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Financial Distress Analysis Using The Altman Z-Score, Zmijewski, Grover, Springate, And Ohlson Methods In Companies Listed In The Indonesian Sharia Stock Index For 2020-2023

Ahmad Faisal Saputro[1], Ujang Syahrul Mubarrok[2*]
[12]Universitas Islam Kadiri, Indonesia
Email: ujang@uniska-kediri.ac.id
(tanda * menunjukkan koresponden author)

Abstrak

Penelitian ini bertujuan untuk mengetahui potensi kebangkrutan dengan menggunakan metode analisis Altman Z-Score, Zmijeski, Grover, Springate, Ohlson pada perusahaan yang terdaftar di Indeks Saham Syariah Indonesia (ISSI) tahun 2020 sampai dengan 2023. Metode yang digunakan dalam penelitian ini adalah deskriptif kuantitatif, dengan 2 (dua) metode analisis yaitu metode deskriptif dan metode kuantitatif. Dengan menggunakan metode deskriptif yaitu peneliti akan menguraikan hasil perhitungan dengan kalimat yang menyatakan apakah perusahaan dalam kondisi sehat atau tidak sehat dari segi keuangannya. Sedangkan metode kuantitatif digunakan untuk mengukur data yang berupa angka/numeric pada laporan keuangan. Populasi yang digunakan untuk penelitian ini adalah perusahaan manufaktur sektor barang konsumsi subsektor farmasi yang terdaftar di Indeks Saham Syariah Indonesia periode 2020 – 2023 dengan jumlah 2 perusahaan. Teknik pengambilan sampel dalam penelitian ini menggunakan metode Purposive Sampling. Hasil penelitian ini menunjukkan bahwa analisis keuangan PT Kimia Farma Tbk (KAEF) dan PT Darya-Varia Laboratoria Tbk (DVLA) menggunakan berbagai model prediksi kebangkrutan menunjukkan perbedaan yang signifikan dalam kinerja keuangan kedua perusahaan. Model Altman mengindikasikan KAEF mengalami penurunan Z-Score yang tajam pada tahun 2023, yang menggarisbawahi perlunya restrukturisasi keuangan. Sebaliknya, DVLA menunjukkan kinerja yang stabil dengan Z-Score di atas 3,0, yang menandakan risiko kebangkrutan yang rendah. Model Zmijewski dan Grover mencatat fluktuasi dalam kesehatan keuangan KAEF, dengan peningkatan risiko kebangkrutan pada tahun 2023. DVLA menunjukkan stabilitas yang lebih besar, meskipun ada beberapa penurunan kecil dalam profitabilitas dan efisiensi. Model Springate dan Ohlson juga mengungkapkan fluktuasi yang signifikan di kedua perusahaan, terutama KAEF yang menghadapi tantangan besar pada tahun 2023. Namun, peningkatan yang signifikan di kedua perusahaan terlihat dalam berbagai aspek, meskipun DVLA secara keseluruhan menunjukkan stabilitas yang lebih kuat. Implikasi dari analisis menggunakan berbagai model (Altman, Zmijewski, Grover, Springate, dan Ohlson) menunjukkan adanya perbedaan dinamika kesehatan keuangan antara PT Kimia Farma Tbk (KAEF) dan PT Darya-Varia Laboratoria (DVLA) dari tahun 2020 hingga tahun 2023. KAEF mengalami penurunan yang signifikan pada tahun 2023, dengan Z-Score dan model lainnya menunjukkan adanya peningkatan risiko kebangkrutan, yang membutuhkan restrukturisasi keuangan dan peningkatan likuiditas, pengurangan utang, serta efisiensi operasional. Sementara itu, DVLA berkinerja baik dengan risiko kebangkrutan yang rendah, meskipun mengalami sedikit penurunan pada tahun 2023. Meskipun stabil, DVLA perlu fokus pada profitabilitas dan likuiditas untuk menjaga kesehatannya di masa mendatang.
Kata kunci: Kesulitan Keuangan; Model Alman; Zmijewski, Grover; Springate; Model Ohlson

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Abstract

This study aims to determine the potential for bankruptcy using the Altman Z-Score, Zmijeski, Grover, Springate, Ohlson analysis methods in companies listed on the Indonesian Sharia Stock Index (ISSI) from 2020 to 2023. The method used in this research is descriptive quantitative, with 2 (two) analysis methods, namely descriptive methods and quantitative methods. Using descriptive methods, namely researchers will describe the results of calculations with sentences stating whether the company is in a healthy or unhealthy condition in terms of its finances. While quantitative methods are used to measure data in the form of numbers / numeric on financial statements. The population used for this study are pharmaceutical sub-sector consumer goods sector manufacturing companies listed on the Indonesian Sharia Stock Index for the period 2020 - 2023 with a total of 2 companies. The sampling technique in this study used the Purposive Sampling method. The results of this study show that financial analysis of PT Kimia Farma Tbk (KAEF) and PT Darya-Varia Laboratoria Tbk (DVLA) using various bankruptcy prediction models shows significant differences in the financial performance of the two companies. The Altman model indicated KAEF experienced a sharp Z-Score decline by 2023, underscoring the need for financial restructuring. In contrast, DVLA showed a stable performance with a Z-Score above 3.0, signaling a low risk of bankruptcy. The Zmijewski and Grover models note fluctuations in the financial health of KAEF, with an increased risk of bankruptcy in 2023. DVLA showed greater stability, despite some small declines in profitability and efficiency. The Springate and Ohlson models also reveal significant fluctuations in both companies, especially KAEF which faces major challenges in 2023. However, significant improvements in both companies were seen in various aspects, although DVLA overall showed stronger stability. The implications of the analysis using various models (Altman, Zmijewski, Grover, Springate, and Ohlson) show differences in financial health dynamics between PT Kimia Farma Tbk (KAEF) and PT Darya-Varia Laboratoria (DVLA) from 2020 to 2023. KAEF experienced a significant decline in 2023, with Z-Score and other models indicating an increased risk of bankruptcy, requiring financial restructuring and increased liquidity, debt reduction, and operational efficiency. Meanwhile, DVLA is performing well with low bankruptcy risk, despite a small decline in 2023. Although stable, DVLA needs to focus on profitability and liquidity to maintain its health in the future.

