Predicting the Possibility of Bankruptcy in Coal Mining Company: Springate S-Score Method

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Abstract:- **The purpose of this study predicts an early signal of bankruptcy with the Springate S-Score model for coal mining companies listed on the Indonesia Stock Exchange for the 2013-2017 period. The analysis shows that there are four companies included in the healthy category, namely PT. Indo Tambangraya Megah Tbk, PT. Resource Alam Indonesia Tbk, PT. Samindo Resources Tbk, and PT. Toba Bara Sejahtera Tbk. While the three companies that are always in the distress zone or potential bankruptcy are PT. Darma Henwa Tbk, PT. Atlas Resources Tbk and PT. Bumi Resources Tbk. While the remaining PT. Bayan Resources Tbk, PT. Delta Dunia Makmur Tbk, and PT. Harum Energy Tbk is predicted to be in the gray zone.**

Keywords:- Bankruptcy, Springate S-Score, Mine company were listed on the Indonesia Stock Exchange.

I. INTRODUCTION

The performance of the Indonesian economy in recent years has shown unsatisfied results. The seven percent economic growth target planned by the government in the last five years actually slows to around 5 - 5.3 percent (from the previous 6 percent) per year [1]. Indonesia bears a heavy burden due to the influence of global economic uncertainty. The economic crisis that hit countries in Europe and the decline in world oil prices due to the political crisis in the Middle East impacted the national economy. The main factor causing the decline in growth was due to declining performance in the mining and oil and gas sectors as the mainstay sector. Pricewaterhouse Cooper (PwC) said that as many as 40 global mining companies suffered the biggest losses in history during 2015. PwC also concluded that the market capitalization of national mining companies listed on the Indonesia Stock Exchange declined by 37 percent, resulting in negative growth. So companies operating in these fields do not escape the potential for bankruptcy [2]. Although in mid-2019, the mining sector index strengthened by 4.7 percent due to the increase in several commodities including coal. But its performance is still negative at 5.5 percent since the beginning of the year [3].

Factors causing company bankruptcy can be caused by external factors (economic conditions, political conditions, and natural disasters) and internal factors (company performance, company policy, and corporate culture). The bankruptcy of a company begins with the transfer of financial difficulties. Financial difficulties of a company can cause more quickly (solvency) lead to the bankruptcy of a company. Detection of initial financial conditions, allows companies to take quick and strategic actions.

The company must be able to identify signs of potential bankruptcy as early as possible. The Springate Score is one model that can be used to evaluate the possibility of company bankruptcy developed from the Altman model by Gordon L.V. Springate [4]. The Springate S-score is still a less popular model for bankruptcy predictions than the Altman, Zmijeweski or Grover models, so there is still limited research using this model. According to [5] the Springate bankruptcy prediction model is better than the Modified Altman, Zmijeweski and Grover models. This bankruptcy calculation model is important for investors and corporate creditors (as well as owners), because it provides information about the company regarding bankruptcy considerations.

Research using the Springate S-Score analysis to predict the potential bankruptcy of mining sector companies in the coal mining sub-sector is still very limited. [6], for example, researching the potential for bankruptcy in Property and Real Estate companies listed on the Indonesia Stock Exchange (IDX). Whereas [7] examines the condition of bankruptcy of coal mining companies using a comparison of the Altman Z-Score and Zmijewski methods. Erdem and Türk [8] measured the level of financial failure from 7 different sectors in the BIST index in the 2014-2016 period measured by the Altman (Z-Score) and Springate (S-Score) models. As a result, the Altman model shows that 69 percent of companies are not under financial pressure, while the Springate model shows that 57 percent of companies. Both models show different levels of financial failure. According to [5] the Springate bankruptcy prediction model is better than the Modified Altman, Zmijeweski and Grover models. Previous research shows that there is a gap in the use of the Springate (S-Score) model, especially not many have examined it in coal mining companies listing on the Indonesia Stock Exchange IDX. This background motivates me to conduct this research by focusing on the use of the Springate model (S-Score) in predicting the bankruptcy of coal companies listed on IDX.

II. LITERATURE REVIEW

The financial statements report the activities that have been carried out by the company in a certain period. These activities are then poured into numbers in the form of both rupiah and foreign currencies [9].

