International Entrepreneurship Review

2022, Vol. 8, No. 4

10.15678/IER.2022.0804.06

Questing benchmarks for the current ratio: An analysis of the Warsaw Stock Exchange firms

Piotr Wójtowicz

ABSTRACT

Objective: The first objective of the article is to assess the benchmarks for the current ratio commonly provided in the accounting and financial analysis literature. The minor objective is to arrange a research methodology permitting the accomplishment of the first objective.

Research Design & Methods: The paper, apart from the literature review and its critique, presents the results of descriptive, quantitative research. The research sample consists of 5 148 firm-years. Data were retrieved from Worldscope Database via Refinitiv Eikon for domestic, going concern, non-financial companies listed on the Warsaw Stock Exchange from 2005 to 2021. For comparison, the U.S.-related data was retrieved from Internet resources as ready-made ratios. Methods used in the analysis include descriptive statistics, parametric and nonparametric ANOVA, confidence intervals, and linear and parabolic trend analysis.

Findings: The tests show that identifying a benchmark for the current ratio is problematic. Benchmarks vary between countries and industries; universal standards do not exist. The benchmark for the current ratio commonly suggested, 1.2-2.0, may be used only as a rough evaluation of the desired value. The findings indicate that the acceptable range for CR is much broader, from 1.1 (the first quartile) to 2.3 (the third quartile) for the total sample. Moreover, the SIC division's quartiles vary from 0.7 to 1.2 (the first) and from 1.6 to 3.6 (the third). Statistical tests indicate that benchmarks do not vary annually. However, the distribution's median and the third quartile change slowly over time toward higher values. The Covid-19 pandemic resulted in a substantial increase. On the contrary, the first quartile of about 1 remains relatively stable over time, indicating the reasonable lower bound for CR. The mean of the distribution is useless as a benchmark because of its sensitivity to outliers. Various techniques must be used to assess the benchmark.

Implications & Recommendations: Since there are material between-industry and between-country differences in benchmarks, analysts and investors should be very sensitive to the standards suggested in the literature and interpret them cautiously. Variability over time exists but is low unless a shock in the economy appears.

Contribution & Value Added: The main contribution of the paper is empirical verification of the benchmarks for the current ratio provided in the literature. Tests show that suggested benchmarks are not universal. Seeking a benchmark, an analyst must compare the firm's financial standing with other firms from the same country, industry, and period.

Article type:	research article
Keywords:	liquidity ratios; current ratio; financial analysis; liquidity benchmark; Warsaw Stock Exchange
JEL codes:	M41, G15

Received: 29 September 2022 Revised: 3 November 2022 Accepted: 15 November 2022

Suggested citation:
Wójtowicz, P. (2022). Questing benchmarks for the current ratio: An analysis of the Warsaw Stock Exchange firms. *International Entrepreneurship Review,* 8(4), 83-97. https://doi.org/10.15678/IER.2022.0804.06

INTRODUCTION

The financial health of a firm can be assessed by comparison with other entities in the industry, change in the value of some vital markers, or assessment of the risk of bankruptcy. The industry-based comparison requires a high-quality baseline. The following article is the quest for the benchmark for the current ratio. This ratio measures a company's ability to pay short-term obligations due within one

year. It is commonly believed that a current ratio that aligns with the industry average or is slightly higher is acceptable. On the other hand, a current ratio that is lower than the industry average may indicate a higher risk of bankruptcy. If a firm has a very high current ratio compared with its peer group, management may not be using its assets efficiently (Investopedia, 2022). I follow well-regarded Investopedia.com; however, the point of view presented here is widespread. Unfortunately, these generally accepted rules are not necessarily valid. In other words, I am eager to challenge them.

How can the financial statement reader be confident that the industry average is the proper benchmark? The average of the distribution is susceptible to outliers; hence the benchmark may be biased towards the right tail of the distribution. What is the exact meaning of the *slightly higher* interval? Are differences between industries' current ratios significant? What about industries with high current assets turnover resulting in a low value of those assets and an extended maturity of liabilities resulting in an increased amount? In other words, is the current ratio below one always the signal of the risk of distress? In the next section, these issues are finally formulated in the form of hypotheses.

I only concentrate on the issues around benchmarks for the current ratio. I exclude the quick ratio and cash ratio from the analysis. The main reason for this is the lack of an unequivocal answer to the question about the research methodology permitting identification of the benchmark. Hence, there are two intertwined objectives of the article. First, I investigate the benchmark for the current ratio, the commonly used liquidity ratio. Second, struggling with that, I try to arrange a research methodology permitting answers to the vital question.

The novelty of my article consists of the empirical verification of the benchmark for the current ratio provided in the literature. I empirically test whether the use of a country-based benchmark is the correct assessment procedure. Finally, I use various statistical methods to estimate benchmarks and identify patterns they follow. The use of a variety of techniques results in increased robustness of findings.

The remainder of the article is organized as follows. The next section contains a literature review and develops the hypotheses. It is followed by research methodology, including the sample selection process and the description of the data. Then, results and discussion are presented. The last section concludes the study and explains the limitations and avenues for further research.

LITERATURE REVIEW

To run a financial analysis and compare the findings to other firms in order to assess a company's performance, an analyst requires a benchmark, i.e., a standard, or a baseline, that is used for comparative purposes. Revenues, expenses, profits, and liquidity are the most frequent areas to be considered. However, the answer to the simple question "*How is a business doing?*" is not easy because of the need for well-established benchmarks. Such analysis will (1) compare the performance of the company over time and (2) help understand how the company's financial performance stacks up against the industry. The former comparison is easy because the data is usually at the analyst's disposal. The latter requires high-quality benchmarks. Moreover, managers use liquidity ratios to ensure business goals (Kochalski & Łuczak-Trąpczyńska, 2017).

Surprisingly, internationally recognized accounting and finance literature concerning liquidity benchmarking is very scant. To my knowledge, there are no prior international research papers investigating the benchmarks for the current ratio. Usually, the articles concentrate on the role or importance of liquidity in asset pricing (Keene & Peterson, 2007), liquidity monitoring (Ruozi & Ferrari, 2013), the liquidity-profitability tradeoff (Eljelly, 2004), and, recently, the uniqueness of liquidity management during the covid-19 pandemic (Almeida, 2021). Liquidity is perceived a one of the factors ensuring sustainable growth (Pera, 2017). On the other hand, I received almost 1 million links to answer the question about the proper value for a Current Ratio asked on google.com. Even a glimpse of this content, not mentioning deep investigation, leads to the conclusion that the appropriate answer to this question arguably does not exist. However, some researchers attempted to do that.

