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Izabela Jonek-Kowalska*

Exposure of Polish enterprises to risk within business cycle

1. Introduction

In modern economies, sudden and deep changes of the business cycle are relatively frequent; these changes spread quickly and adversely affect regional and global development opportunities due to the progressing globalization of economies and internationalization of business activity. This is confirmed by such events as the global crisis of 2007 or economic collapses in such countries as Argentina, Island, Cyprus, or Greece. In economies with relatively short free-market traditions, such business cycle fluctuations are a substantial threat to the economic stability, entrepreneurship, and the desired level of economic growth constituting the necessary condition for the transformation of an economy from the level of an emerging one to a developed one. The Polish economy is surely such an economy, which has only been functioning as a free-market economy since 1989.

The aforementioned circumstances require the monitoring of economic changes and their impact on the operations of enterprises and their financial results. Therefore, the goal of this article is to assess the exposure of Polish enterprises to the risk related to changes in the economic situation. To attain the goal set in this manner, the article is divided into two parts. The first one covers conceptual issues connected with the shaping of economic risk in the business cycle and enterprise behavior in this cycle. The second one presents the methodology of assessing the exposure of Polish enterprises to risk within the business cycle.

The conducted research shows that the financial results of Polish enterprises undergo intensive changes over time, which attests to a rather high level of economic risk accompanying their activity. They also strongly correlate with changes

* Silesian University of Technology, Faculty of Organization and Management, e-mail: izabela.jonek-kowalska@polsl.pl

in the GDP, which means that, at present (and most likely in the future), they will be prone to variations in terms of the business cycle.

2. Behavior of enterprises in business cycle vs. economic risk

Changes in the economic situation materially affect the entrepreneurship, activity, financial standing, and results of enterprises (Bayar et al., 2018, pp. 248–263; Firlej, 2008, pp. 151–158). Thus, the demand for goods and services increases as part of the operating activity in the situation of an economic recovery, which positively affects production and investment plans (Bachmann et al., 2013, pp. 217–249; Kayo and Kimura, 2011, pp. 358–371). In order to meet growing market needs, enterprises are producing more; this results in the growth of their volumes and revenues from the sales of products (also including services), goods, and materials. As a result of the increase in production volumes, the growth of sales revenues is also accompanied by increases in product manufacturing costs (including service provision costs) as well as the value of the sold materials and goods; however, the said increase is less intensive as a rule, which allows enterprises to significantly increase their financial results from sales (Adamowicz and Walczyk, 2009, pp. 139–156) and reap the benefits of the market prosperity (Hübner et al., 1994; Motoki and Gutierrez, 2015, pp. 47–59).

During a period of recession, however, market enthusiasm and optimism are reduced; this is accompanied by a decrease in the demand for goods and services. Under such conditions, both prices and sales volume fall, resulting in a reduction of revenues from sales and, consequently, a deterioration in the financial results from sales. Meanwhile, enterprises very frequently do not recognize the symptoms of an imminent crisis in the initial phase of a recession and do not abandon ambitious production plans, which leads to overproduction, increases in the stocks and costs of their maintenance, and an oversupply on the market. Under such economic conditions, it is initially necessary to reduce costs by means of diminishing production volumes, subsequently reducing employment; this results directly from the reduction of the sales volume forced by the market (Bachmann and Bayer, 2014, pp. 1392–1416; Matkowski, 2002, pp. 26–34).

In financial activity, the effects of shaping the capital structure and investments of a financial nature are shown by the level of financial costs and revenues. During a period of recovery, enterprises have as a rule increased the opportunities of their own internal financing in the form of growing net profits. Hence, the financial costs related to financing the acquisition of their own external capital and external third-party capital may be lower during this period than at a time of recession

(when difficulties in generating positive financial results are higher), forcing enterprises to reach for external financing sources; this increases the level of their financial costs. In the case of financial revenues that can be generated from the interest on granted loans and from the cash means accumulated on current and term deposits or that can reflect the revenues related to the disposal of financial investments, financial revenues may increase during a period of recovery, whereas they may diminish their value during a downturn (Sierpińska and Jachna, 2007). Decreasing financial revenues and increasing financial costs during the period of a recession adversely affects the generated value of the operating results. As a result, the business activity result and the gross result may be reduced (Bławat et al., 2017, pp. 159–181; Jakimowicz, 2003, pp. 47–62).