The purpose of the Financial Statements stated in the Financial Accounting Standards is to provide information regarding the financial position, performance, and changes in the financial position of a company that is beneficial for a large number of users in making economic decisions [10].

According to [9] There are two types of financial statement analysis methods commonly used, namely:
1. Vertical Analysis (Static), vertical analysis is an analysis of only one financial statement period.
2. Horizontal Analysis (Dynamic), horizontal analysis is an analysis conducted by comparing financial statements for several periods.

Financial failure (financial distress) or insolvency takes two forms, namely technical defaults that occur when a company fails to meet one or more conditions in its debt provisions, such as the ratio of current assets to current liabilities, and financial failures or technical insolvency) which occurs when a company is unable to meet its obligations at the specified time [11].

III. METHOD

This research is a quantitative descriptive study using secondary data. The secondary data used in the form of financial ratios in the financial statements of each coal mining company listed on IDX with a population of 22 companies and researchers using a sample of 10 companies with a simple random sampling method, namely:
1. PT. Atlas Resources Tbk;
2. PT. Bumi Resources Tbk;
3. PT. Bayan Resources Tbk;
4. PT. Darma Henwa Tbk;
5. PT. Delta Dunia Makmur Tbk;
6. PT. Harum Energy Tbk;
7. PT. Indo Tambangraya Megah Tbk;
8. PT. Resource Alam Indonesia Tbk;
9. PT. Samindo Resources Tbk; dan
10. PT. Toba Bara Sejahtera Tbk.

Data were analyzed using the Springate S-Score method. Springate [4] uses four financial ratios that can be combined to be able to see the difference between a healthy company and an unhealthy company. The discriminant function proposed by Springate is as follows.

$$Si = 1{,}03\, x_1 + 3{,}07\, x_2 + 0{,}66\, x_3 + 0{,}4\, x_4 \quad (1)$$

Where:
Si = *S-Score Year -I*
x_1 = *Working Capital to Total Assets*

$$\frac{Working\ Capital}{Total\ Assets}$$

x_2 = *Earning Before Interest and Taxes to Total Assets*

$$\frac{Earning\ Before\ Interest\ and\ Taxes}{Total\ Assets}$$

x_3 = *Earning Before Taxes to Current Liabilities*

$$\frac{Earning\ Before\ Taxes}{Current\ Liabilities}$$

x_4 = *Sales to Total Assets*

$$\frac{Sales}{Total\ Assets}$$

With the evaluation criteria (Cut-Off Point) as follows.

1. S-Score <0.862 Showing indications that the company is facing financial distress.
2. 0.862 <S-Score <1.062 means that the company is in the gray area which shows that the company is in a vulnerable condition (gray area).
3. S-Score> 1,062 Shows the company is in a healthy financial condition and has no problems with finance [4].

IV. RESULTS AND DISCUSSION

The results of this study are the calculation of ratio analysis of coal mining companies listed on IDX, which were sampled as many as 10 companies from 2013-2017 as presented in the following section.

Corporate	Springate S-Score Analysis				S-Score Value $S = 1,03 X_1 + 3,07 X_2 + 0,66 X_3 + 0,4 X_4$	Classification
	X1	X2	X3	X4		
PT. Atlas Resources Tbk	- 0,398	- 0,044	- 0,092	0,363	- 0,461	Distress Zone
PT. Bumi Resources Tbk	- 0,500	- 0,017	- 0,251	0,012	- 0,726	Distress Zone
PT. Bayan Resources Tbk	0,027	- 0,019	- 0,157	0,732	0,158	Distress Zone
PT. Darma Henwa Tbk	0,084	- 0,017	- 0,064	0,164	0,056	Distress Zone
PT. Delta Dunia Makmur Tbk	0,113	0,016	- 0,094	0,642	0,360	Distress Zone
PT. Harum Energy Tbk	0,426	0,135	0,738	1,763	2,046	Safe Zone
PT. Indo Tambangraya Megah Tbk	0,175	0,223	0,789	1,640	2,041	Safe Zone
PT. Resource Alam Indonesia Tbk	0,194	0,238	0,898	1,824	2,253	Safe Zone
PT. Samindo Resources Tbk	0,219	0,423	0,295	0,541	1,477	Safe Zone
PT. Toba Bara Sejahtera Tbk	- 0,054	0,533	0,229	0,541	1,249	Safe Zone

