

## Article

# The Impact of a New Accounting Standard on Assets, Liabilities and Leverage of Companies: Evidence from Energy Industry

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**Abstract:** The climate policy of the EU enforced substantial changes for producers and suppliers of energy. New assets and providers of capital are needed to fulfill the policy requirements. To provide comparability and facilitate an investment process, EU law requires companies to prepare annual financial statements according to International Financial Reporting Standards. One of these accounting standards—IFRS 16 Leases—specifies how to recognize, measure, present and disclose leases. It came into force in 2019 and implemented a single lessee accounting model, contrary to a dual accounting approach for lease accounting. The latter approach enabled companies to keep leased tangible assets and respective liabilities off-balance sheet. By using a sample of companies from the energy industry (oil, gas, energy and mining sectors) that are listed on the Warsaw Stock Exchange, we examine, measure, and analyze the impact of IFRS 16 Leases implementation on the value of assets, liabilities and leverage on assets and leverage on equity. The paper may serve as an insightful case study of how the implementation of a new standard influences the financial situation of the affected companies in the energy industry. Our paper contributes to the scientific debate in the following three ways: (1) we confirmed the influence of IFRS 16 Leases on assets, liabilities, leverage on assets and leverage on equity that was anticipated in the literature, (2) using the auditing methodology, we demonstrated the material changes of assets and liabilities in the energy industry, (3) based on the research results, we suggested recommendations for further scientific studies.

**Keywords:** financial reporting; energy industry; leverage on assets; leverage on equity; leasing; IFRS 16; materiality



**Citation:** Górowski, I.; Kurek, B.; Szarucki, M. The Impact of a New Accounting Standard on Assets, Liabilities and Leverage of Companies: Evidence from Energy Industry. *Energies* **2022**, *15*, 1293. <https://doi.org/10.3390/en15041293>

Academic Editor: Behnam Zakeri

Received: 9 January 2022

Accepted: 7 February 2022

Published: 10 February 2022

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## 1. Introduction

The energy industry plays a crucial role in economies, as a number of key economic indicators are highly influenced by it [1]. Coal, which for many years was the major source of energy in the European Union (EU), lost its position due to environmental concerns [2]. The functioning of the energy sector in some EU countries, such as Poland, is still based on the usage of coal [3]; however, the demand for coal will surely deteriorate in the future [4]. Interestingly, there is evidence of neutrality for hard coal usage, with respect to economic growth in Poland [5]. Although the coal mining industry in Poland has been restructured for a number of years [6–8], the production of energy in Poland that is based on coal mines is still outdated [9]. Hence in order to comply with EU climate policy, this sector requires substantial investments in assets and adequate sources of funding.

Some industries are more and some are less capital intensive. A capital intensive industry or company is one that needs large upfront investments of capital in machinery, plant and equipment, ensuring the production of goods or services in high volumes and maintaining higher levels of profit margins and return on investments. Capital intensive enterprises are characterized by a higher proportion of fixed assets, compared to the

total assets. Automobiles, manufacturing companies, real estate, oil and gas, and metals and mining are examples of capital-intensive industries. Thus, the activities of energy industry enterprises are technologically complex and capital-intensive [10–13]. In the energy industry, tangible assets play an important role, especially property, plant and equipment. The relevant disclosure of property, plant, and equipment that fulfill the investors' needs has always been a significant challenge for accounting standard setters. Sir David Tweedie, the former chairman of the International Accounting Standards Board, said the following: 'One of my big ambitions is actually flying an aircraft that is on an airline's balance sheet before I die' [14] (p. 11). That quote refers to the phenomenon of not recognizing key assets financed through operational leasing in a company's balance sheet. The chairman addressed the differentiation between operational and financial leasing that has left a great number of key tangible assets (as well as liabilities resulting from the financing of these assets) off-balance sheet. In the case of companies that prepared their financial statements in accordance with International Financial Reporting Standards (IFRS), assets were kept off-balance sheet until 1 January 2019 if a financing contract was classified as an operational leasing (IFRS are required for domestic public companies in 144 jurisdictions [15]). On that date, IFRS 16 Leases was introduced, and the aforementioned classification was abolished. The new standard introduces a single lessee accounting model and requires a lessee to recognize assets and liabilities for all leases with a term of more than 12 months, unless the underlying asset is of low value [16]. Accounting standard setters believe that the new manner of reporting ensures that lessees and lessors provide relevant information that faithfully represents those transactions (IFRS 16 Leases, par. 1).

While there is a rich history of studies exploring determinants of capital structure and related financial issues in energy industry companies [17–23], to the best of our knowledge, there are no studies on the impact of changes in accounting standards on the value of assets, liabilities, and leverage on assets and equity in the mentioned enterprises. The main objective of the paper is to examine, measure, and analyze the impact of IFRS 16 Leases implementation on the value of assets, liabilities, and leverage on assets and leverage on equity of companies from the energy industry (oil and gas, energy and mining sectors—hereafter OGEM) in Poland.

For the empirical analysis, we selected all listed companies that were traded on the regulated market of the Warsaw Stock Exchange on 4 January 2021. We chose companies from the following three sectors: oil, energy and mining. For each company, we hand collected data by going through annual consolidated financial statements for the year ending 31 December 2019 and extracting relevant financial data.

We used the following research methods: paired *t* test, Wilcoxon signed-rank test, one sample sign test. We utilized the following software: Stata/IC 14.1 and Microsoft Office Excel.

