The impact of low interest rates on the debt of polish listed companies

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ABSTRACT

Central bank decisions have an impact on the whole economy. Increasing or lowering interest rates as part of a specific policy determines not only changes in macroeconomic aggregates or decisions of financial entities, such as banks, but also has a significant impact on business decisions. Low interest rates, which have been maintained for several years, encourage reflection on the impact of interest rates on the financing structure of companies. The main objective of the research is to verify the relations between monetary policy, in particular low interest rates, and the level of indebtedness of Polish listed companies. The analysis showed that the level of total interest-bearing liabilities for the selected sample of companies remains in a clear upward trend, and interest rates – in a downward trend, excluding the increases in 2008 and 2012. The Pearson correlation for the variables in question should be considered strong, especially in the case of the relationship between long-term interest-bearing liabilities and interest rates. Considering the above, it should be noted that interest rates influence the level of indebtedness of companies, bearing in mind that this is a transmission channel of monetary policy, which operates with a time lag.

Keywords: interest rates, interest-bearing liabilities, debt, monetary policy.

1. Introduction

Each company must have necessary capital resources to develop. Nowadays, entities can benefit from many sources of financing divided into the so-called sources of internal and external financing. External financing sources include credit and debt securities. Both credit and bonds are interest-bearing instruments, which, in view of the subject matter of this article, will form the basis for further consideration. When choosing a source of financing, entities take into account a number of factors, such as: availability of financing, the risk associated with financing, the strategy of the company or the cost of raising capital. In 1967, N. Baxter in his article "Leverage, Risk of Ruin and the Cost of Capital",

noted that excessive debt increases can lead to financial difficulties and, in extreme cases, even bankruptcy. The entity's ability to service debt is therefore a key factor determining the ability or willingness to borrow foreign capital. Due to the fact that the cost of obtaining a loan or issuing bonds depends mainly on the interest rate[5] that the entity is able to negotiate with a financial institution, which in turn is conditioned by the level of interest rates of the National Bank of Poland (hereinafter referred to as NBP), the decisions made by the central bank as part of monetary policy become important. Monetary policy, apart from fiscal policy, is a part of the economic policy conducted by the states in order to influence the economy of a given country. In the case of monetary policy,

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[5] The author omits here all costs related to credit, such as preparatory commission or fees related to early repayment of the loan due to the relative independence of financial institutions in shaping the levels of the above fees.

decisions taken by the state authorities are transferred to all market participants through the so-called transmission channels of monetary policy impulses. The basic channels for transmitting monetary policy impulses include: the exchange rate channel, the credit channel, the asset price channel and the interest rate channel (Egert, MacDonald 2009). "The mechanism for transmitting monetary policy impulses determines the way in which monetary authorities influence the decisions taken by economic life participants, as well as their further interactions. This process results in changes in such monetary variables as: central bank money, free liquidity reserves, money supply, volume of loans, interest rates, as well as the value of financial assets of various degrees of liquidity" (Szydłowski 2017, p. 102). This means that an increase or decrease in the nominal NBP interest rates translates into interest rates on the interbank market, which in turn has a direct impact on the interest rates on commercial debt instruments offered by financial institutions to consumers and entrepreneurs.

The policy of low interest rates pursued by central banks for years poses new challenges for the economy, and thus influences decision making by economic entities in previously unknown conditions. A long-term regime of low interest rates is a new situation, at least for the European and Polish economies. The expansive monetary policy in response to the global financial crisis of 2007-2009 continues and interest rates in the European Union are below zero. Previous reflections by economists on low interest rates have usually focused on the Japanese economy, which was the forerunner of lowering the interest rate close to zero in the 1990s. However, these considerations were usually of a macroeconomic rather than microeconomic nature. In Poland, Andrzej Rzońca has been discussing low interest rates for several years, but his publications are also of a more macroeconomic nature, showing the impact of monetary policy on the whole economy and presenting the issue from the perspective of central banks. The apparent lack of a comprehensive approach to the problem from the point of view of economic entities, which are not financial institutions, operating in conditions of low interest rates, confirmed the author's conviction that research in this area is necessary. Therefore, the main objective of the research is to verify the relations between monetary policy, in particular low interest rates, and the level of indebtedness of Polish listed companies. In order to achieve the main objective, two hypotheses have been established. Hypothesis I states that: *The lower the level of interest rates, the higher the share of interest-bearing liabilities in total liabilities in the research group under analysis over the years 2004-2017*, whereas hypothesis II reads as follows: *Changes in interest rate levels are more negatively correlated with the level of long-term interest-bearing liabilities than with the level of short-term interest-bearing liabilities in the research group under analysis over the years 2004-2017*. The assessment of individual research hypotheses was made on the basis of the research conducted, described further in the article.

