



**Bank of Russia**

The Central Bank of the Russian Federation

**Drivers of price inertia:  
survey evidence**

**Analytical note of the  
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Research and Forecasting  
Department**

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The paper investigates the pricing behaviour of firms on the basis of a survey conducted by the Bank of Russia<sup>1</sup>. The results show the following price inertia factors which can impede the slowing down of inflation processes in the economy:

- Firms' inflation expectations adaptability. As companies rely on past fast price growth, it leads to higher inflation expectations and the setting prices based on past (instead of future) inflation levels. When the price growth rate slows down, it can lead to a partial loss of demand and hinder the process of slowing down inflation to meet the target level. It is important to provide economic agents with information on current inflation processes and to increase their confidence in the inflation targeting policy of the Bank of Russia.

- Inflexible pricing policy due to a relatively low level of perceived competition, the existence of large companies and regulated contract prices. In certain industries, it leads to deferred price growth in response to inflation and past increase of costs. Such growth often includes a price "premium" as insurance against future price shocks. Therefore, it is necessary to develop competition-based market relationships by stimulating small and medium firms and reducing the monopoly power of the major players. It is also important to develop competitive practices in relation to government procurement with a great possibility of overpricing.

- Salary growth which is driven by a lack of qualified workers and firms' internal policies without productivity growth. This is one of the key factors for price growth and inflation. To reduce inflationary risks, the growth of salaries in the public sector must be brought in line with the average rate of salary growth in the economy as a whole. Moreover, growth in labour costs should correlate to growth in productivity.

Machinery manufacturing is the most susceptible to price inertia factors. It could be mitigated by increasing the share of dual-purpose or civil products by companies working mainly with state defence orders.

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<sup>1</sup> The Bank of Russia would like to thank the industrial unions and associations that bring together manufacturers from different industries for their cooperation in conducting the survey.

## Introduction

In December 2016, the Bank of Russia conducted a survey of companies'<sup>2</sup> price-setting behaviour to try to improve its understanding and to determine the role of inflation expectations. Similar surveys were conducted in other countries: Blinder et al. (1998) in the United States, Amirault et al. (2004) in Canada, Fabiani et al. (2005) in the European Union, Hall et al. (1996, 2000) and Greenslade and Parker (2008) in the United Kingdom, Correa et al. (2016) in Brazil. It is important for central banks to understand these processes in order to implement and maintain the effective monetary policy.

The results obtained shed light on main drivers of inflation (price) inertia (or delayed and prolonged response of inflation to shocks) in Russia. It can be caused by *backward-looking* (or adaptive) expectations of economic agents, inflexible pricing policy, and wage indexation based on past inflation level. In turn, pricing inflexibility is determined by price-setting strategy, the company's size, and the level of competition. In general, inflation inertia hinders the process of slowing down inflation to meet the target level and thus lowers the effectiveness of monetary policy.

Widespread methods of assessing the observed inflation inertia using different models can't clear up important aspects, such as between-industry analysis based on firm-specific characteristics and, consequently, the speed of response to external shocks in different sectors.

### 1. Inflation expectations

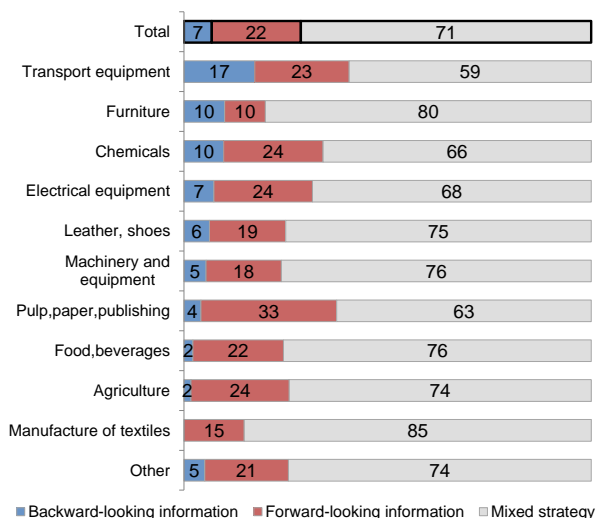
Companies may adjust their prices using primarily forward-looking or backward-looking information or a combination of both. In the case of backward-looking price setting, there are adaptive expectations which cause the inflation inertia. As a result, it is likely that past price growth will determine future price growth.

