

MAGYAR NEMZETI BANK

SHOCKS AND LABOUR MARKET ADJUSTMENT IN HUNGARY:
EVIDENCE FROM WDN DATA

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2016

Shocks and labour market adjustment in Hungary: Evidence from WDN data*

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Abstract

This paper presents descriptive evidence on the shocks that hit Hungarian firms between 2010 and 2013 and their labour market responses. We use the results of an international survey on Hungary. The survey was co-ordinated by the Wage Dynamics Network and it was administered in 24 European countries in 2014. The results show that Hungarian firms were affected mainly by the decline of demand, followed by financial shocks. The demand shock came primarily from the domestic market. The shocks were heterogenous by size and sector and were related to pre-2010 performance of firms. At the same time, most firms also experienced an increase of costs. Labour market responses were moderate both in terms of adjusting labour input and of adjusting wages, but were related to the shocks. Labour input was changed mainly on the extensive margin. Wage setting changed significantly, while the results on wage rigidity are controversial.

*We thank Álmos Telegdy for his useful comments. All remaining errors are our responsibility.

†The views expressed are those of the authors' and do not necessarily reflect the official view of the Magyar Nemzeti Bank (the central bank of Hungary).

1 Introduction

The recent financial crisis had a significant negative impact on the economy. However, this negative effect might mask substantial heterogeneity in the corporate sector as some firms managed to thrive despite the difficult circumstances. Understanding this heterogeneity might help policymakers to design better policies.

This paper examines the adjustment of Hungarian firms during the second phase of the crisis (2010-2013) with a focus on the labor market. We use a unique firm-level survey of the ECB working group Wage Dynamics Network (WDN). The questionnaire was harmonized across the 24 participating countries of the European Union. The survey focuses on how the recent crisis affected the corporate sector, why the labour market continues to be slack and how various institutional characteristics of the labour market might influence the labour market outcomes. The data contains information on a wide set of firm-level characteristics ranging from wage setting behavior to pricing decisions and to access to finance that are not necessarily available from domestic administrative databases.

We find, in line with aggregate statistics, that Hungarian firms were negatively affected by the crisis between 2010 and 2013. The primary shock was change of demand, mainly in the domestic market. Different types of shocks were highly correlated, i.e. if a firm endured one type of shock it was likely that other types also affected its activity. The shocks were also related to several firm-level characteristics, since firms in construction and financial intermediation, as well as smaller firms and those whose profitability was lower before the crisis were hit more negatively than others. Intensive competition and employing more workers at the minimum wage were also associated with a higher probability of negative shocks.

Half of the firms were credit constrained, either in terms of access to finance or in terms of strict credit conditions, and it was especially common for small firms and construction firms. We find that being credit constrained is associated with higher leverage, less profitability and less productivity, even before 2010.

Labour market responses to the shocks, including both adjustment of the labour input and wage adjustment, were moderate. 16 per cent of firms needed to decrease their labour input between 2010 and 2013, and most firms adjusted on the extensive margin by dismissing workers, non-renewal of temporary employment or freezing new hiring. Although we observed significant adjustment on the intensive margin on the macro level, the survey did not point to cyclical reasons behind it. The need to adjust labour input was related to shocks, in particular

to demand shocks, as well as to some firm characteristics. For example, lower export share, lower profitability and lower firm age were associated with a higher probability of labour adjustment. Hiring difficulties were also linked to the shocks, while we found no evidence that the slack labour market conditions made hiring easier. Survey respondents mentioned several structural problems that hinder hiring: uncertainty of economic conditions, high payroll taxes and high wages were the most frequent ones.

The ratio of firms cutting wages was small, while results on wage freezing were controversial. Although the share of firms reporting a wage freeze was low, several firms did not change base wages between 2010 and 2013. Wage setting, however, changed significantly as most firms set wages less frequently than before and/or linked to the economic conditions. Based on the survey results it is impossible to decide if this change is due to adjustment to shocks or to the lower inflation. Our results are in line with previous ones on the low importance of the wages of new entrants as an adjustment channel.

We find that labour market policies affected firms significantly in the period examined. Although the minimum wage increase in 2012 did not affect the average share of workers paid at the minimum wage (which remained at 31 per cent), firms mainly responded to the policy by increasing productivity and increasing prices. A lower ratio, 18 per cent of firms needed to lay off employees, however, it is significantly higher than the reaction to a hypothetical pre-crisis raise (Kézdi and Kónya, 2012), pointing to potential differences in the effect of minimum wage changes in different stages of the business cycle. The survey provides a picture on firms' perceptions on, among others, labour market interventions. In Hungary, several labour market measures took place between 2010 and 2013. The survey results reflect that positive effects of these measures could have been used primarily by firms that were positively affected by the shocks of the economic environment. Firms that were hit negatively, however, reported with a higher probability that labour market interventions influenced them negatively.

The paper relates to the literature on nominal wage rigidity. Studies using Hungarian data document significant wage reigidity. Kézdi and Kónya (2012) use the first wave of WDN survey data with reference period of 2006 and document wage setting behavior in Hungary compared to Central European countries and the euro area countries. They find significant nominal wage rigidity and conclude that though wage rigidity is not binding, it may become an important constraint for nominal wage adjustment if productivity growth and inflation decline. Kátay (2011) estimates downward real and nominal wage rigidity

using administrative data between 2000 and 2004. He finds significant nominal wage rigidity, while evidence on real wage rigidity is less convincing. Previous research on labor market institutions indicate that Hungary has flexible institutions, however, observed labor market outcomes do not reflect this. For important references, see [Horváth and Szalai \(2008\)](#).

The recent literature on the crisis emphasizes the heterogeneity in firm responses. A multi-country firm-level survey conducted during the crisis shows that firms' responses to the crisis were heterogeneous ([Békés et al., 2011](#)). The report finds important linkages between firms' financial constraints and the size of adjustment they needed to make. The second wave of the WDN, in which Hungary did not participate, aimed at examining shocks and adjustment of firms in the first phase of the crisis ([Fabiani et al., 2015](#)). The results also point to significant heterogeneity by the type of shocks experienced and the institutional background of firms.

The structure of the paper is as follows. The next section gives a brief overview on the Hungarian macroeconomic environment, how the economy evolved during this period and what were the important policy measures that might have potentially influenced the behavior of firms. Section 3 describes the WDN data. Section 4 presents the results. First, we document the nature and distribution of shocks. Then we examine the ways of adjusting labour input (Section 4.2). Section 4.3 is on changes of wage setting and wage dynamics, while section 4.4 is on obstacles to hiring a new employee. Section 4.5 deals with answers on main labour market measures between 2010 and 2013. The last section concludes.

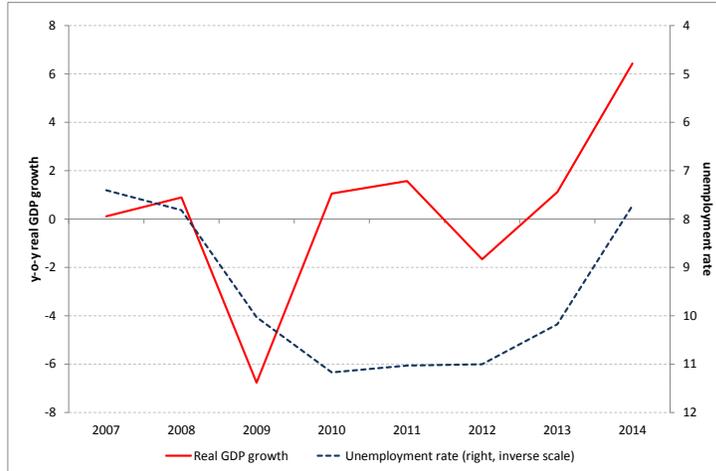
2 Macroeconomic and labour market performance during the crisis

The financial crisis hit Hungary in the 3rd quarter of 2008. The economy was already characterised by a slowdown of GDP-growth and several other structural problems including high indebtedness of domestic sectors (predominantly in foreign currency), low labour force participation and high tax wedge.

GDP declined by 6.6 per cent in 2009, having a second dip in 2012, and reaching its pre-crisis level only in 2014 (Figure 1). The recovery has been led primarily by exports while domestic demand also picked up since mid-2013. Inflation was well above the inflation target of 3 per cent before the crisis, after which it moderated, however, due to indirect tax increases and depreciating exchange rate it remained above the target of 3 per cent until 2013 (Figure

2).

Figure 1: GDP growth and unemployment rate



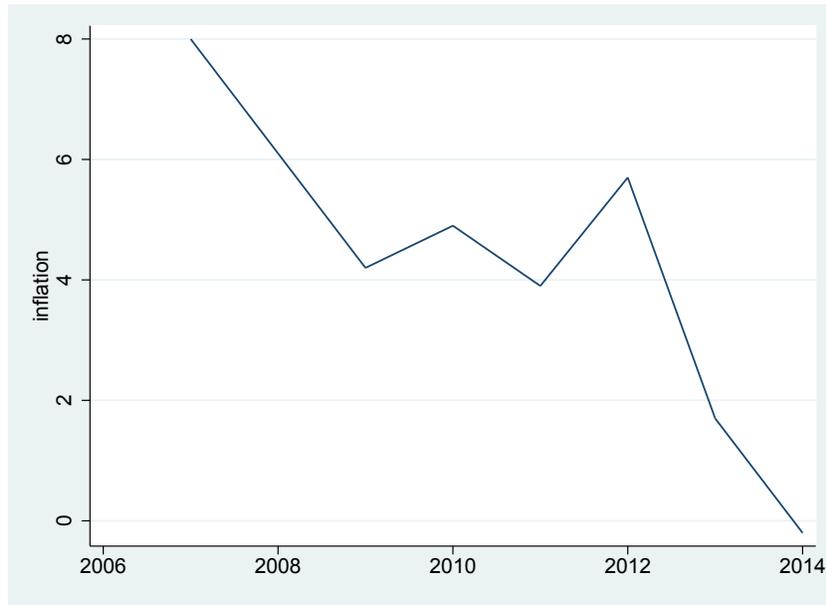
Source: HCSO, LFS

Beside credit demand, the crisis might have also affected banks' credit supply. Since foreign currency lending was prevalent the depreciating exchange rate had a significant negative effect on the quality of the banks' portfolio. Moreover, increasing tax burden of the banking sector and the Eurozone sovereign crisis might have also lowered their credit supply.

Unemployment increased considerably during the crisis (Figure 1) as labour demand declined while labour supply increased. Peak-to-trough (from 2007Q3 until 2009Q4) decline of total economy employment was 4.7 per cent compared to a 8.5 per cent decline in GDP, and total economy employment returned to its pre-crisis level sooner than output ((Figure 3)). Following the trough, the public-private composition of employment changed markedly as the government increased the volume of public employment programs to mitigate the effect of the declining private sector labour demand (see Section 2.2). The labour supply increased due to government policies despite increasing emigration.

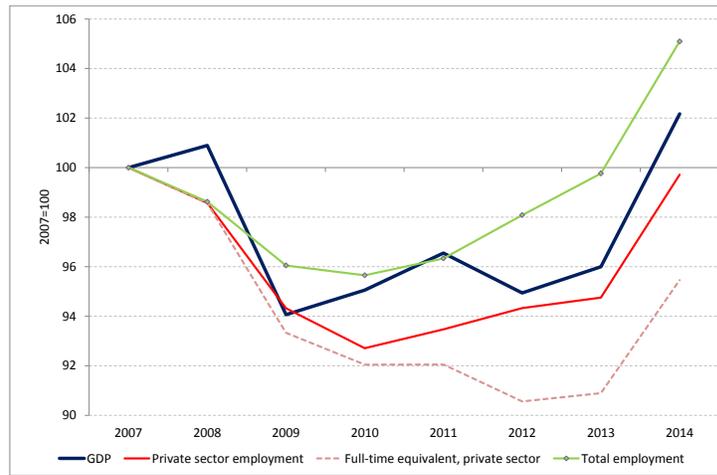
Wage dynamics (see Figure 4) were influenced by both slack labour market conditions and government measures. Policies decreasing the tax wedge contributed to decreasing dynamics despite measures to mitigate the negative effect of flat tax rate for low-income employees. As a result of these developments and the differences between consumers' and producers' price

Figure 2: Inflation



Source: MNB

Figure 3: Evolution of GDP, total and private economy employment, and full-time equivalent

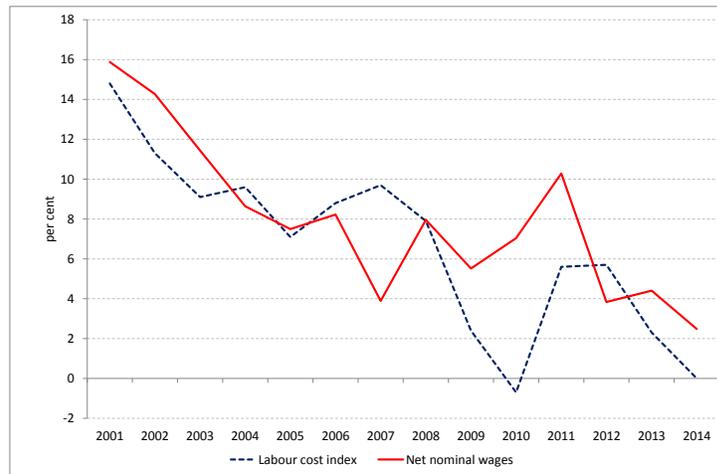


Source: HCSO, LFS

inflation, greater adjustment was observed in employers' labour costs than in average wages received by employees.

Wage adjustment seems to be more significant than adjustment of employment at the aggregate-level. According to the estimates of Gál et al. (2013) using data on OECD countries, output elasticity of earnings per worker was largest in Hungary by 2010, while employment declined only modestly. An EU-comparison of changes of compensation per employee and employment also suggests that labour costs declined to a larger degree than employment until 2010, however, between 2010 and 2013, labour costs increased while private sector employment remained unchanged.

Figure 4: Growth of labour costs and net wages



Source: Eurostat, HCSO

2.1 Main institutional characteristics of the labour markets

The Hungarian labour market institutions are considered flexible. In OECD comparison, employment protection legislation (measured by EPL index of OECD) is one of the least strict ones in Europe, other labour market characteristics (e.g. trade union density, replacement rate) also point to a flexible institutional setup. Policy changes since the start of the crisis further increased the flexibility of the labour market (MNB, 2014).

Minimum wages constitute the only significant formal institutional constraint for Hungarian firms in wage setting. The minimum hourly and monthly wage is set annually by statute. In the last decade the Kaitz index (ratio of minimum wage to median wage) has been higher than OECD average. Share of minimum wage earners is also relatively high in international comparison. This may, however, reflect wage underreporting (Elek et al., 2012).

Wages in Hungary are determined mainly at the individual-level. Firm-level bargaining also exists while collective agreements outside the firm (e.g. at industry-level) are rare. Trade union density is low and trade unions are relatively weak (Rigó, 2012). Collective agreements are signed between the company and firm-level trade unions and cover all employees at the company, however a third of firm-level collective agreements do not include regulation on wages (Neumann, 2002).

Hungary was characterised by high tax wedge (the difference between the labour cost to the employer and the net wage of employees), due to both high personal income tax rates and high employees' contribution (Horváth and Szalai, 2008). Tax wedge declined since the start of the crisis, as both average personal income tax declined and social security contribution decreased. Nevertheless, average tax wedge is still well above EU average.

2.2 Labour market policies since the start of the crisis

Several labour market measures have been implemented since the start of the crisis, aiming at increasing labour demand, increasing labour supply and changing employment protection.

2.2.1 Measures to influence labour demand

Government measures initially aimed at keeping employment as high as possible and curbing unemployment, similarly to other Central and Eastern European countries (Elek and Scharle, 2011). Measures focusing on the employment of workers despite the decline of demand included a decrease of employers' social security contribution¹ and wage compensation for short term work or training.² *Back to work programme* supported hiring of employees who were laid off from another company.

¹In 2009, the employers' social security contribution rate decreased by 5 percentage points below wage twice the minimum wage. The reduction was extended to all wage levels in 2010 and lump-sum health contribution was abolished. First job guarantee program provided significant reduction of employers' contribution for employing unemployed carrier starters from 2012.

²In 2010, two programs were initiated by the National Employment Non-profit Public Company Ltd. for a maximum of 12 months.

Table 1: Measures affecting the labour market since 2009

Aim of measure	Measures and their timing
Measures to increase labour demand	Public employment programs from 2009
	Reduction of social security contribution in 2009-2010
	Back to work scheme in 2009
	Short time work schemes in 2010
	First job guarantee program from September 2012
Measures to increase labour supply	Job protection plan from 2013
	Reduction of social transfers
	Tightening of eligibility criteria for disability pension
	Abolishment of early retirement (from 2012 with some exceptions)
Other measures	Decrease of unemployment benefit (length and amount) from 2011
	Change of rules of parental leave
	Decrease personal income tax (from 2011, personal income tax system changed in each year between 2011 and 2013) and abolishing tax credit
	Change of labour code in two steps from H2 2012 and 2013
	Increasing minimum wage (19.2 per cent) in 2012

In addition, several jobs were directly created by the public employment program. Public employment has had two aims: to increase activity by providing work for those inactive who are able to work and to decrease cyclical unemployment and prevent hysteresis. Significant increase of the volume of public employment was linked to a redesign of regular social transfers. The ratio of workers employed in the public employment program to total employment increased from below 1 per cent in 2008 to above 4 per cent in 2014. Analysis of public employment program shows that the probability of finding a job in the private sector remains low³ (Bakó et al., 2014).

