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Disparities in wage flexibility in the Polish economy

Introduction

The pace in wage growth is one of the latest trends to be observed not only in the labour market but throughout the entire Polish economy. An increase in wages by over 7% and the rising level of the minimum wage in Poland are referred to as wage pressure. Numerous companies have raised the wages of their employees. Those in which productivity is either not increasing or not increasing at a sufficient pace have been forced to raise wages too. Wage pressure is additionally intensified by the increasingly limited workforce availability in Poland. The new reality on the labour market raises questions concerning the relationship between wages and labour productivity in different sectors of the Polish economy.

The paper aims to examine wage flexibility in the Polish economy. It focuses on researching wage flexibility using a sectoral approach to show the differentiation amongst them. It was assumed that an efficiency factor would be the most important determinant influencing wages. Therefore, wage flexibility was defined traditionally as a wage response to changes in labour productivity. This study consisted of verifying that a relationship exists between the average wage amounts and labour productivity in different sectors of the Polish economy. The study focused on explaining to what extent wages depend on labour productivity. At the same time, the study identified those sections where labour productivity had the strongest influence on wages, and therefore where wage flexibility was the highest.

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Characteristics of wage flexibility

Wage flexibility is the central element of a flexible labour market. A flexible labour market is characterized by the ability to adapt to changing economic conditions in a way that maintains a high employment rate and low inflation, and ensures continued growth in real income (EMU and Labour Market Flexibility, 2003, p. 10).

Wage flexibility is called financial flexibility on the labour market. It is associated with adjusting the wage amounts to meet several factors occurring in the micro and macro environments. Wage flexibility is defined as the extent to which wages react to changes in the factors determining them. In other words, wage flexibility reflects the degree/speed with which wages adjust to changes in the economy, in particular to changes in labour productivity.

Apart from wage flexibility, a flexible labour market consists of (Kryńska, 2007, p. 1; Wiśniewski, 1999, pp. 42–43; Kwiatkowski, 2003, pp. 18–19):

– employment flexibility, which represents the ability of employers to adapt the number of employees to changing economic conditions and structural changes caused by technical progress;
– working time flexibility, which means the possibility to adjust (within established standards and reference periods) the length and organization of working times to the needs of enterprises;
– functional flexibility, which is described as an economic entity's ability to effectively adapt labour supply to the changing structure of labour demand, which results from technological changes.

Wages in the economy should be flexible, i.e. be sensitive to changes in the factors determining them. In addition to labour productivity, the following determinants of the level of wages are most often listed: current trends in the labour market, profitability of a given sector and tendencies occurring in the business environment of a particular sector. The level of wages and, as a consequence, their flexibility also depend on non-efficiency factors, among which institutional issues play an important role. Wages depend on such institutional factors as trade union density, the minimum wage, labour law, the tax wedge, centralization and coordination of wage negotiations and contract length, as well as indexation (Boni, 2004, p. 11). Although the above-listed institutional determinants are not related to the effects achieved by the labour force, their role in shaping wages is indisputable. Some of them, such as the tax wedge, trade union density or the minimum wage, stifle wages from the bottom up, making it impossible to reduce them regardless of achieved labour productivity.

According to the neoclassical theory of marginal productivity of production factors, labour should not be rewarded either significantly below or above its marginal productivity. The amount of wages should change in line with changes in labour productivity, while the dynamics of wages should not exceed the dynamics

of labour productivity. Transitorily, both dynamics may differ, which results from the existence of real and nominal frictions. The frictions reflect the long-term adjustment of wages to new levels of balance as a result of macroeconomic disorders, such as productivity shocks or monetary and fiscal shocks (Magda, Szydłowski, 2008, p. 76).

The efficiency wage theory

The efficiency wage theory arose in the 1970s, when Keynes's theory based on rigid real wages lost its credibility. On the other hand, the neoclassical theory of a perfectly competitive labour market, including wage flexibility, did not reflect the reality on the labour markets of developed market economies either. The neoclassical theory was unable to explain the lack of reaction by employers (unwillingness to reduce the amount of wages) in a situation where involuntarily unemployed people would be willing to work for lower than the applicable wage rates (Golnau, 2012a, pp. 151–152).

Marshall is considered to be the precursor of the efficiency wage theory, as in 1920 he noticed a relationship between wages and labour productivity. Marshall saw that a well-paid labour force is much more efficient and therefore not very expensive (Nyk, 2016a, pp. 42–45). The foundations of the efficiency wage theory date back to the second half of the 1950s, when Leibenstein presented the so-called model of nutrition. He argued that better-paid employees are better nourished, which translates into their higher work efficiency. The relation between labour productivity and the amount of the wages was proved based on the example of developing countries (Leibenstein, 1957, pp. 94–98).