As mentioned hereinabove, the financial results of enterprises may change as a result of changing economic conditions during a business cycle. Taking account of the fact that economic risk is defined as the possibility of an adverse deviation of a result from the planned effect, one may assume that the variability of financial results of enterprises expresses the level of economic risk accompanying the conduct of the business activity. As regards the whole economy, in turn, the synthetic measure of its effectiveness is the Gross Domestic Product; therefore, its variability enables us to determine the general economic risk.

Having regard to the theoretical assumptions concerning the behavior of enterprises during a business cycle, economic recovery should be linked to a reduction of general economic risk, which should also have a positive impact on the safety of the conduct of the business activity. An economic crisis, however, results in an increase of general economic risk due to the accompanying reduction of the GDP, which adversely influences the financial results of enterprises and increases the economic risk of their activity.

3. Methodology

In the assessment of general economic risk and economic risk accompanying the activity of enterprises, the coefficient of Variation (1) has been used, being a commonly used risk measure on an ex post basis calculated for the purposes of the Gross Domestic Product and financial results of Polish enterprises, respectively.

$$v = \frac{s}{\overline{x}} \cdot 100\% \tag{1}$$

where:

s – standard deviation of sample,
$\overline{x}$ – arithmetic mean of sample.

In addition, the chain dynamics indices (2) were calculated in order to assess the intensity of changes observed over time for both variables mentioned above, subsequently assessing their mutual links by means of the Pearson correlation coefficient (3), which will enable us to answer the basic research question asked in this article: Do changes in the GDP reflect the level of general economic risk significantly related in statistical terms to changes in the economic results of Polish enterprises, which in turn are a measure of economic risk accompanying the conduct of business activity in the microscale?

$$i_{t/t-1} = \frac{x_t}{x_{t-1}} \tag{2}$$

where:

x_t – value of variable x during period t,
x_{t-1} – value of variable x during period $t-1$.

$$r_{xy} = \frac{\text{cov}(x, y)}{s_x \cdot s_y} \tag{3}$$

where:

cov(x,y) – covariance of x and y variables,
s_x, s_y – standard deviations of x and y variables.

As mentioned earlier, the direct risk measurement was based on the net financial results of Polish enterprises whose changes over time reflect the economic risk accompanying the business activity. In addition, the financial liquidity ratios, debt ratios, and profitability indices were also used to assess the risk with regard to other determinants of the risk level. This enabled an assessment of not only the resultant effects of enterprise activities within the business cycle but also an assessment of the financial situation and risk connected with the possibility of losing financial liquidity. The ratios used in the assessment as well as the methodology for their calculation are presented below.

For the measurement of liquidity-related risk, current ratio (4) and quick ratio (5) were used:

$$CR = \frac{CA}{CL} \tag{4}$$

where:

CA – current assets,
CL – current liabilities.

$$QR = \frac{CA - I - STP}{CL} \tag{5}$$

where:

CA – current assets,
I – inventories,
STP – short-term prepayments,
CL – current liabilities.

The current ratio reflects the ability to finance current liabilities after liquidating all current assets. It is accepted that its normal value should be between 1.5 to 2.0. If the current ratio is lower than 1.5, the enterprise has no financial liquidity, whereas if it is greater than 2, there is a so-called excess liquidity (an excess of current assets relative to current liabilities), which may generate high actual costs of maintaining such assets (the costs of warehousing and financing short-term accounts receivable) or additional alternative costs connected with their possession (the cost of lost investment possibilities).

In the case of quick ratio, inventories and short-term prepayments are deducted from the pool of assets due to the difficulty of liquidating these assets (e.g., problems with the sale of the finished products), with only the most liquid current assets in the form of short-term accounts receivable and short-term investments left in the numerator of the ratio. As a result, the normal value for this ratio is lower than in the case of the current ratio; this is sufficient when its value oscillates around 1.0, which means that all current liabilities can be paid back with the most-liquid current assets (Bławat et al., 2017, pp. 9–39).

During a period of economic recession, financial liquidity usually decreases due to the increasing level of current liabilities and difficulties with acquiring assets to settle them. Eventually, its loss becomes one of the key causes of enterprise bankruptcies (Chen, 2012, pp. 3346–3365; Radde, 2015, pp. 192–207; Roggi and Giannozzi, 2015, pp. 327–342). During a period of economic recovery, the financial liquidity of enterprises is maintained at a normalized level; if additional current assets are accumulated, it may result in excess liquidity (both in the current ratio and quick ratio). It can thus be assumed that, during a period of economic recovery, enterprises have no problems with maintaining financial liquidity.