The results indicate that 7% of companies review prices mainly looking backward, whereas 22% use an information set that includes expectations about future economic conditions. The rest 71% use a mixed strategy (see Fig. 1).

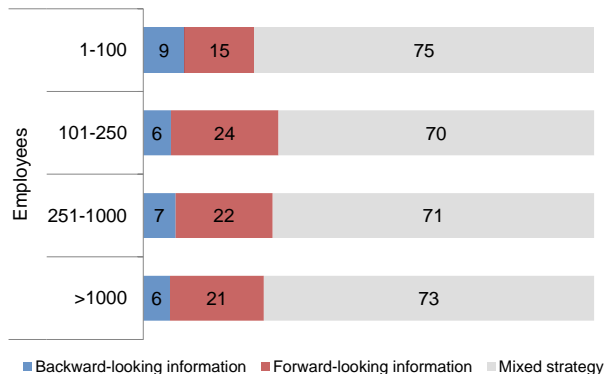
A significant difference in the companies' pricing policies can be observed at the industry level. Companies from transport equipment (17%), furniture manufacturing (10%) and chemical production (10%) are more likely to set prices based on historical data than an average firm from the sample. Therefore, slowing down the rate of inflation for these industries may take longer than for the economy as a whole.

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<sup>2</sup> The final sample consists of 554 companies from the manufacturing and the agriculture covered different regions. We classify as *small* and *medium* firms those with up to 250 employees (37%), *large* with 250 to 1000 employees (44%), and *very large* with more than 1000 employees (19%). In total, 69% of firms are exporters.

**Fig. 1. Information used when changing prices by industry, percentage of respondents**

Source: the Bank of Russia survey.

**Fig. 2. Information used when changing prices by company size, percentage of respondents**

Source: the Bank of Russia survey.

Large companies appear to be more forward-looking than small and medium enterprises (see Fig. 2). The survey has shown that 21%-24% of medium and large companies (with more than 100 employees) setting prices use the expected level of inflation only, whereas for smaller companies (with up to 100 employees) this figure is 15%. It can be explained by the fact that small companies have limited access to information and lack of opportunities for forecasting due to high costs.

Companies' irrational behaviour in price-setting decisions means that state policy must focus on lowering the level of uncertainty for economic agents by increasing the accessibility and credibility of information regarding the current and future economic situation. In this context, the Bank of Russia's efforts to explain the current economic situation and its future dynamics make companies use looking-forward strategy and consolidate inflation expectation at the target level.

## 2. Inflexible pricing policy

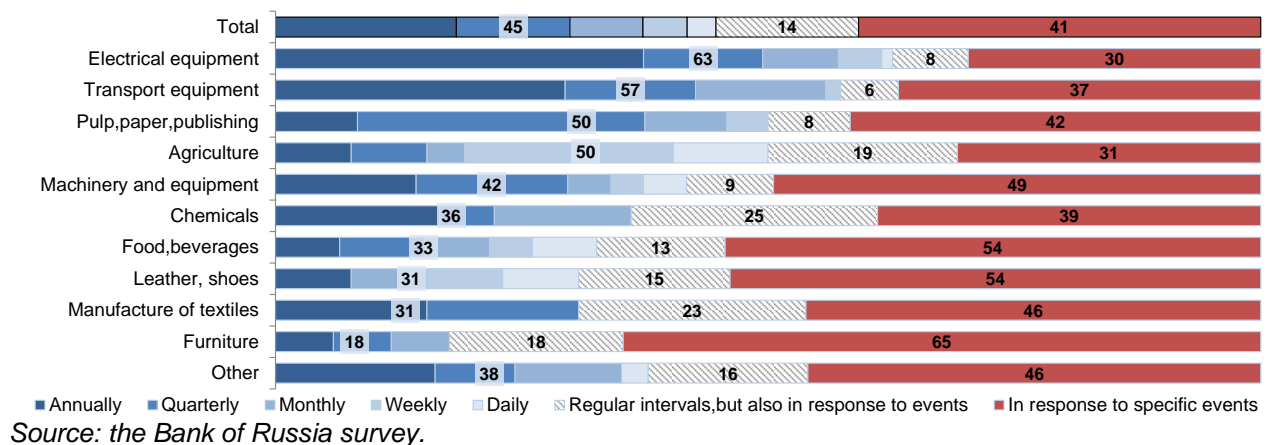
Inflation inertia can be caused by price inflexibility when prices react to various shocks gradually due to certain restrictive factors.