In our analysis, we used a unique legal setting with companies from the OGEM sectors. The exceptional feature of the Polish legal system is the existence of two types of contracts that enable companies to control and use land. The implementation of the new accounting standard forced companies to report land controlled through both rights in a uniform way. We showed material changes (according to the auditing methodology) in the value of assets and liabilities that had to be recognized in a balance sheet by listed companies, according to the requirements of the new accounting standard (IFRS 16 Leases). We demonstrated that the recognition of assets and liabilities in a balance sheet, according to the new accounting standard, leads to the deterioration of key financial ratios—leverage on assets and leverage on equity—and the changes were statistically significant.

Our paper contributes to the scientific debate in the following three ways: (1) we confirmed the influence of IFRS 16 Leases on assets, liabilities, leverage on assets and leverage on equity that was anticipated in the literature, (2) using the auditing methodology, we demonstrated the material changes of assets and liabilities in the energy industry, (3) based on the research results, we suggested recommendations for further scientific studies.

The paper is organized as follows: Section 1 introduces the research problem, Section 2 provides theoretical background and develops research hypotheses, Section 3 characterizes the research methodology, Section 4 describes data and presents our empirical findings, Section 5 discusses the results, Section 6 concludes and offers guidance for further studies.

## 2. Theoretical Background

As Sunder explains [24], the essence of a firm is a set of contracts among rational agents. Various groups of agents can be identified, with managers, shareholders and lenders among them. Agents have asymmetrical access to information; thus, the economic rationality of some groups may be bounded (agency theory describes relationships between parties that have uneven access to information [25]). Managers run companies on a daily basis and have full access to a historical and current stream of information on controlled companies, via the accounting system [26,27] and the management control system [28]. On the other hand, shareholders and other external providers of capital do not have access to such detailed and accurate information, as they only receive relevant information in the form of periodic and ongoing reports, as required by European Union Transparency Directive (Directive 2004/109/EC of the European Parliament and of the Council of 15 December 2004, on the harmonisation of transparency requirements in relation to information about issuers whose securities are admitted to trading on a regulated market and amending Directive 2001/34/EC). Periodic reports include quarterly and annual financial statements. The statement of financial position, also known as the balance sheet, is one of the mandatory elements of a complete set of financial statements (International Accounting Standard 1 Presentation of Financial Statements, par. 10). It includes a list of assets and their sources of financing (equity and liabilities) at a given date.

It is believed that investors evaluate companies through the knowledgeable analysis of information and on the efficient market prices of securities that reflect available information [29,30]. One source of relevant information is the statement of financial position (i.e., a balance sheet). The balance sheet enables one to explore the set and value of a company's assets and liabilities. In some cases, such as conducting bankruptcy proceedings, the scope of relevant information required to value a company's assets is much larger [31].

In accounting, an asset is understood as a resource controlled by the entity, as a result of past events and from which future economic benefits are expected to flow to the entity (Conceptual Framework for Financial Reporting 2018, par. 4.4 (a)). Although a traditional financial accounting system, as regulated by accounting standards, leaves many resources outside the scope of required measurement and reporting (such as human resources [32]), investors may reasonably expect that at least all tangible resources used in a company's operations, and bringing economic benefits to it, will be disclosed in the statement of financial position.

Until 2019, many tangible resources of this kind were not recognized in the statement of financial position, as they were financed through operational leasing [33]. Everything changed with the introduction of IFRS 16 Leases. The International Accounting Standards Board issued IFRS 16 Leases on 13 January 2016. It was adopted by the European Union on 31 October 2017. The standard is effective for annual financial statements prepared for periods starting on 1 January 2019, with earlier application permitted. On that date, IFRS 16 Leases superseded the previous regulation on lease accounting—International Accounting Standard 17 Leases (hereinafter IAS 17, effective from 1999 until 2018)—which, in turn, superseded International Accounting Standard 17 Accounting for leases (effective from 1984 until 1998). The new standard does not introduce major changes for the lessor. It does, however, significantly change the lessee situation. In accordance with the old standards, operating leases were kept off-balance sheet. In other words, when a company used their operations assets (e.g., machines or land) that were financed through operating leasing, these assets were not included in the total value of assets for this company. The same applied to the total value of future liabilities resulting from the operating leasing—these were not included in the total value of liabilities for this company. Under the new regulation,

lessees are required to capitalize operating leases, i.e., to recognize operating leases on their statements of financial position (balance sheets). In principle, the expected change is twofold—both assets and liabilities should increase. The objective of the new standard is to reflect all assets and resulting payment obligations on statements of financial position. It makes the users of financial statements more informed. More detailed financial information (that is readily available to investors) increases the efficiency of capital markets. The new regulation also affects the statement of profit or loss and other comprehensive income and the statement of cash flows. Under the old regulations, in the case of operating leases, the total lease payment was treated as an operating expense. According to the new regulation (after the reclassification of an operating leasing into a financial leasing), one part of the total payment is treated as a depreciation charge and the other part of the total payment is treated as an interest expense. That influences the reported EBIT directly. Similarly, in the statement of cash flows, the total payment is split into operating and financial activities under the new standard. We noticed that few companies disclose detailed information on the isolated influence of the new standard on this statement. That is why it is only possible to measure the impact of the new standard on statements of financial position.

