

The concept of a ratio analysis of consolidated financial statements applied to listed capital groups on the example of the Deutsche Börse Group

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Abstract

Purpose: The article concerns the ratio analysis of consolidated financial statements. The aim is to encourage and conduct a discussion about its specifics and usefulness.

Methodology/approach: The concept of ratio analysis of consolidated reporting created by Karmańska in 1999 (and later verified) is presented. The advantages of this analytical method were illustrated on the example of the corporate group of the German stock exchange operator.

Findings: The concept has shown its usefulness in identifying aspects of business activity that are specific for capital groups. The authors recommend its usage either fully or to a limited extent, depending on the area of analysis where functioning in a capital group matters and can enrich the reasoning.

Research limitations/implications: This article does not present the results of direct empirical studies conducted using the proposed analytical approach but is oriented on a specific aspect of business activity assessment. It is aimed at a wider community of academics and practitioners verifying the proposed analytical concept.

Originality/value: The article concentrates on the specifics of consolidated financial statement analysis, which has, until now, been present in the literature only to a limited extent. Moreover, this is the first work where a detailed financial analysis of a stock exchange operator was performed.

Keywords: consolidated financial statements, ratio analysis, capital group, financial analysis.

Streszczenie

Koncepcja analizy wskaźnikowej skonsolidowanych sprawozdań finansowych w zastosowaniu do notowanych grup kapitałowych na przykładzie Deutsche Börse Group

Cel: Artykuł odnosi się do analizy wskaźnikowej skonsolidowanych sprawozdań finansowych. Ma na celu zachęcenie i prowadzenie dyskusji na temat jej specyfiki i przydatności.

Metodyka/podejście badawcze: W artykule przedstawiona została stworzona w 1999 roku przez Karmańską (a następnie zweryfikowana) koncepcja analizy wskaźnikowej, odnosząca się do sprawozdawczości skonsolidowanej. Na przykładzie grupy kapitałowej z jednostką dominującą będącą operatorem giełdy niemieckiej zilustrowano metodykę analityczną i uzasadniono jej walory poznawcze.

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Wyniki: Artykuł wskazuje na użyteczność koncepcji w rozpoznawaniu takich aspektów działalności gospodarczej, które wynikają z funkcjonowania w grupie kapitałowej. Autorki rekomendują stosowanie koncepcji kompleksowo lub wybiórczo, zależnie od obszaru analizy, dla której funkcjonowanie w grupie kapitałowej może mieć znaczenie, i w której wnioskowanie może być dzięki tej koncepcji wzbogacane.

Ograniczenia/implikacje badawcze: Należy podkreślić, że w artykule nie przedstawiono wyników badań empirycznych przeprowadzonych z wykorzystaniem proponowanego podejścia analitycznego, a zorientowanych na wybrany aspekt oceny działalności gospodarczej. W tym miejscu, artykuł jest instrumentem poznawczym, dzięki któremu autorki mają nadzieję uzyskać weryfikację proponowanej koncepcji analitycznej przez szerszą społeczność akademików i praktyków.

Oryginalność/wartość: Artykuł koncentruje się na temacie specyfiki analizy sprawozdawczości skonsolidowanej, która do tej pory obecna była w literaturze tylko w ograniczonym zakresie. Ponadto jest to pierwsza praca, w której dokonano szczegółowej analizy finansowej operatora giełdy papierów wartościowych.

Słowa kluczowe: skonsolidowane sprawozdania finansowe, analiza wskaźnikowa, grupa kapitałowa, analiza finansowa.

Introduction

In recent years, companies have undergone major developments. Their structures have become increasingly complex, with many subsidiaries and associates often located in different parts of the world. An investor who wants to place their money in an entity that will bring profits in the future is likely to use a comprehensive approach to evaluate their potential investment based on the available data. This is mostly done using financial ratios, as they are based on information publicly available in a company's financial statements. Many sets of ratios have been created over time; however, most of them can be applied only to single-entity financial statements. Moreover, the vast majority of these works include only a theoretical description of an approach with no practical application in a real-life scenario. This article intends to bridge this gap by proposing a method that can be used to analyze consolidated financial statements (CFS), showing its usefulness in practice.

The reason for presenting such a proposal is the observation that the ratio analysis of CFS should be conducted using a different analytical approach than the analysis of separate financial statements (SFS). Based on the ratios created for analyzing CFS, this reasoning makes it possible to disclose specific aspects of the activities of corporate group entities and risk factors that are not normally noticed when analyzing SFS. The set chosen for this research was created by Karmańska (2006), as it is comprehensive, allowing for the analysis of six main aspects of a corporate group's financial position, paying special attention to the group structure and its relations with non-controlling interests. Each ratio of Karmańska's concept has been analyzed, described, and then used in a practical analysis of a corporate group. The company chosen for this analysis is the Deutsche Börse Group (Gruppe Deutsche Börse, GDB) – the operator of the German stock exchange market in Frankfurt am Main.

The conceptual framework for the title issue was first presented in 2017 at the forum of the 40th European Accounting Association Annual Congress in Valencia. It was then presented in 2018 at the 30th Asian-Pacific Conference on International Accounting Issues in San Francisco. A full description is presented below for further discussion.

The article is structured as follows: in Chapter 1, the literature on the value relevance of parent and consolidated reporting is reviewed. The known sets of ratios for analyzing SFS and CFS are presented. Chapter 2 describes the research methods employed. In Chapter 3, the ratio analysis is described and is used to investigate consolidated statements of the GDB. Finally, conclusions are drawn from the analysis.

1. Literature review

The fact that a corporate group needs to prepare two sets of accounts (both the separate statements of the parent entity and subsidiaries, as well as the consolidated financial statements), and thus keep books in multiple parallel ledgers, raises the question about which set of accounts gives a better view of a company's financial position and whether the less informative set of accounts needs to be prepared at all. There are only a few studies on this topic, but the conclusions generated by all of them are very similar.

Müller investigated which set of financial statements better captures the information that influences share prices by measuring the correlation between financial information and share prices (the so-called value relevance). The analysis was performed twice, first on the companies listed on the German market only (Frankfurt Stock Exchange) (Müller, 2011a) and then as a comparison of the three biggest European markets (the Frankfurt, London, and Paris Stock Exchanges) (Müller, 2011b). He statistically confirmed that CFS have superior value relevance in contrast to the individual ones and that the value-relevance of consolidated accounts has been increasing over time. However, he could not verify the superiority of consolidated and parent information taken together over solely consolidated information.

This analysis was later extended by analyzing IFRS adoption in group financial statements (Müller, 2016). There, he found that the value relevance of CFS rises after IFRS were adopted, both in comparison to CFS before and after adoption and when comparing the incremental quality gained in CFS compared to SFS (after the adoption of IFRS for CFS became mandatory). Müller's results show that consolidated statements give very important information for investors on the capital markets. Some other studies have supported these conclusions about the superiority of consolidated over parent information – similar research has been performed for the companies listed on the Madrid Stock Exchange (Abad et al., 2000) and for all German stock exchanges (Goncharov et al., 2009). The results pointed once again to the higher predictive ability and value relevance of CFS.

Niskanen et al. (1998) found that although consolidated and parent-only accounts “tell different stories” to the market, it is the consolidated information that is more important. Therefore, they raise the issue that the requirement to disclose separate statements of the parent entity as an addition to consolidated statements should “be based on arguments other than their value-relevance to shareholders.” Goncharov et al. (2009) also confront this question by concluding from their research that the main function of individual statements is to compute taxable income. However, they believe it not to be an economic function but “a legal requirement that possibly can be achieved by less costly means than disclosing an own set of accounts following distinct accounting rules”.

While these studies concentrated on analyzing the group and its net income only, Sotti (2018) extended this research by analyzing non-controlling interest (NCI). Having confirmed the higher value relevance of consolidated vs. parent-only financial statements, he also investigated the NCI share of capital and profit in CFS, i.e., the items that do not exist in SFS give additional information about parent profitability and control on the group level. He found that, as expected, the level of NCI in equity and its share in net income are statistically significant and negatively correlated with the group market value. These results show that the information about NCI gives relevant information to the analysts of CFS, therefore increasing their significance over SFS. On the other hand, in a second approach, he found that the presence of NCI in CFS, compared to those without NCI, tends to limit the value relevance of CFS (Sotti, 2017). However, as the decrease in value relevance is very small, Sotti claims that this should not be a significant factor for analysts and investors.