45% of the respondents are characterized by inflexibility in price adjustment as they review prices at specific intervals only (*purely time-dependent*) (see Fig. 3.). Moreover, 67% of companies from this group demonstrate a high level of inflexibility, adjusting prices annually (41%) or quarterly (26%) (see Fig. 4). At the same time, 41% of respondents have a flexible pricing mechanism changing their prices depending on economic conditions (*purely state-dependent*). The rest 14% of companies use a mixed strategy (see Fig. 3).

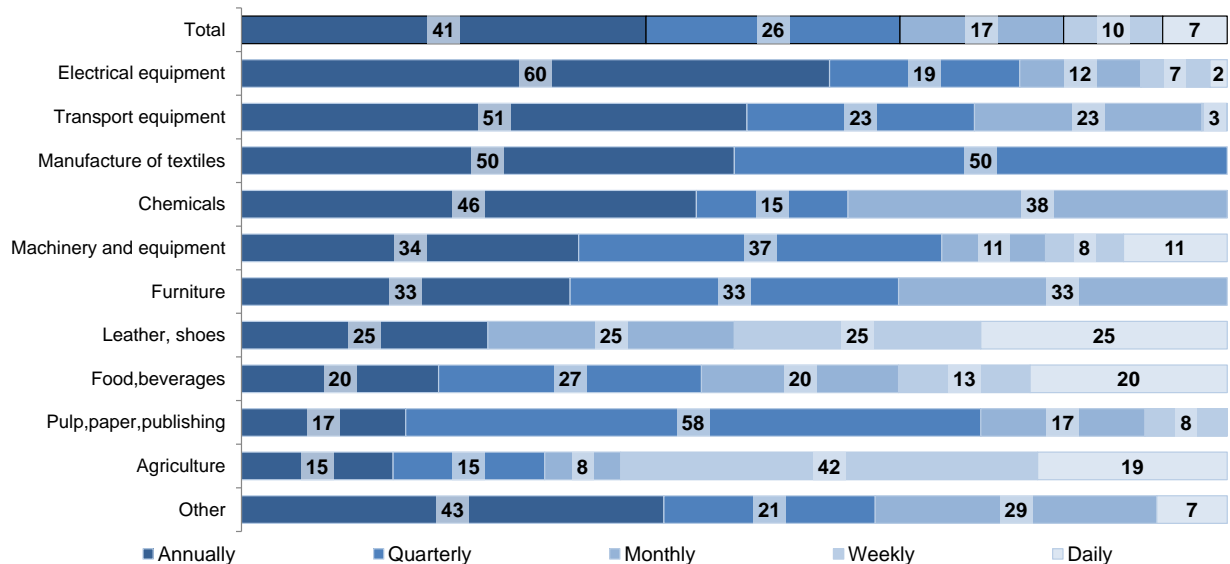
We take the frequency of price changes or the average period of price stability as a quantitative indicator of price flexibility.

If inflation is high, companies tend to review their prices more often. Otherwise (situation of low inflation), prices are generally more stable against cost shocks, including exchange rate shocks (Correa et al., 2016; Greenslade, Parker, 2008; Fabiani et al., 2005). The survey suggests that the average price stability period in Russia is 172 days with the average number of price changes 2.1 per year (see Fig. 5). It is similar to the price stability period in the UK where prices are changed approximately 2 times per year (Greenslade, Parker, 2008).

**Fig. 3. Frequency of price changes for main products by industry, percentage of respondents**



**Fig. 4. Distribution of respondents regularly changing prices, percentage of respondents**



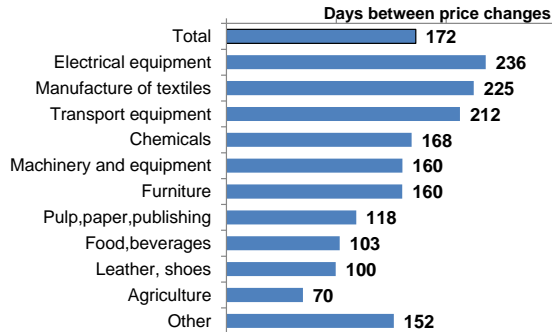
Source: the Bank of Russia survey.