Analysts typically concentrate on five main groups of financial ratios: profitability, liquidity, solvency, efficiency/activity, and capital market-related ratios. Benchmarks for some of them are respectively easy to identify. For example, in the case of profitability ratios (Return on Equity and Re-

turn on Assets), the general logic behind the interpretation is simple: the higher, the better. In the same vein, generally, the lower the Assets Turnover Ratio in days, the better efficiency with which a company uses its assets to produce sales. The real challenge is the benchmark for ratios, which are supposed to vary between the lower and upper limits. Typical examples are the Current Ratio and Debt-to-Equity Ratio. The strengths and weaknesses of the Current Ratio are discussed in detail. However, the Current Ratio considered low does not necessarily indicate liquidity problems; a high ratio does not have to be financially sound (Fleming, 1986).

In this article, I concentrate on benchmarks for liquidity ratios because they focus on a company's ability to meet short-term obligations. Liquidity ratios determine a debtor's ability to pay off current debt obligations without raising external capital. They determine a company's ability to cover short-term obligations and cash flows, while solvency ratios concern a longer-term ability to pay ongoing debts. Failure in the former area is hazardous because it may quickly result in the company's default or bankruptcy. In other words, a company may continue even for several years as a going concern making losses. It is hardly imaginable, however, that creditors would accept a lack of cash flows for so long period. Therefore, they will undoubtedly claim bankruptcy proceedings.

Liquidity ratios include the Current Ratio (CR), Quick Ratio, and Cash Ratio. They are commonly known; however, all of them are defined in the next section of the article.

One of the most distinguished Polish researchers and practitioners argues that the Current Ratio should range from 1.2 to 2.0 according to standards. They also suggest that the Quick Ratio should be close to or above 1 (Sierpińska & Jachna, 2004). But unfortunately, the authors do not provide any reference to literature or the mentioned standards. Therefore, the reader must trust them or start their investigation. Moreover, the international use of the suggested benchmark is doubtful. For instance, the ideal current ratio in India is suggested to be 2 (Chandra, 2008; Pandey, 2010).

In Poland, a helpful hand is given by Maślanka (2019), providing reference to a bunch of articles and monographs on liquidity ratios, specifically on the suggested proper values of CR and QR, respectively. These findings, expanded by other references, are summarized in Table 1.

Table 1. Benchmarks for CR and QR suggested by various authors

Ratio / Author(s)	Suggested value of CR	Suggested value of QR
Czekaj & Dresler (2002) Wędzki (2002)	1.2-2.0	1.0-1.2
Bednarski (1997) Kowalak (2022) Pomykalska & Pomykalski (2007) Sierpińska & Jachna (2006) Waśniewski & Skoczylas (2002)	1.2-2.0	About 1.0
Gołaś & Witczyk (2010)	1.2-2.4	About 1.0
Olzacka & Pałczyńska-Gościniak (2004)	1.3-2.0	–
Bednarski (2007) Michalski (2005) Nowak (2008)	1.5-2.0	Above 1.0
Nowak (2002)	1.5-2.0	1.2-1.5
Rogowski & Lipski (2014)	1.5-2.0	1.0-1.2
Ostaszewski (2013)	1.6-1.9	0.9-1.0
Bień (2018)	About 2.0	–
Świderska (2003)	At least 2.0	–
Kreczmańska-Gigol (2020)	1.0-2.0	0.7-1.5
Gołaszewski *et al.* (2001)	1.0-1.5	Above 1.0

Source: own study based on Maślanka (2019) and the references quoted in the table.

Furthermore, some authors provide benchmarks for the Cash Ratio equal to 0.25 (Kowalak, 2022) or 0.2 (Dębski, 2005; Świderska, 2003).

Table 1 shows that generally accepted benchmarks for CR do not exist. The standard for CR ranges from 1.0 to 2.4, with the most frequent range from 1.2 to 2.0. Similarly, benchmarks for QR range from 0.7 to 1.5, with the mode above 1.0. Furthermore, the authors often quote one another, so the reader cannot be sure whether the benchmarks are based on sample data or represent the authors' beliefs and professional experience. Next, an interesting conclusion can be drawn from the comparison of Table 1 with the U.S.-based benchmark. In the latter case, a CR of 1.5 to 3 is often considered good (BusinessInsider, 2022) but with no generally accepted upper and lower limits. Likely there is no one perfect benchmark (Sierpińska & Jachna, 2004). Therefore, the "good" value for one firm is not necessarily good for the other, and industry benchmarks must be considered. Last but not least, when evaluating a company's liquidity, the Current Ratio alone doesn't determine whether it's a good investment or not. It is, therefore, essential to consider other financial ratios in the analysis.

There are many factors shaping the economic behavior of both individuals and organizations. The impact of formal (e.g., tax law, interest rates, financial market supervision) and informal (e.g., religion, culture) institutions may establish entirely different economic conditions and risk factors. Furthermore, the impact of culture is conditional on the level of regulation and monitoring in a country (Kanagaretnam *et al.*, 2011). For that reason, the existence of international benchmarks, even for a specific industry, is hardly possible. To shed light on the expected between-country differences, I compare the distribution of the CR in Poland versus the U.S.

The distribution of yearly values of financial ratios by industry is analyzed since 2002 by the Financial Analysis Committee of the Scientific Council of the Accountants Association in Poland (Komisja ds. Analizy Finansowej Rady Naukowej Stowarzyszenia Księgowych w Polsce). The Committee publishes its findings through publicly available reports (Rachunkowość, 2022a). The sample selection process is straightforward. The company included must (Dudycz & Skoczylas, 2021):

- prepare financial statements in line with Polish Accounting Act,
- provide financial statements for two consecutive years for comparison,
- have a fiscal year equal to 12 months,
- have a nonnegative value of owner's equity.

For that reason, the sample comprises a considerable number of companies. For example, the 2019 sample consisted of 157 022 companies (Dudycz & Skoczylas, 2021), ranging from small sole proprietorships to blue chips listed on the Warsaw Stock Exchange. Furthermore, the number of companies included increases year by year. In 2012, the sample consisted of only 37 624 companies (Dudycz & Skoczylas, 2014). The usefulness of these reports for practitioners and researchers in Poland is certainly high. However, the diversity of the sample may result in some limitations of the results. The size of the business and its legal form result in different institutional conditions, so finally, firms are exposed to various risks influencing the ratios. The breakdown by industry follows the Classification of Business Activities in Poland (Polska Klasyfikacja Działalności – PKD); hence an international comparison of these ratios is hardly possible. However, intra-industry trend analysis and between-industry comparison remain feasible.

An investigation of the contents of huge tables published by the Committee shows that the average and median values of the ratios vary greatly. Table 2 shows selected examples. Means are much higher than medians; hence, the distributions are asymmetric, with substantial outliers. Furthermore, there are material differences between industries' ratios.

A comparison of the results presented in Table 1 and Table 2 suggests that the authors quoted in Table 1 built their suggestions on medians. Table 2 shows respectively high medians, suggesting that the most frequent range for CR 1.2-2.0 may not work in practice. The same issue refers to QR; however, medians for the *10 – Production of food* and *47 – Retail (cars excluded)* are very close to the benchmark. Presumably, the most surprising are medians for CHR, which are much higher than the suggested value equal to or just above 0.2.