Keywords: *Financial Distress; Alman Model; Zmijewski, Grover; Springate; Ohlson Model*

INTRODUCTION

Developing countries are characterized by a large dependence on technology and an increasingly sophisticated workforce, as evidenced by the number of companies growing and developing in Indonesia. Due to the large Muslim population in Indonesia, the sharia capital market is growing rapidly. One way to expand market share in the sharia financial sector is to implement sharia investment transactions in the capital market. Currently the Indonesian Stock Exchange (BEI) is the only legal entity in Indonesia that regulates capital market operations, systems and instruments. So that all capital market players can participate in the stock market index, the Indonesian Stock Exchange continues to strive to create and improve the stock market index. The Indonesia Sharia Stock Index (ISSI) is an index that tracks daily stock prices (DES) and global daily stock prices published by the Financial Services Authority (OJK).

The following is the trend of the Indonesian Sharia Index (ISSI) from 2020 to 2023.

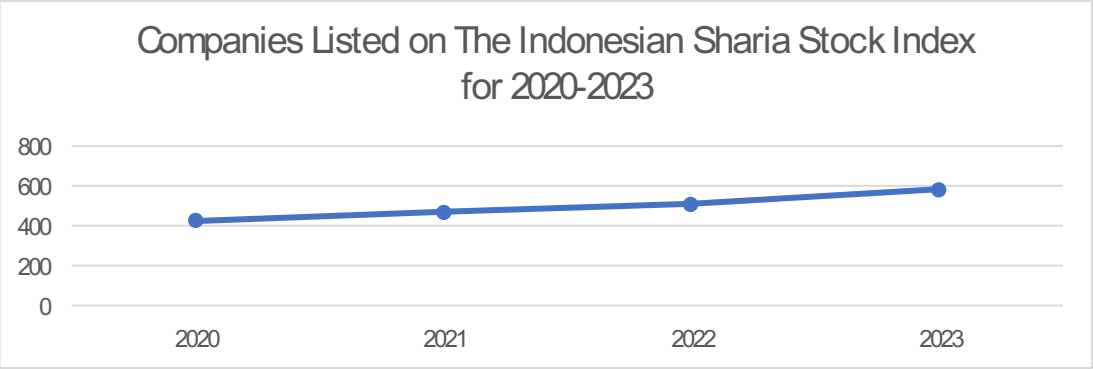

Figure 1. Companies Listed on The Indonesian Sharia Stock Index for 2020-2023

In the 2020–2023 period, the syariah stock index continued to rise. In 2020, there were 425 businesses, in 2021 there were 469, in 2022 there were 510, and in 2023 there were 583 businesses. With 270 million inhabitants, Indonesia is the most populous developing nation in Southeast Asia and the fourth most populous globally. Indonesia now has a market that is feasible for its producers. One of the most basic needs of the Indonesian people, being a developing nation, is healthcare. The world of health is inextricably linked to medicine and the pharmaceutical business. The pharmaceutical industry is a corporate enterprise that has obtained approval from the Minister of Health to manufacture medications or medicinal substances. Every year, human health demands expand, particularly in emerging nations with dense populations such as Indonesia.

Increased competition and changes in market conditions need producers to properly address and make company-related decisions. The results of analyzing the company's financial reports can be used to measure its performanceAn overview of the company's performance is provided by financial report analysis, and this picture can be used to project certain aspects of the business's finances in the future. aiming to keep the business from going bankrupt, and can act as a roadmap for managers, financiers, and entrepreneurs creating a policy.

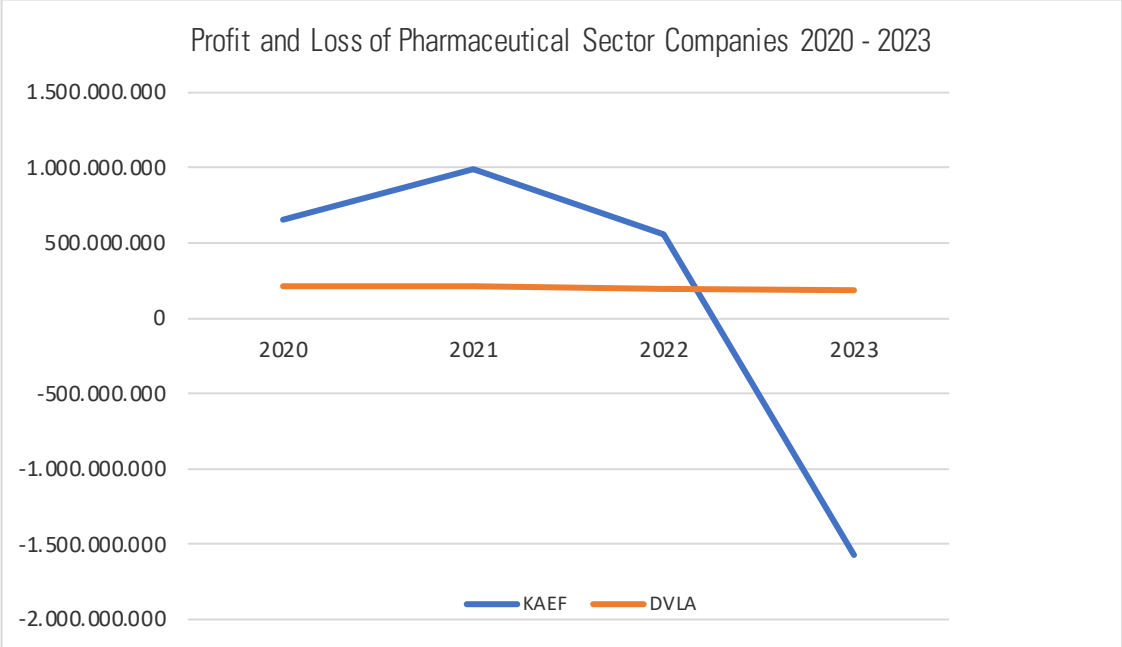

Figure 2. Profit and Loss of Pharmaceutical Sector Companies 2020 – 2023

The pharmaceutical sector companies included on the Indonesian Sharia Stock Index can see their profits (losses) rise and fall as seen in the graph above. Between 2020 and 2023, the profit (loss) of Kimia Farma Company (Persero) Tbk. (KAEF) fluctuated significantly. In 2020, the company's profit (loss) was IDR 653 million, and in 2021, it is projected to increase to Rp 985 million. Nevertheless, the company's earnings dropped from Rp. 558 million to Rp. -1.57 billion in 2022 and 2023. Meanwhile, Darya-Varia Laboratoria Tbk. (DVLA) reported a very steady profit (loss) between 2020 and 2023, with a profit (loss) of IDR. 210 million in 2020. The company's profits declined from 2021 to 2023, but not significantly.