Finally, in order to enhance the employment of certain groups characterised by low participation and employment rates (career starters, the young, the old, women returning from parental leave, the unskilled), the *Job protection plan* was introduced in 2013 which decreased employers' contribution upon employment to encourage the employment of these groups.

2.2.2 Measures to influence labour supply

Participation rate is low in international comparison, especially for the low-educated, the old and women. The government introduced several measures to boost participation. Social

³The ratio of public workers finding a job in the private sphere and remaining employed for at least 180 days was 18 per cent between the 4th quarter of 2011 and the 3rd quarter of 2012 and 13 per cent between the 4th quarter of 2012 and the 3rd quarter of 2013.

transfers and disability benefits were cut and early retirement was abolished⁴ after the start of the crisis with the aim of reducing the inflow into inactivity. In 2011, duration and amount of unemployment benefit was decreased. Finally, rules of parental leave changed in order to make it easier for parents to return to the labour market. As a result, inflow into inactivity declined considerably. According to a decomposition of the change of participation rate, the increase of activity was primarily due to tightening of the eligibility criteria of welfare transfers (MNB, 2014). At the same time, active labour market programs (Job protection plan, public employment program) also contributed to the increase of labour supply.

2.2.3 Other measures affecting the labour market

During 2010-2013 the tax system also changed significantly: a flat rate for personal income tax combined with family taxation was introduced. The change of the tax system took place in three phases: in 2011, the flat tax rate was introduced, favouring workers above the median wage and tax credit decreased, reducing net wages of low-earners. In 2012, the tax credit was entirely abolished, decreasing net wages of workers below the median wage. In order to compensate for the loss, the Government determined a required pay rise, stimulating its implementation in the private sector by paying wage compensation. Finally, in 2013, super-grossing was abolished, resulting in a further increase of net income. The minimum wage increased significantly as well: from 2011 to 2012 the increase was as high as 19.2 per cent.

Of the measures on the change of the personal income tax system, the minimum wage increase and required wage increase directly influenced labour costs of companies and thus their labour demand. These two measures affected three quarters of workers in the private sector (NLO, 2013). It was not compulsory to increase the wages of employees as implied by the required pay rise (except for those earning minimum wages), but the legislation initially envisaged some penalty for firms not participating. Survey evidence suggests that a major part of firms increased wages of most employees affected.

In 2012 and 2013, a new labour code was introduced, further increasing the flexibility of labour market institutions. This meant an increase of both numerical and functional flexibility⁵ of employment Busch et al. (2013). The changes made it easier for companies to change the amount of labour input, use atypical forms of work or organise work in a more

⁴At the same time, a new early retirement system for women with an eligibility period of at least 40 years was introduced.

⁵Numerical flexibility refers to the possibility to change the quantity of the labour input, while functional or organisational flexibility reflects the possibility to infer qualitative changes to the use of labour (see Busch et al. (2013), 2013, p. 288.)

flexible way. Changing the amount of labour input has become easier because both hiring and firing has become more flexible. The possibility of setting a longer probationary period than before makes it easier for the employers to end employment without additional costs or consequences. Notice period has been regulated, in certain cases dismissal became easier and redundancy pay has decreased somewhat as well (for details see [Busch et al. \(2013\)](#), p. 291-293).

3 Data

Wage Dynamics Network (WDN) is an ECB working group and it was established in 2006 with the aim of identifying the sources and features of wage and labour cost dynamics that are relevant for monetary policy. It includes the ECB and members from ESCB central banks. The current, third wave of the WDN firm-level survey focuses on how the recent crisis affected the corporate sector, why the labour market continues to be slack and how various institutional characteristics of the labour market might influence the labour market outcomes. A harmonized questionnaire was put together by the European System of Central Banks and translated to the languages of the participating countries.

The Hungarian survey was commissioned and supervised by the Central Bank of Hungary and was carried out by IMG Hungary between July and September 2014 when selected firms were contacted and personal interviews were conducted with CEOs, deputy CEOs or HR managers. The sample was drawn from the population of double-entry book keeping firms in 2013. Firms with less than 5 employees and firms from two sectors, agriculture and electricity, were excluded. All surviving firms from the first wave of WDN were intentionally selected. Responses from this subsample constitute approximately 25 percent of the final sample. The sample was stratified by firm size, the size categories were 5-19, 20-49, 50-199 and more than 200 employees. The response rate of the survey was 58 percent. The final sample consists of 2032 firms. Summary statistics are presented in [Table 10](#) in the Appendix.

The WDN questionnaire consists of three type of questions. The harmonized core questions were asked in all participating countries. Non-core questions were also harmonized but they were optional to include in the questionnaire. Some countries included country-specific questions on domestic policies. The Hungarian questionnaire contains non-core questions on price setting and price changes and some country-specific questions on domestic policies. The reference period of the questionnaire in most of the cases is the 2010-2013 period.

The Hungarian WDN survey data is matched with administrative balance sheet data

(National Tax and Customs Administration'database). This enables us to examine the performance of firms even before the crisis period.

The reference period of the survey is the 2010-2013 period, however, the interviews were conducted in 2014. Therefore firms are missing that went bankrupt after 2010. This implies that the negative effect of the crisis on the corporate sector could have been larger than the survey data indicate as we are unable to observe exiting firms.

Table ?? in the Appendix contains the characteristics of the labour force of firms in the sample. Sample averages are broadly in line with aggregate figures and reflect that permanent, full time employees make most of the workforce in Hungary. The ratio of part-time workers is low at 8.34 per cent and it is highest in medium-sized enterprises and in manufacturing and services sectors. The ratio of temporary or fixed-term workers (13 per cent) and the ratio of agency workers (1.6 per cent) are somewhat higher in the sample than aggregate statistics reflect. The composition of workforce according to skills is somewhat different from other statistics. The ratio of unskilled is much higher in the WDN survey than Labour Force Survey or Wage Survey databases indicate. The composition of employees by tenure is similar to the Wage Survey database, but the ratios of employees with shorter tenure are much higher than in the Labour Force Survey.

In the following we use weights that adjust for the importance of firms in terms of employment in the realized sample.

4 Results

4.1 Sources and size of shocks

The unfavourable aggregate statistics may mask important firm-level heterogeneities. In this subsection we examine the distribution of shocks that firms experienced between 2010-2013 by groups of firms and also on how these shocks interact.

Firms were asked on how their environment affected their activity between 2010 and 2013.⁶ Examining the distribution of shocks reveals that change in demand level was the most important factor affecting the activity of firms (Figure 5). This holds separately for both negative and positive shocks. The importance of demand level is followed closely by

⁶They were asked on the effect of changes of (1) demand level, (2) demand volatility, (3) access to external financing through the usual financial channels, (4) customers'ability to pay and meet contractual terms and (5) availability of supplies from usual suppliers. For the ease of visualization we grouped answers into three categories: negative shock, no shock, positive shock.

shocks from demand volatility and customers'ability to pay, while access to external financing and access to supply of usual suppliers affected fewer companies.

The most frequent combination of shocks of all possible combinations was negative shock from all five sources which was observed in case of 14 per cent of firms that were hit by any shock. 21 per cent of firms that were hit by any shock experienced both a negative demand level and a negative financial shock (and several of them other shocks as well). The shocks seem to be highly correlated (see Table 18 in Appendix). Demand level and demand volatility shocks are closely related, their correlation is .78, while correlation among other shocks are somewhat smaller but even the smallest correlation coefficient is above .5.

Examining sectoral (Figure 6) and firm size (Figure 7) heterogeneities we find that shocks affected firms unevenly. Smaller firms (micro, small and medium sized ones) and those operating in construction and financial intermediation were hit by negative shocks more frequently and by positive shocks less frequently than others. Demand type negative shocks (demand level, demand volatility and customers'ability to pay) were the most frequent in all groups, while financial and supply shocks were experienced less frequently. This ranking is the same for all size categories and industries. However, there are considerable differences in the ratios of firms affected by these shocks as well as the exact demand type shock they experienced. Smaller firms and construction firms suffered primarily as a result of lower demand level or higher demand volatility, while large firms and those operating in trade, service and financial intermediation were hit most seriously by the lack of customers'ability to pay.

We combine the survey data with balance sheet data. This enables us to examine whether certain pre-crisis firm characteristics are associated with the shocks and how the shocks affected the performance of firms.

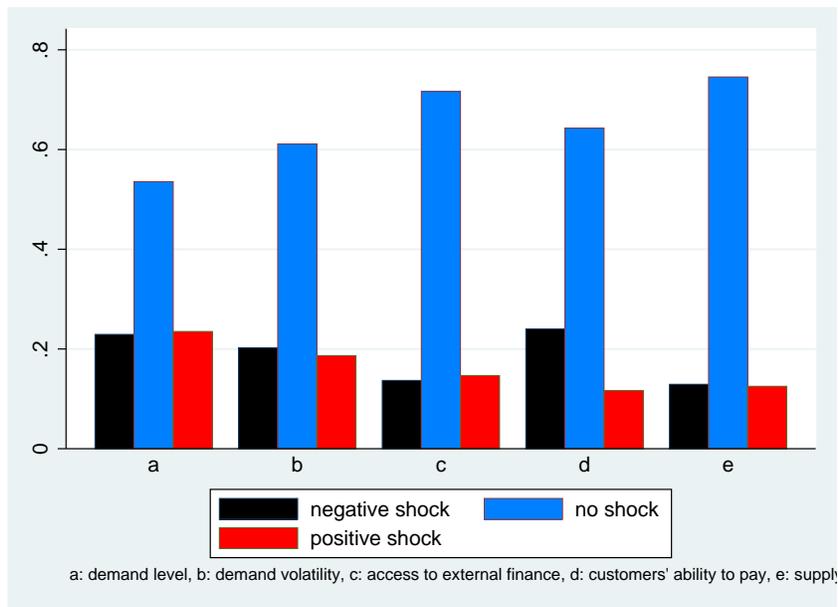
Figure 8 shows the unconditional return on assets and year-on-year change of revenue by sign of the demand level shock. Profitability is significantly higher for firms having been positively affected by shocks than for firms having been negatively affected while the evolution of revenue is similar for the three groups. This pattern holds not only for the entire 2010-2013 period but also for the years before. This result suggests that firms assessed changes in profitability rather than changes in sales or total assets when answering questions on how shocks affected their activity.

Examining further the evolution of firm characteristics by sign of demand level shock

we find that positive shocks are associated with smaller leverage ratios⁷, higher total factor productivity⁸, higher export share and higher labour costs per employee. These results indicate that shocks did not randomly hit firms as more productive and more profitable firms were less likely to endure negative shocks.

Similar statistics are calculated for the financial shock and the effect of customers' ability to pay (Figure 22 and 25) and these corroborate the previous findings that answers on the activity of firms are related more with return on assets and firms with better characteristics were less likely to be hit by negative shocks.

Figure 5: Share of firms by types of shocks



⁷Leverage is calculated as $1 - \frac{E_t}{TA_t}$, where E_t is own equity, while TA_t is total assets in year t .

⁸TFP is calculated on the basis of Wooldridge (2009).

Figure 6: Share of firms by types of shocks and by sector

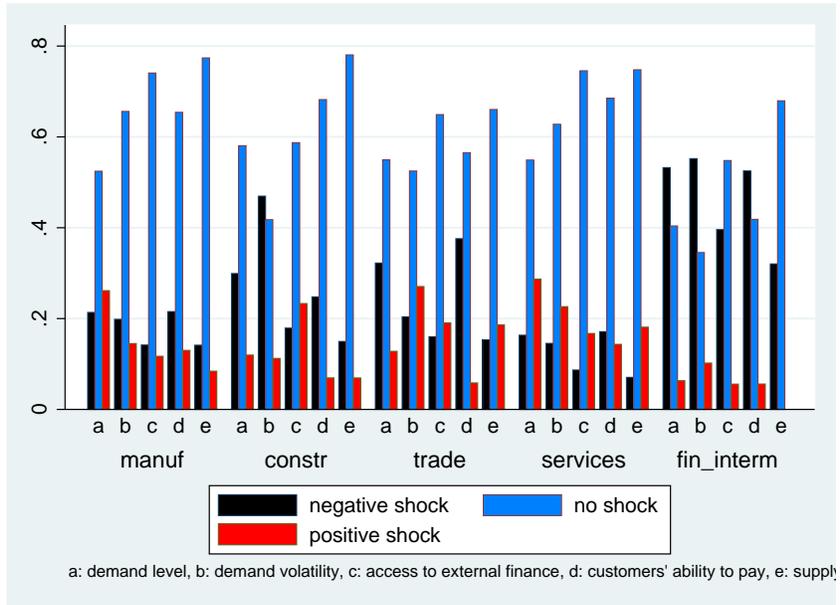


Figure 7: Share of firms by types of shocks and by size

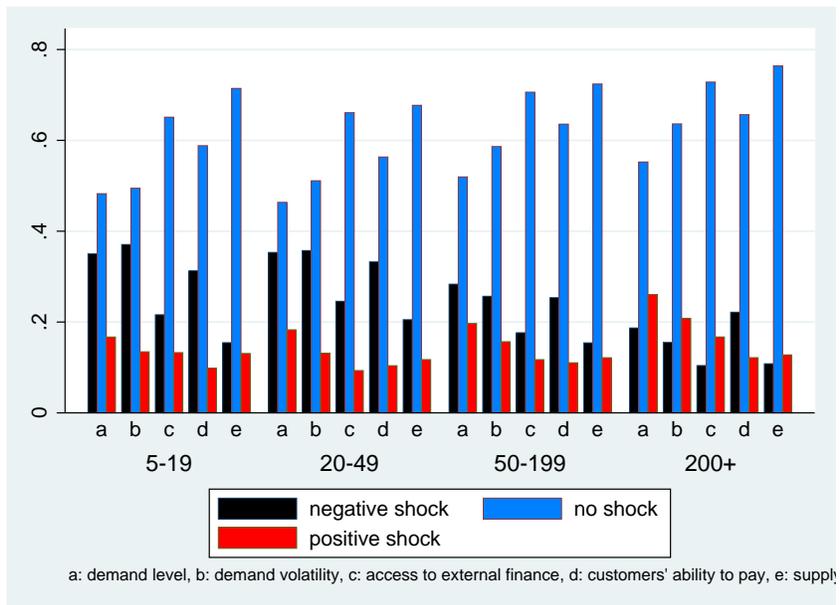


Figure 8: Demand shock and firm-level characteristics

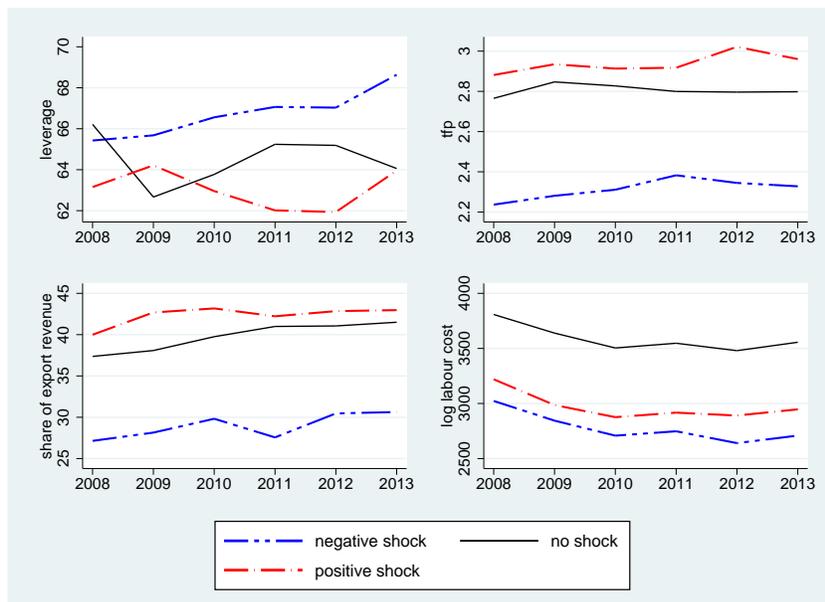
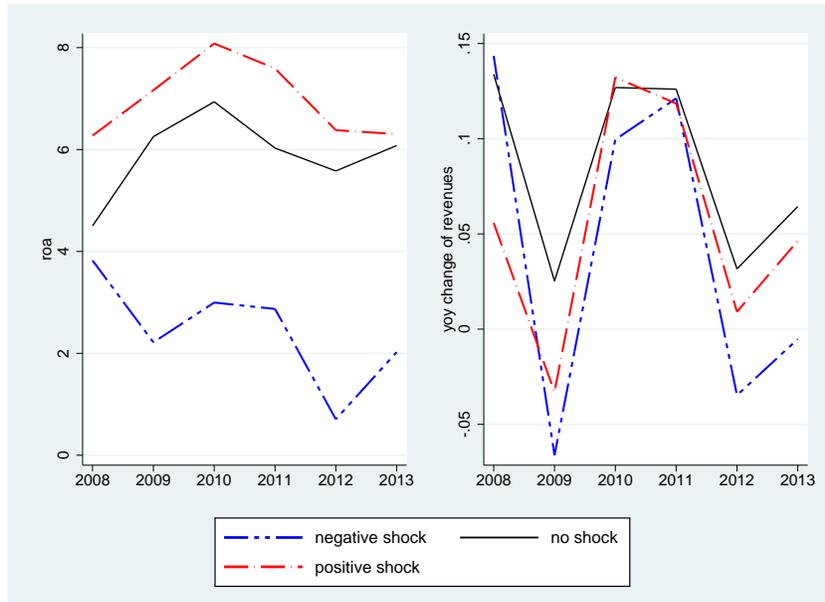
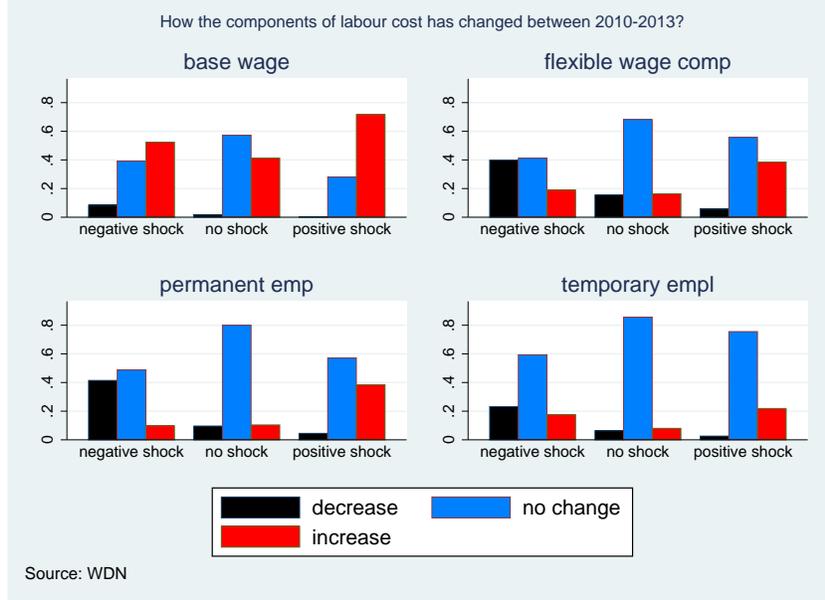