I conjecture that in the Polish context, the benchmarks for liquidity ratios are different than the ones suggested in the literature. Furthermore, benchmarks may vary over time because they reflect changing risk of business activity and vary between industries. Finally, the average value of liquidity ratios is different from the median.

Table 2. Arithmetic means and medians for liquidity ratios in selected industries in 2019

Ratio / Industry	Current Ratio CR	Quick Ratio QR	Cash Ratio CHR
01 – Agriculture production livestock and animal specialties			
Arithmetic Mean	5.50	3.57	1.55
Median	3.30	2.01	0.59
03 – Fishing			
Arithmetic Mean	5.18	4.25	2.41
Median	3.80	2.36	1.19
10 – Production of food			
Arithmetic Mean	2.19	1.63	0.60
Median	1.64	1.16	0.25
49 – Land transportation and pipelines			
Arithmetic Mean	1.92	1.77	0.51
Median	1.54	1.44	0.27
47 – Retail (cars excluded)			
Arithmetic Mean	2.28	1.30	0.66
Median	1.76	0.99	0.37

Source: (Dudycz & Skoczylas, 2021).

The hypotheses address these issues as follows:

H1: Mean value of CR differs from the median;

H2: Mean value of CR differs from benchmarks most commonly provided in the literature;

H3: Median of CR differs from benchmarks most commonly provided in the literature;

H4: Mean values and medians of CR vary yearly;

H5: Mean values and medians of CR differ between industries;

H6: Mean values and medians of CR differ between Poland and the U.S.

RESEARCH METHODOLOGY

The size of the business and its legal form result in different institutional conditions. For instance, a sole proprietorship does not have a separate legal existence from its owner, so it does not pay income tax. Instead, the owner of the business pays personal income tax. However, unlike a sole proprietorship, a corporation is legally separate and distinct from the owner(s). A separate legal entity means a corporation is responsible for its acts and debts, including corporate income tax.

Moreover, following Polish Accounting Act, an external audit of sole proprietorships' financial statements is usually not mandatory, while financial statements of joint-stock companies must be audited. The list of differences may be expanded. Hence, firms act in different institutional conditions and are exposed to various risks influencing the ratios. Wanting to limit the variety of factors influencing liquidity ratios, in my analysis, I concentrate on companies listed on the Warsaw Stock Exchange (WSE).

I concentrate on the period 2005-2021. The reason for including 2005 as a first sample period is twofold. First, International Financial Reporting Standards have been mandatory in consolidated financial reporting since the beginning of this year. Hence, despite rare substantial changes in the IFRS[1], all financial statements in the sample are prepared according to the same methodological basis (71% of the sample) or at least under indirect influence of this basis (29% of the sample). Second, data availability in the database was highly limited in the pre-2005 period. The reason for including the year 2021 as the last in the sample period is also twofold. An extended period is necessary to test hypothesis H4. Moreover, 2021 is the first fiscal year after the Covid-19 pandemic season. I conjecture that the pandemic, a unique risk factor, heavily influenced liquidity ratios.

[1] For example, IFRS 16 *Leases* superseded IAS 17 *Leases*. The influence of IFRS 16 on assets, liabilities, leverage on assets and leverage on equity is confirmed in the literature (Górowski *et al.*, 2022).

I retrieve data from Worldscope Database via Refinitiv Eikon, including SIC codes. The sample consists of only domestic, going concern, non-financial firms. In line with many other studies, I exclude firms rendering financial services because they face different regulations and are monitored additionally by specialized national supervisory authorities. I exclude firms with incomplete data and firms with negative owner's equity. Standard Industrial Classification (SIC) codes are four-digit numerical codes assigned to business establishments to identify the primary business of the establishment (SIC, 2022)[2]. The so-called primary SIC code indicates a company's primary line of business. What determines a company's SIC code is the code definition that generates the highest revenue for that company at a specific location in the past year. The use of SIC codes is determined by data availability and the need for international comparison of the results.

Regarding SIC classification, firms assigned to Division H: *Finance, Insurance, and Real Estate* are excluded from the analysis. Division J: *Public Administration* was not represented at all.

My final sample consists of 5 148 firm-year observations. The population of firms listed on the WSE from 2005 to 2021 varies yearly due to newly listed firms, delisted firms, and rare bankruptcies. Therefore, the sample's number of observations per year varies. Table 3 shows the number of observations per year and the division of SIC classification.

Definition of the Current Ratio (CR) and related fields in the Worldscope Database are the following:

$$CR = \frac{TCA}{TCL} \tag{1}$$

where:

TCA - Total Current Assets, Worldscope field 2201;

TCL - Total Current Liabilities, Worldscope field 3101.

I do not use other liquidity ratios in my analysis; however, I include their definitions for clarity:

1. Quick Ratio QR

$$QR = \frac{TCA - TI - PE}{TCL} \tag{2}$$

where:

TI - Total Inventories, Worldscope field 2101;

PE - Prepaid Expenses, Worldscope field 2140.

2. Cash Ratio CHR

$$CHR = \frac{CH + STI}{TCL} \tag{3}$$

where:

$CH + STI$ - cash and short-term investments, Worldscope field 2001.

Methods used in the analysis include descriptive statistics, parametric and nonparametric ANOVA, confidence intervals, and linear and parabolic trend analysis.

RESULTS AND DISCUSSION

Table 4 shows descriptive statistics of the Current Ratio (CR) per year for the total sample. Figure 1 shows the histogram for CR for the sample. The distribution of CR is highly asymmetric[3], with an arithmetic mean of 2.8 and a median of 1.5. In the sample, the skewness of 17.0 says that the distribution is heavily skewed to the right. Figure 1 shows that the distribution has a very long right tail. Kurtosis is a measure of the heaviness of the tails of a distribution[4]. In the sample, Kurtosis of 408.1 signals extremely tailed distribution. Even the lowest annual values of skewness (4.1) and kurtosis

[2] The SIC system arrays the economy into 10 divisions, that are divided into 83 2-digit major industry groups, that are further subdivided into 416 3-digit industry groups, and finally disaggregated into 1,005 4-digit industries. For instance, Division D: 20-39 Manufacturing; Major Industry Group 25 Furniture and Fixtures; Industry Group 252 Office Furniture; Industry 2521 Wood Office Furniture.

[3] A symmetric distribution has a skewness of 0.

[4] A normal distribution has a kurtosis of 3.

(25.0) in 2006 indicate high asymmetry. The maximum value in the sample is 247.0. Mode, not tabulated in Table 4, is located in bar 1.2-1.4.

