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Wage Rigidities and Jobless Recovery in Slovakia: New Survey Evidence

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WAGE RIGIDITIES AND JOBLESS RECOVERY IN SLOVAKIA: NEW SURVEY EVIDENCE

Occasional paper NBS[1]

Peter Tóth[2], Katarína Vaľková[3]

Abstract

The aim of this paper is to test the determinants of labour cost adjustments by Slovak firms during the recent recovery period from 2010 to 2013. We use a new dataset from a firm-level survey, which was conducted in cooperation with the Wage Dynamics Network of the European Central Bank. The main findings are broadly in line with macroeconomic data, such as the uneven recovery of demand across sectors, stagnation of employment and increase in wages. Our estimates highlight the importance of demand shocks in explaining labour cost adjustments. Further, the role of collective agreements and wage rigidities seems crucial, which forces firms to downsize their labour inputs rather than to cut wages. Finally, we find evidence that large and foreign owned firms face fewer barriers to adjusting their labour costs. The mentioned factors seem to be the main explanation for the recent jobless recovery in Slovakia during 2010 to 2013.

JEL classification: E24, J30, J50, C81

Keywords: labour cost adjustment, firm-level survey, collective bargaining, wage rigidities, adjustment costs

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1. INTRODUCTION

The recent global financial crisis was followed by a slow recovery in output and employment, both in the U.S. economy and in Europe. New-Keynesian models attribute sluggish adjustment mostly to demand shocks originating from uncertainty and the zero lower bound on interest rates (Galí et al. 2012). While for weak job creation, downward wage rigidities are usually blamed. A closer look at the crisis reveals a very uneven impact both across and within sectors. First, the relocation of job opportunities across sectors joint with barriers to labour mobility between professions can lead to permanent layoffs. These barriers are often viewed as the main cause of jobless recoveries.[4] Second, there is a vast literature emphasizing the different business cycle impacts on small versus large firms. The advantages from firm size are thought to emerge via smaller adjustment costs[5] or less binding financial constraints.[6] This implies that labour cost adjustments after the crisis may be heterogeneous by firm size.

The main features of the recent recovery in Slovakia were quite standard compared to the rest of Europe. Output has recovered, though unevenly across sectors. Employment had hardly reached its pre-crisis level even by 2013. Employee compensations developed quite positively, going hand in hand with output. The main aim of this paper is to shed more light on the determinants of labour cost adjustment in Slovakia during the period 2010-2013. We use a new firm-level survey to estimate a model of labour cost adjustment channels. A further goal of this article is to provide a detailed overview of a newly collected survey dataset.

The survey used and described in this paper investigated labour cost and price adjustment strategies of Slovak firms during the period 2010-2013. Data was collected at the end of 2014 in cooperation with the Wage Dynamics Network (WDN). This research network is operated by the consortium of EU central banks and is coordinated by the European Central Bank. The current wave of the survey is the third overall, while the National Bank of Slovakia is participating for the second time since 2009. The qualitative data contained in this survey is a unique source of information that cannot be substituted with standard firm-level data. The additional value added of the current wave of the survey comes from studying labour cost and price adjustments during the recent recovery. This particular timing allows us to study factors behind firm-level adjustments to aggregate shocks.

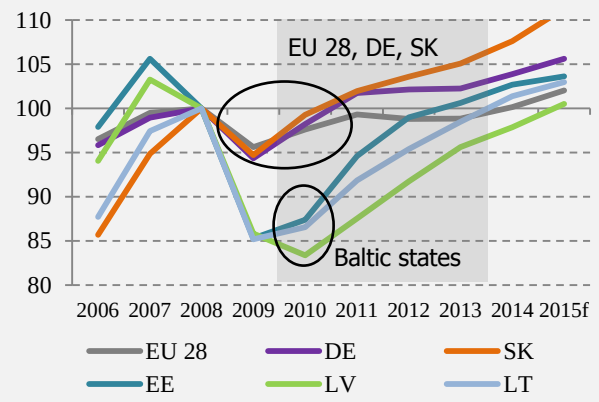
[4] The term "jobless recovery" emerged among market analysts and economists after the 1990-91 and 2001 recessions in the U.S. According to Schreft and Singh (2003), the recoveries of GDP after those recessions were accompanied by a much slower employment growth than predicted by forecasting models. While these models were based on data on earlier business cycles.
[5] See for example Moscarini and Postel-Vinay (2012, 2013).
[6] See for example Gertler and Gilchrist (1994) and Bernanke et al. (1996).

The rest of the paper is organised as follows. Section 2 compares the macro-level developments in Slovakia and the rest of Europe during the recovery period. Section 3 describes the institutional characteristics of the Slovak labour market, focusing on collective bargaining and labour market reforms. Section 4 provides a detailed overview of the survey dataset. In section 5 the determinants of labour cost adjustments are tested via an econometric model. The last section concludes.

2. Macro-Level Developments During the Recent Recovery

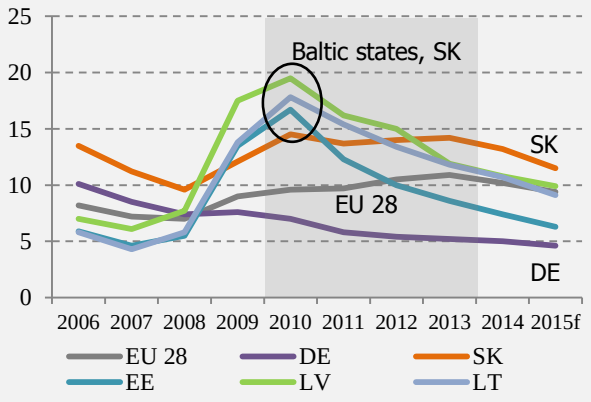
The macroeconomic impacts of the recent crisis were relatively diverse across the European Union. Regarding real activity (Figure 1), the EU 28 economy fully recovered its pre-crisis level of output by 2011. In terms of GDP, the least affected EU members belonged to the core of the EU, such as Germany, France, the U.K., Austria and the Benelux countries. In addition, as the Central European new member states maintain tight trade linkages to the core, most of them enjoyed an export-led recovery following the crisis. The latter group includes the Czech Republic, Slovakia and Poland, with the exception of Hungary. In contrast, not all of the EU 28 managed to recover their pre-crisis output levels in a few years period. First, the global demand shock hit the GIIPS economies rather hard uncovering also their fiscal imbalances. Next, Finland's weak rebound spilled over to the Baltic states through their trade ties. This lead to a persistent dip of economic activity in Estonia, Latvia and Lithuania, which represent the hardest hit group of economies in terms of lost real GDP levels.

Figure 1 – Real GDP (2008=100)



Source: Eurostat, EC–Ameco (2015f)

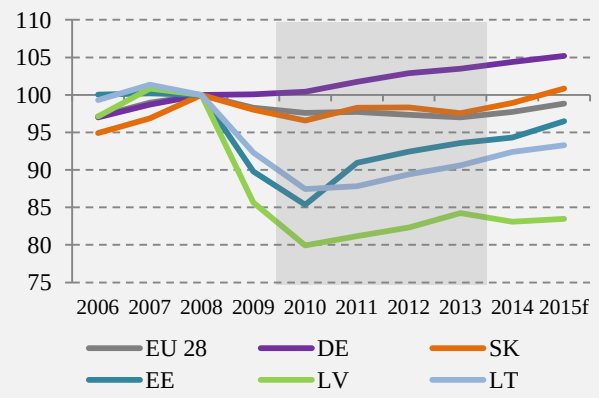
Figure 2 – Unemployment rate (%)



Source: Eurostat, EC-Ameco (2015f)

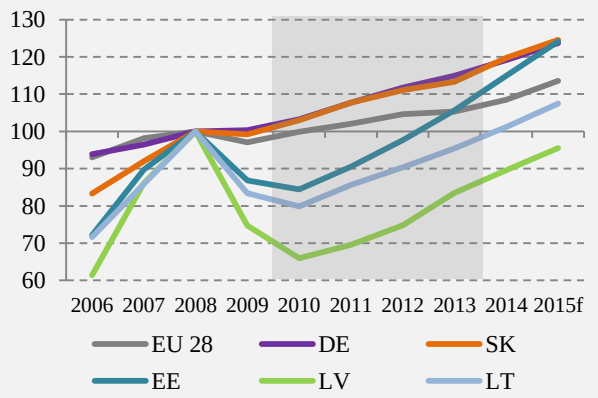
Regarding labour market developments, the impacts of the crisis were also heterogeneous across Europe. Unemployment rates in the EU 28 generally increased during the post-crisis period with some notable exceptions of a falling rate, e.g. in Germany (Figure 2). The upward trend in unemployment rates and the fall in employment (Figure 3) suggest that job destruction was the prevailing strategy overall to cut labour costs. This story is complemented by the increasing level of employee compensations in the EU 28 economy (Figure 4). However, alternative paths of labour market adjustments can also be observed. In the Baltic states, unemployment exploded temporarily (Figure 2) and both employment and compensations plummeted as a response to the foreign demand shock (Figures 3 and 4). This may indicate the high flexibility of labour markets, in particular that of wages and dismissals, compared to other EU countries. Large wage cuts and the revival of output enabled the gradual decrease of unemployment rates in the Baltics. In the observed spectrum of labour market outcomes Slovakia stood close to the EU average. This meant a jobless recovery of economic activity together with increased employee compensations at a cost of persistently high unemployment.

Figure 3 – Employment (2008=100)



Source: Eurostat, EC–Ameco (2015f)

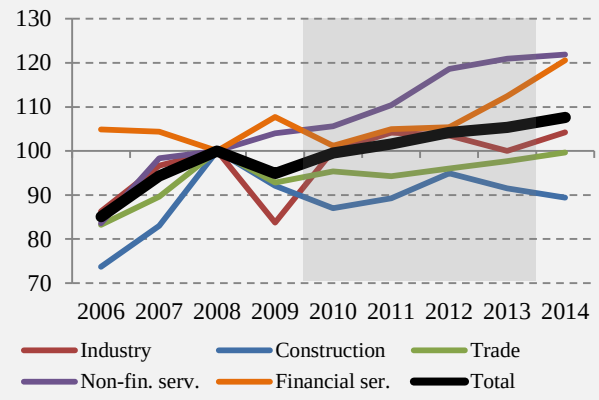
Figure 4 – Compensations (2008=100)



Source: Eurostat, EC-Ameco (2015f)

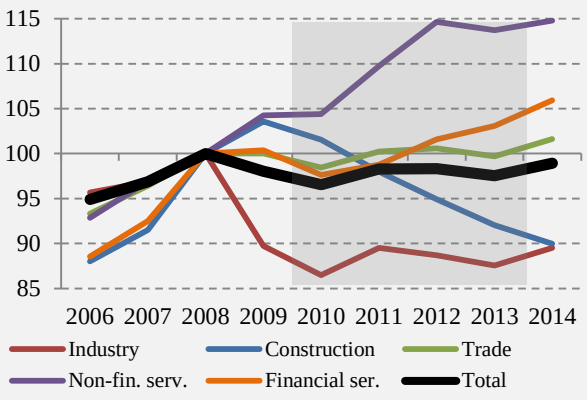
The post-crisis recovery in Slovakia was characterized by marked differences across sectors. On one hand, both financial and non-financial services made a positive contribution to value added as well as job creation (Figure 5 and Figure 6). On the other, construction and industry remained below their pre-crisis levels of employment. The above differences suggest a reallocation of job opportunities between sectors, namely from industry and construction to services. Imperfect worker mobility across occupations leads to structural unemployment, which is one of the potential causes of jobless recoveries (Kolesnikova and Liu 2011).

