

## THE IMPACT OF ASSET STRUCTURE ON A COMPANY'S FINANCIAL RESULTS STABILITY

Artur Zimny\*



<https://doi.org/10.18778/2391-6478.4.36.07>

### Abstract

**The purpose of the article** is to examine the impact of asset structure on the stability of financial results of companies. The article verifies two hypotheses: 1. high share of non-current assets in total assets results in high volatility of profitability over time. 2. high share of PPE (Property, Plant & Equipment) in total assets results in high volatility of profitability over time.

**The methodology** of the study includes a literature review and empirical research based on correlation analysis. The research covered the aggregated data of Polish non-financial enterprises employing 10 persons or more keeping accounting ledgers, data for years 2009–2020 (first dataset) and annual financial data of 115 companies from 13 WSE industry sub-sectors for years 2009–2021 (second dataset).

**The results of the research.** The analysis of the asset structure and the volatility of profitability in the research sample indicated industries with large and small values of these parameters. Then, the hypotheses were tested; the results for the second dataset showed that there is a positive and weak, but statistically significant ( $p$  value  $\leq 0.005$ ) correlation between non-current asset structure ratio and both, ROS and ROS adjusted ratios, and there is a weak, but negative correlation between PPE structure ratio and ROS and ROS adjusted ratios (with  $p$  value of 0.021 and 0.076, respectively). On this basis, hypothesis 1 was considered as verified positively, and hypothesis 2 was rejected. The discussion contains suppositions concerning the probable reasons of the discrepancy between the result for the hypotheses 1 and 2.

**Keywords:** asset structure, asset tangibility, financial results stability, volatility of profitability, operating leverage.

**JEL Class:** D25, G31.

\* Ph.D. Faculty of Economics and Sociology, University of Lodz, e-mail: [artur.zimny@uni.lodz.pl](mailto:artur.zimny@uni.lodz.pl) <https://orcid.org/0000-0002-6658-952X>

## INTRODUCTION

The stability of financial results is one of the main characteristics of the enterprise. It is important for managers because of the relationship with the operational risk of ongoing operations (e.g. from the point of view of maintaining an appropriate level of liquidity). For the owners of the enterprise, the stability of its financial results determines the possibilities of its development and growth. For potential investors considering investing in a company, this is one of the investment risk measures. Therefore, the academic research should examine the factors influencing the stability of financial results. The subject of research in this study is the potential relationship between the structure of company's assets and the stability of its financial results.

### 1. LITERATURE REVIEW

The primary inspiration to study the impact of the asset structure on the stability of financial results of companies was the observation of the impact of the Covid-19 pandemic on the financial results of Polish enterprises. New data and publications that appeared over time indicated that the pandemic situation affects various industries with varying intensity. Stojczew (2021) notes that tourism is one of the first industries that suffered from the pandemic, which was similar to the crisis in 2009. Zając et al. (2021) points out that microentrepreneurs and farmers, due to the scale of their activities, are particularly vulnerable to the negative consequences of the pandemic. According to the ongoing analyzes of the financial data of Polish enterprises (Zimny, 2020a), the transport sector suffered the most in Q2 2020, while the trade and manufacturing were less impacted, and the construction and energy sectors showed just a slight decrease in sales and even improved profitability. The study of impact of the pandemic on various business branches in the Wielkopolskie voivodeship (*Wpływ pandemii...*, 2021) showed the deterioration of the situation of many of them (passenger transport, accommodation, food services, tourism, education, culture and entertainment, sports and recreation, beauty industry) and improvement of the situation in postal and courier activities. Focusing only on service companies, Dominiak (2022) also points out the difference between industries that have suffered more (hotels and catering), and those that have proven resilient (business-related services) or even benefited from the pandemic (ICT sector). The fact that the pandemic turned out to be favorable for some industries (like internet sales or pharmaceutical companies) is also mentioned by Zimny (2020b; 2022). Jabłońska et al. (2021), examining public aid applied to the national economy during the pandemic, noted specific support for activities that were significantly affected by its effects,

i.e. companies from the tourism and hotel sectors, as well as the organization and service of fairs, conferences and exhibitions.

The differentiation of the impact of the pandemic on the activities of various industries is also reported in other countries. Rapaccini et al. (2020) showed, using the example of Italian companies, that service providers suffered less from the pandemic than manufacturing companies, which was similar to the 2009 crisis. Bloom et al. (2021) studied small businesses operating in the US and found that the biggest drops in sales were recorded by companies from the Travel, Art & Photography and Clothes industries, smaller sales decreases was reported by Retail, Food, Education and Digital industries, and the smallest decline characterized the Medicine industry. They also reported that companies operating only offline saw the biggest drops in sales, while the companies operating only online – the smallest ones. Also Kalogiannidis (2020) indicates the travel & tourism industry as suffering most from the pandemic, while others (e.g. sanitizers and other protective equipment suppliers) recorded an increase in profits. Research by Sama-Berrocal and Corchuelo Martínez-Azúa (2022) shows that even within a narrowly defined sector (in this case: the agri-food sector in Extremadura, Spain), the impact of the pandemic on its subsectors was varied. A good example of significant impact of the pandemic on tourism is also the research of such impact on the touristic activity in the Lviv city in Ukraine (Rutynskyi and Kushniruk, 2020).

It is obvious that the pandemic influenced the financial results of enterprises mainly through restrictions reducing the demand for goods and services. However, while the decrease in demand affects the amount of sales revenues, the changes in the financial result also depend on the changes of costs incurred. One can find observations (*Realne jest...*, 2020) indicating the share of fixed costs as an important factor in generating losses for companies whose revenues drop sharply. Thus, the pandemic verified in practice the negative aspect of operating leverage, i.e. the sensitivity of profit to sales decline. The sensitivity of earnings to changes in sales is one of the company's risk measures, therefore, it is worth empirical verification, but such research should cover a wider (multi-year) time frame, not limited only to a specific period of the pandemic. However, such a study would be very difficult, if not impossible, as companies are not obligated to present fixed and variable cost breakdowns as part of their reporting duties, and many companies do not make such breakdowns even for their own purposes. However, it can be presumed that a higher share of fixed costs is characteristic for companies with a high share of fixed assets in total assets. Companies with large fixed assets incur significant costs of depreciation or lease, servicing, inspections and labor costs related to their exploitation, and a significant part of these costs is not dependent on the production volume, i.e. they are fixed costs. The opposite example are trading companies with a high share of current assets in the form of

inventories of goods; the value of goods sold is, in turn, the main cost of these companies, and it is a variable cost. Therefore, it can be presumed that the structure of assets indirectly (through the structure of costs) influences the volatility of financial results over time. This assumption is the basis of the hypothesis studied in this paper.