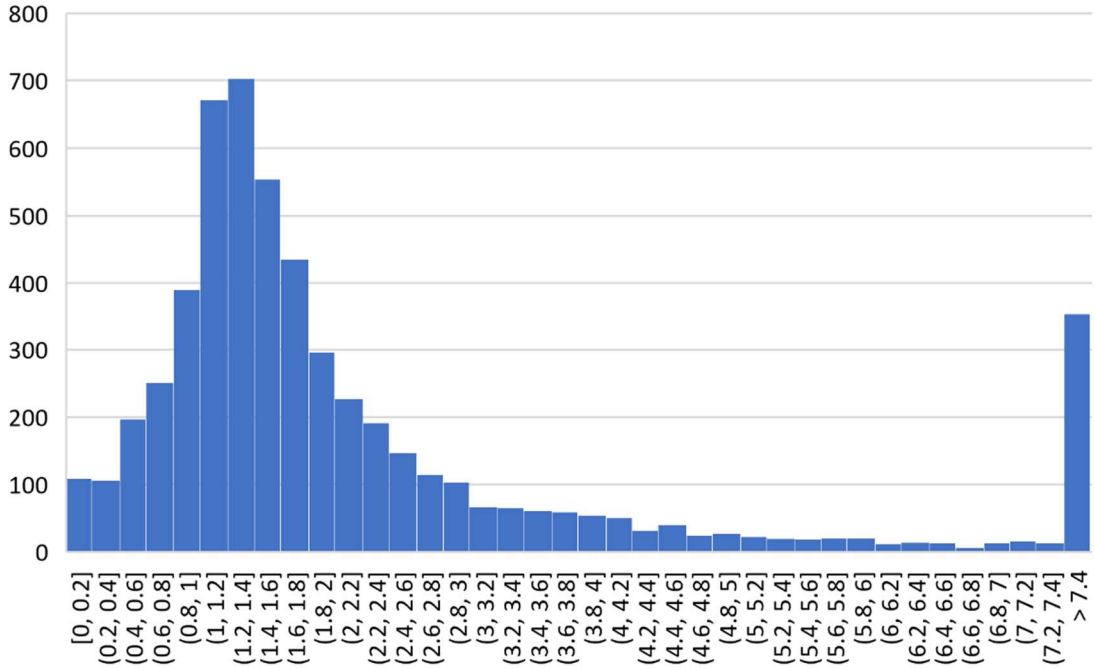

Figure 1. Histogram for Current Ratio (CR) for the total sample
Source: own elaboration based on current ratio calculation.

There are many firm-years with a value of CR above 7.4. The threshold of 7.4 (Figure 1) is chosen because the 95th percentile equals 7.444444. Hence, for about 5% of the sample observations, the CR is above 7.4. There are many possible reasons for such a situation; however, disentangling the puzzle is out of my interest in this article. On the other hand, a considerable number of managers of listed companies run their operations with CR far from the benchmarks suggested in the literature. An analyst may expect that managers are rational decision-makers. Hence, the apparently excessive current ratio may result from sound decisions.

The interpretation of the interquartile range (Table 4) is especially interesting. The range for the sample says that 50% of firm-years have a value of CR ranging from 1.1 to 2.3, with a median of 1.5. Knowing that firms included in the sample are going concern units, we may interpret this range as empirical verification of the benchmarks presented in Table 1. Both the first (25%) and the third (75%) quartiles are reasonably close to the theoretical value of the benchmark. Moreover, the first quartile seems to be respectively stable over time, but the third quartile increases slowly in 2005-2019 and grows substantially in 2020 and 2021. Therefore, I fit trend lines to the first and the second quartile values to verify my temporary conclusions. Figure 2 shows the yearly median, first and third quartiles of CR, and regression results.

The intercept for the first quartile linear model (Figure 2) says that its estimated value in 2004 was 1.19 and is decreasing yearly by 0.009 on average. On the other hand, the intercept for the third quartile linear model says its estimated value in 2004 was 2.06 and is increasing annually respectively quickly, by 0.029 on average. In other words, on average, the quartile range is becoming wider and wider year by year. Not surprisingly, the value of 1 is fairly stable over time because it is a reasonable minimum ratio of current assets to current liabilities. Both R^2 coefficients are high, so linear models fit the data. I conjecture that the increase in CR is due to the increased risk of business activity, especially its abrupt jump in the Covid-19 pandemic season. The median is stable over time, with an average sample value of 1.5 (Table 4), because it is, per se, robust to new observations. The linear trend model does not fit yearly median data; R^2 for this model equals 0.03 (not tabulated). In the case of CR, the

median heaves gently up and down around 1.5 value. There is an increase in the 2020-2021 (Covid-19 pandemic) and 2007-2010 (sup-prime crisis).

Table 3. Number of observations per year and the division of SIC classification

Year / Division	A: Agriculture, Forestry, and Fishing	B: Mining	C: Construction	D: Manufacturing	E: Transportation, Communications, Electric, Gas, and Sanitary Services	F: Wholesale Trade	G: Retail Trade	H: Finance, Insurance, and Real Estate	I: Services	J: Public Administration	Total
2005	2	2	18	64	10	16	8	–	25	–	145
2006	1	1	18	73	12	15	10	–	28	–	158
2007	3	3	22	83	14	17	10	–	34	–	186
2008	3	4	25	91	20	19	11	–	42	–	215
2009	3	5	27	98	23	21	10	–	50	–	237
2010	3	5	30	105	26	23	12	–	56	–	260
2011	3	5	34	111	30	24	12	–	66	–	285
2012	4	5	38	116	29	23	12	–	73	–	300
2013	4	5	38	116	29	25	17	–	72	–	306
2014	5	5	43	123	31	24	16	–	83	–	330
2015	5	5	45	130	33	24	19	–	96	–	357
2016	5	5	46	136	33	26	20	–	104	–	375
2017	3	5	44	130	33	26	21	–	110	–	372
2018	4	5	50	139	35	26	21	–	123	–	403
2019	4	5	48	146	33	25	24	–	133	–	418
2020	4	5	50	140	33	27	25	–	130	–	414
2021	2	4	47	128	28	22	24	–	132	–	387
Total sample	58	74	623	1929	452	383	272	–	1357	–	5148

Source: own calculations in Stata.

The yearly mean CR is much higher than the median due to the sensitivity of the former to outliers. The mean calculated after the rejection of observations greater than the 95th percentile equals 1.8 and is much lower than the mean for the entire sample, equal to 2.8. On the other hand, it is significantly higher than the median of 1.5. To sum up, hypothesis H1 should not be rejected. When looking for a benchmark, an analyst must decide whether to use the mean or median. Furthermore, the benchmarks suggested in the literature (Table 1) likely involve medians.

To strengthen the tests of hypotheses H2 and H3, I calculate confidence intervals for mean and median with a confidence level of 0.95; 0.99; and 0.999. The last confidence level is beyond the traditional testing approach. Still, I want to construct a confidence interval with a 0.999 confidence level to be confident that 99.9 out of 100 times, virtually *always*, the estimate falls between the upper and lower bounds. Table 5 shows the results.

