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Gábor Kézdi–István Kónya

Wage setting in Hungary: evidence from a firm survey

MNB OCCASIONAL PAPERS 103.
2012

MAGYAR NEMZETI BANK

Gábor Kézdi–István Kónya

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2012

This paper contains research conducted within the Wage Dynamics Network (WDN). The WDN is a research network consisting of economists from the European Central Bank (ECB) and the national central banks (NCBs) of the EU countries. The WDN aims at studying in depth the features and sources of wage and labour cost dynamics and their implications for monetary policy. The specific objectives of the network are: i) identifying the sources and features of wage and labour cost dynamics that are most relevant for monetary policy and ii) clarifying the relationship between wages, labour costs and prices both at the firm and macroeconomic level. The Hungarian research projects conducted within the WDN are published either in the MNB Working Papers series or as MNB Occasional Papers. Some of the studies are also available as ECB Working Paper.

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

Occasional Papers 103.

Wage setting in Hungary: evidence from a firm survey

(Bérmegállapítás Magyarországon: egy vállalati felmérés eredményei)

Written by: Gábor Kézdi*, István Kónya**

(Magyar Nemzeti Bank, Research)

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* Central European University, IEHAS, and Magyar Nemzeti Bank, kezdig@ceu.hu.

** Magyar Nemzeti Bank and Central European University, konyai@mnb.hu.

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Abstract

This paper presents new evidence on the flexibility of the Hungarian labor market, with special emphasis on wages. The results are based on a new survey on wage setting among Hungarian firms. The survey is part of the Eurosystem Wage Dynamics Network (WDN), and it is a harmonized questionnaire administered in 17 countries in Europe, including almost all Euro Area countries as well as five Central and Eastern European countries. The survey results show that the Hungarian labor market, while institutionally flexible, appears to be surprisingly rigid. The survey evidence points to low turnover and possibly more rigid wages than previously thought.

Keywords: wage setting, survey, wage dynamics network, Hungary.
JEL: C83, J01, J30.

Összefoglaló

A tanulmány a magyar munkapiac rugalmasságáról ismertet új tényeket, különös tekintettel a bérekre. Az eredmények egy új, a magyar vállalatok bérmegállapítására vonatkozó kérdőíven alapulnak. A felmérés része az EKB „Wage Dynamics Network" kutatási hálózatának. A harmonizált kérdőívet 17 európai országban kérdezték le, beleértve a legtöbb eurozónabeli tagországot, valamint 5 közép- és kelet-európai országot is. A felmérés eredményei azt mutatják, hogy bár a munkapiaci intézmények rugalmasak, a magyar munkapiac meglepően merev. A kérdőív alapján ennek okai lehetnek az alacsony munkapiaci áramlások, valamint a korábban gondoltnál merevebb bérek.

Non-technical summary

This paper presents new evidence on the flexibility of the Hungarian labor market, with special emphasis on wages. The results are based on a new survey on wage setting among Hungarian firms. The survey is part of the Eurosystem Wage Dynamics Network (WDN), coordinated by the European Central Bank (ECB). It is a harmonized questionnaire administered in 17 countries in Europe, including almost all Euro Area countries as well as five Central and Eastern European countries. Here we focus on the Hungarian results and use the results from the other countries to put the Hungarian findings in context. For a general overview of the WDN survey, see Babecky et al. (2009), Bertola et al. (2010), Druant et al. (2009) and Galuščák et al. (2010).

Our paper identifies facts of wage determination in Hungarian firms. Whenever possible, we present the Hungarian results together with average results from the other Central and Eastern European (CEE) countries (the Czech Republic, Estonia, Lithuania and Poland) as well as the Euro Area (EA) countries. We also present the most important findings by sector and firm size. After establishing the facts, we make sense of them in the light of theories of wage setting. We also draw some tentative policy conclusions.

Our most important findings are the following.

1. Worker turnover in Hungary is low, especially among small and medium sized enterprises. In that respect, Hungary stands out from the analyzed CEE countries.

2. Hungarian firms do not face formal institutional constraints in wage setting, with the important exception of the minimum wage.

3. Despite this fact, wages appear rigid, particularly base wages. They are reset on average once a year at most, in a time-dependent fashion. In terms of frequency, Hungary is similar to the EA and other CEE countries, although wage setting in the other CEE countries is less time-dependent.

4. Wages are irresponsive to temporary shocks. Firms are accommodating these shocks by cutting other costs, and to a lesser degree, changing prices, margins and output.

5. It is unclear whether flexible wage components are used to absorb external shocks. The survey answers are contradictory in this respect, and call for further investigation.

6. By 2006 the minimum wage is a binding constraint for firms. A 20 per cent minimum wage increase would not induce massive layoffs, but it would spill over to other workers, and lead to an additional 2 per cent increase in average wages.

7. The frequencies of wage and price setting are not synchronized, at least not by explicit mechanisms.

8. Overall, in terms of its formal institutions, the Hungarian labor market is flexible, similarly to other CEE countries. In terms of outcomes, however, it is more similar to the more rigid Euro Area countries.

We can draw a few tentative policy conclusions from these facts. First, lower levels of real flexibility of the Hungarian small and medium size enterprises have direct consequences for efficient allocation of resources and economic growth. We can only guess the reasons behind lower flexibility, but high taxes and welfare benefits are likely to play an important

role. Therefore the reduction of taxes and reforming the benefit system is important in order to increase labor market flexibility as well.

Second, the fact that Hungarian firms use non-labor costs to adjust for adverse shocks has important implications for monetary policy. We speculated that firms may use investment or capital utilization for adjustment. Since investment is sensitive to changes in monetary conditions, monetary policy may have a bigger impact on firm behavior than previously thought. An important caveat, however, is that the role of flexible wage components is unclear from the contradictory answers to different sets of questions.

Downward nominal wage rigidity is also important for monetary policy. While DNWR was not binding for Hungarian firms in the sample period, it is clearly present in the wage setting decision. Thus as productivity growth slows down and inflation declines, DNWR may become an important constraint for nominal wage adjustment at least for some firms and employees. The aggregate implications of this are not clear, and merit further research.

Some of these results are new, others are in line with previous findings, and yet others are at odds with those. Previous research suggests that wages in Hungary are rather flexible in European comparison, and labor institutions are also relatively flexible, with the potential exception of the effect of the minimum wage. On the other hand, other aspects of the Hungarian labor market may show significantly less flexibility. For important references, see Kőrösi (2003), Kertesi and Köllő (2003), Horváth and Szalai (2008), Kátay (2008), Kőrösi (2007), Köllő and Nacsa (2007), Commander and Köllő (2008). Our findings are based on descriptive evidence from one survey. Most of our results thus pose questions rather than giving definite answers. In particular, the results that conflict with previous findings call for further investigations.

1 Introduction

The functioning of the labor market is central to the macroeconomic performance of a country. Labor market flexibility allows economies to adjust to temporary shocks and permanent changes. Thus it is a key question whether labor markets in particular countries are indeed flexible, and if not, what are the main constraints that prevent adjustment.

Labor market adjustment can occur through changes in employment, hours, and wages. In different countries, any of these can be subject to rigidities, due to unionization, government intervention, and even to optimal human resource management at the firm level. While the flexibility in employment and hours are primarily important to determine long-run unemployment, the behavior of wages also influences inflation dynamics. Empirical evidence on labor market flexibility in general, and on wage flexibility in particular, is thus crucial to economic policy making.

This paper presents new evidence on the flexibility of the Hungarian labor market, with special emphasis on wages. The results are based on a new survey on wage setting among Hungarian firms. The survey is part of the Eurosystem Wage Dynamics Network (WDN). It is a harmonized questionnaire administered in 17 countries in Europe, including almost all Euro Area countries as well as five Central and Eastern European countries. Here we mainly focus on the Hungarian results and use the results from the other countries to put the Hungarian findings in context. For a general overview of the WDN survey, see Babecky et al. (2009), Bertola et al. (2010), Druant et al. (2009) and Galuščák et al. (2010).

The WDN is a research network coordinated by the European Central Bank (ECB). It includes all Euro Area countries and most of the other members of the European Union. Its main goals are 'studying in depth the features and sources of wage and labor cost dynamics and their implications for monetary policy in the euro area'.[1]

Within this broad mandate, the WDN survey is an important effort to collect first-hand evidence on how firms set their wages (and prices).The questions are designed to provide researchers with a set of stylized facts that characterize wage setting, and to facilitate the empirical validation of different theories of wage setting. The survey includes a core set of questions common to all national questionnaires, a set of additional questions that were optional for each country, and it also allowed country teams to ask further, country-specific questions.

This is a descriptive paper with two aims. The first aim is identifying facts of wage determination in Hungarian firms. Whenever possible, we present the Hungarian results together with average results from the other Central and Eastern European (CEE) countries (the Czech Republic, Estonia, Lithuania and Poland) as well as the Euro Area (EA) countries. We also present the most important findings by sector and firm size. Our second aim is to make sense of the facts in the light of theories of wage setting. We also draw some tentative policy conclusions. Some of our results are new, others are in line with previous findings, and yet others are at odds with those. By the nature of our findings (descriptive evidence from one survey), most of our results pose questions rather than giving definite answers. In particular, the results that conflict with previous findings call for further investigations.

Previous research suggests that wages in Hungary are rather flexible in European comparison, and labor institutions are also relatively flexible, with the potential exception of the effect of the minimum wage. On the other hand, other aspects of the Hungarian labor market may show significantly less flexibility. For important references, see Kőrösi (2003), Kertesi and Köllő (2003), Horváth and Szalai (2008), Kátay (2008), Kőrösi (2007), Köllő and Nacsa (2007), Commander and Köllő (2008). The 2008 Convergence Report of the Magyar Nemzeti Bank concludes that "the Hungarian labour market may basically be considered flexible in terms of real wage adjustment, (...) [and] wages can be considered flexible in nominal

[1] http://www.ecb.int/home/html/researcher_wdn.en.html

terms as well. (...) At the same time, the structural inflexibility of the labour market is alarmingly high." (MNB, 2008, p. 40.)

The survey results we summarize are mostly in line with this assessment. The Hungarian labor market, while institutionally flexible, appears to be surprisingly rigid. The survey evidence points to low turnover, and possibly to more rigid wages than previously thought. While generalizing from these findings is fraught with difficulties, we think it is important to take firms' perception of the labor market seriously, and investigate the surprising results further.

The rest of the paper is structured the following way. We first describe the Hungarian WDN survey. Then we present the results using simple tools, but always comparing them to the results from the Euro Area and CEE countries. After presenting the results, we put them in the context of various wage setting theories. The last part concludes. It includes a summary list of the most important facts as well as some tentative policy conclusions.

2 The WDN wage setting survey

2.1 GENERAL SURVEY DESIGN

This paper makes use of the Wage Dynamics Network (WDN) Survey of 2008. The WDN Survey aims at uncovering specific features of firms' price and wage setting policies in Europe. Appendix A contains the questionnaire.

The project involves all Euro Area (EA) countries except Finland and Malta (Austria, Belgium, France, Germany, Greece, Italy, Ireland, Luxembourg, the Netherlands, Portugal, Slovenia and Spain), as well as five Central-Eastern European (CEE) countries: the Czech Republic, Estonia, Hungary, Lithuania and Poland. The overall number of covered countries is 17. This analysis excludes Luxembourg (the data is not ready yet) and Germany (the data is poorly comparable and it is not available for public use).