Figure 9: Demand shock and firm-level characteristics



The increasing leverage of firms is in contrast with the deleveraging at the macro level observed since the start of the crisis. We examine the leverage of firms by shocks. Marked differences are found in terms of leverage by the sign of the shocks, mainly for the financial shock. Leverage of firms that reported a negative effect from changes in access to finance increased significantly, while leverage of those who experienced positive effects increased only moderately.

We decompose the change in leverage in the following way:

$$\frac{1 - \frac{E_t}{TA_t}}{1 - \frac{E_{t-1}}{TA_{t-1}}} = \frac{\frac{TA_t - E_t}{TA_{t-1} - E_{t-1}}}{\frac{TA_t}{TA_{t-1}}}$$

where E_t is own equity in year t , TA_t is total assets in year t . The nominator shows the change in non-equity liabilities and the denominator is the change in total assets. If non-equity liabilities grow faster (or shrink slower) than total assets then the leverage increases.

Figure 23 and 24 in Appendix shows the evolution of total assets and non-equity liabilities relative to 2010 by the sign of financial shock. The evolution of non-equity liabilities differ markedly for the three groups of firms. This item increased the most for firms with negative financial shock while it only increased moderately for firms experiencing an increase in activity due to access to finance. The evolution of total assets was very similar for the three groups up

until 2012 when total assets increased significantly for firms with no financial shock. Therefore the increasing leverage of firms with negative financial shock is due to their change in non-equity liabilities. The prevalence of foreign currency lending might explain this phenomenon since the exchange rate depreciated significantly. However, as the survey does not contain information on the currency composition of debt, this hypothesis cannot be tested.

We further explore which firm-specific factors may be associated with the probability of experiencing a negative shock. We estimate a linear probability model of the following form:

$$shock_i = \alpha + \beta X_i + \epsilon_i \quad (1)$$

where $shock_i$ is equal to 1 if firm i experienced a negative shock and zero otherwise. The questionnaire distinguishes among five different type of shocks, we estimate the regression for these shocks separately. A shock is considered negative if it affects the activity of the firm negatively. X_i is a vector of firm characteristics.

Firms enduring a negative shock might need to adjust. For example firms facing declining demand may need to reduce their labor demand as well. This implies that even if the shocks are random we may find positive correlation between labor input and the incidence of shocks due to reverse causality if we use labor input from later years. To avoid this problem we first estimate the regression using firm characteristics from 2009 that are exogenous, and then including additional variables that might be affected by the crisis.

Since we are interested in which pre-shock firm characteristics are related to the probability of different shocks, we are using administrative data for 2009 (the reference period of the survey is 2010-2013) and some survey data which are available for 2014 (the date of the survey), but are assumed to be persistent.

We examine the role of firm size, industry, share of foreign, firm ownership and firm age (Table 12 presents the sources of data). We also use proxies of labour composition (ratio of minimum wage earners and ratio of high-skilled non-manual workers) and the degree of competition since we expect that firms with higher labour productivity and lower level of competition are more resilient to shocks. We include a variable on collective agreement because it may affect firms' ability to react to shocks.

Regression results are presented in Table 13 in Appendix. Larger firm size is associated with lower probability of a negative shock especially for demand volatility and financial shock. Profitability of firms in 2009 also significantly influence the probability of a negative shock in most regressions. However, ownership is not related to enduring negative shocks.

There is sectoral heterogeneity. The baseline sector is manufacturing, relative to this sector firms in the financial intermediation sector experienced negative shocks more often. Demand volatility increased for construction firms, while service firms were less likely to experience a negative shock. The intensity of the competition positively related the probability of a negative shock for all types of shocks.

The second question we address is how shocks influenced the performance of firms in terms of sales, profitability and employment. The previous results showed that firms with worse characteristics such as profitability and TFP were more likely to hit by the crisis. If the crisis has no effect on performance but it affects worse firms only, cross sectional analysis might find spurious negative effect of the crisis. For this reason cross sectional analysis might not be conclusive. We examine the effect of shocks on firm performance controlling for pre-crisis performance by estimating the following regression:

$$y_{2013,i} = \alpha + \beta X_i + \gamma shock_i + \xi y_{2009,i} + \epsilon_i$$

where $y_{2013,i}$ is the outcome variable in 2013, $y_{2009,i}$ is the outcome from 2009, X_i contains control variables. The variable of interest is $shock_i$ which is equal to 1 if firm i endured a negative shock and zero otherwise. Different types of shocks are included separately as well as jointly. We run this regression for three outcome variables: log sales, return on assets and log employment.

The results are presented in Table 14, 15 and 16 in Appendix for log sales, profitability and log employment, respectively. Columns 1-5 show the estimates when shocks are included separately in the regression, while in the last specification contained in Column 6 all shocks are included.

Shocks have a negative effect on firm performance. Including the negative shocks separately yield significant negative parameter estimates in all regressions. However, including them jointly gives insignificant estimates probably due to low power. The sign of other control variables are also of interest. Relative to the manufacturing sector there are no significant differences among the sectors. Among firm controls the share of export revenue is significant on sales and employment, however, most other covariates are not significant.

Demand conditions abroad might have aggravated the problems of domestic firms after the collapse of trade during the crisis but export possibilities might have also helped domestic firms to alleviate the negative effect of domestic demand. Therefore we examine how firms

perceived the evolution of domestic and foreign demand.⁹ Negative demand shock came mainly from the domestic markets: 76 per cent of enterprises indicating a negative demand shock stated that domestic demand declined, while only 38 per cent experienced a decline of foreign demand for its main product. Smaller difference was observable in case of positive shocks: 66 per cent of enterprises indicating that demand level affected their activity positively between 2010 and 2013 experienced an increase of domestic demand and 61 per cent observed an increase of foreign demand (see Table 19). Thus, the asymmetric effect of domestic and foreign demand shocks is related mainly to the differences in negative shocks which were more frequent in the domestic market. Demand shocks on domestic and foreign markets are correlated: correlation is as high as 0.58.

Large (200+) companies reported a decline of domestic demand less frequently than smaller companies, while the differences among ratios of firms reporting a decline of foreign demand were small by size categories. The share of firms reporting an increase of domestic demand was highest among small firms (20-49), followed closely by large (200+) and medium sized (50-199) firms. Differences are more pronounced by sector: distribution of domestic demand shocks were almost symmetric for manufacturing firms, while more of them experienced an increasing external demand than a decreasing one; construction and trade firms were disproportionately affected negatively by domestic demand conditions, services were hit by the decline of domestic demand but foreign demand increased for larger share of firms than it declined, and financial intermediation suffered from the decline of both domestic and foreign demand (Table 20).

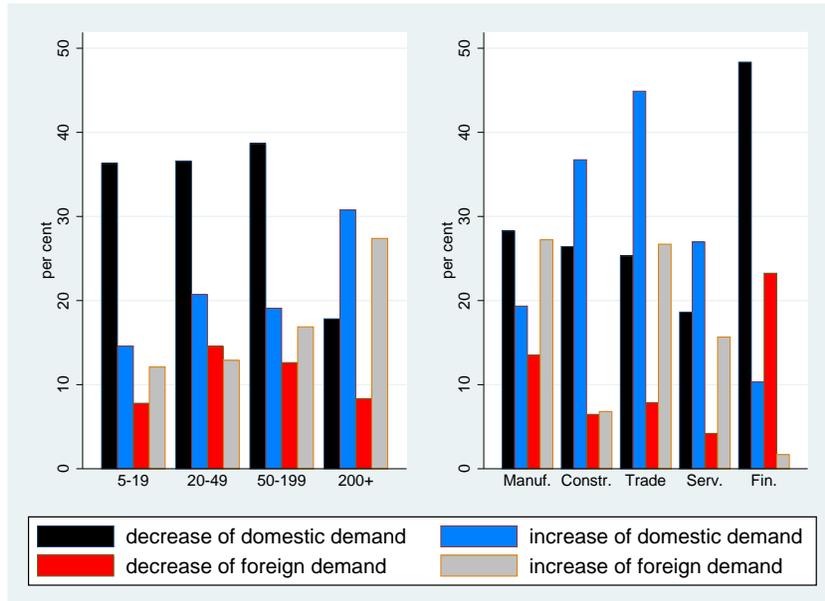
4.1.1 Changes in financing conditions

Beside the change of demand conditions in domestic and foreign markets, supply and demand for financing changed dramatically after 2008. Between 2010 and 2013, the financial sector experienced several shocks while demand for financing also changed. Specific questions about financial constraints in the WDN questionnaire may help to better understand the nature of the shocks that firm experienced.

Although less than 20 per cent of the firms reported that access to external finance negatively affected their activity, more than half of companies stated that credit had become unavailable and/or its conditions were too onerous. Credit was unavailable for almost a third of enterprises, while credit conditions were too onerous for almost half of them.

⁹Answering questions on foreign demand was not conditional upon exporting status.

Figure 10: Change of domestic and foreign demand by size and sector



Firms were asked about access to three types of credit: (1) credit to finance working capital, (2) credit to finance new investment and (3) credit to refinance debt. Answers are highly correlated (Table 21): if one type of credit was unavailable (or available only with too tight conditions) then the other types were unavailable (or available with too tight conditions) also, however, the degree of relevance may be different (correlations are above 70 per cent for answers on lack of access to and for answers on too onerous conditions for different types of credit). Correlations were significantly smaller between answers on lack of access and conditions on the same type of credit. This is related to the asymmetry between the two types of constraints: the majority of firms finding credit conditions too onerous had no access to credit, but several firms who did have access to external finance found credit conditions too onerous.

Descriptive statistics reveal that small firms'(20-49) activity was affected more by lack of access to credit primarily for working capital and new investment (Table ??). Too onerous conditions were mentioned as a relevant problem mainly by small and medium sized companies. Construction firms mentioned lack of access to credit more frequently and firms in financial intermediation less than others, while too onerous credit conditions were mentioned similarly by all sectors except for financial intermediation where those stating this was of relevance was highest.

Table 2: Financial constraints by firm size and sector

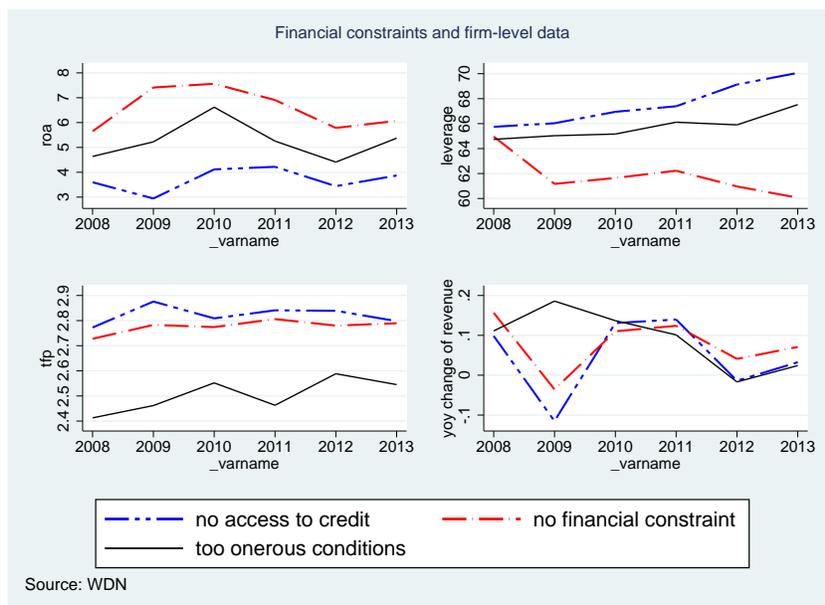
	No access to credit				Conditions are too onerous			
	working capital	new investment	refinance debt	refinance debt	working capital	new investment	refinance debt	refinance debt
5-19	11.3 (2.17)	13.1 (2.32)	11.7 (2.25)	11.7 (2.25)	34.5 (3.32)	33.7 (3.31)	31.0 (3.28)	31.0 (3.28)
20-49	12.3 (1.38)	12.9 (1.41)	11.6 (1.36)	11.6 (1.36)	30.7 (1.96)	32.2 (1.99)	30.1 (1.97)	30.1 (1.97)
50-199	7.4 (0.96)	9.3 (1.07)	7.7 (0.98)	7.7 (0.98)	23.1 (1.55)	24.1 (1.58)	22.1 (1.54)	22.1 (1.54)
200+	6.5 (1.32)	9.1 (1.54)	9.8 (1.59)	9.8 (1.59)	23.7 (2.30)	21.3 (2.22)	17.2 (2.05)	17.2 (2.05)
Manufacturing	8.2 (1.01)	11.0 (1.15)	10.2 (1.12)	10.2 (1.12)	25.6 (1.63)	21.7 (1.54)	18.6 (1.46)	18.6 (1.46)
Construction	8.2 (2.36)	16.8 (3.23)	16.9 (3.26)	16.9 (3.26)	28.2 (3.92)	35.2 (4.14)	23.7 (3.70)	23.7 (3.70)
Trade	5.7 (1.16)	10.4 (1.53)	10.0 (1.51)	10.0 (1.51)	25.9 (2.21)	23.6 (2.15)	21.4 (2.08)	21.4 (2.08)
Services	9.5 (1.25)	8.4 (1.18)	9.9 (1.28)	9.9 (1.28)	28.9 (1.94)	29.5 (1.97)	25.0 (1.88)	25.0 (1.88)
Financial intermediation	1.1 (1.56)	0.9 (1.42)	1.9 (2.00)	1.9 (2.00)	17.2 (5.56)	17.7 (5.63)	17.2 (5.56)	17.2 (5.56)
Total	8.0 (0.63)	10.3 (0.70)	10.3 (0.71)	10.3 (0.71)	26.6 (1.03)	24.9 (1.01)	21.2 (0.96)	21.2 (0.96)

Note: weighted by firm weight, standard errors are in parenthesis. The table shows the ratio of firms answering that a type of credit constraint was relevant or very relevant.

An alternative classification of credit constraints is used to shed some light on the extent to which firms differ along credit conditions. Respondents are classified into three distinct groups based on their answers on credit conditions: (1) those who had no financial constraints, (2) those who had access to finance but with too onerous conditions for at least one type of credit and (3) those who had no access at least to one type of credit. Firms indicating that they had no access to at least one type of credit were assigned to the third group independently from what they answered on conditions of other types of credit.

These groups differ along several firm characteristics (Figure 11). The differences are pronounced and statistically significant in the case of all examined characteristics, except for change in sales, between those experiencing no financial constraints and those having no access to financial sources. Firms that faced no difficulties in access to finance were on average more profitable, less leveraged and higher profitability than firms with difficulties in financing. Differences in revenue growth were, however, not significant. The differences are significant and persistent suggesting that financial constraints may have been present for some firms even before the financial crisis.