The issue of financial liquidity is related to the issue of an enterprise's indebtedness. As mentioned earlier, an increase in short-term debt is not conducive to sustaining financial liquidity. Meanwhile, there may be an increase in both short-term debt and long-term debt during a period of recession due to the limited inflow of capital in the form of a positive and increasing financial result. With a growth in the debt level, there is an increase in an enterprise's funding risk, which is measured by means of debt ratio (6) and debt to equity ratio (7) in the

assessment of the financial situation (Bordo and Meissner, 2012, pp. 2147–2161; Sierpińska and Niedbała, 2003, pp. 216–262).

$$DR = \frac{TL}{TA} \tag{6}$$

where:

TL – total liabilities,
TA – total assets.

$$DER = \frac{CL}{E} \tag{7}$$

where:

CL – current liabilities,
E – equity.

In the case of debt ratio, it is recommended that this should not exceed 65% of the value of the total assets, which directly results from two basic financing rules stating that an enterprise's fixed assets should be financed with equity capital; if this is insufficient, it can be increased by long-term liabilities, thus forming the so-called fixed capital. If the fixed capital does not cover the value of the fixed assets, an enterprise is exposed to an excessive funding risk, which may lead to disruptions or losses of the continuity and stability of the sources of financing for its business activity.

Associated with the debt ratio is the debt to equity ratio, which reflects the proportions of the capital structure broken down into equity capital and borrowed capital represented by liabilities and provisions for the liabilities. In order to maintain a safe level of debt, it is recommended that the value of this ratio should not exceed 1.0 in large enterprises. In small- and medium-sized enterprises, a value of 3.0 is permissible. Above these limits, capital structure is regarded as unstandardized and poses a risk to the further existence of an enterprise. It is worth adding at this point that, during a period of recession and difficulties with increasing equity capital, capital structure changes as a result of adverse external conditions and the value of both of these ratios increases. During an economic recovery, adverse external stimuli are limited, and an enterprise can form its capital structure more consciously and more independently from external circumstances (Falk, 1986, pp. 1096–1109; Konopczak et al., 2010, pp. 7–31).

As the level of the financial results of an enterprise changes in a business cycle, profitability indices change as well (An et al., 2017, pp. 131–152; Margaritis and Psillaki, 2015, pp. 621–632). In this paper, these are quantified by determining the return on total assets (8), return on equity (9), and return on sale (10).

$$ROA = \frac{NFP}{TA} \tag{8}$$

where:
NFP – net financial profit,
TA – total assets.

$$ROE = \frac{NFP}{E} \tag{9}$$

where:
NFP – net financial profit,
E – equity.

$$ROS = \frac{NFP}{R} \tag{10}$$

where:
NFP – net financial profit,
E – sale revenues.

As the net financial result is present in the numerator of all of the ratios, one can conclude that, during a period of recession when there is stabilization or a decrease in the net financial result, there is also a decrease in the return on assets, return on equity, and return on sales. However, it should be noted that this will happen only when the rate of decrease of the values present in the denominator is lower than the rate of decrease of the net financial result. During a period of economic recovery when the results are improving and their growth rate is faster than the rate of increase in assets, equity, and the return on sales, profitability (expressed by ROA, ROE, and ROS) increases (Bloom et al., 2017, pp. 391–415; Dyduch et al., 2013, pp. 34–41; Kotowska et al., 2017, pp. 89–101; Tian, 2015, pp. 227–249).

4. Research results

4.1. Economic risk in context of net financial result

Figure 1 shows the changes in the GDP in the nominal prices in Poland during the period under analysis; these changes determine the course of the changes in the business cycle.

According to the data shown in Figure 1, the level of economic growth was positive during the entire analyzed period (ranging from 1.68 to 11.01%). Nonetheless, during the years of 2000–2015, periodical downturns in the business cycle occurred in 2005, 2010, and 2013. In turn, periods of intensive economic recovery

occurred in 2004, 2007, and 2011. It should also be noted that, during the years of 2011–2015, the growth rate of the GDP clearly lowered as compared to the period covering the years of 2001–2010; this attests to the systematic slowdown of the development of the Polish economy in the most recent period.