Table 1:- Springate S-Score Analysis For 2013 Period

Based on table 1 above, there are five coal mining companies that are in a distress zone position, which means financial difficulties so that there is a great potential for bankruptcy, there are even two companies with negative S-scores. Namely PT. Atlas Resources Tbk and PT. Bumi Resources Tbk, which means that extra attention is needed to improve company performance. There are three negative value companies ratios namely X1, X2, and X3, which means that both in terms of liquidity and profitability the company does not show good results resulting from losses experienced by the company and corporate debt cannot be guaranteed by the company's working capital. The highest S-Score was obtained by PT. Resource Alam Indonesia Tbk with the S-Score S = 2.253 and the lowest S-Score is PT. Bumi Resources Tbk with a negative S-Score that touches the number - 0.726. The financial ratios calculated using the Springate S-Score method use four of financial ratios that are considered capable of measuring the level of the financial health of the company. There are five companies in the safe zone category, which means healthy in their financial condition, namely: PT. Harum Energy Tbk, PT. Indo Tambangraya Megah Tbk, PT. Resource Alam Indonesia Tbk, PT. Samindo Resources Tbk, PT.

Toba Bara Sejahtera Tbk. While the rest, namely 5 companies are in the distress zone position, namely: PT. Delta Dunia Makmur Tbk, PT. Darma Henwa Tbk, PT. Bayan Resources Tbk, PT. Atlas Resources Tbk, and PT. Bumi Resources Tbk which is in the lowest position with a negative S-Score.

The average company whose S-Score is below the safe zone value has a negative ratio of X2 and X3. Negative in this case means the company has a loss that results in both values of this ratio is negative. In addition, Working Capital to Total Assets from companies experiencing distress zones must also receive serious attention and need improvement. The company's working capital is very influential in the company's operations so that the working capital is not used optimally. The corporate debt must be maximized with existing cash, so that company debt does not burden the company's operations. Company assets should also not be too burdensome for the company. Indeed, assets must be run optimally because each asset requires maintenance and maintenance costs that do not cost a little.

Corporate	Springate S-Score Analysis				S-Score Value $S = 1{,}03\,X_1 + 3{,}07\,X_2 + 0{,}66\,X_3 + 0{,}4\,X_4$	Classification
	X1	*X2*	*X3*	*X4*		
PT. Atlas Resources Tbk	- 0,292	- 0,082	- 0,204	0,113	- 0,642	*Distress Zone*
PT. Bumi Resources Tbk	- 0,907	0,121	- 0,059	0,013	- 0,596	*Distress Zone*
PT. Bayan Resources Tbk	- 0,168	- 0,135	- 0,364	0,713	- 0,543	*Distress Zone*
PT. Darma Henwa Tbk	- 0,907	- 0,006	- 0,117	0,013	- 1,024	*Distress Zone*
PT. Delta Dunia Makmur Tbk	0,193	0,077	0,222	0,669	0,850	*Distress Zone*
PT. Harum Energy Tbk	0,456	0,024	0,090	1,075	1,033	*Grey Zone*
PT. Indo Tambangraya Megah Tbk	0,157	0,201	0,722	1,482	1,849	*Safe Zone*
PT. Resource Alam Indonesia Tbk	0,162	0,130	0,542	1,364	1,468	*Safe Zone*
PT. Samindo Resources Tbk	0,240	0,564	0,434	0,596	1,834	*Safe Zone*
PT. Toba Bara Sejahtera Tbk	0,071	0,410	0,258	0,665	1,404	*Safe Zone*

Table 2:- Springate S-Score Analysis For 2014 Period

Based on table 2 above, there is no significant change compared to 2013, only there is one company that experienced a decline in financial condition from initially in a healthy/safe zone position in 2013, declining to the gray area position in 2014, namely PT. Harum Energy, Tbk. As for the five companies that were previously in a financial distress position, there was still no progress, even in terms of the financial ratios of each company is still indicated experiencing losses which if left unchecked the possibility of bankruptcy will be very large. Even in terms of the company's working capital ratio, four companies are negative, which means that the working capital generated cannot guarantee business continuity because the company's current debt is greater than the company's current assets. In addition, the losses that were still experienced by the four companies still resulted in the company still in a financial distress position and with great potential for bankruptcy. For PT. Delta Dunia Makmur Tbk, although the company is still in the position of financial distress but the company shows an increase in the value of its financial ratios even the increase occurred in all financial ratios.