Existing surveys show that in highly competitive markets companies tend to react to various shocks more quickly and prices tend to be more flexible (Correa et al., 2016; Greenslade, Parker, 2008; Fabiani et al., 2005). We asked companies about their perception of the level of domestic and foreign competition ('high', 'moderate', 'low', or 'none'). We received, that firms perceiving higher competitive pressures review their

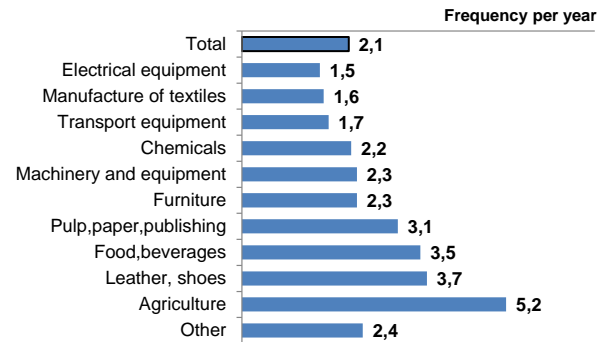
prices more frequently (3.5 times per year for high perceived domestic competition and 2.7 times per year for high perceived foreign competition) (see Fig. 6).

**Fig. 5. Frequency of price changes by industry**

**A. Average price stability period<sup>3</sup>, days**



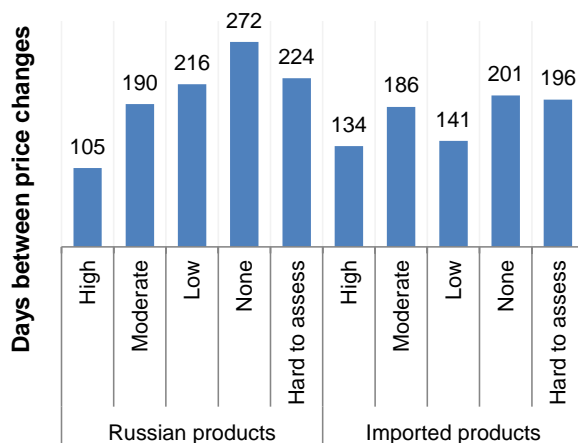
**B. Average number of price changes per year**



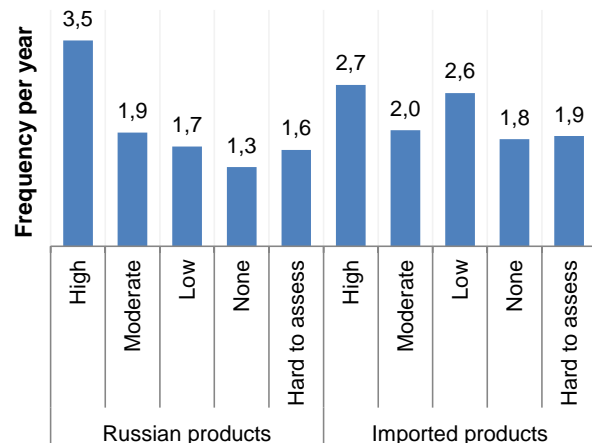
Source: the Bank of Russia survey.