In the model of nutrition, Leibenstein hypothesized the existence of a wage-productivity curve. The hypothesis was then examined by other economists, with the largest contribution made by Joseph E. Stiglitz (1976, pp. 185–207; 1987, pp. 1–49). Figure 1 presents the shape of the wage-productivity curve. Initially, an increase in wages causes more than a proportional increase in the employee's involvement, which shows the initial section of this curve. Then, after exceeding a certain point, the increase in employees' effort progressively reduces. This means that further increases in wages result in less than proportional increases in labour productivity. The employer offers the wage amount which ensures the lowest costs per effective unit of labour productivity. This is called the efficiency wage, and is denoted by w^* in Figure 1. The efficiency wage is drawn as the point of contact on the efficiency curve P(w) with the straightest line derived from the beginning of the coordinate system.

The labour cost per efficiency unit (cost per effective unit of labour) is given by the inverse of the slope of the wage-productivity curve from the coordinate system origin to a given point on that curve. For wages included in the range (0;

w*) the slope of the wage-productivity curve increases in line with wage increases, which means that costs per effective unit of labour decrease. The situation is different when wages are higher than the efficiency wage. For w>w *, the slope of the wage productivity curve steadily decreases. This means an increase in costs per effective unit of labour (Stiglitz, 1987, p. 5).

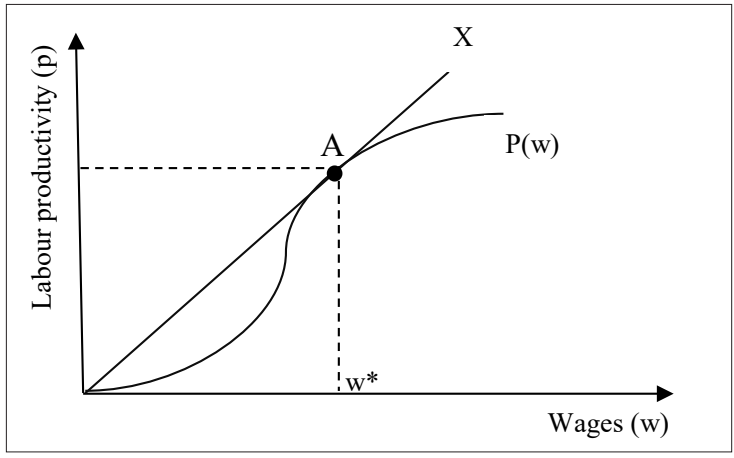

Figure 1. The wage-productivity curve

Source: (Stiglitz, 1976, p. 187).

The wage-productivity curve is a graphical representation of the efficiency wage theory, whose key element is the positive relationship between wage rates and labour productivity. According to this theory, employers offer wages higher than the equilibrium wage. Employers set the amount of wages at the level of the efficiency wage as it guarantees the lowest costs per effective unit of labour productivity. Employers do not reduce wage rates even when there is an excess supply of workers. They are afraid of a decrease in labour productivity which exceeds the benefits of lowering the wages. This would lead to a situation in which real labour costs per effective unit of labour would increase (Golnau, 2012a, pp. 151–152). The efficiency wage theory emphasizes that entrepreneurs desire wage rigidity, as a reduction in real wages result in a productivity decrease and an increase in costs.

Solow is the author of the formal foundations of the efficiency wage theory, included in the paper "Another Possible Source of Wage Stickiness", published in 1979. Solow argued that employers set the wage at the level of the efficiency wage, for which the elasticity of effort relative to wages is 1 (Golnau, 2012a, p. 156). This is called the Solow condition, under which the company maximizes its profit. The second condition for maximizing profit refers to the employment of the labour force until the marginal product equals the efficiency wage. This second

condition determines the size of employment in the economy. When the efficiency wage is higher than the equilibrium wage, involuntary unemployment appears. Employers are unwilling to employ employees at a lower price than the efficiency wage, as they will not meet the conditions that allow them to maximize profits (Nyk, 2016a, pp. 45–46).

Solow emphasized the positive relationship between wages and labour productivity, but explained it only by the fact that higher wages lead to an improvement in the well-being of employees. This directly affects labour productivity, as employees are more involved in doing their job. However, this explanation was insufficient, especially concerning highly developed economies. As Golnau noted, "until almost the end of the 1970s, there was no convincing explanation for the relationship between labour productivity and employee wages, which would be adequate to the situation in a developed market economy" (Golnau, 2012a, p. 158). After that time, more modern theories began to emerge that are considered microeconomically reliable bases for the efficiency wage theory. These are the labour turnover model, the adverse selection model, sociological models and the shrinking model (Golnau, 2012b, pp. 282–296).

Research methodology

In this paper, wage flexibility is defined as the wage response to changes in labour productivity. The starting point in the study was to analyse the trends in wages and labour productivity in the entire economy, and then in sections of the Polish economy using the Polish Classification of Activities – PKD 2007. The analysis of the relationship between average wages and average labour productivity on a macro scale and in sections of the Polish economy was carried out assuming that the relationship was linear. In the study, wages were the dependent variable (Y), while labour productivity was the independent variable (X).

The research began with verification of the order of integration of both time series and checking for cointegration. First, both variables were tested in all sections to see if the time series was integrated of order 0, denoted ~$I(0)$, using the Dickey-Fuller unit root test (ADF). When the results of the test did not confirm the stationarity of the time series, calculations were performed to check whether the time series was integrated of order 1, which was denoted as ~$I(1)$. Testing was repeated until the non-stationary time series was transformed to become stationary. After the variables were integrated, according to the Engle-Granger test, cointegration did not exist so further testing was performed until the cointegration condition was met. The results of the study on the order of integration of time series are presented in Table 1. Researching the order of integration of the time series, a null hypothesis about the non-stationarity of the time series, was tested against the alternative hypothesis assuming the stationarity of the time series.