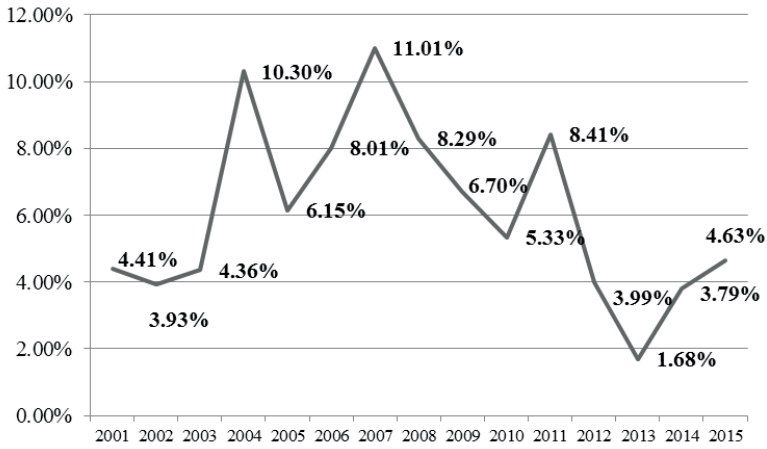

Figure 1. Changes in GDP in Poland during years of 2000–2015 [shown in percentage values]

Source: own study based on data from Central Statistical Office

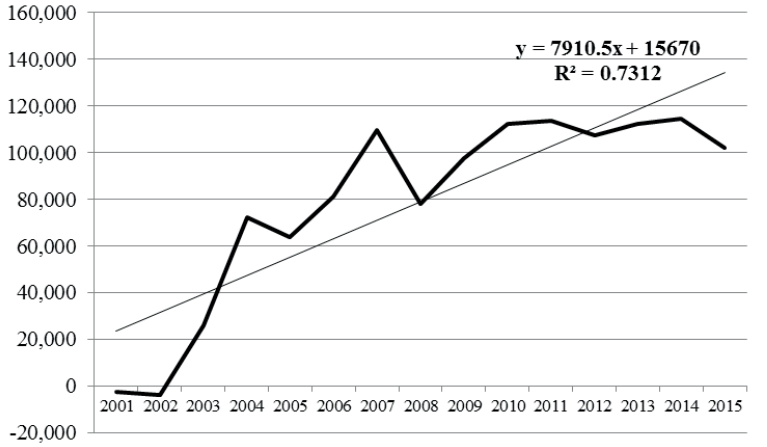

Figure 2. Net financial results of Polish enterprises in Poland during years of 2000–2015 [in millions – PLN]

Source: own study based on data from Central Statistical Office

Figure 2 presents the value of the financial results of Polish enterprises in Poland during the years of 2001–2015. The data contained in this figure shows that it changed according to a well-adjusted linear upwards trend; however, the rate of increase in the financial results has clearly lowered over the last five years.

For the purpose of assessing the variability of both parameters determining the risk level and factors affecting the financial results of Polish enterprises within the analyzed period, Table 1 presents the coefficients of variation for all of the variables under study.

The data contained in Table 1 shows that the highest variability (and, at the same time, the economic risk) is characteristic of the net results of Polish enterprises, which are both exposed to the general economic changes and shaped by the number of determinants of a significant level of variability (said determinants include, first and foremost, the sales revenues and costs of goods and services sold). The financial revenues and costs related to the formation of the capital structure are also characterized by great variability over time, which results from both the changing need for capital within the business cycle and changes to the interest rates. The GDP's coefficient of variation is below 30%, which reflects a lower risk level than in the case of the variables listed above and relating to the activity of the enterprises. Therefore, it can be stated that the general economic risk is lower than the economic risk of the operation of the enterprises within the period under analysis.

Table 1

Coefficients of variation for variables under study [for net financial result and its determinants in percentage values]

GDP	Net result	Sales revenues	Costs of goods and services sold	Other operating revenues	Other operating costs	Financial revenues	Financial costs
27.85%	52.40%	30.77%	31.22%	17.27%	20.09%	29.63%	29.03%

Source: own study based on data from Central Statistical Office

Table 2 contains an assessment of the links of the economic risk under analysis to changes in the GDP (expressed by means of Pearson correlation coefficients). The data contained therein shows that the other operating revenues and costs are not significantly related to the economic situation; this is a result of their incidental nature and minor importance in shaping the final net financial result.