Figure 5 – Gross value added by sectors, Slovakia (2008=100)



Source: Eurostat

Figure 6 – Employment by sectors, Slovakia (2008=100)



Source: Eurostat

An interested reader can find more details on the sectoral composition of Slovak GDP, employment, FDI stock and the structure of foreign trade in Tables A1.1 and A1.2 of the Annex. The tables show that about half of output and employment in Slovakia come from services and another third from industrial sectors. Further, FDI is most concentrated in financial services and to a bit lesser extent in manufacturing. Finally, the Slovak economy is very open to foreign trade (exports to GDP exceed 80%), most of which is exchanged with the EU28 countries (above 80%).

3. Institutional Characteristics of the Slovak Labour Market

This section first summarizes the main features of collective bargaining in Slovakia. The second part describes labour market reforms during the surveyed period.

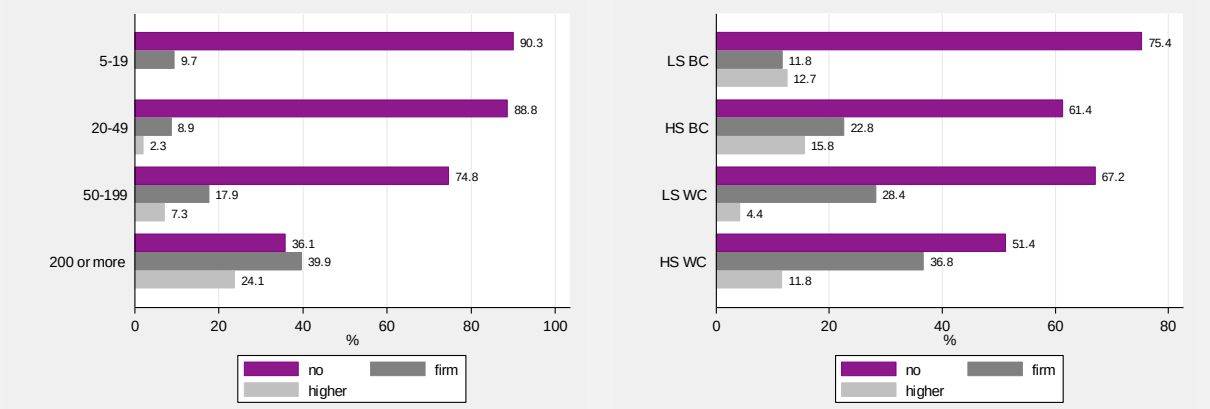
3.1 COLLECTIVE BARGAINING IN SLOVAKIA

Compared to other EU countries, a relatively low share of Slovak firms are covered by collective agreements and coverage is gradually shrinking. According to the latest WDN survey, the percentage of firms applying any kind of bargaining agreement amounts to 37.5%. Further, the existence of a collective agreement as well as within firm union density are positively correlated with firm size (see Figure 7 and Table 1). A significant weakening in labour unions' influence can be inferred from the previous WDN survey, which recorded up to 57.4% coverage just a few years earlier, in 2009. Further, the European Union's Eurofound (2015) report also shows a drop in union coverage from 42.1% in 2009 to 32.3%

in 2011.[7] According to the report, Slovakia is undergoing significant changes in the system of collective bargaining. This refers to an abrupt fall of workers' membership in labour unions (union density). At the same time, collective bargaining is shifting from sectoral to the company level in an accelerated pace, which is in line with decentralisation trends in most of European countries. The increasing dominance of company-level agreements in the country is further strengthened by weakening coordination between the mentioned two levels of bargaining. In addition, the influence of national-level bargaining agreements is rather limited in Slovakia.

According to the current WDN survey, the level at which collective agreements are negotiated has a characteristic pattern by workforce types and sectors. Firm-level agreements are more typical for companies with a higher share of white collar workers (Figure 7), whereas higher level agreements are slightly more characteristic for firms with blue collar workers as the dominant workforce. In a sectoral breakdown, higher-level agreements apply in as much as two thirds of firms in the financial sector, while their occurrence in other sectors is below 20% (Figure 8). Firm-level agreements are most frequent in energy and manufacturing, where they apply in about every third company. The lowest share of firms participating in collective bargaining can be found in the construction sector, where the vast majority of firms do not apply any kind of collective agreements.

Figure 7 – Coverage by collective agreements, % of firms by size and workforce type



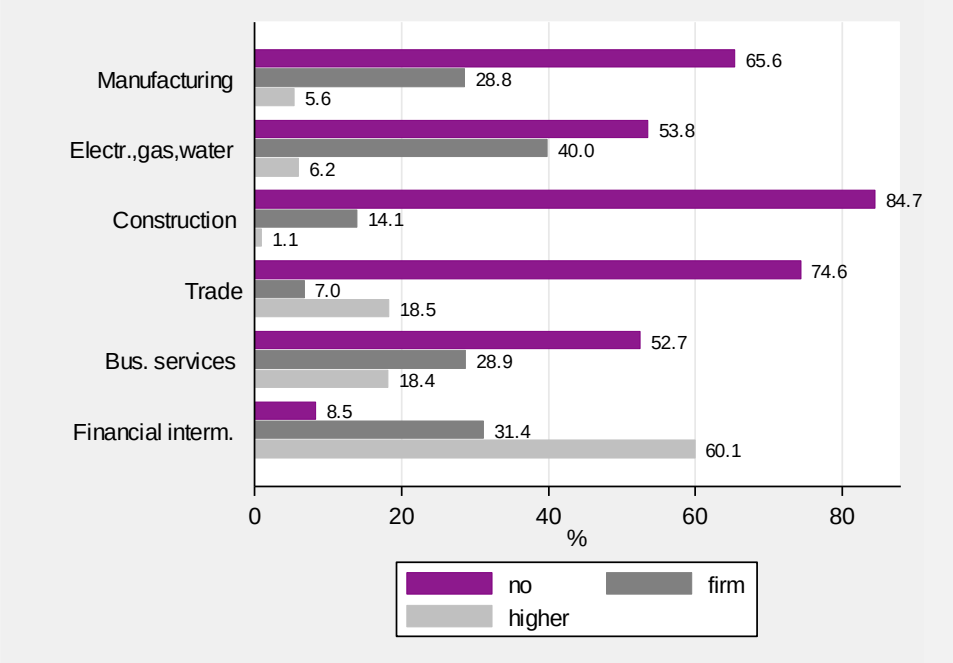
Note: Collective agreements at firm level or higher (national, regional, sectoral, occupational). Firm size (left) by number of employees. Workforce types (right): LS BC – low-skilled blue collar, HS BC – high-skilled blue collar, LS WC – low-skilled white collar, HS WC – high-skilled white collar. Employment adjusted (see Annex A3 for details on weighting).

Source: WDN Survey (2014), NBS

[7] The cited figures of union coverage are not fully comparable, as the previous WDN survey in Slovakia sampled only firms with more than 10 employees, while the current survey includes also firms with 5 and more workers. Information from the Eurofound (2015) report comes from a larger survey covering all types of firms and more than one-third of all employees in Slovakia. It is conducted in cooperation with the Ministry of Labour (ISPP and ISCP surveys). As small firms are less likely to participate in collective bargaining, surveys oversampling large firms may overestimate union coverage. Therefore such an upward bias is probably smallest in case of the Eurofound's figures.

Union density, i.e. within firm union coverage exceeds 60% for firms with more than 200 employees, compared to just below 8% for firms with less than 20 employees (see Table 1). High skilled white collar workers benefit from the highest union density (close to 50%). The same applies to the financial sector, where more than 90% of employees are subject to collective bargaining. In contrast, the least covered sector is again construction.

Figure 8 – Coverage by collective agreements, % of firms by sectors



Note: Collective agreements at firm level or higher (national, regional, sectoral, occupational). Employment adjusted.
Source: WDN Survey (2014), NBS

Table 1 – Union density, % of workers by firm size, workforce types and sectors

Average union density: 37.5%

Firm size		**Prevailing workforce type**		**Sector**	
Employees	Average density	Workforce	Average density	Sector	Average density
5-19	7.7%	LS BC	19.9%	Manufacturing	33.8%
20-49	9.4%	HS BC	36.0%	Electr.,gas,water	32.9%
50-199	26.4%	LS WC	32.8%	Construction	16.9%
>200	61.1%	HS WC	49.3%	Trade	20.2%
				Business services	46.5%
				Financial services	90.6%

Note: LS BC – low-skilled blue collar, HS BC – high-skilled blue collar, LS WC – low-skilled white collar, HS WC – high-skilled white collar. Employment adjusted.
Source: WDN Survey (2014), NBS

3.2 LABOUR MARKET REFORMS DURING 2010-2013

Labour cost adjustments during the surveyed period were also influenced by two essential law amendments in the Slovak labour and tax law. The first law change in 2011 increased labour market flexibility regarding dismissal rules in Slovakia. Correspondingly, the OECD's Employment Protection Legislation (EPL) index[8] decreased by almost 0.5 points to 2.16 points, which was somewhat below the OECD average (close to 2.3 points).

The second law amendment in 2013 aimed at reducing non-standard forms of employment, especially work by agreement, in favour of standard work contracts. Additionally, firing costs due to the extended rights to severance payments for some employees had increased and the renewal of fixed term contracts was restricted. These measures lead only to a minor overall increase in employment rigidity measured by the EPL index, which went up by 0.1 points to 2.26. In addition, agreement workers became more integrated into the social security system, the new regulation of their working standards extended their rights, and their contracts have become subject to the minimum wage. Thus it turned costlier for firms to apply workers by agreement and their numbers dropped sharply as a result. Table 2 shows firms' adjustments due to all these legal changes based on the survey. In particular 16.6% firms stated having cut the number of permanent employees, whereas 25.5% cut the number of agreement workers.

Table 2 – Workforce adjustments due to the labour code reform in 2013, % of firms

	Number of employees		**Workers by agreement contracts**	
	Frequency	%	Frequency	%
Did not adjust	484	79.0%	426	70.7%
Cut	102	16.6%	154	25.5%
Increased	27	4.4%	23	3.8%

Note: Employment adjusted.
Source: WDN Survey (2014), NBS

[8] We consider the "eprc_v3" version of the EPL index, which reflects both individual and collective dismissals and is based on the broadest set of underlying indicators compared to other versions.