Table 1. A study of integration order of time series and cointegration

Specification	The order of integration		Cointegration function/regression function	Cointegration
	X	Y		
Total	~*I*(2)*	~*I*(2)*	Y=0.514448X+21.0890; R^2=0.966463; p=6.08e-08	DF=-4.58257; p=0.02333
Industry	~*I*(1)	~*I*(1)	Y=0.523932X-210.813; R^2=0.865277; p=1.16e-05	DF=-4.59671; p=0.01982
Manufacturing	~*I*(1)	~*I*(1)	Y=0.630078X-139.562; R^2= 0.697988; p=0.0007	DF=-3.08766; p=0.09085
Electricity, gas, steam and air conditioning supply	~*I*(2)	~*I*(2)	Y=0.474381X+288.363; R^2=0.635236; p=0.0033	DF=-4.32881; p=0.0327
Agriculture	~*I*(2)	~*I*(2)	Y=0.06474X-8.31352; R^2= 0.205658; p=0.1612	DF=-4.03109; p=0.0488
Construction	~*I*(1)	~*I*(1)	Y=0.247594X+189.573; R^2=0.59999; p=0.0031	DF=-4.49499; p=0.02295
Wholesale and retail trade; repair of motor vehicles and motorcycles	~*I*(2)*	~*I*(2)*	Y=0.296843X+34.3428; R^2= 0.793233; p=0.0002	DF=-4.46047; p=0.02745
Transportation and storage	~*I*(1)	~*I*(1)	Y=0.378599X-33.6259; R^2= 0.549180; p=0.0058	DF=-3.69867; p=0.07086
Accommodation and food service activities	~*I*(2)*	~*I*(2)*	Y=0.491393X+2.65838; R^2=0.850534; p=5.33e-05	DF=-5.6271; p=0.005844
Information and communication	~*I*(1)	~*I*(1)	Y=0.438989X+694.542; R^2= 0.877865; p=7.06e-06	DF=-3.43255; p=0.1031
Financial and insurance activities	~*I*(1)	~*I*(1)	Y=0.203008X-6.77385; R^2= 0.398876; p=0.0276	DF=-9.04219; p=7.502e-00
Real estate activities	~*I*(1)	~*I*(1)	Y=0.0880173X+174.378; R^2=0.527549; p=0.0075	DF=-4.09769; p=0.04035
Professional, scientific and technical activities	~*I*(1)	~*I*(1)	Y=0.284038X+139.646; R^2=0.667738; p=0.0012	DF=-4.59132; p=0.01998
Administrative and support service activities	~*I*(2)*	~*I*(2)*	Y=0.622974X-23.4139; R^2= 0.933536; p= 5.48e-06	DF=-3.26696; p=0.135
Public administration and defence; compulsory social security	~*I*(0)	~*I*(0)	Y=0.814X+493.64; R^2=0.9303; p= 1.05e-07	Not applicable
Education	~*I*(0)	~*I*(0)	Y=0.649522X+3294.16; R^2=0.780065; p= 6.29e-05	Not applicable
Human health and social work activities	~*I*(3)*	~*I*(3)*	Y=0.623079X-14.8052; R^2= 0.984868; p=1.44e-08	DF=-3.08898; p=0.09058
Arts, entertainment and recreation	~*I*(2)*	~*I*(2)*	Y=0.570903X+141.608; R^2= 0.850095; p=5.40e-05	DF=-3.70549; p=0.07551
Other service activities	~*I*(1)	~*I*(1)	Y=0.351583X-325.454; R^2=0.662669; p=0.0013	DF=-4.39154; p=0.02661

* A time series with an integration of order 1, but lack of cointegration; DF – Dickey–Fuller test statistics in the Engle-Granger cointegration test.

Source: own work using GRETL software.

Cointegration was tested using the Engle-Granger test and the null hypothesis, according to which the variables are not integrated against the alternative hypothesis to which the variables are co-integrated (Maddala, 2006, pp. 612–634). p=0.05 was assumed in the case of stationarity of the time series, and p=0.1 for cointegration, which was accepted due to the relatively short time series. In order to examine the extent to which wage growth was stimulated by changes in labour productivity, a Pearson correlation coefficient was calculated between labour productivity and the average annual amount of wages for 2005–2017, both at the macro level and then in sections respectively. Linear regression and a coefficient of determination R^2 were also used.

The statistical data used in the research came from the Eurostat statistical database (gross value added and wages) and the Polish Central Statistical Office (CSO), which provide data on the number of employed people by sections. The research period covered 2005–2017 and its selection was limited to the availability of data by sectors according to the PKD 2007 classification. In the study, labour productivity was described as gross value added per employee, while average wages refer to total gross wages. The time series of both variables were built using annual data in euro. Calculations were carried out at constant prices from 2017.

