

WAGE AND PRICE SETTING BEHAVIOUR OF LITHUANIAN FIRMS

Ernestas Virbickas

Lietuvos bankas
Gedimino pr. 6
01103 Vilnius
E-mail: evirbickas@lb.lt

This article investigates wage and price setting behaviour of Lithuanian firms based on ad hoc survey "On Price and Wage Setting" that was undertaken by the Bank of Lithuania. The article provides survey evidence on frequency of wage and price changes. Frequency of wage changes turns to be higher in firms that apply collective pay agreements while frequency of price changes appears to be positively affected by the market competition. Labour cost share is not confirmed to be significant in making the impact on the frequency of price changes. This article also investigates the role of some of the technological, institutional and other factors in shaping firms' responses to a negative demand shock, an intermediate input cost shock and a wage shock. It is found out that higher labour cost share increases the likelihood of price increase following the wage shock. Flexible wage components mitigate firms' responses to the slowdown in demand and intermediate input cost increase. Behaviour of firms following the investigated shocks is also affected by the stance of the competition. The role of collective pay agreements appears to be rather limited in shaping responses of firms to these shocks.*

Keywords: wage setting; price setting; labour costs.

Introduction

Nominal rigidities play an important role in the transmission of economic shocks. Higher degree of wage and price rigidities makes economic adjustment less efficient and less smooth. The level of flexibility of these variables is especially important when a country operates in a monetary union or maintains exchange rate fixed, as is the case of Lithuania. When adjustment is not possible through the nominal exchange rate, wage and price setting becomes of a particular significance in the transmission of the shocks.

This article investigates wage and price setting behaviour of Lithuanian firms. It uses a unique dataset obtained in *ad hoc* survey of the Bank of Lithuania "On Price and Wage Setting" conducted within Wage Dynamics Network (WDN)**. This network is a research project combining research efforts of a number of European Union (EU) national central banks coordinated by the European Central Bank. To some extent this project is a follow-up to research conducted within Inflation Persistence Network (IPN). IPN findings suggested that in euro area wage persistence was an important factor behind price stickiness (Altissimo et al. 2006). Therefore WDN aimed at investigating: sources and features of wage and labour cost dynamics, and the relationship between wages and prices.

Micro studies on wage setting are typically related to discovering the existence of downward nominal wage rigidity and possible explanations for this phenomenon. In addition to questions on downward wage rigidity the WDN survey inquired information about frequency and patterns of wage and price changes thus extending possibilities to analyse wage and price rigidities and their relationship with characteristics of firms. The survey also included questions on price, wage and employment reactions in response to certain economic shocks allowing investigating the role of technological, institutional and competitive environment in wage and price setting and overall behaviour of firms. Some of the results covering most of the countries that carried out the WDN survey*** are documented in Babecký et al. (2009), Bertola et al. (2009), Druant et al. (2009), Galuščák et al. (2009).

- Ernestas Virbickas is a Senior Economist at Macroeconomics and Forecasting Division, Economics Department, Bank of Lithuania.
Areas of activity: macroeconomic analysis, monetary policy.

*Author is thankful to Rūta Rodzko for the support in conducting this research.

**Survey questionnaire is available upon request.

***Between the end of 2007 and the first half of 2008, the WDN survey was carried out in 17 EU countries: Austria, Belgium, the Czech Republic, Estonia, France, Germany, Greece, Hungary, Italy, Ireland, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, and Spain.

The purpose of this article is to determine the patterns of wage and price setting in Lithuanian firms identifying among the others technological, institutional and market competition factors behind the behaviour of firms. Analysis is conducted by investigating two subsets of the survey data. The first one deals with the frequency of wage and price changes. Frequency of these changes represents the outcome of wage and price setting and might be viewed as a measure of wage and price rigidities. Therefore this article explores the survey data to investigate the patterns of wage and price changes. Another targeted subset of the data relates to the responses of firms to economic shocks. These shocks include a slowdown in demand, an increase in intermediate input cost and an increase in wages. It is tried to figure out the role of some of the technological, institutional and other factors (such as the labour cost share, the presence of collective pay agreements, the share of flexible wage components, market competition) in determining the adjustment channels following the economic shocks. Throughout the analysis particular attention is paid to reveal information on the relationship between labour costs and prices. Some of the survey information, for instance, on downward nominal wage rigidity and on wages of newly hired employees, is left for future investigation.

This article is organised in the following way: Section 1 provides overview of the survey conduct and describes some of the employee structure and labour compensation features of the Lithuanian firms; frequency of wage and price changes is investigated in Section 2; Section 3 deals with the analysis of the ways of adjustment in response to a negative demand shock, an intermediate input cost shock and a wage shock. The main findings of this study are summarized in the concluding Section.

1. Survey conduct and some of the results

The survey of the Bank of Lithuania “On Price and Wage Setting” was conducted in April–May 2008. It was carried out by contacting respondents by mail, phone and face to face. In answering the questions, respondents were asked to refer to their operational activities of the year 2007. This was a year of particularly strong economic expansion, which continued for a number of years. At that time labour market of Lithuania was undergoing exceptionally severe pressures as the level of unemployment was notably low and the rate of vacancies was reaching the peak. This was a period of the elevated growth rates of wages and prices.

Firms satisfying certain criteria were stratified according to economic activities (D–K according to NACE rev. 1.1)* and firm size (measured by the number of employees – 5 to 19 employees, 20 to 49 employees, 50 to 149 employees, 150 to 249 employees, and 250 and more employees). Firms operating in agriculture and fishing (economic activities A and B according to NACE rev. 1.1) were not targeted since in these activities there are many self-employed people, which means that in these activities wage determination is not a real issue. Mining and quarrying (economic activity C according to NACE rev. 1.1) was excluded due to relatively small number of firms operating in this activity. Firms operating in public administration, education and health care (economic activities L–N according to NACE rev. 1.1) were not targeted since wage formation in public services does not have a significant influence on prices in these activities. Small firms (up to 5 employees) were excluded since many of them are sole proprietorships with simplified operational activities. Sole proprietorships were not targeted. In total, 2,810 firms were contacted. Targeted sample was 500 firms. Some of them provided incomplete answers. Therefore responses only from 343 firms are used in the analysis. In other words realized sample consists of 343 firms. Realized sample composition of firms is provided in Appendix (Tables 1–2).