4. DESCRIPTION OF THE SURVEY DATASET

4.1 SURVEY DESIGN

To collect the survey data, a sample of 7999 active private-sector enterprises with more than five employees was randomly selected from the Slovak Statistical Office's firm registry using stratified sampling. Firms were distributed into forty strata according to ten sectoral groups and four firm size categories (see Table 3 below). Agriculture, education and public services were excluded. The National Bank of Slovakia contacted the sampled firms via traditional mail and e-mail at the end of November 2014. Respondents filled in the online questionnaire during December 2014 and January 2015. The final sample consisted of 621 companies with at least one respondent in each stratum. The overall response rate reached almost 8%, which was slightly below our expectations. Notable differences in response rates across strata are observable. Namely, larger firms and some sectors were more likely to respond than others. The financial sector was most likely to cooperate and firms in industry also had an above average probability to respond. However, the quality of our results will not be affected by responding patterns, as employment weights[9] account for non-response.

Table 3 – Number of firms in the realized sample by sectors and size

		Firm size by the number of employees					
Sector	**NACE 2**	**5-19**	**20-49**	**50-199**	**≥ 200**	**Total**	**response rate**
Food, beverages, tobacco	10-12	1	5	6	1	**13**	4.7%
Textile, wood, paper, printing	13-18	3	6	16	8	**33**	8.0%
Chemicals, plastics, metals	19-25	10	21	34	16	**81**	11.2%
Electron., machinery, equipm.	26-33	4	12	32	17	**65**	10.1%
Water and energy supply	35-39	3	2	7	5	**17**	11.1%
Construction	41-43	19	17	15	3	**54**	6.3%
Trade	45-47	49	39	30	11	**129**	5.9%
Transport, accommodation	49-56	16	24	21	7	**68**	6.5%
Other non-financial services	58-82	54	35	33	14	**136**	8.4%
Financial services	64-66	3	7	9	6	**25**	27.2%
Total		**162**	**168**	**203**	**88**	**621**	7.8%
response rate		4.0%	9.1%	12.9%	15.4%	7.8%	

Source: WDN Survey (2014), NBS

[9] See Annex A3 for details on the computation of employment weights.

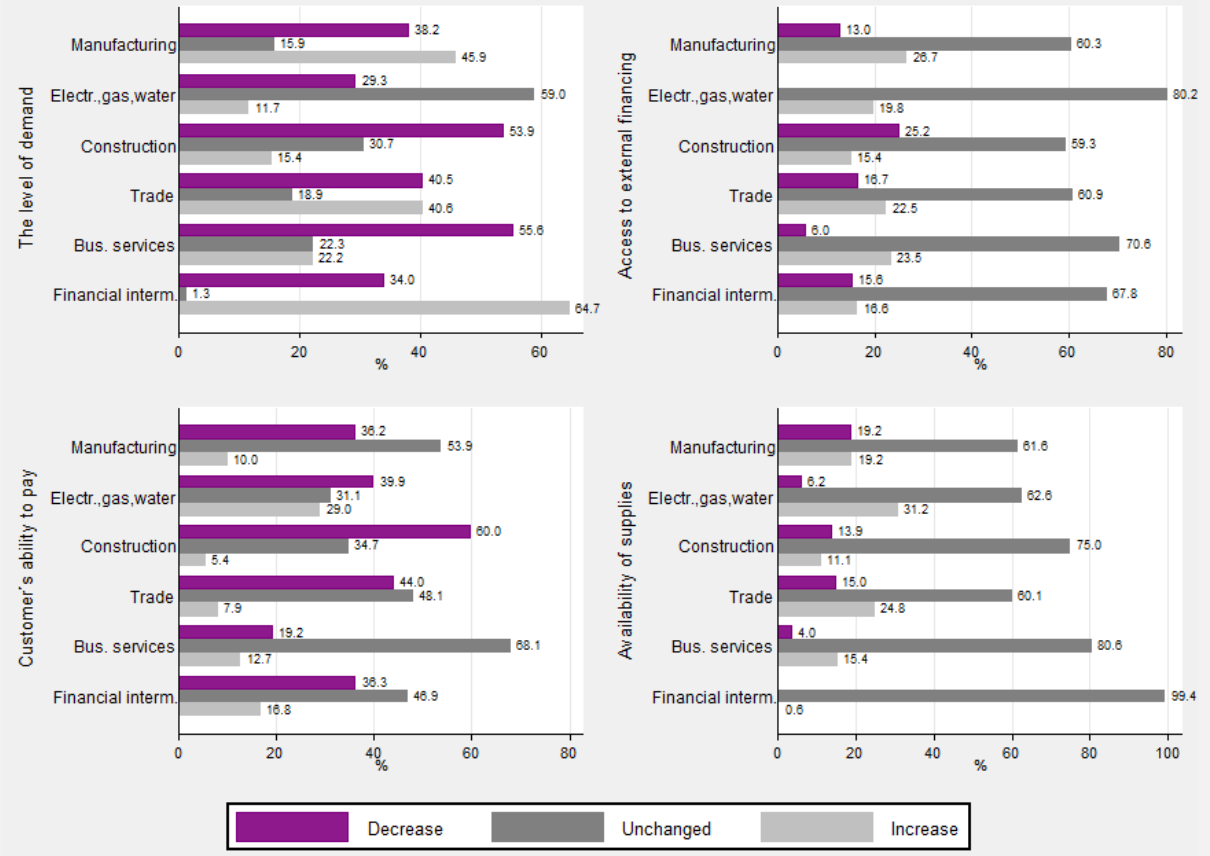
The questionnaire consisted of harmonised questions common to all national banks participating in the WDN, extended by a set of ad hoc country-specific questions. The harmonized part contained core and non-core questions, where the inclusion of non-core ones was voluntary for each participating central bank. The questionnaire was organised in four sections. The first investigated changes in the economic environment, such as demand, credit availability, various types of costs and a breakdown of the main margins of labour cost adjustments. The second section focused on adjustments in labour input. In addition to a detailed structure of workers by contract types, occupational groups and job tenure, this section asked about various practices of adjusting the labour input. The third section dealt with wage adjustments. It provides information on the coverage of workers by collective agreements and the frequency at which these agreements are renegotiated. This section also collected information on wage rigidities, such as inflation indexation rules, the frequency of base wage changes, and the occurrence of base wage cuts and freezes. The fourth section was a fully non-core part of the questionnaire and it investigated price adjustments. Respondents disclosed details about their price setting rules, the degree of competitive pressures they face and the frequency at which they change prices.

Although answering most of the questions did require knowledge of certain quantitative figures of the firm, the overall nature of the survey data was qualitative. Respondents were typically asked to assess the direction of changes in various indicators by five categories ("strong decrease", "moderate decrease", "unchanged", "moderate increase", "strong increase"). Alternatively, respondents needed to assess various factors or firm responses to them according to a range of relevance categories (e.g. "very relevant", "relevant", "of little relevance", "not relevant" or "strongly", "moderately", "marginally", "not at all"). Despite the categorical nature of responses and the subjective self-assessment character of the survey, the WDN dataset proves to be a unique source of firm-level information, which cannot be substituted with standardly available firm-level data.

4.2 CHANGES IN THE ECONOMIC ENVIRONMENT

Figure 9 depicts changes in the firms' economic environment, such as demand level, customers' ability to pay, access to external financing and the availability of supplies. Demand developments in the sample were largely heterogeneous both within and across sectors. This picture is somewhat in line with macro-level evidence. Business services and construction were the worst hit sectors with more than half of respondents reporting a fall in demand. On the opposite end of the spectrum were financial services, where the majority of firms benefited from a demand increase. The rest of the industries faced a more heterogeneous impact, meaning a more equal frequency of drops and hikes in demand. A breakdown of demand shocks by firm size and workforce structure further revealed that small firms with less than fifty employees and firms employing more white collar workers were slightly more likely to experience a fall in demand (Figures A2.1 and A2.2 in the Annex).

Figure 9 – Changes in the economic environment by sectors (2010-2013, % of firms)



Note: Employment adjusted (see Annex A3 for details on employment weights).
Source: WDN Survey (2014), NBS

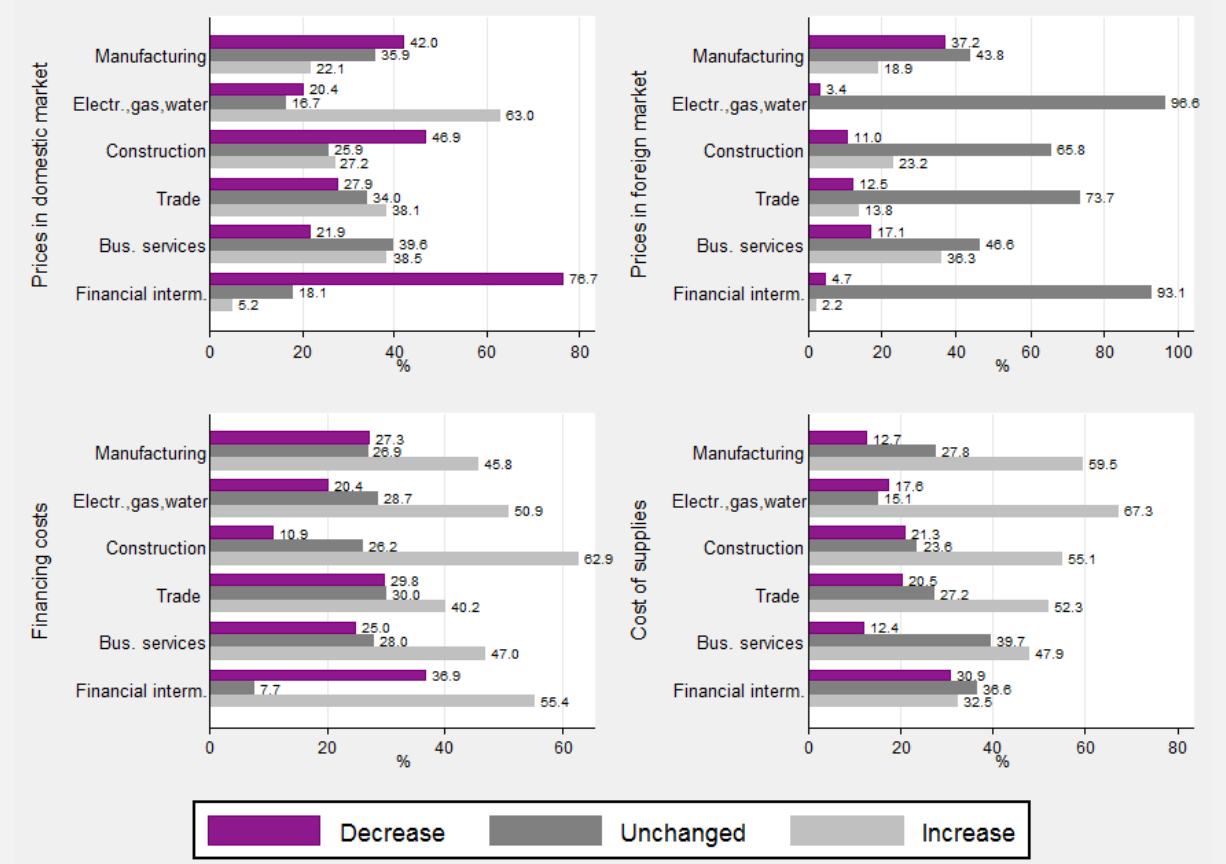
Next, patterns in customers' ability to pay was quite similar to demand developments. The highest frequency of adverse impacts was concentrated in the construction sector, while the most frequent response elsewhere suggested no changes in customer solvency. Finally, access to external finance[10] and the availability of supplies on average was not considered more problematic during the period 2010-2013 than before.