The survey was implemented in a decentralized way in which each National Central Bank was responsible for carrying out the survey within its country. Strong coordination guaranteed that the national questionnaires are almost fully harmonized, at least with respect to the pre-defined "core questions". The data was collected between the end of 2007 and the beginning of 2008. Overall, more than 17,000 firms were interviewed. In most countries the survey was outsourced to an external company, which collected the answers from firms mainly through traditional mail or the internet. Operational instructions were added to the questionnaire, in particular regarding the person who preferably was required to fill in the questionnaire (the CEO or the Human Resource Manager), the business unit answers should refer to (the firm and not the establishment), and the reference period (2006 for most questions). All national questionnaires were pre-tested on a pilot sample.

The Hungarian survey closely followed the WDN instructions. It was commissioned and supervised by the Magyar Nemzeti Bank and administered by the survey research institute TARKI. The data was collected through personal interviews, in which interviewees could fill out the questionnaire themselves as well. The person interviewed was the CEO or the Human Resource Manager of the firm. This mixed-mode technique ensured comparability with the mailout survey mode applied by most countries, and at the same time it led to relatively high response rates. It also made sure that respondents fully understood the questions and could answer them at their own convenience.

The sample was taken from the population of firms that filed corporate tax reports in 2006 (56 thousand firms with 1.6 million employees). The sample was stratified by sector, firm size and county; and sampling probability was increasing in firm size. Response rate was 53 per cent, among the highest in the WDN, with little variation by sector and size. Non-responding firms were replaced by second addresses within strata in order to meet target sample sizes and ensure representativeness by strata.

Sectoral coverage varies somewhat across countries. All national samples cover manufacturing, trade and business services (trade is not covered in Germany but we don't use German data anyway). Besides those three sectors, we include construction and financial intermediation in this analysis. Those are covered by many but not all countries, along with the energy sector, whereas non-market services are only covered by a few countries. Energy and non-market services are excluded from this analysis because of poor coverage and sample size considerations. Concerning firm size, the sample is split into four classes: 5 to 19 employees, 20 to 49 employees, 50 to 199 employees and 200 employees and more. All countries cover firms that employ at least five employees.

The analyzed sample covers 15,000 firms. Sample size varies across countries, ranging from 366 in Estonia to 2001 in France. The Hungarian sample is among the largest ones, with 1959 observations. In terms of response rates, three broad

groups can be identified: Austria, Greece and Lithuania with a response rate below 20 per cent; a large group of countries with response rates between 20 and 50 per cent; and Hungary, Ireland, the Netherlands, Poland and Spain with above 50 per cent. The sample represents 2.4 million firms and 48 million employees.

During the analysis, we use the WDN-generated employment-adjusted weights. This is defined as the sum of all employees in the population in a sampling category divided by the number of firms in the sample in the sampling category (see Druant et al., 2009, for more details). The employment-adjusted weights ensure that the reported Charts show distributions in terms of employment. We shall compare the Hungarian results to two groups of countries, the Euro Area (EA) countries and the Central and Eastern European (CEE) countries in the sample. The latter group contains the Czech Republic, Estonia, Lithuania and Poland. Because of the large size asymmetries, the CEE results are dominated by Poland as it has 69 per cent of the employees (the Czech Republic having another 20 per cent). For a robustness check, we looked at the two largest countries separately. Our main conclusions are the same if the Hungarian data are compared to either the Polish or the Czech data.

2.2 THE HUNGARIAN QUESTIONNAIRE

The Hungarian survey conforms very closely to the template provided by the WDN. It includes not only its core but also its optional questions, and it also has some questions that are specific to Hungary and are not included in other national questionnaires. In this section we describe the content of the Hungarian survey in more detail.

The questions asked can be divided into the following broad categories:

1. The firm and its employees

   a. Descriptive information on firm size, sector, employment composition

   b. Worker turnover

2. Wage setting and wage changes

   a. Collective agreement

   b. Structure and type of wages

   c. Frequency of wage changes

   d. Wages of new hires

3. Wage rigidity and shocks

   a. Existence of downward wage rigidity

   b. Adjustment to shocks

   c. Insurance of workers against shocks

   d. Effects of increasing the national minimum wage

4. Price setting and wages

Questions under 1a allow us to examine cross-firm heterogeneity in terms of sector and size, while those under 1b provide evidence on labor flows into and out of the firms, i.e. the "real" side of flexibility. Questions under 2a explore the prevalence of wage coordination either at the firm or at a higher level. 2b questions ask about the relative importance of

hourly vs. monthly wages, and the weight of bonuses and other flexible wage components in total compensation. 2c questions are related to wage stickiness, which is an important issue for new Keynesian macroeconomic models used at many central banks (including MNB). In particular, dynamic stochastic general equilibrium (DSGE) models often assume that wages are not completely flexible.[2]

Answers to 2d are also important for macroeconomic modeling. If wages of newly hired workers are more flexible than those of existing employees, firms can use changes in employment to adjust their overall wage bill.[3]

Answers to 3a and 3b shed light on the extent and consequences of downward nominal wage rigidity (DNWR). If present, DNWR may have macroeconomic consequences if firms are not able to use alternative channels to respond to negative shocks. The macro importance of DNWR, in turn, is an important aspect of the determination of the optimal level of inflation.

Questions 3c and 3d are specific to the Hungarian survey: 3c complements research carried out at the MNB (Kátay, 2008), while 3d collects information on the effects of increasing the minimum wage. The minimum wage is an important institution of the Hungarian labor market. It is set as a country-wide monthly minimum for full-time employees. Our questions looked at a hypothetical increase in the minimum wage as well as past experiences. Besides direct effects on employment, we asked about indirect effects on the wages of other employees.

Finally, questions in the last block try to uncover regularities between price and wage setting. In the new Keynesian interpretation of monetary policy and its transmission, which is now the dominant doctrine in most central banks, wage costs play a key role in inflation dynamics. Thus the survey asks questions about the synchronization of price and wage changes, and test whether firms' wage setting and pricing behavior confirms the theoretical assumptions.

2.3 THE HUNGARIAN SAMPLE

The Hungarian sample is drawn from the population of firms that filed a tax report in 2006. It is restricted to firms having more than five employees. The original sample includes manufacturing; electricity, gas, water; construction; trade; business and non-business services (together classified as market services); and financial intermediation. Of those, the electricity, gas and water sector is not used in this analysis because of small sample size. In order to make the sample representative of employment, the sampling probability is proportional to firm size. The sample is made fully representative of all employees in the target population (sector and firm size) by using the employment corrected weights of the WDN.

Charts 1 through 3 describe the Hungarian sample in more detail. As mentioned above, we present statistics for two control groups: the Euro Area (EA) and the four Central and Eastern European countries without Hungary (CEE: the Czech Republic, Estonia, Lithuania and Poland). The Charts show the sectoral composition, size distribution, and employment composition of the firms. These are broadly similar across Hungary and the other countries. One partial difference is in the size distribution, where the Hungarian sample is similar to the Euro Area sample but contains more large firms relative to the CEE sample. Recall that since the sample is re-weighted using overall employment by sector and firm size in each country, Charts 1 and 2 reflect differences in overall employment as opposed to the composition of the WDN sample.

Another difference is that the Hungarian sample contains more production and fewer technical workers than both the EA and the CEE average (Chart 3). This is more likely to be due to classification differences across countries. In the Hungarian translation (as advised by the WDN template), the production/technical categories are defined as synonymous to unskilled/skilled manual employment, with vocational training school graduates included in the unskilled part. Other countries followed different procedures.

Overall, we conclude that in terms of firm size distribution, Hungary is closer to the Euro Area than the other CEE countries. Otherwise the samples seem comparable in general, and there are no obvious reasons for concern.

[2] The DSGE model of the Magyar Nemzeti Bank is described in Jakab and Vilagi (2008).

[3] For a theoretical argument for the importance of distinguishing wages of existing and new workers, see Pissarides (2009). Some empirical evidence for the US is given by Haefke et al. (2009).

3 Results

We present summary statistics for all the main question blocks of the Hungarian wage setting survey. Since the questions are straightforward, our strategy is to concentrate on the presentation of simple facts. As we mentioned earlier, whenever possible, we present the Hungarian results together with average results from the other Central and Eastern European (CEE) countries in the sample (the Czech Republic, Estonia, Lithuania and Poland) as well as the Euro Area (EA) countries. We defer the more detailed economic interpretation of the results to a later section.

3.1 WORKER TURNOVER

We start by the survey evidence on employment type and turnover, summarized on Chart 4. Worker flows represent the 'real side' or the 'quantity side' of the labor market. Besides their importance for flexible adjustment of the labor market, they have a direct bearing on the wage setting process as well.

The first set of bars show that the fraction of permanent full-time employees in Hungary is close to 80 per cent, very similarly to the other CEE countries and slightly below the Euro Area average. In the Euro Area, the remaining 20 per cent are made of part time and temporary workers in equal proportions. On average, the CEE countries employ temporary workers to a significantly larger extent. Hungarian firms are different in this respect: they use very few temporary workers and significantly more part-time workers.

Temporary workers are, by definition, easier to hire and fire than permanent workers, be those full-time or part-time. As a result, temporary work plays an important role in making the labor market more flexible. It is therefore an important finding that Hungarian firms make less use of flexible employment contracts than other CEE countries or, in fact, other countries of continental Europe. In principle, this may not reflect lower flexibility in itself. Hungarian firms would need less of the temporary contracts if the permanent contracts were more flexible than in the comparison countries. However, regular employment in the other CEE labor markets is not considered any more rigid, and yet they make use of significantly more temporary work than Hungary. This finding points to somewhat lower flexibility of Hungarian firms in their hiring and firing decisions.

That conclusion is supported by the second observation from Chart 4, shown by the bottom two sets of bars. The turnover of employment, both in job creation and job destruction, is lower in Hungary than in the CEE region. It is more similar to the Euro Area average, although lower than that as well, especially with respect to job creation.

In order to gain more insight on this issue, Charts 5 and 6 plot job destruction and job creation by firm size. Interestingly, job creation and job destruction are lowest for small enterprises in Hungary, while there is no obvious pattern for the Euro Area. Relative to the CEE region, job destruction is uniformly lower, but job creation lags especially in large firms. The latter finding indicates that the expansion of large companies found in the CEE region is much less prevalent in Hungary. This may be because in 2006 Hungary was in a different part of its business cycle. But the job destruction Charts and the negative relationship of worker flows and firm size are more likely to be explained by structural features of the Hungarian labor market.