Table 5 shows that the higher the confidence level, the wider the confidence level. However, rejection of the 95th percentile results in very narrow intervals close to mean and median, respectively. In other words, these intervals may be useless for an analyst because they do not convey any new information. On the other hand, confidence intervals for the total sample lead to the following conclusions. First, intervals for mean and median differ significantly, so hypothesis H1 definitely should not be rejected. Second, literature benchmarks indeed rely on medians. Third, the most common benchmark for CR, 1.2-2.0, is very close to the interval for the confidence level of 99.9% ranging from 1.07 to 1.93. In summary, hypothesis H2 should not be rejected. On the contrary, H3 may be rejected for the total sample. Essentially, the sample median sticks to the benchmark.

Table 4. Descriptive statistics of Current Ratio (CR) per year

Year / Parameter	No. of Obs	Mean	Std. Dev.	Min	25%	Median	75%	Max	Skewness	Kurtosis
2005	145	1.9	1.9	0.2	1.2	1.4	2.0	20.0	6.4	55.2
2006	158	2.0	1.9	0.4	1.2	1.5	2.2	16.0	4.1	25.0
2007	186	2.2	2.2	0.3	1.2	1.6	2.2	21.3	4.8	34.2
2008	215	2.3	3.1	0.2	1.1	1.5	2.3	29.2	5.7	41.6
2009	237	2.5	6.2	0.1	1.1	1.6	2.2	91.7	12.8	183.3
2010	260	2.6	6.4	0.0	1.2	1.6	2.3	74.3	9.9	107.4
2011	285	2.5	5.9	0.0	1.1	1.5	2.3	94.4	13.7	211.3
2012	300	2.4	3.7	0.1	1.1	1.5	2.2	42.9	6.7	61.4
2013	306	2.5	5.7	0.0	1.1	1.5	2.2	92.5	13.1	202.5
2014	330	3.4	16.4	0.0	1.1	1.5	2.4	247.0	13.0	178.2
2015	357	2.8	4.6	0.0	1.1	1.5	2.2	40.0	4.6	27.1
2016	375	2.8	5.7	0.0	1.1	1.5	2.4	82.8	8.7	107.5
2017	372	2.8	5.5	0.0	1.1	1.5	2.4	66.8	7.4	71.0
2018	403	2.7	5.7	0.1	1.0	1.4	2.4	80.2	10.1	125.3
2019	418	2.7	5.6	0.0	1.0	1.4	2.4	66.2	7.7	74.4
2020	414	3.4	9.9	0.0	1.0	1.5	2.6	143.0	10.1	125.2
2021	387	3.6	11.7	0.0	1.1	1.6	2.7	193.6	12.5	189.2
Total sample	5148	2.8	7.5	0.0	1.1	1.5	2.3	247.0	17.0	408.1

Source: own calculations in Stata.

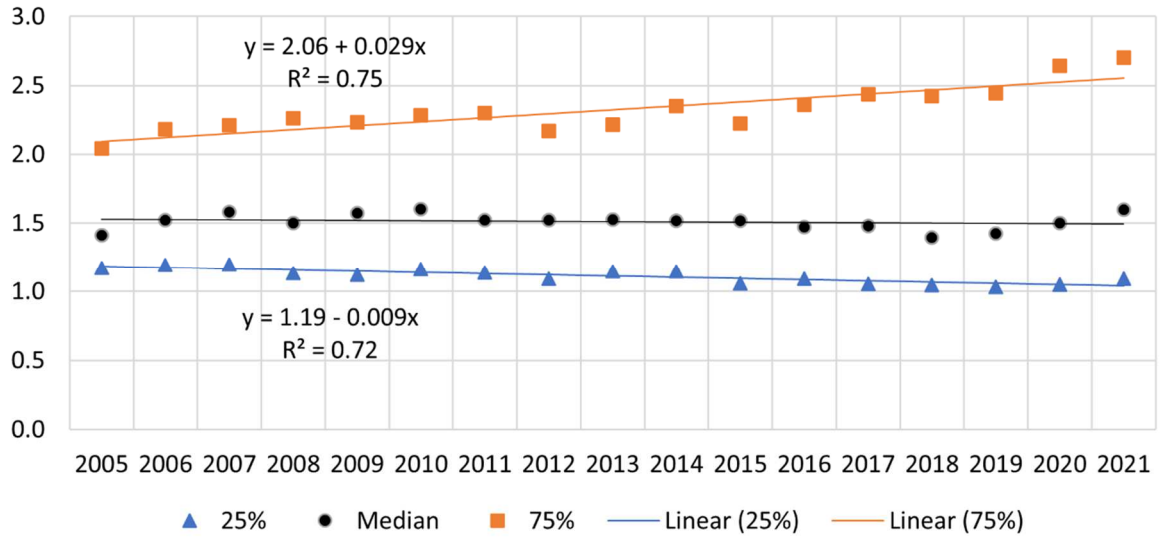

Figure 2. Median, first (25%), and third (75%) quartile of CR per year

Source: own elaboration based on current ratio calculation.

Table 5. Confidence intervals (CI) for mean and median for CR

Parameter / Conf. interval	*Total sample – 5148 observations*						*95th percentile rejected – 4890 observations*					
	Mean			Median			Mean			Median		
CI level of	***0.95***	***0.99***	***0.999***	***0.95***	***0.99***	***0.999***	***0.95***	***0.99***	***0.999***	***0.95***	***0.99***	***0.999***
CI Left bound	2.56	2.49	2.42	1.25	1.17	1.07	1.78	1.76	1.75	1.41	1.40	1.38
CI Right bound	2.97	3.03	3.11	1.76	1.84	1.93	1.84	1.86	1.87	1.50	1.51	1.53

Source: own calculations in Stata.

I build the above conclusions on a fair calculation; however, I must raise one more issue. The median confidence interval for 2020-2021, the confidence level of 0.999, ranges from 0.0 to 3.1. In that period, both boundaries differ substantially from the benchmarks. The difference is likely the result of

the confidence interval calculation formula, i.e., the increase of standard error due to the decrease in the number of observations. However, it may also stem from the substantial change in the CR in the pandemic period. In my opinion, the last conclusion weakens the power of literature benchmarks.

I run ANOVA to verify whether there were any statistically significant differences between the yearly means and medians of the CR ratio. The p-value is 0.5127, and the null hypothesis (all means are equal) should not be rejected. The exclusion of outliers greater than the 95th percentile does not change the result, p=0.6077. Unfortunately, CR is not normally distributed, and the p-value in Bartlett's test for equal variances is p<0.0001, so the ANOVA assumptions are broken. To verify my results, I run the nonparametric Kruskal-Wallis ANOVA. The hypotheses for the test are:

H0: Population medians are equal.

H1: Population medians are not equal.

In that case, the p-value equals 0.7825. Statistic tests show that CR medians do not vary yearly, so hypothesis H4 should be rejected.

The above results of the ANOVA tests must be interpreted with caution because there is a considerable difference between statistical significance and substantive significance. Table 4 and Figure 2 show that CR varies over time. Moreover, the third quartile slowly increases yearly.