Figure 10 summarizes the evolution of selling prices and non-labour related costs. First, selling prices on domestic markets reflect a mixed picture. Cuts were the most typical for financial intermediation, going hand in hand with an above average increase in competition (more in Section 4.5) and a below average increase in the cost of supplies in this sector (bottom right figure). In contrast, the majority of firms in energy and utilities raised their prices. Although prices in this sector are largely regulated, the outcome is consistent with increased costs of supplies prevailing in this sector. In the rest of the sample, the frequency

[10] More details on the availability and conditions of credit supply can be found in Figure A2.9 in the Annex.

of price cuts and increases are more balanced. Turning to the export market, selling prices can be characterized by much more stability. This is to say that the most frequent response is no change in all sectors. Albeit, a higher occurrence of dropping export prices in the export-oriented manufacturing sector is noticeable.

Figure 10 – Changes in prices and costs by sectors (2010-2013, % of firms)



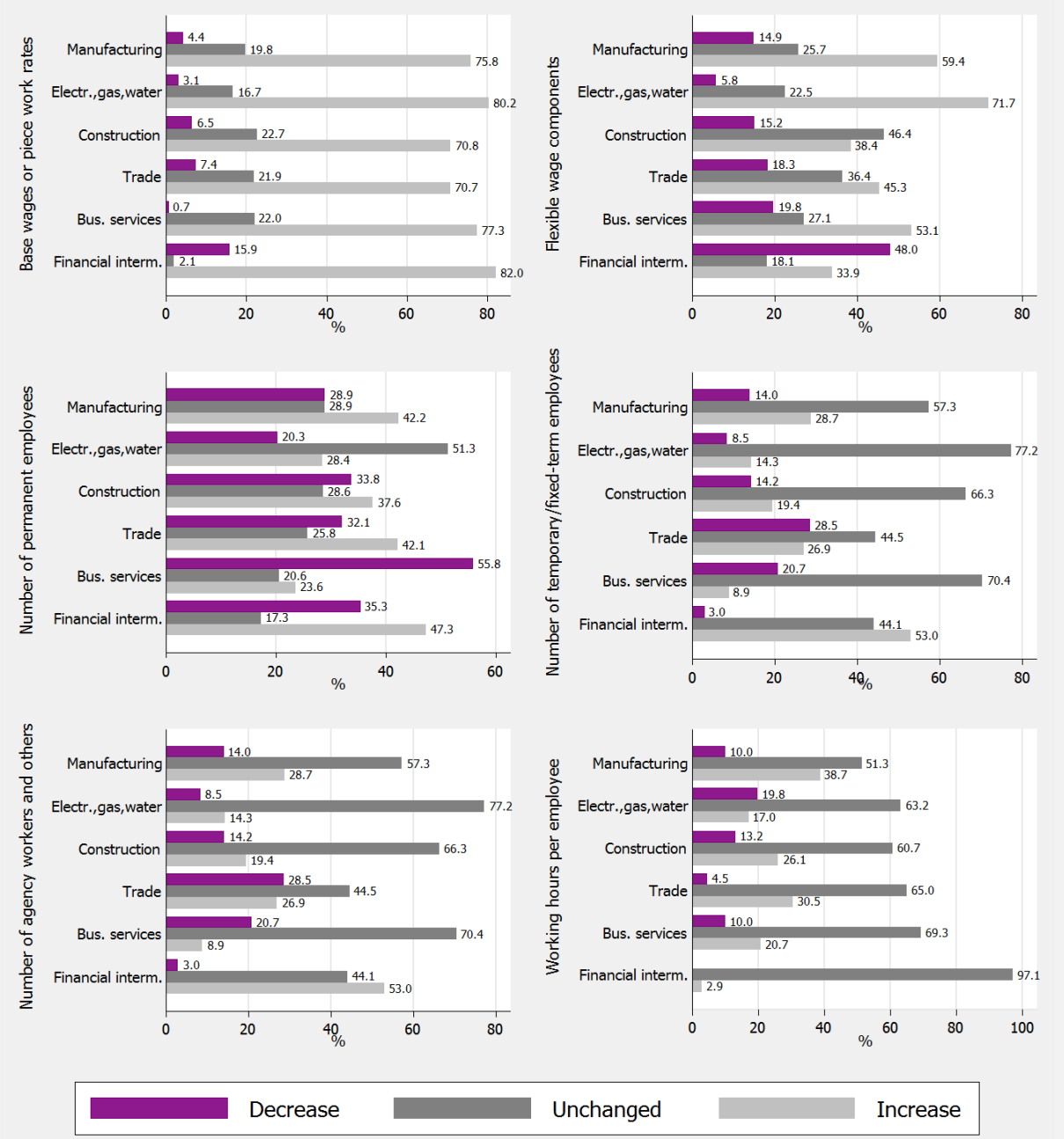
Note: Employment adjusted.
Source: WDN Survey (2014), NBS

Second, increasing financing costs and costs of supplies dominated in most industries. Here the case of the financial sector was somewhat special. Whilst their supplies, i.e. financial liquidity, were cheaper thanks to monetary easing, financial market volatility due to the European debt crisis and stricter regulations may have moderately increased their financing costs during the surveyed period. Costlier finances for intermediaries may have also caused the increased occurrence of rising financial costs for respondents in other industries. In this respect, a breakdown by firm size reveals that small firms where a bit more likely to face increased financial costs and also higher costs of supplies (Figure A2.3 in the Annex). The former result is in line with theories of flight to quality[11], i.e. the preference of financial

[11] See Bernanke et al. (1996).

intermediaries to finance larger firms during economic downturns. And the latter finding is in line with the evolution of producer prices on the macro level in the same period.

Figure 11 – Labour cost adjustments by sectors (2010-2013, % of firms)



Note: Employment adjusted.
Source: WDN Survey (2014), NBS

4.3 WAGE ADJUSTMENTS

The comparison of alternative labour cost adjustment strategies in Figure 11 is broadly in accordance with the macro-level figures of employee compensations and employment. The increase of compensations in the sample were driven by base wages, while slightly more cuts occurred in flexible wage components. Looking at wage adjustments by firm size shows that large firms with more than 200 employees were more likely to increase wages and bonuses than their smaller competitors (Figure A2.4 in the Annex). This result is consistent with theories suggesting that large firms are more productive and thus pay higher wages.

Table 4 – Base wage flexibility: cuts, freezes and indexation rules

	Yes		No	
	Frequency	%	Frequency	%
Wages were cut	14	1.5%	564	97.6%
Wages were frozen	53	9.1%	530	90.9%
Indexation rules	398	67.1%	195	32.9%

Note: Employment adjusted.
Source: WDN Survey (2014), NBS

As mentioned above, base wage cuts were a rare adjustment strategy in the post-crisis period in Slovakia. Indeed, only 1.5% of enterprises cut base wages (Table 4). Another question went further to investigate the reasons preventing base wage cuts. The most frequent answers were the fear of losing the most productive employees, reduced employees efforts and negative impact on their morale. Interestingly, state regulations preventing base wage cuts were not as important as one would expect. Only 42.0% of firms rated it as a relevant or very relevant concern, compared to 81.7% in case of the fear of losing the most productive employees (see Table 5). Generally there was a consensus in the above concerns across sectors. A notable exception are financial services, where an above average share of respondents were concerned with all of the surveyed reasons for preventing wage cuts (last column of Table 5).

The above results are similar to findings from the first wave of the WDN survey in 2007. According to Du Caju et al. (2015), firms operating in Western Europe (EU-15) and Central and Eastern European countries (CEE) found it difficult to cut base wages for similar reasons as in Slovakia. Fears of worsening worker morale and loss of productive workers were also the most frequently mentioned reasons. In contrast to CEE, barriers to cutting wages due to regulations and collective agreements were found to be more important by firms in the EU-15. However union coverage and density in those countries are significantly higher than in CEE. As further noted by the authors, the link between downward wage rigidities and worker

morale is consistent with efficiency wage theories[12]. Those assume that higher wages stimulate the efforts of workers. Next, the fear of losing key staff can be explained by the turnover model[13], which connects higher wages to lower quit rates and lower expenditures on hiring and training.

Table 5 – Reasons preventing base wage cuts, % of firms rating them as relevant

	Total	Manufac-turing	Energy	Cons-truction	Trade	Business services	Financial services
Regulation, collective agr.	**42.0%**	47.8%	48.5%	28.1%	27.6%	45.3%	62.8%
Reduce employees' efforts	**76.2%**	78.3%	63.6%	81.1%	77.6%	73.7%	82.2%
Negative impact on morale	**79.3%**	87.5%	69.4%	79.1%	78.5%	74.5%	82.5%
Damage firm's reputation	**65.6%**	68.2%	51.2%	57.7%	63.3%	70.0%	79.6%
Loss of productive workers	**81.7%**	89.6%	80.6%	82.9%	77.4%	75.8%	83.6%
Fear of increased quits	**68.6%**	75.4%	71.7%	72.4%	54.4%	64.4%	78.0%

Note: Employment adjusted. Answers "relevant" or "very relevant" were considered.
Source: WDN Survey (2014), NBS

Apart from wage adjustments, the survey also contains information on wage rigidities. First, in contrast to wage cuts, a slightly larger portion of firms (9.1%) reported having frozen wages sometime during the surveyed period. Wage freezes are often used as a proxy for downward nominal wage rigidities (e.g. Babecký et al. 2012). Interestingly, almost all reported wage cuts (eleven out of fourteen) were performed in combination with wage freezes. This implies some limitations in the interpretability of wage freezes as downward wage rigidities in a very strict sense. Second, turning to real rigidities, base wages in Slovakia were quite frequently adapted to inflation. About 67% of respondents admitted reflecting on the developments of inflation when setting base wages. The presence of indexation rules is often treated as an indicator of downward real wage rigidity, e.g. in Babecký et al. (2012), who use and earlier wave of the WDN survey. However the authors rely on a narrower definition, namely the presence of a formal or automatic indexation rule. In other words, the our data is not fully comparable to theirs due to differences in the questionnaires.