**Fig. 6. Frequency of price changes by perceived competition**

**A. Average price stability period, days**



**B. Average number of price changes per year**

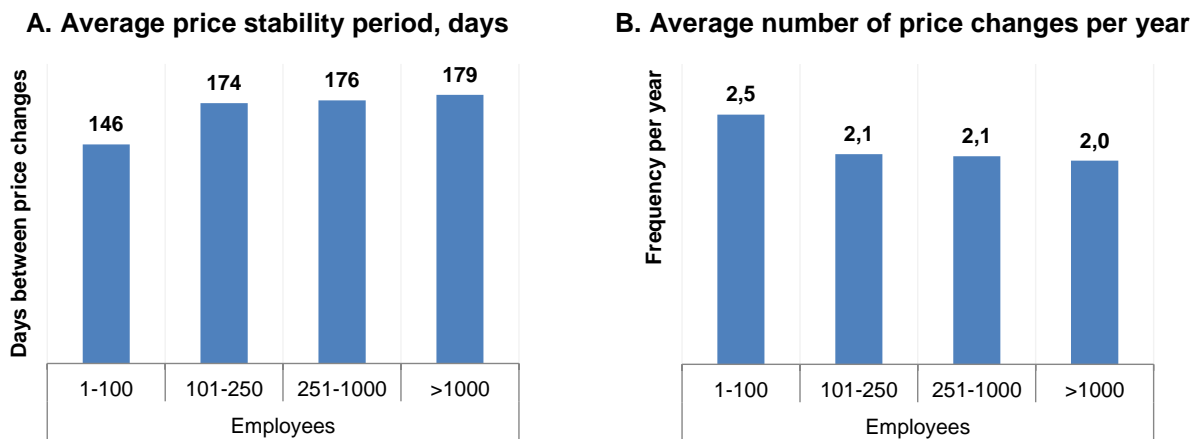


Source: the Bank of Russia survey.

Firm's size can also explain the difference in price flexibility. The survey reveals that small companies change prices more frequent (2.5 times per year) comparing with large enterprises (2 times per year for companies with more than 1000 employees) (see Fig. 7). It could be explained by onerous decision-making process in corporations due to its complex hierarchical structure or less intensive competitive pressure.

<sup>3</sup> Average price stability (rigidity) period:  $R_i = \sum_j t_{ij} * s_{ij}$ , where  $R_i$  is the average price stability period;  $t_{ij}$  is the price stability period;  $s_{ij}$  is the share of respective responses;  $i$  is the industry;  $j$  is the answer variant in the question.

Fig. 7. Frequency of price changes by company size



Source: the Bank of Russia survey.

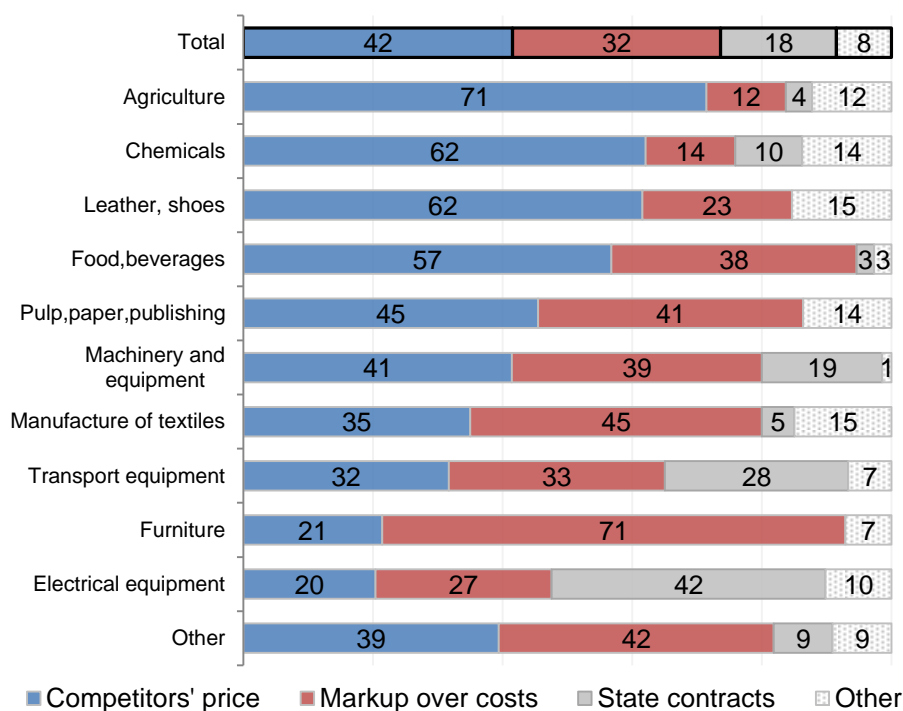
Price inflexibility can also be explained by long-term contracts which fix prices for a relatively long period. According to the survey, setting prices regulated by a state contract is a commonly used pricing mechanism in Russia (see Fig. 8). This kind of price-setting mechanism is more relevant for machinery industry. Comparing with the average level 18% for the whole sample, 41% of electrical equipment, 28% of transport equipment, and 18% machinery and equipment producers are working mainly with state contracts. This is most likely related to foreign contract shipments for the purposes of military and technical cooperation, as well as to manufacturing under state defence procurement orders.

Thus, the combination of different factors makes the average price stability periods vary significantly by industry (70 to 236 days) (see Fig. 5).