When compared to other corporate finance categories, like capital structure or company's valuation, the asset structure seems to be a less popular subject of academic research. There are few papers investigating less obvious factors than the type of activity, which may influence the asset structure of the company (see Kalusova and Badura, 2022; Humeniuk et al., 2022). More studies concern the asset structure as an explanatory variable, especially as one of the factors potentially influencing the structure of the company's financing sources. Such Devesa and Parte Esteban (2011) analysed the factors influencing the indebtedness of the companies and found the impact of fixed assets as negative, although they expected a positive one. Balios et al. (2016) also found that the relation between asset structure and leverage of the company is negative. Similarly, the asset structure was found as the factor negatively affecting the capital structure in the paper of Dewi and Fachrurrozie (2021). The opposite results were reported by Kenourgios et al. (2020), who found tangible assets structure ratio negatively impacting the level of leverage. The research by Delikanlı and Kılıç (2021) was concluded that there is no significant relationship between the asset structure (as one of the factors) and financial debt of the examined companies.

There are also some studies concerning the impact of asset structure on the firm's value; Nyamasege (2014) found that firms with a higher fixed asset base have a higher value than those with lower fixed asset values, while Setiadharna and Machali (2017) showed that there is a direct, but negative effect of asset structure on the firm value. In turn, Ooi and Liow (2020) found that among the various factors that may affect the rates of return on shares of the companies, the asset structure has no statistically significant impact. Other studies concern the relation between the asset structure and the performance of the company, which is closest to the scope of this study. Okwo et al. (2012) examined the relationship between the level of investment in fixed assets and its impact on the firms' operating profit. The relationship occurred to be positive, but the result was not statistically significant. In turn, Olonite (2021) found that fixed assets have a positive and significant impact on return on asset (ROA) and current assets have positive and significant impact on earnings per share (EPS). Some of the conclusions from the research of Saleh et al. (2015) indicated that asset structure significantly influences company's growth, company's profitability and company's value.

The literature review presented above suggests that the asset structure (usually understood as the value of fixed assets or their share in total assets) is an important factor influencing other financial categories, such as the structure of financing sources, firm's value, rates of return on company shares or their financial results. However, the research on the relationship between the asset structure and the stability of financial results over time was not found, therefore, this paper constitutes a significant contribution to the theory of corporate finance.

## 2. HYPOTHESIS AND RESEARCH METHODOLOGY

The theoretical premises of this research stem from the operating leverage model and the supposition that company's asset structure impacts its cost structure. The assumed chain of impact is as follows:

- high share of fixed assets in the total assets structure results in a high share of fixed costs in the cost structure;
- high share of fixed costs means a high degree of operating leverage, i.e. high sensitivity of the profit to changes in sales;
- high sensitivity of profit to changes in sales causes high volatility of profitability over time.

Due to the lack of access to data on the cost structure, the indirect relation was examined, i.e. the impact of the assets structure on the volatility of financial results over time.

Assets structure is defined primarily as their division into long-term and short-term assets. Assets intended to be exploited in the long term are usually referred to by one of the terms: fixed assets, non-current assets, tangible assets or PPE (Property, Plants & Equipment). These terms, although quite synonymous and sometimes used interchangeably, have in fact different (broader or narrower) meanings. To avoid misunderstandings, this study is based on the asset structure defined as total assets divided into:

- current assets, and
- non-current assets, which are divided into:
  - PPE (Property, Plants & Equipment) and
  - other non-current assets.

PPE are the most typical, tangible non-current assets, like buildings, land, machines, devices or means of transport, used for the core activity of the company. In turns, non-current assets other than PPE consist of other long-term components important for the company's operations, which include especially: intangible assets (e.g. patents, licenses, trademarks), long-term tangible investments (e.g. buildings intended for rent or for resale), financial non-current assets (e.g. other companies' shares acquired for strategic purposes) or long-term accruals (e.g. due to long-term construction contracts).

Given the above, it was decided for this paper not to use the term ‘fixed assets’ (to avoid ambiguity whether it replaces the concept of ‘non-current assets’ or ‘PPE’).

It was considered whether to use the term ‘asset tangibility’ instead of ‘asset structure’, because such nomenclature can be found in the literature. It should be noted, however, that the term ‘tangibility’ clearly indicates the assets of material form, so it should not be used interchangeably with the category of ‘non-current assets’, which is a broader term, because it also includes long-term assets other than tangible ones (such as the above-mentioned intangible assets or financial assets). On the other hand, the term PPE does not include tangible assets purchased for investing purposes (e.g. buildings intended for rent or for resale), so its meaning is narrower than covered by the term ‘asset tangibility’. Therefore, it was decided not to use the term ‘asset tangibility’ in the study.

Finally, it was decided to use the broadest and the narrowest concept of long-term assets, i.e.: non-current assets and PPE (Property, Plants & Equipment), in the study. Therefore, there are two hypotheses to be verified:

**H.1: High share of non-current assets in total assets results in high volatility of profitability over time.**

**H.2: High share of PPE (Property, Plant & Equipment) in total assets results in high volatility of profitability over time.**

A positive verification of these hypotheses would mean that enterprises with a large share of non-current assets (or PPE) are exposed to greater changes in financial results in response to changes of sales over time, while a smaller share of non-current assets (or PPE) should result in greater stability of profitability. Proving the existence of such a relation would be of practical value, first of all, for company managers: a high share of non-current assets (or PPE) would indicate that the value of current assets may be too low to secure the liquidity, which in such cases is at greater risk because of the high profit sensitivity to changes in sales. The proof of such a relation would also be useful for stock market investors: a high share of non-current assets (or PPE) would mean a higher investment risk resulting from the high sensitivity of the profit to changes in sales.

The empirical verification of the hypothesis was performed by examining the correlation in several variants, using two datasets, as described below.