WAGES AND LABOUR PRODUCTIVITY IN POLAND – MACROECONOMIC SCALE

In the long term, there is a strong relationship between labour productivity and wages at the macroeconomic level. The relation is described not only in economic theory, but empirical data also confirms it. An analysis of statistical data from 1960–2006 concerning developed countries (mainly OECD) showed that the differences in average labour productivity were responsible for approximately 70% of the variance in average wage dynamics in the group of these countries and the relationship between these indicators is slightly less than one. In the short and medium-term, the dynamics of labour productivity and wages may differ significantly due to the occurrence of rigidity in wage adjustment (Kawa, 2010, p. 73).

The analysis of statistical data describing changes in labour productivity and wages in the Polish economy shows that, after 1992, higher dynamics in labour productivity rather than the dynamics of real wages made Poland stand out from other countries of Central and Eastern Europe. On the other hand, the opposite tendency has been observed since 2005, and wages have increased faster than labour productivity, which has resulted in increasing unit labour costs. In 2005–2007 the demand for labour increased, driven by a strong trend towards the economic migration of Polish workers. Therefore it can be concluded that wages responded more to the situation on the labour market in terms of labour supply and demand than to labour productivity. The increasing wage growth was also a consequence of the growing negotiating power of employees, which led to filling the gap between the level of real wages and productivity seen in 2001–2005 (Kawa, 2010, pp. 73–88).

An analysis of labour productivity and wages at the macroeconomic level in 2005–2017 preceded the sectoral research of these categories. In 2005–2017, both labour productivity and wages in Poland recorded an increase, as shown in Figure 2. In 2006–2010, the lines describing wages and labour productivity in the Polish economy were very close to each other, which confirmed that both variables were changing at a similar pace. In 2011–2015, labour productivity grew dynamically, while wages slowed slightly and grew more slowly than labour productivity. However, in 2016 the trend reversed and the wage dynamics accelerated. As a result, wages increased by less than 27% throughout the entire period, which gives an average annual increase of 2%, while labour productivity in 2005–2017 increased slightly less, by 24.4%, i.e. by an average of 1.84% per year.

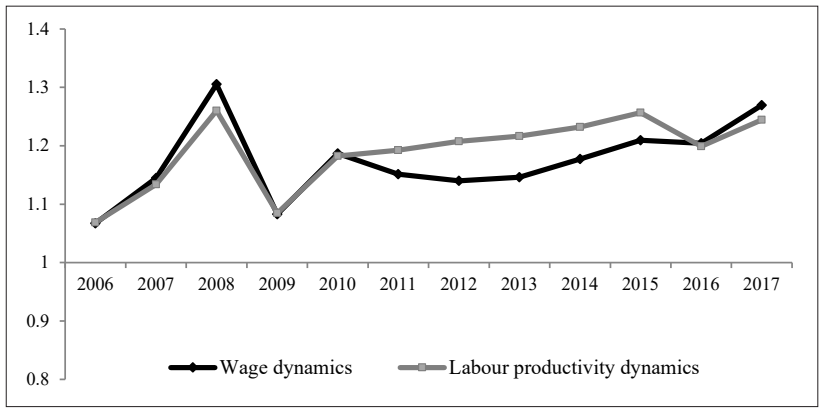

Figure 2. Wage and labour productivity dynamics in Poland in 2005–2017 (constant prices 2017, 2005 = 100)

Source: own study based on Eurostat and CSO statistics.

The high dynamics in both categories in 2008 requires a short commentary. The period of 2007–2008 was called an employee market to emphasize the bargaining power of employees. After a period of prosperity in 2007 and its continuation in 2008, the unemployment rate, which was one of the main economic problems in Poland, fell to 9.5% at the end of 2008 (*Mały Rocznik Statystyczny Polski*, 2009). Wages were rising dynamically, while growing demand for employees in almost all professional groups was considered to be the main driver of wage growth (Morawski, 2016). Whilst wages were in line with productivity gains, labour productivity, however, increased at a slightly slower pace than wages. The global financial crisis, initiated in 2007 on the subprime mortgage market in the United States, caused a deep recession in Western Europe in the autumn of 2008. In spite of the fact that Poland was not directly affected by the crisis, it initiated a weakening economic growth in 2009 as well (Bukowski, Lewandowski, 2010, p. 14). This translated into trends on the Polish labour market, with a significant slowdown in wage dynamics and labour productivity being observed.

The stationarity of the time series, both wages and labour productivity and their cointegration were verified before researching the relationship between the variables. The time series of labour productivity and wages were integrated of order 1, but they were not co-integrated. As a result, the conclusions were based on time series with integration of order 2.

A linear relationship between labour productivity and wages in Poland can be seen by looking at the scatter diagram of both variables (see Figure 3). A Pearson correlation coefficient between wages and labour productivity was applied to examine the extent to which labour productivity stimulated wage growth in 2005–2017. This amounted to 0.98, which indicated a very similar tendency in the development of wage dynamics and labour productivity during the analysed period. The average wage in the Polish economy increased along with the average increase in labour productivity. The Pearson correlation coefficient was significantly different from zero[2] while the coefficient of determination R^2 was over 96.6%, which suggests a very strong relationship between wages and labour productivity in Poland.

