Employment Fluctuations with Equilibrium Wage Stickiness, The American economic review, 95(1), pp. 50-65, 2005

Employment Efficiency and Sticky Wages: Evidence from Flows in the Labor Market, Review of Economics and Statistics, 87, pp. 397-407, 2005

Iordache, S., Pandioniu, L. — *The Price-setting Behaviour of Romanian Firms*, NBR Occasional Papers No. 10, 2015

Iordache, S., Militaru, M., Pandioniu, L. — *Ajustări pe Piaţa Muncii din România în Contextul Crizei Economice. Rolul Salariilor*, NBR Monetary Policy Colloquia, 6th edition, 2013

The Inverse Relationship between Inflation and Unemployment in Romania. How Strong was It After the Crisis?, NBR Occasional Papers No. 19, 2016

Keeney, M., Lawless, M. — *Wage Setting and Wage Flexibility in Ireland. Results from a Firm-Level Survey*, ECB Working Paper Series No. 1181, 2010

Kezdi, G., Konya, I. — *Wage Setting in Hungary. Evidence from A Firm Survey*, ECB Working Paper Series No. 1378, 2011

Klau, F., Mittelstadt, A. — *Labour Market Flexibility*, OECD, 1986

Lindbeck, A., Snower, D. — *The Insider-Outsider Theory of Employment and Unemployment,* Cambridge, MA: MIT Press, 1988

Lozev, I., Vladova, Z., Paskaleva, D. — *Wage-setting Behaviour of Bulgarian Firms: Evidence from Survey Data*, Bulgarian National Bank Discussion Papers No. 87, 2011

Messina, J., Du Caju, P., Duarte, C.F., Hanse, N.L., Izquierdo, M. — *The Incidence of Nominal and Real Wage Rigidity: An Individual-Based Sectoral Approach*, Banco de Espana Documentos de Trabajo No. 1022, 2010

Montornes, J., Sauner-Leroy, J.B. — *Wage-Setting Behavior in France. Additional Evidence From an Ad-Hoc Survey*, ECB Working Paper Series No. 1102, 2009

Mortensen, D.T. — *The Matching Process as a Noncooperative Bargaining Game*, in The Economics of Information and Uncertainty, ed. John J. McCall, pp. 233-258, 1982

Mortensen, D.T., Pissarides, C.A. — *Job Creation and Job Destruction in the Theory of Unemployment*, Review of Economic Studies, 61(3), pp. 397-415, 1994

National Bank of Romania — *Bank Lending Survey*, November 2015

Pissarides, C.A. — *Short-Run Equilibrium Dynamics of Unemployment, Vacancies, and Real Wages*, The American Economic Review, 75(4), pp. 676-690, 1985

Equilibrium Unemployment Theory, second edition, Cambridge, MA: MIT Press, 2000

The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?, Econometrica, 77(5), pp. 1339-1369, 2009

Equilibrium in the Labor Market with Search Frictions, The American Economic Review, 101(4), pp. 1092-1105, 2011

Shimer, R. — *The Cyclical Behavior of Equilibrium Unemployment and Vacancies*, The American Economic Review, 95(1), pp. 25-49, 2005

Stiglitz, J.E. — *Theories of Wage Rigidity*, NBER Working Paper Series No. 1442, 1984

Thomas, C. — *Search and Matching Frictions and Optimal Monetary Policy*, Journal of Monetary Economics, 55(5), pp. 936-956, 2009

Yellen, J. — *Efficiency Wage Models of Unemployment*, The American Economic Review, 74(2), pp. 200-208, 1984.

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		JOB TENURE	
Higher skilled non-manual (ISCO: 1, 2, 3)	____%	Below 1 year	____%
Lower skilled non-manual (ISCO: 4 and 5)	____%	Between 1 and 5 years	____%
Higher skilled manual (ISCO: 7 and 8)	____%	More than 5 years	____%
Lower skilled manual (ISCO: 9)	____%		
TOTAL (= 100%)		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.