The dependent (response) variable is the volatility of financial results. The return on sales (ROS) ratio in its classic version, i.e. net profit related to sales, was used as the main proxy of the financial result measurement. However, in the operating leverage model, in principle, only the basic operating costs (such as depreciation, usage of materials and energy, external services, salaries or taxes

and charges) are taken as variable and fixed costs, while the final net profit consists also of: other operating revenues (e.g. profits from the sale of fixed assets), other operating costs (e.g. losses on the sale of fixed assets, revaluation write-offs of assets), financial revenues, financial costs and income tax. Other operating revenues and financial revenues increase the financial result, although they do not come from the company's core activities. Moreover, basic operating costs are recurring and more stable in time than other operating costs or some financial costs (e.g. exchange differences). Therefore, a significant part of the net profit volatility may result from events not included in the operating leverage model. For this reason, apart from the profitability expressed by the classic ROS ratio, the alternative ratio was employed. For the purposes of this study the ratio was called 'ROS adjusted' and it is defined as basic operating profit (sales less basic operating costs only) in relation to sales. There are two other popular profitability ratios: ROA and ROE, which were also (supplementary) included in the study, so the research included four proxies of the financial result measurement.

The research concerns not the profitability itself, but the volatility of profitability; it was measured by the standard deviation of the values of profitability ratios in the analyzed period.

The independent (explanatory) variable is the asset structure, represented in this study by two proxies:

- non-current assets, including PPE and other non-current assets;
- PPE (Property, Plants & Equipment) only.

The structure of the data provided by Statistics Poland (GUS), as well as by the Biznesradar website, takes into account the above-mentioned division of assets (non-current assets are represented by 'aktywa trwałe' category, and PPE – by 'rzeczowe składniki majątku trwałego'), making the research possible.

Both ratios, i.e. the share of non-current assets in total assets and the share of PPE in total assets, are not constant over time, therefore, additionally, standard deviations of these ratios in the examined period were calculated. These deviations demonstrate the stability of the asset structure of individual companies or sectors; it is clear that the potential relationship between the asset structure and the stability of financial results is more reliable when the structure of assets is stable over time.

Taking into account the above, the hypotheses were verified by examining the correlation for the following pairs of indicators:

1. the standard deviation of the ROS ratio and the average share (average structure ratio) of non-current assets in total assets;
2. the standard deviation of the ROS adjusted ratio and the average share (average structure ratio) of non-current assets in total assets;
3. the standard deviation of the ROS ratio and the average share (average structure ratio) of PPE in total assets;

4. the standard deviation of the ROS adjusted ratio and the average share (average structure ratio) of PPE in total assets.

Additionally, the same correlation analysis was conducted (only for the second dataset) for the ROA and ROE ratios, as an alternative to ROS and ROS adjusted measures of profitability.

The verification was performed on two datasets. First of them is the aggregated financial data of Polish non-financial enterprises employing 10 persons or more, and keeping accounting ledgers. This data is published by the Statistics Poland (Główny Urząd Statystyczny). The data is grouped in NACE sections, which are:

- mining and quarrying
- manufacturing
- electricity, gas, steam and air conditioning supply
- water supply; sewerage, waste management and remediation activities
- construction
- trade; repair of motor vehicles
- transportation and storage
- accommodation and catering
- information and communication
- real estate activities
- professional, scientific and technical activities
- administrative and support service activities
- education
- human health and social work activities
- arts, entertainment and recreation
- other service activities.

This dataset covers a significant number of enterprises, but it enables the comparison of the examined characteristics only between individual sections grouping these companies.

The dataset consists of the annual aggregated financial data for the period 2009–2020 (12 years), so it covers the periods of recession (after the crisis of 2008–2009 and caused by the 2020 pandemic), as well as the period of good economic conditions between these crises.

The second dataset includes data of individual companies listed on the Warsaw Stock Exchange (WSE). There are 14 sub-sector stock exchange indices published by the WSE, grouping different numbers of companies (most numerous is WIG-construction, consisting of 38 companies, and the least numerous are WIG-oil&gas, WIG-chemical and WIG-mining, grouping 5 companies each). The financial data of the companies was obtained from the Biznesradar website, which presents such data in a very uniform way, ensuring their high comparability. The dataset was reduced by excluding:



- all companies from WIG-banking index (the scope of the research should cover only non-financial entities);
- companies for which data for sufficiently long periods (2009–2021) were not available;
- companies with the most unstable structure of assets in the analyzed period (standard deviation of the average share of non-current asset or the average share of PPE greater than 17%);
- companies with an extremely high volatility of profitability in the analyzed period (standard deviation of ROS or ROS adjusted above 1000 percentage points).

After the reduction, the dataset includes 115 companies, with each WSE sub-sector index (except from WIG-banking) represented by at least 1 company.

The characteristics of the second dataset are presented in Table 1.

Table 1. Companies of the second dataset

WSE sub-sector (WSE index)	Total number of companies composing the index	Number of companies covered by the study	Companies covered by the study (WSE tickers)
Construction	38	31	ATR, BDX, CNT, CPR, DCR, ELT, ERB, FRO, HRS, INK, LBT, LTX, MCR, MRB, MSP, MSW, MSZ, NVA, PJP, PRM, PXM, RFK, RMK, RPC, SEL, SKA, TRK, TSG, ULM, UNI, ZUE
Chemical	5	3	ATT, CIE, PCE
Energy	11	8	BDZ, CEZ, ENA, KGN, PEP, PGE, TPE, ZEP
Mining	5	3	JSW, KGH, LWB
Games	18	1	CIG
IT	25	17	ABS, ACP, ALL, ASE, ATD, BCM, CMP, CMR, ELZ, IFI, K2H, LSI, NTT, OPM, TLX, U2K, WAS
Pharmaceuticals	8	2	PHR, SPH
Media	12	7	AGO, ATG, IMS, KCI, KPL, MZA, PGM
Automobiles & parts	7	5	ACG, BAH, CAR, DBC, SNK
Real estate	25	9	AAT, DOM, DVL, EDI, GTC, INP, PHN, RNK, WIK
Clothes	15	11	CCC, HRP, IPO, LBW, LPP, MIR, MON, PRT, SNW, VRG, WOJ
Oil&gas	5	3	MOL, PGN, PKN
Food	20	15	AMB, AST, ATP, GOB, HEL, IMC, KSG, MAK, MBW, OTM, OVO, PMP, PPS, SEK, WWL
<b>Total</b>	<b>194</b>	<b>115</b>	–

Source: own work based on www1 and www2.