Tables 2 to 4 further examine the cross-country differences in worker turnover and its relation to firm size by controlling for sector and some firm-level control variables in a regression framework. We look at three left-hand-side variables: the per cent share of temporary workers, the per centage of workers who left the firm in the previous year, and the per centage of workers who joined the firm in the previous year. For each left-hand side variable y_{ijc} for firm i in sector j in country c we run the following three specifications (we run separate regressions for the EA countries, the CEE countries and Hungary):

$$y_{ijc} = size_{ijc}\beta + u_{ijc}$$
$$y_{ijc} = size_{ijc}\beta + \alpha_{jc} + v_{ijc}$$
$$y_{ijc} = size_{ijc}\beta + x_{ijc}\gamma + \alpha_{jc} + w_{ijc},$$

where $size_{ijc}$ is the full vector of size dummies (the regression contains no constant), α_{ijc} are country-sector fixed effects (full interaction), and x_{ijc} is a vector of firm-specific control variables. The first regression shows heterogeneity by firm size (for the second and third left-hand-side variables it reproduces Charts 5 and 6). The second and third specifications look at whether the conclusions from the Charts are robust to heterogeneity in terms of sectors (allowed to have different effects in different countries), and the additional control variables. The control variables include the share of labor costs among total costs, the share of white-collar workers, the share of workers covered by collective wage agreements, the share of exports in total revenues, and whether the firm is likely to follow a price cut by a competitor as a measure of competitive pressure (see Druant et al., 2009 for an argument for using the last variable). Note that the vector of control variables is missing in quite a few cases (some 30 per cent in the EA subsample); robustness of the conclusions to that specification is therefore a strong result. The coefficients on the size dummies are directly comparable across the three models because we normalized all other right-hand-side variables to have zero mean (in each of the three subsamples separately).

These are linear regressions estimated by OLS, weighted by the employment-adjusted WDN weights. Note that the left-hand-side variables are bounded between 0 and 100 per cent. The frequency of zero values is substantial: most firms in the sample employ no temporary workers, and quite a few firms report zero per centage of workers who left or joined in the previous year. The latter is most common among small firms, for whom total employment is a small integer number. Notice that the Tobit model is unlikely to address the question of zeros in the worker turnover models as the problem is not of censoring but of relatively rare events occurring among small integer numbers. For this reason we do not estimate generalized nonlinear models but stay with the linear OLS estimates.

The regression results show that the raw differences between Hungary and the EA or CEE countries, as well as their variation by firm size, are robust to heterogeneity by sector and the observed control variables. Temporary employment in the large firms of Hungary is similar to the large firms in the Euro Area, but significantly less than in other CEE countries. On the other hand, small and medium sized firms in Hungary employ no temporary workers at all, while firm size is not significantly related to temporary employment in the EA. Hungarian firms are more similar to firms in the EA in terms of worker turnover than to firms in the CEE countries. The share of workers who left the preceding year is virtually the same in Hungary and the EA countries in all size categories, and the share of workers who joined the firms is also very similar, especially in the richest specification. All these Charts are substantially lower than the corresponding estimates in the other CEE countries.

Taken these findings together, we can conclude that on the 'real' or 'quantity' side, Hungarian firms are similar to their peers in the Euro Area, but much less flexible than similar firms in the CEE region. Temporary employment is very low among small firms in Hungary even compared to the EA. The positive relationship between flexibility and firm size is apparent in Hungary in all specifications, even after controlling for sector and firm-specific variables. We conclude that our findings from Charts 5 and 6 remain valid.

This conclusion is rather surprising in the light of previous research on Hungarian firms implying flexibility in terms of employment. The Charts in Faggio (2006) suggest that Hungarian job creation and job destruction rates are very similar to those in other CEE countries. Kőrösi (2003) also suggests that 'the standard gross job flow Charts indicate an extremely flexible labor market.' Moreover, he concludes that 'small firms are, as expected, much more flexible,' especially in destroying jobs (p. 9.). Those analyses differ from ours in several aspects. First, the concept of job creation and job destruction used by Faggio and Körösi is narrower; it is net employment changes at the firm level. Second, our sample contains more of the very small firms that we found to be less flexible. Faggio's sample consists of medium and large firms only, and Körösi's sample has fewer of the very small firms than ours. Third, the sample period of those two studies is different from ours, ending in 2003 and 2001, respectively, while our Charts refer to 2006. Nevertheless, their conclusions are clearly at odds with ours. This puzzle calls for further research.

3.2 WAGE SETTING

3.2.1 Collective agreements

Many countries in Europe apply collective agreements in the wage bargaining process. This can take place at the country, sector, or firm level. Due to local specificities, the Hungarian questionnaire asks about all collective agreements, whereas the other countries restrict the question to collective wage agreements that include specific provisions for wages ('collective wage agreements'). In order to ensure comparability, the Hungarian data was corrected ex post, using the official registry of collective wage agreements, in order to restrict the agreements recorded in the survey to those that include wage provisions. Our Charts are based on the corrected measures.

As Chart 7 shows, collective wage agreements are common in the Euro Area countries, but are rare in CEE countries. The magnitude of the difference is large: the Hungarian coverage is below 20 per cent, while in the Euro Area countries it is above 80 per cent. Equally striking is the fact that while in the old member states collective agreements occur mostly at the country or sectoral level, in the CEE region only firm-level agreements are present. We thus conclude that in Hungary the wage setting process takes place mostly at the individual level, similarly to other countries in the region but in stark contrast to the Euro Area nations. These results are in line with previous research (Horváth and Szalai, 2008; and MNB, 2008).

3.2.2 The structure of wages

An important question is to determine how easily the overall wage bill can be adjusted. While we discuss this in more detail below, an important first answer is provided by Charts 8 and 9. Performance related components of the overall wage bill are usually more flexible than the wage bill. Chart 8 shows that their role in Hungary is moderately important, consisting about 10 per cent of the overall wage bill. Interestingly, Hungary is more similar to the Euro Area than to the other CEE countries, where such wage components are more common at 17 per cent.

Inflation indexation is another potentially important determinant of wage flexibility. Chart 9 shows that a significant minority of Hungarian employees worked in firms with some kind of indexation. Out of these cases, the majority uses implicit adjustment to inflation. Inflation indexation is less prevalent in Hungary than in other CEE countries, which may be surprising given the country's history of fairly high inflation. One explanation could be that by 2006 inflation was low enough to allow firms to move away from indexation, even from implicit indexation mechanisms. The lack of centralized wage setting also implies that there are no external indexation requirements on firms (as opposed to, for example, Belgium). Note that the results should be taken as a lower limit as firms may not have any explicit (formal or informal) policy of indexation but may take inflation into account when changing wages. Nevertheless, this conclusion of the lack of real wage rigidity is in line with the conclusions of MNB (2008).

3.3 WAGE ADJUSTMENT

3.3.1 The timing of wage changes

An obvious indicator of wage flexibility is the timing and frequency of wage changes. The survey question refers to base wages, since other components are typically more flexible. Chart 10 presents results concerning the frequency of wage changes.

In most countries, approximately 60 per cent of firms adjust base wages at a yearly frequency. In Hungary, even more of them, 80 per cent of firms adjust their wages once a year. In order to have a summary, if artificial, measure of the frequency of wage adjustments, we calculated average wage durations as well. (The construction of the duration measures is shown in detail in Appendix B. The measures are identical to the ones used by other papers using the WDN survey data, see Druant et al., 2009.) Average duration of base wages is 13.8 months in Hungary, to be compared to the 15 months average in the EA and 14.8 months in the CEE countries. The fact that CEE countries, including Hungary adjust base wages at virtually the same frequency than Euro Area countries is remarkable in light of the fact that they have more decentralized wage setting institutions.

Since base wages are stable for an extended period, it is important to know if wage changes happen in predefined time periods (i.e. they are time-dependent), or respond to changes in the environment only periodically (i.e. they are state-dependent). Chart 11 shows that at least in Hungary, time-dependent wage setting predominates. Fully 40 per cent of employees work in firms where wages are reset in January, and the wages of another 30 per cent are reset in the same month each year (other than January). These months are the ones following January, so they still correspond closely to the end of the calendar year. Anecdotal evidence suggests that even among these firms wage changes are backdated to January, but the survey does not directly ask about this kind of behavior.

There is large heterogeneity in Europe in this respect. Time-dependent wage setting is more common among Hungarian firms than the average of other CEE countries, with 70 per cent and 30 per cent, respectively (calculated as the inverse of the last set of bars). In that respect, Hungary is a lot closer to (but even higher than) the Euro Area average at 60 per cent. These results are new: we are not aware of any study in Hungary that looked at the timing and frequency of wage changes.

The average duration measures discussed above are useful for the parameterization of macro models with Calvo-type wage and price rigidities. Recall that average wage duration in Hungary is 13.8 months, to be compared to 15 months for the Euro Area and 14.8 months for the other CEE countries. These numbers are similar to other estimates, and the cross-country differences are not very substantial. We have also calculated durations by sectors and firm size, which are available from the authors upon request. In a nutshell, we found that both sectoral and size heterogeneity is moderate.

3.3.2 Downward nominal wage rigidity

There is a large body of international evidence that firms are reluctant to cut wages in general, and base wages in particular. At the same time, some evidence seems to suggest that Hungarians firms cut nominal wages relatively often (16 per cent of workers saw their nominal wages cut between 1999 and 2002, as shown in charts 1-12 in MNB, 2008, p. 33).

Our results suggest that Hungarian firms are as reluctant to cut or freeze wages as their western-European peers. Chart 12 shows the fraction of firms that reported to have implemented some wage freezes or wage cuts in the previous five years. Similarly to the previous Charts, the data are weighted by the number of employees in order to represent the fraction of employees who work at such firms. The results show that in Hungary, less than 5 per cent of employees work at firm that experienced wage freezes; and essentially none experienced wage cuts. Wage cuts are very rare in all countries, but freezes do happen: in the four CEE countries in the sample, about 9 per cent of employees work at firms that implemented them. The difference between Hungary and the CEE average may be due to the different inflationary environment. While Hungary still had sizable inflation and fast average nominal wage growth in the 5 years up to 2006, inflation was significantly lower in the other countries.

These findings are clearly at odds with the Chart published by MNB (2008). When comparing the results, one should keep at least two differences in mind. First, the MNB (2008) Chart presents changes at the individual level, while our Chart shows the fraction of firms (weighted by employment). Measurement error in each data may be in part responsible for the gap: classical error in individual wages would exacerbate the fraction of measured negative wage changes, while fading memories of small cuts or freezes may bias firm-level Charts downwards. Another difference is in the concept of wages: while our Charts are about base wages, the MNB (2008) Chart contains all other elements in earnings. While our previous Chart 8 suggests that the role of performance-related elements is small in Hungarian earnings, other non-base wage elements can be important. The puzzling difference between the two results calls for further research.

Chart 13 lists reasons why firms find it difficult to cut wages (which are again understood as base wages). Many factors seem to be important, with the ones related to motivation and morale being the most prevalent. Collective agreements are much less important in Hungary and the CEE region than in Euro Area countries, and implicit wage insurance (the intolerance of instability) is somewhat more common in Hungary than in other nations.

The survey contains some other questions related to wage cuts and freezes. Given that in the sample period downward nominal wage rigidity was not a binding constraint for most firms in Hungary, we skip the discussion of these questions. More results concerning this topic are available from the authors upon request.

3.3.3 Wages of new hires

Another margin of adjustment of the overall wage bill is the wages of newly hired employees. This becomes especially important when the wages of existing employees are infrequently adjusted, as we showed above. There is also a growing body of theoretical and empirical evidence that underscores the importance of this issue. We defer the detailed discussion of this issue to a later section.