We can say that price inflexibility is more common for industries producing investment and intermediate goods. Prices for consumer goods (food, shoes, etc.) are more flexible and tend to adjust to consumer demand. The high price volatility of agricultural goods can be explained by seasonality, as well as higher competition in food and agricultural product markets.

Costs growth has a deferred effect on prices in the case of inflexibility. This effect can be seen most prominently in certain machinery (electrical and transport equipment) and textile manufacturing, where the average price stability period can reach 212 to 236 days, or 7 to 8 months (see Fig. 5). Machinery manufacturing in the sample mostly consists of large companies with long-term contracts with clients and suppliers and state procurement orders. Furthermore, many of firms operate in segmented markets and thus experience relatively low levels of competition from imported or domestic producers, so they are less inclined to consider competitors' prices.



**Fig. 8. Price-setting mechanism by industry, percentage of respondents**

Source: the Bank of Russia survey.

### 3. Salary growth

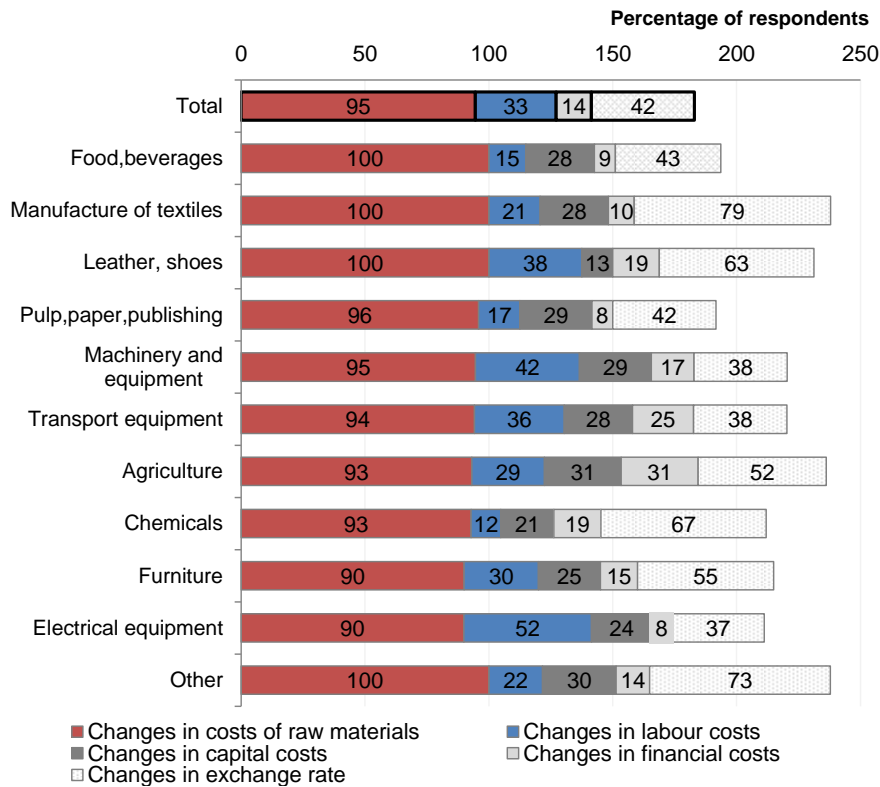
Consistently growing labour costs can also act as a driver of inflation inertia. If nominal salaries grow more quickly than productivity, companies generally have to increase their prices to compensate additional costs. Together with growth in consumer demand amid increasing salaries, it can support inflationary pressure.

The survey suggests that key cost drivers for manufacturing companies are raw materials (95%) and foreign exchange rate volatility (42%) (see Fig. 9). The latter have a significant effect on industries with a large share of imports in costs.