The second dataset covers the companies' annual financial data for 2009–2021 period (13 years), so like the first set, both good and bad economic times are covered.

The Games sub-sector has the lowest representation in the study (only 1 company out of 18), because most of these companies were introduced to the stock exchange relatively recently, and there has been no data since 2009 available for them. Some of them were also excluded because of the very unstable structure of assets or the extremely high volatility of profitability in the analyzed period. Similarly, there is a relatively low representation of pharmaceutical and real estate companies. However, the study covers almost 60% of all companies grouped in 13 WSE sub-sectors, and the number of companies covered (115) is sufficient for statistical inference.

### 3. RESULTS

Before the correlation analysis, the data was preliminarily analyzed in terms of the asset structure and the volatility of profitability. Such an analysis for the first dataset is presented in Table 2.

Aggregated data allows to identify sections with extreme shares of non-current assets in total assets. The largest shares are in sections: Accommodation and catering, Water, sewerage & waste, Real estate, Electricity, gas, steam & air and Mining and quarrying, while the smallest ones are in sections Construction, Trade & repair, Manufacturing and Education. The ranking by the share of PPE in total assets is quite similar. The variability in time of both structure ratios for all sections is small (compared to the data of individual companies from the second dataset), which is caused by averaging as a result of aggregating data of a significant number of enterprises within each section.

It is also worth mentioning that PPE constitute the largest part of the non-current assets in the following sections: Water, sewerage & waste, Transportation and storage, Arts, entertainment & recreation and Accommodation and catering, while the smallest – in sections: Professional, scientific and technical activities, Information and communication, Administrative and support service activities and Construction.

As for the stability of financial results, Mining and quarrying shows a distinguishingly high volatility of profitability (the highest standard deviation of the ROS and ROS adjusted ratios). A relatively high volatility of at least one of these ratios characterizes also the following sections: Professional, scientific and technical activities; Accommodation and catering; Electricity, gas, steam & air; Education. Sections showing the most stable aggregated profitability are Manufacturing Trade & repair. It should be noted, however, that aggregating data for entire sections causes compensation of losses of some companies with high profits of others, thus reducing the volatility of profitability for the entire section.

Table 2. Characteristics of the asset structure and the profitability of companies from the first dataset; all data as percentage points

NACE section	Average non-current asset structure ratio	Average PPE structure ratio	Standard deviation of ROS	Standard deviation of ROS adjusted
Mining and quarrying	76	50	11	7
Manufacturing	53	39	0	0
Electricity, gas, steam & air	81	51	4	2
Water, sewerage & waste	84	80	1	1
Construction	37	18	2	1
Trade & repair	38	24	0	0
Transportation and storage	73	64	1	1
Accommodation and catering	84	64	4	4
Information and communication	73	26	2	1
Real estate	82	60	2	0
Professional, scient. and techn.	67	14	6	1
Administr. and support service	60	26	1	1
Education	54	32	3	6
Human health and social work	74	53	1	1
Arts, entertain. & recreation	70	58	1	1
Other service	62	41	2	2

Source: own work based on wwv3.

The calculations of the correlation coefficients verifying the hypotheses for the first dataset are shown in Table 3.

Table 3. Correlation coefficients (and their statistical significance) for the first dataset (17 sections grouping aggregated data of Polish non-financial enterprises)

Volatility of profitability:	Asset structure: Average non-current asset structure ratio	Average PPE structure ratio
Standard deviation of ROS	$r = 0.303$ (p value = 0.237)	$r = -0.028$ (p value = 0.915)
Standard deviation of ROS adjusted	$r = 0.128$ (p value = 0.624)	$r = 0.066$ (p value = 0.801)

Source: own work based on Table 2.

The results presented in the Table 3 show that in three variants the correlation coefficient is very low, and p values (greater than 0.6) indicate no statistical significance. In one case (ROS and non-current assets), the value of the coefficient indicates a weak correlation, but it could be considered statistically significant only at a relatively high p value (greater than 0.237), so at the standard level of significance ( $\alpha = 0.05$ ) this coefficient is also statistically not significant. Therefore, the study on the first dataset gives no grounds to consider the hypotheses as verified positively.

It should be emphasized that the research usefulness of the first dataset is limited for two reasons: firstly, it covers the whole sections, so the sample size for the statistical analysis is relatively small (17 sections); secondly, aggregating data in sections causes their averaging, and as a result the asset structures and even more the volatility of profitability for the entire sections are much less varied than for individual enterprises belonging to these sections, which significantly reduces the possibility of statistical identification of the relationship between them. Therefore, the lack of correlation of the studied variables at the level of entire sections does not mean that there is no correlation at the level of individual companies. Thus, this part of the research is only preliminary for the whole study. Nevertheless, it is relevant, because it shows how individual industries differ in terms of the asset structure and profitability volatility, and what signs of correlation coefficients should be expected from the study conducted on the second dataset.

The same research calculations were performed for the second dataset, i.e. the data of 115 individual companies. The calculations regarding assets structure ratios and the profitability ratios of companies from this dataset are presented in Table 4.

The WSE sub-sectors list is partially consistent with the list of NACE sections used as the first dataset, but there are also some differences. Two large NACE sections: Manufacturing and Trade & repair, are represented on WSE by a several more specific subsectors: Automobiles&parts, Oil&gas, Chemical, Pharmaceuticals, Clothes and Food. On the other hand, there are several NACE sections, which do not have equivalents among WSE sub-sectors indices (e.g. Transportation and storage, Accommodation and catering or Education). Therefore, the research conducted on two differently defined datasets complement each other.

The calculation results for the second dataset showed that the average share of non-current assets in total assets is slightly above 50%, but it may be skewed by a more numerous representation of some industries with a relatively low ratio values (like Construction or IT).

Table 4. Asset structures of the companies from the second dataset  
(structure ratios in percentage point, averages for years 2009–2021)

WSE sub-sector (WSE index)	No. of comp.	Average non-current assets structure ratio			Average PPE structure ratio		
		lowest	median	highest	lowest	median	highest
Construction	31	13	42	83	4	18	75
Chemical	3	66	68	71	55	58	58
Energy	8	67	74	84	50	68	77
Mining	3	73	75	82	48	65	78
Games	1	61			2		
IT	17	13	46	73	5	12	56
Pharmaceuticals	2	27	38	48	2	18	35
Media	7	45	57	73	3	10	47
Automobiles&parts	5	24	45	51	14	39	50
Real estate	9	1	47	88	0	1	17
Clothes	11	33	50	73	4	33	53
Oil&gas	3	56	69	75	52	55	68
Food	15	28	53	70	13	44	59
<b>Total</b>	<b>115</b>	1	51	88	0	26	78

Source: own work based on [www1](http://www1).