The research contributes significantly to the economic and financial literature. The analysis of decisions taken by economic entities in conditions of low interest rates, i.e. when the central bank conducts monetary policy considered unconventional (Rzońca 2014), constitutes a significant cognitive value. By analysing the level of interest-bearing liabilities of Polish listed companies over the years, we can observe the reactions of entities to changing interest rates. The results of the research allow us to assess the effectiveness of the transmission channel of monetary policy impulses, which is an added value from both a scientific and practical points of view. To emphasize the meaning of the presented enquiry, it is worth mentioning that the author is currently developing the area of low interest rates in fusion with the debt of companies. Following research papers will not only show how this phenomenon functions in Poland, but also in the selected European countries.

2. Literature review

Unconventional monetary policy as a result of the financial crisis, which has lasted more than ten years since the outbreak of the global crisis in 2007, makes it possible for entities to obtain cheaper financing. The maintenance of low interest rates and often negative interest rates[6] by central banks is both supported and strongly criticized by scientists and economic practitioners, with a clear advantage of the critics. In her speech "Low interest rates: King Midas' golden touch", Kristin Forbes (2015) calls into question the positive effects of low interest rates, wondering whether "cheap money" does not allow less efficient companies to survive, and thus whether it does not reduce the overall efficiency of sectors. R. J. Caballero,

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[6] The European Central Bank's deposit interest rate has been below zero since 2016. The Swiss National Bank also keeps interest rates below zero.

T. Hoshi and A. K. Kashyap (2008) also raise the issue of non-profit borrowers. "Zombie" companies, as they are called by the authors mentioned above, create continuous distortions that reduce the number of new jobs created and lower productivity. Low interest rates translate into the price of money (Fisher 1930), which means that companies can afford additional financing because they are able to service debt. J. Klepacki (2016) states that the unconventionality of monetary policy may disrupt the classic mechanisms of reactions and actions of market participants, which will lead to the emergence of speculative bubbles on the real estate and financial asset markets. These fears are all the more justified because, according to sources, indirect foreign capital[7] "is the most common debt instrument – not only among small unlisted companies, but also among listed companies" (Damodaran 2007, p. 759). On the other hand, economists stress that the expansionary monetary policy is intended to stimulate the economy by increasing investment expenditure, which in turn, through a multiplier, would lead to a higher growth of the real Gross Domestic Product (Woźniak, Lisowski 2017). As a result, unemployment would be reduced (Powell 2017) and the economy would recover. However, this mechanism is applied when lowering interest rates is a short-term measure, so the question arises as to what happens when low interest rates persist for a few or even several years. How do economic entities react to unconventional monetary policy – do they constantly increase their debt?

Studies conducted by K. Szydłowski (2017, p. 108), based on the data obtained from the National Bank of Poland, the Polish Financial Supervision Authority (hereinafter referred to as KNF) and the Central Statistical Office (hereinafter referred to as GUS) for the years 2009-2014, allow us to observe "a relatively strong correlation between interest rates and the volatility of corporate capital structures. The upward trend in debt ratios was recorded in periods of interest rate falls and their persistence at a relatively low level". It should be stressed, however, that the research conducted by the author mentioned above was carried out for a series of years ending in 2014, which means that no analysis was carried out for the next 3 years, during which interest rates remained at low levels. Moreover, the value of loans was analysed from the perspective of the