In terms of the number of firms realized sample mostly consists of small firms (of size up to 19 employees). In this sample there are 97 manufacturing, 27 construction, 104 trade and 115 business services firms. In realized sample the highest share of employees work in large companies (of size 50 and more employees). In this sample most of the employees work in business services and manufacturing.

*In this article (unless stated otherwise), group of economic activities titled “manufacturing” refers to manufacturing and supply of electricity, gas and water (D and E according to NACE rev. 1.1); economic activities “construction” and “trade” are self-explanatory (F and G according to NACE rev. 1.1); economic activities titled “business services” refer to the rest of the market services (H–K according to NACE rev. 1.1).

To ensure that realized sample reflects the distribution of total population of firms as closely as possible, descriptive analysis in this article is based on firms' responses that are weighted by employment adjusted sampling weights. These weights adjust for unequal probability of firms ending up in the realized sample as well as adjust the realized sample to represent employees in total population.

Table 1 summarizes some of the features of the structure of employees and labour compensation of the surveyed firms. The survey showed that flexible forms of employment are applied for approximately 13 per cent of employees. In the surveyed firms 9.1 per cent of the employees are part time permanent workers and 3.8 per cent are temporary workers. Flexible forms of employment are more popular in business services. In these services, 14 per cent of hired employees are part time permanent workers while 5 per cent of employees are temporary workers. In other economic activities, the usage of such forms of employment is less popular.

Table 1

Selected indicators of the surveyed firms*

Indicator	(per cent)				
	Manufac- turing	Const- ruction	Trade	Business services	Total
Employees by their employment status:					
share of full time permanent employees	90.4	93.5	88.4	81.0	87.1
share of part time permanent employees	5.4	3.2	9.8	14.0	9.1
share of temporary employees	4.2	3.3	1.7	5.0	3.8
Occupational groups of employees:					
share of low skilled blue-collar employees	51.3	31.8	30.3	32.0	37.2
share of high skilled blue-collar employees	25.6	40.5	24.9	25.2	27.4
share of low skilled white-collar employees	6.8	5.9	8.5	6.5	6.9
share of high skilled white-collar employees	10.8	15.3	20.0	29.8	20.2
Labour compensation principles:					
share of firms paying hourly base wages	16.9	8.6	8.0	24.1	16.4
share of firms paying piece-rate base wages	45.7	68.2	27.8	24.5	37.4
share of firms paying monthly base wages	37.4	23.3	63.7	50.0	45.6
Use of performance related bonuses:					
share of firms paying bonuses	70.7	92.1	72.7	68.8	73.5
share of bonuses in total wage bill	10.0	27.4	18.5	18.1	17.1
Use of policies to adapt changes in wages to inflation:					
share of firms in which wage changes are automatically linked to					
past inflation	8.4	2.0	3.3	10.5	7.1
expected inflation	1.0	6.3	1.4	6.1	3.6
share of firms in which there is no formal rule however wage changes take into account					
past inflation	30.3	38.9	34.1	9.8	25.0
expected inflation	7.3	9.8	11.4	19.5	12.9
share of firms that do not use such policies	53.0	43.0	49.9	54.5	51.5
Application of collective pay agreements:					
share of firms applying collective pay agreements signed at the national level					
share of firms applying collective pay agreements signed at the national level	0.2	2.0	1.1	0.9	0.9
share of firms applying collective pay agreements signed at the firm level					
share of firms applying collective pay agreements signed at the firm level	21.9	8.6	23.1	32.1	24.0
share of employees covered by collective pay agreements					
share of employees covered by collective pay agreements	15.4	5.4	16.5	19.6	15.7

Note: *responses are employment weighted and rescaled to exclude non-responses.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

According to the survey, in terms of occupational groups most of the employees fall into the categories of low skilled and high skilled blue-collar employees. Low skilled

blue-collar employees account for more than half of employees in manufacturing while high skilled blue-collar employees constitute more than 40 per cent of employees in construction. Another substantial share of employees is made up of high skilled white-collar employees that are more widely employed by business services firms.

The survey showed that quite a sizable share of firms use flexible forms of remuneration. More than one third of the firms use piece-rate and another 16.4 per cent of the firms use hourly remuneration as the main form of employee compensation. Piece-rate remuneration is more popular in construction and manufacturing while hourly wages are more favoured by business services. Firms also indicated rather widespread use of performance related bonuses. Flexible wage components (performance related bonuses) are used by 73.5 per cent of the firms, and they account for 17.1 per cent of total wage bill. The highest share of wages paid through performance related bonuses is observed in construction as well as in trade and business services.

Approximately one half of the surveyed firms use a policy that adapts changes in base wages to inflation. Except for business services, wage changes are mostly adapted to past rather than expected inflation. Relatively widespread use of this policy during a reference period of the survey (the year of 2007) could be tentatively explained by rather high inflation. This might also explain relatively more popular use of informal (non-automatic) rules to account for inflation when adjusting wages.

The survey also pointed out rather low presence of collective pay agreements in the investigated firms. It was found out that approximately one quarter of the firms apply collective pay agreements signed at the firm level while collective pay agreements are very rare at the national level. In the surveyed firms the coverage by these agreements amounts to 15.7 per cent of employees. The presence of collective pay agreements and the highest coverage are mostly observed in business services.

2. Frequency of wage and price changes

Frequency of wage and price changes might be viewed as a measure of wage and price rigidities*. Shorter period during which wage or price is not changed might imply that wage or price is more flexible, i.e. wage or price setting is more sensitive in response to economic shocks. On the other hand longer period during which wage or price is not changed, i.e. longer wage or price duration, need not necessarily imply higher rigidity. This might be due to the absence of economic shocks. Thus, frequency of wage and price changes is not a perfect measure of nominal rigidities. Nevertheless frequency of these changes represents the outcome of wage and price setting, which heavily depends on the degree of flexibility in making decisions on wages and prices.