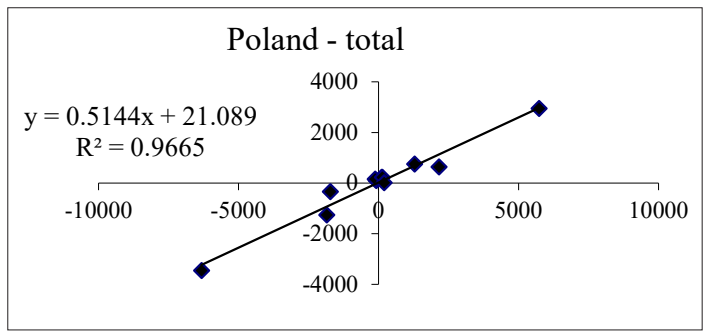

Figure 3. Labour productivity and average wages in the Polish economy in 2005–2017 (constant prices 2017, 2005 = 100)

Source: own study based on Eurostat and CSO statistics.

When interpreting the results, it should be underlined that a wage is a compound economic category with numerous different factors, economic, social and institutional, which influence it. This might be why that the application of other research tools shows that the impact of labour productivity is not as high as the coefficient of determination R^2 that this study indicated.

Nevertheless, the results obtained are in line with the efficiency wage theory and its core statement of a positive relationship between the wage amount and labour productivity. Based on the assumptions of the theory, Nyk conducted a study verifying the relationship between labour productivity and wages in regional

[2] The statistical significance of the Pearson correlation coefficient was tested using the Student's t-test. The *t*-value was 16.105, while the critical value *t** was 2.2622 (p=0.05 and nine degrees of freedom).

terms. The author studied how the average wage reacted to changes in labour productivity in Polish regions in 1999–2013. The study showed that the efficiency wage theory was true in most regions. A significant linear relationship was identified in the Mazowieckie voivodeship and such voivodeships as Dolnośląskie, Kujawsko-Pomorskie, Lubelskie, Łódzkie, Opolskie, Podlaskie, Wielkopolskie and Warmińsko-Mazurskie. Some voivodeships (Lubuskie, Małopolskie, Pomorskie and Zachodniopomorskie) experienced a moderate relationship between wages and labour productivity, while in the other three voivodeships (Podkarpackie, Śląskie and Świętokrzyskie) the relationship was absent or weak. The author also examined the wage reaction to labour productivity changes on the macroeconomic scale in 1999–2013, obtaining the coefficient of determination R^2 of about 80% (Nyk, 2016b, pp. 45–46).

Wages and labour productivity – sector approach

When analysing wage flexibility by the three traditional sectors: agriculture, industry and services, it should be noted that wage responses to changes in labour productivity in industrial sections is more noticeable than in service sections. Such a conclusion comes from the analysis of the Pearson correlation coefficient, the coefficient of determination R^2 and wage and labour productivity dynamics in particular sections of the Polish economy. Scatter diagrams representing labour productivity and average wages by sections were also helpful[3] (Figure 4).

Agriculture is a peculiar sector for the examination of wage flexibility as it contributes a small share of gross value added whilst utilizing a significant percentage of employees. In 2017, the share of agriculture in the total gross value added was only 3.15%, while agriculture was responsible for over 15% of total employment in the economy (Eurostat). Both wages and labour productivity increased in agriculture, by 1.7% and 2.2% on average per year respectively, but showed significant fluctuations. In agriculture, wages responded poorly to changes in labour productivity and depended on many other factors. A coefficient of de termination R^2 of only around 20% confirms this. What should be noted is that the value of the p-parameter in the co-integrating equation, which referred to variable X, indicated an inference with a large error (Table 1).

In 2005–2017, industry recorded results similar to the entire economy, achieving a Pearson correlation coefficient of 0.93 and a coefficient of determination R^2 of 86.5% against similar indicators of 0.98 and around 96.6% in the total economy. Such results indicate a very similar tendency in wage and labour productivity

[3] Selected sections were presented guided by their share in the total gross value added in the economy.

developments, and suggest that wage flexibility in industry was high over the researched period. Such performance in industry primarily came from the results achieved by manufacturing, as the largest section in the sector.

Manufacturing noted a slightly lower Pearson correlation coefficient and coefficient of determination R^2 than industry as a whole, and simultaneously higher indicators than agriculture, energy production and supply as well as several service sections. The last in particular included: transportation and storage, financial and insurance activities and real estate activities. In manufacturing, labour productivity had been growing faster than wages since 2009. In the last years of the research period, labour productivity slowed slightly while wage growth accelerated, revealing wage pressure in this section. Nevertheless, throughout the entire period, wages increased by 2.7% annually on average, while labour productivity by about 3%. The coefficient of determination R^2 was about 70%, which means that wage flexibility in manufacturing was relatively high. Wages responded quite strongly to changes in labour productivity over the study period. However, it is worth emphasizing that apart from labour productivity, there are many other factors affecting wages in manufacturing, such as technological capabilities, availability of a qualified workforce, involvement in export activities and many others.