There have been many publications that concern ratio analysis of financial statements, and therefore only some of them will be mentioned here. Pomykalska and Pomykalski (2017) describe five groups of financial ratios (liquidity, asset management, leverage, profitability, and capital market ratios) and use them to analyze the consolidated financial statements of a Polish company, CCC S.A., for the years 2011–2015. However, none of the ratios described analyzes the specifics of group accounting. Lessambo (2018), on the other hand, chose the ratios most relevant to the investing process. Therefore, in addition to the already mentioned groups of ratios, he also includes a cash flow indicator and strategic financial or bankruptcy ratios. He also shows the method of calculating these ratios, although it is based on the data of imaginary companies.

Ratio analysis is regularly used by leading accountancy bodies. Each year, the Association of Accountants in Poland (Stowarzyszenie Księgowych w Polsce, SKwP) issues an analysis of the financial performance of Polish enterprises for each of the 96 economic sectors. Profitability, liquidity, operating efficiency, and capital structure ratios are calculated for companies from all of these sectors based on the latest available information from the financial statements according to the Polish GAAP. In the last research, nearly 145,000 enterprises were analyzed for the financial year 2018 (Dudycz, Skoczył, 2020). Most of the other publications on the analysis of financial

ratios are similar to those just presented – they perform the analysis based on individual financial statements, local accounting data, or the use of imaginary numbers. Even when IFRS CFS are used, no use is made of this additional information. Of the available literature, only a handful of publications concentrate on the specifics of CFS ratio analysis.

The first CFS-specific set of ratios was published by Karmańska in Wiankowski et al. (1999). It enhances the basic ratio analysis with two groups of ratios attributable to consolidated reports only: the ratios of influence of separate entities from the group on its financial result and the ratios of the rights of minority shareholders. A very similar set of ratios (including the group structure and NCI sections) was later published by Śliwa (2011), while Sikacz (2001) also proposed a set of financial ratios for CFS analysis. In addition to those sets mentioned above, this set includes a group of ratios concerned with analyzing the results of business segments of a corporate group. Prędkiewicz et al. (2012) concentrated on the cash flow analysis of a corporate group and examined the convergence in liquidity between the parent entity and the group. They found that the parent entity has a significant influence on the liquidity of the business combination.

2. Research methods used

The research method used in this article is based on the approach by Karmańska (2006), which is a continuation of the above-mentioned study published in Wiankowski et al. (1999). After it first appeared, it was published in numerous respected Polish newspapers and scientific journals, e.g., in “Rzeczpospolita” (Karmańska, 1999), “Gazeta Prawna” (Karmańska, 2000b) and “Ekonomika i Organizacja Przedsiębiorstwa” (Karmańska, 2000a), as well as a part of a book dedicated to the problems of management in capital groups (Karmańska, 2004). It was thus verified by many analysts and practitioners, leading to multiple adjustments to better reflect the specifics of analyzing consolidated financial statements.

The concept uses a set of 38 ratios that describe the corporate group’s profitability, payment capabilities, cash flows, and indebtedness. Moreover, it includes two groups of ratios that are specifically designed for analyzing corporate groups – the ratios of the influence of separate entities on the group result and the rights of minority shareholders. This approach was chosen for the analysis in this study because it expanded the basic financial analysis by the features specific for consolidated financial statements.

However, some changes needed to be made in order to make it suitable for international research. It was translated into English and adjusted from Polish GAAP to the International Financial Reporting Standards (IFRS). In this form, it presents a tool that enables a comprehensive financial analysis of international corporate groups. Additionally, it not only pays attention to their profitability, liquidity, and indebtedness as a whole, but it also analyzes the relationships inside the group and those with its non-controlling shareholders.

In the following chapter, each ratio has been described in order to show its usefulness and to draw attention to some of the specifics that it can reflect. Next, the ratios' values were calculated based on the data from the CFS of GDB for the years 2010–2019. The trends were analyzed, and their causes were sought. When a one-off event was found to disturb the actual trend, or some specifics of the analyzed entity required an adjustment to the ratio, a modified version was calculated, and the two compared.

The mother company of GDB is Deutsche Börse AG (DBAG), the operator of the German stock exchange market in Frankfurt am Main. The group offers the whole value chain of services for securities, derivatives, and commodities, i.e., listing, trading, clearing, and settling these financial instruments. It also offers other services, e.g., developing IT systems for other European exchanges or managing a series of benchmarks, with DAX being the best-known. DBAG is itself listed on its own stock exchange. Because the German stock market is one of the biggest in the world, it is stable and mature, and therefore, its participants are well-suited for a long-term study. The choice fell specifically on GDB as it combines two roles on the German stock market – it is both a participant and organizer and therefore, it introduces unique issues that would not appear in an analysis of an entity from a different economic sector, e.g., the existence of financial instruments of the central counterparties on the balance sheet of the group. To the best of the authors' knowledge, there has been no detailed financial analysis of a stock exchange operator performed yet.

This finding, as well as the interest in the possibility of using the proposed approach for a very specific capital group, were the main drivers for the authors to use GDB's consolidated reporting as source material to verify the proposed ratio analysis concept. This was also done due to the future research plans connected with analyzing corporate groups that are established by the entities that operate stock exchanges.

The aim of this article is to fill the analytical gap that exists both in the research and practice of consolidated financial reporting. On the one hand, the analytical approach normally used for separate entity accounting cannot be used when analyzing a set of consolidated financial information (the difference lies not only in the computational procedures but also in the interpretation of the results). On the other hand, there is a shortage of concepts dedicated to such analysis.

This work was prepared based on a strong belief that analyzing a specific set of financial information requires a special analytical tool. The empirical analysis confirms the validity of this opinion.

A concept of an approach to analyzing consolidated financial reporting is presented whose field discussion can enrich the analytical tools available to the stakeholders of the entities belonging to a capital group. Thus, the study uses the methodology of consolidating financial statements and the economic interpretation of positions that are created during the consolidation procedures and which are finally revealed in the consolidated reporting. Such a normative approach was the basis of the preparation of this proposal of financial ratios.

Next, taking into account the diversity of the sources that contain important data for the proposed ratio analysis, a case study was used. Thanks to this, on the example of the chosen capital group, the practicability of the computational procedures was not only verified but also visualized. Additionally, this analysis verified the reasoning based on the determined values.

And finally, taking into consideration the fact that capital group structures undergo continuous modifications based on the strategy of the parent company, it was determined that it would be suitable to carry out a ratio analysis in a longitudinal dimension. Thus, it is possible to identify trends in the respective fields of the analysis. Additionally, when researching a given aspect of how a capital group functions, a long-term analysis can reveal information about periods with extraordinary ratio levels. This can lead to a deeper understanding of the economic conditions or changes in the economic policy of the capital group. Also, a need to manage some specific risk factors connected with the functioning of the capital group may be revealed thanks to such an approach.

The article does not present the potential decisional contexts in which the proposed set of ratios can be used by the stakeholders of a given capital group. However, the authors will further verify the usefulness of the proposed set by choosing some decisional contexts. It can be expected that for such contexts, only individual groups of ratios or even only single ratios will be useful. However, this requires future empirical confirmation.

3. Ratio analysis of consolidated financial statements – a proposition of dedicated sets of ratios (RA~CFS-Sets) and an example of their utility

This chapter presents various ratios and the results of the application for analyzing GBD. It is divided into six parts, corresponding to the six sets of ratios, each one concentrating on different parts of the financial analysis.

3.1. RA~CFS Set A: Group profitability ratios

No. 1. Gross sales profitability (*Consolidated gross profit / Consolidated revenue*) – The first indicator shows what percentage of money earned in sales revenues is left over after accounting for the cost of sales. This is the broadest of the profitability ratios, as it shows only the proportion of the cost of goods sold to the total revenue from sales. The consolidated gross profit is the basis for paying all of the remaining costs, so the gross sales profitability should be as high as possible.

No. 2. Net sales profitability (*(Consolidated gross profit – Distribution costs – Administrative expenses) / Consolidated revenue*) – This ratio measures the percentage of revenue that stays with the company after covering the cost of sales, distribution

costs, and administrative expenses. It is important for companies as it shows the part of the revenues that is left for finance costs and to pay taxes. As with gross sales profitability, the higher the ratio, the better.