Chart 14 shows the most important factors in the setting of the wages of newly hired workers. In Euro Area countries with sectoral or nationwide wage setting these also apply to new hires. Perhaps more interestingly, however, firms in the CEE countries without such external constraints feel constrained by internal wage equity considerations. In Hungary almost 80 per cent of firms report that the wages inside the firm are very relevant when they determine the wages of new entrants. The same is true for CEE countries, but to a somewhat lesser extent.

Besides the general question on entry wages, the survey includes two questions that address the importance of market pressure on entry wages. Chart 15 and 16 show the answer when the labor market is unusually tight or unusually slack. Remarkably, less than one fifth of the firms adjust wages in response to market pressure. Those who do not are reluctant to adjust entry wages because of internal considerations; they feel that would be unfair to either existing or new workers. Firms in the Euro Area cite external institutional constraints to be the main reason, while CEE countries emphasize informal constraints such as fairness and motivation. Hungary is close to the other CEE countries with some differences that show no particular pattern.

3.4 ADJUSTMENT TO EXTERNAL SHOCKS

3.4.1 Demand and cost shocks

The WDN survey includes three sets of questions that address (i) the flexibility of wages in response to different types of shocks, and (ii) the importance of alternative adjustment mechanisms. The three sets differ in the hypothetical shock under consideration: a decrease in demand, an increase in the price of an intermediate input, and an increase in competitors' wages. The responses are summarized in Charts 17 to 19.

The first observation from the top four answers to the three questions is that Hungarian firms seem to adjust less of everything than their peers in CEE countries or the Euro Area. Besides the obvious interpretation (Hungarian firms are less likely to adjust to shocks), it is possible that Hungarian firms are less likely to use all four adjustment margins but concentrate on fewer at a time.

Chart 17 lists the most common ways firms respond when demand for their products falls. Hungarian firms mostly try to cut costs, while output, price and mark-up adjustments are common in other countries. Base wages are never cut in any country, and cutting flexible wage components is also rare. Interestingly, adjusting of temporary employment is an important margin in the Euro Area, but not in the CEE countries.

An input cost increase is frequently passed on to consumers, and reducing margins is also common (Chart 18). Cutting production is an option in other countries, but Hungarian firms do not typically use that margin. Again, Hungarian companies try to adopt by cutting non-labor costs. Since – apart from input and labor costs – the only major cost item is capital costs, this provides some indirect evidence that investment is an important adjustment margin in Hungary. Of course, cost cutting may reflect increasing efficiency as well.

Wage increases outside the control of the firms are mostly countered by trying to reduce other costs in Hungary (Chart 19). Again, while in other countries firms are likely to increase prices, reduce the mark-up or cut production, these options are less common in Hungary.

An important concern is that some of the respondents to the survey do not have a complete view about the firm's strategic decisions and thus underestimate the importance of certain adjustments. The important questions here are whether the position of the respondent affects the answers and whether the Hungarian sample is different in terms of the position of

the respondents. Unfortunately, we don't know the position of the respondent in the harmonized cross-country data so we cannot address the second question. However, the Hungarian data does contain such information, which allows for testing the first question. We found that respondents from human resources do tend to underestimate all adjustments relative to respondents in finance and general management as expected, but the differences are small and statistically insignificant if we control for sector and size. All results are available from the authors upon request.

We can therefore conclude that Hungarian firms accommodate negative shocks by cutting non-labor costs, irrespective of the nature of the shock. Flexible wage components may also serve as an adjustment margin to some extent, but their role is limited. These results are quite puzzling and call for further research. Besides the possible room for increasing efficiency, an explanation could be that Hungarian firms use investment as a buffer more often than their peers in the Euro Area or other CEE countries.

3.4.2 Wage insurance

Our previous findings suggest that firms are reluctant to cut labor-related costs in case of unfavorable shocks. One potential reason is that employers provide insurance to their workers against unfavorable events. Kátay (2008) presents micro evidence that this is the case. In order to take another look at the issue, the Hungarian WDN survey includes questions on wage insurance as well.

Charts 20-23 list the answers to 4 possible scenarios: permanent and temporary improvements and declines in profitability. Firms are asked if they would change base wages, flexible wages, and hiring behavior. If the insurance hypothesis is correct, wages should respond more to permanent shocks than to temporary ones.

Base wages are immune to profit declines, both in case of temporary and permanent changes. For profit increases, we find small effects: only 20 per cent of companies would change wages somewhat, and essentially none would make a big adjustment. We thus find evidence to some asymmetry in response to shocks depending on their sign. This is also consistent with the presence of downward nominal wage rigidity. Since direct questions indicated that DNWR was not a concern in the past (see above), the reason must be that DNWR was simply not binding.

Flexible wage components respond much more to profit shocks. More than 60 per cent of firms would adjust flexible wage components, and many of these by moderate and even large amounts. We do not see significant asymmetries between positive and negative shocks, but the effects are somewhat larger for permanent changes.

Hiring behavior is affected by declining profitability, and in case of a permanent decline the effect is quite pronounced. Hiring responds much less to positive shocks, especially when the shock is temporary. All these again point to the existence of asymmetric wage rigidity, as (some) firms use hiring rather than wage cuts to accommodate adverse shocks.

These results are consistent with the findings of Kátay (2008) that show substantial but not full insurance against transitory shocks. We find, however, an interesting asymmetry in the responses to positive vs. negatie shocks: the former are accommodate more through wages, while the latter more through hiring. We interpret these as indications of downward nominal wage rigidity.

Finally, as expected, flexible wage components are important margins of adjustment under all circumstances. This finding somewhat contradicts those on Charts 17-19, where flexible wage components were not mentioned by firms as shock absorbents. This apparent discrepancy calls for further investigation.

3.5 THE MINIMUM WAGE

A section of the survey specific to Hungary asked about the effects of an increase in the minimum wage. The questions refer to (i) a hypothetical 20 per cent increase in the minimum wage, and (ii) the actual minimum wage increase in 2001–2002 that led to a 100 per cent increase in two steps. Table 1 lists the answers to both sets of questions. The findings are consistent across the hypothetical and the actual experiments, which differ only in size. For this reason, we mostly report results concerning the hypothetical minimum wage increase, but corroborate findings with the actual minimum wage change.

On average, around 14 per cent of employees would earn at or below the hypothetical higher minimum wage (after the 20 per cent increase). Thus such an increase would represent a significant wage shock to firms. Given the magnitude of the shock, it is surprising to find that very few companies would respond by laying off workers: less than 8 per cent indicated any possible layoffs. Those who said yes would, on average, lay off one third of the affected workers. This implies that about 2.5 per cent of affected employees and 0.34 per cent of all employees would lose their jobs a direct result of the 20 per cent increase in the national minimum wage.

This number may seem surprisingly low: as a share of total employment it is essentially zero. While one may suspect that firms underestimate the layoffs in a hypothetical scenario, the responses to the 2001–2002 minimum wage increase are only marginally stronger despite the fact that then the increase was close to 100 per cent. Note that the weak response in 2001–2002 is consistent with other estimates. Kertesi and Köllő (2003) estimated the aggregate employment response to the 2001 increase (which was nearly 60 per cent in itself) to be around 0.5 per cent. This could be because that increase took place in a different point of the business cycle, and (even though proportionately much higher) hit firms less than a 2006 increase would have. It is also possible, of course, that the minimum wage was not effective before 2001–2002. Tonin (2007) provides some evidence that tax evasion was an important reason why the reported minimum wage may not have been an effective constraint on firms in that period.

The second important finding is that firms would (and did) pass on the minimum wage increase to employees not directly affected. About 30 per cent of (employment weighted) firms gave an affirmative answer to this question, and they would raise wages for a large set of their employees. In case of a hypothetical 20 per cent increase in the minimum wage, these firms would increase the wages of an additional 62.1 per cent by around 10 per cent. This implies that in addition to the direct effect, the minimum wage increase would lead to a further 2 per cent increase in the economy-wide wage rate. Again, the numbers are somewhat smaller for the 2001–2002 increase, but they are significant as well.

This finding is consistent with the hypothesis that firms are concerned about the relationship among their employees, and want to have a wage distribution that is perceived as 'fair'. This seems to include the keeping of a 'pecking order' of workers, where relative wages are important in addition to absolute levels. An interesting question is the way firms would respond to maintain profitability in response to a significant cost shock. While the survey did not ask this question for the minimum wage increase, previously we saw that the main way Hungarian companies are trying to adjust is by cutting non-labor costs.

3.6 PRICES AND WAGES

The survey also contained questions about pricing and about links between price and wage setting. This is an important issue given that wage costs are the biggest component of firms' total costs, and an arguably even larger component of marginal costs. Thus, theoretically, we expect wage pressure to lead to higher prices. In a competitive labor market, on the other hand, firms would pass on price increases to wages, implying a reverse relationship.

Chart 24 and 25 display basic characteristics of price setting. Roughly half of Hungarian firms (employment weighted) keep prices fixed for about 1 year, which is comparable to the Euro Area but somewhat higher than the CEE average. The average price duration is somewhat shorter than the average wage duration in all countries, at around 10 months. The average price duration is somewhat higher in Hungary (10.7 months) than in the other CEE countries (9.5 months) or the Euro Area (9.6 months).

Compared to wages, prices are substantially less time-dependent. Recall that many wages are typically reset in January, but we see that to a much lesser extent for prices (Chart 25). Overall only about 25 per cent of employees work in firms that have explicit time-dependent price setting practices. There is some heterogeneity across countries, but it is generally true that wage changes are more concentrated to particular months.

Chart 26 shows answers to questions whether firms' price and wage changes are linked. The answers indicate that the link is weak or nonexistent, and especially so in Hungary. Only about 22 per cent of employment-weighted firms report any link, and most of these claim that the link follows no particular pattern. It is important to note, however, that the survey asked about a very specific type of relationship, i.e. about the timing of price and wage changes. Even if wage changes respond to price movements and vice versa, the lag may very well depend on other factors. Thus we think the answers to this question are only informative about the lack of a joint time-dependent nature of price and wage setting.

4 Economic interpretations

After presenting the basic findings of the WDN wage setting survey, in this section we discuss the economic interpretation of these findings. The main question is to see if the survey answers are consistent with basic theories of wage setting, and which of these theories is the most relevant for Hungary.

The first conclusion we can draw from the survey is that Hungarian firms are not constrained by external factors in their wage setting (with the important exception of the minimum wage, which we discuss below). Collective agreements at the national or sector level are nonexistent, and even within firms wages are typically set individually. On the other hand, wages are set in a fairly rigid manner. The wages of new hires confirm to the wages of existing employees, and most firms reset their wages at most once a year. Base wages are never cut, and are hardly frozen, although the latter finding may be due to the sample period during which average wage growth was high.

To reconcile these findings, we need to look for wage theories that emphasize that wages may have other roles than reflecting workers' marginal product. The *implicit contract theory* (see, for example, Beaudry and DiNardo, 1991) argues that workers receive an insurance against idiosyncratic shocks, since firms may be better able to hedge against such risks. While infrequent wage setting and the reluctance of cutting wages supports this hypothesis, the lack of inflation indexation suggests either money illusion from the workers' part, or other considerations behind the stability of wages.

One set of facts supporting implicit insurance is that firms shield workers from temporary and permanent profit shocks, seen on Charts 20-23. While this is certainly evidence to the insurance motive, the asymmetric response between negative and positive (temporary) shocks also suggests that workers are sensitive to nominal wages.