As shown in Table 4, sub-sectors with a high share of non-current assets include: Mining, Energy, Oil&gas and Chemical, and companies from these industries showed the least diversified values of this structure ratio within their sub-sectors. On the other hand, a particularly low share of non-current assets characterizes the Automobiles&parts and Pharmaceuticals sub-sectors, and the structure ratios of individual companies within these sub-sectors also do not differ significantly. Real estate turned out to be a specific sub-sector, grouping companies with a very diversified non-current assets structure ratio – DOM and EDI companies showed only, respectively, 1% and 3% share of non-current assets, while AAT, GTC and PHN companies have this ratio at 86%-88% level. A similarly high spread of this ratio value was also obtained for the Construction and IT sub-sectors. It means that there are no grounds for generalizing conclusion about the high or low share of non-current assets for these specific sub-sectors, but at the same time, it is a valuable material for the study of correlation, based on individual companies.

As for the share of PPE in total assets, the average ratio was slightly above 25%, which also can be skewed by a more numerous representation of some

industries with a relatively low ratio values (like Construction or IT). Sub-sectors characterized by a high ratio and its low differentiation are the same as in the case of non-current assets ratio, i.e. Mining, Energy, Oil&gas and Chemical, but the ranking is different in the case of the smallest ratio values, because the smallest shares of PPE were obtained for Real Estate sub-sector, followed by Media, IT and Pharmaceuticals. The industry with a particularly high differentiation of this ratio value is Construction.

It is worth mentioning that PPE constitute the majority of non-current assets, but it is not the vast majority – it is (on average) about 60% of non-current assets. The examined companies from the Energy, Chemical, Mining and Oil&gas sub-sectors showed a very high proportion of PPE to non-current assets, but many companies reported PPE as the minority of their non-current assets, especially from sub-sectors: IT, Games and Media (probably because of the high share of intangible non-current assets) and Real estate (probably because of the high share of buildings reported as tangible investments, separately from PPE). It proves that identifying non-current assets with PPE (even as a proxy) is not appropriate and it also justifies a need for separating these two financial categories when formulating the hypotheses for verification.

Table 5. Volatility of profitability of the companies from the second dataset (standard deviations of profitability ratios for years 2009–2021, data as percentage points)

WSE sub-sector (WSE index)	No. of comp.	Standard deviations of ROS ratios			Standard deviations of ROS adjusted ratios		
		lowest	median	highest	lowest	median	highest
Construction	31	1	4	22	1	4	11
Chemical	3	5	7	9	3	5	8
Energy	8	4	8	29	3	10	24
Mining	3	11	19	20	11	14	17
Games	1	41			28		
IT	17	1	4	112	1	4	13
Pharmaceuticals	2	2	15	28	2	15	27
Media	7	3	6	329	4	6	39
Automobiles&parts	5	1	2	6	1	3	4
Real estate	9	3	23	591	4	8	100
Clothes	11	2	5	153	3	4	74
Oil&gas	3	3	4	4	3	3	5
Food	15	1	6	65	1	3	21
<b>Total</b>	<b>115</b>	1	5	591	1	4	100

Source: own work based on ww1.

The standard deviations of the profitability ratios presented in Table 5 may seem relatively small (the median for all 115 companies is 5 percentage points for the ROS ratio and 4 percentage points for the ROS adjusted ratio). However, the profitability ratios also are of relatively low values: on average, it is about 5% for ROS and about 6% for ROS adjusted. Thus, standard deviations constitute even up to 100% of the average base values, which means that they are not small.

The sub-sectors, of which all companies showed relatively low profit volatility, include Automobiles&parts, Oil&gas and Construction. In general, the Real estate sub-sector companies showed high volatility of profitability. The Games sub-sector is also characterized by a high standard deviations of profitability ratios, but only one company from this industry entered the study, so it is difficult to assess to what extent this result is representative for the entire sub-sector.

It is also worth emphasizing that the standard deviation of ROS is generally higher than the standard deviation of ROS adjusted, which suggests that the assumption of high volatility of revenues other than sales and costs other than basic operating costs resulting in high volatility of net profit compared to basic operating net profit, seems to be true.

Charts 1–4 show a graphical illustration of the relationship between the non-current assets structure ratio and PPE structure ratio with standard deviations of ROS and ROS adjusted ratios.

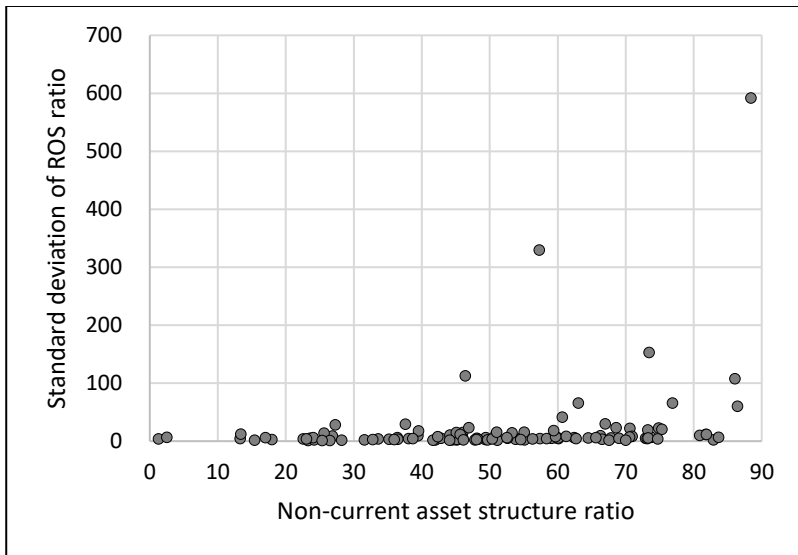


Chart 1. Relation between non-current asset structure ratio and standard deviation of ROS ratio

Source: own work based on [www1](#).