Wahyuni & Rubiyah (2021) explain that a financial crisis occurs when a company's operational cash flow is insufficient to cover expenses such as rent and utilities, and the company must improve it. Ferbianasari (2020) identifies major issues that cannot be resolved without changing the size and function of the company. Bankruptcy is when a company is no longer able to operate, earn money, or pay its creditors.

Research has demonstrated that financial distress effects several areas of corporate performance and operations, including stock returns. In the downturn stage of the business life cycle, financial distress negatively affects stock returns, but financial stress can lessen this impact (Akhmad Sigit Adiwibowo et al., 2023). Furthermore, financial stress raises the sensitivity of investment cash flows (ICFS), which has a detrimental influence on business investments. As a result, cash flow is more crucial in investment decisions, particularly for financially pressured organizations (Gupta, G., & Mahakud, J. 2022). However, financial pressures and authority do not cause accountants to be more cautious in conservative accounting; the influence is limited to the accounting process (Meilinda et al., 2022). Knowing the impacts of stakeholders is critical for achieving the desired objectives. It is critical to understand the role that stakeholders play in achieving the intended outcomes. They must recognize the significance of taking proactive measures to solve and minimize financial issues (Sheng, 2023).

After analyzing the aforementioned challenges, Idi & Borolla (2021) discovered that the Altman Z Score enables organizations facing financial stress to predict the extent of financial stress they will encounter. Wahyuni & Rubiyah (2021) Altman's strategy is the best at predicting erratic economic conditions. But as previous studies on the application of the Altman

Z-score, Zmievsky, Grover, Springate, and Zavgren have shown, the Altman Z-score is not always the best method to predict financial troubles (Fahma Yoga Taufan & Setyaningsih Nina Dwi, 2019). The results of this investigation show that Zavgren's model is the most successful in foretelling financial catastrophes. Another finding was made by Lutfiyyah in additional investigation.

LITERATUE REVIEW

Financial Statement

Financial statements are reports that include comprehensive data on a financial company's cash flow, types of corporate expenditure, income, equity, liabilities, and assets. The purpose of financial statements is to give information and a summary of the performance and financial condition of the company. According to (IAI, 2021) financial statements aim to :

a. Provides information concerning the financial position, performance, and changes in the financial position of a company that is useful for a large number of users in making decisions.
b. Financial statements do not provide all the information users may need to make economic decisions because they generally describe financial effects and past events, and are not required to provide non-financial information.
c. Financial statements also show what management has done (stewardship), or management's responsibility for the resources entrusted to it.

Financial statements, as previously stated in the PSAK, include information that many stakeholders require in order to make decisions going forward, but they may not always contain all the information that users require. Analysis is required to provide such information. Interpret financial statements to provide stakeholders with information that helps develop company performance.

Bankruptcy & Financial Distress

In essence, businesses constantly aim to endure over the long term. But occasionally, market conditions shift, and when a business is thrown into a protracted crisis or declares bankruptcy, it can be challenging for them to adjust. Generally speaking, bankruptcy describes a company's incapacity to continue operating in order to make money (Yati & Afni Patunrui, 2017). A debtor who has two or more creditors and has not paid off at least one debt that is due and collectible may, at his own request or at the request of one or more creditors, have his debts ordered by the court. According to UU No37 (2004), bankruptcy is the general residue of the bankrupt debtor's assets, whose management and dissolution is carried out by a bankruptcy trustee under the supervision of a supervisory judge.

When a business is in financial difficulty, it means that it is having trouble making ends meet, has reduced profits, is unable to pay its debts, and its financial statements show a difference from the previous period's financial statements (Hanifah & Indrawati, 2022). Another way to characterize financial distress is when a business is having such serious cash flow issues that it is unable to conduct its activities as usual. According to Altman (1968) financial statement figures are expressed in a single number, the Z-score, which defines the level of financial distress and can be used to determine if a company is likely to go bankrupt.

METHOD

This study employs descriptive-quantitative research with two (2) analysis methodologies: descriptive methods and quantitative methods. Using descriptive approaches, researchers will express the outcomes of calculations in phrases that indicate whether the

company's finances are healthy or unhealthy. Quantitative approaches are used to measure data in the form of numbers or numerical values on financial accounts.
This study's population consists of pharmaceutical sub-sector consumer products manufacturing enterprises listed on the Indonesian Sharia Stock Index from 2020 to 2023, totaling two companies. This study's sample strategy was Purposive sample. Purposive sampling is a technique that allows researchers to select and collect samples based on certain criteria.
Characteristics or criteria utilized in this research sample method are:

1. Manufacturing companies listed on the Indonesian Sharia Stock Index (ISSI) for the period 2020 – 2023
2. Pharmaceutical sub-sector consumer goods sector companies listed on the Indonesian Sharia Stock Index during the research period 2020 - 2023.
3. Annual financial report data during the research period 2020 - 2023.

Based on the criteria set above, 2 pharmaceutical subsector companies listed in the Indonesian Sharia Stock Index (ISSI) were obtained. The number of observation years used in this study is 4 consecutive years starting from 2020-2023.

Table 1. Pharmaceutical Subsector Companies Listed in ISSI 2020 - 2023

No.	Code	Company
1.	KAEF	PT. Kimia Farma (Persero) Tbk.
2.	DVLA	PT. Darya-Varia Laboratoria Tbk

The operational definition of variables found items that are outlined in the research instrument. In this study, the Altman Z-Score, Zmijewski, Grover, Springate, and Ohlson methodologies are utilized to examine financial distress in companies listed on the Indonesian Sharia Stock Index (ISSI) from 2020 to 2023.