No. 3. Return on equity from operating activities (*Consolidated operating profit / (Shareholder's equity + Non-controlling interest – Consolidated net profit (loss) + Gain on bargain purchase)*) – The next formula shows how much operating profit a company generates with the money that the shareholders and the non-controlling interest have invested.

No. 4. Return on equity (*Net profit (loss) attributable to the owners of the parent / (Shareholder's equity – Net profit (loss) attributable to the owners of the parent + Gain on bargain purchase)*) – While the previous ratio calculates the operating return for shareholders, this one measures how much net profit (or loss) the company is able to generate using the equity that belongs only to the shareholders of the parent. This shows the efficiency of the group in terms of profit-making. This is the ratio which the shareholders of the company can use in order to see how efficiently their money is being used to create net profits for the group.

No. 5. Return on equity before tax (*Consolidated profit before tax / (Shareholder's equity + Non-controlling interest – Consolidated net profit (loss) + Gain on bargain purchase)*) – This formula calculates the level of profit which is created from the company's equity before paying taxes.

No. 6. Return on equity, taking into account extraordinary events and before tax (*((Consolidated profit before tax + Extraordinary items) / (Shareholders' equity + Non-controlling interest – Consolidated net profit (loss) + Gain on bargain purchase)*) – It shows the ability of the company to create profits out of its equity while considering the positive and negative effects of the extraordinary items on the functioning of the company (only useful for groups which are allowed to use the category of extraordinary gains and losses).

No. 7. Return on assets (*Total comprehensive income (loss) / Total assets*) – This ratio shows how efficiently the management uses the whole corporate group's assets to generate earnings. The higher the ratio, the better because the company earns more money on the investment. However, too high values of return on assets (ROA) may mean that the managers are not investing in new assets or improving the old ones, and the fraction may be increasing from year to year only because of decreasing assets due to depreciation.

No. 8. Return on capital employed in a corporate group (*Total comprehensive income (loss) / (Shareholders' equity + Non-controlling interest – Total comprehensive income (loss) + Gain on bargain purchase + Non-current liabilities)*) – The current ratio shows how efficiently the management uses not only equity but also long-term debt, i.e., the full long-term financing of the company. It enables both the investors and creditors to check whether the return on this investment is in line with their requirements.

Table 1. RA~CFS-Set A: Group profitability ratios (analysis) in %

No.	2010	2010*	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	90.3	90.3	89.4	87.4	86.1	84.8	88.9	89.2	87.7	88.6	88.5
2	40.1	64.6	68.8	63.8	59.1	59.8	59.8	62.1	58.6	55.3	59.0
3	17.1	34.7	51.4	39.0	26.3	31.3	31.3	32.2	28.8	29.9	28.5
4	14.0	31.7	37.6	25.5	17.1	25.5	22.0	38.0	21.4	19.9	19.7
5	13.9	31.5	51.4	33.5	24.1	32.5	29.3	31.1	31.7	28.1	27.6
6	13.9	31.5	51.4	33.5	24.1	32.5	29.3	31.1	31.7	28.1	27.6
7	0.3	0.7	0.4	0.3	0.3	0.4	0.4	0.8	0.6	0.5	0.7
7a**	2.3	5.0	2.5	1.6	1.5	2.0	1.7	2.6	1.7	1.5	1.8
8	8.1	18.9	21.0	16.3	5.6	7.2	5.2	10.8	8.1	5.0	7.6
8a	8.1	18.9	21.0	16.3	10.5	15.6	10.9	21.1	14.3	12.2	12.3

* Values for 2010 adjusted for one-off costs of efficiency programs; 2010 is still the period when the negative consequences of the financial crisis were present. In order to fight the economic downturn, DBAG started efficiency programs and had to charge impairment losses to various segments of the group. The total adjustment amounted to EUR 530.7 million (Deutsche Börse Group, 2010, p. 88).

** All ratios marked with “a” are ratios adjusted for the value of financial instruments of the central counterparties (both assets and liabilities). More details are explained for each such ratio, respectively.

Source: authors’ calculations based on Karmańska (2006) and GDB Annual Reports (2010–2019).

Table 1 presents the calculations for the group profitability ratios of GDB. The group’s gross sales profitability (Ratio No. 1) seems to be high at the beginning but steadily decreases, with a drop of 6% over the first five years. Afterward, it becomes stable at the level of 88%. This is caused by two factors: firstly, relatively small increases in sales revenues until 2014 and stable growth of about 10% afterward, pushed mainly by additional revenues from derivatives trading (Deutsche Börse Group, 2015, pp. 202–203). Secondly, the costs of goods sold, which are the “volume-related costs” in the case of GDB, have been growing each year.¹ However, since 2015, this increase has slowed down and has been compensated for by additional revenues, leading to stable gross profitability. A slightly bigger decline in profitability can be seen in the group’s net sales profitability (No. 2) if we adjust the 2010 figure for the costs connected with restructuring after the economic crisis (column marked with *). If we reverse these one-off costs, it can be seen that the net sales profitability is also declining, with a decrease of 8.4% over the analyzed period.

¹ “Volume-related costs comprise expenses that are correlated with the level of sales revenue, such as fees and commissions from banking business or costs for purchasing price information. In addition, various license fees contribute to volume-related costs” (Deutsche Börse Group, 2010, p. 88).

The average net return on equity (ROE, No. 4) was 25.8% between 2010 and 2019, a few percentage points below the operating ROE (No. 3) with an average value of 33.3% over the analyzed period. Only in 2016 was the net ROE higher than operating ROE – in this year, GDB disposed of its interest in International Securities Exchange Holdings, Inc. (ISE) (Deutsche Börse Group, 2016, pp. 174–175). As the profit earned by ISE for this year was accounted for as one line in the P&L, in accordance with IFRS 5 (line “Net profit for the period from discontinued operations” to the value of EUR 550.6 million), it was included in GDB’s operating profit, and therefore also not in Ratio No. 3. The value of return on equity from business activities (No. 5) is comparable to ROE from operating activities (No. 3), meaning that financial gains and losses and the result from equity investments had a minor impact on the group’s profitability. Because no items could be classified as extraordinary gains or losses for GDB, the ROE that takes into account extraordinary items and before tax (No. 6) is the same as ROE before tax (No. 5).

A standard ROA (No. 7), i.e., calculated according to the rules described in this approach, fluctuates around an average level of 0.5%. However, this value is biased in a stock exchange that acts as a central counterparty (CCP, Eurex Clearing AG for equities and securities, and European Commodity Clearing for energy and commodity products).² If we recalculate this ratio without taking into account the financial instruments of the CCPs, the ratio (No. 7a) increases to an average of 2.2% over the ten years, which is still not high due to the large value of assets (mainly goodwill, other intangible assets, and receivables).

Return on capital employed (No. 8) in its standard version is very volatile, with a huge drop in 2013. However, this drop is due to the fact that in January 2013, GDB extended its product portfolio to include repo transactions with a maturity greater than one year (Deutsche Börse Group, 2013, p. 211). This caused the split of the financial instruments held by the CCP from this year into current and non-current. If, for consistency, we exclude from the analysis the item “Financial instruments held by central counterparties” in current liabilities, the return on capital employed in the corporate group reduces its volatility, with the lowest value increasing from 5.0% to 12.2% in 2018, and with an average of 15.3% (No. 8a). It means that GDB companies were able to produce an average return of 15.3% from its equity and long-term debt.

² Being a CCP means that the entity is involved in every transaction as a buyer for each seller and as a seller for each buyer. This allows it to cover market participants against the risk of default by their trading partners. This activity is performed by a clearing house, which calculates a total exposure risk from all open positions of its members and asks for a deposit of a margin in the form of cash or securities (collateral). This collateral is recorded simultaneously as an asset and a liability (divided into current and non-current, based on the maturity of the underlying transaction), thus significantly increasing the value of total assets and liabilities.