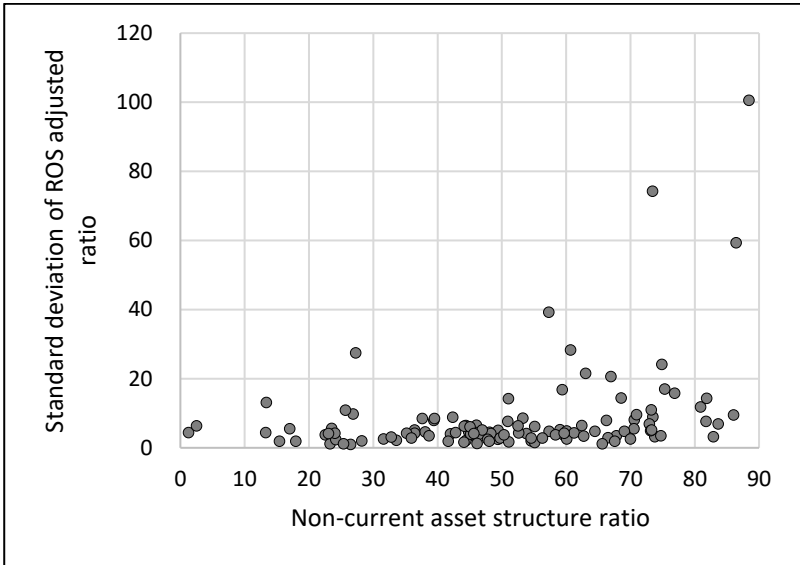


Chart 2. Relation between non-current asset structure ratio and standard deviation of ROS adjusted ratio

Source: own work based on ww1.

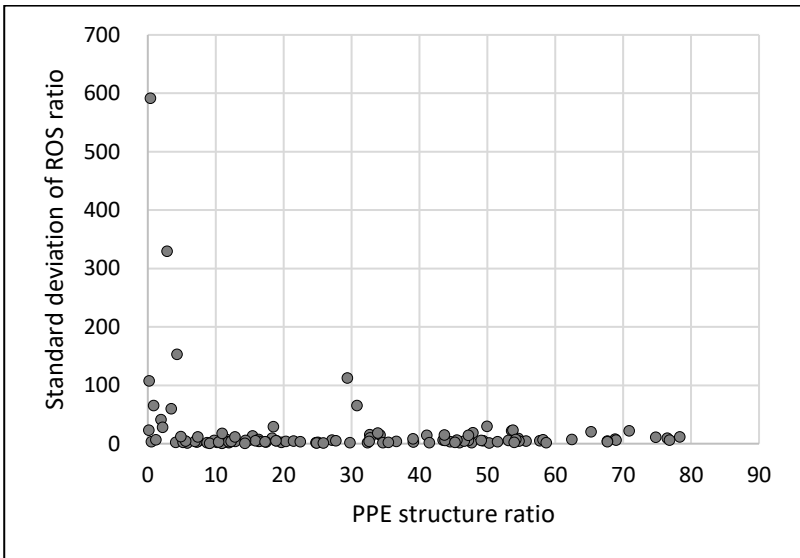


Chart 3. Relation between PPE (Property, Plant & Equipment) structure ratio and standard deviation of ROS ratio

Source: own work based on ww1.



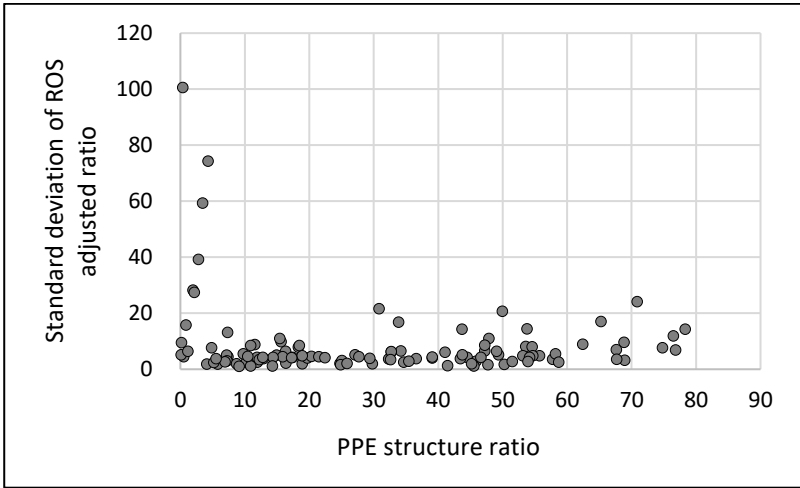


Chart 4. Relation between PPE (Property, Plant & Equipment) structure ratio and standard deviation of ROS adjusted ratio

Source: own work based on www1.

Charts 1 and 2 show that the positive correlation should be expected, while charts 3 and 4 suggest that the correlation would be negative.

The calculations of the correlation coefficients verifying the hypotheses for the second dataset are shown in Table 6.

Table 6. Correlation coefficients (and their statistical significance) for the second dataset (115 companies)

Volatility of profitability:	Asset structure:	Average non-current asset structure ratio	Average PPE structure ratio
Standard deviation of ROS		$r = 0.258$ (p value = 0.005)	$r = -0.215$ (p value = 0.021)
Standard deviation of ROS adjusted		$r = 0.337$ (p value < 0.001)	$r = -0.166$ (p value = 0.076)
Standard deviation of ROA		$r = 0.002$ (p value = 0.983)	$r = -0.091$ (p value = 0.333)
Standard deviation of ROE		$r = -0.135$ (p value = 0.150)	$r = -0.071$ (p value = 0.451)

Source: own work based on www1.

The correlations for ROS and ROS adjusted presented in Table 6 constitute the most important part of this study. It shows, primarily, that there is a weak but statistically significant correlation between the share of non-current assets in total

assets and the standard deviation of the ROS ratio and the ROS adjusted ratios. Based on this result, hypothesis 1 should be verified positively.

Then, the results obtained for the share of PPE in total assets are surprising, as negative correlation coefficients were obtained, and their statistical significance is also relatively high (the correlation for the ROS adjusted ratio is insignificant at the level of  $\alpha = 0.05$ , but significant for  $\alpha = 0.10$ ). Negative values of correlation coefficients are the basis for rejecting hypothesis 2, and their relatively high significance suggests that in the case of the share of PPE in total assets, the relation may be just the opposite as expected, i.e. that greater share of PPE results in smaller volatility (i.e. greater stability) of profitability.