Over the years, scientists tried to anticipate the potential impact of the capitalization of operational leases (i.e., the conversion of operational leasing into financial leasing) on data reported in financial statements. For that reason, academics conducted the following two types of research: *ex ante* and *ex post*. The former was based on drafts of a proposed standard, while the latter was based on the actual standard that was issued by the International Accounting Standards Board. For example, Fitó et al. [34] made a simulation on a sample of Spanish companies and showed the statistically significant impact of leasing capitalization on the company's financial statements. In particular, the new regulation would have an impact on totals of assets and liabilities, as well as on their structure. The influence on equity depends on the method of calculation but, in all methods, the leverage and performance ratios (return on assets, return on equity) would change significantly. Another *ex ante* simulation, conducted in Canada, led to similar conclusions; Durocher [35] predicted an increase in the debt to equity ratio and a decrease in the current ratio. Singh [36] showed that financial ratios related to interest coverage, leverage, and profitability would change significantly in the hospitality and tourism industries. After the issuance of IFRS 16 Leases, these expectations on the impact of the new standard on financial statements were confirmed. Öztürk and Serçemeli [37], in their case study on an airline company, noticed an essential change in the financial position of a company. The change was caused by the capitalization of all leasing contracts. The post-issuance study by Yu [38], which was conducted on Air China's financial statements, showed that total liabilities, total assets, the debt to asset ratio and EBITDA increased and the asset turnover ratio decreased. Morales-Diaz and Zamora-Ramirez [39] showed the significant impact of IFRS 16 Leases on the financial statements of Spanish companies that were even higher than previously anticipated. Morales-Diaz & Zamora-Ramirez [40] confirmed their previous findings. Researchers generally agree that the introduction of IFRS 16 Leases should do the following: (a) increase the reported values of assets and liabilities in the statement of financial position, (b) affect the statement of profit and loss, (c) lead to significant changes in key financial ratios, especially leverage on assets, leverage on equity and profitability (e.g., return on assets) [37–41]. It is reasonable to expect that the magnitude and direction of the impact would depend on the industry, due to the value and structure of leased assets. Researchers suggest that the most affected industries should be retail, airlines, media, hotels and the energy sector [34,39,40].

Changes in core financial metrics may have meaningful consequences for companies in a number of areas, such as finance covenants, communications with the market, cost of debt, as well as capital, financial and economic metrics [41]. For example, unfavorable changes in financial metrics may lead to breaches of financial covenants, which in turn may trigger legal actions against the borrower of funds (e.g., bond issuer). It is also undeniable

that the change in the standard should lead to material changes in key financial metrics that are published in the financial press and included in databases.

The area of our research interest is the set of companies from OGEM sectors that are listed on the Warsaw Stock Exchange, which is the biggest financial instruments exchange in Central and Eastern Europe [42]. The largest and most influential Polish companies from various sectors are listed on this stock exchange. In the case of companies from OGEM sectors, high value assets (especially property, plant and equipment) are the basis of their operations. It is reasonable to expect that the implementation of IFRS 16 Leases would lead to significant changes in the financial situation of companies, due to the usage of high value assets that were initially financed via operational leasing and similar contracts. In particular, these assets include land. Polish law enabled the control and use of land through various rights, e.g., the right of ownership or the right of perpetual usufruct of land. Companies from OGEM sectors in Poland frequently use the right of perpetual usufruct of land, due to the historical background (the land is owned by state treasury or municipality and is used by the company). The investigation on the influence of IFRS 16 Leases implementation on companies in OGEM sectors may deliver knowledge relevant for the financial analysis of these companies. Financial analysis, in turn, is crucial in making strategic decisions [43]. Furthermore, it may serve as an insightful case study of how the implementation of a new standard influences the financial situation of affected companies.

The important question is whether the impact, i.e., the numerical change, has materially affected the view of companies' financial situation presented in financial statements. The concept of materiality is used in financial reporting on a daily basis [44,45]. However, it is one of the most difficult terms to define quantitatively [46]. According to IAS 1 Presentation of Financial Statements (paragraph 7), "Information is material if omitting, misstating or obscuring it could reasonably be expected to influence decisions that the primary users of general purpose financial reports make on the basis of those reports, which provide financial information about a specific reporting entity". In other words, materiality is an entity-specific aspect of relevance, based on the nature or magnitude, or both, of the items to which the information relates, in the context of an individual entity's financial report. Auditors use the concept of overall materiality to define the level of acceptable errors relating to financial statements as a whole or to individual items or groups of transactions. The most common quantitative measures of overall materiality that are used by auditors, as well as researchers, are based on the main categories of a statement of financial position and a statement of profit or loss and other comprehensive income. The thresholds of overall materiality can be derived from total assets, equity, net income, pre-tax income or net sales [47]. There is evidence of a high level of consistency across firms, regarding aforementioned items, that are used to determine overall materiality [48]. There is a high level of consistency in quantitative benchmarks used to determine overall materiality [48]. One of the most frequent choices for this threshold is either 0.5% or 1.0% of the value of total assets [49].

Hence, we state the first set of research hypotheses.