4.4 WORKFORCE ADJUSTMENTS

According to Figure 11 above, adjustments in the number of permanent employees was the most frequent strategy. In a sectoral breakdown, cuts and increases are more or less evenly distributed, though with a marked exception of payroll reductions as the most frequent

[12] See Akerlof (1982) and Akerlof and Yellen (1990).
[13] See Stiglitz (1974) and Hashimoto and Yu (1980).

response in business services. A breakdown of the sample by firm size shows that close to half of the firms with more than 200 employees reduced their permanent employment, while only about 20% of the smallest firms with less than 20 workers did the same (Figure A2.4 in the Annex). This result is consistent with theories suggesting that large firms face lower hiring frictions, which allows them to lay off employees and eventually rehire them later at a lower cost compared to small firms.

Turning to more flexible margins of adjusting the labour input in Figure 11, there is little evidence that firms adjusted the number of temporary workers, agency workers or the working hours of employees extensively. This result is broadly based across firm size bins (Figure A2.4 in the Annex) and most sectors, except financial intermediation. This is because financial firms typically increased their workforce, both in terms of permanent employment and other, more flexible forms of the labour input. The above developments in the financial sector are consistent with macro-level quantitative data.

Table 6 – Typical measures used to reduce labour input, % of firms

	Total	Manufac-turing	Energy	Cons-truction	Trade	Business services	Financial services
Firms in need to reduce their labour input	**189**	45	2	14	31	93	4
% of the sector	**30.4%**	23.6%	11.7%	26.3%	24.4%	45.7%	16.7%
Measures used (% of firms in need to cut labour):							
Individual layoffs	**97.1%**	94.3%	100%	100%	96.8%	97.4%	100%
Collective layoffs	**43.1%**	32.0%	23.5%	20.5%	50.3%	57.7%	0.0%
Temporary layoffs	**21.3%**	28.5%	0%	60.5%	31.1%	6%	9.0%
Subsidized reduction of working hours	**14.2%**	30.8%	0%	4.1%	25.2%	7.3%	0.0%
Non-subsidized reduction of working hours	**35.2%**	16.3%	26.5%	4.1%	47.0%	53.8%	0.0%
Non-renewal of temporary contracts at expiration	**53.4%**	74.3%	76.5%	64.0%	52.4%	35.3%	92.5%
Early retirement schemes	**35.3%**	58.8%	76.5%	13.0%	31.2%	28.1%	5.2%
Freeze or reduction of new hires	**93.3%**	91.9%	100%	92.4%	83.9%	95.7%	100%
Reduction of agency workers and others	**29.7%**	52.7%	47.0%	23.5%	66.1%	5.7%	95.2%

Note: Employment adjusted. Answers other than "not used at all" were considered.
Source: WDN Survey (2014), NBS

The relevance of various measures reducing the labour input is assessed in Table 6. We can differentiate between adjustments in headcount (external flexibility) or working hours (internal flexibility[14]). In the post-crisis period, about 30% of Slovak firms reported the need to reduce their labour input. Individual layoffs, freezes or reduction of new hires were the most important, if the labour input had to be reduced. Almost all firms reported that individual layoffs were at least marginally important, while close to half of them marked them as very important. Non-renewal of temporary contracts at expiration and collective layoffs are next in the relevance ranking. In contrast, subsidized or non-subsidized reduction of working hours and temporary layoffs were the least relevant cost-cutting strategies. Namely, less than a quarter of respondents rated the latter strategies as at least marginally important.

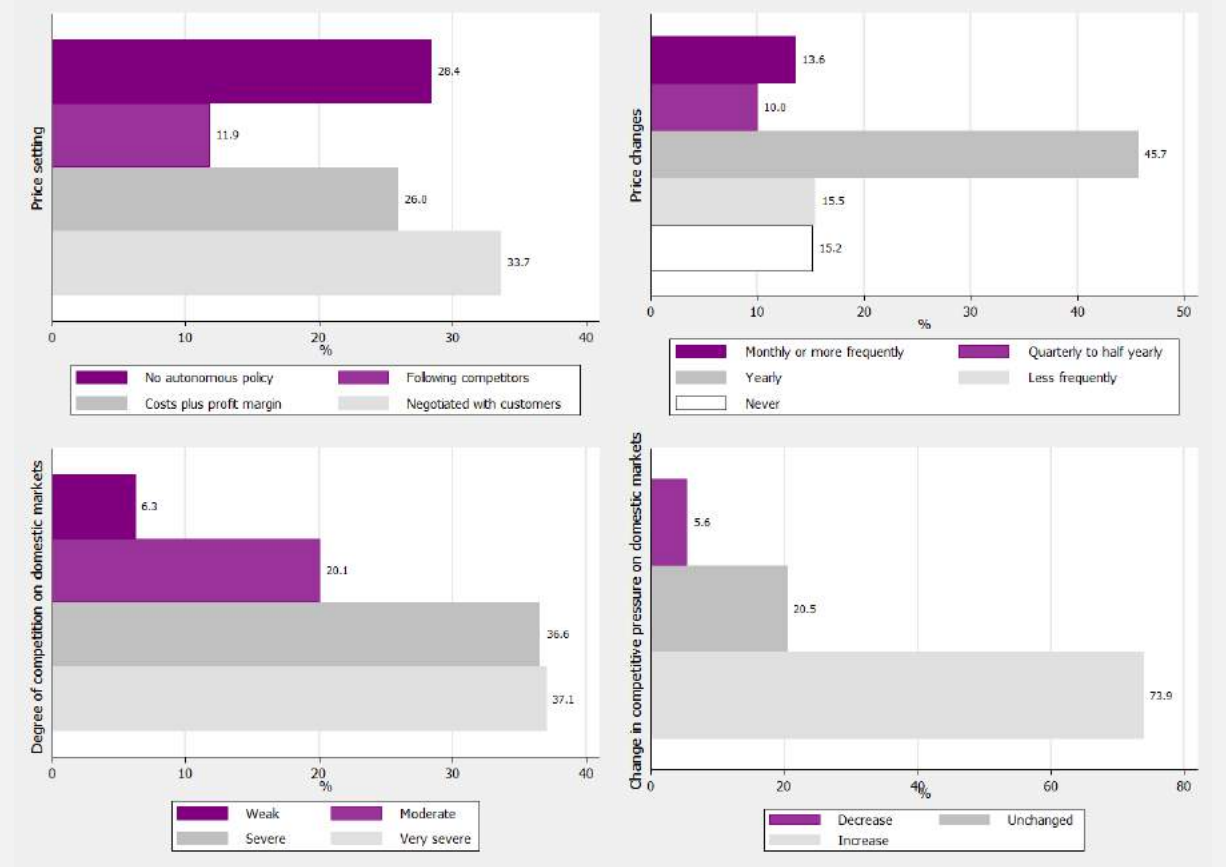
4.5 PRICE ADJUSTMENTS

This subsection describes price-setting policies, price change frequencies and the development of competitive pressures according to the survey. First, Figure 12 shows that about a quarter of respondents reported having no autonomous price-setting policies in place. This answer was relatively more frequent among the largest firms and in the financial and energy sectors (Figures A2.5 and A2.6 in the Annex). This may be due to the specific character of financial products or the presence of regulated energy prices. The typical firm in the sample tends to negotiate its prices with individual customers. This suggests the dominance of industries with differentiated products, specialized customers and the possibility of monopolistic mark-ups. Just a quarter of respondents sets prices to costs augmented by a fixed margin. Finally, a small minority of firms simply adjusts prices according to competitors.

Second, regarding the frequency of price changes, almost half of the sample updates prices on an annual basis. This roughly corresponds to the sample frequency of changing base wages. However, the fraction of firms that change prices more often than yearly (about a quarter of the sample) is much larger than the share of respondents reporting base wage changes more than once a year (only 3% of firms, see Figure A2.8 in the Annex). This result is in line with previous findings in the literature that nominal wages are more rigid than prices. Third, almost three quarters of the sample encountered severe competitive pressures on domestic markets, which even intensified during the recovery years. The situation with competition on foreign markets was much the same (Figure A2.7 in the Annex). In a firm size breakdown, the pressures were slightly less tight for the largest firms with more than 200 employees compared to smaller firms. While the highest degree of competition is reported in the construction and trade sectors (Figures A2.5 and A2.6 in the Annex).

[14] The terms external and internal flexibility follow Atkinson (1984).

Figure 12 – Price setting and competition on domestic markets (2010-2013, % of firms)



Note: Employment adjusted.
Source: WDN Survey (2014), NBS

5. DETERMINANTS OF LABOUR COST ADJUSTMENTS

In this section we compare the relative importance of external shocks, wage rigidities and different firm-level characteristics for the choice of margins to adjust labour costs. In particular, we examine firms' decisions to cut base wages, bonuses, the number of workers and hours worked as a set of binary response models. This means, the base and flexible components of adjusting compensations and labour input are distinguished. By estimating an econometric model we can, for example, contrast the effects of a demand drop and scarcer external finance on firm-level choices of labour cost adjustment channels. Next, we can test whether limitations to wage flexibility, e.g. collective agreements or inflation indexation rules, avoid wage cuts, lead to short time work or layoffs. Firm-level characteristics, such as foreign ownership, exporting status or firm size may proxy for lower adjustment costs

related to hiring and firing. Hence we can ask, whether those special groups of firms benefit from more wage flexibility and find it easier to terminate work contracts. In the remainder of this section we first describe the list of indicators included in the model. Second, we discuss the main estimation issues and finally the key findings are summarized.

First, the model is composed of three groups of regressors common to all adjustment channel equations. The group of firm-level characteristics contains a binary indicator of foreign ownership, exporting status (assumed if more than 20% of sales come from abroad), two firm size dummies for medium (50-199 employees) and large firms (more than 200 employees), binary indicators of prevailing workforce type according to skills and collar, and finally the percentage of employees earning the minimum wage. The second group is associated with external shocks, of which we included decreases in demand, availability of external finance and customers' ability to pay. The third group of explanatory variables are related to wage rigidities. We considered the existence of collective agreements signed on the firm- or higher level. Further, indicators of downward nominal wage rigidities (wage freezes) and real wage rigidities (inflation indexation rules) are added. We also test whether price flexibility, approximated by the frequency of price changes, helps avoid labour cost cuts, or on the contrary it forces firms to adjust labour costs. Finally, all equations contain constant terms and sector-specific fixed effects.