banking portfolio and not from the perspective of corporate balance sheets. Similar studies, however, on a much longer time series, i.e. for the years 1997-2010, were conducted by Katarzyna Łach (2012). In this case, the author analyzed the scope of the data from the NBP databases, as well as the Central Statistical Office (GUS) and the Warsaw Stock Exchange. After their synthesis, it was stated that „the interest rate is not a determinant of the financing strategy, understood as a decision at the level of indebtedness of the company and the scale of use of credits and loans to finance operations" (Ibidem, p. 230). This different opinion gives rise to doubts, and it is necessary to consider in detail the causes of discrepancies. Therefore, it is worth taking a look at a comprehensive study conducted by Anna Białek-Jaworska, Aneta Dzik and Natalia Nehrebecka (2014). The authors have shown that "monetary policy through the interest rate channel increases the willingness of medium-sized companies to take out long-term bank loans. Moreover, it also increases the utilisation rate of (new) long-term bank loans taken out in large companies to a greater extent than in small companies" (Ibidem, p. 190). In their research, the authors also verified the impact of WIBOR 3M on the companies' financial leverage[8], proving that "the higher WIBOR 3M in the current period, the lower the financial leverage of large companies" (Ibidem, p. 310). An analogous dependence has been shown by the authors for small and medium-sized companies. However, it should be noted that WIBOR 3M affects the financial leverage with a delay of two periods. It seems, therefore, that discrepancies in the final conclusions resulting from the work carried out may be caused by different characteristics of companies or significant heterogeneity of research groups. The assumptions indicated above may be confirmed by an analysis of foreign literature. Brown, Ongena, Popov and Yesin (2011) analysed data from 2004-2005 for companies in 20 countries of Western and Eastern Europe, comparing the supply and demand for bank credit. In their study, they showed that in high interest rate conditions, Eastern European companies are more likely not to apply for credit despite the need for capital than in Western Europe. Gosh (2010), in his study on large Indian companies using data for the years 1995-2007, stated that changes in monetary policy translated into the structure of liabilities of

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[7] Intermediate capital includes loans and borrowings – classification proposed by E. Chojnacka in *Struktura kapitału spółek akcyjnych w Polsce w świetle teorii hierarchii źródeł finansowania*, 2012.

[8] Defined by Anna Białek-Jaworska, Aneta Dzik and Natalia Nehrebecka [2014] as the ratio of total debt (foreign capital less provisions for income tax liabilities and liabilities) to total debt and equity at book value less revaluation reserve.

non-financial entities, but what is interesting, the restrictive monetary policy was accompanied by an increase in total debt. Also Charles Muthama, Peter Mbaluka and Elizabeth Kalunda (2013) came to interesting conclusions in their research conducted on companies listed on the Nairobi Stock Exchange. The analysis of the data for 1999-2008 showed that the level of interest rates has a positive impact on the long-term debt ratio and the total debt ratio, and a negative impact on the short-term debt ratio, which means that if interest rates rise, companies will be more willing to finance themselves with long-term debt than with short-term debt.

As can be seen from the above, monetary policy as a determinant of the financing structure of companies has been the subject of numerous studies and articles. However, the results of the research and the conclusions drawn from them are divergent. Moreover, there are no studies that would attempt to observe the reaction of the structure of financing of companies and the debt ratio of companies to long-term low interest rates. Only research conducted over a period of time, in which we can observe low interest rates for several or more years, can lead to the assessment of the effects of unconventional monetary policy.

3. Methodology

The study discussed here was conducted on the companies listed on the main market of the Warsaw Stock Exchange. All entities listed on the Warsaw Stock Exchange since 2003 or earlier and continuously until the end of 2017 were included in the research sample. Therefore, the time series constituted the full years 2004-2017. All entities which were financial institutions or conducted financial, insurance, investment activity, etc., were eliminated from the research sample. In addition, companies which started operating as National Investment Funds were eliminated. After further verification, companies with a postponed financial year and companies whose data were incomplete were removed from the sample. The financial data of the entities under analysis were taken from the Notoria database. Finally, 84 entities listed on the Warsaw Stock Exchange were examined. The table below presents the individual steps of elimination and the conditions for the selection of the research sample.