The WDN survey explicitly asked the firms how frequently the base wage is typically changed. Respondents were asked to indicate whether change occurs more than once a year, once a year, once every two years, less frequently than once every two years, or change never occurs or pattern is not known. The survey asked the respondents to provide the information on frequency of wage changes due to tenure, due to inflation and due to reasons other than tenure and inflation.

As shown in the Table 2, the surveyed Lithuanian firms reported that most of wage changes occur due to reasons other than tenure and inflation. Such answer was indicated by 78.9 per cent of the firms. Due to reasons other than tenure and inflation wage is typically changed once a year or more frequently than once a year. This pattern of frequency of wage changes is quite similar across economic activities.

Due to inflation wages are changed in 60.7 per cent of the firms. Due to this reason change in wages mostly occurs once in a year. This is observed in all economic activities. As reported by the firms, the least common are wage changes due to tenure. This is observed in slightly more than half of the surveyed firms. Due to tenure wage changes typically occur once a year or less frequently than once a year. Thus, due to tenure wages are changed less frequently than due to inflation and due to reasons other than tenure and inflation. Somewhat different wage setting pattern is observed in construction where due to tenure wages are typically changed more frequently than once a year.

*Studies on these issues include Blinder et al. (1998), Bils and Klenow (2004), Vermeulen et al. (2007), Dhyne et al. (2006), Fabiani et al. (2006) and Druant et al. (2009).

Table 2

**Frequency of wage changes
(share of firms)***

(per cent)

Reason of wage change / economic activity	Frequency of wage change			
	More than once a year	Once a year	Less than once a year	Never / don't know
Due to tenure:				
manufacturing	7.6	15.7	21.6	55.1
construction	19.7	18.4	9.5	52.4
trade	10.4	25.8	22.0	41.8
business services	3.1	28.4	19.6	49.0
total	8.3	22.8	19.3	49.7
Due to inflation:				
manufacturing	17.5	33.2	11.4	37.9
construction	21.6	51.2	4.0	23.3
trade	16.3	28.9	12.8	42.1
business services	16.2	27.4	11.4	45.0
total	17.3	32.7	10.7	39.3
Due to other reasons:				
manufacturing	29.0	37.0	8.2	25.8
construction	31.5	59.9	0.0	8.6
trade	29.4	29.6	16.0	25.1
business services	30.5	35.1	14.7	19.7
total	30.0	37.9	11.0	21.1
Due to all reasons:				
manufacturing	43.6	45.0	5.8	5.5
construction	54.8	43.2	2.0	0.0
trade	40.6	45.8	8.5	5.1
business services	38.0	41.6	10.2	10.3
total	42.5	43.7	7.4	6.3

Note: *responses are employment weighted and rescaled to exclude non-responses; frequencies of wage changes "due to all reasons" are calculated by assigning each firm the highest frequency of wage change irrespective the reason behind the change.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

To get a perception of how frequently wages are changed in general, wage change frequencies across all investigated reasons were combined into one variable by assigning each firm the highest frequency of wage change irrespective the reason behind the change. It turned out that in Lithuania in slightly more than 40 per cent of the surveyed firms wages are changed once a year and in approximately the same share of firms wages are changed more than once a year. Somewhat higher frequency of wage changes is observed in construction and manufacturing while this frequency is somewhat lower in business services.

Compared to the other countries, which conducted the surveys within WDN (Druant et al. 2009), wages in Lithuania seem to be changed more frequently. As in Lithuania, in both euro area and non-euro area EU countries wages are typically changed once a year. However in Lithuania, considerably larger part of firms change wages more frequently than once a year. One should keep in mind that in case of Lithuanian survey the respondents were asked to provide information based on their operational activities in 2007, which was a period of particularly strong economic growth and elevated inflation. This could have contributed to relatively high frequency of wage changes in Lithuania.

The WDN survey also explicitly asked the firms how frequently the price of the firm's main product is typically changed. Firms were asked to indicate whether change occurs: daily, weekly, monthly, quarterly, half-yearly, once a year, once every two years, less frequently than once every two years, never, or there is no defined pattern.

Survey results (see Table 3) show that in Lithuania approximately in one third of the firms frequency of price changes does not follow any specific pattern. Approximately in

one quarter of the firms prices are changed quarterly to half yearly, and in approximately one fifth of the firms prices are changed once a year. Prices seem to be changed more frequently in manufacturing and less frequently in business services.

In comparison to the other countries, which undertook the surveys within WDN (Druant et al. 2009), prices in Lithuania appear to be changed more frequently. In both euro area and non-euro area countries prices are typically changed once a year while, as mentioned, in Lithuania they are typically changed on a more frequent basis. It should be noticed that some studies show that frequency of price increases is positively associated with the level of inflation (Dhyne et al. 2006; Vermeulen et al. 2007). Elevated inflation during the reference period of the survey could have contributed to higher frequency of price changes in Lithuania.

Table 3

**Frequency of price changes
(share of firms)***

Economic activity	Frequency of price change				
	Daily to monthly	Quarterly to half yearly	Once a year	Less than once a year	Never / no pattern
Manufacturing	6.8	39.0	13.7	13.9	26.6
Construction	2.0	37.0	28.2	0.0	32.8
Trade	18.9	15.5	15.0	2.1	48.5
Business services	6.8	21.3	26.0	20.9	25.1
Total	8.7	27.3	20.4	11.9	31.6

Note: *responses are employment weighted and rescaled to exclude non-responses.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

One should notice that the surveyed firms included companies making products and providing services not only for final consumers. Therefore frequency of price changes revealed by the WDN survey reflects changes of both producer and consumer prices.