Figure 11: Financial constraints and firm characteristics



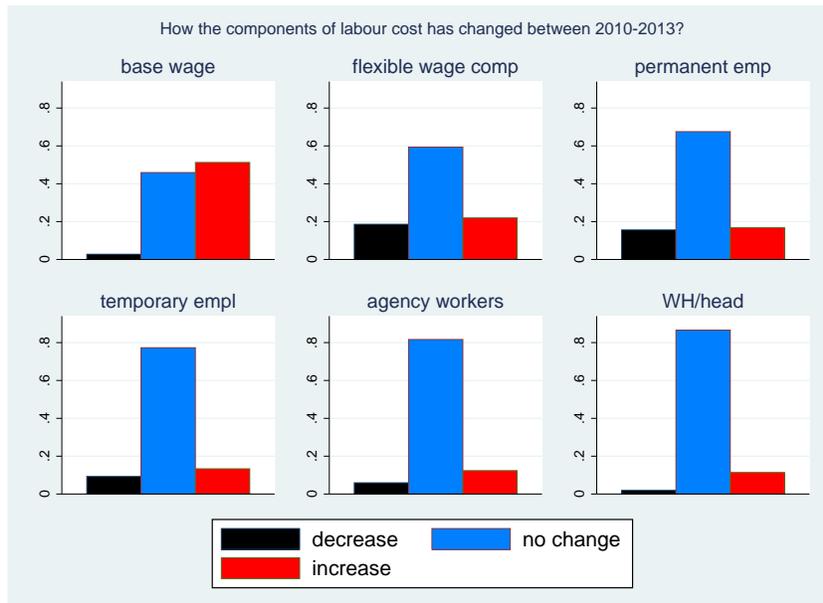
4.1.2 Changes in costs

Beside the shocks that affected revenue, costs also increased. 60 per cent of firms reported an increase of total costs, while 8 per cent a decrease between 2010 and 2013. Of the components of total costs, 72 per cent of enterprises reported that at least one type of costs (labour costs, financing costs, costs of supply) increased, while for 44 per cent all increased. The increase of total costs affected mostly small and medium sized firms and firms in financial intermediation and trade sectors (Table 22). The distributions of answers to questions on various types of costs are fairly similar: about 60 per cent of enterprises reported an increase of costs, 33-39 per cent no change and 5-8 per cent a decrease.

Labour costs increased for 61 per cent of respondents, and declined for 5 per cent. Again, the share of firms reporting an increase of labour costs was highest for small and medium sized firms and in financial intermediation and trade sectors (Table 23). Labour costs declined for 14 per cent of construction firms, which is above the average.

Examining the individual components of labour cost shows that most companies (49 per cent) increased base wages, while only 9 per cent decreased it (Figure 12). This leaves a very high ratio, 47 per cent of respondents reporting no change of base wages. This is in contrast with the low ratio of firms freezing wages during this period at least in one year and with changes in wage setting frequency (see section 4.3).

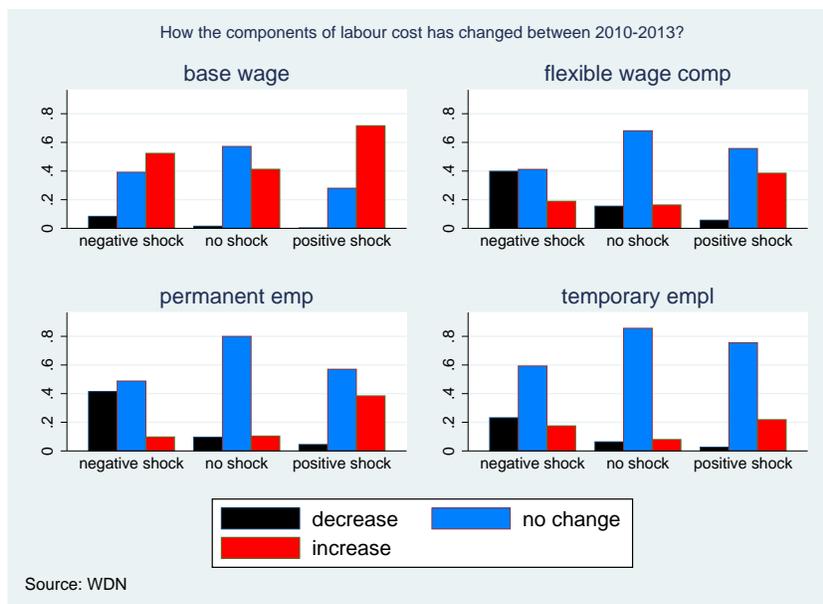
Figure 12: Changes of components of labour cost



Other components of labour costs were unchanged at most enterprises, while the observed changes were more symmetric. Flexible wage components increased for 22 per cent of respondents, while 20 per cent reported a decline. More companies reported a decline of permanent and temporary employment than an increase, while more respondents experienced an increase of the number of agency workers than a decrease. Hours worked per employee increased in more companies than it declined.¹⁰

The developments of labor cost components are related to shocks (Figure 13). For example, 12 per cent of firms having been hit by demand level shock reported a decline of base wages, as compared to 1 per cent of firms having been unaffected and positively affected by demand level. Base wages and flexible wage components as well as the number of permanent and temporary employees increased mainly at those companies that were positively affected by demand shock. The same is true for financial shock.

Figure 13: Changes of components of labour cost by demand level shock



¹⁰This is not in line with the decline of the hours worked per head observed on the macroeconomic level since before the crisis. In the questionnaire we have no information on the exact degree of change, thus, it is possible that hours worked per head changed less on average in case of companies reporting an increase than for those reporting a decline. Please see also 4.2.1 for the results of country-specific questions on part-time work.

4.2 Adjustment in labour costs and labour composition

4.2.1 Adjustment of labour input

Aggregate statistics indicate significant adjustments of labour input. Time-series data, however, is not suitable for examining different ways of adjustment and their relationship with shocks. The WDN3 data, however, may help in understanding this relationship.

During 2010-2013, 15.5 per cent of firms needed to significantly reduce their labour input or alter its composition.¹¹ This ratio was highest for small firms (see Table 3), although differences among size categories were not marked. Sectoral differences were more pronounced as the share of firms having had to adjust labour input was higher than average in construction, trade and services.

Surprisingly, enterprises experiencing positive shocks needed to adjust their labour input somewhat more than those who experienced no shock (see Table 4). The difference is statistically significant in case of demand shock and financial shock. There are some potential explanations for the relatively higher probability of adjustment in case of a positive shock. First, some firms may have used the crisis as an excuse to adjust their labour input even if it was not a negative shock that triggered this adjustment. Second, since we do not have exact information on the timing of adjustments and shocks between 2010 and 2013, it is possible that firms that could successfully adjust their labour input realised positive shocks later on with a higher possibility.

The main channel for adjusting labour input was the number of permanent employees. Conditional on adjusting labour input 87 per cent of firms used collective or individual layoffs, collective layoffs being more prevalent in case of large companies. The second most frequent tool was non-renewal of temporary contracts at expiration (however, its scale must have been moderate because of the small ratio of temporary employment), followed by freeze or reduction of new hires. Early retirement schemes and non-subsidised reduction of hours worked were used by less than half of respondents each.

¹¹Based on balance sheet data, much more firms decreased labour input (as measured in full time equivalent). On average (disregarding extreme values at employment growth between 2010 and 2013 exceeding below the 5th and above the 95th percentile and not considering firms that were established after 2009), employment increased by 7.0 per cent in the sample. Firms stating that they needed to significantly adjust their labour input increased their employment by 2.3 per cent (standard error is 0.18), while firms that did not need to adjust their labour input by 7.9 per cent (standard error is 0.72). The median changes were -0.7 per cent for those who needed to adjust their labour input and 5.1 per cent for those who did not need to do so. Looking at changes between two consecutive years, employment declined on average mainly in 2013 for those who stated that they needed to decrease labour input.

Table 3: Per cent of firms that needed to adjust their labour input by size and sector

	5-19	15.3	(2.35)
	20-49	19.0	(1.60)
	50-199	17.2	(1.33)
	200+	15.3	(1.83)
	Manufacturing	12.4	(1.17)
	Construction	22.9	(3.50)
	Trade	18.9	(1.87)
	Services	17.0	(1.54)
	Financial intermediation	14.6	(4.90)
	Total	15.5	(0.80)

Note: weighted by firm weight, standard errors are in parenthesis

Table 4: Per cent of firms having had to adjust labour input by answers on shocks

	negative shock		no shock		positive shock	
demand level	36.0	(1.85)	7.3	(0.84)	8.2	(1.40)
demand volatility	34.1	(1.90)	8.9	(0.87)	10.5	(1.78)
access to external financing	35.1	(2.37)	10.8	(0.85)	15.4	(2.50)
customers' ability to pay	31.5	(1.88)	8.6	(0.82)	14.7	(2.41)
access to supply of usual suppliers	33.1	(2.56)	11.8	(0.87)	11.7	(2.11)
domestic demand	28.8	(3.78)	6.0	(0.99)	19.2	(1.11)
foreign demand	27.3	(3.95)	7.0	(1.05)	19.0	(1.09)
domestic prices	29.8	(3.89)	5.1	(0.84)	20.8	(1.20)
foreign prices	29.2	(4.74)	6.0	(0.90)	20.5	(1.18)

Note: weighted by firm weight, standard errors are in parenthesis

To examine what factors are associated with higher probability of adjusting labour input we estimate the following linear probability model:

$$y_i = \alpha + \beta X_i + \gamma shock_i + \epsilon_i \quad (2)$$

where the variable y_i equals to 1 if firm i needed to significantly reduce its labour input or to alter its composition and zero otherwise, X_i contains control variables and $shock_i$ is a dummy variable indicating negative shock experienced by firm i .

The results are reported in Table 5. All shocks are significantly positively associated with labour input adjustment. However, when they are jointly included in the regression, only demand level shock remains significant: firms experiencing negative demand shock adjusted labour input with 29 per cent higher probability. Larger firms adjusted their labor input more while export revenue and profitability are negatively related to adjustment.

Aggregate statistics suggest that the ratio of part-time workers increased significantly since the start of the crisis (Bodnár, 2014). This was mainly due to an increase of involuntary part-time workers (suggesting that labour demand reasons explain the changes) and a major part of this change happened in the second phase of the crisis (between 2011 and 2013). In order to better understand the reasons behind the observed changes of aggregate statistics, we included questions on part-time workers (PTWs). 77 per cent of respondents to this survey did not change the number of PTWs, while those who changed were equally divided between increasing and decreasing the number of part-time workers. The average ratio of part-time workers to regular employees is 16.3 per cent for those who increased their number, while it is 8.6 per cent for those who decreased.

More than half of those who increased the number of PTWs did so because these employees work in special working hours. 38 per cent of respondents increased the number of PTWs because this was a way to adjust to lower demand, while lower labour cost per hour in case of part-time workers appears in case of 28 per cent. The relationship between realised shocks and changes of PTWs may help in determining whether the increase was due to structural (for example, change of the organisation of work or cost structure) or cyclical reasons (labour hoarding). The effect of shocks is, however, not obvious. Firms having been negatively affected by demand shock decreased the number of PTWs with a higher chance than others, while firms that experienced positive effects from access to finance increased the number of PTWs rather than decreased. Taken together, these results do not point to strong cyclical reasons behind the higher number of PTWs since the start of the crisis, instead,

Table 5: Labor input adjustment

	Labour input adj.	Labour input adj.	Labour input adj.	Labour input adj.	Labour input adj.	Labour input adj.
negative demand level shock	0.285*** (0.0452)					0.294*** (0.0699)
negative demand volatility shock		0.196*** (0.0395)				-0.0520 (0.0602)
negative financial shock			0.136** (0.0476)			-0.0664 (0.0607)
negative customers shock				0.195*** (0.0486)		0.0729 (0.0560)
negative supply shock					0.171** (0.0544)	0.00783 (0.0626)
construction	0.00858 (0.0473)	-0.0369 (0.0634)	0.0149 (0.0547)	0.0130 (0.0491)	0.0182 (0.0536)	0.0114 (0.0470)
trade	0.110* (0.0520)	0.124 (0.0678)	0.123 (0.0702)	0.104 (0.0577)	0.131 (0.0689)	0.104* (0.0481)
services	0.0684 (0.0405)	0.0583 (0.0441)	0.0579 (0.0464)	0.0648 (0.0429)	0.0726 (0.0448)	0.0725 (0.0422)
financial intermediation	0.00849 (0.0765)	0.0374 (0.0822)	0.0621 (0.0880)	0.0386 (0.0784)	0.0215 (0.0814)	-0.0308 (0.0722)
intensive competition	0.0360 (0.0300)	0.0481 (0.0305)	0.0518 (0.0314)	0.0351 (0.0315)	0.0508 (0.0309)	0.0366 (0.0309)
collective agreement	0.0466 (0.0313)	0.0559 (0.0376)	0.0429 (0.0383)	0.0529 (0.0348)	0.0482 (0.0381)	0.0529 (0.0315)
bonus/total wage bill	0.00283 (0.00172)	0.00265 (0.00177)	0.00270 (0.00181)	0.00246 (0.00180)	0.00246 (0.00183)	0.00304 (0.00181)
share of skilled labor	-0.000229 (0.000909)	-0.000811 (0.000941)	-0.000926 (0.00102)	-0.000625 (0.000944)	-0.00108 (0.000960)	0.0000859 (0.000962)
share of minimum wage earners	-0.0000183 (0.000551)	-0.000147 (0.000676)	-0.0000240 (0.000658)	0.000157 (0.000605)	-0.0000874 (0.000659)	0.000158 (0.000519)
share of export revenue, 2009	-0.000906* (0.000412)	-0.00126* (0.000519)	-0.00128* (0.000542)	-0.00110* (0.000456)	-0.00120* (0.000521)	-0.000864* (0.000407)
foreign ownership, 2009	0.00338 (0.0304)	0.0138 (0.0331)	0.0157 (0.0345)	0.00482 (0.0326)	0.00679 (0.0332)	-0.00156 (0.0312)
state ownership, 2009	0.153 (0.117)	0.156 (0.114)	0.141 (0.123)	0.136 (0.133)	0.151 (0.126)	0.168 (0.127)
log employment, 2009	0.0339* (0.0160)	0.0366 (0.0223)	0.0333 (0.0222)	0.0321 (0.0186)	0.0315 (0.0224)	0.0298* (0.0139)
ROA, 2009	-0.00165* (0.000731)	-0.00213* (0.000885)	-0.00203* (0.000885)	-0.00189* (0.000767)	-0.00225* (0.000882)	-0.00195* (0.000781)
age	-0.00811* (0.00324)	-0.00920* (0.00423)	-0.00932* (0.00426)	-0.00838* (0.00359)	-0.00927* (0.00425)	-0.00799** (0.00306)
Constant	-0.0130 (0.0805)	0.0366 (0.0858)	0.0747 (0.0926)	0.0373 (0.0853)	0.0859 (0.0881)	-0.00738 (0.0836)
Observations	1773	1753	1723	1751	1723	1670

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

structural reasons may have been prevalent behind the tendencies. This is also confirmed by firms' plans to change different components of labour input in case demand improved (more than one option could have been chosen). Potential ways to change labour input was: to change hours worked per head, number of full-time employees, number of part-time employees or number of agency workers. Interestingly, 40 per cent of respondents would not change the amount of labour input. 39 per cent would increase the number of full-time employees, 19 per cent would hire more part-time workers and 14 per cent would increase the number of hours worked per employee. These hypothetical answers suggest a further increase of the ratio of PTWs, while the effect on the number of hours worked per employee would be ambiguous.

4.3 Changes in wage setting

Wages can be set by collective pay agreements at the firm, sector or country level. In Hungary, the typical form of collective agreement is at the firm-level and slightly more than 20 per cent of workers are covered by such agreements, while other forms of agreements are rare (Figure 14). Although collective agreements are more prevalent than this number reflects, many of them do not include regulation on wage bargaining (Neumann, 2002). Thus wages are set mainly at the individual-level and this did not change compared to the pre-crisis period (Kézdi and Kónya, 2012).

Figure 15 shows the distribution of the frequency of base wage changes for two periods. Before 2010, 50 per cent of firms adjusted the base wage on a yearly basis and this share declined to 44 per cent for the period 2010-2013 while the share of firms adjusting wages in every two years or less often have become more common. As the end of the baseline period (before 2010) was already characterised by recession it is important to compare these results to a truly non-crisis period. Compared to the pre-crisis period the difference is striking as in 2007 approximately 80 per cent of firms changed wages at a yearly frequency (Kézdi and Kónya, 2012).

There are sectoral heterogeneities in the frequency of base wage changes. Before 2010, in manufacturing, trade, construction and business services approximately 50 per cent of firms adjusted wages on a yearly basis, in the period 2010-2013 this share dropped significantly for construction, trade and especially for business services (Figure 16). In terms of firm size there are differences in the distribution of frequency, however, changes between the two periods were similar (Figure 17).

Firms were also asked whether they adapted to inflation in base wage changes. The share

of firms indicating that low inflation made indexation rules unoperative is essentially the same for the two periods (Table 18).

We estimate the following linear probability model to examine what factors are associated with lower frequency of base wage changes during the 2010-2013 period:

$$y_{2013,i} = \alpha + \beta X_i + \gamma y_{2010,i} + \epsilon_i$$

where $y_{t,i}$ equals to 1 if firm i at time t changes wages less often than yearly and zero otherwise. The lagged dependent variable is included to control for unobserved firm heterogeneity, e.g. management practises at the firm.