Another set of theories comes under the heading of 'efficiency wages". *Efficiency wage theories* assume that wages may have an incentive component, that the right wage motivates workers to work harder and more productively. Firms may use their wage setting policies to alleviate moral hazard problems (Shapiro and Stiglitz, 1984), to provide workers with a 'fair' wage relative to others (Akerlof and Yellen, 1990), or to reduce costly turnover (Salop, 1979). An important empirical contribution in this area is Bewley (1999). In interviews with over three hundred business leaders and human resource officers in the US, Bewley found that employers are reluctant to cut wages because they think it would hurt morale.

The WDN survey is supportive of the Bewley (1999) findings. Firms are reluctant to cut wages even in the case of adverse shocks. This is true even for flexible wage components that should in principle act as "shock absorbents". It seems that bonuses are used less to accommodate outside shocks, and more to motivate individual worker effort. Employers also pay close attention to relative wages within the company, either in the case of new hires or in the case of changes in the minimum wage. Altogether a robust conclusion seems to be that maintaining employee morale and work incentives is a very strong consideration for wage setting.

A third set of theories emphasizes frictions in hiring and the existence of long-term employer-employee relationships, which is known as the *search-and-matching framework* or the flow approach to unemployment (Mortensen and Pissarides 1994). While the search-and-matching model was developed primarily to understand equilibrium unemployment, its implications for wage setting have also been discussed extensively.

Hall (2005), for example, argues that wage rigidity helps the search-and-matching model to match unemployment volatility. The main advantage of the model in this respect is that since forming job matches is costly, successful matches generate a surplus that is shared by the worker and employer. Since the wage is the result of bilateral bargaining and it

is not allocational over the surplus range, economic theory says little about the outcome. As long as it remains in the bargaining set, a rigid wage is thus fully consistent with economic rationality and equilibrium conditions.

An interesting question concerns the behavior of the wages of newly hired workers. Pissarides (2009) argues that the crucial wage rate in the search-and-matching model is that of new hires, and he presents some evidence that these are more flexible than average wages. The WDN survey offers some contradicting evidence. The firms report that they do not respond to labor market developments by adjusting the wages of new hires. The main reasons offered are that it would be after to existing employees and would hurt morale. Collecting more evidence on this issue should be an important topic for future research.

An important set of facts related to the flow approach to labor markets is on job turnover. In Hungary, both job creation and job destruction are low, especially relative to the CEE region. Firms are reluctant to fire workers, even in the case of adverse shocks. The survey provides little information on why this is the case, but we speculate that this is not because of firing costs or strong regulation. Rather, our interpretation is that the small amount of 'churning' is due to rigidities at the lower end of the labor market.

In particular, Hungary is both characterized by a high minimum wage and generous welfare benefits. This implies that hiring low-skilled workers is difficult, given their low productivity and high outside option. Since low-skilled jobs are much less stable than high-skilled ones, such composition effect can explain why turnover is lower in Hungary.

The only direct evidence to the composition effect in the survey can be seen on Chart 3, which seems to contradict our hypothesis. The share of production workers is much higher in the Hungarian sample than elsewhere, while the share of skilled manufacturing jobs is much lower. We believe, however, that the classification was probably misleading, and as a result, the Hungarian Chart is not in line with the skill distribution in Hungary. Evidence from other sources does show that the employment of low-skilled workers is much smaller in Hungary than the European average (Bajnai et al., 2009). Nevertheless, this is an issue which a possible repeat of the survey could clarify further.

Up to now we have discussed wage setting theories with a micro-foundation. In macroeconomics, however, it is common to assume that wages are simply set in a staggered way. Time-dependency of wage setting is assumed in many *New Keynesian (DSGE) models,* starting with the contribution of Erceg et al. (2000).

The WDN survey provides support for the time-dependent nature of wage setting. Wages are reset infrequently, mostly once a year. Many wages change in January, or in other fixed period. For price setting, the evidence is less conclusive: while prices are also fixed for up to one year on average, they are changed in a much less predictable time pattern. Probably for this reason, wage and price changes are not coordinated in most companies.

A practical issue for macro models is the calibration of Calvo-parameters for price and wage setting. For the latter, the survey suggests two obvious values. The mode of the distribution is 4 quarters, while the average is a bit below 5 quarters. Given the huge spike at 1 year, it is probably more representative of the distribution than the average value. In case of price setting, the mode is also at 4 quarters while the average is around 3 quarters. Since the spike is less dramatic but still very significant, both 3 and 4 quarters seem reasonable calibration values.

5 Summary and conclusions

In this paper we summarized findings from the 2006 Hungarian wage setting survey of the Eurosystem Wage Dynamics Network. We focused on aggregate findings and comparisons to two country groups, the Euro Area and the CEE region. Summing up, the analysis of the Hungarian WDN survey of 2008 suggests the following facts.

1. Worker turnover in Hungary is low, especially among small and medium sized enterprises. In that respect, Hungary stands out from the analyzed CEE countries.

2. Hungarian firms dot not face formal institutional constraints in wage setting, with the important exception of the minimum wage.

3. Despite this fact, wages appear rigid, particularly base wages. They are reset on average once a year at most, in a time-dependent fashion. In terms of frequency, Hungary is similar to the EA and other CEE countries, although wage setting in the other CEE countries is less time-dependent.

4. Wages are irresponsive to temporary shocks. Firms are accommodating these shocks by cutting other costs, and to a lesser degree, changing prices, margins and output.

5. It is unclear whether flexible wage components are used to absorb external shocks. The survey answers are contradictory in this respect, and call for further investigation.

6. By 2006 the minimum wage is a binding constraint for firms. A 20 per cent minimum wage increase would not induce massive layoffs, but it would spill over to other workers, and lead to an additional 2 per cent increase in average wages.

7. The frequencies of wage and price setting are not synchronized, at least not by explicit mechanisms.

8. Overall, in terms of its formal institutions, the Hungarian labor market is flexible, similarly to other CEE countries. In terms of outcomes, however, it is more similar to the more rigid Euro Area countries.

We can draw a few tentative policy conclusions from these facts. First, lower levels of real flexibility of the Hungarian small and medium size enterprises have direct consequences for efficient allocation of resources and economic growth. We can only guess the reasons behind lower flexibility, but high taxes and welfare benefits are likely to play an important role. Therefore the reduction of taxes and reforming the benefit system is important in order to increase labor market flexibility as well.

Second, the fact that Hungarian firms use non-labor costs to adjust for adverse shocks has important implications for monetary policy. We speculated that firms may use investment or capital utilization for adjustment. Since investment is sensitive to changes in monetary conditions, monetary policy may have a bigger impact on firm behavior than previously thought. An important caveat, however, is that the role of flexible wage components is unclear from the contradictory answers to different sets of questions.

Downward nominal wage rigidity is also important for monetary policy. While DNWR was not binding for Hungarian firms in the sample period, it is clearly present in the wage setting decision. Thus as productivity growth slows down and inflation declines, DNWR may become an important constraint for nominal wage adjustment at least for some firms and employees. The aggregate implications of this are not clear, and merit further research.

Many interesting questions can be investigated further that we do not have the space to do in this overview – a task that we leave for future research. A particularly interesting question concerns the behavior of firms under different circumstances. The current labor market conditions are very different from the ones in 2006, and repeating or updating the survey would provide information on how firms adapt to such changed circumstances. We hope that such an update will indeed take place, and we are looking forward to report the findings from that exercise.

References

Akerlof, G. and J. Yellen (1990), "The Fair Wage-Effort Hypothesis and Unemployment", *Quarterly Journal of Economics,* 105, pp. 255–283.

Babecky, J., P. Du Caju, T. Kosma, M. Lawless, J. Messina and T. Rööm (2009), "The Margins of Labour Cost Adjustment. Survey Evidence from European Firms", *European Central Bank Working Paper,* no. 1106.

Bajnai, B., Sz. Hámori and J. Köllő (2009), "The Hungarian Labor Market: a European Perspective", in: Fazekas, K. and J. Köllő (eds.), *The Hungarian Labor Market 2009,* Institute of Economics (IE-HAS), Budapest.

Beaudry, P. and J. DiNardo (1991), "The Effect of Implicit Contracts on the Movement of Wages over the Business Cycle: Evidence from Micro Data", *Journal of Political Economy,* 99, pp. 665–688.

Bertola, G., A. Dabusinskas, M. Hoeberichts, M. Izquierdo, C. Kwapil, J. Montornes and D. Radowski (2010), "Price, wage and employment response to shocks: evidence from the WDN survey", *European Central Bank Working Paper,* no. 1153.

Bewley, T. (1999), *Why Wages Don't Fall During a Recession,* Harvard University Press, Cambridge MA.

Commander, S and J. Köllő (2008), "The changing demand for skills: Evidence from the transition", *Economics of Transition,* 16, pp. 199–221.

Druant, M., S. Fabiani, G. Kezdi, A. Lamo, F. Martins and R. Sabbatini (2008), "How are firms' wages and prices linked: evidence in Europe", *European Central Bank Working Paper,* No. 1084.

Erceg, C., D. Henderson and A. Levin (2000), "Optimal monetary policy with staggered wage and price contracts", *Journal of Monetary Economics,* 46, pp. 281–313.

Faggio, Giulia (2006), "Job Destruction, Job Creation and Unemployment in Transition Countries: What Can We Learn? ", *Working Paper,* presented at the 2007 AEA Meetings.

Galuščák, K., M. Keeney, D. Nicolitsas, F. Smets, P. Strzelecki and M. Vodopivec (2010), "The determination of wages of newly hired employees: survey evidence on internal versus external factors", *European Central Bank Working Paper,* no. 1153.

Haefke, C., M. Sonntag and T. van Rens (2009), "Wage rigidity and job creation", *Kiel Working Papers,* 1504, Kiel Institute for the World Economy.

Hall, R. (2005), "Employment Fluctuations with Equilibrium Wage Stickiness", *American Economic Review,* 95:50-65.

Horváth, H. and Z. Szalai (2008), "Labour market institutions in Hungary with a focus on wage and employment flexibility", *MNB Occasional Papers,* No. 77.

Jakab, Z. and B. Világi (2008), "An Estimated DSGE Model of the Hungarian Economy", *MNB Working Papers,* no. 2008/9.

Kátay G. (2008), "Do firms provide wage insurance against shocks? – Evidence from Hungary", *Working Paper Series,* 964, European Central Bank.

Kertesi, G and J. Köllő (2003), "Fighting low equilibria by doubling the minimum wage – Hungary's experiment", *IZA Discussion Paper,* No. 970.

Köllő, J and B. Nacsa (2007), "Flexibility for Some, Security for Others? Hungary's Experience", in: Cazes, S. and A. Nesporova (eds.), *Flexicurity – A relevant approach in Central and Eastern Europe,* International Labour Office, Geneva, pp. 121–149.

Kőrösi, Gábor (2003), "Job Creation and Destruction in Hungary", *Central European University Working Paper,* No. 1/2003.

Kőrösi, Gábor (2007), "Dynamics of inter-firm wage differentials", in: Fazekas, K. and G Kézdi (eds.), *The Hungarian Labour Market 2007,* MTA KTI–OFK, Budapest, pp. 47–59.

MNB (2008), *Analysis of the Convergence Process,* Magyar Nemzeti Bank, Budapest.