Table 1: Conditions for the selection of the research sample

No.	Description	Number of companies which met the condition
1.	Companies listed on the Warsaw Stock Exchange in 2003, main market	203
2.	Companies listed in 2003 and continuously until the end of 2017	121
3.	Companies meeting condition 2. + without banks	113
4.	Companies meeting condition 3. + without companies engaged in financial and investment activities and without National Investment Funds	98
5.	Companies meeting condition 4. + without companies with a postponed financial year or whose data are incomplete	84

Source: own study.

The selected data sample was subjected to statistical analysis, verifying the levels of interest-bearing liabilities over the years, the share of particular groups of liabilities and debt ratios[5]. Then, the data obtained from the companies' balance sheets were compared with the interest rate levels, assessing the relationship between the variables examined by means of the Pearson correlation coefficient. The Pearson correlation coefficient is one of the most important coefficients used in correlation analysis. This factor should be used to describe the linear relationship between two variables. The correlation coefficient may take positive or negative values, which indicates the direction of the relationship between the variables. The value of the coefficient indicates its strength. The coefficient assumes values in the range <-1;1>. The closer it is to |1|, the stronger the relationship between the variables. Usually the following interpretation of the Pearson correlation coefficient is assumed: |0.0-0.2| – very

[5] The debt ratio in this article shall be understood as the quotient of the sum of the company's interest-bearing liabilities and liabilities.

weak correlation, |0.2-0.4| – weak correlation, |0.4-0.6| – moderate correlation, |0.6-0.8| – strong correlation, and |0.8-1.0| – very strong correlation (Pułaska-Turyna 2011). Additionally all correlation coefficients were verified if they are statistically significant using student's t-test and p-value. In the presented article, WIBOR 3M was considered to be a representative interest rate due to the very strong, significant correlation with the NBP rates. The Pearson correlation coefficient for the reference rate and WIBOR 3M in the period of 2004-2017 was close to 0.96, for the lombard rate over 0.96, for the deposit rate over 0.94, and for the rediscount rate over 0.95.

Table 2: Correlation coefficients between the NBP interest rates and WIBOR 3M

Specification	Coefficient value	Student's t-test	p-value	Statistical significance $\alpha = 0.05$
Reference rate and WIBOR 3M	0.96	11.8040	5.8084E-08	yes
Lombard rate and WIBOR 3M	0.94	12.6973	2.5709E-08	yes
Deposit rate and WIBOR 3M	0.94	9.9514	3.7747E-07	yes
Rediscount rate and WIBOR 3M	0.95	11.0541	1.2005E-07	yes

Source: own study.

4. Results

The first stage of the study was the analysis of interest rates. The 3M WIBOR interest rate was analysed. Due to the fact that WIBOR 3M is the interbank market rate, the average interest rate of total loans for non-financial companies, published monthly by the National Bank of Poland, was also analysed. The average loan interest rate is an effective interest rate, calculated for each newly concluded or renegotiated agreement in a given reporting month separately. The formula applied by the central bank is based on the fundamental principle of the time value of money (NBP 2018). The chart below presents how the variables developed in the years 2004-2017.