Table 6 shows descriptive statistics of the CR per division of SIC. Means and medians differ significantly. For each division, the distribution is skewed to the right (Skewness 1.8 or more), and tails are heavy (kurtosis 6.2 or more). Means are much higher than medians due to their sensitivity to outliers; hence hypothesis H1 is supported.

Two divisions, D (Manufacturing) and I (Services), contribute almost 64% of the observations. On the contrary, divisions A (Agriculture, Forestry, and Fishing) and B (Mining) are narrowly represented. The over-representation of divisions D and I biases the descriptive statistics for the sample towards parameters for these divisions. In other words, an investigation by division is necessary.

Table 6. Descriptive statistics of Current Ratio (CR) per SIC division

Division / Parameter	A	B	C	D	E	F	G	I
No. of Obs	58	74	623	1 929	452	383	272	1 357
Mean	2.3	1.4	2.3	2.4	2.0	1.9	1.6	4.3
Std. Dev.	1.6	0.9	3.3	6.7	4.5	1.7	2.6	11.4
Min	0.6	0.3	0.0	0.0	0.0	0.3	0.0	0.0
25%	1.1	1.0	1.2	1.2	1.0	1.1	0.7	1.1
Median	2.0	1.2	1.6	1.5	1.3	1.3	1.1	1.7
75%	2.6	1.7	2.2	2.2	2.0	1.9	1.6	3.6
Max	8.2	5.7	40.0	193.6	82.8	12.4	27.0	247.0
Skewness	1.8	2.3	7.1	18.4	14.4	3.5	7.2	12.0
Kurtosis	6.2	10.4	63.8	424.3	240.4	17.7	64.5	204.8

Source: own calculations in Stata.

I rerun ANOVA to verify whether there were any statistically significant differences between the means of the CR by SIC division. For p<0.0001, the null hypothesis is rejected. To verify my results, I rerun the nonparametric Kruskal-Wallis ANOVA; the p=0.0001. Statistic tests show that CR means and medians vary between divisions (industries), so hypothesis H5 should not be rejected. This result leads to a crucial conclusion: there is no benchmark for the economy. A useful benchmark may be built for industry only, whereas an economy-based benchmark may be useless.

The last conclusion is the premise for an in-depth analysis of the CR for a division. Table 7 shows the structure of division D (industry groups) and descriptive statistics for CR. Means and medians per major industry group differ, but there are two exceptions, industry groups 26 and 32 - the positive and close to zero skewness signals symmetry of the distribution. Kurtosis less than three is a signal of light right tail. Hence, CR varies substantially between groups, p=0.0001 for ANOVA and Kruskal-Wallis ANOVA. The results support hypotheses H1 and H5.

The first and third quartiles differ between 2-digit major industry groups (Table 7). Moreover, they are close to the typical benchmark for CR, 1.2-2.0, only for four major groups[5] (24; 34; 35; 37), out of nineteen. On the other hand, the highest interquartile range has boundaries of 1.5 to 4.3 for group 38[6]. In general, sample-based means and medians differ from the literature benchmark, and hypotheses H2 and H3 should not be rejected.

Tests for hypothesis H4 (yearly variability) require enough annual data, while the number of observations per group decreases for detailed analyses. Accordingly, I verify H4 only for the major groups 20; 28; and 34; contributing over 200 observations each in the sample period. For these groups in parametric and nonparametric ANOVA, the p-value is 0.5 or higher. Undoubtedly, H4 should not be rejected. However, even statistically not significant differences may be material for an analyst.

Table 7. Descriptive statistics of Current Ratio (CR) per SIC 2-digit major industry group in division D: Manufacturing

Industry group / Parameter	No. of Obs	Mean	Std. Dev.	Min	25%	Median	75%	Max	Skewness	Kurtosis
20	201	1.6	1.2	0.3	1.0	1.3	1.7	7.7	2.7	11.8
22	65	2.4	1.2	0.7	1.5	2.1	2.6	6.2	1.5	4.8
23	60	3.1	4.0	0.5	1.2	1.5	2.2	17.8	2.4	7.5
24	62	1.7	0.5	1.1	1.3	1.5	1.9	3.5	1.6	5.3
25	39	1.4	1.0	0.0	0.7	1.4	1.8	3.4	0.5	2.6
26	64	1.2	0.4	0.4	0.9	1.2	1.4	2.1	0.0	2.8
27	75	6.0	24.9	0.2	1.0	1.5	2.4	193.6	6.6	47.1
28	278	3.5	10.7	0.1	1.0	1.4	2.2	94.4	7.4	59.0
29	62	2.0	0.9	0.8	1.4	1.7	2.3	5.0	1.8	5.4
30	58	1.5	0.5	0.9	1.2	1.4	1.6	3.7	2.5	11.5
31	23	2.7	1.2	1.1	1.8	2.3	3.3	5.7	1.0	2.9
32	32	1.5	0.6	0.4	1.1	1.4	1.8	2.8	0.2	2.7
33	100	1.5	0.5	0.3	1.2	1.5	1.8	3.4	0.4	3.9
34	254	2.0	1.5	0.2	1.2	1.6	2.1	12.3	2.4	3.6
35	200	1.8	1.4	0.0	1.1	1.5	2.1	13.0	3.7	27.3
36	146	2.5	2.5	0.8	1.3	1.6	3.1	28.1	7.2	71.4
37	73	1.7	0.7	0.7	1.3	1.5	2.0	4.2	1.5	5.1
38	127	4.0	5.0	0.8	1.5	2.3	4.3	42.9	4.6	31.9
39	24	3.2	3.4	0.0	1.5	2.0	3.2	13.1	1.8	5.3

Source: own calculations in Stata.

Table 8. Mean and Median of Current Ratio, Poland v.s. the U.S.

Year / Parameter	2016	2017	2018	2019	2020	2021
Mean, Poland	2.82	2.81	2.67	2.72	3.45	3.64
Mean, the U.S.	26.89	21.79	66.06	30.14	95.14	54.29
Median, Poland	1.49	1.49	1.41	1.42	1.51	1.59
Median, the U.S.	1.53	1.56	1.58	1.69	1.94	2.03

Source: for Poland, own calculations in Stata; for the U.S., (ReadyRatios, 2022).

To test hypothesis H6, I retrieve ready-made ratios[7] from Internet resources (ReadyRatios, 2022). They provide two measures of position for industry financial ratios for the U.S. listed companies: mean and median. Table 8 shows these measures for Poland and the U.S. I compare the period 2016-2021 because of the limited availability of the U.S. data.

[5] 24 Lumber And Wood Products, Except Furniture; 34 Fabricated Metal Products, Except Machinery and Transportation Equipment; 35 Industrial and Commercial Machinery and Computer Equipment; 37 Transportation Equipment.

[6] 38 Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks.

[7] The current ratio is calculated in line with the following formula: Current Assets / Current Liabilities. The amounts are retrieved form the balance sheet (statement of financial position) prepared in line with IFRS or US GAAP, respectively (ReadyRatios, 2022).