In construction, wage flexibility is more complicated to identify than in the industrial sections due to the significant fluctuations in gross value added and employment. The fluctuations come from the specificity of construction, strongly dependent on the economic situation, and above all the implementation of expensive infrastructure projects, including those financed by the European Union. Wages and labour productivity strongly fluctuated, for example in 2012–2013 when both variables significantly decreased after intense growth in previous years, stimulated by infrastructure preparation to organize the European Championships in 2012 in Poland. Since 2012, the dynamics of labour productivity has slowed significantly, while the increase in average wages has remained at a two-figure level. Construction is one of those sections where wage pressure is the most pronounced. In the review period, the coefficient of determination R^2 stood at just under 60%, suggesting many determinants other than labour productivity were influencing wages in construction. However, the Pearson correlation coefficient does not allow them to be identified. It also does not allow several potential factors to be examined (both measurable and non-measurable) that effect wages at the same time. Therefore, it can only be assumed that such determinants include the already mentioned infrastructure projects or the business environment around the construction sector. The shortage of labour influenced wages in construction in the last years of the research period. According to data from the Ministry of Family, Labour and Social Policy, construction was the dominant section in terms of employing foreign nationals. Almost 20% of all work permits issued to foreign nationals in 2015–2017 concerned construction (*Cudzoziemcy pracujący w Polsce*...., http).

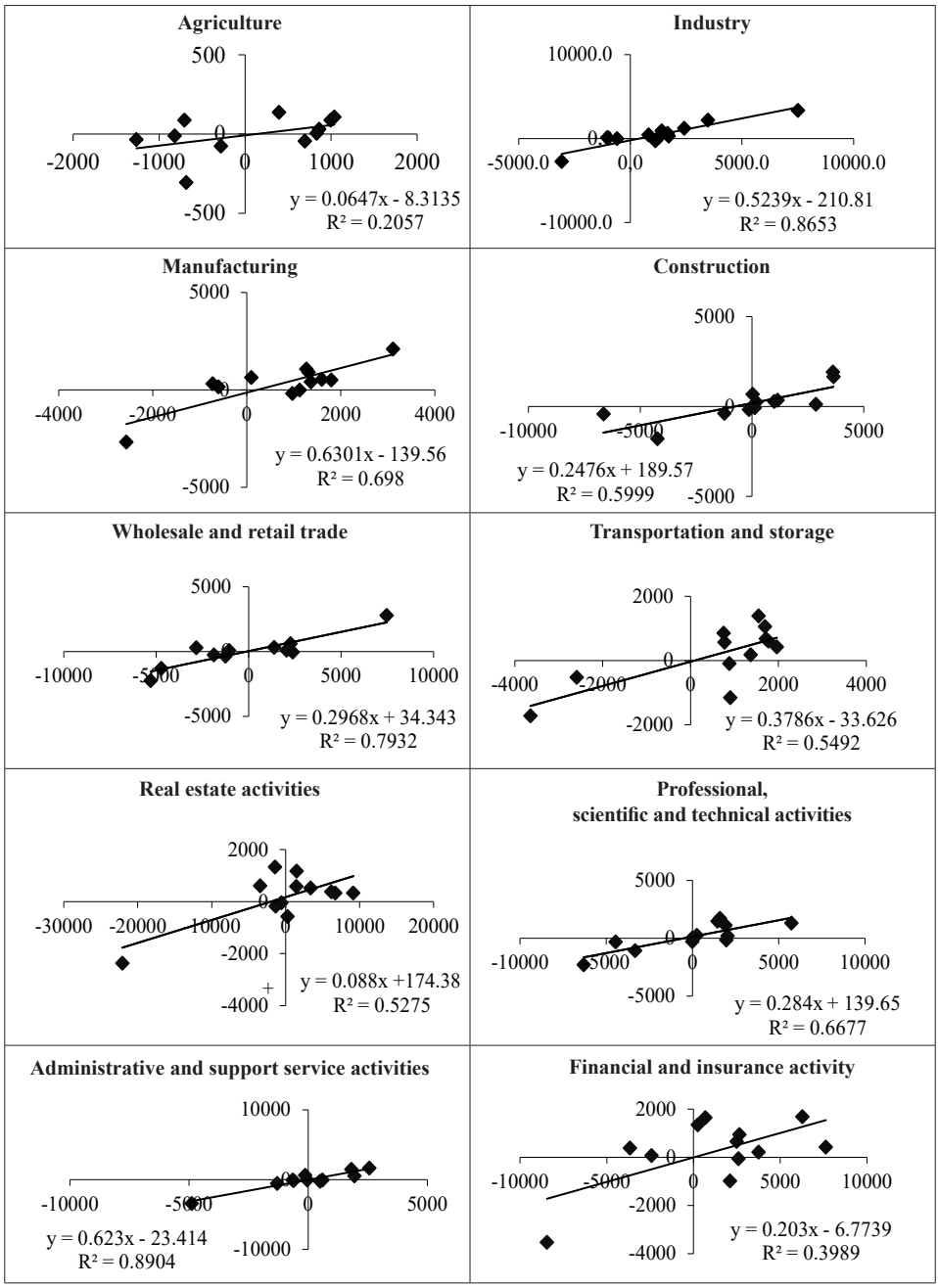

Figure 4. Labour productivity and average wages in selected sections of the Polish economy in 2005–2017 (constant prices 2017)

Source: own study based on Eurostat and CSO statistics.