**Hypothesis 1a (H1a):** *The increase in a balance sheet value resulting from IFRS 16 Leases implementation exceeds the overall materiality level.*

**Hypothesis 1b (H1b):** *The increase in value of fixed assets resulting from IFRS 16 Leases implementation exceeds the specific materiality level of fixed assets.*

**Hypothesis 1c (H1c):** *The increase in value of liabilities resulting from IFRS 16 Leases implementation exceeds the specific materiality level of liabilities.*

A balance sheet is often used as a source of information for bankers and other lenders [50]. A change in the value of assets and liabilities may have a significant negative impact on the financial situation of companies. Debt contracts often use values of assets and liabilities from a balance sheet, recognized on the balance sheet to trigger covenants, which

restricts managers from excessive borrowing [51]. The deterioration of a financial situation may have other adverse impacts on the day-to-day operations of business entities, e.g., cost of capital may increase (creditors may demand a higher premium for the increased risk of insolvency). Yu [38] noticed that due to increased debt to asset ratio, external financing will be more difficult. Financial ratios, e.g., leverage on equity and leverage on assets, may be used as a proxy for financial situation. The increase in these ratios may be negatively perceived by shareholders, as the investment becomes more risky [52]. Hence, we state the second set of research hypotheses.

**Hypothesis 2a (H2a):** *Liabilities to equity ratio increases as a result of IFRS 16 Leases implementation.*

**Hypothesis 2b (H2b):** *Liabilities to assets ratio increases as a result of IFRS 16 Leases implementation.*

### 3. Research Methodology

We verified research hypotheses H1a, H1b and H1c by measuring the impact of IFRS 16 Leases implementation on the following three values disclosed in the statement of financial position: assets, fixed assets and liabilities. For each company we measured the percentage changes in these values that resulted from the adoption of the new standard—Equations (1)–(3) respectively.

$$\Delta Assets_i[\%] = \frac{Assets_i^{post\ IFRS16} - Assets_i^{pre\ IFRS16}}{Assets_i^{pre\ IFRS16}} \times 100[\%], \quad (1)$$

where:

$\Delta Assets_i[\%]$ —percentage change in the value of assets for company “i” as a result of the IFRS 16 Leases adoption,

$Assets_i^{pre\ IFRS16}$ —value of assets for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$Assets_i^{post\ IFRS16}$ —value of assets for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements).

$$\Delta FixedAssets_i[\%] = \frac{FixedAssets_i^{post\ IFRS16} - FixedAssets_i^{pre\ IFRS16}}{FixedAssets_i^{pre\ IFRS16}} \times 100[\%], \quad (2)$$

where:

$\Delta FixedAssets_i[\%]$ —percentage change in the value of fixed assets for company “i” as a result of the IFRS 16 Leases adoption,

$FixedAssets_i^{pre\ IFRS16}$ —value of fixed assets for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$FixedAssets_i^{post\ IFRS16}$ —value of fixed assets for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements).

$$\Delta Liabilities_i[\%] = \frac{Liabilities_i^{post\ IFRS16} - Liabilities_i^{pre\ IFRS16}}{Liabilities_i^{pre\ IFRS16}} \times 100[\%], \quad (3)$$

where:

$\Delta Liabilities_i[\%]$ —percentage change in the value of liabilities for company “i” as a result of the IFRS 16 Leases adoption,

$Liabilities_i^{pre\ IFRS16}$ —value of liabilities for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$Liabilities_i^{post\ IFRS16}$ —value of liabilities for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements).

We further analyze the size of adjustments (resulting from the implementation of IFRS 16 Leases) in relation to materiality. Materiality establishes the cutoff point for the importance and significance of a particular transaction or a particular amount. To express materiality in a quantitative way we used an auditing concept of materiality. Overall materiality of assets (expressed in currency units) is defined as 0.5% and/or 1% of the value of total assets before the adoption of IFRS 16 Leases. Although the auditing concept of materiality is complex and is based on professional judgment, a “formula approach” can also be used to estimate the level of specific (account) materiality [53–56]. For this purpose, we employed equations 4 and 5 which assign proportion of overall materiality to the amount of company fixed assets and liabilities respectively. Materiality of fixed assets is measured according to Equation (4) and materiality of liabilities is measured according to Equation (5).

$$Materiality_{Fixed\ Assets,i}[PLN] = Overall\ materiality_i \times \sqrt{\frac{Fixed\ Assets_i^{pre\ IFRS16}}{Assets_i^{pre\ IFRS16}}}, \quad (4)$$

$$Materiality_{Liabilities,i}[PLN] = Overall\ materiality_i \times \sqrt{\frac{Liabilities_i^{pre\ IFRS16}}{Assets_i^{pre\ IFRS16}}}, \quad (5)$$

where:

$Overall\ materiality_i[PLN]$ —materiality for company “i” expressed in currency units [PLN], equals to 0.5% or 1% of total assets,

$Materiality_{Fixed\ Assets,i}[PLN]$ —specific materiality of Fixed Assets for company “i” expressed in currency units [PLN],

$Materiality_{Liabilities,i}[PLN]$ —specific materiality of Liabilities for company “i” expressed in currency units [PLN].