Mortensen, D. and C. Pissarides (1994), "Job Creation and Job Destruction in the Theory of Unemployment", *Review of Economic Studies,* 61, pp. 397–415.

Pissarides, C. (2009), "The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?", *Econometrica,* 77, pp. 1339–1369.

Salop, S. (1979), "A Model of the Natural Rate of Unemployment", *American Economic Review,* 69, pp. 117–125.

Shapiro, C. and J. Stiglitz (1984), "Equilibrium unemployment as a worker discipline device", *American Economic Review,* 74, pp. 433–444.

Appendices

A THE WDN QUESTIONNAIRE

This survey is aimed at collecting information on wage and price setting procedures at the firm level. The survey is an integral part of a Eurosystem project on wage dynamics, involving the Central banks of the euro area and of other EU countries, and is conducted through a harmonised questionnaire. The importance the Eurosystem places on conducting this survey is signalled by the accompanying letter by …..

In the case of Italy, the survey is conducted by …. under the supervision and the authority of the Bank of Italy.

Your cooperation is extremely valuable but your participation is totally on a voluntary basis and your eventual refusal to participate will not have any implication.

Firm-level information collected through the questionnaire will be treated only inside the Bank of Italy on a secure and confidential basis, will be never disseminated outside the Bank of Italy and will be used exclusively for research purposes. Only aggregate figures, that do not contain information which might permit the identification of individual records in the data, will be published and eventually disseminated to other organizations. A copy of the main aggregate findings of the survey will be sent to you.

The questionnaire is addressed to either the CEO of the company or the Human Resource Manager and is organised in 4 sections:

Section 1 – *Wage Setting and Wage Changes* collects information on wage setting practices and the frequency and timing of the wage changes.

Section 2 – *Downward Wage Rigidity and Adjustment to Shocks* collects information on potential obstacles to downward wage rigidity and the reaction of firms to shocks.

Section 3 – *Price Setting and Price Changes* gathers information on price setting procedures, the main determinants of prices and the frequency of price changes.

Section 4 – *Information about the firm* collects some information about the firm mainly relating to the main features of the workforce.

Most questions are qualitative and only a few of them (mostly those in the 4th section) require figures. If exact numbers are difficult for you to find please use approximate answers. We estimate that the questionnaire takes approximately xx minutes to complete. At the beginning of each section/question you might find instructions and definitions that are helpful to fill in the individual questions. Moreover, the following instructions should simplify this process:

i) Business unit: answers should refer to the firm and not to the establishment (which is a single physical location at which business is conducted).

ii) Reference period: The reference period used should be that covered by your latest 12 month profit and loss account. Most questions refer to the practices followed during that period, a few questions; however, refer to figures at end of the reference period (e.g. question on the distribution and number of employees).

iii) Contacts and help: You can send the required information either by fax (….) or by email (…), possibly by the end of ….
In case you need any information or clarification, you can contact ….

Before we begin with the questionnaire, please indicate:

a) name of the firm _____

b) VAT number _____

c) Sector of activity (Ateco 2002) _____

Wage setting and wage changes	
This section focuses on information on wage setting practices, on the frequency and timing of wage changes. It also collects information on how the wages of new workers are set relative to those of existing workers. Unless otherwise indicated, answers should refer to "normal conditions and practices".	
1 – How were your firm's employees distributed across the following occupational groups at the end of the reference period? **For the definition of employees and of occupational groups, see the Appendix.**	
Low skilled blue collar/Production	____%
High skilled blue collar/Technical	____%
Low skilled white collar/Clerical	____%
High skilled white collar/Professional	____%
Other	____%
TOTAL (= 100%)	100%
2 – Does your firm apply a collective pay agreement bargained and signed outside the firm (at the national, regional, sectoral or occupational level)?	
No, such an agreement does not exist	☐
No, we opt out	☐
Yes, we apply such an agreement	☐
3 – Notwithstanding your answer to question 2, does your firm apply a collective pay agreement signed at the firm level?	
Yes	☐
No	☐
4 – If "yes" in questions 2 or 3, what percentage of your firm's employees are covered by a collective pay agreement (at any level)?	
_____ %	
5 – What percentage of your total wage bill in the "reference period" was related to individual or company performance related bonuses or benefits? **Definition of bonuses / benefits (flexible wage components)** – part of compensation different from the base wage and usually linked to individual's performance.	
_____ %	
6 – Does your firm have a policy that adapts changes in base wages to inflation? **Definition of base wage** – direct remuneration excluding bonuses (regular wage and salary, commissions, piecework payments).	
No	☐ → GO TO QUESTION 8
Yes	☐
7 – If "yes" in question 6, please select the options that best reflects the policy followed:	
Wage changes are automatically linked to:	
– past inflation	☐
– expected inflation	☐
Although there is no formal rule, wage changes take into account:	
– past inflation	☐
– expected inflation	☐
8 – NON-CORE What is the principle of remuneration for the main occupational group (as defined in question 1)? **Please choose a single option** **Definition of hourly, piece-rate and monthly base wage** – base wage per hour worked, per month worked, or per pieces produced.	
Hourly base wage	☐
Piece-rate base wage	☐
Monthly base wage {or other period-specific wage}	☐
Other {please specify} _____	☐

9 – How frequently is the base wage of an employee belonging to the main occupational group in your firm (as defined in question 1) typically changed in your firm?
Please tick an option for each of the three types of wage changes listed below.

	more than once a year	once a year	once every two years	less frequently than once every two years	never / don't know
Wage changes apart from tenure and/or inflation	☐	☐	☐	☐	☐
Wage changes due to tenure	☐	☐	☐	☐	☐
Wage changes due to inflation	☐	☐	☐	☐	☐

10 – Under normal circumstances, are base wage changes concentrated in any particular month / months?

No ☐

Yes: Jan. ☐ Feb. ☐ Mar. ☐ Apr. ☐ May ☐ June ☐ July ☐ Aug. ☐ Sept. ☐ Oct. ☐ Nov. ☐ Dec. ☐

11 – Considering the main occupational group in your firm (as identified in question 1), please indicate among the following options which is the most relevant factor in determining the entry wage of newly hired employees:
Please choose a single option

Collective pay agreement (signed at any level)	☐
Wage of similar employees in the firm	☐
Wage of similar workers outside the firm	☐
Availability of workers with similar characteristics in the labour market	☐
Other reasons (please specify) _____	☐

12 – NON-CORE If there is abundance in the labour market of workers you need to hire, do you pay newly hired employees significantly lower wage than that of similar (in terms of experience and qualitfication) employees already in the firm?

Yes	☐
No, because (please choose a single option, the most important reason):	☐
a) It would be perceived as unfair and earn the firm bad reputation	☐
b) it would have a negative effect on the work effort of the new employees	☐
c) It is not allowed by labour regulation or collective pay agreement	☐
d) Unions would contest such action	☐
e) Other reasons (please specify)_____	☐

13 – NON-CORE If there is a shortage in the labour market of workers you need to hire and attracting new workers is difficult, do you give newly hired employees significantly higher wage than that of similarly qualified employees already in the firm?

Yes	☐
No, because (please choose a single option, the most important reason):	☐
a) It would be perceived as unfair by existing employees	☐
b) It would have a negative effect on work effort of the employees in the firm	☐
c) It is not allowed by labour regulation or collective pay agreement	☐
d) It would generate pressure for wage increases by existing employees	☐
e) Other reasons (please specify)_____	☐

Downward wage rigidity and the adjustment to shocks

This section addresses the issue of the presence of (potential) obstacles to downward wage adjustments and the reaction of firms to different shocks.

14 – Over the last five years, has the base wage of some employees in your firm ever been frozen?
Definition of freeze in base wage – base wage in nominal terms remains unchanged from a pay negotiation to the next.

– No	☐
– Yes (indicate for what percentage of your employees)	_____%

15 – Over the last five years, has the base wage of some employees in your firm ever been cut ?
Definition of cut in base wage – base wage in nominal terms decreases from a pay negotiation to the next.

– No	☐
– Yes (indicate for what percentage of your employees)	_____%

16 – NON-CORE If "yes" in either question 14 or 15, what was the main reason for freezing/reducing the base wage? Please choose a single option, the most important reason.	
Profitability and/or sales went down	☐
Other costs increased	☐
Jobs were at risk	☐
It was imposed by legislation or a higher level collective agreement	☐
Because worker performance was not satisfactory	☐
Other reasons (please specify)_____	☐

17 – How relevant is each one of the following reasons in preventing base wage cuts?
Please tick an option for each line.

	not relevant	of little relevance	relevant	very relevant	don't know
Labour regulation/collective agreements prevent wages from being cut	☐	☐	☐	☐	☐
It would reduce employees' efforts, resulting in less output or poorer service	☐	☐	☐	☐	☐
It would have a negative impact on employees' morale	☐	☐	☐	☐	☐
It would damage the firm's reputation as an employer, making it more difficult to hire workers in the future	☐	☐	☐	☐	☐
In presence of a wage cut the most productive employees might leave the firm	☐	☐	☐	☐	☐
A wage cut would increase the number of employees who quit, increasing the cost of hiring and training new workers	☐	☐	☐	☐	☐
It would create difficulties in attracting new workers	☐	☐	☐	☐	☐
Workers dislike unpredictable reductions in income. Therefore workers and firms reach an implicit understanding that wages will neither fall in recessions nor rise in expansions	☐	☐	☐	☐	☐
Employees compare their wage to that of similarly qualified workers in other firms in the same market	☐	☐	☐	☐	☐

18 – NON-CORE Has any of the following strategies ever been used in your firm to reduce labour costs? Please choose as many options as apply to your firm.	
Reduction or elimination of bonus payments	☐
Reduction or elimination of non-pay benefits	☐
Change in shift assignments	☐
Slowdown or freeze of the rate at which promotions are filled	☐
Recruitment of new employees (with similar skills and experience) at lower wage than those who left (e.g due to voluntary quits and retirement)	☐
Use of early retirement to replace high wage employees by entrants with lower wages	☐
Other strategies (please specify) _____	☐

19 – NON-CORE Has it become easier over the last decade to adjust wages to reduce labour costs?	
Yes	☐
No	☐ → GO TO QUESTION 21
Don't know	☐ → GO TO QUESTION 21

20 – NON-CORE If "yes", why? Please choose a single option, the most important reason.	
Competition has become more intense	☐
More workers are available on the market	☐
Trade unions have less power in collective bargaining	☐
Employment protection has become less tight	☐
Production is outsourced in markets where labour is cheaper	☐
Price inflation and inflation expectations are lower and more stable	☐

The next six questions investigate how your firm adjusts wages, prices, total costs, employment and margins to shocks. In answering, for prices please refer to the "main product or service, defined as the one that generated the highest fraction of turnover in the "reference year", and for employment and wages please refer to the main occupational group in your firm (as identified in question 1)

21 – How relevant are each one of the following strategies when your firm faces an unanticipated slowdown in demand?
Please tick an option for each line.

	not relevant	of little relevance	relevant	very relevant	don't know
Reduce prices	☐	☐	☐	☐	☐
Reduce margins	☐	☐	☐	☐	☐
Reduce output	☐	☐	☐	☐	☐
Reduce costs	☐	☐	☐	☐	☐

22 – If the reduction of costs is of any relevance in your answer to question 21, please indicate the main channel through which this goal is achieved:
Please choose a single option, the most important factor.