Second, our setup requires addressing the following estimation issues: the four response variables are binary, mutually non-exclusive and potentially correlated with each other. According to Greene (2012), the most suitable approach in this case is the multivariate probit (MP) model[15], where all equations are estimated jointly. The MP is built on multiple latent variables, each of them observed with the value of one, if the latent variable is greater than zero. In case of a MP, the probability distribution driving positive outcomes of the latent response variables is multivariate normal. This feature of the MP allows the latent variables, as well as their binary observations, to be correlated with each other. The model is estimated by simulated maximum likelihood and robust standard errors can also be computed. We use employment weights in the effort to obtain representative results.

[15] In case of continuous response variables the MP has an analogy to the seemingly unrelated regressions (SUR) model.

Table 7 –Determinants of labour cost adjustment channels, multivariate probit estimates

Cuts in:	Base wages	Bonuses	Number of workers	Hours worked
Firm-level characteristics:				
Foreign ownership	-0.485	0.044	0.505**	0.246
Exporting status	-0.188	0.197	-0.023	0.469*
Medium-sized firm (50-199 empl.)	0.808***	0.856***	0.313*	0.102
Large firm (>200 empl.)	0.465	1.369***	0.420*	0.109
Prevalence of HS BC workers	-0.501*	-0.234	0.040	0.004
LS WC workers	-0.029	-1.154**	-0.758**	0.093
HS WC workers	0.469	0.387	0.125	-0.555
LS BC (baseline)				
% of minimum wage earners	0.009*	0.018***	0.007*	-0.001
External shocks (decrease in):				
Demand	1.203***	1.090***	0.920***	1.402***
Availability of external finance	0.592**	0.444	0.260	0.400
Customers' ability to pay	0.135	-0.054	-0.026	0.148
Wage rigidity factors:				
Firm-level collective agreement	-0.971***	0.010	0.306	-0.048
Higher-level collective agreement	0.212	-0.272	0.982***	1.452***
Wage freezes	0.004	0.421	0.212	1.252***
Inflation indexation rules	0.169	-0.384**	0.427**	0.890***
Frequency of price changes	0.331	0.412**	0.034	-0.110
Number of observations:	601	601	601	601

*Note: *,**,*** denote significance levels at 10%, 5% and 1% based on robust standard errors. Constants and sectoral dummies were included. HS BC – LS BC stand for high/low skilled white/blue collar workers respectively. LS BC workers are the baseline case. Average marginal effects are reported. Employment adjusted estimates (see Annex A3 for details on employment weights).*

Source: authors' calculations

Third, estimates of the four labour cost adjustment equations are reported in Table 7. Among firm-level characteristics approximating higher productivity and lower adjustment costs, firm size plays a key role. A medium to large firm size is positively associated with all cost-cutting channels, except hours worked. This implies fewer barriers for larger firms to adjust labour costs. From the policy point of view this may suggest that stricter employer regulations can hurt smaller firms disproportionately more. Turning to foreign-owned and

exporting firms, the former are more likely to sack workers while the latter decrease hours worked with a higher probability, other things equal[16].

According to our results, firms' labour cost adjustment practices differ for some worker types. Low-skilled white collar[17] workers are less prone to get fired and their bonuses are cut more rarely compared to the baseline case of low-skilled blue collar workers. Similarly, base wages of high-skilled blue collar workers are cut with the lowest probability compared to the rest. Turning to firms employing a higher share of workers earning the minimum wage, we found an increased probability of all cost cutting channels, except hours worked. This outcome is somewhat counterintuitive for base wage cuts, but is in line with our expectations for flexible wage components. In case of the higher probability of firing, the result suggests minor rehiring costs for the typically low-skilled minimum wage earners.

Further, considering the impact of external shocks on the probability of labour cost adjustment, demand shocks stand out clearly. Their dominance is broadly based across all adjustment channels and holds also in terms of impact size. At the same time, the presence of a financial shock matters only to base wage cuts and its effect is about half of the demand shock's effect.

Looking at wage rigidity factors, only collective agreements signed at the firm level seem to prevent base wage cuts. Other factors, as higher-level agreements, wage freezes or inflation indexation rules do not limit wage adjustments significantly. However, those factors tend to induce firing and cuts in hours worked. Finally, a higher frequency of price changes is positively associated with cutting base wages and bonuses, while the effect is statistically significant only for the latter channel. This suggests that firms use bonuses as a buffer for price volatility on product markets.

[16] Both foreign-owned and exporting firms are less likely to cut base wages, though the associated coefficients are not statistically significant.

[17] High-skilled white collar: managers, professionals, technicians, associate professionals (ISCO 1-3)
Low-skilled white collar: clerical support, service and sales workers (ISCO 4-5)
High-skilled blue collar: craft workers, machine operators, assemblers (ISCO 7-8)
Low-skilled blue collar: elementary occupations, e.g. labourers in various sectors (ISCO 9)

6. CONCLUSION

The main findings of the WDN survey in Slovakia were broadly in line with macroeconomic data. This concerns the uneven recovery of demand across sectors, stagnation of employment and increase of wages. Considering prices, increased competitive pressures following the demand shock led to a weak recovery of selling prices, despite rising costs of finance and supplies.

The detailed qualitative information in the survey dataset allows us to make further insights into the labour adjustment processes following the crisis. First, the coverage of Slovak workers by collective agreements is at a medium to low level compared to the rest of Europe and such agreements are more concentrated among large firms. Second, the application of inflation indexation rules in wage setting, often referred to as real wage rigidities, is quite widespread in Slovakia. Although, the most important factor preventing wage cuts is the fear of losing the most productive workers and worsening worker morale. Third, most of the labour cost adjustments, centred around layoffs, took place at large firms. These are typically more productive, pay higher wages and face lower costs of adjusting their labour input.

Estimates from our econometric model highlight the importance of demand shocks in explaining labour cost adjustments. Further, the estimates confirm the role of collective agreements and wage rigidities in forcing firms to downsize their labour inputs instead of cutting worker compensations. Finally, the model provides evidence that large and foreign owned firms face fewer barriers to adjusting their labour costs.

To sum up the main findings, the presence of unions, downward wage rigidities and the leading role of large firms seem to be the main explanation for the joblesss recovery in Slovakia following the crisis.

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ANNEX

A1. SELECTED MACRO-LEVEL STATISTICS OF SLOVAKIA

Table A1.1 describes the sectoral composition of Slovak output and employment. Further, the table shows an increased concentration of inward FDI stocks in the financial sector and industry relative to the distribution of employment or output. According to Table A1.2, the Slovak economy is very open to international trade, as exports or imports amount to more than 80% of GDP. The territorial structure of Slovak trade is focused at EU28 countries and the majority of trade is classified as machinery, equipment or intermediate products.

Table A1.1 - Sectoral composition of the economy in 2012

	NACE 2	Gross value added	Employment	FDI stock
Agriculture	A	4%	4%	0%
Manufacturing	C	25%	27%	36%
Other industry	B,D,E	6%	3%	17%
Construction	F	11%	10%	1%
Trade, transport, accomod.	G,H,I	25%	35%	10%
Non-financial services	J,L,M,N,S	24%	19%	11%
Financial services	K	5%	2%	24%

Source: Eurostat (ESA 2010, current prices) and NBS (FDI).

Table A1.2 – Structure of Slovak foreign trade in 2012

Territorial structure of exports	
EU28	**84%**
Germany	21%
Czech Republic	14%
Poland	8%
Hungary	7%
Austria	7%
France	5%
Italy	5%
Other EU28	17%
Extra-EU28	**16%**
Russia	4%
China	2%
USA	2%
Other	8%

Trade openness of the economy	
Export to GDP	86%
Import to GDP	81%

Commodity structure of trade

	share in:	
BEC categories	exports	imports
Final consumption	12%	22%
Raw materials	7%	15%
Intermediate products	24%	24%
Machinery, equipment	57%	38%

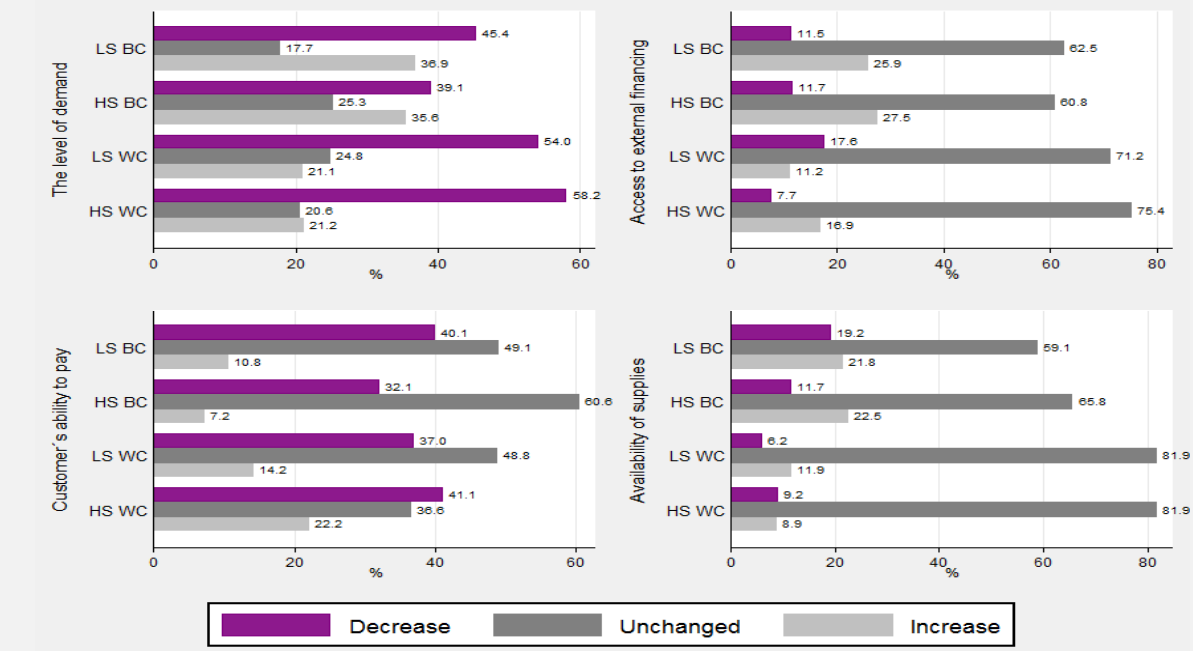
Source: Statistical Office of the Slovak Republic and NBS.