We verified research hypotheses H2a and H2b by measuring the impact of IFRS 16 Leases implementation on the following two leverage ratios: leverage on equity (liabilities to equity—L/E) and leverage on assets (liabilities to assets—L/A). For each company we measured L/E before the adoption of IFRS 16 Leases Equation (6) and after the adoption of IFRS 16 Leases (Equation (7)).

$$L/E_i^{pre\ IFRS16} = \frac{Liabilities_i^{pre\ IFRS16}}{Equity_i^{pre\ IFRS16}}, \quad (6)$$

where:

$L/E_i^{pre\ IFRS16}$ —liabilities to equity ratio for company “i” measured with the usage of data before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$Liabilities_i^{pre\ IFRS16}$ —value of liabilities for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$Equity_i^{pre\ IFRS16}$ —value of equity for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018).

$$L/E_i^{post\ IFRS16} = \frac{Liabilities_i^{post\ IFRS16}}{Equity_i^{post\ IFRS16}}, \quad (7)$$

where:

$L/E_i^{post\ IFRS16}$ —liabilities to equity ratio for company “i” measured with the usage of data after the adoption of IFRS 16 Leases (data from the statement of financial position

on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements),

$Liabilities_i^{post\ IFRS16}$ —value of liabilities for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements),

$Equity_i^{post\ IFRS16}$ —value of equity for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements).

Pre- and post- IFRS 16 Leases adoption values of L/E ratio are further used to calculate comparability index Equation (8) and the percentage change of L/E ratio Equation (9).

$$CI.L/E_i = \frac{L/E_i^{post\ IFRS16} - L/E_i^{pre\ IFRS16}}{L/E_i^{pre\ IFRS16}}, \quad (8)$$

where:

$CI.D/E_i$ —comparability index of liabilities to equity ratio for company “i”.

$$CI.L/E_i[\%] = CI.L/E_i \times 100[\%], \quad (9)$$

where:

$CI.D/E_i[\%]$ —the percentage change of the liabilities to equity ratio for company “i” after the adoption of IFRS 16 Leases.

Similarly for each company we measured L/A before the adoption of IFRS 16 Leases Equation (10) and after the adoption of IFRS 16 Leases Equation (11).

$$L/A_i^{pre\ IFRS16} = \frac{Liabilities_i^{pre\ IFRS16}}{Assets_i^{pre\ IFRS16}}, \quad (10)$$

where:

$L/A_i^{pre\ IFRS16}$ —liabilities to assets ratio for company “i” measured with the usage of data before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$Liabilities_i^{pre\ IFRS16}$ —value of liabilities for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018),

$Assets_i^{pre\ IFRS16}$ —value of assets for company “i” before the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018).

$$L/A_i^{post\ IFRS16} = \frac{Liabilities_i^{post\ IFRS16}}{Assets_i^{post\ IFRS16}}, \quad (11)$$

where:

$L/A_i^{post\ IFRS16}$ —liabilities to assets ratio for company “i” measured with the usage of data after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements),

$Liabilities_i^{post\ IFRS16}$ —value of liabilities for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements),

$Assets_i^{post\ IFRS16}$ —value of assets for company “i” after the adoption of IFRS 16 Leases (data from the statement of financial position on 31 December 2018 adjusted by the impact of IFRS 16 Leases disclosed in the notes to financial statements).



Pre- and post- IFRS 16 Leases adoption values of L/A ratio were further used to calculate comparability index Equation (12) and the percentage change of L/A ratio Equation (13).

$$CI.L/A_i = \frac{L/A_i^{post\ IFRS16} - L/A_i^{pre\ IFRS16}}{L/A_i^{pre\ IFRS16}}, \quad (12)$$

where:

$CI.L/A_i$ —comparability index of liabilities to assets ratio for company “i”.

$$CI.L/A_i[\%] = CI.L/A_i \times 100[\%], \quad (13)$$

where:

$CI.L/A_i[\%]$ —the percentage change of the liabilities to assets ratio for company “i” after the adoption of IFRS 16 Leases.

#### 4. Data and Empirical Analysis

For the empirical analysis, we used listed companies that were traded on the regulated market of the Warsaw Stock Exchange on 4 January 2021 (the first trading day in 2021). We selected companies from the following three sectors: oil and gas (sector code: 210), energy (sector code: 220), and mining (sector code: 320). We excluded companies that did not release audited financial statements prepared under IFRS (4 observations), e.g., Coal Energy SA reported that “the Company postpones the annual audit procedure until the armed unrests in the region of operations are resolved and access to assets as well as to documentation is safe”. One company was also excluded as it provided an unclear explanation of the impact of IFRS 16 Leases. We were left with 19 observations. Table 1 presents the structure of the sample by sector.

**Table 1.** Sample structure by sector.

Sector	Observations	
	Number	Percentage
Oil and gas	7	37%
Energy	9	47%
Mining	3	16%
Total	19	100%

For each of the 19 companies, we hand collected data by going through annual consolidated financial statements (including explanatory notes) for the year ending 31 December 2019 and extracting relevant financial data. These financial statements reported values of the following: (1) assets and liabilities for the year ending 31 December 2018, prepared in accordance with IAS 17 Leases and (2) assets and liabilities for the year starting 1 January 2019, prepared in accordance with IFRS 16 Leases. For each separate item, the following three values are shown: pre-IFRS 16 Leases adoption, change, post-IFRS 16 Leases adoption.

Table 2 presents descriptive statistics for relative and nominal changes in the value of total assets, fixed assets and liabilities that result from IFRS 16 Leases implementation. The adoption of this new standard in companies from OEM sectors led to the increase in all three abovementioned categories in statements of financial position. As previously mentioned, we applied two materiality thresholds, commonly known in auditing (more strict—0.5% of the value of assets—and less strict—1% of the value of assets). The implementation of IFRS 16 Leases significantly changed the total value of assets in the analyzed sectors—the median relative increase in assets equals 1.71%. The average nominal increase in assets equals PLN 614.6 m, which is an equivalent of USD 163.5 m (when an official exchange rate of PLN/USD 3.7597, quoted by National Bank of Poland from 31 December 2018, is applied).