Results are reported in Table 6. Results indicate that the former frequency of wage changes is strongly correlated with the current frequency. More interestingly, demand shocks are not associated with the frequency of wage changes while financial shocks are: firms experiencing positive financial shocks tend to have lower frequency of wage changes, indicating that financial conditions may affect wage setting behaviour of firms.

This pattern is reflected also in the change of regularity of base wage and bonus changes. More than 20 per cent of the firms that changed base wages on a regular basis before 2008 switched to occasional changes based on economic conditions, while only a few firms reverted back to regular base wage changes from occasional changes. The pattern is similar for bonuses. In the aggregate, the share of firms that change base wages occasionally based on economic conditions increased by 8 percentage points.

Firms may change the timing of wage increases due to unfavorable economic conditions, but they can also choose to freeze or cut wages. Figure 19 shows the yearly share of employees by wage freeze or wage cut during the 2010-2013 period. The share of affected workers was the highest in 2012 when GDP was shrinking but it was still comparable to its pre-crisis level documented by Kézdi and Kónya (2012). During the pre-crisis period the inflation and average wage growth was high so freezes and cuts were not necessary for real adjustment, however, weak demand together with low inflation would increase the necessity of these measures. However, these adjustment channels are not widely used. Looking at the heterogeneity of wage freezes and cuts by the type of the demand shock that firms endured (Figure ??) it is apparent that negative demand shock is positively associated with such measures.

The low ratio of firms reporting wage freezes is in contrast with the high ratio of firms reporting no changes in the base wage components of the labour costs (section 4.1.2). There are two potential explanations to reconcile this contradiction. First, although base wages

Table 6: Wage changes are less frequent than yearly

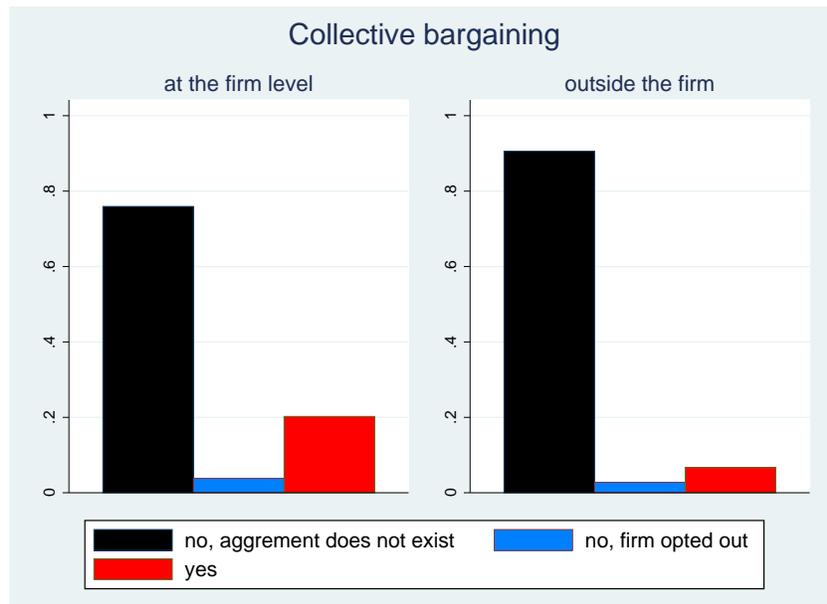
	Less than yearly	Less than yearly	Less than yearly	Less than yearly	Less than yearly	Less than yearly
negative demand level shock	0.0481 (0.0295)					0.0611 (0.0558)
negative demand volatility shock		0.0276 (0.0229)				-0.0106 (0.0425)
negative financial shock			0.0226 (0.0264)			0.0250 (0.0376)
negative customers shock				0.00750 (0.0287)		-0.0297 (0.0569)
negative supply shock					0.00920 (0.0239)	-0.0157 (0.0394)
construction	0.0200 (0.0333)	0.0149 (0.0344)	0.0225 (0.0338)	0.0232 (0.0339)	0.0237 (0.0335)	0.0220 (0.0352)
trade	0.0170 (0.0365)	0.0199 (0.0356)	0.0195 (0.0359)	0.0205 (0.0370)	0.0191 (0.0360)	0.0168 (0.0373)
services	0.0743 (0.0396)	0.0722 (0.0396)	0.0789 (0.0408)	0.0772 (0.0406)	0.0796* (0.0405)	0.0817* (0.0415)
financial intermediation	0.210* (0.0890)	0.219* (0.0883)	0.214* (0.0899)	0.215* (0.0893)	0.247** (0.0947)	0.240* (0.0980)
intensive competition	-0.0474 (0.0285)	-0.0425 (0.0288)	-0.0405 (0.0287)	-0.0437 (0.0288)	-0.0406 (0.0292)	-0.0405 (0.0289)
collective agreement	0.0106 (0.0321)	0.0146 (0.0324)	0.0182 (0.0330)	0.0197 (0.0328)	0.0240 (0.0328)	0.0219 (0.0337)
bonus/total wage bill	-0.00196* (0.000960)	-0.00202* (0.000939)	-0.00193* (0.000956)	-0.00195* (0.000957)	-0.00185 (0.000950)	-0.00182 (0.000988)
share of skilled labor	-0.00118 (0.000686)	-0.00127 (0.000653)	-0.00142* (0.000718)	-0.00145* (0.000705)	-0.00143* (0.000671)	-0.00141* (0.000700)
share of minimum wage earners	-0.000889* (0.000446)	-0.000813 (0.000429)	-0.000780 (0.000421)	-0.000757 (0.000429)	-0.000739 (0.000426)	-0.000771 (0.000437)
age	-0.00149 (0.00170)	-0.00180 (0.00167)	-0.00196 (0.00168)	-0.00183 (0.00167)	-0.00169 (0.00168)	-0.00174 (0.00171)
less than yearly, before 2010	0.801*** (0.0239)	0.801*** (0.0236)	0.806*** (0.0238)	0.803*** (0.0241)	0.804*** (0.0240)	0.805*** (0.0243)
Constant	0.221*** (0.0523)	0.229*** (0.0539)	0.230*** (0.0529)	0.232*** (0.0531)	0.224*** (0.0537)	0.221*** (0.0526)
Observations	2006	1986	1947	1984	1950	1889

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

did remain unchanged for most employees, firms did not call this *wage freeze*, and failed to report it when asked explicitly. Second, respondents might have made their calculations on average base wages of all employees. This could have remained unchanged without freezing or cutting wages if the number of employees declined or composition of the labour force changed. Based on an examination of the Hungarian Wage Survey database, the frequency of base wage freezes increased markedly after 2008 and was much higher than reported in the survey.¹²

Figure 14: Incidence of collective pay agreement



¹²The Wage Survey database contains annual data on wage components at the individual level.

Figure 15: Frequency of wage changes

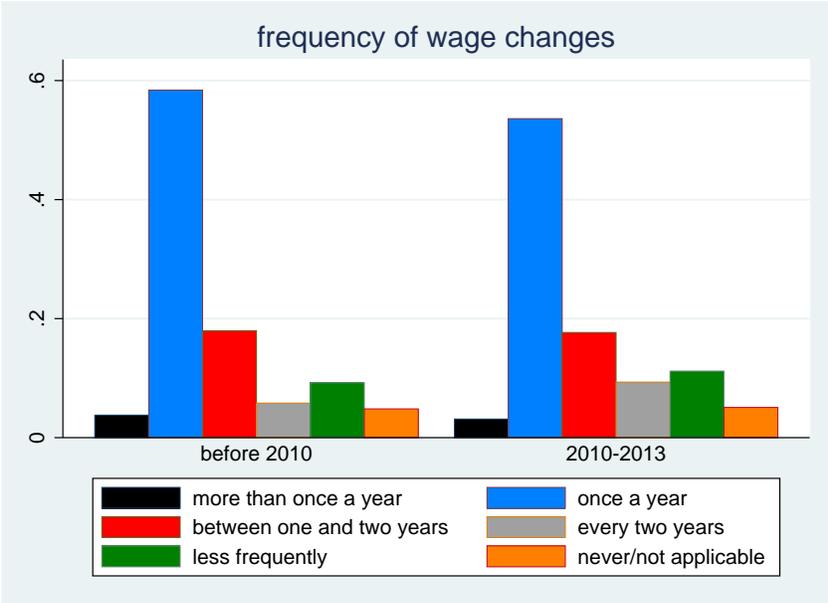


Figure 16: Frequency of wage changes by sector

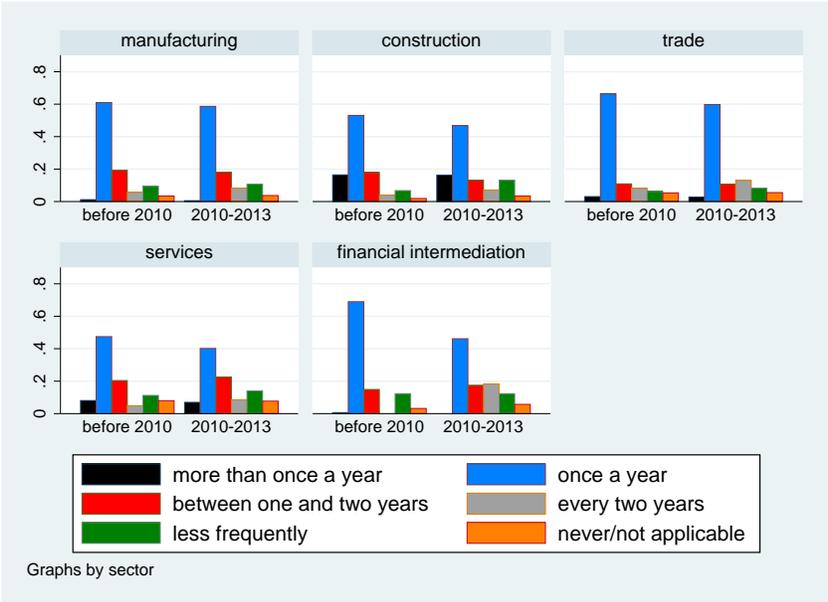


Figure 17: Frequency of wage changes by size

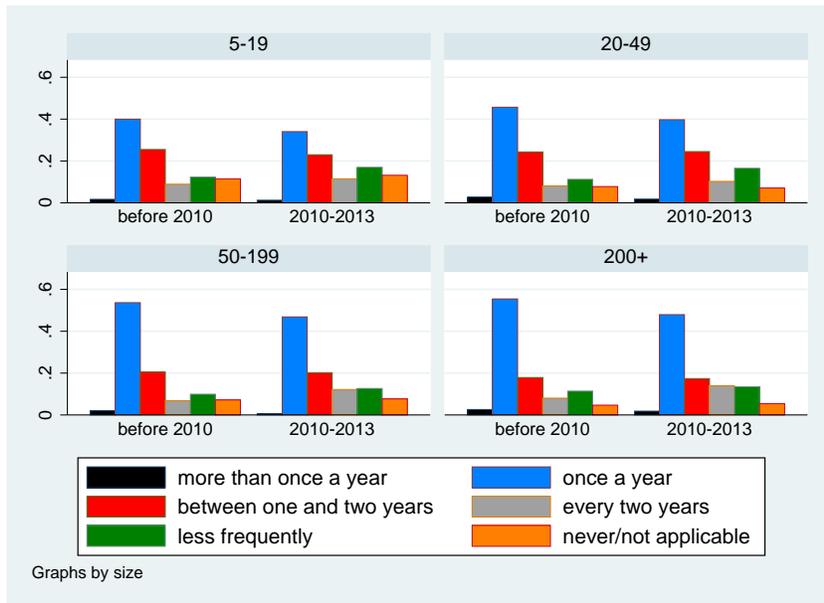


Figure 18: Firms adapt changes in base wages to inflation

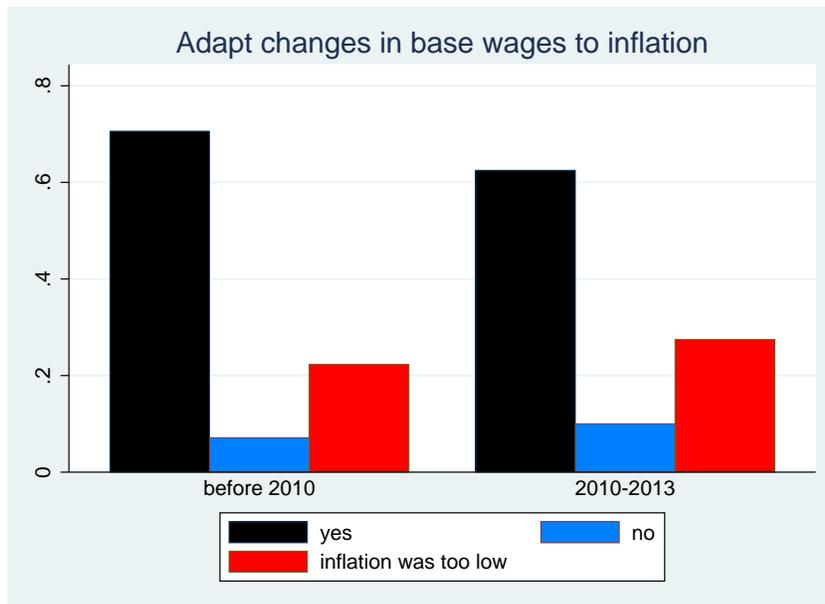


Figure 19: Wage freeze and wage cut

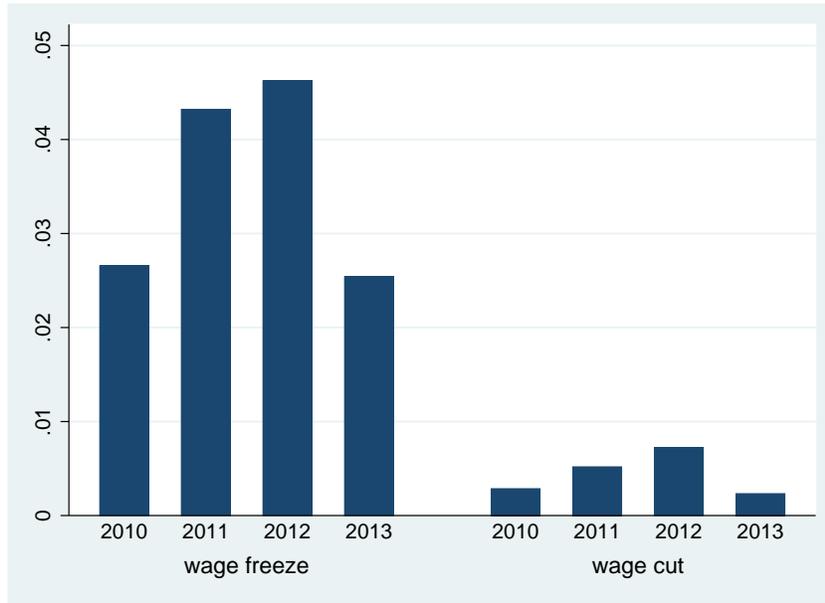


Figure 20: Wage freeze and wage cut by type of demand shock



4.4 Hiring decisions

Changes in hiring influence both the effect of the crisis on employment and the speed of recovery. Hiring difficulties may change over the business cycle, but there can also be structural problems. In Hungary, labour market conditions were slack in the reference period, while the size and the composition of the labour force changed, as well as labour market institutions. Thus, several factors influenced difficulties and conditions of hiring and firms' perceptions may provide unique information on obstacles to expanding employment.

Firms were asked about how the difficulty to hire new employees changed (in terms of hiring costs, including administrative costs) since 2010. While a majority of firms did not report changes in hiring difficulties, 20 per cent of them stated that it became more difficult to hire new employees, and only 11 per cent thought that it became easier. Furthermore, 16 per cent of respondents found it more difficult to lower the wage at which new employees are hired (compared to wages of similar incumbent employees), while 11 per cent found this became easier.

Above 50 per cent of those experiencing more difficulties in hiring said that it also became more difficult to lower wages at which the company hires new employees. More than a third of respondents attributed these developments to reforms of the labour code. On the other hand, 51 per cent of those who found it easier to lower wages at which the company hires new employees thought this was because of changes in the behaviour of individuals (for example their efforts to keep or find a job).

The share of firms indicating that hiring and lowering the wage of new employees became easier was highest among small enterprises (20-49 employees) and lowest among medium sized ones (50-250 employees). More companies in construction sector found that difficulties of hiring or the possibility to lower wages at hiring changed than in other sectors, while practically zero respondents in financial intermediation experienced an improvement of these factors.

Changes in hiring difficulties are related to the shocks experienced by respondents. Over a quarter of respondents experiencing a negative shock indicated that hiring became more difficult, followed by companies having experienced a positive shock, while the ratio of firms finding hiring more difficult was lowest among those experiencing no shock. Firms experiencing financial constraints (lack of access to finance or too onerous financing conditions) also found hiring more difficult with a higher probability.