Table 2. Operational Definition of Variables

NO.	VARIABLE	MEASUREMENT	LITERATURE
1.	Altman Z-Score	Z = 1,2 (WCTA) + 1,4 (RETA) + 3,3 (EBITTA) + 0,6 (MVEBVL) + 1 (STA)	Altman, (1968)
2.	Zmijewski	X = -4,3 – 4,5X1 + 5,7X2 – 0,004X3	Zmijewski, (1983)
3.	Grover	G = 1,650X1 + 3,404X2 – 0,016X3 + 0,057	Pholen & Londe (1998)
4.	Springate	S = 1,03A + 3,07B + 0,66C + 0,4D	Altman, (1968)
5.	Ohlson	O = -1,32 -0,407X1 + 6,03X2 -1,43X3 + 0,0757X4 - 2,37X5 - 1,83X6 + 0,285X7 -1,72X8 - 0,521X9	Ohlson, (1980)

Research tools are used to determine the value of the variables being studied. The number of instruments employed is determined by the number of variables being studied. Research equipment is used to make measurements that are intended to produce accurate and precise quantitative data. Therefore, each instrument must have a clear scale.

Data analysis techniques on financial statements are used to measure, determine, and describe the likelihood of financial hardship in companies included on the Indonesian Sharia Stock Index (ISSI) from 2020 to 2023. The financial accounts of PT Indofarma Tbk for 2024 were obtained from the IDX website.

RESULTS AND DISCUSSIONS

Result

Altman's Z-Score Model

The following are the Z-Score values of pharmaceutical subsector companies listed on the Indonesian Sharia Stock Index from 2020 to 2023, calculated using five bankruptcy indicator variables.

Table 3. Altman Model Calculation

CODE	SCORE				PREDICTION STATUS
	2020	2021	2022	2023	
KAEF	1,053	1,361	1,084	0,176	Bankrupt
DVLA	3,670	3,642	3,984	3,837	Healthy

Based from author estimation (2024)

Zmijewski Model

Table 4 displays the results of study utilizing the Zmijewski method formula, which is based on yearly financial report data from companies listed on the Indonesian Sharia Stock Index (ISSI).

Table 4. Zmijewski Model Calculation

CODE	SCORE				PREDICTION STATUS
	2020	2021	2022	2023	
KAEF	4,076	3,917	2,438	5.699	Bankrupt
DVLA	-1,841	-1,718	-2,188	-2,043	Healthy

Based from author estimation (2024)

Grover Model

Table 5 displays the results of study utilizing the Grover approach formula, which is based on yearly financial report data from companies listed on the Indonesian Sharia Stock Index (ISSI).

Table 5. Grover Model Calculation

CODE	SCORE				PREDICTION STATUS
	2020	2021	2022	2023	
KAEF	0,118	0,273	0,186	-0,575	Bankrupt
DVLA	1,117	1,132	1,181	1,128	Healthy

Based from author estimation (2024)

Springate Model

Table 6 displays the findings of study utilizing the Grover approach formula, which is based on yearly financial report data from companies listed on the Indonesian Sharia Stock Index (ISSI).

Table 6. Springate Model Calculation

CODE	SCORE				PREDICTION STATUS
	2020	2021	2022	2023	
KAEF	0,307	0,519	0,298	-0,404	Bankrupt
DVLA	1,385	1,365	1,451	1,377	Healthy

Based from author estimation (2024)

Ohlson Model

Table 7 displays the findings of study utilizing the Grover approach formula, which is based on yearly financial report data from companies listed on the Indonesian Sharia Stock Index (ISSI).

Table 7. Ohlson Model Calculation

CODE	SCORE				PREDICTION
	2020	2021	2022	2023	STATUS
KAEF	-4,380	-4,520	-5,147	-4,469	Healthy
DVLA	-7,451	-7,592	-7,957	-7,107	Healthy

Based from author estimation (2024)

Discussions

Altman's Model

Table 8. Discussion (KAEF) Altman Model

Coefficient	2020	2021	2022	2023
1,2	-0,039	0,018	0,023	-0,2
1,4	0,001	0,017	-0,008	-0,142
3,3	0,037	0,055	0,027	-0,089
0,6	0,679	0,686	0,847	0,571
1	0,569	0,723	0,471	0,566
Results	**1,0531**	**1,3615**	**1,0847**	**0,1761**

Based from author estimation (2024)

The calculation results of PT Kimia Farma (Persero) Tbk (KAEF) show that the company's financial health has experienced several fluctuations over the years. The most alarming change occurred in 2023, where the Z-Score dropped dramatically, indicating a potential increase in financial risk.

A Z-score of 1.0531 shows that the company is in a bad situation. While not very high, the score is slightly above the threshold that indicates potential financial distress. The coefficient values indicate a reasonably balanced performance, with certain factors showing strengths multiplied by X4 (Market Value of Equity to Book Value of Liquidity) and X5 (Sales to Total Assets).

The Z-score rose to 1.3615, showing an improvement in financial stability. The coefficients that contributed to this gain included minor increases in most factors, particularly the components weighted X2 (Retained Earnings to Total Assets) and X3. This shows that the company's financial fundamentals improved over the year.

The Z-Score decreased slightly to 1.0847. While still above 1, this drop indicates that the financial health of the company took a slight hit. The X3-weighted coefficient dropped slightly, which may have contributed to the overall Z-Score decline. The other coefficients remained fairly stable, but the cumulative effect led to a lower Z-Score.

The Z-Score plummeted to 0.1761, indicating a severe deterioration in the company's financial health. This is a worrying development, as a Z-Score this low is often associated with companies facing significant financial difficulties or even the risk of bankruptcy. The weighted components X1 (Working Capital to Total Assets), X2 (Retained Earnings to Total Assets), and X3 (Earning Before Interest Tax to Total Assets) all fell sharply, significantly lowering the overall Z-Score.

Table 9. Altman Model Discussion (DVLA)

Coefficient	2020	2021	2022	2023
1,2	0,425	0,446	0,48	0,458
1,4	0,49	0,494	0,529	0,525
3,3	0,106	0,1	0,098	0,093
0,6	2,008	1,958	2,318	2,202
1	0,92	0,911	0,954	0,925
Results	**3,6706**	**3,6426**	**3,9848**	**3,8377**

Based from author estimation (2024)

The calculation results on PT Darya-Varia Laboratoria Tbk (DVLA) for these four years show that the company is in a fairly good condition in terms of finance. A Z-Score value above 3.0 generally signifies a company that is financially stable and has a low risk of bankruptcy. However, although this Z-Score value is quite high, there are fluctuations that indicate changes in the company's financial condition during this period.

In 2020, the Z-Score value of 3.6706 indicates that the company is in good financial condition.

The largest contribution comes from the coefficient with a weight of 0.6 (possibly related to leverage or efficient use of assets) which is worth 2.008. This indicates that the company in that year was able to manage its assets and liabilities effectively. The other coefficients, especially those related to liquidity and profitability, also make positive contributions.