3.2. RA~CFS Set B: Ratios of the influence of separate entities from the group on its financial result

No. 9. The impact of the parent entity on the profit or loss attributable to the group (*Net profit (loss) of the parent entity / (Net profit (loss) attributable to the shareholders of the parent + Impairment losses on goodwill from subsidiaries – Gain on bargain purchase of subsidiaries)*) – This ratio tries to evaluate the impact of the parent entity on the overall results of the group. It indicates that when this ratio is high, the group mostly creates its profits because of parent activities. That might be because the parent can generate much higher profits than other companies in the group or that other entities in the group are mostly making losses that the parent has to make up for. A high level of this ratio also indicates that the group is highly dependent on the parent's operations, and big fluctuations in its results will also have a high impact on the group's overall results.

No. 10. The impact of subsidiaries on the profit or loss attributable to the group (*(Net profit (loss) attributable to the shareholders of the parent – Net profit (loss) from equity-accounted associates and joint ventures – Net profit (loss) of the parent entity – Gain on bargain purchase of associates and joint ventures + Impairment losses on the goodwill of associates and joint ventures) / (Net profit (loss) attributable to the shareholders of the parent – Gain on bargain purchase of associates and joint ventures + Impairment losses on the goodwill of associates and joint ventures)*) – It shows what part of that profit the capital group is generating from the operations of the subsidiaries. As the profits and losses they generate are consolidated in the group accounts, they are not explicitly stated on the face of group financial statements; thus, they cannot be analyzed directly. This way of calculating the ratio makes it easy to find the group's level of dependence on the profitability of its subsidiaries.

No. 11. The impact of associates on the profit or loss attributable to the group (*Net profit (loss) from equity-accounted associates and joint-ventures / (Net profit (loss) attributable to the shareholders of the parent + Impairment loss on goodwill of subsidiaries – Gain on bargain purchase of associates and joint arrangements)*) – This ratio calculates how big the impact of associates and joint ventures is on creating net profit (or loss) attributable to the group. This is the final of the three ratios that show the impact of three different types of entities in the group on the overall profit that is attributable to the parent's shareholders (Nos. 9, 10, 11). Analyzing all of them in conjunction makes it possible to gain an insight into the dependence of the group on these types of entities and to assess the risk of changes in profits due to the group's investment decision, such as divesting some of its dependent entities.

No. 12. The impact of goodwill impairment on the profit or loss attributable to the group (*Impairment loss on goodwill of subsidiaries / (Net profit (loss) attributable to the shareholders of the parent + Impairment loss on goodwill of subsidiaries)*) – This ratio shows what part of the consolidated net profit or loss (before adjusting for impairment loss on goodwill) constitutes the goodwill impairment. The trend of this

ratio over the last few years will show the quality of the parent entity's investments. If it is higher than zero only from time to time, the situation is normal. However, if it can be continuously calculated for a number of years, the group's investment policy should be verified and, perhaps, wrong investments should be disposed of.

No. 13. The impact of gain on bargain purchase on profit or loss that is attributable to the group (*Gain on the bargain purchase of subsidiaries and joint arrangements / Net profit (loss) attributable to the shareholders of the parent*) – This ratio was created because gain on the bargain purchase of subsidiaries and joint arrangements is a one-off event, as it is credited to profit or loss in the period in which it occurs. Therefore, it should not be included with other more regular items as it would distort the trend. This relationship will highlight the years in which investments resulting in gain on bargain purchase appeared. The higher the value of this fraction, the more of the subsidiaries and joint arrangements were bought for less than their fair value, meaning that the management believes they will be able to reorganize the undervalued company and make future gains from it.

Table 2. RA~CFS -Set B: Ratios of influence of separate entities from the group on its financial result (analysis) in %

No.	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
9	66.2	79.2	92.0	86.0	55.2	47.1	43.2	70.3	64.5	82.3
10	30.4	19.3	7.6	12.2	43.1	53.2	57.3	29.5	35.2	17.7
11	3.4	1.5	0.4	1.8	1.6	-0.3	-0.5	0.2	0.3	0.0
12	0.8	0.3	2.0	0.3	0.5	0.9	0.5	0.1	0.1	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: authors' calculations based on Karmańska (2006) and GDB Annual Reports (2010–2019).

As presented in Table 2, the majority of GDB's profit is generated by its parent company, DBAG. This amount is highly volatile, ranging from 92% in 2012 to 43% in 2016 (No. 9). This drop of 53% over three years shows the group's strategy of new business acquisition and consolidation. The number of consolidated companies has been increasing steadily over the years, from 34 entities in 2010 to 75 in 2015, remaining at a relatively stable level of about 60 entities thereafter. It can be seen, however, that starting in 2017, Ratio No. 9 rises to about 70% – after the aforementioned disposal of ISE in 2016, DBAG's profits became a major part of the group's results.

A mirror image of this situation can be seen in Ratio No. 10 – since 2012, the profit created by subsidiaries has improved, from 7.6% to 57.3% in 2016, making an increase of 654%. Afterward, the ratio declined to 17.7% in 2019. Moreover, the profit generated by associates (No. 11) seems to have only a marginal impact on the group's profit or loss, not exceeding 3.4% of the group's earnings (2010) and declining

from year to year. It can thus be clearly seen that GDB used to earn most of its income from the parent entity's operations. At the beginning of the analyzed period, the emphasis moved to widening its base of consolidated companies, with them making nearly half of all profits in 2014. However, since 2017, the majority of profits have again been created by DBAG.

The ratio of the impact of goodwill impairment on consolidated profit or loss (No. 12) includes goodwill impairment of both subsidiaries and associates. This indicator has been stable over the years, at a level below 1%. The only exception was 2012, where the increase up to 2% was caused by a EUR 13.3 million impairment of goodwill from associates. At the end of the analyzed period, the value of the ratio was even lower than 0.1%. These results show that the group has a good investing policy, as the companies bought are not subject to extraordinary decreases in value. As there has been no gain on the bargain purchase recorded in the analyzed period, the value of this ratio is equal to zero for the whole period (No. 13).

3.3. RA~CFS Set C: The ratios of average payment capabilities in a capital group

No. 14. Current ratio (*Current assets / Current liabilities*) – The current ratio calculates if there are readily available assets to pay the creditors. Current liabilities are those which must be paid in the coming 12 months; therefore, it must be checked whether there are enough assets in the company that are freely available to be turned into cash within this period. In order to show a healthy situation, the ratio shall be above 1.

No. 15. Quick ratio (*(Current assets – Inventories) / Current liabilities*) – This is a special form of the current ratio. As inventories are the least liquid current assets, meaning that it is the most difficult to turn them into money, the quick ratio eliminates them from this calculation, showing whether enough liquid current assets exist to cover the current liabilities.

No. 16. Immediate payment ability ratio (*Cash / Current liabilities*) – This ratio checks to what degree the company is able to cover its short-term liabilities with cash that is freely available to the company. It thus indicates that money is available on-demand, and that the company does not have to spend time and effort to turn it into monetary resources.

No. 17. Net working capital (*((Current assets – current liabilities) × 365 / Consolidated revenue)*) – If we divide working capital, i.e., the difference between current assets and current liabilities, by the daily need for working capital, we receive the net working capital ratio. This ratio shows for how many days it will be enough to cover the daily need for monetary resources using working capital. It means that this ratio can estimate the security of operating activities from the company's own resources.

No. 18. Inventory turnover (*Consolidated revenue / Average inventory*) – This ratio shows the number of times that the inventory changes during the year, i.e., how many times per annum on average new stocks need to be ordered. Higher levels of this ratio

mean that stocks are changed more often. This is usually a good situation, as more frequent turnover diminishes the risks that inventory may become obsolete, damaged, or stolen. However, keeping minimum stock, like in just-in-time manufacturing, risks there being no inventories available to meet an unanticipated hike in demand. Therefore, a proper level of stock should be determined, e.g., using the economic order quantity formula.

No. 19. Inventory turnover in days ($365 / \text{Inventory turnover}$) – Inventory turnover in days illustrates for how long the stock is held in the company between their delivery and sale. The higher the inventory turnover, the shorter the time that stock is held in the company. This means that usually, the shorter the inventory turnover in days, the better. However, all other risks described in ratio No. 18 also apply here.

No. 20. Receivables turnover ($\text{Consolidated revenue} / \text{Average receivables}$) – Receivables turnover is an indicator of the value of accounts receivable that a company collects during a year. Usually, the higher the receivables turnover ratio, the more efficient the company is in collecting its receivables. Alternatively, it can also suggest that the company has a conservative policy regarding its extension of credit. However, extremely high levels may mean that this policy is too restrictive, and this may frighten off potential customers. On the other hand, the increased sales from extended credit terms may not give enough profit for the firm to cover the interest from overdraft needed to cover the cash gap.