The variability of the GDP determines the net financial results of Polish enterprises to the largest extent. It affects the level of revenues from the sales and their own costs of the goods and services sold to a slightly lower but important and still-significant extent. The economic situation is uninterestedly related to financial

revenues, whereas it does not determine the financial costs; in this case, it results from the systematic cutting of interest rates by the Polish Central Bank within the analyzed period for the purpose of triggering the economic activity of enterprises.

Table 2

Pearson correlation coefficients between GDP and net financial result of Polish enterprises and its determinants

Net result	Sales revenues	Costs of goods and services sold	Other operating revenues	Other operating costs	Financial revenues	Financial costs	Net result
0.8842*	0.7644*	0.7526*	–0.0392	0.2337	0.6664*	0.2973	0.8842*

* significance level $p < 0.05$

Source: own study based on data from Central Statistical Office

4.2. Economic risk in context of liquidity, debt, and profitability

The second part of the research deals with the measurement of economic risk in the context of the economic financial situations of Polish enterprises. Figure 3 presents the results of the assessment of the current ratio and quick ratio conducted in the first of three sub-areas of the research.

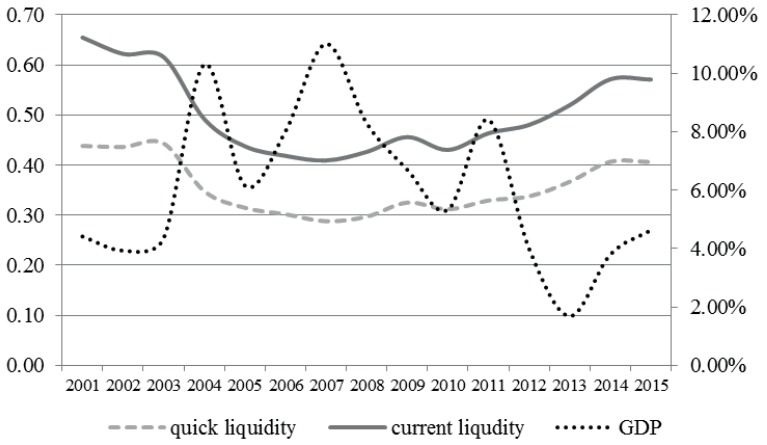

Figure 3. Current ratio and quick ratio of Polish enterprises in Poland and GDP during years of 2000–2015

Source: own study based on data from Central Statistical Office

The measurement of financial liquidity shows that Polish enterprises do not maintain liquidity norms over the whole period under analysis (which are 1.5–2.0 for the current ratio and 1.0 and more for the quick ratio). Polish enterprises are able to settle from 29% to 44% of short-term liabilities with their current assets and from 41% to 65% of these liabilities with the most-liquid assets; these are comprised by short-term accounts receivable and short-term investments. Generally, this level is insufficient for the ability to settle current liabilities positively.

The values of both the ratios similarly change over time, which means that the level of inventories does not have a significant impact on the differences in the assessments of the current and quick ratios. From 2006 onward, there is a significant decrease in financial liquidity due to an intensive increase in the short-term liabilities of the enterprises analyzed. A systematic deterioration of the situation in this regard continues until 2006, when both ratios record the lowest values during the period under analysis. Starting in 2007, both the current and quick ratios systematically increase over time; this is mainly due to a significant increase in the current assets, which increases the size of the assets that may be used to pay off short-term liabilities. However, none of the ratios reach the postulated standardized values. This low liquidity is to a large extent the result of a low level of current assets and their decreasing share in the structure of the total assets, as the indebtedness of Polish enterprises is not excessive and does not exceed the recommended limits (as will be shown later in this paper).

It is also worth highlighting the fact that the decrease in liquidity during the first half of the period under analysis takes place when the GDP growth rate decreases, which confirms the adverse impact of the economic conditions on the situations of Polish enterprises. During the second half of the period under analysis, these relationships are no longer so pronounced, but they are still statistically significant and show positive moderate correlation (Tab. 3). One can thus conclude that the financial liquidity of Polish enterprises changes over time in parallel with the changes in the economic situation.