As the analysis shows, the interest rates represented in this case by WIBOR 3M showed a downward trend over the years 2004-2017. An exception is the years 2008 and 2012, when interest rates increased. The increase in 2008 was caused by the need to normalize the growth of inflation, which in July and August 2008 reached 4.8%. The second phase of the increases was in turn caused by good prospects for improvement of Poland's economic situation, as evidenced by the economic growth at the level of 4.3% and the fear of inflation growth (Pyka and Nocon 2016). As can be seen in the presented chart, the average interest rate of total loans for non-financial companies is completely dependent on the interbank market interest rate. The curve testifying to changes in the range of the variable in question is almost parallel to the curve responsible for WIBOR 3M. This is confirmed by the Pearson correlation coefficient, which for the variables in question was 0.98 (statistically significant, $\alpha=0,05$). Therefore, only one variable, i.e. WIBOR 3M, was used in further analyses.
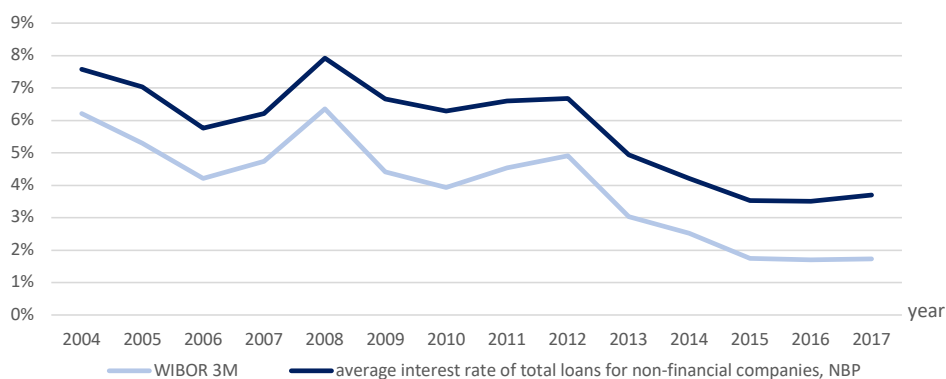

Figure 1. WIBOR 3M and average interest rates of total loans in 2004-2017
Source: own study based on the NBP data "Interest rate statistics" and the data from money.pl website

After analysing trends in interest rate levels, the liabilities of the selected sample of companies were analysed. For each company, the level of interest-bearing liabilities was determined, which included long-term loans and borrowings, long-term bond liabilities, financial liabilities (loans and borrowings) and short-term liabilities on the account of bonds. Then, individual categories for the whole sample were summed up for individual years. Additionally, the share of particular groups of liabilities in total interest-bearing liabilities was calculated in order to show the changes taking place over the years. The results are presented in the charts below.
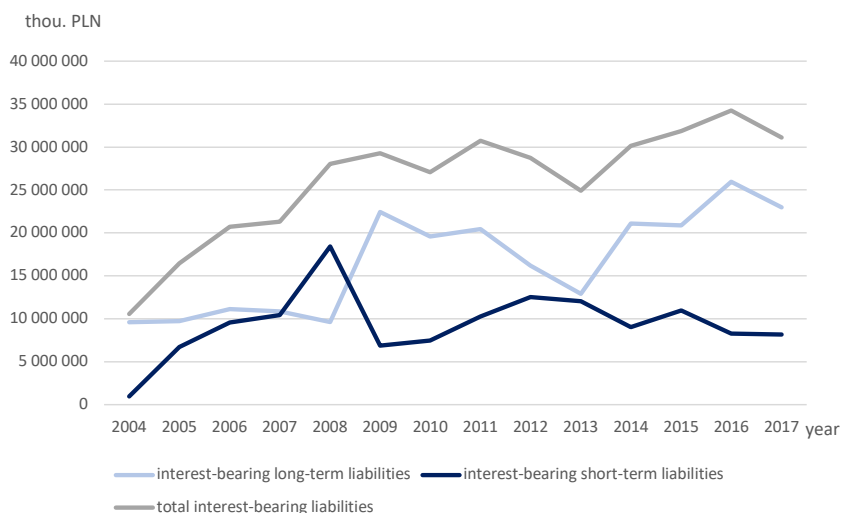
thou. PLN