No. 21. The receivables collection period ($365 / \text{Receivables turnover}$) – The receivables collection period can be determined from the receivables turnover ratio. It shows the average duration of accounts receivable during a given year. Usually, the less time it takes to collect the receivables, the better, but all other risks connected with ratio No. 20 are also applicable here.

No. 22. Payables payment period ($365 \times \text{Average payables} / \text{Consolidated revenue}$) – The average number of days it takes a company to pay its creditors is shown by the payables payment period. There needs to be a proper balance taken between a too long and too short payables payment period. When this period is long, the company can use it for other short-term investments before paying off its invoices. However, a too long period, especially one longer than the industry average, may have a negative impact on the relationships with the suppliers, who may offer less favorable payment terms, and the firm will not be able to use early payment discounts. On the other hand, paying accounts payable too early will cause problems with free cash flows in the company.

No. 23. The cash conversion cycle ($\text{Inventory turnover in days} + \text{Receivables collection period} - \text{Payables payment period}$) – This indicator calculates the working capital cycle in days, i.e., how long it takes the company to sell the goods from inventories and receive cash for them, less the time it takes it to pay its creditors. The longer this cycle, the longer the period in which the company has no cash inflows from receivables and sale of turnover to cover the payables outstanding.

Table 3. RA~CFS-Set C: Ratios of average payment capabilities in a capital group (analysis)

No.	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
14	1.001	1.000	0.998	1.003	1.002	0.999	1.009	1.009	1.015	1.025
14a	1.014	1.001	0.990	1.000	0.977	0.990	1.021	1.009	1.039	1.047
15	1.014	1.001	0.990	1.000	0.977	0.990	1.021	1.009	1.039	1.047
16	0.006	0.004	0.003	0.003	0.004	0.004	0.010	0.011	0.009	0.007
16a	0.054	0.032	0.019	0.023	0.023	0.018	0.034	0.029	0.026	0.020
17	34.6	4.5	-54.2	80.8	67.9	-15.6	184.9	143.2	253.5	331.8
18	n/a									
19	n/a									
20	10.6	10.8	10.1	10.3	8.6	5.6	4.4	5.6	8.6	7.8
21	34.4	33.7	36.0	35.4	42.6	65.6	83.5	65.1	42.4	46.5
22	15.7	16.3	18.4	19.1	26.2	43.5	57.6	40.4	20.0	22.1
23	18.7	17.4	17.6	16.4	16.5	22.2	25.9	24.7	22.3	24.4

Source: authors' calculations based on Karmańska (2006) and GDB Annual Reports (2010–2019).

In Table 3, the analysis of the average payment capabilities in GDB is shown. In its original form, the current ratio (No. 14) is roughly stable around the level of 1.006. This means that the level of current assets would be just enough to cover the liabilities payable within 12 months. However, by far the most significant item in both current assets and current liabilities is the financial instruments of the central counterparties. They impact both sides of the balance sheet to a similar extent and so may have an impact on 'flattening' the ratio over time. Therefore, they have been eliminated from further analysis. The current ratio without CCP positions (No. 14a) shows an upward sloping trend from 1.014 in 2010 to 1.047 in 2019, making it a 3.3% increase over ten years. After a slight decline below the level of 1 in the first years of the analysis, the company steadily increased its level of readily available assets.

Because GDB is a group of service companies, it does not hold inventories, and so the quick ratio (No. 15) in this case is equal to the current ratio (No. 14). The immediate payment ability ratio, having eliminated CCP positions (No. 16a), shows a clear declining trend over the years 2010–2012, meaning a diminishing amount of current liabilities that could be covered immediately by cash. Since 2013, there has been a stabilization of the ratio and an improvement in 2016, showing that the direct liquidity position has improved slightly. However, the ratio has again been decreasing since then.

GDB's net working capital (No. 17) was very volatile at first, but then showed a positive trend. Initially, it reached a minimum in 2012, when it was a negative 54.2 days. After this, it increased in nearly every period, up to a maximum of 332 days in 2019. This is far higher than the cash conversion cycle of about 24 days, meaning that

there is a healthy situation in the group's security of operating activities. This trend is also confirmed by the analysis of current (No. 14) and immediate (No. 16) payment abilities ratios.³ As already mentioned, due to a lack of inventories on the balance sheet, the inventory turnover (No. 18) and inventory turnover in days (No. 19) could not be calculated.

The average time it takes GDB companies to collect money from their debtors increased by 142.7% between 2010 and 2016 (No. 21). This is a negative trend which was caused by an increase in trade receivables. It shows that the companies either extended the credit terms to their customers or the clients paid late. After 2016, a radical change in receivables management can be seen – the ratio decreases to a level of 42 days in 2018. This is a very positive change, showing no material problems with receivables collection afterward. A very similar situation can also be seen in the payables payment period (No. 22), probably caused by the need to lag payments due to slow receivables collection until 2016. The payables payment period increased from 15.7 days in 2010 to 57.6 in 2016, marking a rise of 267%. For the company, this growth may be favorable, as it does not use cash to pay its payables. However, one should compare it to the credit period given to the company and the average payables payment time of its competitors to state whether or not this is excessive – levels above 30 days seem to be uncommon. However, after 2016, the payables payment period is again at the level of 20 days, showing a good situation. A higher overall rate of increase in receivables collection than in payables payment had a negative impact on the cash conversion cycle (No. 23), which slowly increased from 18.7 to 24.4 days.

3.4. RA~CFS Set D: Ratios of cash flow analysis of the corporate group

No. 24. The ratio of monetary efficiency of the operating profit (*Net cash flows from operating activities / Operating profit*) – This ratio shows the company's ability to manage its liquidity. It compares cash flows from operating activities, i.e., the inflow of money from the company's operations to the accounting measure of operating profit, which is based on the accruals method and does not take into account payments. The higher the ratio, the better, as it shows that the company is successful in demanding payment for its activities. A low ratio is an indication that, although the business may be booming and the company is earning huge profits, it may not last for long as it will soon run out of money to finance its ordinary operations.

No. 25. The ratio of the monetary operating rate of return of shareholders' equity (*Net cash flows from operating activities / (Total equity – Consolidated net profit (loss))*) – Here, the return on equity for the investors in monetary terms is calculated. As in the previous ratio, the company may be making huge profits and thus earning a good accounting return for the shareholders. However, stockholders want to be sure

³ Both of them include CCP positions, as we do not eliminate the CCP positions here.

that their investment is safe and that the company will not go bankrupt due to liquidity problems. The higher the ratio, the higher the return that the shareholders have on their investment in monetary terms.

No. 26. The monetary ratio of self-financing investing activities (*Cash inflows from investing activities / Cash outflows from investing activities*) – This ratio presents the company's ability to finance its investing activities from the inflows it receives from other investments. It shows this part of the company's investing activities for which it does not need any additional (internal or external) financing because it is generating enough money in the form of dividends or liquidated capital gains from its investments. The higher the ratio, the better the group's investment strategy, as it can generate more inflows from its investments that can be then reinvested.

No. 27. The monetary ratio of internally financing investing activities (*Net cash inflows from operating activities / Cash outflows from investing activities*) – As in the previous ratio, the ability to self-finance investing activities was checked; now, the total internal financing ability is examined. This ratio examines what proportion of money is needed to finance its investing activities using the money a company generates from its operations. The higher the proportion, the more independent the company may be from externally financing its investment activities, meaning that the operating activities were enough to cover the investment needs. It also means that it does not have to increase its indebtedness or dilute shareholding in order to get money for investing.

No. 28. The monetary ratio of external financing of investing activity (*Net cash inflows from financing activities / Cash outflows from investing activities*) – This is the third of the ratios that analyze the source from which the company is able to generate cash flows needed for investments. It relates the money from external sources for financing operations. The higher the ratio, the more external money the firm could use for this purpose.