The study was additionally extended by the analysis of correlation with ROA and ROE ratios, which are also popular measures of profitability. However, the obtained correlation coefficients are very low and statistically insignificant. It should be emphasized that this study indirectly analyzes the impact of the asset structure on the cost structure, which determines the level of operating leverage, therefore, the most appropriate measure of profitability for this study are ROS ratios (standard or adjusted). As it is known from the construction of the Du Pont pyramid, the ROA ratio is influenced not only by the level of operating leverage (like ROS ratio), but also by the total assets turnover (TAT), and the ROE ratio is additionally influenced by the use of liabilities. Probably the impact of these additional factors reduces the statistical significance of the results obtained for ROA and ROE and it makes these ratios less important for this study.

It is worth mentioning that the signs of the calculated correlation coefficients are generally consistent for both datasets: only 1 of the 6 correlation coefficients for non-current assets is a negative value (correlation with ROE volatility in the second dataset) and only 1 of the 6 correlation coefficients for PPE is a positive value (correlation with ROS adjusted for the first dataset), but in both of these exceptional cases the coefficients are statistically insignificant.

It was decided that the results of the study for the second dataset, being much more numerous than the first one and including individual, non-averaged data, are conclusive for the research, so the final conclusion is as follows:

– **hypothesis 1 should be considered as verified positively**, which allows to state that high share of non-current assets in total assets results in high volatility of profitability over time (for profitability measured by the ROS or ROS adjusted ratio);

– **hypothesis 2 should be rejected**, which means that high share of PPE (Property, Plant & Equipment) in total assets **does not result** in high volatility of profitability over time, and the relation is rather quite opposite: the higher share of PPE, the lower volatility of profitability.

## CONCLUSIONS AND DISCUSSION

In this study, the calculation of the correlation coefficients for the verification of the hypotheses was preceded by a preliminary analysis of the asset structure and the volatility of profitability in the research sample. The specificity of activity in some sectors (industries) quite unambiguously determines, respectively, a large or small share of non-current assets or PPE in total assets and the empirical data is generally in line with these expectations. There are some differences between the results for two datasets used in the study, but they are mainly due to a different way of qualifying companies to specific NACE sections and WSE sub-sector indices. Nevertheless, both datasets indicated that energy and mining industries are among those with the large shares of non-current assets and PPE in total assets, as well as with high volatility of profitability, while construction industry is characterized by rather small structure ratios and profitability deviations. Real estate is a particularly ambiguous industry in this respect.

The research hypotheses were empirically tested using two different datasets, which gives a broader picture of the subject of the study. Due to a much greater size of the second dataset and the way it is captured (data of individual companies), the study based on this dataset was considered conclusive. On the basis of correlation coefficients calculated for this dataset, it was decided that:

- hypothesis 1 should be considered as verified positively;
- hypothesis 2 should be rejected.

Such a conclusion enables to claim that high share of non-current assets in total assets results in high volatility of profitability over time (for profitability measured by the ROS or ROS adjusted ratio), but high share of PPE does not result in high volatility of profitability over time, and the relation is rather quite opposite: the higher share of PPE, the lower volatility of profitability (in other words, the profitability is more stable when the share of PPE is higher).

It has to be remembered that the correlations being the basis for these conclusions are weak, but statistically significant.

As mentioned before, the study examines the indirect relationship, according to which the asset structure impacts the cost structure, which in turn determines the degree of operating leverage and, as a result, the sensitivity of profitability to changes in sales. As the results show, empirical data supports the presumption of such a chain of relation in respect to non-current assets, but not to PPE, which is a surprising result of the study. As part of further research, to explain this discrepancy in results, the relationship between the non-current asset structure ratio and the PPE structure ratio was analyzed. The results are presented in the Chart 5.

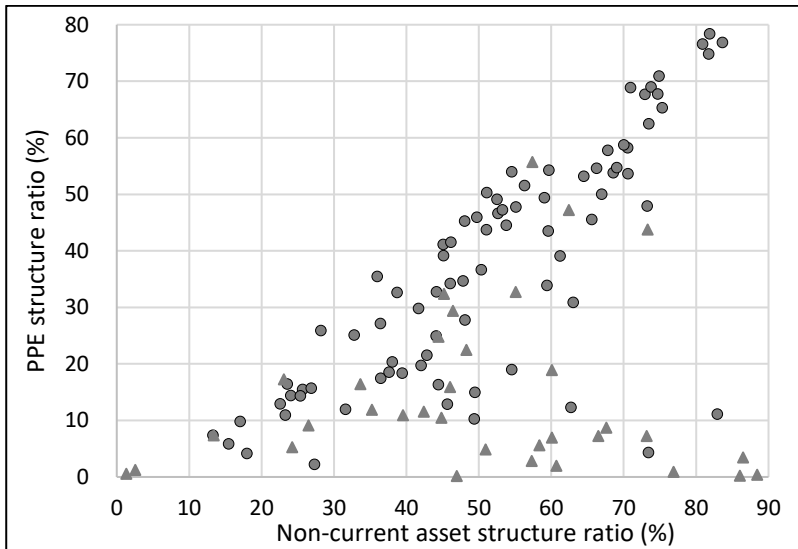


Chart 5. Relation between non-current asset structure ratio and PPE structure ratio

Source: own work based on [www1](http://www1).

Chart 5 shows that there is no typical, linear correlation between PPE structure ratio and non-current assets structure ratio, because, companies with a share of non-current assets in total assets greater than 50% are clearly divided into two separate groups; in the first group, the share of PPE is high (from 31% to 78% of total assets and from 49% to 99% of non-current assets), and in the second group the share is low (from 0% to 19% of total assets and from 0% to 35% of non-current assets). It was found that the latter group, with a significant difference between the PPE share and the share of non-current assets in total assets, consists mainly of companies from the following sub-sectors: Real Estate, IT, Games and Media (these companies are represented by the grey triangles on the Chart 5).

This may suggest that the mechanism of the asset structure impact on the volatility of profitability is more complicated, and while the positive correlation between non-current asset ratio and profitability volatility has been empirically proven, the impact of the non-current assets structure itself should be analyzed in more detail. Perhaps higher PPE share results in greater volatility of profitability only when PPE are the main non-current assets of the company, while they have a stabilizing effect on profitability when they are only an addition to other non-current assets, such as intangible non-current assets (typical for IT, games and media industries), or tangible investments, like properties built or purchased for sale or for rent (typical in real estate industry). These suppositions set further directions for potential research on the subject.