Figure 2. Liabilities over 2004-2017 (thousand PLN)
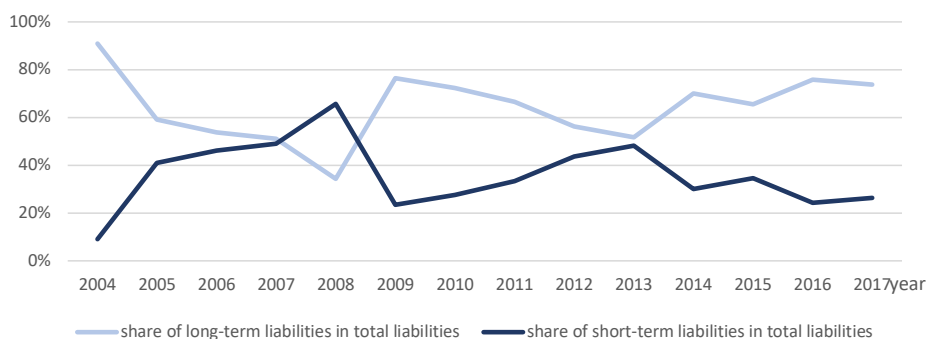Source: own study based on data from the Notoria database

Figure 3. Share of long-term and short-term liabilities in total liabilities
Source: own study based on data from the Notoria database

On the basis of the above data, it was stated that for the sample under analysis, total interest-bearing liabilities are characterised by an upward trend, with long-term interest-bearing liabilities having a greater impact on the increase in total liabilities. Short-term interest-bearing liabilities do not show a clear upward or downward trend, as from 2009 to 2017 they remained at a similar level. As can be seen in Figure 2, in 2008 there was an incremental increase in short-term liabilities; however, the increase in question was of a one-off nature. When analysing the share of long-term liabilities in total liabilities, we can distinguish four periods. From 2004 to 2008, the share of interest-bearing long-term liabilities in total liabilities decreased, from 2008 to 2009 it increased, and then it started to decrease again from 2009 to

2013. From 2013, we can observe an upward trend in the share of interest-bearing long-term liabilities in total interest-bearing liabilities. The share of short-term interest-bearing liabilities was characterised by exactly the opposite trend, because, as shown in Figure 3, the share of long-term and short-term liabilities in total liabilities is two curves which are a mirror image. Therefore, whenever the share of current liabilities increases, the share of long-term liabilities decreases and vice versa.

After analysing individual variables being the subject of the study, an attempt was made to compare interest-bearing liabilities of companies with the level of interest rates. The variables in question are presented in the chart below.

It should be noted that interest rates in the analyzed time series are in a clear downward trend, and liabilities, excluding short-term liabilities, are in an upward trend. The most noticeable increase in long-term liabilities can be seen from 2013, when interest rates are at their lowest levels. In the periods characterized by higher interest rates, companies increase the short-term debt (2008 or 2012).

In order to determine the relationships between the variables studied, a statistical analysis was made using the Pearson correlation coefficient. The Pearson correlation coefficient was calculated for the following variables:
- total interest-bearing liabilities and WIBOR 3M interest rate in 2004-2017,
- value of interest-bearing long-term liabilities and WIBOR 3M interest rate level in 2004-2017,
- value of short-term interest-bearing liabilities and WIBOR 3M interest rate in the years 2004-2017.

Calculations of the above variables showed that for the first pair of variables the Pearson correlation coefficient was -0.65, which means that there is a strong negative relationship between the variables. Therefore, if the WIBOR 3M interest rate is increased, the value of total interest-bearing liabilities will decrease. For the second pair of variables, the Pearson correlation coefficient was -0.75, which also means a strong negative correlation between the variables tested. There was no correlation between the third pair of variables. The obtained Pearson correlation coefficient of 0.03 indicates that there is no relation between the value of short-term interest-bearing liabilities and the WIBOR 3M interest rate level.
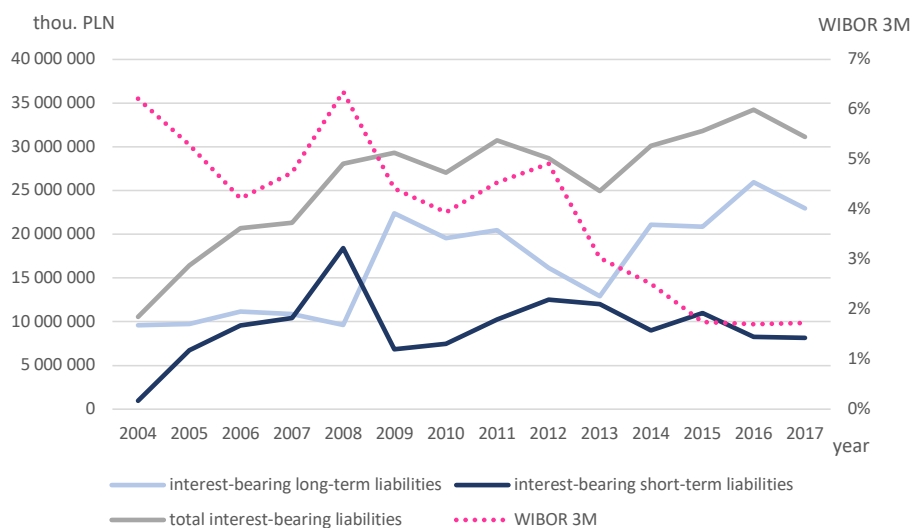