Table 4. RA~CFS-Set D: Ratios of cash flow analysis of the corporate group (analysis) in %

No.	2010	2011	2012	2013	2014	2015*	2016*	2017	2018	2019
24	90.2	67.8	72.7	99.8	73.0	93.9	151.3	90.2	105.6	64.1
25	31.3	34.8	28.3	26.3	22.9	29.4	48.8	26.0	31.6	18.2
26	43.7	255.4	62.3	4.7	57.0	11.6	218.3	126.9	312.3	37.1
27	102.1	148.3	99.9	83.7	116.3	48.9	331.4	156.0	347.9	80.6
28	0.4	1.8	196.3	215.7	200.4	188.6	82.5	0.8	160.7	1.3

* The value for cash flows from operating activities has been adjusted for the years 2015 and 2016. This is due to the change in CCP items caused by non-delivery of financial instruments caused by a participant's failure to provide the necessary cash in time – it was provided on 4 January 2016 instead of 31 December 2015 (Deutsche Börse Group, 2015, p. 56). This triggered a shift of USD 869.5 million from 2015 to 2016 causing distorted values for both of these years.

Source: authors' calculations based on Karmańska (2006) and GDB Annual Reports (2010–2019).

The company's efficiency of turning operating profits into cash (No. 24) has changed over the years, between average and very good, as presented in Table 4. For nearly every second year, almost all profits were turned into monetary resources with the ratio above 90%, but in the remaining years, on average, only 70% of profits were actually received in cash. The ratio of the monetary operating rate of return of shareholders' equity (No. 25) displays a negative trend, slightly decreasing from its peak in 2011. This means that in monetary terms, the shareholders are receiving less and less from the company's basic operations.

The monetary ratios of internally financing and self-financing investing activities (No. 26) follow a common trend in the analyzed period. This trend can be connected to GDB's major merger and acquisitions activities, e.g., the purchase of an NCI in Eurex Zurich AG in 2012 (Deutsche Börse Group, 2012, p. 214), the purchase of an NCI in STOXX AG and the merger with 360T GmbH in 2015 (Deutsche Börse Group, 2015, pp. 180–181), or the sale of ISE in 2016 (Deutsche Börse Group, 2016, pp. 174–175). On average, the investment activities themselves were able to cover roughly 27% of the investment needs (the monetary ratio of self-financing investing activities, No. 26). The monetary ratio of internally financing investing activities (No. 27) balances around an average level of 113%. It means that for most of the analyzed period, GDB companies were able to finance their investment activities with cash generated from operations. This is a sign of a mature organization that can generate not only operating profits but also cash flows, and is able to use them in other areas like investment activities.

The monetary ratio of externally financing investing activities (No. 28) is inversely proportionate to both of the above ratios (except in 2018), but mainly to the monetary ratio of self-financing investing activities. Between 2012 and 2015, there was a large increase in external financing due to the issuance of bonds and proceeds from short-term financing received since 2012 (Deutsche Börse Group, 2012, p. 279).

3.5. RA-CFS Set E: Ratios of analysis of the average indebtedness of entities of a corporate group and its ability to service debts

No. 29. The coverage of non-current assets by equity (*(Shareholders' equity + Gain on bargain purchase + Non-controlling interest) / Non-current assets*) – This ratio shows the degree to which non-current assets are covered by equity. It is assumed that equity should be enough to cover the non-current assets, meaning that this ratio should be at the level of at least 100%. However, if it is far above that level and, additionally, there are many long-term liabilities, it shows a very conservative strategy, with a very low liquidity risk. On the other hand, there is low profitability (profits are driven down by the high costs of equity and long-term debt). If the ratio is below 100%, it means that part of the company's assets is financed by external sources. This is not negative in itself, but it is one of the factors that increase the risk of the enterprise.

No. 30. The coverage of non-current assets by capital employed ($(\text{Shareholders' equity} + \text{Gains on bargain purchase} + \text{Non-controlling interest} + \text{Non-current liabilities}) / \text{Non-current assets}$) – This ratio shows the degree to which non-current assets are covered by the capital employed. In a perfect situation, the ratio should be slightly above 100%. This is when the parent entity and the subsidiaries can manage the need for long-term capital well and thus optimize its cost. If the ratio is below 100%, it means that the capital employed is not enough to finance the non-current assets of the entity, and so they are financed by current external sources as well. This situation would mean that the company is pursuing an aggressive financing strategy where current liabilities are used to finance non-current assets.

No. 31. The ratio of leverage of assets by liabilities ($\text{Total liabilities} / \text{Total assets}$) – This ratio shows the average level of indebtedness. It estimates how likely it is that the company will pay off the liabilities to its creditors, especially in the case of liquidation.

No. 32. The long-term debt ratio ($\text{Non-current liabilities} / (\text{Shareholders' equity} + \text{Gain on bargain purchase} + \text{Non-controlling interest})$) – The long-term debt ratio measures the company's gearing, and thus its financial risk in the long term. It compares the non-current liabilities with the cash generators that will cover them, i.e., the total equity of the firm, including eventual gain on bargain purchase. Debt is a fixed liability, and equity is the capital equivalent that generates funds to cover this liability. If the ratio is high, there are large, fixed liabilities to cover with only a small equity investment, and so the business is at financial risk. Usually, in financially safe firms, this ratio should not exceed the level of 100%.

No. 33. The ratio of leverage of tangible assets by non-current liabilities ($\text{Non-current liabilities} / \text{Tangible assets}$) – This ratio shows how much of the company's long-term debt is collateralized in the form of tangible assets. This is because tangible assets are used by the company for a long time, and, in case it is needed, they can be sold and turned into cash to pay off the non-current liabilities. This ratio is the most useful for companies facing the threat of liquidation.

No. 34. Interest cover ($(\text{Consolidated profit before tax} + \text{Interest expense}) / \text{Interest expense}$) – The ability of the group to pay its interest due is depicted in this indicator. It shows the relationship between the consolidated profit before interest and tax and the interest for the period, which will be paid out of this profit. When the ratio amounts to 1 or less, it means that the group earns less than it needs to pay to its creditors. The delay in interest payments may lead to a breach of loan covenants and, if the situation becomes severe, even to the company's liquidation. On the other hand, the interest cover ratio of about 2 indicates a very good situation, where the payment of interest is not in danger.

No. 35. The ratio of the ability to pay off external financing ($(\text{Consolidated profit before tax} + \text{Interest cost}) / (\text{Average short-term loan liability} + \text{Interest expense})$) – This ratio is an extension of the previous one in the way that it acknowledges that interest may not be the only payment to external sources of financing. The denominator also includes the average short-term loan liability, as it will be repayable during

the next 12 months, thus estimating the group's ability to cover the interest and debt repayments in the current period and the immediate future. It may be the case that a company has an interest cover of about 1 and is able to pay the interest for the current period; however, it will have problems meeting the loan repayments during the following year.

Table 5. RA~CFS-Set E: Ratios of analysis of the average indebtedness of a corporate group's entities and its ability of to service debts (analysis) in %

No.	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
29	67.3	62.4	62.0	37.1	33.3	25.7	38.7	45.6	31.7	52.2
29a	67.3	62.4	62.0	69.0	69.7	51.2	76.0	82.0	87.7	94.4
30	104.2	100.6	93.6	105.6	104.0	99.3	111.3	110.1	113.9	125.7
31	97.7	98.6	98.4	98.3	98.3	97.9	97.2	96.3	96.9	95.5
32	54.8	61.2	51.0	184.2	212.2	286.5	187.5	141.6	259.0	140.9
32a	54.8	61.2	51.0	60.0	55.3	92.3	60.8	44.1	57.8	55.3
33	13.5	14.6	12.6	56.1	78.9	96.5	76.4	61.9	98.2	17.3
33a	13.5	14.6	12.6	18.3	20.6	31.1	24.8	19.3	21.9	6.8
34	4.2	9.3	6.8	9.7	16.6	14.8	14.1	15.9	14.8	22.7
35	2.3	6.8	2.1	1.7	4.6	4.1	7.1	3.3	2.0	3.2

Source: authors' calculations based on Karmańska (2006) and GDB Annual Reports (2010–2019).

The average indebtedness of GDB and its ability to service debts is presented in Table 5. To make the data comparable across periods, once again, the CCP positions, which do not constitute the company's real source of financing, were deleted from long-term liabilities from 2013 for ratios marked with 'a' The adjusted ratio of coverage of non-current assets by equity (No. 29a) shows an increasing trend from 67.3% in 2010 to 94.4% in 2019, meaning that almost 95% of the non-current assets in 2019 were covered by equity, with the remaining 5% being financed from riskier, but less expensive, external sources.