Survey respondents were also asked about the relevance of potential obstacles to hiring a

Table 7: Per cent of firms reporting changes in the obstacles to hire new employees and to lower wages at which they hire new employees

	% of respondents experiencing a change attributing it to					
	a	b	c	d		
hiring new employees	more difficult	11.1 (0.71)	42.1 (3.64)	23.0 (3.10)	2.5 (1.14)	32.5 (3.45)
	did not change	69.1 (1.04)				
	less difficult	19.8 (0.90)	46.4 (2.67)	29.7 (2.45)	3.0 (0.92)	20.9 (2.18)
lower the wage at which the company hires new employees	more difficult	11.2 (0.72)	46.2 (5.06)	26.3 (4.47)	0.8 (0.89)	26.7 (4.49)
	did not change	72.9 (1.02)				
	less difficult	15.9 (0.84)	47.3 (3.28)	28.6 (2.97)	1.5 (0.80)	22.6 (2.75)

Note: weighted by firm weight, standard errors are in parenthesis. Answer options: a: reforms of labour laws, b: jurisprudence/ law enforcement, c: changes in trade unions'behaviour, d: changes in individuals'behaviour.

worker. Most enterprises mentioned uncertainty about economic conditions as the main obstacle, followed by high payroll taxes and high wages. SMEs mentioned these obstacles more frequently than large (200+) companies. All problems were considered more serious obstacles by non-tradable sectors. Uncertainty of the economic environment was an obstacle mainly for trade and construction firms, while it was least frequently mentioned by financial intermediation. High payroll taxes were mentioned as an obstacle mainly by firms in construction, trade and services sectors, while high wages were mentioned primarily by the construction sector. Firms having experienced negative shocks or being financially constrained mentioned all factors as an obstacle significantly more frequently than other firms.

Insufficient availability of labour was considered an obstacle by 39 per cent of respondents, mainly by medium sized enterprises and companies in manufacturing and construction sectors. By skill group lack of skilled manual applicants was considered as a main problem, followed by the lack of skilled non-manual applicants. Most respondents experienced both lack of appropriate education and lack of experience of applicants, while lack of applicants per se was mentioned less frequently.

New hires can also be used for adjustment in the presence of nominal rigidity as firms experiencing negative shocks may offer them lower wages compared to incumbent workers¹³. Although firms may be reluctant to decrease wages of their current employees, they may find it easier to decrease wages at which they hire. [Kézdi and Kónya \(2012\)](#), however, found that wages of new entrants are not a significant adjustment channel for the Hungarian firms and attributed this to firms' desire to pay "fair" wages and to use wages for motivation purposes. Results of this survey confirmed this behaviour. Only 14 per cent of respondents stated that wages of new entrants was lower than wages of incumbent employees before 2010, the ratio being somewhat higher for small and medium sized firms and in the construction sector. Even less, only 11 per cent of companies paid less to new entrants than to similar incumbents between 2010 and 2013, while the ratio of those paying higher wages increased somewhat (from 5 per cent to 9 per cent, see [Figure 21](#)). The ratio of firms paying lower wages to new entrants declined most for medium sized firms and for financial intermediation (from 22 per cent to 14 per cent and from 17 per cent to 2 per cent, respectively). Furthermore, firms that experienced negative shocks did not use wages of new entrants as an adjustment channel, while firms experiencing a positive shock paid either lower or higher wages to new entrants than to incumbent employees.

¹³E.g. [Pissarides \(2009\)](#)

Figure 21: Labour cost of newly hired relative to similar incumbent workers, total sample and by demand shock

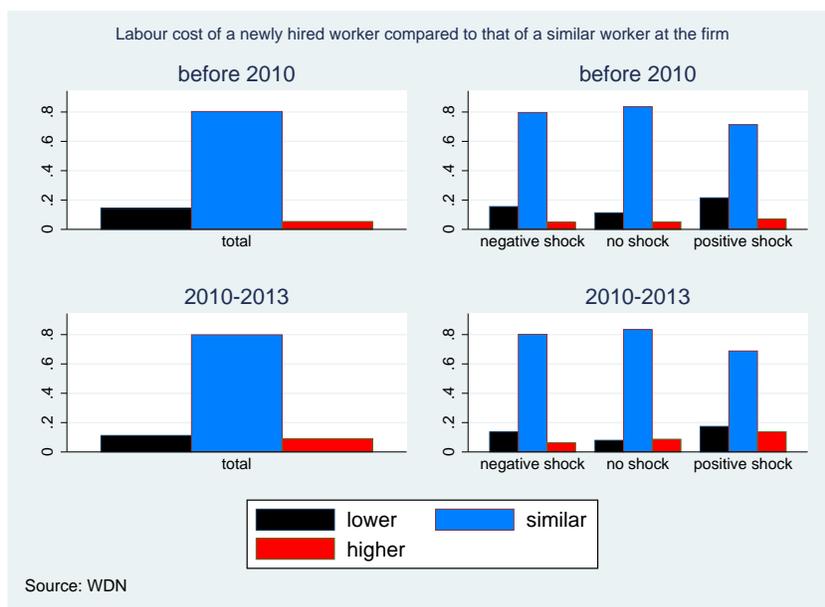


Table 8: Demand shocks and wages of new employees

		Lower wages		Similar wages		Higher wages	
Before 2010	All firms	15.4	(0.82)	79.3	(0.93)	5.4	(0.51)
	Negative demand shock	17.2	(1.51)	77.4	(1.67)	5.4	(0.90)
	No demand shock	12.0	(1.07)	83.3	(1.23)	4.7	(0.70)
	Positive demand shock	22.1	(2.19)	70.5	(2.41)	7.3	(1.38)
2010-2013	All firms	12.2	(0.74)	79.4	(0.92)	8.4	(0.63)
	Negative demand shock	15.3	(1.43)	78.4	(1.64)	6.4	(0.97)
	No demand shock	8.5	(0.92)	83.6	(1.22)	7.9	(0.89)
	Positive demand shock	17.4	(1.98)	69.1	(2.42)	13.5	(1.78)

Note: weighted by firm weight, standard errors are in parenthesis

4.5 Labour market policies

4.5.1 Minimum wage increase and required pay rise in 2012

Hungary introduced flat tax rate in 2011 and abolished employment tax credit. The latter resulted in a decrease of the net wage of those earning below median wages. The government increased the minimum wage by 19.2 per cent in 2012 and also set a non-compulsory "required pay rise" to keep the net value of the pay check. Firms could participate in the accompanying wage compensation scheme.

36 per cent of the respondents to this survey took part in the wage compensation scheme while the required pay rise covered an average 55 per cent of employees at these companies.¹⁴ The ratio of companies participating in the scheme was highest among micro enterprises (5-19 employees). Manufacturing and construction firms used the scheme more frequently. Companies having been positively affected by shocks used the scheme most frequently, followed by companies having been negatively hit by shocks. Having a collective agreement increased the unconditional probability of participating in the scheme.

77 per cent of survey respondents employed at least one minimum wage earner. The average ratio of minimum wage receivers was 31 per cent in the sample, both before and after the minimum wage increase. This ratio is somewhat higher in manufacturing and for medium-sized enterprises, and there is a slight positive correlation between the ratio of minimum wage earners and the probability of a negative shock. The ratio of minimum wage earners at the survey respondents is higher than available aggregate statistics suggest (5 per cent in salary structure database, 10 per cent according to National Labour Office (2013), 23 per cent in the Labour Force Survey (2014)). This large difference may be due to the fact that in the questionnaire we did not ask for exact calculations, and responses may have been upward biased.

The average ratio of minimum wage earners reported in the survey being very similar before and after the minimum wage increase suggests that the ratio of minimum wage earners did not change at all, however, this is not the case: 21 per cent of firms decreased, 15 per cent increased the ratio of minimum wage earners at least by 2 percentage points. The changes were non-negligible in both groups: on average 14 percentage points decline and 15 percentage points increase was reported.

All companies (including those who did not employ any minimum wage earners) could

¹⁴This is much smaller than found by the survey of the National Labour Office in 2013. They found that 73 per cent of the enterprises participated in the scheme.

answer the question on the effect of minimum wage increase, and most of them did (the non-response rate was below 2 per cent for all options). Most companies (52.3 per cent) increased productivity as a response to the minimum wage increase. The second most popular adjustment channel was price increase, followed by the decrease of non-labour costs and reduced hiring (chosen by 50 per cent, 49 per cent and 41 per cent, respectively). 25 per cent needed to decrease the wages of those earning above minimum wage while 18 per cent needed to fire labour. This latter is much higher than found by [Kézdi and Kónya \(2012\)](#) in the first survey of the Wage Dynamics Network. According to their results, less than 8 per cent of firms would lay off employees after a hypothetical 20 per cent increase of the minimum wage which may indicate that the costs associated with a minimum wage increase could be different along the business cycle.

Table 9: The effect of minimum wage increase

	Not relevant		Of little relevance		Relevant		Very relevant	
lay off people	82.5	(0.85)	12.6	(0.74)	4.8	(0.48)	0.1	(0.08)
hire less people	58.7	(1.10)	22.5	(0.94)	15.3	(0.81)	3.5	(0.41)
increase product prices	49.0	(1.12)	31.3	(1.04)	16.8	(0.84)	2.9	(0.37)
reduce non-labour costs	51.2	(1.12)	29.9	(1.03)	15.3	(0.81)	3.6	(0.42)
decrease the wages of employees above the minimum wage level	75.2	(0.97)	14.9	(0.80)	8.9	(0.64)	1.0	(0.22)
increased productivity	47.7	(1.12)	27.0	(1.00)	20.3	(0.90)	5.1	(0.49)

Most companies who did not employ any minimum wage earner did not fire employees or froze hiring in 2012 as a response to minimum wage increases. 30 per cent of these respondents, however, needed to increase prices, 29 per cent increased productivity, 25 per cent decreased non-labour costs and 22 per cent decreased hiring. These may be indirect effects of the minimum wage increase, however, they seem to be unexpectedly large for those. The decline of hiring by those who had no minimum-wage earners, however, indicates a significant indirect effect on employment levels.

Turning to the effect of the tax changes on wage setting, a little more than half of respondents took the effect of tax changes (affecting gross-net gap differently at different wage levels and the distribution of net wages) into consideration when setting gross wages in 2011. The ratio was higher for medium sized enterprises, in manufacturing and for foreign-owned enterprises. Firms having been positively affected by shocks took the effect of tax changes into consideration when setting gross wages more frequently than others. Those,

however, who were seriously credit constrained (lack of access to finance was very relevant for the firm) considered tax changes much less frequently when setting gross wages than others. Firms having a collective agreement took tax changes into consideration more frequently than others.

4.5.2 Job protection plan

The government introduced the *Job protection plan* in 2013 in order to foster the employment of the young, the long-term unemployed, parents returning from parental leave and the unskilled, groups that are characterised by low employment rates. The government reduced employers' contribution ¹⁵ significantly in case of hiring from these groups or keeping them in employment.

Half of the firms in the sample participated in the Job protection plan either by hiring a new employee or by not dismissing an incumbent one. Most firms (35 per cent) used the employers' contribution reduction to employ a young employee, followed by the employment of long-term unemployed (32 per cent). 28, 25 and 23 per cent used the tax reduction to employ those above 55, parents (returning from parental leave) and unskilled, respectively. While in most cases the companies hired new employees, 12 per cent of respondents stated that they did not fire an elderly employee because of the job protection plan.

Medium sized enterprises took advantage of the reduction more frequently than others, followed closely by large (200+) enterprises. Micro firms took part less frequently. The variance of answers is not very large by sector, but it is worth mentioning that manufacturing companies used reduction in all categories most intensively.

The contribution reduction in all categories was used by firms having been positively affected by shocks significantly more frequently than by firms having been negatively affected. The explanation may be that these firms hired more. The tax reduction for employing old was, however, most intensively used by firms negatively affected to keep the employees.

4.5.3 Change of the labour code

A new labour code was introduced during the 2010-2013 period that further increased the flexibility of labour market institutions as described in Section 2.2.

Firms were asked about developments in possibilities to change labour input between 2010 and 2013. 59.6 per cent of respondents found all factors unchanged, while those who

¹⁵Employers'contribution refers to the payments of employers to social security systems.

reported changes were on average balanced between the options "easier" and "more difficult". The two exceptions are the possibility "To adjust wages of incumbent employees" and "To hire employees (cost of recruitment, including administrative costs)" where the ratio of those reporting more difficulties was higher than those reporting easier conditions by 13 and 9 per cent, respectively. The highest ratio of firms finding that a possibility became easier was observed in case of individual lay-off, while the highest ratio of firms reporting more difficulties was observed in hiring employees, followed closely by the possibility to adjust wages of incumbent employees.

On average, firms attribute these changes mainly to reforms of the labour code and changes of jurisprudence/law enforcement. The ratio of firms attributing changes to reforms of the labour code was highest and above 38 per cent for each factor, while more than half of respondents thought changes of the possibility to adjust working hours happened because of labour code reforms. Changes of the possibility "to lay off employees for economic reasons (collectively)" is the factor where the ratio of attributing the change to jurisprudence/law enforcement was the highest, followed by "To lay off employees temporarily for economic reasons". The ratio of firms attributing developments to "changes in individual behaviour" ranged between 5 and 31 per cent, with the highest ratio found at "To lower wages at which you hire new employees" and the lowest at "To lay off employees for economic reasons (collectively)". The role of trade unions seemed to be limited, with the ratio of companies attributing changes to their behaviour between 3 and 13 per cent. Change of trade unions behaviour plaid the largest role in "To move employees to positions in other locations" and "To move employees across different job positions" and most firms thought these became more difficult.

On average, firms who found that factors became more difficult attributed these changes to reforms of the labour code and changes of jurisprudence/law enforcement with higher possibility than those who found factors easier (and with lower possibility to changes in individual behaviour). The most striking example is the possibility "To lower wages at which you hire new employees" where 51.4 per cent of those finding it easier attributed this to "changes in individuals behaviour" and only 28.6 per cent to reforms of the labour code while relevant ratios are 18 and 45.7 per cent in case of firms finding it more difficult to pay lower wages to new entrants. Exceptions from the above-mentioned rule are "To move employees to positions in other locations" and "To move employees across different job positions". In case of these factors, firms who found these more difficult attributed this

to "changes in trade unions behaviour" with higher possibility than firms who found these easier, and the opposite is true to "reforms of the labour code".

5 Conclusion

The firm-level survey of Wage Dynamics Network aimed at examining the shocks that firms experienced between 2010 and 2013 and their effects on the labour and wage adjustment. With the help of the survey data we were able to examine firms' perceptions as well as the distribution of shocks and reactions to them by firm type.

This paper provides descriptive evidence on what happened to the Hungarian corporate sector between 2010 and 2013. The results suggest that the crisis affected firms heterogeneously. However, the results should not be interpreted as a causal effect as we do not use exogenous variation in the intensity of the crisis on the adjustment of firms.

It is important to bear two points in mind when assessing the results: first, the questionnaire did not ask about the first, most serious phase of the crisis. In 2010-2013 demand conditions already improved somewhat compared to 2009. It is also possible that firms that were hit most by the crisis stopped operating by 2010 or by the time the survey was conducted. Second, while most questions of the WDN survey refer to the period 2010-2013, the questionnaire was filled in in 2014. The second part of the reference period, and mainly 2014 was characterised by an improving macroeconomic environment. It is possible that this influenced the answers: companies may have remembered the latest developments better and firms hit hardest by the crisis might have gone bankrupt, thus, the survey results may seem brighter than developments in the entire reference period. As a result of these two factors, the survey results may show smaller adjustment than what was going on.

The survey results highlighted some characteristics of the recent crisis that were unknown before. However, several questions were not examined here in detail and requires further research. For example, comparison of the Hungarian results with other countries was out of scope of this report. The effect of financial shocks on employment and wage setting as well as the effects of the minimum wage increase on employment and other variables would also require more examination. Finally, our results on changes of wage setting and wage rigidity should be important for monetary policy, and should be explored more.