A2. ADDITIONAL FIGURES FROM THE SURVEY DATASET

Figure A2.1 – Changes in the economic environment by firm size, % of firms

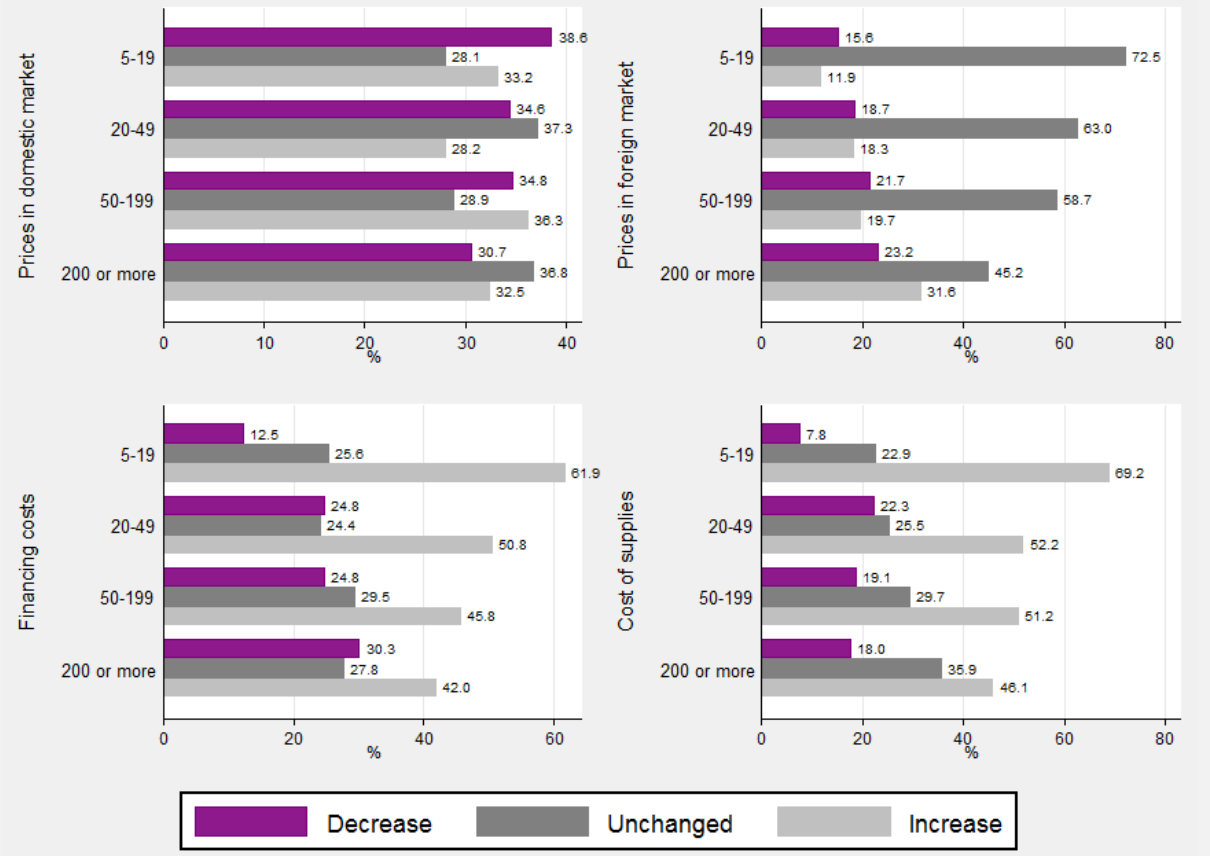
Note: Employment adjusted.
Source: WDN Survey (2014), NBS, surveyed period: 2010-2013

Figure A2.2 – Changes in the economic environment by workforce types, % of firms



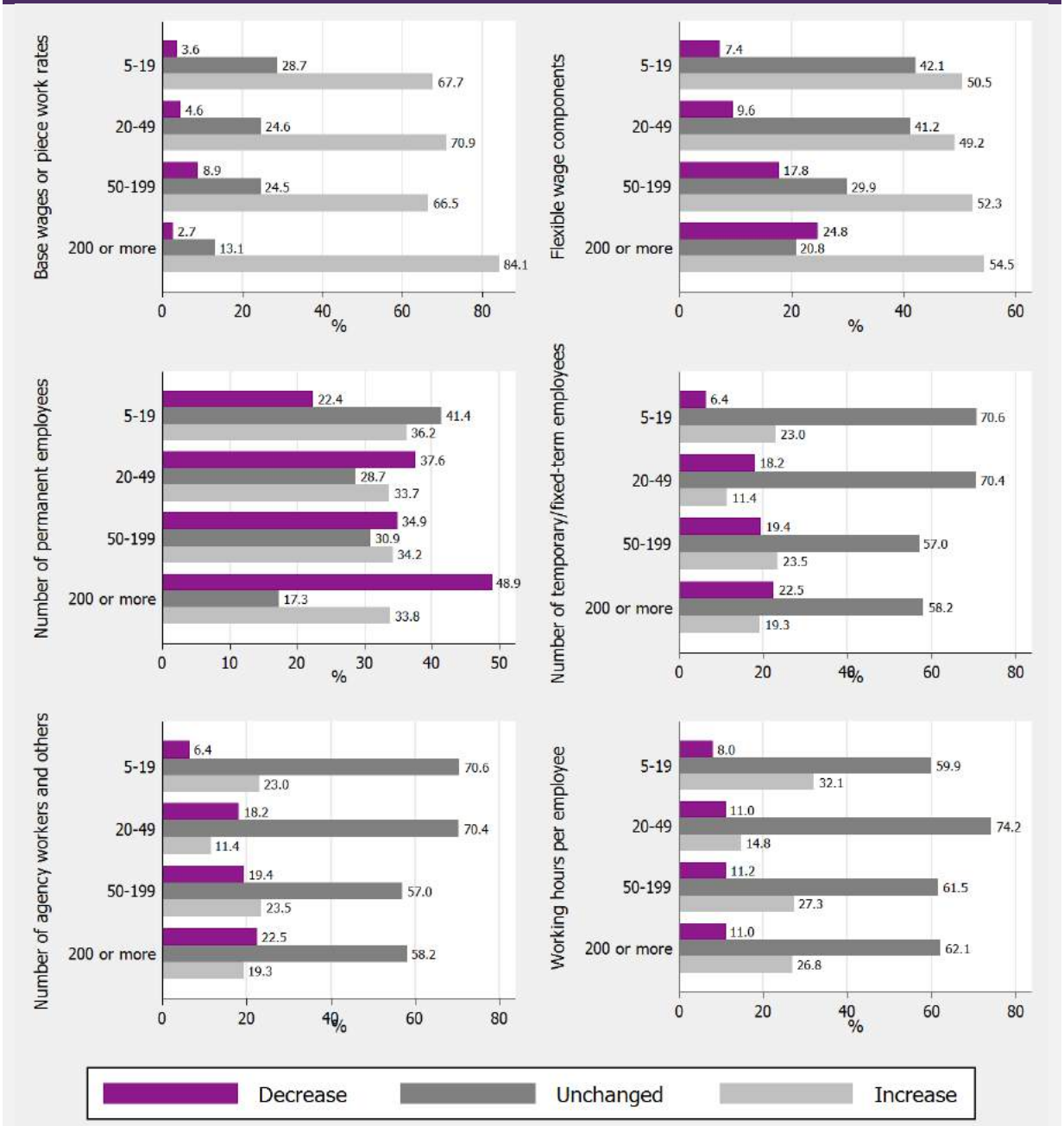
Note: LS BC – low-skilled blue collar, HS BC – high-skilled blue collar, LS WC – low-skilled white collar, HS WC – high-skilled white collar. Employment adjusted.
Source: WDN Survey (2014), NBS, surveyed period: 2010-2013

Figure A2.3 – Changes in prices and costs by firm size (2010-2013, % of firms)



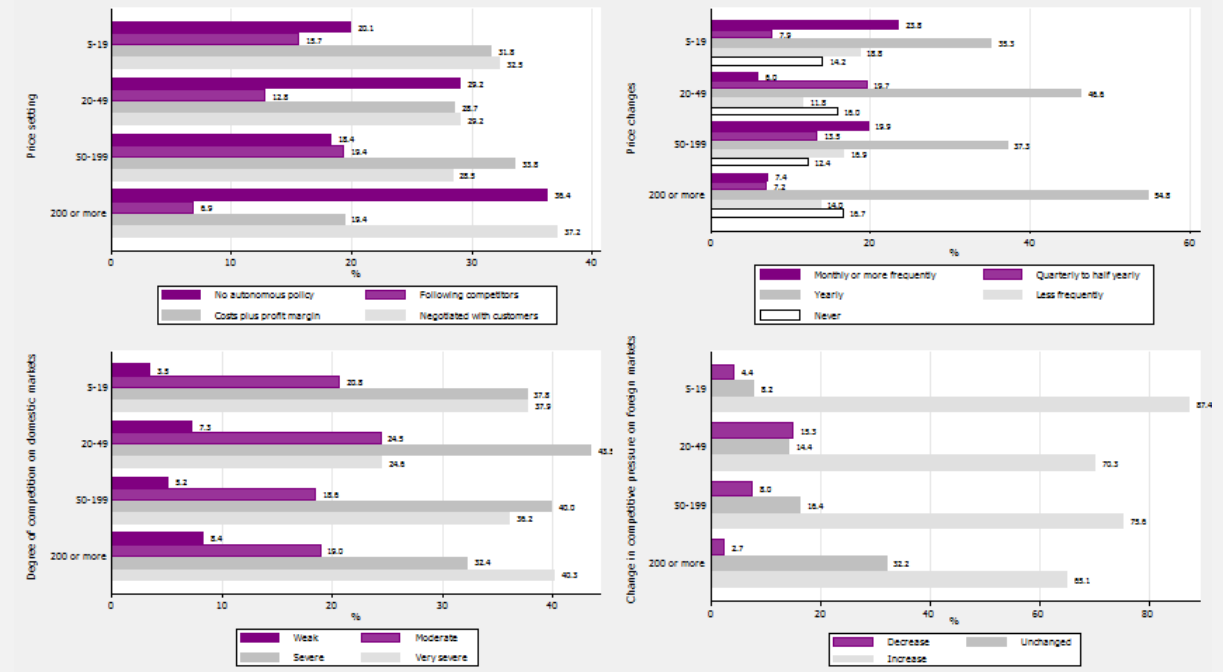
Note: Firm size by number of employees. Employment adjusted.
Source: WDN Survey (2014), NBS

Figure A2.4 – Labour cost adjustments by firm size (2010-2013, % of firms)