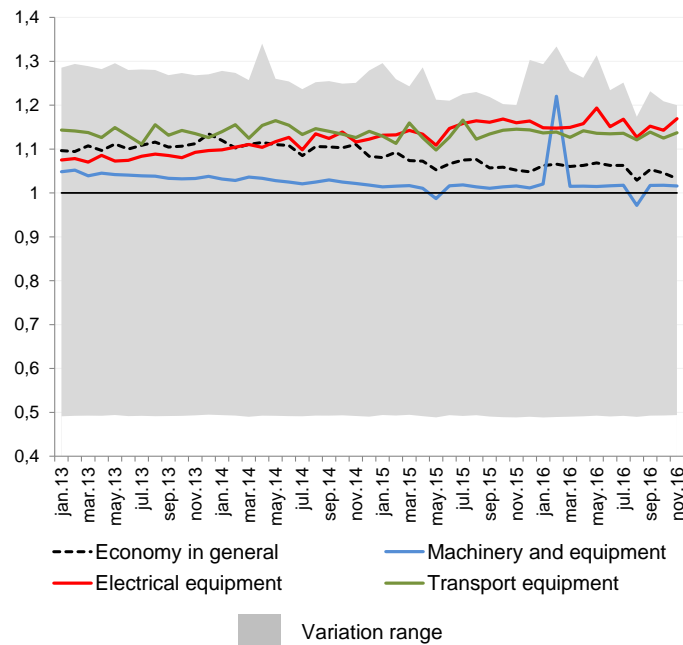
In 2016, financial costs (debt servicing expenses) had a minor role in setting prices for nearly all industries, excluding agriculture and transport equipment (which includes motor vehicles manufacturing) where the debt burden was high due to credits received through a large-scale state support program.

In contrast, salary growth was one of the key price growth drivers for 52% of electrical equipment producers, 42% of machinery and equipment manufacturers, and 36% of transport equipment producers.

According to Rosstat, the average monthly nominal gross salary in the machinery manufacturing is higher than in the manufacturing sector in general (see Fig. 10). Furthermore, this gap in electrical equipment and transport equipment has been increasing since 2015, indicating that in these industries salaries have been growing faster than in the manufacturing sector and the economy in general.

**Fig. 9. Most significant factors affecting price-setting in 2016 (3 main)**

Source: the Bank of Russia survey.

**Fig. 10. Relative salary level by industry for 2013–2016 (seasonally adjusted)<sup>4</sup>**

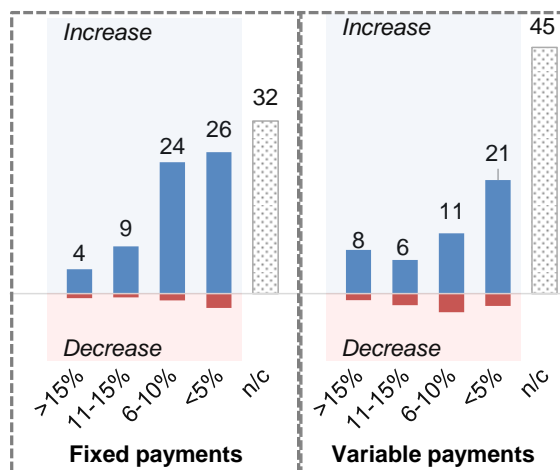
Sources: authors' own calculations, Rosstat.

<sup>4</sup> The ratio of the average monthly nominal gross salary in different industries to the average monthly nominal gross salary in the manufacturing sector in general. The variation range excludes the manufacture of coke and petroleum products.

To determine the reasons for salary growth in these industries, the Bank of Russia has conducted an additional survey of machinery manufacturing companies<sup>5</sup>. We found that 63% of companies increased the fixed component of their salaries, while 46% of respondents raised their variable components (premiums and rewards) in 2016. Variable payments are usually linked to a company's productivity. However, growth in the fixed component of salaries indicates that there are certain factors that make the employer increase labour costs regardless of the employee's or company's productivity. Notably, in 2016 the growth rate of fixed payments was above the rate of inflation (5.4%) for nearly 40% of companies (see Fig. 11).

The main factor driving changes in salaries in the machinery manufacturing industry is *company profitability* (73% of respondents report that this factor had a strong or moderate impact) (see Fig. 12). Profitability determines the size of premiums and other payments that can be easily adjusted depending on employee productivity. As a rule, during recessions, companies tend to lower variable payments rather than laying off staff. This is related to the fact that many industrial enterprises are large factories that have town-forming status. Cutting jobs at such factories entails certain costs due to economic, administrative, or social factors: high layoff costs under current labour laws, restrictions imposed by local and regional authorities, fears of conflicts with personnel, social responsibility of the company's management, resistance from trade unions.