## REFERENCES

- Balios, D., Daskalakis, N., Eriotis, N. and Vasiliou, D. (2016). SMEs capital structure determinants during severe economic crisis: The case of Greece. *Cogent Economics & Finance*, 4(1).
- Bloom, N., Fletcher, R.S. and Yeh, E. (2021). The Impact of Covid-19 on US Firms. *NBER Working Paper Series*, Working Paper 28314.
- Delikanlı, İ. and Kılıç, S. (2021). Factors influencing SMEs' capital structure: A comparative analysis from Turkey. *Small Enterprise Research*, 28(1).
- Dewi, C.R., Fachrurrozie, F. (2021). The Effect of Profitability, Liquidity, and Asset Structure on Capital Structure with Firm Size as Moderating Variable. *Accounting Analysis Journal*, 10(1).
- Dominiak, J. (2022). Wpływ pandemii COVID-19 na zmiany w sektorze usług w Polsce. *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego*, 36(2).
- Humeniuk, M., Shelenko, D., Kovalchuk, N., Balaniuk, I. and Kozak-Balaniuk, I. (2022). The Impact of Innovation on The Structure of the Assets of the Enterprises. *Economic Studies Journal (Ikonomiczeski Izsledvania)*, 31(4).
- Jabłońska, M., Stawska, J., Dziuba, R., Tekce, M. and Krasoń, M. (2021). Public Aid and Entrepreneurship During the Covid-19 Pandemic in the European Union Countries. *Journal of Finance and Financial Law*, 3(31).
- Kalogiannidis, S. (2020). Covid Impact on Small Business. *International Journal of Social Science and Economics Invention*, 06(12).
- Kalusová, L. and Badura, P. (2022). Factors Affecting the Capital Allocation into Fixed Assets of Slovak Enterprises. *Montenegrin Journal of Economics*, 18(1).
- Kenourgios, D., Savvakis, G.A. and Papageorgiou, T. (2020). The capital structure dynamics of European listed SMEs. *Journal of Small Business & Entrepreneurship*, 32(6).
- Nyamasege, D., Okibo, W.B., Nyang'au, A.S., Sang'ania P.O., Omosa H. and Momanyi C. (2014). Effect of Asset Structure on Value of a Firm: a Case of Companies Listed In Nairobi Securities Exchange. *Research Journal of Finance and Accounting*, 5(7).
- Okwo, I.M., Ugwunta, D.O. and Nweze A.U. (2012). Investment in Fixed Assets and Firm Profitability: Evidence from the Nigerian Brewery Industry. *European Journal of Business and Management*, 4(20).
- Olonite, O.A., Okoro, C.N. and Kfa, I. (2021). Impact of Assets Structure on Financial Performance of Quoted Construction Firms in Nigeria. *International Journal of Research in Academic World*, 1(2).
- Ooi, J. and Liow, K.H. (2004). Risk-Adjusted Performance of Real Estate Stocks: Evidence from Developing Markets. *Journal of Real Estate Research*, 26(4).
- Rapaccini, M., Saccani, N., Kowalkowski, C., Paiola, M. and Adrodegari, F. (2020). Navigating disruptive crises through service-led growth: The impact of COVID-19 on Italian manufacturing firms. *Industrial Marketing Management*, 88.
- Realne jest odbicie w kształcie „V”*. *Przynajmniej na razie* (2020). <https://biznes.interia.pl/gospodarka/news-realne-jest-odbicie-w-ksztalcie-v-przynajmniej-na-razie,nId,4734888> [Accessed 22.09.2020].
- Rutynskiy, M. and Kushniruk, H. (2020). The impact of quarantine due to COVID-19 pandemic on the tourism industry in Lviv (Ukraine). *Problems and Perspectives in Management*, 18(2).
- Saleh, H., Priyawan, S. and Ratnawati, T. (2015). The Influence of Assets Structure, Capital Structure and Market Risk on the Growth, Profitability and Corporate Values (Study In Manufacturing Companies Listed In Indonesia Stock Exchange). *International Journal of Business and Management Invention*, 4(12).
- Sama-Berrocá, C. and Corchuelo Martínez-Azúa, B. (2022). How Has the COVID-19 Pandemic Affected the Different Branches of the Agri-Food Industry in Extremadura (Spain)? *Land*, 11(938).

- Setiadharna, S. and Machali, M. (2017). The Effect of Asset Structure and Firm Size on Firm Value with Capital Structure as Intervening Variable. *Journal of Business & Financial Affairs*, 6(4).
- Stojczew, K. (2021). Ocena wpływu pandemii koronawirusa na branżę turystyczną w Polsce. *Research Papers of Wrocław University of Economics and Business*, 65(1).
- Such Devesa, M.J. and Parte Esteban, L. (2011). Spanish hotel industry: indebtedness determinants. *Applied Economics*, 43(28).
- Wpływ pandemii koronawirusa na poszczególne branże w województwie wielkopolskim w 2020 r.* (2021). Samorząd Województwa Wielkopolskiego, Wojewódzki Urząd Pracy w Poznaniu, Poznań.
- Zajac, A.A., Wielechowski, M.W. and Czech, K. (2021). The Impact of Covid-19 Pandemic on Credit Financing of Microenterprises and Farmer Business Activity in Poland. *Journal of Modern Science*, 2(47).
- Zimny, A. (2020a). Dodatek Kwartalny: Koniunktura w sektorze przedsiębiorstw niefinansowych. *Journal of Finance and Financial Law*, 3(27).
- Zimny, A. (2020b). Dodatek Kwartalny: Koniunktura w sektorze przedsiębiorstw niefinansowych. *Journal of Finance and Financial Law*, 4(28).
- Zimny, A. (2022). Dodatek Kwartalny: Koniunktura giełdowa. *Journal of Finance and Financial Law*, 1(33).
- (www1) [www.biznesradar.pl](http://www.biznesradar.pl) [Accessed 19.08.2022–29.10.2022].
- (www2) [www.stooq.pl](http://www.stooq.pl) [Accessed 19.08.2022–29.10.2022].
- (www3) [www.stat.gov.pl](http://www.stat.gov.pl) [Accessed 20.08.2022].

Zakończenie recenzji/ End of review: 10.10.2022

Przyjęto/Accepted: 18.11.2022

Opublikowano/Published: 07.12.2022