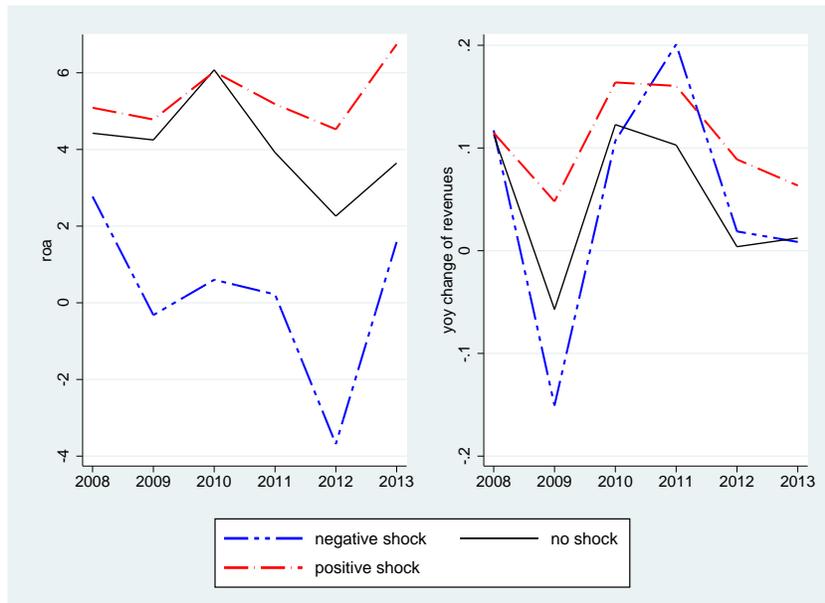
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A Figures

Figure 22: Financial shock and firm-level characteristics



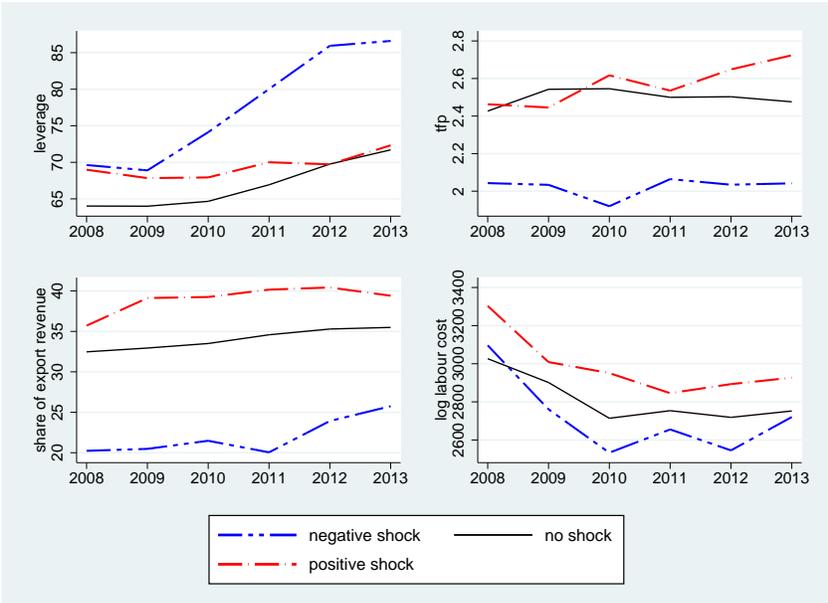


Figure 23: Change in total assets relative to 2010 by type of financial shock

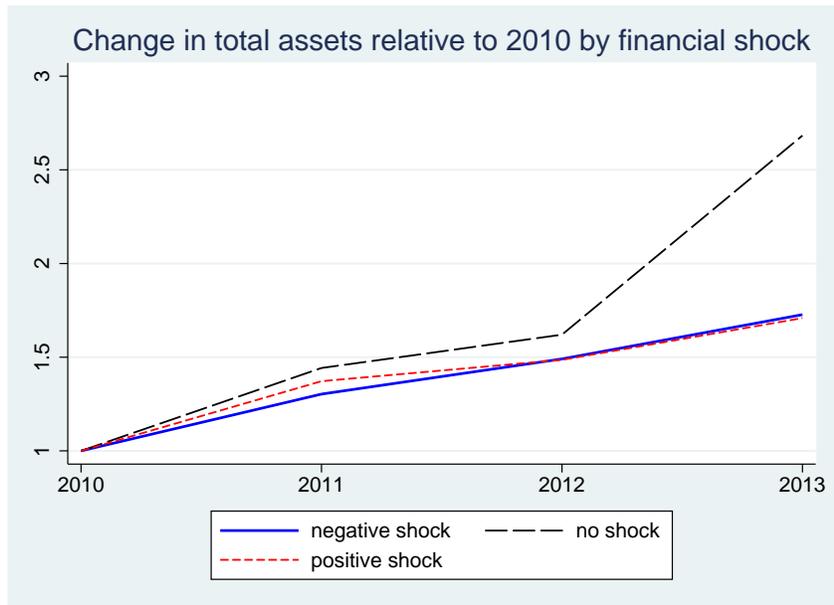


Figure 24: Change in non-equity liabilities relative to 2010 by type of financial shock

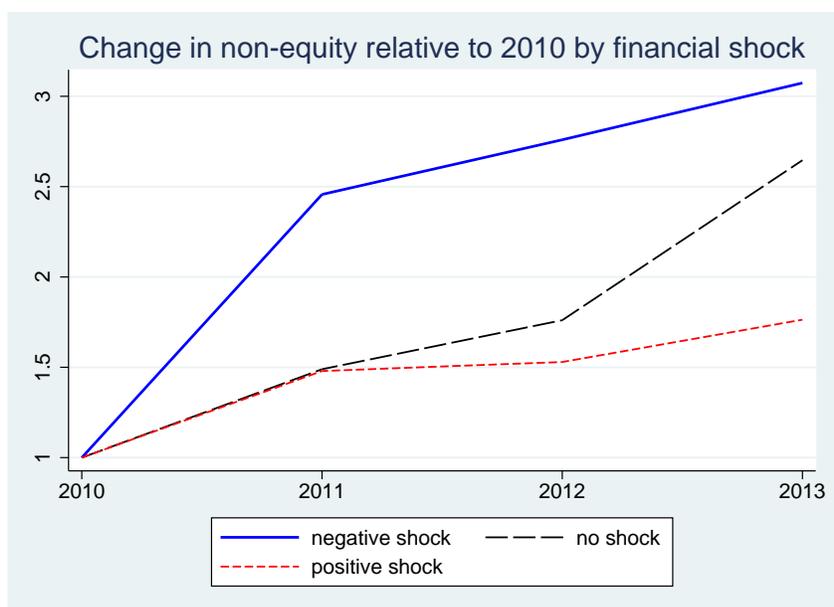
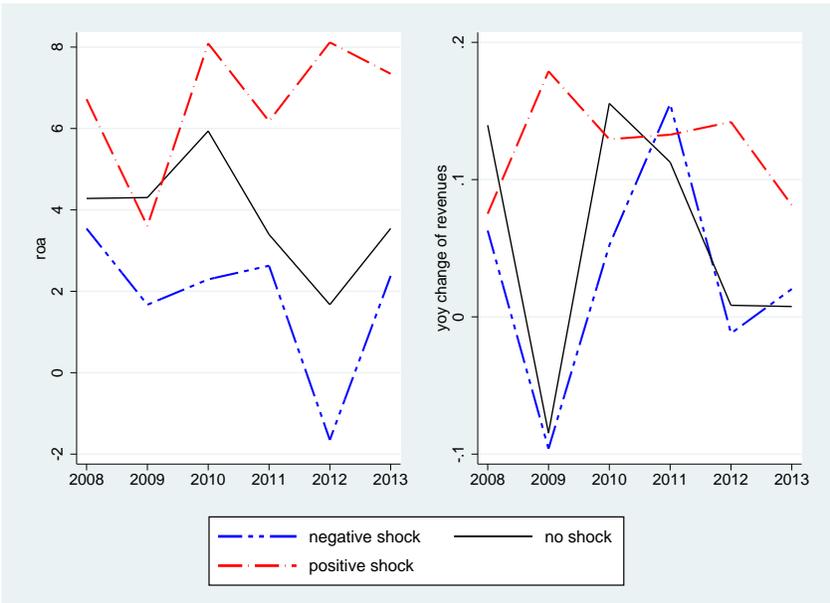
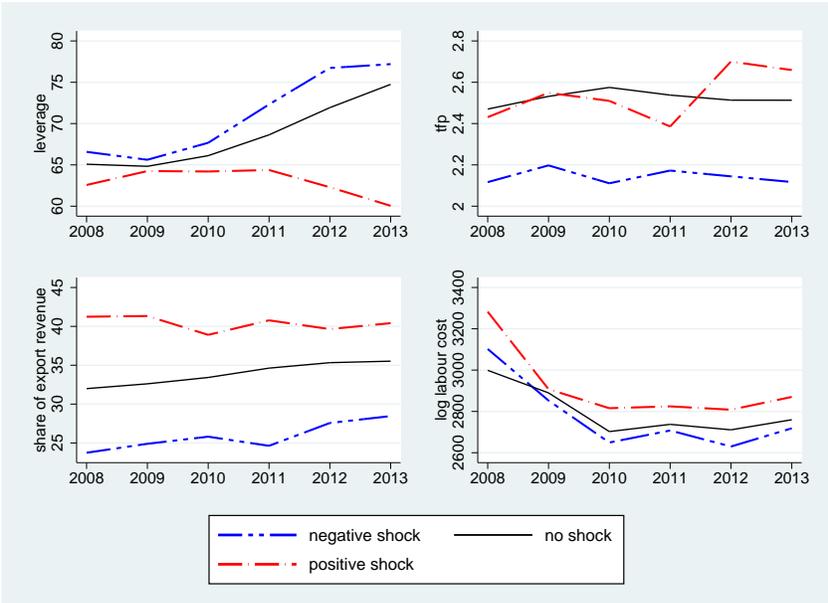


Figure 25: Customers' ability to pay and firm-level characteristics





B Tables

Table 10: Summary statistics

	Population		Sample		Representativeness	
	Firms	Employment	Firms	Employment	Firms	Employment
Total	55,613	1,720,584	2,032	302,520	3.7%	17.6%
Manufacturing	13,508	677,180	799	155,808	5.9%	23.0%
Construction	6,920	117,813	145	11,359	2.1%	9.6%
Trade	16,953	341,383	437	54,918	2.6%	16.1%
Services	16,582	452,291	445	51,818	2.7%	11.5%
Financial int	859	68,769	54	4,763	6.3%	6.9%
5-19	42,997	376,149	235	2,735	0.5%	0.7%
20-49	7,859	236,168	604	21,586	7.7%	9.1%
50-199	3,718	342,519	807	90,499	21.7%	26.4%
200+	1,039	765,748	386	187,700	37.2%	24.5%
WDN1	1,293	235,915	507	88,717	39.2%	37.6%

Table 11: Employment structure

Ratio of	permanent	part-time workers1	temporary or fixed-term workers1	agency and other workers
Macro (2013)				
Salary structure database	5.6		8.2	1.0
LFS	9.3		4.9	0.7
WDN3				
5-19	7.6	(1.16)	8.5	3.6 (1.97)
20-49	7.8	(0.64)	14.0	0.8 (0.23)
50-199	9.1	(0.56)	12.4	1.2 (0.21)
200+	8.6	(0.68)	14.8	2.5 (0.49)
Manufacturing	7.1	(0.40)	12.1	3.5 (0.79)
Construction	6.5	(0.82)	15.3	1.9 (0.52)
Trade	8.0	(0.74)	14.7	2.0 (0.36)
Services	11.2	(0.79)	12.3	2.0 (0.50)
Financial intermediation	4.0	(0.98)	38.4	0.0 (0.04)
Total sample	8.3	(0.33)	13.2	2.7 (0.38)

Ratio of	higher-skilled non-manual	lower-skilled non-manual	higher-skilled manual	lower-skilled manual
Macro (2013)				
Salary structure database	28.8	24.7	37.0	9.4
LFS	30.3	19.0	36.9	13.7
WDN3				
5-19	31.9	19.1	30.8	18.1
20-49	24.0	14.4	32.4	29.3
50-199	22.7	14.6	34.9	27.8
200+	20.8	16.8	31.5	30.9
Manufacturing	17.1	15.4	34.6	33.0
Construction	19.7	15.0	38.6	26.7
Trade	24.2	19.3	28.3	28.2
Services	33.6	18.4	28.4	19.6
Financial intermediation	57.2	34.5	5.4	3.0
Total sample	23.7	17.2	31.4	27.6

Ratio of	employees with tenure below 1 year	employees with tenure between 1-5 years	employees with tenure above
Macro (2013)			
Salary structure database	9.9	35.0	55.2
LFS	17.2	42.5	40.3
WDN3			
5-19	11.3	35.2	53.5
20-49	12.8	37.3	49.9
50-199	14.6	38.4	47.0
200+	18.1	39.4	42.5
Manufacturing	16.1	38.2	45.7
Construction	16.3	34.8	48.9
Trade	16.2	37.7	46.0
Services	16.3	39.4	44.3
Financial intermediation	11.4	36.2	52.5
Total sample	16.2	38.2	45.6

Note: weighted by firm weight, standard errors are in parenthesis, ratio of permanent part-time workers is the number of permanent part-time workers divided by the number of employees without agency and other workers (C3.1b/C3.1a), ratio of temporary of fixed-term workers is the number of temporary of fixed-term divided by the number of employees without agency and other workers (C3.1c/C3.1a), ratio of agency and other workers is the number of temporary of fixed-term workers divided by the number of employees without agency and other workers (C3.1c/C3.1a)

Table 12: Firm-level data used in regressions

Survey data:	Administrative data:
- firm size (log number of employees, question c3.3),	- industry,
- degree of competition (1 if competition is strong or very strong either on the domestic or on the foreign market, 0 otherwise, question nc5.4.),	- firm age in years (calculated from question c1.2 which was filled in using administrative data),
- ratio of minimum wage earners (question nc4.11),	- ratio of foreign ownership in 2010,
- ratio of highly skilled non-manual workers (question c3.2),	- ratio of export revenues in 2010,
- collective agreement (question c4.3)	- profitability level in 2010.

Table 13: Probability of a negative shock

	demand level	demand volatility	financial	customers' ability to pay	supply
log employment, 2009	-0.0111 (0.0286)	-0.0369** (0.0129)	-0.0261* (0.0112)	0.00213 (0.0253)	-0.0284** (0.0110)
share of export revenue, 2009	-0.00138* (0.000692)	-0.000593 (0.000575)	-0.000185 (0.000424)	-0.00153* (0.000708)	-0.000862 (0.000505)
foreign ownership, 2009	0.0259 (0.0425)	0.00777 (0.0443)	-0.0481 (0.0334)	0.0388 (0.0443)	0.0476 (0.0321)
state ownership, 2009	-0.0155 (0.0783)	-0.0817 (0.0556)	0.0899 (0.0941)	0.0918 (0.118)	0.0920 (0.0901)
ROA, 2009	-0.00282* (0.00125)	-0.00148 (0.00113)	-0.00287** (0.000874)	-0.00306* (0.00125)	-0.00193* (0.000886)
age	-0.00329 (0.00517)	0.000561 (0.00303)	0.00207 (0.00231)	-0.00311 (0.00475)	0.000334 (0.00236)
construction	0.0209 (0.0692)	0.234* (0.0987)	-0.00397 (0.0504)	-0.0318 (0.0680)	-0.0421 (0.0477)
trade	0.0478 (0.0853)	0.0515 (0.0827)	0.0179 (0.0440)	0.0869 (0.0898)	-0.0294 (0.0450)
services	-0.107* (0.0454)	-0.0729 (0.0455)	-0.0812* (0.0346)	-0.116* (0.0499)	-0.0938* (0.0391)
financial intermediation	0.221* (0.109)	0.322** (0.106)	0.250* (0.109)	0.208 (0.110)	0.118 (0.114)
intensive competition=1	0.0826* (0.0321)	0.0621 (0.0337)	0.0893*** (0.0269)	0.136*** (0.0330)	0.0642* (0.0282)
collective agreement=1	0.0133 (0.0475)	0.0211 (0.0371)	0.0776* (0.0342)	0.0259 (0.0518)	0.0328 (0.0306)
bonus/total wage bill	-0.000738 (0.00130)	-0.000247 (0.00102)	0.00177 (0.000982)	0.00179 (0.00149)	0.00195* (0.000972)
share of skilled labor	-0.00258** (0.000952)	-0.00138 (0.000772)	-0.000627 (0.000723)	-0.00217* (0.000954)	-0.000617 (0.000628)
share of minimum wage earners	0.000654 (0.000864)	0.00218** (0.000713)	0.00172** (0.000623)	0.000362 (0.000827)	0.00127* (0.000611)
Constant	0.416*** (0.101)	0.430*** (0.0890)	0.297*** (0.0648)	0.354*** (0.0993)	0.328*** (0.0661)
R ²	0.053	0.073	0.060	0.063	0.043
Observations	1784	1773	1764	1753	1734

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 14: Firm characteristics and return in assets in 2013

	roa	roa	roa	roa	roa	roa
negative demand level shock	-2.773** (0.884)					-2.372 (1.709)
negative demand volatility shock		-1.753 (1.075)				1.507 (1.820)
negative financial shock			-2.051* (0.992)			0.309 (1.531)
negative customers shock				-2.573** (0.965)		-1.557 (1.532)
negative supply shock					-2.327* (1.175)	-0.823 (1.986)
construction	-2.311 (2.237)	-2.143 (2.282)	-2.281 (2.261)	-2.439 (2.260)	-2.541 (2.249)	-2.818 (2.240)
trade	-1.993 (1.215)	-2.224 (1.316)	-2.072 (1.280)	-1.894 (1.225)	-2.353 (1.324)	-2.095 (1.254)
services	0.383 (1.322)	0.352 (1.348)	0.590 (1.324)	0.513 (1.318)	0.167 (1.329)	0.267 (1.347)
financial intermediation	-0.888 (2.265)	-1.499 (2.324)	-0.998 (2.288)	-0.789 (2.283)	-0.143 (2.486)	0.418 (2.454)
collective agreement	-1.160 (1.094)	-1.269 (1.151)	-1.105 (1.150)	-1.189 (1.127)	-1.343 (1.157)	-1.321 (1.167)
bonus/total wage bill	0.0692* (0.0350)	0.0744* (0.0354)	0.0814* (0.0361)	0.0805* (0.0359)	0.0883* (0.0362)	0.0843* (0.0366)
share of skilled labor	0.0297 (0.0296)	0.0390 (0.0300)	0.0348 (0.0306)	0.0310 (0.0300)	0.0290 (0.0296)	0.0143 (0.0303)
share of minimum wage earners	0.00185 (0.0164)	0.000469 (0.0175)	0.00107 (0.0167)	-0.000933 (0.0165)	0.00581 (0.0168)	0.00192 (0.0174)
share of export revenue, 2009	0.00760 (0.0170)	0.00861 (0.0175)	0.0106 (0.0172)	0.00785 (0.0175)	0.00790 (0.0170)	0.00405 (0.0177)
foreign ownership, 2009	-0.683 (1.134)	-0.936 (1.169)	-0.865 (1.150)	-0.723 (1.166)	-1.389 (1.074)	-1.125 (1.091)
state ownership, 2009	-3.293 (2.053)	-3.438 (2.046)	-2.992 (1.968)	-3.029 (1.958)	-2.958 (1.976)	-2.846 (1.960)
log employment, 2009	-0.736 (0.564)	-0.700 (0.584)	-0.781 (0.586)	-0.745 (0.568)	-0.843 (0.591)	-0.864 (0.587)
ROA, 2009	0.277*** (0.0404)	0.281*** (0.0410)	0.280*** (0.0416)	0.277*** (0.0404)	0.301*** (0.0396)	0.294*** (0.0402)
log sales, 2009	0.155 (0.518)	0.124 (0.525)	0.182 (0.529)	0.197 (0.523)	0.463 (0.487)	0.551 (0.495)
age	-0.0902 (0.0764)	-0.0704 (0.0797)	-0.0781 (0.0801)	-0.0909 (0.0768)	-0.0501 (0.0799)	-0.0775 (0.0778)
Constant	7.244 (5.825)	6.787 (5.910)	6.139 (5.947)	6.507 (5.886)	2.103 (5.163)	2.157 (5.274)
R^2	0.134	0.126	0.130	0.133	0.140	0.142
Observations	1751	1731	1701	1729	1701	1648