In 2021, the Z-Score experienced a slight decrease to 3.6426. Although the decrease is not significant, it indicates a slight decline in the financial aspects of the company. The weighted coefficient of 0.6 dropped from 2.008 to 1.958, which may indicate a slight decline in asset management efficiency or an increase in liabilities. However, overall, the company remains in a financially sound condition.

In 2022, the Z-Score increases significantly to 3.9848, which is the highest value in the analyzed period. This increase can be attributed to the increase in the weighted coefficient of 0.6 which rose to 2.318. This indicates that the company managed to improve operational efficiency or reduce liabilities, which contributed significantly to the increase in Z-Score. In 2023, the Z-Score experienced a slight decrease to 3.8377. This decline may be due to a decrease in the coefficient with a weight of 3.3, which dropped from 0.098 to 0.093. Nevertheless, this Z-Score still indicates that the company is in a financially sound condition.

Zmijewski Model

Table 10. Discussion (KAEF) of Zmijeski Model

Coefficient	2020	2021	2022	2023
-4,3				
4,5	0,001	0,016	-0,005	-,006
5,7	1,471	1,455	1,179	1,75
0,004	0,897	1,054	1,058	0,625
Result	**4,076612**	**3,917284**	**2,438568**	**5,6995**

Based from author estimation (2024)

The result value of PT Kimia Farma (Persero) Tbk (KAEF) shows fluctuations in the company's financial health during the analyzed period. The year 2022 recorded a significant

decline in the Zmijewski result, which may indicate an increase in financial risk in that year. However, in 2023, the result increased sharply, which could signal a substantial improvement in the company's financial health.

In 2020, the company showed a fairly good performance with a Z-Score of 4.076612. X2, which has a value of 1.471, shows that the company has a healthy capital structure with controlled leverage. While X1 is only worth 0.001, which may indicate low profitability, X3 which is worth 0.897 indicates good operational efficiency.

In 2021, Zmijewski's result decreased slightly to 3.917284. This decrease is mainly due to a small drop in X2 from 1.471 to 1.455, although X1 saw a small increase to 0.016. Nonetheless, the company is still in a relatively stable condition, with a low risk of bankruptcy.

The year 2022 recorded a significant drop in Z-Score to 2.438568. This decrease is mainly due to X1 becoming negative (-0.005), which indicates that the company may be experiencing losses or liquidity issues. X2 also saw a significant drop to 1.179, indicating increased leverage or a substantial decrease in equity. X3 remained stable, indicating that despite problems with profitability and leverage, operational efficiency remains good.

In 2023, there is a sharp increase in the Z-Score to 5.6995. X1 is still negative (-0.006), which suggests that the company may still face challenges in profitability or liquidity. However, the significant increase in X2 to 1.75 suggests that the company has managed to improve its capital structure, possibly through debt reduction or equity increase. X3 decreased to 0.625, indicating a decline in operational efficiency.

Table 11. Discussion (DVLA) Zmijewski Model

Coefficient	**2020**	**2021**	**2022**	**2023**
-4,3				
4,5	0,081	0,07	0,074	0,071
5,7	0,497	0,51	0,431	0,454
0,004	2,519	2,565	3,001	2,857
Result	**-1,841676**	**-1,7183**	**-2,1883**	**-2,043**

Based from author estimation (2024)

The negative value in the result of PT Darya-Varia Laboratoria Tbk (DVLA) indicates that the company is in a relatively good condition and has a lower risk of bankruptcy. The more negative the result, the smaller the company's bankruptcy risk.

In 2020, Zmijewski's result was at -1.841676. This negative value indicates that the company has a relatively low risk of bankruptcy. X1 shows that profitability or liquidity is at a fairly good level, while X2 and X3 show that the capital structure and operational efficiency are also in a stable condition.

In 2021, Zmijewski's result increased slightly to -1.71826, indicating a slight deterioration in the company's financial condition. X1 and X2 show a slight decrease in profitability and leverage, while X3 shows a slight increase in operational efficiency. Despite this, the company remains in a relatively safe condition.

The year 2022 recorded an increase in the Zmijewski result to -2.188304, indicating that the risk of bankruptcy decreased. The increase in the value of X3 indicates that the company has managed to improve its operational efficiency, while X1 and X2 show a slight decrease in profitability and leverage.

In 2023, the Zmijewski score improved slightly to -2.043128. X1 decreased slightly to 0.071, which may indicate a further decline in profitability or liquidity. X2 increased slightly to 0.454, indicating a slight improvement in the company's capital structure. However, the small decline in X3 to 2.857 may indicate that the company is starting to face challenges in maintaining its operational efficiency.

Grover Model

Table 12. Discussion (KAEF) of Grover Model

Coefficient	2020	2021	2022	2023
1,65	-0,039	0,018	0,023	-0,2
3,404	0,037	0,055	0,027	-0,089
0,016	0,001	0,016	-0,005	-0,006
0,057				
Result	**0,118582**	**0,273664**	**0,186938**	**-0,57586**

Based from author estimation (2024)

The results of the Grover Model for the company KAEF show significant fluctuations from year to year. The positive values from 2020 to 2022 indicate that the company is in a relatively stable financial position, despite some changes in its financial strength. However, the sharp decline to negative values in 2023 is an important indication that the company is facing serious financial challenges, which may increase the risk of bankruptcy.

In 2020, Grover's result shows a positive value of 0.118582, which indicates that the company is in a relatively stable financial condition with a low risk of bankruptcy. Although X1 is slightly negative (-0.039), the positive values of X2 (0.037) and X3 (0.001) indicate that the company has a fairly good capital structure and stable operational efficiency.

In 2021, Grover's result increased to 0.273664, indicating an improvement in the company's financial condition. This improvement is mainly due to an increase in X1 to 0.018 and X2 to 0.055. This increase in profitability and leverage indicates that the company managed to increase its profits and improve its capital structure, while X3 remained stable.

In 2022, Grover's result decreased slightly to 0.186938. This decrease is mostly due to a small decrease in X2 to 0.027, although X1 saw a slight increase to 0.023. This decrease indicates that although the company's profitability increased slightly, there was an increase in leverage which may indicate an increase in financial risk. However, the still positive Grover's result suggests that the company is still in a relatively good financial position.