Table 3

Pearson correlation coefficients between GDP and financial condition of Polish enterprises

Current ratio	Quick ratio	Debt ratio	Debt to equity ratio	ROA	ROE	ROS	Current ratio
−0.6400*	−0.6195*	−0.3433	−0.3400	0.5507*	0.5477*	0.4872*	−0.6400*

* significance level $p < 0.05$

Source: own study based on data from Central Statistical Office

As mentioned earlier, the debt ratio of Polish enterprises is not excessive and does not exceed the recommended limits; that is, 60% of the financing of the total assets with borrowed capitals (Fig. 4). Apart from the first three years of the period under analysis, the degree of covering assets with total liabilities does not even exceed 50%, and its value over time is characterized by a very low variability of 3 percentage points maximally. This provides stable foundations for financing economic activity, as is also confirmed by the debt to equity ratio (which only exceeds the recommended value of 1.0 during the period of 2001–2003). During the remaining period, the total liabilities are fully secured by the equity of the enterprises analyzed (representing 79% to 88% of the value of such capital).

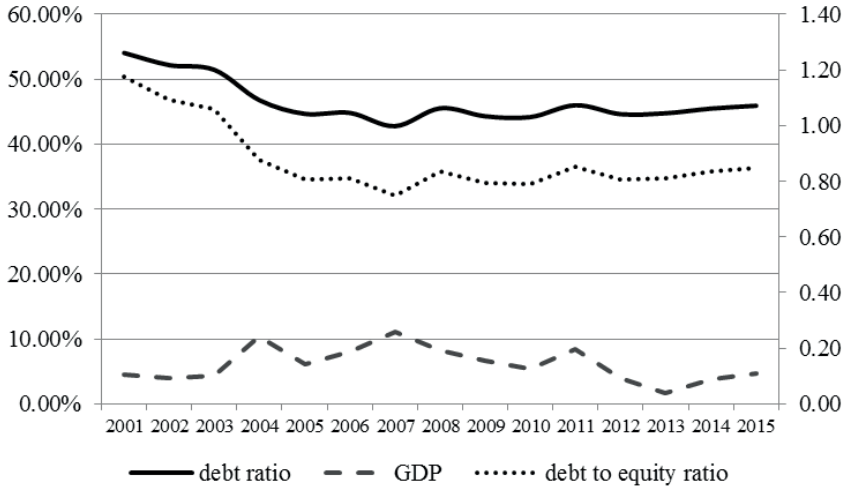

Figure 4. Debt ratio and debt to equity ratio of Polish enterprises and GDP in Poland during years of 2000–2015

Source: own study based on data from Central Statistical Office

The changes in debt in enterprises are not significantly and substantially correlated with the changes in the GDP, which is reflected by the Pearson correlation coefficient contained in Table 3. Thus, enterprises' decisions as to the formation of capital structure are not determined by changes in the economic situation; this may be due to their long-term character and strategic importance, which is not directly affected by the economic situation expressed only in the form of change in the GDP growth rate (which more or less signals economic growth). However, it is worth noting that, despite the significance of the identified correlations, these are negative. This means that, if the economic situation deteriorates, there may

be increases in debt and funding risk due to the decreased financial results and, thus, enterprise equity.

As stressed in the theoretical part and that presenting analysis of financial results of Polish enterprises during the period of 2001–2015, changes in the economic situation have a significant impact on the financial results of enterprises through their determinants; i.e., revenues and costs. An additional and universal measure of assessing the financial results of enterprises is profitability (which has been calculated for three basic determinants of economic activity further on in the paper); that is, return on assets (ROA), return on equity (ROE), and return on sale (ROS). Figure 5 presents the above-mentioned profitability indices for Polish enterprises during the period of 2001–2015.