The increase in the value of the financial ratio resulted in the company's S-Score also increasing, which initially only 0.360 crept up to 0.850, this increase was due to the company leaving the business loss zone in 2014 so that all profitability financial ratios either X2 or X3 were no longer negative. Four companies that were previously in a healthy position or safe zone in 2014 are still consistent with their financial position, and even some of the company's financial ratios have also experienced an increase in the ratio X2 where this ratio is the ratio of the company's asset management to profit, even though the value of s- company score has decreased seen from the sales ratio that is less than the maximum, it is expected that in the future all lines of the company's ratio will continue to improve.

For the highest S-Score, the company is held by PT. Indo Tambangraya Megah, Tbk and the lowest S-Score is occupied by PT. Darma Henwa, Tbk. A negative S-Score value must be a serious concern for the company because there are many suboptimal financial ratios such as working capital management, profitability stability, and the company must also be careful in its current debt policy.

Corporate	Springate S-Score Analysis				S-Score Value $S = 1{,}03\,X_1 + 3{,}07\,X_2 + 0{,}66\,X_3 + 0{,}4\,X_4$	Classification
	X1	*X2*	*X3*	*X4*		
PT. Atlas Resources Tbk	- 0,442	- 0,068	- 0,136	0,081	- 0,722	*Distress Zone*
PT. Bumi Resources Tbk	- 1,453	- 0,468	- 0,373	0,012	- 3,174	*Distress Zone*
PT. Bayan Resources Tbk	0,163	- 0,035	- 0,457	0,555	- 0,025	*Distress Zone*
PT. Darma Henwa Tbk	- 1,453	- 0,083	- 0,060	0,012	- 1,787	*Distress Zone*
PT. Delta Dunia Makmur Tbk	0,246	0,048	- 0,056	0,680	0,637	*Distress Zone*
PT. Harum Energy Tbk	0,507	- 0,040	- 0,542	0,655	0,302	*Distress Zone*
PT. Indo Tambangraya Megah Tbk	0,193	0,119	0,490	1,349	1,428	*Safe Zone*
PT. Resource Alam Indonesia Tbk	0,222	0,289	0,345	0,451	1,306	*Safe Zone*
PT. Samindo Resources Tbk	0,310	0,665	0,601	0,562	2,137	*Safe Zone*
PT. Toba Bara Sejahtera Tbk	0,100	0,476	0,374	0,494	1,444	*Safe Zone*

Table 3:- Springate S-Score Analysis For 2015 Period

Based on table 3 above, there are only four coal mining companies that are in a healthy zone/safe zone and the remaining six companies are in a distress zone position, which means financial difficulties so that there is a great potential for bankruptcy. The distress zone position in this period is a fairly large distress zone position because more than half of the companies sampled in the research are in the distress zone position even PT. Harum Energy Tbk, which was previously in the gray area position, has fallen to a distress zone, this is due to the company's loss so that the ratio of X2 and X3 is in a negative position. Even PT. Bumi Resources Tbk in position X2 has a high negative ratio value. PT. Indo Tambangraya Megah Tbk, PT. Resource Alam Indonesia Tbk, PT. Samindo Resources Tbk, and PT. Toba Bara Sejahtera Tbk is still in the safe zone position where the company can defend its S-Score value from the previous year, and there are even companies that have increased the S-Score value. The average company that experiences a distress zone is a company with a negative ratio of X2 and X3 resulting from companies that experience losses. Indeed, 2015 was a bad year for several companies in the coal mining sector. Until

2015 Along with the drop in world coal prices. In 2015, world coal prices were $ 52.13 per metric ton, down 38 percent from the end of 2013 at $ 84.34 per metric ton. The drop in coal prices caused many mining companies to temporarily suspend operations and layoffs inevitable. In addition, non-tax state revenues from the mineral and coal sectors were affected. Throughout 2015, the realization of the mineral and coal sub-sector non-tax state revenues only reached Rp. 29,631 trillion or 56.76 percent of the target of Rp. 52.2 trillion.

This is due to the impact due to the number of coal mining companies that suffered losses in 2015. The loss has a very big impact on the company's accountability to the investor.