Wages or prices might adjust less sensitively in response to economic shocks if adjustments occur in a predefined pattern. Wages or prices might become less flexible if they are changed in a time-dependent way. Therefore along with questions about frequency of wage and price changes the WDN survey also inquired the firms whether wage and price changes occur in any particular month(s).

The survey revealed that in Lithuania 16.9 per cent of the firms typically change wages in a particular month while prices are changed in a particular month by 14.9 per cent of the firms (see Table 4). In almost two thirds of time-dependent firms wages are typically changed in January while the first month of the year was indicated as the month in which prices are typically changed by almost half of time-dependent firms. Other peaks occur in the beginning of every quarter, i.e. in April, July, and October. Adjustment of wages and prices appears to be more time-dependent in construction firms.

Table 4

Share of firms reporting that wage and price changes occur in a particular month(s)*

Economic activity	Frequency of price change	
	Wage change	Price change
Manufacturing	15.1	10.7
Construction	23.6	23.6
Trade	10.1	13.9
Business services	19.8	15.6
Total	16.9	14.9

Note: *responses are employment weighted and rescaled to exclude non-responses.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

As documented in Druant et al. (2009), time-dependence of wage and price changes in Lithuania stands at a relatively low level compared to the other countries that carried out the WDN survey. It is considerably lower than on average in euro area countries where wages and prices are typically changed in a particular month(s) in more than 60 per cent and more than 40 per cent of the firms respectively. It is also somewhat lower than on average in non-euro area countries.

Frequency of wage and price changes might be affected by a number of factors related to firm's production technology, labour compensation settings, market competition, and some other factors. To get better understanding of frequency of wage and price changes, these frequencies are modelled using ordered probits. Both models (i.e. the model of frequency of wage changes and the model of frequency of price changes) include three sets of explanatory variables: the one accounting for differences in production technologies; the other reflecting labour compensation arrangements; and the third one proxying market competition.

The set of explanatory variables that account for the differences in production technologies includes:

- *labour share*. This is a share of total costs of a firm, which are incurred due to hiring of employees (it includes wages, individual or company performance related bonuses, social contributions, training expenses, etc.); this variable is expressed in percentages;

- *trade firms* and *services firms*. These are economic activity dummy variables; dummy variable "trade firms" takes value 1 if firm is a trade firm (economic activity G according to NACE rev. 1.1); dummy variable "services firms" takes value 1 if a firm is any other market services firm (economic activities H–K according to NACE rev. 1.1); otherwise these variables take value 0; reference category is manufacturing firms (economic activities D–F according to NACE rev. 1.1);

- *firms 20–49* and *firms 50 and more*. These are firm size dummy variables; these dummy variables take value 1 if the number of employees in a firm equals from 20 to 49 or 50 and above respectively and takes value 0 otherwise; reference category is the firms that employ up to 19 employees.

Labour compensation arrangements are reflected by two variables. One of them accounts for the presence of wage bargaining institutional setup. This variable – "collective pay agreements" – is constructed as a dummy variable that takes value 1 if a firm applies collective pay agreement signed outside the firm or signed at the firm and takes value 0 if no collective pay agreement is applied. Another variable represents the use of flexible wage components. The variable "flexible wage share" is a share of total wage bill, which is due to individual or company performance related bonuses. The latter variable is expressed in percentages.

Market competition is captured by two variables. The variable "competition" is generated using the answers to a question whether the firm decreases its own price following the price decrease of a product of a main competitor. This variable is a dummy variable that takes value 1 if firm is "very likely" to decrease the price and takes value 0 if firm is "likely" or "not likely" to decrease the price or responds "not at all". One more variable to capture the competition pressures is related to the exposure of the firm to foreign markets. Higher share of the revenue due to sales in foreign markets might imply more competitive environment. Therefore "foreign sales share" is one more way to proxy the intensity of the competition in the product market. The latter variable is expressed in percentages.

In addition to the above-described factors, the model of the frequency of wage changes also accounts for the presence of institutional setting that adapts changes in base wages to inflation. The explanatory variable "policy to account for inflation" is constructed as a dummy variable that takes value 1 if such kind of setting is used in a firm (i.e. wage changes are automatically linked to inflation or there is no formal rule however wage changes take into account inflation) and takes value 0 if there is no such setting.

Apart from the three sets of explanatory variables outlined above, the model of the frequency of price changes also includes a variable on price regulation. The explanatory

variable “price regulation” is constructed as a dummy variable that takes value 1 if a firm does not have an autonomous price setting policy (the price is regulated by a state or set by a parent company or set by main customer(s)) and takes value 0 if the price is set following the main competitors or the price is set according to the costs and self-determined profit margin.

In both models (i.e. in the model of frequency of wage changes and in the model of frequency of price changes) the dependent variable is the categorical variable increasing with the frequency of wage and price changes: 1 = wage or price is changed less frequently than once a year, 2 = wage or price is changed once a year, 3 = wage or price is changed more frequently than once a year. As in analysis above, the variable that reflects frequency of wage changes is constructed by assigning each firm the highest frequency of wage change irrespective the reason behind the change.

Estimation results are provided in Appendix. For simplicity purposes analysis is limited to marginal effects on the highest probability cell. In particular, Table 3 of Appendix provides only marginal effects on the probability that wage or price change occurs more frequently than once a year.

Regression analysis shows that frequency of wage changes is affected by the institutional features of the firms. In particular, frequency of wage changes is more likely to be higher in firms that apply collective pay agreements and in firms that adapt changes in base wages to inflation. Statistically significant role of the presence of collective pay agreements is in line with the fact that most of these agreements are signed at the firm level (rather than national level) what allows the bargaining for wages on a more frequent basis. As the changes in wages mostly reflect upward revisions, the presence of these agreements along with the other factors mostly contribute to more frequent increases of wages. Analysis also shows that wages are more likely to be changed more frequently in larger firms compared to smaller ones.