Figure 4. Liabilities vs. interest rates
Source: own study based on the data from the Notoria database and the data from money.pl website

Table 3: Pearson linear correlation coefficient for liabilities and WIBOR 3M

Specification	Coefficient value	Student's t-test	p-value	Statistical significance α = 0.05
Pearson correlation – total liabilities and WIBOR 3M	-0.65	-2.9572	0.0119	yes
Pearson correlation – long-term liabilities and WIBOR 3M	-0.75	-3.9727	0.0018	yes
Pearson correlation – short-term liabilities and WIBOR 3M	0.03	0.0926	0.9277	no

Source: own study based on the data from the Notoria database and the data from money.pl website.

The next research step was the analysis of the debt of business entities over the years. For the purpose of this study, the debt ratio is the quotient of the value of total interest-bearing liabilities and liabilities. For each year, the data for 84 entities constituting the research sample were aggregated and subjected to statistical analysis. Out of the statistical measures of the distribution position, the following were used: the arithmetic mean, median, quartile I and quartile III.

Table 4: Measures of the distribution position for the debt ratio of the tested sample

Specification	2004	2005	2006	2007	2008	2009	2010
median	0.00%	0.73%	4.44%	2.43%	7.70%	3.87%	5.53%
average	7.92%	9.26%	11.90%	10.81%	12.16%	11.54%	11.15%
quartile I	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%
quartile III	12.45%	17.67%	24.11%	20.38%	20.98%	20.61%	18.60%

Specification	2011	2012	2013	2014	2015	2016	2017
median	7.69%	9.85%	8.92%	7.90%	9.80%	10.09%	10.96%
average	12.37%	14.15%	11.82%	15.08%	1167.37%	284.65%	21.92%
quartile I	0.08%	1.98%	1.02%	2.00%	2.09%	3.31%	1.89%
quartile III	19.60%	21.04%	18.67%	21.24%	21.72%	23.56%	21.69%

Source: own study based on the data from the Notoria database.

Due to the large diversity of debt ratios for individual companies in one-year periods, the arithmetic mean was excluded from further analysis. Therefore, the median and quartiles were interpreted. The median of the debt ratio for the sample was characterised by a clear upward trend. From the median debt ratio of 0.00% in 2004, there was an increase to 10.96% in 2017. At the same time, the median debt ratio in 2017 presents the highest value for the whole time series. An equally high level of debt was observed in 2012, 2015 and 2016, where the median of the debt ratio stood at 10%. Quartile I for the first six years amounted to 0.00%. Since 2010, there has been a gradual increase in the value of quartile I, which means that the lower limit for the debt ratio has increased. The highest value of quartile I was observed in 2016, where 25% of companies had a debt ratio lower than 3.31%. Quartile III for the surveyed community showed a steep upward trend. It assumed the highest value in 2006 and 2016, where it amounted to about 24%. This means that only in the case of 25% of the companies the coefficient was higher than this level. The lowest values of quartile III were observed for 2004 and 2005, i.e. at the beginning of the time series under analysis.