**Table 2.** Descriptive statistics for statement of financial position categories (whole sample, n = 19).

Variable	Minimum	Maximum	Average	Quartile 1	Median	Quartile 3
ΔAssets [%]	0.00	5.22	1.80	0.80	1.71	2.30
ΔFixedAssets [%]	0.00	9.77	2.79	1.27	2.17	3.13
ΔLiabilities [%]	0.00	11.80	3.95	1.19	3.54	5.47
ΔAssets [10 <sup>6</sup> PLN] <sup>†</sup>	0.0	3348.0	614.6	12.9	549.2	906.6
ΔAssets [10 <sup>6</sup> USD] <sup>‡</sup>	0.0	890.5	163.5	3.4	146.1	241.1
ΔFixedAssets [10 <sup>6</sup> PLN] <sup>†</sup>	0.0	3316.0	610.4	12.9	549.2	906.6
ΔFixedAssets [10 <sup>6</sup> USD] <sup>‡</sup>	0.0	882.0	162.4	3.4	146.1	241.1
ΔLiabilities [10 <sup>6</sup> PLN] <sup>†</sup>	0.0	3352.0	616.8	12.9	549.2	906.6
ΔLiabilities [10 <sup>6</sup> USD] <sup>‡</sup>	0.0	891.6	164.1	3.4	146.1	241.1

Notes: <sup>†</sup> for companies that report in a foreign currency we applied an official exchange rate (quoted by National Bank of Poland) from 31 December 2018. The difference in values between assets, fixed assets and liabilities results from changes in current assets and in retained earnings (in two cases there were relatively small changes in current assets and in two cases there were relatively small changes in retained earnings); <sup>‡</sup> values converted to USD—for official exchange rate of PLN/USD 3.7597 quoted by National Bank of Poland from 31 December 2018.

Similarly, the relative increase in fixed assets is significant—the median equals 2.17%. The average ratio of nominal increase in fixed assets to their specific materiality level equals 221.69% (assuming overall materiality threshold of 1%)—compare Table 3.

**Table 3.** Descriptive statistics for adjustments in relation to materiality threshold (whole sample, n = 19).

Variable	Minimum	Maximum	Average	Quartile 1	Median	Quartile 3
1. Overall materiality threshold = 1% of assets						
ΔAssets to Materiality [%]	0.00%	521.98%	180.35%	80.15%	171.07%	229.94%
ΔFixed Assets to Materiality of Fixed Assets [%]	0.00%	710.79%	221.69%	100.44%	192.60%	264.42%
ΔLiabilities to Materiality of Liabilities [%]	0.00%	785.35%	266.60%	103.49%	245.96%	367.02%
2. Overall materiality threshold = 0.5% of assets						
ΔAssets to Materiality [%]	0.00%	1043.95%	360.71%	160.29%	342.13%	459.88%
ΔFixed Assets to Materiality of Fixed Assets [%]	0.00%	1421.58%	443.39%	200.87%	385.21%	528.85%
ΔLiabilities to Materiality of Liabilities [%]	0.00%	1570.69%	533.21%	206.98%	491.93%	734.04%

Notes: 1. Overall materiality threshold is expressed in (%) contrary to overall materiality (PLN) that is expressed in currency units (PLN). Overall materiality threshold is assumed at the level of 1% of assets (in 12 out of 19 cases adjustment of assets was greater than the overall materiality threshold; in 14 out of 19 cases adjustment of fixed assets was greater than the specific materiality of fixed assets; in 15 out of 19 cases adjustment of liabilities was greater than the specific materiality of liabilities); 2. Overall materiality threshold is assumed at the level of 0.5% of assets (in 16 out of 19 cases adjustment of assets was greater than the overall materiality threshold; in 18 out of 19 cases adjustment of fixed assets was greater than the specific materiality of fixed assets; in 17 out of 19 cases adjustment of liabilities was greater than the specific materiality of liabilities).

The increase in total liabilities is even more substantial—the median increase equals 3.54%. It is caused by the recognition of weighty leasing liabilities that were disclosed as off-balance sheet liabilities before the adoption of IFRS 16 Leases. Only in 1 case out of 19, observations liabilities did not increase. The maximum—observable in the sample— increase in liabilities equals 11.8%. The average ratio of nominal increase in liabilities to their specific materiality level equals 266.60% (assuming overall materiality threshold of 1%).

Table 3 reveals that the monetary sizes of adjustments of assets, fixed assets and liabilities, caused by the implementation of IFRS 16 Leases, were above overall materiality (PLN), specific materiality of fixed assets (PLN) and specific materiality of liabilities (PLN) respectively. The last component has a significant meaning because liabilities are often an obligatory component of ratios that are used to verify the breach of credit covenants.

From the financial statements of companies, it is known that the implementation of IFRS 16 Leases impacts both short- and long-term liabilities. Unfortunately, not every company discloses the structure of changes in liabilities. That is why it is impossible to analyze it in more detail.