In 2023, there is a sharp decline in Grover's result to -0.57586, indicating that the company faces serious financial challenges and an increased risk of bankruptcy. This decline is due to a significant drop in X1 to -0.2 and X2 to -0.089, as well as a drop in X3 to -0.006. The decrease in profitability and the increase in leverage indicate that companies may face problems in generating enough profit and managing their debt, which increases the risk of bankruptcy.

Table 13. Discussion of (DVLA) Grover Model

Coefficient	2020	2021	2022	2023
1,65	0,425	0,446	0,48	0,458
3,404	0,106	0,1	0,098	0,093
0,016	0,081	0,07	0,074	0,071
0,057				
Result	**1,117778**	**1,13218**	**1,181408**	**1,12814**

Based from author estimation (2024)

The sharp drop of 74.24% from 2020 to 2021 indicates that X1 underwent significant changes that reduced its contribution to the final result. This may indicate that the factors

affecting X1 underwent major changes or that the calculations for X1 underwent significant revisions. The increase of 4.94% from 2021 to 2022 shows that although X1 is still at a lower level compared to 2020, there is a small recovery. This indicates that the contribution of X1 is starting to increase again, but has not fully recovered from the previous decline. The small decrease of 2.68% from 2022 to 2023 shows that X1 has decreased again, although not significantly.

The huge drop of 96.9% from 2020 to 2021 shows that X2 had a very large contribution in 2020 but hardly contributed in 2021. This change is very significant and indicates a possible major change in the factors affecting X2 or a change in the way X2 is measured or applied. The decrease of 5.66% from 2021 to 2022 shows that the contribution of X2 has slightly decreased after the large decrease in 2021. This suggests that although X2 remains low, there is a slight further decline in its contribution. A decrease of 7% shows that X2 continues to decline. The contribution of X2 continues to decrease year on year, suggesting that the factors affecting X2 may have undergone a sustained decline.

The increase of 406.25% from 2020 to 2021 shows that X3 experienced a very significant increase from 2020 to 2021. Although the contribution of X3 remained relatively small, this large increase indicates that X3 became more relevant or more optimized in 2021. The decrease of 13.58% from 2021 to 2022 shows that X3's contribution decreased slightly after the large increase in 2021. Although this decrease is not very large, it shows that although X3 is still relevant, its contribution has decreased. A small decrease of 1.43% from 2022 - 2023 shows that X3's contribution is relatively stable, with minor fluctuations in the latter years.

Springate Model

Table 14. Discussion (KAEF) Springate Model

Coefficient	**2020**	**2021**	**2022**	**2023**
1,03	-0,039	0,018	0,023	-0,2
3,07	0,037	0,055	0,027	-0,089
0,66	0,01	0,065	0,006	-0,23
0,4	0,569	0,723	0,471	0,566
Result	**0,30762**	**0,51949**	**0,29894**	**-0,40463**

Based from author estimation (2024)

The 1.29% increase in the final outcome indicates a small improvement in the company's financial health from 2020 to 2021. While this change is not significant, it reflects positive adjustments in the variables that affect the final outcome. This improvement comes from small improvements in operational efficiency, increased revenue, or decreased costs. The 4.35% increase in the final result represents a more substantial improvement compared to the previous year. This suggests that the company experienced a more significant improvement in its financial health. Factors that may have influenced this increase include revenue growth, better cost efficiency, or improvements in the aspects measured by coefficients X1, X2, and X3. A decrease of 4.52% indicates that the financial health of the company decreased from 2022 to 2023. This decrease indicates that there is a negative change in the factors that affect the final outcome. This could be due to a decrease in revenue, an increase in costs, or a decline in operational efficiency. The decline may also reflect challenges or issues that arise in 2023 that affect the final outcome.

Table 15. Discussion (DVLA) Springate Model

Coefficient	2020	2021	2022	2023
1,03	0,425	0,446	0,48	0,458
3,07	0,106	0,1	0,098	0,093
0,66	0,385	0,355	0,416	0,379
0,4	0,92	0,911	0,954	0,925
Result	**1,38527**	**1,36508**	**1,45142**	**1,37739**

Based from author estimation (2024)

The 1.45% drop in the final result from 2020 to 2021 indicates a slight deterioration in the company's financial health. While this drop is not very large, it may indicate a challenge or decline in efficiency over the period. Factors affecting this decline need to be further examined to understand the cause, such as changes in profitability, operational efficiency, or costs. A 6.33% increase in the final result from 2021 to 2022 indicates a significant improvement in the company's financial health. This increase could reflect an increase in profitability, operational efficiency, or a decrease in costs. This increase indicates that the company was able to overcome the challenges faced in the previous year and show progress in its financial performance. A decrease of 5.11% from 2022 to 2023 indicates that the company's financial health has regressed in the final year. This decline may reflect emerging issues in 2023, such as decreased revenue, increased costs, or decreased operational efficiency. This decline suggests that the company may face serious challenges that need to be overcome to restore financial performance.

Ohlson Model

Table 16. Discussion (KAEF) Ohlson Model

Coefficient	2020	2021	2022	2023
-1,32				
0,407	16,584	15,551	16,153	13,241
6,03	0,595	0,592	0,541	0,636
1,43	-0,039	0,018	0,023	-0,2
0,0757	1,113	0,948	0,944	1,598
2,37	0	0	0	0
1,83	0,001	0,016	-0,005	-0,103
0,285	0,097	-0,021	0,004	-0,032
1,72	0	0	1	1
0,521	0,124	0,868	-2,219	0,886
Result	**-4,3806029**	**-4,5209664**	**-5,1470812**	**-4,4692744**

Based from author estimation (2024)

The 3.20% decrease in the final O-Score from 2020 to 2021 shows that there was a slight decrease in the score indicating an increased risk of bankruptcy. This change indicates that the company's financial health declined slightly in 2021. This decline can be caused by various factors, such as a decrease in revenue, an increase in operating expenses, or other factors that

affect the company's liquidity and solvency. The 13.85% decrease in the final O-Score from 2021 to 2022 represents a significant drop in the score indicating an increased risk of bankruptcy. This decline may reflect serious problems in the company's financial health, such as a sharp drop in revenue, an increase in debt, or liquidity issues. This significant drop indicates that the company may face major challenges in maintaining its financial stability. The 13.17% increase in the final O-Score from 2022 to 2023 shows an improvement in the score, indicating a decrease in bankruptcy risk. While the score is still negative, this improvement shows that the company has made progress in improving its financial health. This improvement could be due to increased revenue, better debt management, or improved operational efficiency.