Frequency of price changes is found to be positively affected by market competition. It is affected negatively by price regulation. Analysis shows that services firms tend to change prices less frequently than manufacturing firms. In contrary to the IPN findings on the price setting in euro area (Vermeulen et al. 2007) and the WDN findings based on a broader range of countries (Druant et al. 2009), labour share does not appear to be significant in affecting the frequency of price changes in Lithuanian firms.

To check the robustness of the above-described results both regressions were estimated using different definitions of the dependent variables. Dependent variables were constructed as binary variables: 0 = wage or price is changed less frequently than once a year or once a year, 1 = wage or price is changed more frequently than once a year. Robustness analysis revealed that in contrary to the above-described results it cannot be concluded that wages are changed more frequently in firms that adapt changes in base wages to inflation and in larger firms. It also turned out that under different definition of the dependent variable it is not possible to conclude that the presence of price regulation affects the frequency of price changes.

3. Response to economic shocks

To get better understanding of wage and price setting and overall behaviour of firms the survey included several questions on the possible adjustment channels that can be used in response to economic shocks. Responses to these questions combined with available covariates might reveal the role of certain facilitators as well as impediments stemming from characteristics of firms in reaction to changing economic environment.

The survey asked respondents how relevant are certain strategies when the firm faces three types of shocks: unanticipated slowdown in demand, unanticipated increase in the cost of an intermediate input, which affects all the firms in the market, or unanticipated permanent increase in wages (e.g. due to renewal of the collective pay agreement or due to increase in the minimum monthly wage) affecting all the firms in the market. Firms were asked to indicate whether reduction or increase in prices, reduction in margins,

reduction in output and reduction in costs is not relevant, of little relevance, relevant, very relevant in response to the shocks, or they don't know.

As shown in the Table 5, following a shock it is the most popular to use a combination of strategies. In response to a slowdown in demand firms tend to choose cost reduction together with other strategies. Firms report that in face of this shock they would be least willing to lower the prices thus indicating some degree of downward price stickiness. Following both of the cost shocks change in prices is more common reaction among the firms. Nevertheless combinations of increase in prices with other types of strategies are more widely used implying that higher intermediate input costs and higher wages are only partially passed into the prices. In case of both of the cost shocks firms clearly avoid reducing the output. This points to active search for efficiency gains.

Table 5

*Distribution of responses of firms to different types of shocks
(share of firms for which the use of certain combinations of responses is
"relevant" or "very relevant")^a*

Combination of responses to a shock	Type of a shock			(per cent)
	Slowdown in demand	Increase in the cost of an intermediate input	Increase in wages (e.g. due to increase in the minimum monthly wage)	
Price	0.2	5.6	6.2	
Margin	1.3	2.0	3.7	
Output	1.8	0.0	0.0	
Costs	2.1	5.7	6.6	
Price / margin	3.7	8.0	12.9	
Price / output	0.3	1.1	0.1	
Price / costs	3.9	11.2	9.5	
Margin / output	5.0	0.0	0.3	
Margin / costs	7.0	1.8	9.4	
Costs / output	12.9	1.5	0.9	
Price / margin / output	4.0	1.4	0.3	
Price / margin / costs	9.5	21.6	21.6	
Price / output / costs	1.6	4.6	2.2	
Margin / output / costs	11.5	3.8	3.4	
Price / margin / output / costs	29.1	20.4	15.7	
None	6.1	11.2	7.2	
Price / any combination	52.3	73.8	68.5	
Margin / any combination	71.1	59.1	67.4	
Output / any combination	66.2	32.9	22.9	
Costs / any combination	77.6	70.8	69.3	

Note: ^aresponses are employment weighted and rescaled to exclude non-responses; "price" indicates price decrease or price increase, "margin" indicates margin decrease, "output" indicates output decrease, "costs" indicate reduction in costs.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

Respondents, which indicated that reduction in costs is of any relevance following the shocks, were asked to identify particular ways of cost cutting. Possible answers included reduction in base wages, reduction in the flexible wage components, reduction in the number of permanent employees, reduction in the number of temporary employees, reduction in the number of hours worked per employee, and reduction in non-labour costs.

As shown in the Table 6, cost cutting ways are quite similar in response of each of the shocks. As expected, firms very rarely use cost cutting through reduction of base wages. This confirms a widely spread perception that nominal cuts in base wages are very seldom. Although (as already mentioned) performance related bonuses account for quite

significant share of total wage bill, adjustment through flexible wage components is reported as less important than adjustment through employment. In response to each of the shocks adjustment through reduction in non-labour costs is considered as the most important.

Table 6

*Use of cost cutting strategies in response to different types of shocks (share of firms for which cost-cutting is “of little relevance”, “relevant” or “very relevant”)**

Type of cost cutting response	Type of a shock			(per cent)
	Slowdown in demand	Increase in the cost of an intermediate input	Increase in wages (e.g. due to increase in the minimum monthly wage)	
Reduction in base wages	3.0	1.3	–	
Reduction in flexible wage components	11.3	12.6	8.5	
Reduction in the number of permanent employees	10.9	7.9	13.5	
Reduction in the number of temporary employees	12.8	11.3	14.6	
Reduction in the number of hours worked per employee	6.1	2.7	3.2	
Reduction in non-labour costs	55.8	64.2	60.2	

Note: *responses are employment weighted and rescaled to exclude non-responses.

Source: the survey of the Bank of Lithuania “On Price and Wage Setting”; author’s calculations.

The channels of adjustment in response to the economic shocks might be determined by a number of characteristics of firms, including the ones investigated in the analysis of frequency of wage and price changes. To keep the analysis concentrated, responses to each of the shocks are modelled using ordered probits that include only three sets of explanatory variables related to production technologies, labour compensation arrangements and market competition as described in the previous Section. The dependent variable in all the models is the categorical variable increasing with the intensity of strategy use: 1 = use of strategy (i.e. price change, margin decrease, output decrease, reduction in costs) is not relevant, 2 = use of strategy is of little relevance, 3 = use of strategy is relevant, 4 = use of strategy is very relevant.