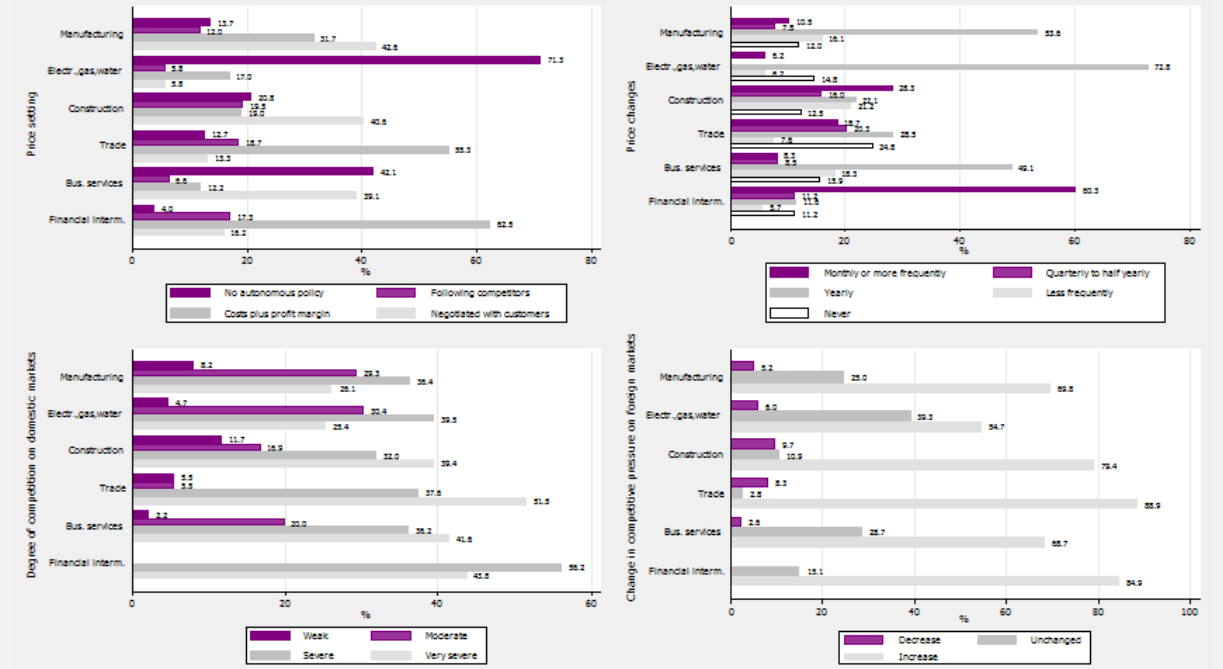
Note: Firm size by number of employees. Employment adjusted.
Source: WDN Survey (2014), NBS

Figure A2.5 – Price setting and competition on domestic markets by firm size (2010-2013, % of firms)



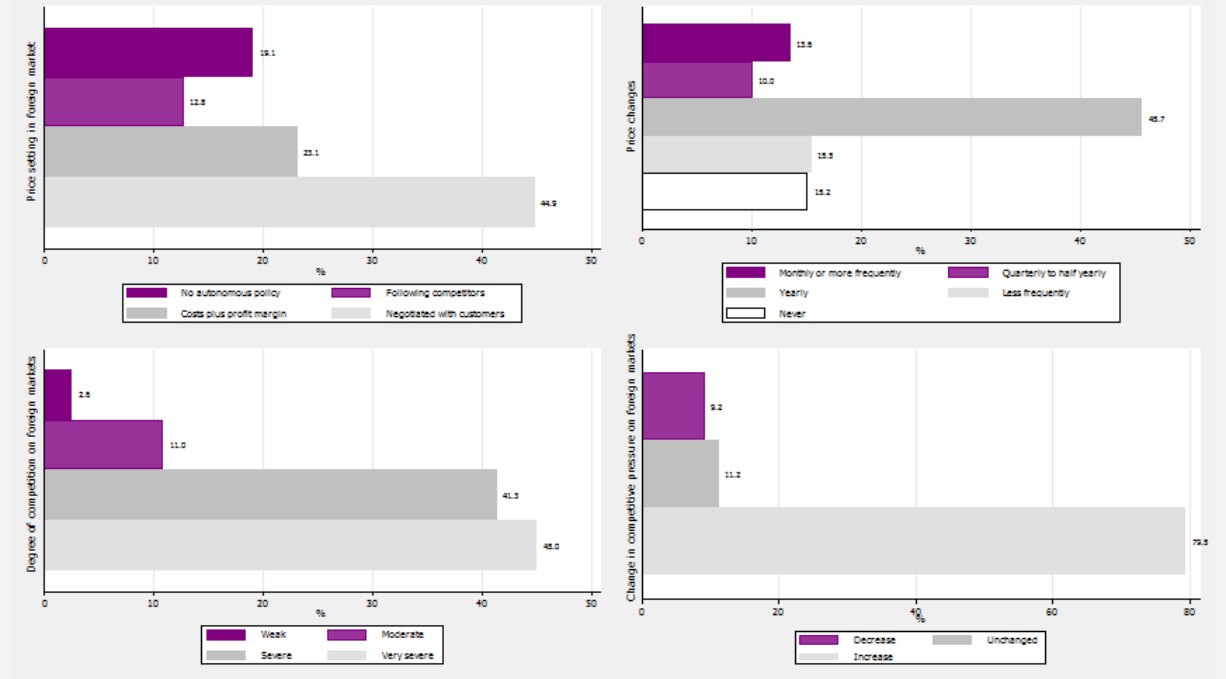
Note: Firm size by number of employees. Employment adjusted.
Source: WDN Survey (2014), NBS

Figure A2.6 – Price setting and competition on domestic markets by sectors (2010-2013, % of firms)



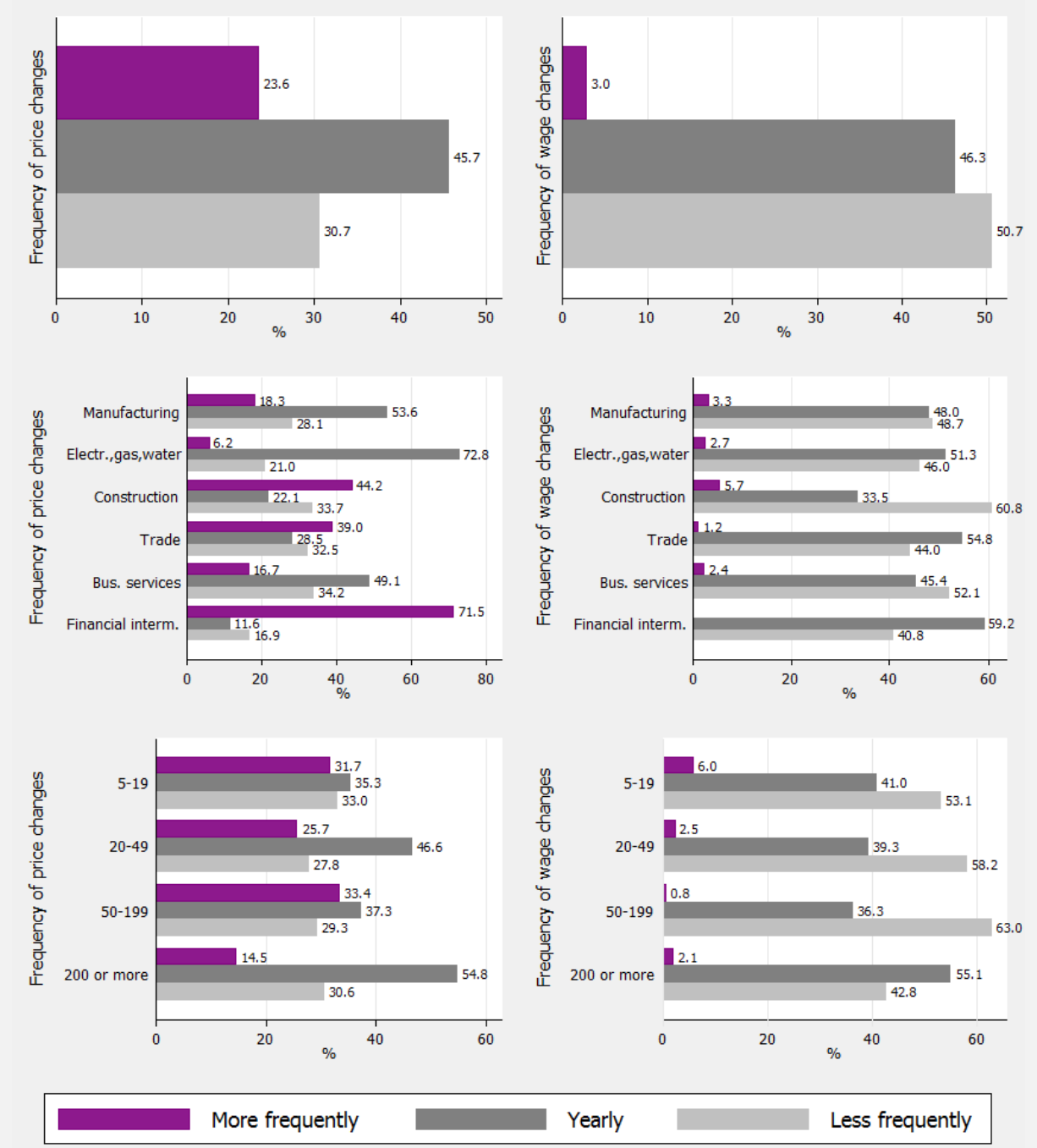
Note: Employment adjusted.
Source: WDN Survey (2014), NBS

Figure A2.7 – Price setting and competition on foreign markets (2010-2013, % of firms)



Note: Employment adjusted.
Source: WDN Survey (2014), NBS

Figure A2.8 – Frequency of price and base wage changes (2010-2013, % of firms)



Note: Employment adjusted.
Source: WDN Survey (2014), NBS

Figure A2.9 – Availability of credit by sectors and firm size (2010-2013, % of firms)

Note: Employment adjusted.
Source: WDN Survey (2014), NBS

A3. EMPLOYMENT ADJUSTED WEIGHTS

All results based on the survey dataset in this paper are adjusted by employment weights. The aim of such weighting is to ensure that the results represent employees in the population, correct for non-response and account for the unequal probability of receiving a survey invitation. Below we describe the way employment weights are computed.

Suppose a population of *N* firms registered in Slovakia, which belong to the surveyed sectors and have more than 5 employees. Out of those, the National Bank of Slovakia invited a potential sample of n^* = 7999 firms to participate in the survey. This set of firms was selected by stratified sampling techniques, which divided the population into *H* mutually exlcusive and exhaustive groups based on firms size and sectors (see section 4.1 for the details). The list of firms to be contacted is obtained by random draws from each stratum *h* of the total of *H*. As some of the firms decided not to participate in the survey, the realised sample ended up with *n* = 621 responding firms.

Employment weights w_l have three components, which take into account the unequal probability of receiving a questionnaire, w_1, correct for non-response, w_2, and adjust for differences of the population workforce represented by different strata w_3:

$$w_l = w_1 w_2 w_3$$

The three components of w_l are constant for each stratum *h* and are computed as follows:

$$w_1 = \left(N_h / n_h^* \right)$$

$$w_2 = \left(n_h^* / n_h \right)$$

$$w_3 = \left(L_h / N_h \right)$$

Yielding the final formula for w_l as:

$$w_l = \left(L_h / n_h \right)$$

Where L_h is the total number of employees in population stratum *h* obtained from aggregate statistics and n_h is the number of respondents in the realized sample of stratum *h*.