The coverage of non-current assets by capital employed (No. 30) for most of the analyzed period was at a level slightly above 100%, increasing even to 125% in 2019. This is an optimal level of the ratio, as it makes it possible to optimize the cost of financing by not using the current liabilities to finance non-current assets. The average indebtedness shown by the ratio of leverage of assets by liabilities (No. 31) was initially very stable, at an average level of 98%, but it started decreasing slightly after 2016. However, as it was at a very high level for the whole analyzed period, it shows that in the case of liquidation, the group should be able to cover slightly more than its liabilities from the disposal of all assets.

The indebtedness of GDB, having eliminated the CCP positions (No. 32a), was kept at a stable average level of 59.3%, meaning there was no apparent financial risk

and a low threat of insolvency. The leverage of tangible assets by non-current liabilities after eliminating CCP (No. 33a) also fluctuated around an average value of 18.3% over the analyzed period. It shows that only a small level of the company's indebtedness is collateralized with tangible assets. In the case of liquidation, less money could be earned from their sale. However, with low levels, creditors would have to look for the repayment of their inputs elsewhere. However, one of the reasons for such a situation is that service organizations, such as a stock exchange, invest more in intangible than in tangible assets (mainly in IT software) to increase their competitive advantage. Even after eliminating goodwill, which is a special kind of intangible asset in group accounts that cannot be sold in liquidation, tangible assets constitute, on average, only 12% of GDB's intangible assets.

The interest cover (No. 34) shows an upward trend, with an increase of 440% over the analyzed period. This indicates the increasing ability to pay off the interest due for the period from earnings before tax. The ratio of the ability to pay off external financing (No. 35) remained at a very similar level during the analyzed period, fluctuating around the value of 3.7. For each year, it was much lower than the interest cover, and the discrepancy between the two has been increasing. It means that, although the group of companies had no problems paying off the interest due for the period, the current liabilities connected with the financing of the firm have been increasing. The level of the ratio above 1 means a healthy situation; however, the level of current loan liabilities needs to be monitored to ensure that the situation stays healthy in the future.

3.6. RA~CFS Set F: Ratios of the rights of minority shareholders

No. 36. Averaged rate of a non-controlling interest (*Non-controlling interest / total equity*) – This ratio examines the average level of an NCI in the capital group. It shows the part of the company which, although controlled by the capital group, is actually owned by the NCI. The higher the ratio, the bigger the impact of the NCI and the more of the net assets that do not actually belong to the shareholders of the parent.

No. 37. Non-controlling interest participation in consolidated net profit or loss (*Net profit (loss) attributable to the non-controlling interest / Consolidated net profit (loss)*) – This ratio shows what part of the profit or loss created by both the capital group and the minority shareholders is attributed to the NCI. The higher the ratio, the more of the profits generated will leave the group.

No. 38. Non-controlling interest participation in consolidated total comprehensive income or loss (*Total comprehensive income (loss) attributable to the non-controlling interest / Consolidated total comprehensive income (loss) for the period*) – This ratio is the enhancement of ratio 37 in that it calculates the part of the total consolidated comprehensive income attributable to the NCI. It enhances the previous ratio by adding the company's profits that will go directly into equity, without being recorded previously in profit or loss.

Table 6. RA~CFS-Set F: Ratios of the rights of minority shareholders (analysis) in %

No.	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
36	13.5	6.8	7.0	7.1	8.6	3.8	3.1	2.4	2.7	6.1
37	-5.7	2.6	3.7	3.4	3.3	5.1	2.0	2.4	3.3	3.0
38	-0.7	0.7	3.9	3.5	3.2	4.6	1.9	1.9	3.6	3.1

Source: authors' calculations based on Karmańska (2006) and GDB Annual Reports (2010–2019).

Finally, Table 6 presents the analysis of the ratios of the rights of minority shareholders. The average rate of an NCI (No. 36) shows a visible drop from 2010 to 2011. This was due to acquiring the interest of non-controlling shareholders in Eurex Zürich AG (50% previously owned) from the Swiss stock exchange operator SIX Group AG, which decreased its NCI level by half (Deutsche Börse Group, 2011, p. 165). Another NCI decrease happened in 2015 with an additional purchase from SIX Swiss AG. This time it was the acquisition of the NCI of STOXX AG, which was also previously only 50% owned (Deutsche Börse Group, 2015, p. 180). This decreased the level of the NCI to about 3%. In 2019, the ratio increased to 6% after numerous mergers and acquisitions.

The participation of the NCI in the consolidated net profit (No. 37) in 2010 was negative at a level of -5.75% (the loss attributable to the NCI in that year was EUR - 22.7 million). This was the result of SIX Swiss Exchange AG's share in the ISE impairment charge (Deutsche Börse Group, 2010, p. 93). In the following years, the ratio remained stable at a level of about 3%. This shows that from all net profits generated, only 3% will leave the group. As this is a small fraction, the vast majority of the income generated by the group will stay with its shareholders.

The average rate of non-controlling interest participation in total comprehensive income (No. 38) shows a very similar trend to the ratio of NCI participation in net profit, but with smaller volatility. It means that the non-controlling interests have roughly the same share in profits and losses recorded in the financial result, as well as in those recorded directly in equity.

Conclusions

The aim of this article was to fill the analytical gap that exists both in the research and practice of consolidated financial reporting. The analytical approach normally used for separate entity accounting cannot be used when analyzing consolidated financial information. Additionally, there is a shortage of concepts dedicated to CFS analysis.

The present study used methods of consolidating financial statements and the economic interpretation of items that appear during consolidation procedures and that are finally revealed in the consolidated reporting. It presented an approach to analyzing consolidated financial reporting based on a ratio analysis approach created by Karmańska (2006). This concept comprises 38 ratios that describe the financial position of a corporate group. It concerns both standard fields of financial analysis like group profitability, average payment capabilities, cash flow analysis, and the average indebtedness of the group, as well as topics that concentrate directly on the items that appear during the consolidation process, and which enable the analysis of the influence of separate entities from the group on its financial result or the rights of minority shareholders. The authors chose this concept as they strongly believe that analyzing a consolidated set of financial information requires a special analytical tool. The empirical analysis validated this opinion.

The chosen method was updated to enable its use for the financial analysis of international corporate groups. Next, taking into account the diversity of sources that contain important data for the proposed ratio analysis, a case study was used. This was done with the help of a longitudinal analysis of consolidated financial statements. Deutsche Börse Group – the operator of the German stock exchange – was the subject of this analysis. Its special role as both the provider of the market and a participant introduced additional facts to the analysis, unique to the economic sector of stock market organizers. The analysis was conducted for the period 2010–2019. Particular attention was paid to issues specific to consolidated reporting. This allowed for a detailed analysis of this corporate group regarding the influence of separate entities on the group's financial result and the rights of minority shareholders.

Thanks to the longitudinal nature of the study, the differences in the strategical issue of the corporate structure could be analyzed. It was shown that GDB leads a strategy of acquiring new businesses and consolidating the group. The increase in the number of subsidiaries first led to diminishing the level of importance of profits of the mother company. However, in the last years of the analysis, a change can be seen in the strategy where few new entities are bought, and the mother creates an even greater share of the profits from year to year. The group's overall investment policy can be positively evaluated, as the subsidiaries and associates are not subject to extraordinary decreases in value.

Moreover, the level of NCI decreased almost every year, after numerous acquisitions of the NCI in controlled companies, and was at an average level of 6% during the analyzed period. Furthermore, the profits belonging to NCI, i.e., those that would leave the group each year, were, on average, only 3%. This shows that for GDB, the vast majority of the income generated by the group would stay with its shareholders. The same could be seen for profits recorded directly in equity (other comprehensive income).