Labour productivity varies across sectors. The level of labour productivity by sectors depends on the intensity of competition or sectoral market regulations. The increase in market regulations harms labour productivity. The negative impact is greater the more distant the sector is from technological capabilities, because the regulations limit the scale of the knowledge diffusion effect. Sectoral labour productivity also depends on the institutional environment of the labour market, information and communication technologies and innovations. Innovations are particularly important in sectors with a high level of concentration (Batóg J., Batóg B., 2009, p. 18).

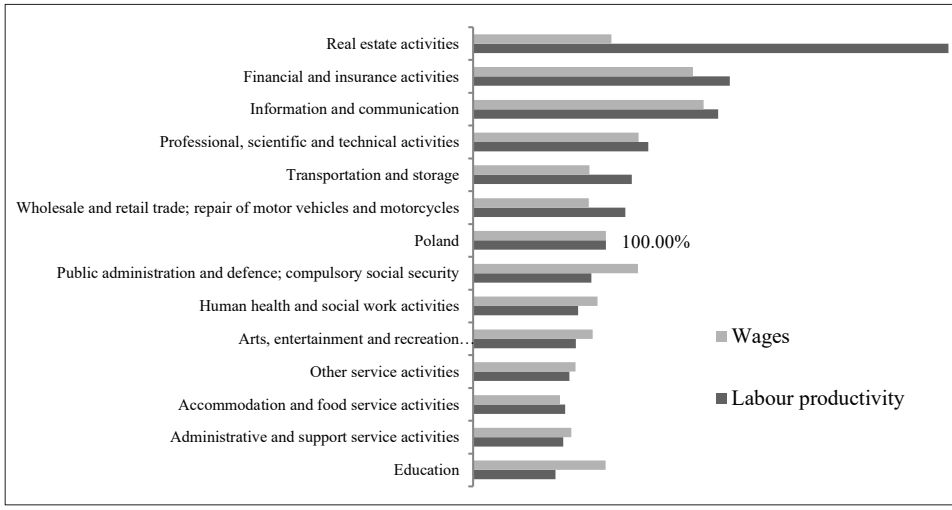

Figure 5. Labour productivity and wages in services in 2017 as a percentage of the average in the economy (Poland = 100)

Source: own study based on Eurostat and CSO statistics.

Labour productivity in the service sector differs from the manufacturing sector. In the service sector there are numerous factors on which the employees have no influence and which significantly affect the results of their work. It can even be said that each section in services has specific, characteristic factors affecting its labour productivity. For instance, labour productivity in the wholesale and retail trade depends on consumers and their purchasing decisions. The level of technological advancement in the retail trade is less important than in the manufacturing activity as the purchasing power of consumers plays a decisive role in trade. In the financial and insurance sector, banking services, which means the amount of use of these services, as well as the development of financial markets determine sectoral labour productivity.

Real estate activities, financial and insurance activities and information and communication are the sections of services which met the highest level of labour productivity in 2017. In turn, the lowest levels of productivity were recorded in

such sections as education, administrative and support service activities, as well as accommodation and food service activities, in which labour productivity did not exceed 70% of the average labour productivity in Poland (Eurostat). Wages in the services sector varied too. For instance, wages in information and communication as well as financial and insurance activities accounted for over 173% and 166% of the average wage in Poland, respectively, while the opposite extreme occurred in accommodation and food service activities, as well as administrative and support service activities, where average wages constituted only 66% and 74% of the average wage (*Mały Rocznik Statystyczny Polski*, 2018).

The specificity of labour productivity in services translated not only into large differences in the level of wages and labour productivity among particular sections, but also the diversity of wage flexibility by section. A significant relationship between wages and labour productivity was observed in sections such as public administration and defence, compulsory social security, administrative and support service activities as well as arts, entertainment and recreation. The Pearson correlation coefficient in the listed sections accounted for over 0.9. The moderate strength of the relationship (a Pearson correlation coefficient of 0.4 to 0.7) was noted, for example, in the wholesale and retail trade; repair of motor vehicles and motorcycles, transportation and storage, professional, scientific and technical activities, real estate activities and other service activities. The weakest relationship between wages and labour productivity was observed in financial and insurance activities, where the Pearson correlation coefficient did not exceed 0.4.

The differences in wage flexibility can also be seen based on the parameter values at the explanatory variable X, which in this study was labour productivity. Sectors or sections of the economy that are characterized by a relatively higher coefficient of determination R^2 have in most cases a higher value of the parameter in the independent variable X. This can be interpreted as the higher the parameter, the stronger the response of wages to changes in labour productivity (Nyk, 2016b, p. 186). This means that wages adapt faster to changes in labour productivity and thus are more flexible in these sections. Therefore, in the Polish economy the most flexible wages were observed in industry, particularly in manufacturing and in some services sections:

– sections of market services – administrative and support service activities, accommodation and food service activities, arts, entertainment and recreation as well as information and communication;
– sections of non-market services – public administration and defence; compulsory social security, human health and social work activities and education.