Using a one-sided one sample sign test, we analyzed whether the change of assets, fixed assets and liabilities exceeded their corresponding materiality levels (Table 4). The analysis reveals that both the median change of fixed assets and the median change of liabilities are greater than their respective materiality levels, and results are statistically significant. Thus, both H1b and H1c are verified positively. The median change of assets is greater than overall materiality of 0.5%, and the results are statistically significant. However, it cannot be said that the median change of assets is statistically greater than overall materiality of 1%. Thus, H1a is partially verified.

**Table 4.** Statistical significance of changes in the value of assets, fixed assets, liabilities in relation to materiality.

1. Overall Materiality Threshold = 1% of Assets		
Null hypothesis	Alternative hypothesis	<i>p</i> -value
$\Delta A$ to Materiality = 100%	$\Delta A$ to Materiality > 100%	0.1796
$\Delta FA$ to Materiality of FA = 100%	$\Delta FA$ to Materiality of FA > 100%	0.0318
$\Delta D$ to Materiality of D = 100%	$\Delta D$ to Materiality of D > 100%	0.0096
2. Overall materiality threshold = 0.5% of assets		
Null hypothesis	Alternative hypothesis	<i>p</i> -value
$\Delta A$ to Materiality = 100%	$\Delta A$ to Materiality > 100%	<0.0001
$\Delta FA$ to Materiality of FA = 100%	$\Delta FA$ to Materiality of FA > 100%	<0.0001
$\Delta L$ to Materiality of L = 100%	$\Delta L$ to Materiality of L > 100%	<0.0001

Notes: A—assets, FA—fixed assets, L—liabilities. One-sided one sample sign test was used to verify statistical significance of a difference between the hypothesized median (of 100%, which corresponds to the respective materiality level) and the real median (H0: the median change of assets/fixed assets/liabilities equals the respective materiality level, H1: the median change of assets/fixed assets/liabilities is greater than the respective materiality level).

We extended our analysis by examining the influence of IFRS 16 Leases implementation on the leverage on assets (liabilities to asset—L/A) and leverage on equity (liabilities to equity—L/E). In Table 5, we present descriptive statistics for each ratio, calculated on a pre- and a post-IFRS 16 Leases adoption basis. The average value of L/E ratio increased by 3.98%, and the median value of L/E ratio increased by 3.54%.

**Table 5.** Descriptive statistics for ratios and their changes (pre- and post- adoption of IFRS 16 Leases, whole sample,  $n = 19$ ).

Variable	Minimum	Maximum	Average	Quartile 1	Median	Quartile 3
L/E pre IFRS 16	0.3333	8.0707	1.4442	0.6257	0.9912	1.4862
L/E post IFRS 16	0.3405	8.1575	1.4834	0.6667	1.0277	1.5151
CI.L/E [%]	0.00%	11.81%	3.98%	1.19%	3.54%	5.47%
L/A pre IFRS 16	0.2500	0.8898	0.5042	0.3849	0.4978	0.5973
L/A post IFRS 16	0.2540	0.8908	0.5134	0.4000	0.5068	0.6017
CI.L/A [%]	0.00%	6.26%	2.09%	0.37%	1.82%	2.98%

Notes: for companies that report in a foreign currency we applied an official exchange rate (quoted by National Bank of Poland) from 31 December 2018.

Both mean and median differences for L/E ratio (pre- and post- adoption of IFRS 16 Leases) are statistically significant (results were confirmed by paired *t* test for mean differences and Wilcoxon signed-rank test for median differences—compare Table 6). In summary, it may be claimed that the implementation of IFRS 16 Leases led to a significant increase in the values of L/E ratio for the OGEM sectors.

**Table 6.** Statistical significance of mean and median differences for financial ratios (pre- and post-adoption of IFRS 16 Leases, whole sample, n = 19).

Variable	Mean Difference	Median Difference
L/E pre IFRS 16	Difference = −0.0392	Difference = −0.0365
L/E post IFRS 16	t = −6.0485 p-value < 0.0001	z = −3.804 p-value = 0.0001
L/A pre IFRS 16	Difference = −0.0092	Difference = −0.0087
L/A post IFRS 16	t = −5.0961 p-value = 0.0001	z = −3.804 p-value = 0.0001

Notes: Paired *t* test was used to verify statistical significance of mean differences (H0: mean difference between paired observations is zero, H1: mean difference between paired observations is not zero). Wilcoxon signed-rank test was used to verify statistical significance of median differences (H0: median difference between pairs of observations is zero, H1: median difference between pairs of observations is different from zero).

The increase in the L/A ratio is slightly lower. The average value increased by 2.09%, and the median value of the L/A ratio increased by 1.82%. Similarly to the L/E ratio, both mean and median differences for the L/A ratio (pre- and post-adoption of IFRS 16 Leases) are statistically significant (compare Table 6). All in all, the implementation of IFRS 16 Leases led to a significant increase in the value of assets, fixed assets and liabilities in OGEM sectors. That resulted in an increase in leverage ratios for respective companies. Hence, both H2a and H2b are verified positively.

## 5. Discussion of Results

The obtained research results have several important theoretical and managerial implications. Firstly, we confirmed our initial suppositions for companies from the energy industry (OGEM sectors), using a unique legal setting, in which two types of controlling and using land exist (the right of ownership or the right of perpetual usufruct of land).