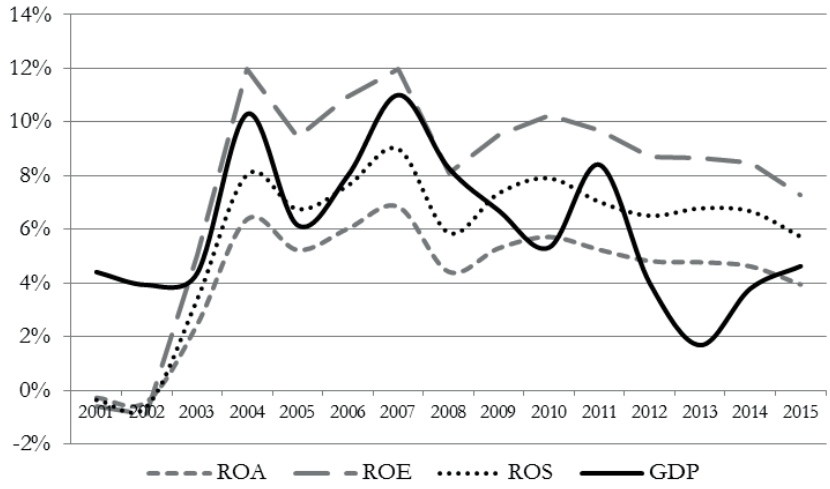

Figure 5. ROA, ROE, and ROS of Polish enterprises in Poland and GDP during years of 2000–2015

Source: own study based on data from Central Statistical Office

The data presented in Figure 5 shows that all three categories of profitability were correlated and changed in the same direction (although with different amplitudes). This means that profitability strongly depends on a financial result. Until 2004, profitability was systematically and quite sharply growing, as was the GDP; i.e., it reflected the changes in the economic situation. Then, during the period of 2004–2005, the ratios decreased, only to increase again with the growth of the GDP in 2007. Starting in 2008, the amplitude of the profitability fluctuations significantly decreased, and its changes were less clearly correlated with the changes in the GDP.

The lowest and most negative profitability was recorded by Polish enterprises during the period of 2001–2002. At that time, the business activity of the enterprises analyzed generated losses in statistical terms. On the other hand, the highest profitability was recorded in the following years: 2004, 2007, and 2010. During these years, 1 Polish zloty invested in total assets brought a net profit of around 6 groszy, 1 Polish zloty of equity generated a net profit of around 11 groszy for its owners, and 1 Polish zloty of net return on sales resulted in a net profit of 8–9 groszy. Despite the quite good values of profitability realized by Polish enterprises during the period of 2009–2015, it is worth highlighting that the financial results and profitability indices decreased over the last three years of the analysis, which may indicate a slight deterioration of the financial situation of the entities under analysis and their abilities to generate financial profits.

As a result of the above-mentioned circumstances and that fact that the indicators take into account not only financial results but also values of the total assets, equity, and return of sales, the relationships between ROA, ROE, ROS, and the GDP growth rate are much weaker than in the case of the absolute values of the financial results (Tab. 3). However, all of the correlations that have been found are statistically significant and indicate a moderate relationship between GDP changes and the profitability of Polish enterprises during the period of 2001–2015. The strongest relationship with changes in the economic situation is shown by the return on assets (ROA) due to the relatively slow changes over time in enterprise assets. Similar is the strength of the relationship between GDP changes and the return on equity (ROE). The lowest value of correlation coefficient (indicating the weakest relationship) is shown by the return on sales (ROS).

5. Conclusions

The research made shows that the financial results of Polish enterprises undergo intensive changes over time, which attests to a quite high level of economic risk accompanying their activity. They also strongly correlate with changes in the GDP, which means that, at present (and most likely in the future), they will be prone to variation in terms of the business cycle. The sales revenues and their own costs of the goods and services sold (i.e., the strongest determinants of the net financial result) are also characterized by average variability and high correlation with the GDP. Other operating revenues and costs as well as financial costs remain invulnerable to variations in the GDP, showing that the less important determinants of the effectiveness of enterprises do not depend on general economic factors.

With respect to the financial situation analyzed in the second area of the relationships between risk and the business cycle, statistically significant relation-

ships were identified in the case of financial liquidity and profitability. They are, however, weaker than those found for the net financial results and their determinants. The weaker correlation of the profitability indices and financial liquidity ratios with the business cycle results mainly from their relativity in the form of the simultaneous dependence on two variables, part of which are moderately correlated with GDP changes. In the case of financial liquidity, it refers to short-term liabilities, whereas in the case of profitability, it refers to the denominators of the ratios used to measure it (which include total assets, equity, and return on sales, respectively).

This is similar with financial decisions and their consequences. Insensitive to changes in the economic situation are such determinants of capital structure as total liabilities and long-term liabilities as well as the financial costs accompanying their regulation. As a result, all debt ratios are not significantly statistically correlated with GDP changes.

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