Negative profitability also results in the value of the company's ratio is also negative. In this study, the average company in the distress zone position is a company whose value of X2 and X3 is negative where the result of company losses both after and before interest expense and taxes.

Corporate	Springate S-Score Analysis				S-Score Value $S = 1,03 X_1 + 3,07 X_2 + 0,66 X_3 + 0,4 X_4$	Classification
	X1	*X2*	*X3*	*X4*		
PT. Atlas Resources Tbk	- 0,513	- 0,045	- 0,094	0,035	- 0,713	*Distress Zone*
PT. Bumi Resources Tbk	0,076	0,079	- 0,012	0,008	0,160	*Distress Zone*
PT. Bayan Resources Tbk	0,165	0,091	0,335	0,674	0,941	*Grey Zone*
PT. Darma Henwa Tbk	0,009	0,022	0,022	0,679	0,363	*Distress Zone*
PT. Delta Dunia Makmur Tbk	0,091	0,129	0,277	0,693	0,951	*Grey Zone*
PT. Harum Energy Tbk	0,521	0,075	0,555	0,525	1,343	*Safe Zone*
PT. Indo Tambangraya Megah Tbk	0,248	0,159	0,804	1,130	1,728	*Safe Zone*
PT. Resource Alam Indonesia Tbk	0,311	0,462	0,994	0,375	2,142	*Safe Zone*
PT. Samindo Resources Tbk	0,451	0,633	0,994	0,516	2,595	*Safe Zone*
PT. Toba Bara Sejahtera Tbk	- 0,009	0,368	0,235	0,395	0,989	*Grey Zone*

Table 4:- Springate S-Score Analysis For 2016 Period

Based on table 4 above, again there are only four companies that are in the safe zone position. Namely PT. Harum Energy Tbk, PT. Indo Tambangraya Megah Tbk, PT. Resource Alam Indonesia Tbk, and PT. Samindo Resources Tbk. PT. Harum Energy, Tbk out of the insecure zone from the previous year because this year the company made a profit and no longer suffered losses as happened in 2015. This is inversely proportional to PT. Toba Bara Sejahtera, Tbk, which is included in the insecure zone/distress zone due to the company's ratio decreases to position X1 ratio due to negative working capital of the company, which is due to the current cash in the company unable to cover current debt during 2016. This should really be a concern of the company because negative working capital produces a negative ratio value and causes the company's liquidity to be disrupted. However, there are two companies that have expanded from the distress zone to the gray zone position, namely PT. Bayan Resource, Tbk and PT. Delta Dunia Makmur, Tbk although it is still in the gray zone position, it means there is a slight increase in the company's special management improvement in terms of obtaining corporate profits where the company is no longer without losses as happened in the previous year.

There are three companies that are still in the distress zone with high potential to go bankrupt, namely PT. Atlas Resources Tbk, PT. Bumi Resources Tbk and PT. Darma Henwa, Tbk. For PT. Atlas Resources Tbk values of X1, X2 and X3 of the company are still in a negative position, which means the company's current debt still cannot be funded by the company's working capital and the company is still experiencing losses. The X4 value of the company is still considered very small, which means the company's sales are still not optimal. As for PT. Darma Henwa Tbk, although the company no longer suffers losses, the ratio related to company profits, whether after or before interest and taxes, still shows a figure that is less than the maximum. For PT. Bumi Resource Tbk has increased the value of the S-Score compared to 2015 wherein 2016 the value of the S-Score has increased but still cannot make PT. Bumi Resources Tbk in a safe position. Three Companies still maintain their secure position, namely PT. Indo Tambangraya Megah Tbk, PT. Resource Alam Indonesia Tbk, and PT. Samindo Resources Tbk.