Table 8 leads to some critical conclusions. First, the U.S. means are more than ten times higher than their Polish counterparts. Without a detailed distribution analysis, I cannot tell the reason for such a situation. As a rule of thumb, high mean values are useless for an analyst or investor. Furthermore, the high variability of means makes trend analysis impossible. Second, medians also differ, but the difference is moderate. In the respectively short period 2016-2021, medians increase, and they do substantially during the pandemic season, especially in the U.S.

Figure 3 shows the yearly median for both countries and the quadratic trend functions. The general shape of parabolas is the same, so yearly medians in both countries increase faster than proportionally year by year. The R^2 coefficients are very high, so the quadratic trend fits the data well. Not surprisingly, the observed abrupt jump in CR during the Covid-19 pandemic season remains visible. It is especially high in the U.S.; hence the medians of CR differ between the two analyzed countries.

Covid was a global risk factor, impacting the world economy. However, a particular economy's reaction depends on many variables. Undoubtedly a global factor affecting all economies results in a similar answer pattern but of a different magnitude. These findings corroborate my hypothesis H6, and their practical consequence for an analyst is the following. Even using industry benchmarks, they should be sensitive to the country and period chosen for comparison.

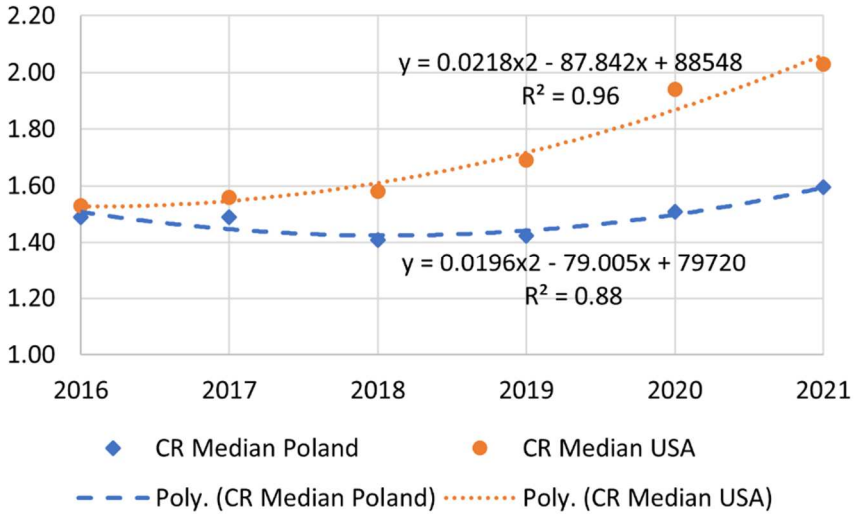

Figure 3. Medians of CR per year, Poland vs. the U.S.
Source: own elaboration based on own CR calculation and (ReadyRatios, 2022).

CONCLUSIONS

The main objective of the article was to test the values of the benchmark for the current ratio, the commonly used liquidity ratio. The minor objective was to arrange a research methodology permitting answers about the benchmark. The tests show that identifying a benchmark for the current ratio is problematic. Concerning this ratio, there is no simple answer to the question – How is a business doing? Benchmarks vary between countries and industries. The benchmark commonly suggested in Poland, 1.2-2.0 (Table 1), may be used only as a very rough evaluation of the desired value. The findings indicate that the acceptable range for CR is much broader, from 1.1 (the first quartile) to 2.3 (the third quartile) for the total sample. Moreover, the SIC division's quartiles vary from 0.7 to 1.2 (the first) and from 1.6 to 3.6 (the third).

Statistical tests indicate that benchmarks do not vary annually; however, a lack of statistically significant difference does not imply a lack of substantive difference. The latter may be material for an analyst, even in the absence of the former.

The total sample median and the third quartile vary slowly over time towards higher values. The Covid-19 pandemic resulted in a substantial increase. On the contrary, the first quartile of about 1

remains relatively stable over time, indicating the reasonable lower bound for CR. In other words, neither the U.S.-based rough benchmark (1.5 to 3) nor its Polish counterpart reflects the current state of the art. Therefore, an analyst must very carefully choose the benchmark for comparison.

The arithmetic mean of the distribution is very sensitive to outliers; hence, it is useless as an estimator of the benchmark. In the case of point estimation, an analyst may rely only on the quartiles, especially the median. Interval estimation seems to be a helpful technique; however, for median only. Outlier bias confidence interval for the mean. Trend analysis permits the identification of the pattern and magnitude of the change in the benchmark. Arguably, linear trend fits empirical data in the long run. However, in the short run, especially after a pandemic, the parabolic trend works better, indicating a substantial increase in the benchmark.

Some limitations of the study provide an opportunity for future research. First, despite international elements, I provide a single-country analysis. Hence, further research should investigate, by industry, the difference between country benchmarks in detail. Second, the benchmarks for the quick ratio and the cash ratio should be analyzed. Third, the question of techniques useful in benchmark identification remains open, despite the usefulness of the methods used.

REFERENCES

Almeida, H. (2021). Liquidity Management During the Covid-19 Pandemic. *Asian-Pacific Journal of Financial Studies*, *50*(1), 7-24. https://doi.org/10.1111/ajfs.12322

Bednarski, L. (1997). *Analiza finansowa w przedsiębiorstwie*. Polskie Wydawnictwo Ekonomiczne.

Bednarski, L. (2007). *Analiza finansowa w przedsiębiorstwie*. Polskie Wydawnictwo Ekonomiczne.

Bień, W. (2018). *Zarządzanie finansami przedsiębiorstwa*. Wydawnictwo Difin S.A.

BusinessInsider. (2022, August 30). *Current ratio: A liquidity measure that assesses a company's ability to sell what it owns to pay off debt*. Business Insider. Retrieved August 30, 2022, from https://www.businessinsider.com/personal-finance/current-ratio?IR=T

Chandra, P. (2008). *Financial management theory and practice*. Tata McGraw Hill Publish Company Limited.

Czekaj, J., & Dresler, Z. (2002). *Zarządzanie finansami przedsiębiorstw. Podstawy teorii* (wyd.3). Wydawnictwo Naukowe PWN.

Dębski, W. (2005). *Teoretyczne i praktyczne aspekty zarządzania finansami przedsiębiorstwa*. Wydawnictwo Naukowe PWN.

Dudycz, T. & Skoczylas, W. (2014). Sytuacja finansowa przedsiębiorstw według działów (branż) w 2012 r. *Rachunkowość*, *3*, 55-80. Retrieved August 31, 2022 from https://rachunkowosc.com.pl/files/Rachunkowosc-sektorowe-wskazniki-finansowe-2012.pdf

Dudycz, T. & Skoczylas, W. (2021). Wskaźniki finansowe przedsiębiorstw według działów (sektorów) za 2019 r. *Rachunkowość*, *4*, 73-100. Retrieved on August 31, 2022 from https://rachunkowosc.com.pl/files/Rachunkowosc-sektorowe-wskazniki-finansowe-2019.pdf

Eljelly, A.M.A. (2004), Liquidity-profitability tradeoff: An empirical investigation in an emerging market. *International Journal of Commerce and Management*, *14*(2), 48-61. https://doi.org/10.1108/10569210480000179

Fleming, M.M.K. (1986). The current ratio revisited. *Business Horizons*, *29*(3), 74-77. https://doi.org/10.1016/0007-6813(86)90011-X

Gołaszewski, P., Urbanek, P., & Walińska, E. (2001). *Analiza sprawozdań finansowych*. Fundacja Rozwoju Rachunkowości.