Table 17. Discussion (DVLA) of Ohlson Model

Coefficient	**2020**	**2021**	**2022**	**2023**
-1,32				
0,407	18,760	18,265	15,943	15,377
6,03	0,332	0,338	0,301	0,312
1,43	0,425	0,446	0,48	0,458
0,0757	0,396	0,389	0,333	0,349
2,37	0	0	0	0
1,83	0,081	0,07	0,074	0,071
0,285	0,161	0,617	-0,026	0,171
1,72	0	0	1	0
0,521	-0,35	0,606	-1,076	1,344
Result	**-7,4511278**	**-7,5920287**	**-7,9571969**	**-7,1070187**

Based from author estimation (2024)

The decrease in the final O-Score of 1.89% from 2020 to 2021 indicates that the company experienced a small decrease in the score which indicates an increased risk of bankruptcy. This decline reflects that the factors affecting the company's financial health deteriorated slightly in 2021. Possible causes include decreased revenue, increased operating expenses, or decreased efficiency. The 4.81% decrease in the final O-Score from 2021 to 2022 indicates a larger decrease in the score, which signifies an increased risk of bankruptcy. This decrease indicates that the company faces greater challenges in this period, such as a decrease in revenue or a significant increase in debt burden. These significant changes require special attention as they may indicate structural issues within the company. The 10.68% increase in the final O-Score from 2022 to 2023 shows an improvement in the score indicating a decrease in bankruptcy risk. While the score remains negative, this improvement shows that the company has made progress in improving its financial health. This increase could be due to improvements in earnings, a reduction in debt burden, or improved operational efficiency.

Rofi et al., (2024) conducted a study on financial distress analysis at PT. Indofarma Tbk. In their study, it was stated that the high total liabilities were not comparable to the assets managed, and the working capital management carried out by PT Indofarma Tbk was not optimal, as indicated by negative figures. This is in line with the company Kimia Farma (Persero) Tbk which also experienced the same financial problems. Research conducted by Damayanti et al., (2023) is also in line with this research, they conducted research discussing financial distress analysis using the Zmijewski and Grover models in transportation and logistics sub-sector companies listed on the IDX, from their research it shows that the Zmijewski model has the highest level of accuracy of 38.88% with a type error of 61.11% and the Grover model has an accuracy level of 27.77% and has a type error of 72.22%. Isal et al., (2024) conducted a study that showed that Kimia Farma (Persero) Tbk. (KAEF) was

categorized as bankrupt during 2020-2023 because it had a high level of liabilities, while PT. Darya-Varia Laboratoria Tbk. (DVLA) was categorized as healthy based on analysis using the Altman model. Meanwhile, analysis using the Ohlson model for both companies stated that they were categorized as healthy during 2020-2023.

CONCLUSION

Altman Model

A Z-Score analysis of PT Kimia Farma Tbk. over four years shows a company that initially maintained a stable financial position, but experienced significant difficulties in 2023. The sharp decline of the Z-Score in that year highlights the need for urgent financial restructuring and strategic alignment to avoid further deterioration. The company should take immediate steps to address the weaknesses revealed by the Z-Score, focusing on improving liquidity, reducing debt, and increasing profitability. The analysis on PT Darya-Varia Laboratoria shows excellent financial performance over the period 2020 to 2023, with a Z-Score consistently above 3.0. This signifies that the company has a very low risk of bankruptcy, which is a positive indicator for investors and other stakeholders. The increase in Z-Score in 2022 to 3.9848 highlights a period where the company managed to significantly improve its efficiency and profitability. Despite a small decline in 2023, the company remains in a financially sound condition.

Zmijewski Model

Analysis of the Zmijewski model on KAEF from 2020 to 2023 shows fluctuations in the company's financial health. While there was a significant increase in 2023 indicating an improvement in the risk of bankruptcy, the decrease in 2022 indicates expanded attention to the aspects of profitability, liquidity, and operational efficiency. With the right strategy, KAEF can strengthen its financial position and reduce the risk of bankruptcy in the future. Analysis of Zmijewski's results for the period 2020 to 2023 on DVLA shows fluctuations in financial condition. Although the results remain negative with a low risk of bankruptcy, the decline in profitability and liquidity deserves special attention. The improvement in operational efficiency is very positive, but the company must remain alert to potential future challenges. With the right strategy, DVLA can strengthen its financial position and keep the risk of bankruptcy low.

Grover Model

Analysis of the Grover Model results on KAEF from 2020 to 2023 shows changes in the company's financial condition. While the positive results from 2020 to 2022 indicate relative stability, the sharp decline in 2023 indicates serious financial challenges that increase the risk of bankruptcy. The company should take proactive measures to increase profitability, manage leverage, and improve operational efficiency to reduce risks and strengthen its financial position in the future. DVLA company data shows that Grover's final results increased from 2020 to 2022, but experienced a small decline in 2023. These fluctuations may be influenced by changes in the coefficients of variables X1, X2, and X3. Significant decreases in X1 and X2 may indicate changes in external or internal factors, or changes in measurement methods. It is important to investigate the causes of large changes in X1 and X2, including market factors, policies, or internal conditions. Meanwhile, X3 showed consistent stability. While the final results show a positive trend until 2022, the decline in 2023 requires further evaluation to understand the influencing factors and for future optimization.

Springate Model

The results of KAEF's analysis show fluctuations in the company's financial health from 2020 to 2023. From 2020 to 2021, there was a small improvement of 1.29%, indicating a minor increase

in operational efficiency or a decrease in costs. From 2021 to 2022, the financial health improved significantly with an increase of 4.35%, signaling substantial progress thanks to revenue growth or better cost efficiency. However, from 2022 to 2023, there was a decline of 4.52%, indicating new problems or declining revenues, increasing costs, or declining operational efficiency. DVLA's analysis also shows similar fluctuations. From 2020 to 2021, there was a decline of 1.45%, signaling a minor setback that may have been caused by a decline in efficiency or profitability. However, from 2021 to 2022, there was a significant increase of 6.33%, indicating an improvement in profitability or efficiency. The 5.11% decline from 2022 to 2023 indicates a larger setback, possibly due to a decrease in revenue or an increase in costs, indicating serious challenges that need to be addressed to restore the company's financial health..