It is also worth adding that some of the sections with high wage flexibility generate a small percentage of gross value added in the Polish economy. As a result, their influence on total wage flexibility in the economy is insignificant. Such sections are, for example, arts, entertainment and recreation, as well as accommodation and food service activities.

CONCLUSIONS

The collected statistical data enabled the examination of wage flexibility by sections of the Polish economy. The research findings focus on two issues: the differences in wage flexibility amongst the sections and the impact of individual sections on total wage flexibility throughout the economy.

The highest wage flexibility in the Polish economy in 2005–2017 was identified in industry, mainly in manufacturing, where wage reaction to changing labour productivity was the most noticeable. This sector, due to the significant share in gross value added production in the economy, played a significant role in shaping wage flexibility in macroeconomic terms. Wages in agriculture did not seem to depend on labour productivity, which means that wages in this sector cannot be considered as flexible. The service sector, due to its specificity and the strongly outlined role of consumers and their preferences expressed by purchasing power, is characterized by highly diversified wage flexibility amongst sections. Wage flexibility varied from high in administrative and support service activities through moderate in real estate activities to its absence in financial and insurance activities.

To sum up, it should be noted that institutional factors affecting wages were not included in this study. In the current economic reality, the growing minimum wage is an institutional factor whose importance in stiffening wages from the bottom up and intensifying wage pressure is growing significantly. This may set the direction for further research into wage flexibility in Poland.

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Summary

The paper focuses on the examination of wage flexibility in the Polish economy, indicating the sectoral differences. In spite of the fact that wages depend on many variables, labour productivity (according to the traditional approach) was selected as the most influential determinant of wages. As a result, the paper describes wage flexibility as how wages respond to changes in labour productivity.

The research shows that wages are the most flexible in manufacturing. The survey also discovers the lack of wage flexibility in agriculture and its strong diversification in the services sector. Disparities amongst services sections are determined by the specificity of individual sections and consumer preferences. A rising minimum wage attracts the attention of economists in the current economic climate in Poland, as the minimum wage plays a significant role as the institutional factor of wage flexibility.

The paper consists of two parts. The first, theoretical, part of the article presents the issues of wage flexibility and its determinants. The efficiency wage theory, which emphasizes a positive relationship between wages and labour productivity, and the wage-requirements curve are also presented in the first part of the paper. In turn, the methodological part of the article includes a study of wage flexibility in the Polish economy on the macroeconomic scale and on a sectoral basis.

The division of the economy according to PKD 2007 was applied, while the empirical materials were Eurostat and the Central Statistical Office database.

Keywords: wages, labour productivity, wage flexibility.

Zróżnicowanie elastyczności płac w Polsce

Streszczenie

Celem opracowania jest zbadanie elastyczności płac w polskiej gospodarce ze wskazaniem różnic występujących między sekcjami działalności gospodarczej. Spośród wielu czynników oddziałujących na poziom płac wybrano wydajność pracy, jako determinantę, która powinna w największym stopniu oddziaływać na płace. W związku z powyższym, na potrzeby realizowanego badania elastyczność płac zdefiniowano w tradycyjnym ujęciu, czyli jako reakcję płac na zmiany wydajności pracy. Badanie koncentrowało się wokół sprawdzenia, w jakim stopniu płace zależą od wydajności pracy w poszczególnych sekcjach polskiej gospodarki. W końcowym efekcie uzyskano odpowiedź na pytanie, w których sekcjach wydajność pracy wpływa najsilniej na płace, a zatem, które z nich cechują się najwyższą elastycznością płac.

Największy wpływ wydajności pracy na płace zidentyfikowano w przetwórstwie przemysłowym. Badanie pokazało także brak elastyczności płac w rolnictwie oraz silne jej zróżnicowanie w sektorze usług determinowane specyfiką poszczególnych sekcji oraz preferencjami konsumentów. W obecnej sytuacji gospodarczej Polski uwagę zwraca rosnąca płaca minimalna, która może odgrywać znaczącą rolę jako czynnik instytucjonalny elastyczności płac.

Artykuł składa się z części teoretycznej i empirycznej. W części teoretycznej zaprezentowano pojęcie i istotę elastyczności płac z uwzględnieniem czynników ją determinujących. Przedstawiono także teorię płacy efektywnej, której zasadniczym elementem jest twierdzenie o dodatniej zależności pomiędzy wysokością stawek płac a wydajnością pracy oraz krzywą płacy-wydajności. Natomiast część empiryczna obejmuje badanie elastyczności płac w gospodarce polskiej w ujęciu sektorowym. Zasadniczą część badania poprzedziła analiza zależności między płacami a wydajnością pracy w skali makroekonomicznej. Zastosowano podział gospodarki wg PKD 2007, zaś materiał empiryczny stanowiły dane statystyczne dostępne w bazach Eurostat oraz GUS.

Słowa kluczowe: płace, wydajność płac, elastyczność płac.

JEL: J24, J30, E24.