Secondly, we demonstrated the magnitude of changes in the value of assets and liabilities resulting from the implementation of IFRS 16 Leases. We proposed the usage of auditing methodology to determine the significance of these changes. After conducting empirical analysis, we showed material changes in the value of assets and liabilities that had to be recognized in a balance sheet. In the analyzed sample, the balance sheet value of companies increased substantially—on average by USD 163.5 m, with the highest observation reaching USD 890.5 m. The increase in assets exceeded the materiality level of assets on average by 260% (when overall materiality threshold is defined as 0.5% of assets). The median increase in fixed assets equaled 2.17%. The increase in liabilities is even more substantial—the median increase equaled 3.54%. The change of assets, fixed assets and liabilities exceeds their corresponding materiality levels. The median changes of assets, fixed assets and liabilities are greater than their respective materiality levels (assuming overall materiality threshold at the level 0.5% of assets), and results are statistically significant, with *p*-values lower than 0.0001. When materiality levels from auditing methodology and practice are employed, these changes should be treated as significantly affecting the financial position of the surveyed companies in terms of fixed assets and liabilities. We confirmed the general predictions from earlier studies on the impact of IFRS 16 Leases on the statement of financial position.

Thirdly, we demonstrated that the recognition of assets and liabilities in a balance sheet, according to the new accounting standard, leads to the deterioration of key financial ratios. Leverage measures (leverage on equity—L/E ratio—leverage on assets—L/A ratio) deteriorated significantly. The changes were statistically significant. The median value of the L/E ratio increased by 3.54% and the median value of the L/A ratio increased by 1.82%. Both the median differences for L/E ratio and for L/A ratio are statistically significant, with *p*-values equal to 0.0001. Similarly, the mean differences for the L/E ratio and for the L/A ratio are statistically significant, with *p*-values lower than 0.0001 and equal to 0.0001, respectively. It should be clearly stated that these changes in leverage on equity and leverage on assets do

not result from the change of contractual obligations of companies, but only from the new reporting framework—IFRS 16 Leases vs. IAS 17 Leases.

## 6. Conclusions

The paper may serve as an insightful case study for how the implementation of a new standard influences the financial situation of affected companies. The contribution of our research to the scientific debate may be perceived as threefold, as follows: (1) we confirmed the influence of IFRS 16 Leases on assets, liabilities, leverage on assets and leverage on equity that was anticipated in the literature, (2) using the auditing methodology, we demonstrated the material changes of assets and liabilities in the energy industry, (3) based on the research results, we suggested recommendations for further scientific studies.

The results of our study have important managerial implications and are useful for analysts involved in preparing energy industry reports. In particular, when such reports include time series of data (changes in financial ratios over time), analysts should make sure that data points are comparable before and after the implementation of the new accounting standard. Our results enable us to establish the influence of IFRS 16 Leases on values presented in financial statements and values of financial ratios.

Furthermore, the obtained results may facilitate the negotiations of contracts between creditors and debtors. The paper proves that the introduction of IFRS 16 Leases changes average values of financial ratios and values reported in financial statements. Such values are used in credit financial covenants. Therefore, their changes, resulting from the introduction of the new accounting standard, should be separated from changes resulting from the operations of the debtor.

Moreover, the paper may serve as an illustrative case for the influence of the change in accounting standards for MBA students. Various accounting courses (such as managerial accounting or financial reporting) are frequently an essential part of such degrees and real life cases are especially valued by professors and students.

Our proposed research methodology and measures have several limitations that offer opportunities for future research. During the data collection process, we noticed that companies do not comply with the disclosure requirements uniformly. In some cases, a complete reconciliation of changes, due to the new standard for all items in the statement of financial position, is provided. In other cases, only changes for selected items are disclosed in the notes. Moreover, most reports do not provide full information on the impact of the implementation of the standard on statement of profit or loss (i.e., how expenses will change as a result of the new classification of contracts) and, consequently, on EBIT and profitability ratios, such as return on assets, return on equity, return on sales. In our opinion, this makes it very difficult for users of annual reports to fully understand the impact of the implementation of IFRS 16 Leases.

As for the guidance for future research, it would be beneficial to expand the empirical analysis on the impact of the new standard on statement of profit or loss and other comprehensive income. Future research should also examine the economic impact of the increase in leverage on assets and leverage on equity, in particular whether companies had to renegotiate the contracts with creditors due to violation of financial covenants and deterioration of financial situation. Another important question is whether the reclassification of leases would trigger changes in the market value of companies, considering the fact that before the change in the standard, investors were able to learn relevant information (operating lease liabilities) from the notes [57]. Moreover, similar studies could be conducted in other European Union countries in order to compare the obtained results.

**Author Contributions:** Conceptualization, I.G., B.K. and M.S.; Data curation, I.G. and B.K.; Formal analysis, I.G. and B.K.; Funding acquisition, I.G., B.K. and M.S.; Investigation, I.G. and B.K.; Methodology, I.G. and B.K.; Project administration, I.G. and B.K.; Software, I.G. and B.K.; Visualization, I.G. and B.K.; Writing—original draft, I.G., B.K. and M.S.; Writing—review and editing, I.G., B.K. and M.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** The publication was financed from the subsidy granted to Cracow University of Economics (Grant No. 87/ZZR/2020/POT, 4/ZZA/2021/POT, 68/ZZA/2021/DOS, and Support for Publishing Activities Program of Cracow University of Economics).

**Data Availability Statement:** Publicly available datasets were analyzed in this study. This data can be found on companies' websites.

**Conflicts of Interest:** The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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