Ohlson Model

KAEF's analysis shows significant fluctuations in the company's financial health between 2020 and 2023. Declines in 2021 and 2022 indicate major challenges, including declining revenue and liquidity issues. However, the rise in 2023 indicates improvement and progress in overcoming these challenges. Companies need to continue monitoring financial risks to ensure long-term stability. The O-Score analysis on DVLA shows significant changes in the company's bankruptcy risk over the same period. A decrease of 1.89% from 2020 to 2021 indicates an increased risk of bankruptcy. A larger decline of 4.81% from 2021 to 2022 reflects more serious challenges, such as declining revenue or increasing debt. A 10.68% increase from 2022 to 2023 indicates an improvement in bankruptcy risk, likely due to increased revenue or operational efficiency.

Based on the calculation results using 5 potential bankruptcy analysis models, the company is threatened with bankruptcy in a matter of years. Corrective or preventive action must be taken by management to avoid bankruptcy at all costs. Investors should choose companies with good financial performance for safer and more selective investment decisions.
Future researchers are advised to use several types of analysis as comparative material to increase the accuracy of the analysis. The company period needs to be extended and updated to make the research results more accurate. Apart from looking at the company's internal factors, external factors that can trigger bankruptcy also need to be considered.

REFERENCES

Akhmad Sigit Adiwibowo, Rohmah, D. S., & Nurmala, P. (2023). The Role of Financial Distress on Company Life Cycle and Stock Return. *JAK (Jurnal Akuntansi) Kajian Ilmiah Akuntansi*, *10*(2), 283–295. https://doi.org/10.30656/jak.v10i2.6222

Article, R. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal OfFinance*, *23*(10), 589–609.

Damayanti, V. S., Suharti, T., & Diah, Y. (2023). *ANALISIS FINANCIAL DISTRESS DENGAN MENGGUNAKAN MODEL ZMIJEWSKI DAN GROVER PADA PERUSAHAAN SUB SEKTOR TRANSPORTASI DAN LOGISTIK YANG TERDAFTAR DI BEI*. *5*(2), 1–14. https://www.ncbi.nlm.nih.gov/books/NBK558907/

Ferbianasari, H. N. (2020). Analisis Penilaian Financial Distress Menggunakan Model Altman (Z-Score) Pada Perusahaan Kosmetik Yang Tercatat Di Bursa Efek Indonesia. *Jurnal Mahasiswa Universitas Negeri Surabaya*, *1*(2), 274–282.

Hanifah, S. N., & Indrawati, L. (2022). Pengaruh Rasio Keuangan Terhadap Financial Distress. *Indonesian Accounting Literacy Journal*, *2*(2), 286–296. https://doi.org/10.35313/ialj.v2i2.3422

IAI. (2021). *Amandemen PSAK 1 Penyajian Laporan Keuangan Tentang Pengungkapan Kebijakan Akuntansi*. http://iaiglobal.or.id/v03/files/file_berita/[Draf] Amendemen PSAK 1.pdf

Idi, C. M., & Borolla, J. D. (2021). Analisis Financial Distress Menggunakan Metode Altman Z–Score pada PT. Golden Plantation Tbk. Periode 2014-2018. *PUBLIC POLICY (Jurnal*

Aplikasi Kebijakan Publik & Bisnis), *2*(1), 102–121. https://doi.org/10.51135/publicpolicy.v2.i1.p102-121

Meilinda, Susanti, S., & Zulaihati, S. (2022). Impact of Leverage and Financial Distress on Accounting Conservatism. *Marginal : Journal of Management, Accounting, General Finance and International Economic Issues*, *2*(1), 126–139. https://doi.org/10.55047/marginal.v2i1.367

Ohlson, J. A. (1980). Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research*, *18*(1), 109. https://doi.org/10.2307/2490395

Pholen, T., & Londe, B. (1998). Reproduced with permission of the copyright owner . Further reproduction prohibited without. *Journal of Allergy and Clinical Immunology*, *130*(2), 556. http://dx.doi.org/10.1016/j.jaci.2012.05.050

Rofi, M., Al, U., & Paramitha, D. A. (2024). *Kilisuci International Conference on Economic & Business Financial Distress Analysis Using the Altman Z-Score Method at PT . Indofarma Tbk Period 2019 to 2022 Kilisuci International Conference on Economic & Business Vol . 2 Tahun 2024*. *2*, 123–131.

Saputro, A. F., Mubarrok, U. S., & Kediri, U. I. (2024). *Financial Distress Analysis Using the Altman Z-Score and Ohlson Methods on Companies Listed on the Indonesian Sharia Stock Index for 2020-2023*.

Sheng, Z. (2023). The Impact of Financial Distress on Corporate Performance in the Chinese Securities Market. *Journal of Digitainability, Realism & Mastery (DREAM)*, *2*(05), 33–37. https://doi.org/10.56982/dream.v2i05.110

UUNo37. (2004). Undang-Undang Republik Indonesia Nomor 37 Tahun 2004 Tentangkepailitan Dan Penundaan Kewajiban Pembayaran Utang. *Database Peraturan Bpk Ri*, 55. https://peraturan.bpk.go.id/Home/Details/40784

Wahyuni, S. F., & Rubiyah. (2021). Analisis Financial Distress Menggunakan Metode Altman Z-Score, Springate, Zmijeski dan Grover pada Perusahaan Sektor Perkebunan yang Terdaftar di Bursa Efek Indonesia. *MANIEGGIO: Jurnal Ilmiah Magister Manajemen*, *4*(1), 62–72.

Yati, S., & Afni Patunrui, K. I. (2017). Analisis Penilaian Financial Distress Menggunakan Model Altman (Z-Score) Pada Perusahaan Farmasi Yang Terdaftar Di Bursa Efek Indonesia Periode 2013-2015. *Jurnal Akuntansi, Ekonomi Dan Manajemen Bisnis*, *5*(1), 55. https://doi.org/10.30871/jaemb.v5i1.275

Zmijewski, M. E. (1983). *Essays on Corporate Bankruptcy*. *Ph.D.*, 400 p. http://search.proquest.com/docview/303195535?accountid=12045%5Cnhttp://sfx.leidenuniv.nl/sfx_local?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&genre=dissertations+&+theses&sid=ProQ:ProQuest+Dissertations+&+Theses+A&I&atitle=&title=ES