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Firm characteristics and log sales in 2013

	log sales					
negative demand level shock	-0.239** (0.0912)					0.00247 (0.0902)
negative demand volatility shock		-0.269** (0.0958)				-0.0446 (0.108)
negative financial shock			-0.365*** (0.0838)			-0.146* (0.0727)
negative customers shock				-0.256*** (0.0704)		-0.0297 (0.0854)
negative supply shock					-0.325*** (0.0725)	-0.187* (0.0896)
construction	-0.166 (0.139)	-0.101 (0.141)	-0.164 (0.136)	-0.175 (0.137)	-0.164 (0.137)	-0.151 (0.148)
trade	0.0365 (0.0694)	0.0299 (0.0664)	0.0399 (0.0657)	0.0521 (0.0676)	-0.00549 (0.0615)	0.00697 (0.0608)
services	-0.0621 (0.0747)	-0.0574 (0.0767)	-0.0562 (0.0772)	-0.0590 (0.0769)	-0.0870 (0.0738)	-0.0828 (0.0758)
financial intermediation	-0.165 (0.195)	-0.148 (0.187)	-0.152 (0.198)	-0.178 (0.196)	0.0359 (0.121)	0.0770 (0.131)
collective agreement	0.170* (0.0764)	0.158* (0.0773)	0.192* (0.0800)	0.164* (0.0781)	0.142* (0.0688)	0.152* (0.0710)
bonus/total wage bill	-0.000956 (0.00258)	-0.000840 (0.00258)	-0.0000290 (0.00256)	-0.000338 (0.00262)	0.00142 (0.00218)	0.00135 (0.00214)
share of skilled labor	0.00220 (0.00324)	0.00250 (0.00302)	0.00276 (0.00350)	0.00234 (0.00335)	-0.000683 (0.00146)	-0.00113 (0.00160)
share of minimum wage earners	-0.00265 (0.00151)	-0.00247 (0.00155)	-0.00225 (0.00140)	-0.00278 (0.00151)	-0.00128 (0.00106)	-0.00123 (0.00115)
share of export revenue, 2009	0.00377*** (0.000760)	0.00409*** (0.000759)	0.00413*** (0.000769)	0.00388*** (0.000781)	0.00393*** (0.000667)	0.00391*** (0.000686)
foreign ownership, 2009	0.197 (0.141)	0.192 (0.142)	0.182 (0.141)	0.199 (0.142)	0.0565 (0.0560)	0.0506 (0.0571)
state ownership, 2009	-0.246* (0.113)	-0.249* (0.113)	-0.203 (0.112)	-0.203 (0.114)	-0.175 (0.105)	-0.183 (0.102)
log employment, 2009	0.00408 (0.0367)	-0.000933 (0.0339)	-0.00244 (0.0352)	0.00389 (0.0372)	-0.0330 (0.0270)	-0.0331 (0.0273)
ROA, 2009	-0.00862 (0.00515)	-0.00839 (0.00508)	-0.00903 (0.00534)	-0.00875 (0.00514)	-0.00296 (0.00195)	-0.00313 (0.00201)
log sales, 2009	0.813*** (0.0745)	0.810*** (0.0749)	0.810*** (0.0756)	0.814*** (0.0751)	0.904*** (0.0236)	0.899*** (0.0238)
age	-0.0285*** (0.00689)	-0.0276*** (0.00664)	-0.0271*** (0.00664)	-0.0286*** (0.00697)	-0.0225*** (0.00488)	-0.0221*** (0.00481)
Constant	3.425** (1.060)	3.445** (1.070)	3.426** (1.066)	3.402** (1.066)	2.152*** (0.376)	2.240*** (0.368)
R^2	0.828	0.829	0.829	0.828	0.877	0.875
Observations	1746	1726	1696	1724	1697	1644

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: Firm characteristics and log employment in 2013

	log employment					
negative demand level shock	-0.140 (0.0784)					0.0632 (0.0875)
negative demand volatility shock		-0.192** (0.0709)				-0.0959 (0.0922)
negative financial shock			-0.252*** (0.0674)			-0.130 (0.0699)
negative customers shock				-0.163* (0.0637)		-0.00700 (0.0728)
negative supply shock					-0.220*** (0.0622)	-0.116 (0.0794)
construction	0.00585 (0.0949)	0.0576 (0.100)	0.0124 (0.0944)	0.00446 (0.0943)	0.00825 (0.0969)	0.0389 (0.107)
trade	0.115 (0.0864)	0.116 (0.0843)	0.128 (0.0826)	0.128 (0.0839)	0.0972 (0.0864)	0.108 (0.0838)
services	0.181 (0.0930)	0.193* (0.0946)	0.188* (0.0955)	0.184 (0.0939)	0.172 (0.0949)	0.186 (0.0960)
financial intermediation	-0.0949 (0.122)	-0.0700 (0.119)	-0.0735 (0.125)	-0.0972 (0.122)	0.00872 (0.0957)	0.0420 (0.101)
collective agreement	0.0966 (0.0685)	0.0916 (0.0683)	0.109 (0.0697)	0.0872 (0.0691)	0.0691 (0.0665)	0.0865 (0.0674)
bonus/total wage bill	-0.000465 (0.00224)	-0.000343 (0.00221)	0.000223 (0.00224)	-0.0000671 (0.00227)	0.00103 (0.00208)	0.00114 (0.00206)
share of skilled labor	-0.000700 (0.00215)	-0.000605 (0.00202)	-0.000271 (0.00231)	-0.000623 (0.00222)	-0.00279* (0.00113)	-0.00280* (0.00120)
share of minimum wage earners	-0.00151 (0.00118)	-0.00127 (0.00119)	-0.00126 (0.00110)	-0.00160 (0.00118)	-0.000699 (0.000939)	-0.000392 (0.000987)
share of export revenue, 2009	0.00278*** (0.000729)	0.00299*** (0.000739)	0.00306*** (0.000743)	0.00288*** (0.000738)	0.00294*** (0.000707)	0.00303*** (0.000702)
foreign ownership, 2009	0.147 (0.104)	0.146 (0.104)	0.139 (0.104)	0.151 (0.104)	0.0569 (0.0649)	0.0512 (0.0669)
state ownership, 2009	0.0109 (0.131)	0.00279 (0.131)	0.0429 (0.135)	0.0439 (0.135)	0.0598 (0.137)	0.0449 (0.136)
log employment, 2009	0.797*** (0.0447)	0.791*** (0.0424)	0.791*** (0.0432)	0.797*** (0.0447)	0.774*** (0.0393)	0.770*** (0.0389)
ROA, 2009	-0.00384 (0.00345)	-0.00361 (0.00341)	-0.00439 (0.00356)	-0.00399 (0.00344)	-0.000220 (0.00171)	-0.000419 (0.00174)
log sales, 2009	0.000513 (0.0517)	0.000222 (0.0519)	-0.00220 (0.0520)	0.000949 (0.0520)	0.0559* (0.0268)	0.0533* (0.0270)
age	-0.0175** (0.00638)	-0.0165** (0.00619)	-0.0166** (0.00625)	-0.0174** (0.00645)	-0.0134* (0.00548)	-0.0129* (0.00524)
Constant	1.512* (0.710)	1.514* (0.714)	1.530* (0.707)	1.501* (0.712)	0.745* (0.347)	0.788* (0.345)
R^2	0.788	0.790	0.791	0.790	0.826	0.826
Observations	1746	1726	1696	1724	1697	1644

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 17: Share of firms having experienced shocks, and share of firms having experienced a negative shock

	positive or negative shock		negative shock	
demand level	47.1	(1.11)	28.3	(1.00)
demand volatility	40.7	(1.10)	26.5	(0.99)
access to external financing	28.1	(1.02)	17.9	(0.87)
customers? ability to pay	37.6	(1.08)	28.1	(1.01)
access to supply of usual suppliers	26.8	(1.00)	16.3	(0.83)
any shock	61.2	(1.08)	39.4	(1.08)

Note: weighted by firm weight, standard errors are in parenthesis

Table 18: Correlations among shocks

	demand level	demand volatility	access to external financing	customers' ability to pay	access to supply of usual suppliers
demand level	1				
demand volatility	0.78	1			
access to external financing	0.54	0.57	1		
customers' ability to pay	0.62	0.60	0.63	1	
access to supply of usual suppliers	0.56	0.57	0.63	0.67	1

Note: unweighted, calculated on a 3-grade scale; correlations calculated on a 5-grade scale are very similar

Table 19: Per cent of firms reporting a decrease, no change and increase of domestic and foreign demand and prices

	Domestic demand		Foreign demand		Domestic prices		Foreign prices	
decrease	30.6	(1.03)	15.4	(0.92)	14.1	(0.78)	9.8	(0.76)
no change	47.2	(1.12)	61.7	(1.24)	48.5	(1.12)	61.5	(1.25)
increase	22.2	(0.93)	22.9	(1.07)	37.4	(1.08)	28.7	(1.16)

Note: weighted by firm weight, standard errors are in parenthesis

Table 20: Sign of demand level shock versus changes of domestic and foreign demand

		Domestic demand				Foreign demand			
		decrease		increase		decrease		increase	
Demand level	decrease	76.6	(1.64)	2.9	(0.65)	37.7	(2.24)	10.0	(1.39)
	no change	14.9	(1.15)	17.3	(1.22)	9.9	(1.08)	15.8	(1.31)
	increase	5.0	(1.13)	66.1	(2.46)	1.5	(0.70)	60.9	(2.82)

Note: weighted by firm weight, standard errors are in parenthesis

Table 21: Correlations among types of financial constraints

	Lack of access to credit to			Too onerous conditions on credit to		
	finance working capital	finance new investment	refinance debt	finance working capital	finance new investment	refinance debt
Lack of access to credit to						
finance working capital	1					
finance new investment	0.87	1				
refinance debt	0.84	0.81	1			
Too onerous conditions on credit to						
finance working capital	0.32	0.34	0.36	1		
finance new investment	0.34	0.35	0.35	0.88	1	
refinance debt	0.35	0.35	0.40	0.84	0.88	1

Note: unweighted

Table 22: Per cent of firms reporting change of total costs by size and sector

	Decrease		No change		Increase	
5-19	11.2	(2.08)	35.3	(3.15)	53.4	(3.28)
20-49	7.7	(1.09)	26.0	(1.80)	66.3	(1.94)
50-199	6.2	(0.86)	27.1	(1.58)	66.7	(1.67)
200+	6.3	(1.25)	35.1	(2.45)	58.6	(2.53)
Manufacturing	8.4	(0.99)	36.1	(1.71)	55.6	(1.77)
Construction	2.7	(1.38)	41.1	(4.14)	56.2	(4.18)
Trade	2.9	(0.80)	28.4	(2.17)	68.7	(2.23)
Services	10.8	(1.28)	35.9	(1.98)	53.2	(2.06)
Financial intermediation	1.3	(1.60)	19.5	(5.66)	79.3	(5.79)
Total	7.6	(0.59)	34.6	(1.06)	57.8	(1.10)

Note: weighted by firm weight, standard errors are in parenthesis

Table 23: Per cent of firms reporting change of labour costs by size and sector

	Decrease		No change		Increase	
5-19	6.9	(1.67)	36.8	(3.18)	56.3	(3.27)
20-49	7.3	(1.07)	28.5	(1.85)	64.1	(1.96)
50-199	6.3	(0.86)	26.5	(1.57)	67.2	(1.67)
200+	4.7	(1.08)	32.6	(2.40)	62.7	(2.47)
Manufacturing	5.3	(0.80)	34.4	(1.69)	60.3	(1.74)
Construction	13.9	(2.90)	23.5	(3.56)	62.7	(4.06)
Trade	2.1	(0.68)	26.4	(2.11)	71.5	(2.16)
Services	6.5	(1.02)	39.1	(2.01)	54.4	(2.06)
Financial intermediation	1.7	(1.83)	20.0	(5.72)	78.3	(5.89)
Total	5.4	(0.50)	33.3	(1.05)	61.3	(1.09)

Table 24: Frequency of measured used to reduce or alter the composition of labour force

	Yes of which:			
	marginally	moderately	strongly	
Collective layoff	38.4 (2.65)	22.5 (2.27)	10.6 (1.68)	5.3 (1.22)
Individual layoff	82.6 (2.04)	40.1 (2.64)	32.9 (2.53)	9.6 (1.59)
Temporary layoff	39.8 (2.68)	25.1 (2.38)	10.9 (1.71)	3.8 (1.05)
Subsidised reduction of working hours	29.1 (2.49)	18.8 (2.14)	8.3 (1.51)	2.0 (0.78)
Non-subsidised reduction of working hours (including reduction of overtime)	44.4 (2.72)	30.2 (2.51)	10.2 (1.65)	4.0 (1.07)
Non-renewal of temporary contracts at expiration	72.4 (11.77)	45.2 (11.83)	22.8 (11.74)	13.8 (11.67)
Early retirement schemes	45.1 (2.72)	29.7 (2.50)	11.4 (1.74)	3.9 (1.06)
Freeze or reduction of new hires	49.7 (2.72)	19.0 (2.14)	21.1 (2.22)	9.6 (1.61)
Reduction of agency workers and others	28.3 (2.61)	12.4 (1.91)	11.4 (1.84)	4.5 (1.20)

Note: weighted by firm weightⁱ, standard errors are in parenthesis

Table 25: Reductions of employers' contribution in the Job protection plan

Target group	Duration	Employers' contribution
under 25, career starter over 55	2 years	12.5 % instead of 27 %
unskilled parents returning from parental leave	3 years for parents with maximum 2 children, 5 years for parents with minimum 3 children	12.5 % instead of 27 % 12.5 % instead of 27 %
long-term (over 183 days) unemployed	unem- 3 years	0 in the first two years, 12.5 % instead of 27 % in the third year of employment 0 in the first three years, 12.5 % instead of 27 % in the fourth and fifth year of employment 0 in the first two years, 12.5 % instead of 27 % in the third year of employment

Note: weighted by firm weight, standard errors are in parenthesis

Table 26: Per cent of firms stating that actions became more or less difficult

	Easier	No change	More difficult
To lay off employees for economic reasons (collectively)	10.2 (0.70)	78.1 (0.96)	11.7 (0.75)
To lay off employees for economic reasons (individually)	14.5 (0.80)	71.5 (1.03)	14.0 (0.79)
To dismiss employees for disciplinary reasons	11.0 (0.72)	81.3 (0.89)	7.7 (0.61)
To lay off employees temporarily for economic reasons	10.8 (0.72)	78.0 (0.96)	11.2 (0.73)
To hire employees (cost of recruitment, including administrative costs)	11.1 (0.71)	69.1 (1.04)	19.8 (0.90)
To adjust working hours	10.8 (0.70)	77.2 (0.95)	12.0 (0.74)
To move employees to positions in other locations	9.6 (0.68)	80.1 (0.92)	10.3 (0.70)
To move employees across different job positions	11.2 (0.72)	78.8 (0.93)	10.0 (0.68)
To adjust wages of incumbents employees	6.7 (0.57)	73.8 (1.00)	19.5 (0.90)
To lower wages at which you hire new employees	11.2 (0.72)	72.9 (1.02)	15.9 (0.84)

Note: weighted by firm weight, standard errors are in parenthesis

Table 27: Intensity of using job protection plan

	Not at all	Yes, by new hires	Yes, by cancelation of planned dismissals
the unskilled (ISCO-9)	73.3 (1.05)	22.9 (1.00)	3.9 (0.46)
the young (below age 25)	59.3 (1.16)	37.9 (1.15)	2.8 (0.39)
the old (above age 55)	67.4 (1.11)	18.6 (0.92)	14.0 (0.83)
parents returning from maternity leave	70.6 (1.08)	22.6 (1.00)	6.8 (0.60)
long-run unemployed	62.6 (1.15)	35.3 (1.14)	2.1 (0.34)