Reduce base wages	☐
Reduce flexible wage components (for example bonuses, benefits, etc.)	☐
Reduce the number of permanent employees	☐
Reduce the number of temporary employees / other type of workers	☐
Adjust the number of hours worked per employee	☐
Reduce non-labour costs	☐

23 – How relevant are each one of the following strategies when your firm faces an unanticipated increase in the cost of an intermediate input (e.g. an oil price increase) affecting all firms in the market?
Please tick an option for each line.

	not relevant	of little relevance	relevant	very relevant	don't know
Increase prices	☐	☐	☐	☐	☐
Reduce margins	☐	☐	☐	☐	☐
Reduce output	☐	☐	☐	☐	☐
Reduce other costs	☐	☐	☐	☐	☐

24 – If the reduction of other costs is of any relevance in your answer to question 23, please indicate the main channel through which this goal is achieved:
Please choose a single option, the most important factor.

Reduce base wages	☐
Reduce flexible wage components (for example bonuses, benefits, etc)	☐
Reduce the number of permanent employees	☐
Reduce the number of temporary employees / other type of workers	☐
Adjust the number of hours worked per employee	☐
Reduce other non-labour costs	☐

25 – How relevant are each one of the following strategies when your firm faces an unanticipated permanent increase in wages (e.g. due to the renewal of the national contract) affecting all firms in the market?
Please tick an option for each line.

	not relevant	of little relevance	relevant	very relevant	don't know
Increase prices	☐	☐	☐	☐	☐
Reduce margins	☐	☐	☐	☐	☐
Reduce output	☐	☐	☐	☐	☐
Reduce other costs	☐	☐	☐	☐	☐

26 – If the reduction of other costs is of any relevance in your answer to question 25, please indicate the main channel through which this goal is achieved:
Please choose a single option, the most important factor.

Reduce flexible wage components (for example bonuses, benefits, etc)	☐
Reduce the number of permanent employees	☐
Reduce the number of temporary employees / other type of workers	☐
Adjust the number of hours worked per employee	☐
Reduce non-labour costs	☐

Price setting and price changes	
This section collects information on price setting and the frequency of price changes. **If your firm produces (or sells) more than a single good or service, the answers must refer to the "main product (or service", defined as the one that generated the highest fraction of your firm's revenue in the "reference year". For instance, if your firm produces (or sells) several types of hats and shoes, by "product" we mean "hats" and "shoes" (irrespective of the specific type), whereas by "main product" we mean the one that generated the highest revenue in the "reference year".**	
27 – What share of the revenue generated by your firm's main product in the reference period was due to sales in:	
Domestic market	____%
Foreign markets	____%
Total (= 100%)	100%
28 – How is the price of your firm's main product set in its main market? **Please choose a single option.**	
There is no autonomous price setting policy because:	
– the price is regulated, or is set by a parent company / group	☐
– the price is set by the main customer(s)	☐
The price is set following the main competitors	☐
The price is set fully according to costs and a completely self-determined profit margin	☐
Other (please specify) _____	☐
29 – NON-CORE To what extent does your firm experience price competition for its main product? **Please choose a single one option.**	
Severe competition	☐
Strong competition	☐
Weak competition	☐
No competition	☐
Don't know / no answer	☐
30 – Suppose that the main competitor for your firm's main product decreases its prices; how likely is your firm to react by decreasing its own price? **Please choose a single option.**	
Very likely	☐
Likely	☐
Not likely	☐
Not at all	☐
It doesn't apply	☐
31 – Under normal circumstances, how often is the price of the firm's main product typically changed? **Please choose a single option, the one that best describes the situation in your firm**	
More than once a year:	
– daily	☐
– weekly	☐
– monthly	☐
– quarterly	☐
– half-yearly	☐
Once a year	☐
Once every two years	☐
Less frequently than once every two years	☐
Never	☐
There is not a defined pattern	☐

32 – Under normal circumstances, are these price changes concentrated in any particular month / months?

No ☐

Yes: Jan. ☐ Feb. ☐ Mar. ☐ Apr. ☐ May ☐ June ☐ July ☐ Aug. ☐ Sept. ☐ Oct. ☐ Nov. ☐ Dec. ☐

33 – How does the timing of these price changes relate to that of wage changes?
Please choose a single option

There is no link between the two	☐
There is a link but no particular pattern	☐
Decisions are taken simultaneously	☐
Price changes tend to follow wage changes	☐
Wage changes tend to follow price changes	☐
Don't know	☐

Information about the firm

34 – How many workers (including employees and other types of workers) did your firm have at the end of the reference period?
Definition of employees is provided in the Appendix. Other definitions:
Permanent full-time – those who have no set termination date, and whose regular working hours are the same as the collectively agreed or customarily worked.
Permanent part-time – those who have no set termination date, whose working hours are less than those specified for permanent full-time.
Temporary – those who have a set termination date or a specific period of employment.

Number of employees: _____

of which:	Percentages	Number
(fill in one of the two columns, as you prefer: levels or %)		
permanent full-time	_____ %	_____
permanent part-time	_____ %	_____
temporary	_____ %	_____
TOTAL (= 100%)	100%	
Number of other types of workers (e.g. people employed by agencies, freelance, consultants, apprenticeships, students, other casual workers, etc.)		Number _____

35 – How many employees left the firm during the reference period?
Please refer to all types of employees: temporary and permanent, see definition in question 34.

_____

36 – How many employees joined the firm during the reference period?
Please refer to all types of employees: temporary and permanent, see definition in question 34.

_____

37 – NON-CORE How were your firm's employees distributed across the following age classes at the end of the reference period?

Less than 24 years old	_____ %
24-54 years old	_____ %
55-65 years old	_____ %
>65 years old	_____ %
TOTAL (= 100%)	100%

38 – NON-CORE How were your firm's permanent employees distributed according to tenure at the end of the reference period?

Less than 1 year	_____ %
Between 1 and 5 years	_____ %
More than 5 years	_____ %
TOTAL (= 100%)	100%

39 – NON-CORE According to the current business register, what was the first year of operation of your firm?
Definitions needed here (see appendix and discuss)

_____

40 – What percentage of your firm's total costs were due to labour costs in the reference period?
Definitions:
Total costs – all operating expenses.
Labour costs – wages, salaries, bonuses, social contributions, training, tax contributions, contributions to pension funds.

_____ %

41 – How was your firm's revenue in the reference period compared to the previous year?	
Much lower	☐
Lower	☐
Approximately the same	☐
Higher	☐
Much higher	☐

Thank you very much for having completed the questionnaire!

QUESTION 1 and 34:
EMPLOYEES:
People with a contract of employment (paid employees who work on-site; paid employees who work off-site such as customer service representatives or telecommuters; salesmen and similar employees). **Exclude** freelance workers, home or out workers, and casual workers who do not have a contract of employment.
OCCUPATIONAL CATEGORIES:
Production: non-supervisory staff in production or maintenance positions that require no vocational /trades accreditation or the equivalent in on-the-job training (assemblers, packers, sorters, pilers, machine operators, transportation equipment operators (drivers), warehousemen, and cleaning staff).
Technical: employees whose duties would normally require a community college certificate/diploma or the equivalent and who are not primarily involved in the marketing/sales of a product or service (technologists, lab technicians, registered nursing assistants, audio-visual technicians; ECE-trained caregivers; technology trainers; legal secretaries and draftspersons; computer programmers and operators).
Clerical: non-supervisory staff providing clerical or administrative services (secretaries, office equipment operators, filing clerks, account clerks, receptionists, desk clerks, mail and distribution clerks, bill collectors and claims adjusters).
Professionals: employees whose duties would normally require at least an undergraduate university degree or the equivalent (medical doctors, lawyers, accountants, architects, engineers, economists, science professionals, psychologists, sociologists, registered nurses, marketing and market research professionals, nurse-practitioners and teaching professionals; computing professionals whose duties would normally require a minimum of an undergraduate degree in computer science).
Other: if you have a large number of employees who do not correspond to any of the above categories, please write in their occupation(s) in the space provided.

QUESTION 5
BONUSES: flexible wage components, i.e. part of compensation different from the base wage and usually linked to individual's performance.

QUESTION 6
BASE WAGE: direct remuneration excluding bonuses (regular wage and salary, commissions, piecework payments).

QUESTION 8–
Definition of hourly, piece-rate and monthly base wage: base wage per hour worked, per month worked, or per pieces produced.

QUESTION 14–
Definition of freeze in base wage: base wage in nominal terms remains unchanged (from a revision to the next).

QUESTION 15–
Definition of cut in base wage: base wage in nominal terms decreases (from a revision to the next).

QUESTION 34–
Definition of permanent full-time employees: those who have no set termination date working (x/30/35?) or more hours per week.
Definition of permanent part-time employees: those who have no set termination date working less than (x/30/35?) hours per week.
Definition of temporary employees: those who have a set termination date or a specific period of employment.

QUESTION 39–
It should be decided whether this includes:
Change of name, Change of address, Change of activity, takeover/merger, being sold by parent organisation, Ex-public sector, now privatised/denationalised, Management buy-out, Buy-out by employees generally, etc.

QUESTION 40–
Total costs: all operating expenses.
Labour costs: wages, salaries,bonuses, social contributions, training, tax contributions, contributions to pension funds.
From the employers point of view these are often grouped as: **direct remuneration** (direct pay for time worked and bonuses); **other direct cost** (payments in kind, payment in capital and remuneration for non working days); **indirect cost** (soc. sec. contributions, vocational training and miscellaneous taxes).

B THE MEASUREMENT OF PRICE AND WAGE DURATIONS

This Appendix discusses the creation of the wage and price duration measures from the frequency answers in the WDN survey. The Appendix is reprinted from Druant et al. (2009).

The WDN survey asks questions on the frequency of price changes (the price of the firm's main product) and wage changes (the base wage of the firm's typical worker). The answers to those frequency questions identify the duration of prices and wages with the help of a few additional assumptions. Price and wage duration can be interpreted as the time interval for which these variables remain unchanged. The frequency answers identify points and intervals on the support of the duration distribution. Most frequency answers are points (e.g. once a year), which translate directly into durations. Some answers are intervals (e.g. more than once a year), which call for the imputation of expected durations within each interval. Such imputations require distributional assumptions. Three such interval answers appear in the survey: a) expected wage duration if it is shorter than one year (frequency more than once a year); b) expected wage duration if it is longer than two years (frequency less than once every two years); c) expected price duration if it is longer than one year (frequency less than yearly).

We assume a lognormal distribution for both wage and price durations. Note that the support of the lognormal is the positive real line appropriate for durations, and the shape of the histogram of point answers is close to the shape of a lognormal density function both for wages and prices. The distributional assumption is necessarily ad-hoc but it is consistent with a positive support of durations. At the same time, the reported large mass of probability at specific points (e.g. once a year that translates into 12 months exactly) is at odds with the lognormal or any other continuous distribution. With these caveats in mind, one should think of the duration results as being an approximation.