After analysis of the debt ratios for the sample group, the variable in question was compared with the WIBOR 3M interest rate level, which is presented in the chart below.

Additionally, in order to better illustrate the correlation between variables, the Pearson correlation coefficient was calculated for the median debt ratio and the WIBOR 3M interest rate level.
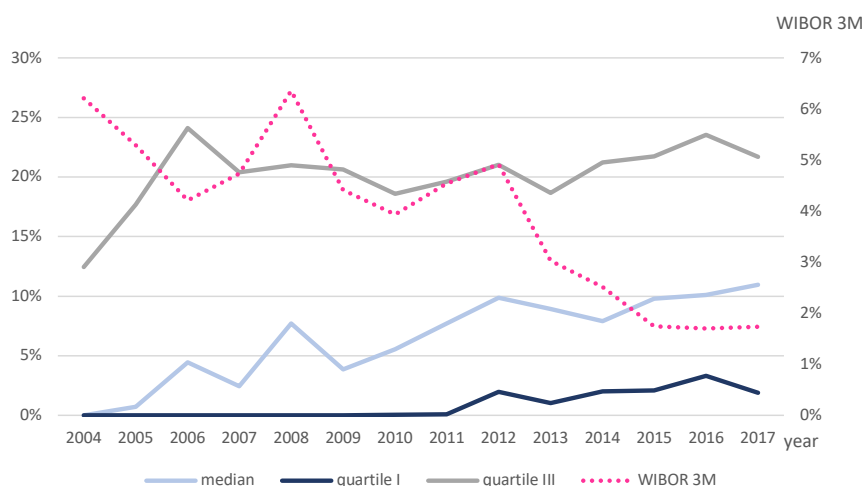
Figure 4. Liabilities vs. interest rates
Source: own study based on the data from the Notoria database and the data from money.pl website

Table 5: Pearson correlation coefficient for the median debt ratio and WIBOR 3M interest rate

Specification	Coefficient value	Student's t-test	p-value	Statistical signifi-cance α = 0.05
Pearson correlation – debt ratio and WIBOR 3M	-0.67	-3.1463	0.0084	yes

Source: own study based on the data from the Notoria database and the data from money.pl website.

5. Conclusions

When verifying the main objective of the research, it should be stated that there is a correlation between the level of interest rates and the level of indebtedness of Polish listed companies. The level of total interest-bearing liabilities for the selected sample of companies remains in an upward trend, and interest rates in a downward trend, excluding increases in 2008 and 2012, which was confirmed by the strong Pearson correlation, whose coefficient for the examined variables in the whole period amounted to -0.65. It should be remembered, however, that interest rates are the transmission channel of monetary policy, which operates with a time lag. Therefore, it can be concluded that only long-term interest rate decreases have a significant impact on the level of indebtedness of Polish listed companies. The results of the research do not allow us to reject the first hypothesis, which stated that the lower the level of interest rates, the higher the share of interest-bearing liabilities in total liabilities in the research group under analysis over the years 2004-2017. Correlation calculated with the Pearson coefficient showed that there is a strong, negative relationship between the median of the debt ratio and the WIBOR 3M interest rate level. While verifying the second hypothesis, it should also be stated that there are no grounds for its rejection. Over the years 2004-2017, the Pearson correlation for long-term liabilities was -0.75 and for current liabilities 0.03. Thus, in the case of long-term liabilities, there is a strong dependence, whereas in the case of short-term liabilities there is no such dependence. In addition, it is worth noting that the share of current liabilities in total interest-bearing liabilities decreases with the decrease in interest rates. This is best illustrated by the years 2013-2017, where the share of short-term liabilities in total liabilities dropped from 48.24% in 2013 to 26.26% in 2017. Based on the above results, it is concluded that the monetary policy transmission channel under analysis affects the decisions not only of financial institutions, but also of the largest economic entities in the country. Nevertheless, a comprehensive assessment of the effectiveness of the central bank's operations requires further research, which the author is currently pursuing.

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