Gołaś, Z., & Witczyk, A. (2010). Pojęcie i metody oceny płynności finansowej przedsiębiorstwa. *Journal of Agribusiness and Rural Development*, *1*(15), 81-95.

Gołębiowski, G. (Ed.), Grucyk, A., Tłaczała, A., & Wiśniewski, P. (2020). *Analiza finansowa przedsiębiorstwa* (wyd. 3). Wydawnictwo Difin S.A.

Górowski, I., Kurek, B., & Szarucki, M. (2022). The Impact of a New Accounting Standard on Assets, Liabilities and Leverage of Companies: Evidence from Energy Industry. *Energies*, *15*(4). http://dx.doi.org/10.3390/en15041293

Investopedia. (2022, September 6). *Current Ratio Explained With Formula and Examples*. Investopedia. Retrieved September 6, 2022, from https://www.investopedia.com/terms/c/currentratio.asp

Jachna, T., & Sierpińska, M. (2004). *Ocena przedsiębiorstwa według standardów światowych*. Wydawnictwo Naukowe PWN.

Kanagaretnam, K., Lim, C.Y., & Lobo, G.J. (2011). Effects of national culture on earnings quality of banks. *Journal of International Business Studies*, *42*, 853-874. https://doi.org/10.1057/jibs.2011.26

Keene, M.A., Peterson, D.R. (2007). The importance of liquidity as a factor in asset pricing. *The Journal of Financial Research, 30*(1), 91-109. https://doi.org/10.1111/j.1475-6803.2007.00204.x

Kochalski, C., & Łuczak-Trąpczyńska, M. (2017). Determinants of controlling in foreign subsidiaries of MNEs: On the explanatory potential of the institutional perspective. *Entrepreneurial Business and Economics Review*, *5*(3), 79-94. http://doi.org/10.15678/EBER.2017.050304

Kowalak, R. (2022). *Analiza finansowa. Przewidywanie bankructwa i analiza trudności finansowych. Teoria, przykłady, zadania*. Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.

Kreczmańska-Gigol, K. (Ed.) (2020). *Analiza płynności finansowej przedsiębiorstwa. Płynność strukturalna. Płynność potencjalna. Zdolność płatnicza*. Wydawnictwo Difin S.A.

Maślanka, T. (2019). *Płynność finansowa determinantą zdolności kontynuacji działalności przedsiębiorstwa*. CeDeWu Sp. Z o.o.

Michalski, G. (2005). *Płynność finansowa w małych i średnich przedsiębiorstwach*. Wydawnictwo Naukowe PWN.

Nowak, E. (2008). *Analiza sprawozdań finansowych*. Polskie Wydawnictwo Ekonomiczne.

Nowak, M. (2002). *Ocena zdolności kredytowej i ryzyka kredytowego. Poradnik bankowca*. Wydawnictwo Bankowego Ośrodka Doradztwa i Edukacji.

Olzacka, B., & Pałczyńska-Gościniak, R. (2004). *Jak oceniać firmę. Metodyka badania, przykłady liczbowe*. Ośrodek Doradztwa i Doskonalenia Kadr Sp. z o.o.

Ostaszewski, J. (Ed.) (2013). *Finanse*. Wydawnictwo Difin S.A.

Pandey, I.M. (2010). *Financial management*. Vikas Publishing House.

Pera, J. (2017). An enterprise's financial stability and its sustainable growth. A risk-based perspective. *Przedsiębiorczość Międzynarodowa*, *3*(2), 49-62.

Pomykalska, B., & Pomykalski, P. (2007). *Analiza finansowa przedsiębiorstwa*. Wydawnictwo Naukowe PWN.

Rachunkowość. (2022a, August 31). *Sektorowe wskaźniki finansowe*. Rachunkowość – Pismo Stowarzyszenia Księgowych w Polsce. Retreived August 31, from https://rachunkowosc.com.pl/sektorowe-wskazniki-finansowe

ReadyRatios. (2022, September 2). *Average industry financial ratios for the U.S. listed companies*. Retrieved September 2, 2022, from https://www.readyratios.com/sec/industry/

Rogowski, W., & Lipski, M. (2014). Płynność finansowa – wybrane zagadnienia. In J. Grzywacz (Ed.), *Płynność finansowa przedsiębiorstw w Polsce. Uwarunkowania, zarządzanie płynnością, ryzyko*. Oficyna Wydawnicza – Szkoła Główna Handlowa.

Ruozi, R., & Ferrari, P. (2013). Liquidity Risk Management in Banks: Economic and Regulatory Issues. In: Liquidity Risk Management in Banks. SpringerBriefs in Finance. Springer. https://doi.org/10.1007/978-3-642-29581-2_1

SIC. (2022, August 25). *Standard Industrial Classification (SIC) Manual*. United States Department of Labor. Occupational Safety and Health Administration. Retrieved August 25, 2022, from https://www.osha.gov/data/sic-manual

Sierpińska, M., & Jachna, T. (2004). *Ocena przedsiębiorstwa według standardów światowych*. Wydawnictwo Naukowe PWN.

Świderska, G.K. (2003). *Sprawozdanie finansowe bez tajemnic*. Wydawnictwo Difin S.A.

Waśniewski, T., & Skoczylas, W. (2002). *Teoria i praktyka analizy finansowej w przedsiębiorstwie*. Fundacja Rozwoju Rachunkowości w Polsce.

Wędzki, D. (2002). *Strategie płynności finansowej przedsiębiorstwa. Przepływy pieniężne a wartość dla właścicieli*. Oficyna Ekonomiczna Grupa Wolters Kluwer.

Author

Piotr Wójtowicz

Prof. Piotr Wójtowicz, PhD, Associate Professor at the Cracow University of Economics (Poland). His research interests include financial reporting, earnings management, and the impact of cultural factors on earnings quality.
Correspondence to: Prof. Piotr Wójtowicz, Cracow University of Economics, Department of Accounting, 31-510 Cracow, 27 Rakowicka Street, Poland, e-mail: piotr.wojtowicz@uek.krakow.pl
ORCID http://orcid.org/0000-0001-5054-9964

Acknowledgements and Financial Disclosure

The publication was financed from the subsidy granted to the Cracow University of Economics – Project nr 065/ZZR/2022/POT.

The author would like to thank the anonymous referees for their valuable comments, which increased the value of this article.

Conflict of Interest

The author declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Published by Cracow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0251/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.