Estimation results are provided in Tables 4–6 of Appendix. These tables provide only marginal effects on the probability that firm’s response to a particular shock is “very relevant”. Thus, as in the previous section, analysis is limited to marginal effects on the highest probability cell.

As shown in Tables 4–6 of Appendix, the investigated set of explanatory variables does not describe satisfactorily the features of firms that respond to the shocks by lowering the costs as well the characteristics of firms that reduce output following wage shock. Therefore no inferences are based on the latter probits.

Regression analysis reveals that pricing decisions are significantly affected by the stance of the competition. In case of negative demand shock competition increases the likelihood of price decrease. In case of both of the cost shocks likelihood of price increase is lowered if firm’s exposure to foreign markets is higher. It needs to be noticed that following permanent increase in wages higher labour share does increase the probability of price increase. This is an important finding of the survey identifying the link between labour costs and prices. The latter result is also obtained in the cross-country analysis covering most of the countries that conducted the surveys within WDN (Bertola et al. 2009).

Another set of findings is related to the use of flexible wage components. As mentioned above, performance related bonuses account for quite significant part of labour costs

although adjustment through bonuses is reported as less important than adjustment through some other channels. Nevertheless regression analysis reveals that higher flexible wage share mitigates responses to a slowdown in demand (it lowers the likelihood of margin and output decrease) and mitigates responses to intermediate input cost increase (it makes the likelihood of price increase and margin decrease lower).

As could be expected, the role of collective pay agreements appears to be mostly insignificant in response to the investigated shocks. This is consistent with the relatively rare use of these agreements in Lithuanian firms. Nevertheless presence of collective pay agreements is found to be important in case of wage shock. Collective pay agreements increase the likelihood of margin decrease following this shock.

Ordered probit estimates spotlight the importance of the competition in the behaviour of Lithuanian firms. In several regressions higher competition level and greater exposure to foreign markets is associated with more sensitive reaction to shocks. In addition to the mentioned role of competition and foreign sales share in pricing decisions, these covariates point to a greater likelihood of margin decrease.

Regression analysis shows that trade and services firms compared to the manufacturing firms are less likely to lower the margin in response to all the investigated shocks. Trade and/or services firms also tend to respond less sensitively by changing prices and output following certain shocks. Larger firms compared to smaller ones appear to be more likely to lower the output when they face a slowdown in demand or increase in the intermediate input cost.

To check the robustness of the estimation results all regressions were also estimated using different definitions of the dependent variables. In particular, dependent variables were constructed as binary variables: 0 = use of strategy (i.e. price change, margin decrease, output decrease, reduction in costs) is not relevant or of little relevance, 1 = use of strategy is relevant or very relevant. It was found out that under different definition of the dependent variable it is not possible to conclude (in contrary to the above-described results) that higher flexible wage share is statistically significant in lowering the likelihood of price increase following intermediate input cost shock. Robustness analysis revealed that it cannot be concluded that trade firms are less likely to lower the output compared to manufacturing firms in response to increase in the intermediate input cost. Additionally, this analysis showed that the investigated set of variables is not statistically significant to explain firms' adjustment of margins following permanent increase in wages.

Conclusions

Analysis of *ad hoc* survey data revealed a number of characteristics of wage and price setting behaviour of Lithuanian firms. This study showed that in Lithuania most of wage changes occur due to reasons other than tenure or inflation. In slightly more than 40 per cent of the surveyed firms wages are changed once a year and in approximately the same share of firms wages are changed more than once a year. Frequency of wage changes appears to be higher in firms that apply collective pay agreements.

The survey showed that in approximately one third of the firms frequency of price changes does not follow any specific pattern. In approximately one quarter of the firms prices are changed quarterly to half yearly, and in approximately one fifth of the firms prices are changed once a year. Frequency of price changes is positively affected by the market competition.

It was found out that Lithuanian firms tend to use performance related bonuses as the form of labour compensation. 73.5 per cent of the firms use flexible wage components that account for 17.1 per cent of total wage bill. Regression analysis revealed that higher flexible wage share mitigates firms' responses to a slowdown in demand by lowering the likelihood of margin decrease and output decrease. It also mitigates responses to an intermediate input cost rise by making the likelihood of margin adjustment lower.

Presence of collective pay agreements is found to be relatively low. Approximately one quarter of the firms apply collective pay agreements signed at the firm level while

collective pay agreements are very rare at the national level. In the surveyed firms 15.7 per cent of employees are covered by these agreements. The role of collective pay agreements is found to be rather limited in shaping responses of firms to economic shocks.

Regression analysis pointed to the importance of the competition behind the behaviour of Lithuanian firms. It was found out that higher competition level increases the likelihood of price decrease following negative demand shock. Greater exposure to foreign markets, which is associated with competition pressures, appeared to be significant in lowering the likelihood of price increase in response to cost shocks. Competition and exposure to foreign markets were also found to be important in fostering adjustment through margins.

The survey yielded somewhat mixed evidence on the relationship between labour costs and prices. Analysis showed that considerable share of the surveyed firms would increase prices in response to the wage shock. Labour share appeared to be an important determinant of price increase in response to this shock. However labour share was not confirmed to be significant in affecting the frequency of price changes.

Table 1

Realized sample composition of firms by economic activity and firm size*

Economic activity	Firm size in terms of number of employees			Total
	Up to 19 employees	20 to 49 employees	50 and more employees	
Manufacturing	51	22	24	97
Construction	7	12	8	27
Trade	74	19	11	104
Business services	74	26	15	115
Total	206	79	58	343

Note: *realized sample consists of the firms that have replied to the survey.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

Table 2

Realized sample composition of employees by economic activity and firm size*

Economic activity	Firm size in terms of number of employees			Total
	Up to 19 employees	20 to 49 employees	50 and more employees	
Manufacturing	568	705	3,444	4,717
Construction	83	409	951	1,443
Trade	731	570	975	2,276
Business services	686	782	3,379	4,847
Total	2,068	2,466	8,749	13,283

Note: *realized sample consists of the firms that have replied to the survey.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's calculations.