This article presented a concept to analyze consolidated financial reporting whose field discussion can enrich the analytical tools available to the stakeholders of the

entities that belong to a capital group. It consisted of both a theoretical description of the selected approach as well as its application in a case study. Thanks to this, the practicability of the computational procedures was not only verified but also visualized. Additionally, this analysis verified the reasoning based on the determined values. The presented set of ratios have shown their usefulness in identifying aspects of business activity that are specific for capital groups. It can be used in similar studies in the future, fully or to a limited extent, depending on the area of analysis where functioning in a capital group matters and can enrich the reasoning. The method can be useful when analyzing the mother company and its role in the corporate group. It also makes it possible to analyze of the dependence of the group on the mother and the risk that the whole group may face if the parent faces financial troubles itself. Using the ratios can support a study of the shareholder structure and provide a better overview and management of the eventual loss of control over some parts of the corporate group. It can also help evaluate the overall investment policy of the group. This list of the possible use cases of these ratios is definitely not finite and can be expanded to different fields of activity. Further works of the authors in such fields will follow.

References

- Abad C., Laffarga J., García-Borbolla A., Larrán M., Piñero J.M., Garrod N. (2000), *An evaluation of the value relevance of consolidated versus unconsolidated accounting information: Evidence from quoted Spanish firms*, "Journal of International Financial Management & Accounting", 11 (3), pp. 156–177.
- Dudycz T., Skoczylas W. (2020), *Wskaźniki finansowe przedsiębiorstw według działów (sektorów) za 2018 r.*, "Rachunkowość. Pismo Stowarzyszenia Księgowych w Polsce", 4, pp. 67–94.
- Goncharov I., Werner J. R., Zimmermann J. (2009), *Legislative demands and economic realities: Company and group accounts compared*, "International Journal of Accounting", 44 (4), pp. 334–362.
- Karmańska A. (1999), *Jak czytać sprawozdania grup kapitałowych*, "Rzeczpospolita", 4th November.
- Karmańska A. (2000a), *Analiza wskaźnikowa skonsolidowanych sprawozdań finansowych*, "Ekonomika i Organizacja Przedsiębiorstwa", 3 (602), pp. 18–20.
- Karmańska A. (2000b), *Model analizy wskaźnikowej skonsolidowanych sprawozdań finansowych*, "Gazeta Prawna", 80, pp. 14, 19–20.
- Karmańska A. (2004), *Uwarunkowania i specyfika analizy wskaźnikowej sprawozdań grupy kapitałowej*, [in:] Walentynowicz P., Nogalski B. (red.), *Zarządzanie w grupach kapitałowych: aspekty organizacyjne, finansowe, właścicielskie i personalne*, Wydawnictwo Wyższej Szkoły Administracji i Biznesu, Gdynia, pp. 334–352.
- Karmańska A. (2006), *Specyfika analizy wskaźnikowej skonsolidowanych sprawozdań finansowych*, "Problemy Rachunkowości", 1 (24), pp. 36–43.
- Lessambo F.I. (2018), *Financial Statements. Analysis and Reporting*, Palgrave Macmillan, Cham.
- Müller V.-O. (2011a), *Evidence from the German capital market regarding the value relevance of consolidated versus parent company financial statements*, "Annals of the University of Oradea", 20 (1), pp. 636–642.
- Müller V.-O. (2011b), *Value relevance of consolidated versus parent company financial statements: Evidence from the largest three European capital markets*, "Accounting & Management Information Systems", 10 (3), pp. 326–350.
- Müller V.-O. (2016), *The Quality of Consolidated versus Parent Company Financial Statements*, [in:] Bonaci C., Strouhal J., *Corporate Governance in Knowledge-Based Society*, WSEAS Press, Cluj Napoca, pp. 137–161.

- Niskanen J., Kinnunen J., Kasanen E. (1998), *A note on the information content of parent company versus consolidated earnings in Finland*, "European Accounting Review", 7 (1), pp. 31–40.
- Nogalski B., Walentyłowicz P. (2004), *Zarządzanie w grupach kapitałowych: Aspekty organizacyjne, finansowe, właścicielskie i personalne*, Wydawnictwo Wyższej Szkoły Administracji i Biznesu, Gdynia.
- Pomykańska B., Pomykański P. (2017), *Analiza finansowa przedsiębiorstwa. Wskaźniki i decyzje w zarządzaniu*, PWN, Warszawa.
- Prędkiewicz K., Sikacz H. (2012), *Ocena płynności finansowej grup kapitałowych na podstawie rachunku przepływów pieniężnych na przykładzie przemysłu metalowego*, "Nauki o Finansach / Financial Sciences", 3 (12), pp. 70–86.
- Robinson T., Henry E., Pirie W., Broihahn M., Cope A. (2015), *International Financial Statement Analysis*, CFA Institute Investment Series, John Wiley & Sons, Hoboken, NJ.
- Sikacz H. (2001), *Ocena sytuacji finansowej operacyjnych grup kapitałowych*, Wolters Kluwer Polska, Warszawa.
- Skoczylas W. (red.) (2009), *Analiza sprawozdawczości finansowej przedsiębiorstwa*, Stowarzyszenie Księgowych w Polsce, Warszawa.
- Sotti F. (2017), *The role of non-controlling interests in the value relevance of consolidated financial statements*, "Corporate Ownership and Control", 15 (1–2), pp. 435–443.
- Sotti F. (2018), *The value relevance of consolidated and separate financial statements: Are non-controlling interests relevant?* "African Journal of Business Management", 12 (11), pp. 329–337.
- Śliwa J. (2011), *Zarządzanie finansami w grupach kapitałowych*, Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego, Warszawa.
- Thomas W.B., Herrmann D.R., Inoue T. (2004), *Earnings management through affiliated transactions*, "Journal of International Accounting Research", 3 (2), pp. 1–25.
- Wędzki D. (2006), *Analiza wskaźnikowa sprawozdania finansowego*, Oficyna Ekonomiczna, Kraków.
- Wiankowski S., Bogusławski Z., Borzęcki J., Karmańska A. (1999), *Zarządzanie grupą kapitałową. Analiza i projektowanie rozwiązań organizacyjnych*, Instytut Organizacji i Zarządzania w Przemysle ORGMASZ, Warszawa.

Internet sources

- Deutsche Börse Group, (2010), *New Perspectives. Annual Report 2010*, https://www.deutsche-boerse.com/resource/blob/36742/b286baa6adc42a2eb0b8b1a4aa46a5d0/data/annual-report-2010_en.pdf (access 30.05.2020).
- Deutsche Börse Group, (2011), *Global Presence. Annual Report 2011*, https://www.deutsche-boerse.com/resource/blob/36734/449f5eb943de26daa59783020b72f43b/data/annual-report-2011_en.pdf (access 30.05.2020).
- Deutsche Börse Group (2012), *Corporate Report 2012*, http://reports2.equitystory.com/deutscheboerse/annual/2012/gb/English/pdf/Full_Corporate_report_2012.pdf (access 30.05.2020).
- Deutsche Börse Group (2013), *Corporate Report 2013*, http://reports2.equitystory.com/deutscheboerse/annual/2013/gb/English/pdf/Full_Corporate_report_2013.pdf (access 30.05.2020).
- Deutsche Börse Group (2014), *Corporate Report 2014*, https://www.deutsche-boerse.com/resource/blob/36684/5ccb83108e1053ab5360572a74871c0e/data/annual-report-2014_en.pdf (access 30.05.2020).
- Deutsche Börse Group (2015), *Financial Report 2015*, https://www.deutsche-boerse.com/resource/blob/36480/5631f715ef77eac6c9e86637747717eb/data/annual-financial-report-2015_en.pdf (access 30.05.2020).
- Deutsche Börse Group (2016), *Financial Report 2016*, https://www.deutsche-boerse.com/resource/blob/36468/e73ada3eae34fab7c840f67e1348ced/data/annual-financial-report-2016_en.pdf (access 20.09.2020).

- Deutsche Börse Group (2017), *Financial Report 2017*, <https://www.deutsche-boerse.com/resource/blob/82350/012404d9e3c34eee486090347dd95b0a/data/DBG-annual-2017.pdf> (access 20.09.2020).
- Deutsche Börse Group (2018), *Annual Report 2018*, <https://www.deutsche-boerse.com/resource/blob/1441006/f7953188907a2dcca8fa078ff0a394d/data/DBG-annual-report-2018.pdf> (access 20.09.2020).
- Deutsche Börse Group (2019), *Annual Report 2019*, <https://www.deutsche-boerse.com/resource/blob/1749866/27390e8dd169dbfd63f867700d4c816a/data/DBG-annual-report-2019.pdf> (access 20.09.2020).