Corporate	Springate S-Score Analysis				S-Score Value $S = 1,03 X_1 + 3,07 X_2 + 0,66 X_3 + 0,4 X_4$	Classification
	X1	X2	X3	X4		
PT. Atlas Resources Tbk	- 0,434	- 0,011	- 0,039	0,088	- 0,471	*Distress Zone*
PT. Bumi Resources Tbk	- 0,155	0,140	0,232	0,005	0,424	*Distress Zone*
PT. Bayan Resources Tbk	0,008	0,505	1,388	1,201	2,956	*Safe Zone*
PT. Darma Henwa Tbk	- 0,058	0,042	0,077	0,604	0,361	*Distress Zone*
PT. Delta Dunia Makmur Tbk	0,142	0,147	0,397	0,809	1,182	*Safe Zone*
PT. Harum Energy Tbk	0,559	0,162	1,264	0,709	2,193	*Safe Zone*
PT. Indo Tambangraya Megah Tbk	0,346	0,267	1,105	1,244	2,403	*Safe Zone*
PT. Resource Alam Indonesia Tbk	0,283	0,579	1,141	0,319	2,322	*Safe Zone*
PT. Samindo Resources Tbk	0,422	0,397	0,372	0,553	1,743	*Safe Zone*
PT. Toba Bara Sejahtera Tbk	0,102	0,618	0,643	0,357	1,721	*Safe Zone*

Table 5:- Springate S-Score Analysis For 2017 Period

2017 is the year of the rise of coal mining companies in Indonesia. Because in 2017, coal prices move with an upward trend. The price of coal rose and touched $ 97.14 per metric ton in October 2017, which also affected the trend of increasing financial ratios in this sector. Can be seen by the increasing value of the S-Score of the company that became the research sample. Of the 10 companies that were sampled, 3 companies left their insecure zone from 2016 and crawled to the safe zone, PT. Bayan Resources Tbk, PT. Delta Dunia Makmur Tbk, and PT. Toba Bara Sejahtera Tbk. So that in the safe zone position, 7 companies are listed in this position and are the most secure zone in the research period. Although there are still three companies that experienced the distress zone, namely companies that experienced distress zone in previous years. Even so, the S-Score value of the three companies has increased compared to 2016 due to accompanying the increase in several sector ratios, but this should still be a concern of the company because five years in a row the company experiences a distress zone and will be very detrimental to the company's management.

The highest S-Score is obtained by PT. Bayan Resources Tbk with an S-Score of 2.956. This is very good because of PT. Bayan Resources Tbk can get out of its insecure zone and then in the following year start from the highest S-Score. This is due to the increase in company profits which rose at the value of the ratio X2 and X3, the company also increased even higher than the number 1 at X2, which is 1.551 and almost increased 1 at the ratio of x3, namely 0.916. PT. Atlas Resources Tbk is still in the lowest position with an S-Score - 0.471 where the position still shows negative results.

The negative results from the company are still caused by the company still in a position of loss and working capital of the company is still negative. On the other hand, PT. Toba Bara Sejahtera which was previously in the gray zone crept up in the safe zone position because the company's X1 ratio is no longer negative related to the company's financial problems can be covered or less than the assets provided by the company for positive company working capital . In fact, all financial ratios determine the S-value of the company working capital score, corporate debt and company profits.

V. CONCLUSIONS

Based on the analysis conducted by the author on the financial statements of coal mines registered on IDX with the calculation of the Springate S-Score method for bankruptcy prediction of 10 coal mining companies during 2013-2017, there were four companies included in the healthy category, namely PT. Indo Tambangraya Megah Tbk, PT. Resource Alam Indonesia Tbk, PT. Samindo Resources Tbk, and PT. Toba Bara Sejahtera Tbk. The three companies that have always experienced distress zones or have great potential bankruptcy are PT. Darma Henwa Tbk, PT. Atlas Resources Tbk and PT. Bumi Resources Tbk. While the remaining PT. Bayan Resources Tbk, PT. Delta Dunia Makmur Tbk, and PT. Harum Energy Tbk is predicted to be positioned in a gray zone where the company is still unable to be consistently categorized as safe and there must be improvements in the future.

Companies that are in a healthy condition or safe zone should always maintain the company's assets well because if not addressed, the tendency of companies to be in vulnerable areas or even potentially bankrupt in the future can occur. It also must continue to maintain the level of profitability so as not to decline.

Companies that are in the gray zone and distress zone position should be careful in using the company's financial assets so that bankruptcy conditions are not realized if the company wants to be in a healthy financial condition, can be done by: Increasing working capital, by increasing current assets and maximizing use of current debt Increase company EBIT and EBT by increasing company sales. The company is expected to really pay attention to the development of the company's EBIT because the value of EBIT is very influential in increasing the value of the company's Springate score.

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