Table 3

Explanations for frequency of wage and price changes*

Ordered probit description	Frequency of wage change	Frequency of price change
Labour share	0.000	0.000
Trade firms	-0.043	-0.002
Services firms	-0.070	-0.179**
Firms 20-49	0.160**	-0.045
Firms 50 and more	0.166**	-0.093
Collective pay agreements	0.153**	-0.037
Flexible wage share	0.002	0.000
Competition	0.067	0.207**
Foreign sales share	-0.001	0.001
Policy to account for inflation	0.108**	-
Price regulation	-	-0.264**
Pseudo R-squared	0.048	0.053
Wald statistic	29.370	19.750
Prob. (Wald statistic)	0.001	0.032
Number of observations	292	198

Notes: *p-values are computed using Huber-White robust standard errors;

**coefficient is statistically significant at the level of 5 per cent; the rest of the coefficients are not statistically significant at the level of 10, 5 or 1 per cent.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's estimations.

Table 4

*Explanations for responses to a slowdown in demand**

Ordered probit description	Type of response to a shock			
	Price decrease	Margin decrease	Output decrease	Cost reduction
Labour share	0.001	0.002 ⁺⁺	0.000	0.001
Trade firms	-0.011	-0.100 ⁺⁺⁺	-0.088 ⁺⁺⁺	-0.002
Services firms	-0.058 ⁺⁺⁺	-0.115 ⁺⁺⁺	-0.082 ⁺⁺⁺	0.006
Firms 20–49	-0.014	0.039	0.119 ⁺⁺⁺	0.067
Firms 50 and more	0.014	0.008	0.110 ⁺⁺	0.068
Collective pay agreements	0.028	0.035	0.016	-0.056
Flexible wage share	0.000	-0.002 ⁺⁺	-0.002 ⁺⁺⁺	0.000
Competition	0.137 ⁺⁺⁺	0.111 ⁺⁺	0.051	0.049
Foreign sales share	0.000	0.000	0.000	-0.001
Pseudo R-squared	0.039	0.041	0.050	0.010
Wald statistic	25.970	33.580	33.750	6.400
Prob. (Wald statistic)	0.002	0.000	0.000	0.699
Number of observations	295	298	294	298

Notes: **p*-values are computed using Huber-White robust standard errors;

⁺⁺coefficient is statistically significant at the level of 5 per cent;

⁺⁺⁺coefficient is statistically significant at the level of 1 percent; the rest of the coefficients are not statistically significant at the level of 10, 5 or 1 per cent.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's estimations.

Table 5

*Explanations for responses to an increase in cost of an intermediate input**

Ordered probit description	Type of response to a shock			
	Price decrease	Margin decrease	Output decrease	Cost reduction
Labour share	0.000	0.000	0.000	0.000
Trade firms	-0.137 ⁺⁺⁺	-0.079 ⁺⁺⁺	-0.028 ⁺⁺	0.015
Services firms	-0.177 ⁺⁺⁺	-0.108 ⁺⁺⁺	-0.019	-0.054
Firms 20–49	0.015	-0.022	0.014	0.075
Firms 50 and more	-0.037	0.023	0.048 ⁺⁺	0.059
Collective pay agreements	0.073	0.040	0.014	0.018
Flexible wage share	-0.002 ⁺⁺	-0.002 ⁺⁺	0.000	0.000
Competition	0.076	0.064	0.016	-0.025
Foreign sales share	-0.002 ⁺⁺⁺	0.001 ⁺⁺	0.000	0.000
Pseudo R-squared	0.045	0.046	0.023	0.011
Wald statistic	32.520	32.230	17.500	7.690
Prob. (Wald statistic)	0.000	0.000	0.041	0.566
Number of observations	295	293	283	294

Notes: **p*-values are computed using Huber-White robust standard errors;

⁺⁺coefficient is statistically significant at the level of 5 per cent;

⁺⁺⁺coefficient is statistically significant at the level of 1 percent; the rest of the coefficients are not statistically significant at the level of 10, 5 or 1 per cent.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's estimations.

Table 6

Explanations for responses to a permanent increase in wages^a

Ordered probit description	Type of response to a shock			
	Price decrease	Margin decrease	Output decrease	Cost reduction
Labour share	0.002 ⁺⁺⁺	0.000	0.000	0.001
Trade firms	-0.121 ⁺⁺⁺⁺	-0.077 ⁺⁺⁺	-0.012	-0.024
Services firms	-0.043	-0.069 ⁺⁺⁺	0.004	-0.064 ⁺⁺
Firms 20–49	0.040	0.033	-0.007	0.030
Firms 50 and more	0.027	0.010	0.015	0.059
Collective pay agreements	0.001	0.070 ⁺⁺	0.029	-0.013
Flexible wage share	-0.001	0.000	0.000	0.000
Competition	-0.021	0.075 ⁺⁺	0.014	0.033
Foreign sales share	-0.002 ⁺⁺⁺⁺	0.001	0.000	0.001
Pseudo R-squared	0.036	0.027	0.016	0.012
Wald statistic	23.750	21.910	10.520	7.020
Prob. (Wald statistic)	0.005	0.009	0.310	0.635
Number of observations	300	295	283	296

Notes: ^a*p*-values are computed using Huber-White robust standard errors;

⁺⁺coefficient is statistically significant at the level of 10 per cent;

⁺⁺⁺coefficient is statistically significant at the level of 5 per cent;

⁺⁺⁺⁺coefficient is statistically significant at the level of 1 per cent; the rest of the coefficients are not statistically significant at the level of 10, 5 or 1 per cent.

Source: the survey of the Bank of Lithuania "On Price and Wage Setting"; author's estimations.

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Gauta 2009 m. kovo mėn.

Priimta spaudai 2009 m. rugpjūčio mėn.