We define durations in months. Let d_w denote the duration of wages and d_p the duration of prices. As already mentioned, the three durations that need to be imputed are the following:

$$E[d_w|d_w < 12], \qquad E[d_w|d_w > 24], \qquad E[d_p|d_p > 12].$$

The sufficient statistics for the computation of expected durations are derived from point answers. Denote the answers to the wage change frequency question by τ_w so that τ_{w1} refers to more than once a year, τ_{w2} to once a year, τ_{w3} to once every two years, and τ_{w4} to less frequently than once every two years. Similarly, denote the answers to the price change

frequency question by τ_{pj} so that τ_{p1} refers to daily, weekly, monthly, or quarterly[4], τ_{p2} to twice a year, τ_{p3} to once a year, and τ_{p4} to less frequently than once a year. Then we can write out the following moment conditions (where the moments mean probabilities):

$$\begin{aligned}
\Pr(d_w \leq 11) &= \Pr(\tau_{w1}) \\
\Pr(d_w \leq 12) &= \Pr(\tau_{w1}) + \Pr(\tau_{w2}) \\
\Pr(d_w \leq 24) &= \Pr(\tau_{w1}) + \Pr(\tau_{w2}) + \Pr(\tau_{w3}) \\
\Pr(d_w > 24) &= \Pr(\tau_{w4})
\end{aligned}$$

and

$$\begin{aligned}
\Pr(d_p \leq 4) &= \Pr(\tau_{p1}) \\
\Pr(d_p \leq 6) &= \Pr(\tau_{p1}) + \Pr(\tau_{p2}) \\
\Pr(d_p \leq 12) &= \Pr(\tau_{p1}) + \Pr(\tau_{p2}) + \Pr(\tau_{p3}) \\
\Pr(d_p > 12) &= \Pr(\tau_{p4}),
\end{aligned}$$

where all right-hand sides can be estimated from the survey answers. Note that the last condition is redundant in each set.

In order to impute conditional expectations, we first need to estimate the parameters of the unconditional distributions. We assume lognormality so that the natural log of durations (denoted as *ld*) are normally distributed so that $ld_j \sim N(\mu_j, \sigma_j^2), j=w,p$. Then, for any threshold *a*,

$$\Pr(d_j \leq a) = \Pr(ld_j \leq log\, a) = \Pr\left(\frac{ld_j - \mu_j}{\sigma_j} \leq \frac{log\, a - \mu_j}{\sigma_j}\right) = \Phi\left(\frac{\log a - \mu_j}{\sigma_j}\right)$$

for $j=w,p$; where Φ is the standard normal c.d.f. Take inverse of Φ of both sides to get

$$\Phi^{-1}[\Pr(d_j \leq a)] = \frac{\log a - \mu_j}{\sigma_j}.$$

We have estimates for $Pr(d_j \leq a)$ for three different values of a both for wages and prices. These define systems of three equations in two unknowns (μ_j, σ_j). We applied an identity-weighted minimum distance approach in order to estimate the parameters (such an approach is equivalent to computing the parameters for each combination of exactly identified systems and taking an unweighted average at the end). The results are μ_w=2.4, σ_w=0.4, μ_p=2.0, σ_p=0.6. The parameters are hard to interpret (they are not the mean and standard deviation of the duration), but they indicate longer average duration but less cross-firm heterogeneity for wages than for prices.

Given the unconditional parameters of the lognormal distribution, we computed the conditional expectations by simulation (M = 100,000). The results are the following:

$$E[d_w | d_w < 12] = 8.3, \qquad E[d_w | d_w > 24] = 27.4, \qquad E[d_p | d_p > 12] = 17.7.$$

Together with the point-identified durations from the other frequency answers, these estimates complete the measurement of wage and price durations from the survey answers.

[4] For the imputation exercise, we collapsed the four high-frequency categories into one, for simplicity and in order to get identification from the upper-duration (low-frequency) part of the distribution. The latter makes sense because here it is only the upper duration point that we want to impute. Not that it is only for the imputation exercise that we collapsed the shorter-duration categories, and no information was discarded for the eventual translation of frequencies into durations.

C TABLES

Table 1
The effects of a minimum wage increase

HU8. By asking the following questions, we would like to learn about the consequences to your firm of a hypothetical 20 per cent increase of the minimum wage from its current level (that is to HUF 79,000).	**mean (weighted by wl)**	**min**	**max**	**obs**
What fraction of your employees have earnings under the hypothetical new minimum wage (that is, under HUF 79,000)?	13.7	0	100	1,517
Due to the increase if the minimum wage, would you lay off some employees whose wages would be directly affected (i.e. whose earnings are under the hypothetical new minimum wage, that is, under HUF 79,000)? Where: 1 = yes (or likely), 0 = no (or not likely)	0.077	0	1	1,477
If 1 (yes or likely), what fraction are those who are affected (i.e. earn under HUF 79,000)?	31.8	1	100	85
Due to the increase in the minimum wage, would you increase wages of some employees whose wages would NOT be directly affected (i.e. whose earnings are ABOVE the hypothetical new minimum wage, that is, under HUF 79,000)? Where: 1=yes (or likely), 0=no (or not likely)	0.295	0	1	1,585
If 1 (yes or likely), what fraction are those (i.e. earn ABOVE HUF 79,000)	62.1	0	100	347
If 1 (yes or likely), by how much on average?	9.9	0	38	225
HU9. On January 1st 2001, the minimum wage was raised from HUF 25,500 to HUF 40,000 (by 57%), and then, on January 1st 2002, by another 25% (to HUF 50,000). By asking the following few questions, we would like to learn about the consequences of these events to your firm.	**mean (weighted by wl)**	**min**	**max**	**obs**
Are you in the position to answer such questions? (Where: 0 = no, 1 = yes)	0.452	0	1	1,570
What fraction of your employees had earnings that were directly affected by the minimum wage increases, (i.e. are under the raised minimum wage, that is, under HUF 50,000)?	23.2	0	100	692
Due to the increase in the minimum wage, did you lay off some employees whose wages were directly affected (i.e. whose earnings were under the hypothetical new minimum wage, that is, under HUF 55,000)? (Where: 0=no, 1=yes)	0.037	0	1	713
If 1 (yes), what fraction are those who were affected (i.e.earned under HUF 55,000)?	13.3	0	50	27
Due to the increase in the minimum wage, did you increase wages of some employees whose wages were NOT directly affected (i.e. whose earnings were ABOVE the new minimum wage, that is, above HUF 55,000)? (Where: 0=no, 1=yes)	0.294	0	1	736
If 1 (yes), what fraction are those (i.e. earned ABOVE HUF 55,000)?	47.1	0	100	221
If 1 (yes), by how much on average?	15.1	0	100	164

Table 2
Temporary employment by firm size

LHS variable: Share of temporary employees, %	EA	CEE	HU	EA	CEE	HU	EA	CEE	HU
5 to 19 employees	10.3	14.3	1.3	9.0	12.5	1.0	9.1	9.9	0.3
	[0.7]**	[1.3]**	[0.5]*	[0.6]**	[1.4]**	[0.8]	[0.7]**	[1.5]**	[1.4]
20 to 49 employees	8.5	18.0	2.3	8.8	18.5	2.2	8.7	17.2	1.2
	[0.5]**	[1.7]**	[0.7]**	[0.5]**	[1.7]**	[0.7]**	[0.6]**	[1.9]**	[1.0]
50 to 199 employees	11.3	19.4	5.3	11.2	20.0	5.7	10.7	20.2	4.3
	[0.5]**	[1.5]**	[1.3]**	[0.5]**	[1.5]**	[1.2]**	[0.5]**	[1.6]**	[0.9]**
200+ employees	9.0	20.4	11.1	9.3	21.3	11.1	9.5	23.2	13.6
	[0.4]**	[1.7]**	[2.4]**	[0.4]**	[1.8]**	[2.4]**	[0.5]**	[2.1]**	[3.1]**
Country x Sector FE				YES	YES	YES	YES	YES	YES
Firm-level control variables							YES	YES	YES
Observations	10,820	1,990	1,899	10,820	1,990	1,899	7,372	1,792	1,437
R-squared	0.00	0.01	0.05	0.13	0.06	0.09	0.14	0.09	0.13

Robust standard errors in brackets.
** significant at 5%; ** significant at 1%*

Table 3
Job destruction by firm type

LHS variable: Percentage of workers who left the firm last year	EA	CEE	HU	EA	CEE	HU	EA	CEE	HU
5 to 19 employees	16.0	21.0	12.6	13.9	20.4	12.3	13.4	19.8	13.4
	[0.7]**	[1.2]**	[1.6]**	[0.6]**	[1.3]**	[1.6]**	[0.7]**	[1.4]**	[2.2]**
20 to 49 employees	13.8	20.7	13.4	14.6	20.5	12.9	13.8	19.1	13.4
	[0.5]**	[1.3]**	[0.8]**	[0.5]**	[1.3]**	[0.8]**	[0.6]**	[1.3]**	[1.0]**
50 to 199 employees	15.9	20.1	16.1	16.2	20.5	16.1	15.6	20.5	15.7
	[0.5]**	[1.0]**	[0.7]**	[0.5]**	[1.0]**	[0.7]**	[0.5]**	[1.0]**	[0.7]**
200+ employees	15.4	23.1	15.4	15.8	23.6	15.8	15.5	25.3	15.9
	[0.5]**	[1.3]**	[1.5]**	[0.5]**	[1.4]**	[1.4]**	[0.6]**	[1.7]**	[1.3]**
Country x Sector FE				YES	YES	YES	YES	YES	YES
Firm-level control variables							YES	YES	YES
Observations	10,413	1,938	1,661	10,413	1,938	1,661	7,163	1,746	1,292
R-squared	0.00	0.00	0.01	0.07	0.05	0.02	0.08	0.09	0.04

Robust standard errors in brackets.
** significant at 5%; ** significant at 1%*

Table 4
Job creation by firm type

LHS variable: Percentage of workers who joined the firm last year	EA	CEE	HU	EA	CEE	HU	EA	CEE	HU
5 to 19 employees	16.4	13.6	11.7	13.7	13.3	11.3	13.3	12.9	12.0
	[0.8]**	[1.0]**	[1.4]**	[0.7]**	[1.1]**	[1.4]**	[0.8]**	[1.2]**	[2.0]**
20 to 49 employees	15.2	17.9	14.3	16.2	17.6	14.0	15.5	17.3	14.3
	[0.6]**	[1.0]**	[1.3]**	[0.6]**	[1.0]**	[1.3]**	[0.7]**	[1.2]**	[1.6]**
50 to 199 employees	17.2	18.2	16.0	17.7	18.5	16.1	17.3	19.1	15.3
	[0.5]**	[0.9]**	[0.8]**	[0.5]**	[0.9]**	[0.8]**	[0.6]**	[0.9]**	[0.8]**
200+ employees	16.2	22.2	15.9	16.6	22.4	16.1	16.4	23.4	17.3
	[0.5]**	[1.1]**	[1.6]**	[0.5]**	[1.2]**	[1.6]**	[0.6]**	[1.5]**	[1.5]**
Country x Sector FE				YES	YES	YES	YES	YES	YES
Firm-level control variables							YES	YES	YES
Observations	10,373	1,941	1,667	10,373	1,941	1,667	7,130	1,751	1,293
R-squared	0.00	0.03	0.01	0.08	0.06	0.02	0.08	0.08	0.07

Robust standard errors in brackets.
** significant at 5%; ** significant at 1%*

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