**Fig. 11. Assessments of changes in fixed and variable salary components at machinery manufacturing companies in 2016, percentage of respondents**



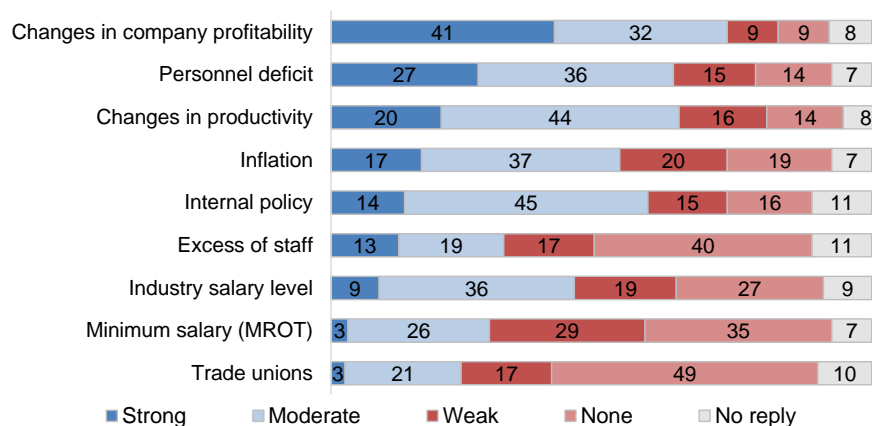
\*n/c – no changes.

Source: the Bank of Russia survey.

64% of companies report a strong or moderate correlation between salaries and *productivity* (see Fig. 12). However, amid the faster growth of salaries compared to productivity, unit costs of labour are also picking up the pace. All other things being equal, this leads to higher producers' prices and exerts upward pressure on inflation.

<sup>5</sup> The survey was conducted in June 2017. The sample consists of 191 machinery manufacturing companies in regions with a high concentration of machinery manufacturing (machinery and equipment, electrical equipment, electronic and optical equipment, vehicles).

**Fig. 12. Impact of different factors on changes to salaries at machinery manufacturing companies, percentage of respondents**

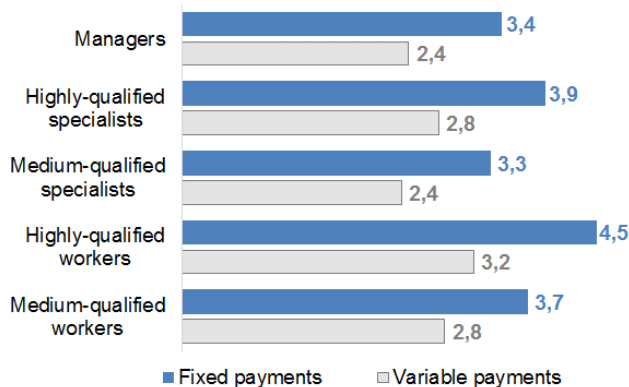


Source: the Bank of Russia survey.

Reasons for salaries increasing without growth in productivity include the lack of qualified personnel in the industry and employment agreements which provide annual compensation at the level of inflation or higher in accordance with the company's internal policy.

The survey showed that 63% of enterprises experienced strong (27%) or moderate (36%) *personnel deficit* (see Fig. 12) and therefore had to increase salaries even during a crisis. Notably, there was salary indexation at all personnel qualification levels in 2016. Highly-qualified workers' incomes grew at the fastest rate while medium-qualified specialists' salary growth rate was the lowest (see Fig. 13).

**Fig. 13. Weighted average salary changes at machinery manufacturing companies in 2016 by qualification**



Source: the Bank of Russia survey.

*Internal company policies* prompted salary growth at 59% of enterprises, whereas growing *inflation* ensure salary indexation at 54% of companies (see Fig. 12). Other factors (excessive workforce, industry-average salary level, minimum salary (MROT) adjustments, trade union activity) impact the salary level in machinery manufacturing industries to a lesser extent.

The above-mentioned factors leading to growth in salaries without an increase in productivity lead to growth in producers' prices in the industry and, ultimately, in the economy in general.

Therefore, potential sources of price inertia (inflexible pricing policy, the widespread practice of basing price adjustment on past inflation levels, and salary growth not backed by increased productivity) can impede the slowing down of inflation. Certain industries, such as machinery manufacturing, are most strongly impacted by these factors. This can influence the overall dynamics of inflation in regions which specialise in that field, and cause shocks to have a delayed and prolonged effect on prices in such regions.

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