Santrauka

LIETUVOS ĮMONIŲ ELGSENA NUSTATANT DARBO UŽMOKESTĮ IR KAINAS

Ernestas Virbickas

Straipsnyje nagrinėjami Lietuvos įmonių apklausos „Apie kainų ir darbo užmokesčio nustatymą“, vykdytos Lietuvos banko užsakymu, duomenys. Apklausa atlikta Lietuvos bankui dalyvaujant Darbo užmokesčio kitimo projekte (*Wage Dynamics Network*), kurį vykdo Europos Sąjungos šalių centriniai bankai, o koordinuoja Europos centrinis bankas. Šis projektas iš dalies pratęsia anksčiau vykdyto Infliacijos inercijos projekto (*Inflation Persistence Network*) tyrimus. Pastarieji leido padaryti išvadą, kad euro zonos šalyse darbo užmokesčio pastovumas yra svarbi kainų nelankstumo priežastis. Todėl buvo numatytas Darbo užmokesčio kitimo projektas, kuriuo siekiama išnagrinėti darbo užmokesčio ir darbo sąnaudų kitimo priežastis bei dėsningumus ir kartu išanalizuoti sąryšį tarp darbo užmokesčio ir kainų.

Straipsnyje analizuojama Lietuvos įmonių elgsena nustatant darbo užmokestį ir kainas. Siekiama įvertinti, kaip įmonių elgseną veikia technologiniai ir instituciniai ypatumai, rinkos konkurencija ir kiti veiksniai. Nagrinėjama, kaip dažnai keičiamas darbo užmokestis ir kainos Lietuvos įmonėse. Darbo užmokesčio ir kainų keitimo dažnis gali rodyti įmonių lankstumą priimant sprendimus dėl darbo atlygio ir kainų. Todėl, naudojant apklausos duomenis, aptariami veiksniai, turintys įtakos darbo užmokesčio ir kainų keitimo pobūdžiui. Straipsnyje taip pat tiriama įmonių reakcija į netikėtus ekonominių sąlygų pasikeitimus (ekonominius šokus). Siekiama nustatyti, kaip ją veikia technologiniai, instituciniai ir kiti veiksniai, būtent: su darbuotojų samdymu susijusių sąnaudų dalis, palyginti su bendrosiomis išlaidomis, kolektyviniai darbo užmokesčio susitarimai, premijų ir priedų

dalį, palyginti su bendru darbo užmokesčiu, rinkos konkurencija ir kt. Ypatingas dėmesys skiriamas nusakyti sąryšį tarp darbo sąnaudų ir kainų.

Remiantis apklausos duomenimis nustatyta, kad Lietuvos įmonėse darbo užmokestis daugiausia keičiamas dėl priežasčių, nesusijusių su darbo stažu ar infliacija. Šiek tiek daugiau nei 40 procentų įmonių pagrindinei darbuotojų grupei darbo užmokestį keičia kartą per metus. Maždaug tokia pati dalis įmonių darbo užmokestį keičia dažniau nei kartą per metus. Dažniau darbo užmokestis keičiamas įmonėse, kuriose taikomi kolektyviniai darbo užmokesčio susitarimai. Maždaug ketvirtadalis apklaustų įmonių nurodė, kad jose kainos keičiamos kas ketvirtį arba kas pusmetį. Maždaug penktadalyje įmonių kainos keičiamos kartą per metus, maždaug trečdalyje – nereguliariai arba visai nekeičiamos. Dažniau kainos keičiamos įmonėse, kurios patiria didesnę konkurenciją.

Atlikta apklausa nustatyta, kad įmonėse gana didelė darbo atlygio dalis mokama kaip premijos arba priedai, kurie siejami su darbuotojų arba įmonės veiklos rezultatais. Tokią darbo užmokesčio praktiką taiko 73,5 procento įmonių. Premijos ir priedai vidutiniškai sudaro 17,1 procento bendro darbo užmokesčio. Pasitelkus regresinę analizę nustatyta, kad minėtos darbo užmokesčio praktikos naudojimas sušvelnina netikėto paklausos kritimo poveikį įmonėms (mažina tikimybę, kad kris gamybos arba paslaugų teikimo apimtys ir pelno norma) ir sumažina netikėto žaliavų kainų padidėjimo įtaką įmonėms (mažina pelno normos kritimo tikimybę).

Įmonių apklausa rodo, kad kolektyviniai darbo užmokesčio susitarimai Lietuvoje nelabai paplitę. Kolektyviniai darbo užmokesčio susitarimai, sudaryti įmonės lygmeniu, naudojami maždaug ketvirtadalyje įmonių, o susitarimus, sudarytus už įmonės ribų, taiko vos keletas įmonių. Apklausos duomenimis, kolektyviniai darbo užmokesčio susitarimai taikomi 15,7 procento darbuotojų. Regresinė analizė rodo, kad, netikėtai pasikeitus ekonominėms sąlygoms, šių susitarimų įtaka įmonių sprendimams būna ribota.

Atliktas tyrimas rodo reikšmingą konkurencijos lygio įtaką įmonių elgsenai. Nustatyta, kad didesnė konkurencija prisideda prie kainų mažinimo netikėtai sumažėjus paklausai. Netikėtai padidėjus žaliavų kainoms arba darbo užmokesčiui, įmonės, kurios daugiau parduoda užsienio rinkose (taigi, patiria didesnę konkurenciją), mažiau linkusios didinti kainas. Beje, įvykus nepalankiems paklausos ir pasiūlos pasikeitimams, didesnė konkurencija prisideda prie įmonių pelno normos mažėjimo. Įmonių apklausa atskleidė, kad nemaža jų dalis didintų kainas, netikėtai padidėjus darbo užmokesčiui. Toks šokas įmones, kurių darbo užmokesčio dalis sudaro didesnę bendrųjų išlaidų dalį, labiau skatintų didinti kainas. Kita vertus, didesnė darbo užmokesčio dalis, palyginti su bendrosiomis išlaidomis, kainų keitimo dažniui įmonėse neturi reikšmingos įtakos.