

## The Determinants of Financial Distress of Basic Industry and Chemical Companies Listed in Indonesia Stock Exchange

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### Abstract

Understanding the factors that determine financial distress would help management prepare anticipating actions and anticipate the worst possible situation in the future. This study examines four fundamental factors of companies in the basic industry and chemical sectors listed at the Indonesian stock exchange. Nineteen companies were classified as financially distressed and thirty-three non-financially as distressed companies. The logistic regression test revealed debts to assets ratio (positive), current ratio (negative), and return on assets (negative) became predictors for possible financial distress. Total assets turn over did were not able to predict whether the companies belonged to financially distressed or non-financially distressed.

**Keywords:** *Financial distress; financial ratios; liquidity.*

### 1. Introduction

The purpose of this study is to examine whether financial distress can be predicted using financial ratios. The financial distress prediction has been examined in numerous studies. The initial study by Altman (1968) showed that some accounting variables were able to predict the potential of companies to experience financial distress. Since then many studies were devoted to examine this possibility.

Financial distress occurs when a company fails or is unable to satisfy the obligations to the creditor because it is experiencing shortages of funds. This unfavorable condition makes total liabilities greater than the total assets, and it cannot achieve the company's economic goals of profit. Financial distress occurs because the company is not able to manage and maintain the stability of financial performance. It is derived from its failure to promote the products. As a result, it causes the decline in sales values (Platt & Platt, 2006). The declining sales results in decreasing operation incomes, and net loss for year. Losses incurred caused by capital deficiency is due to the decline of retained earning values so that the total equity as a whole is deficient. If this happens continuously, then the total liabilities will exceed the total assets owned by the company. This condition will trigger financial distress that eventually makes companies go bankrupt if they are not able to take appropriate measures.

Financial distress can be measured using financial ratios calculated from the financial statements of the company. Financial ratios show the

company's financial position in a certain period, reflecting the company's performance in the corresponding period. An analysis of the company's financial ratios could provide information about the financial condition and provide a valuation process that aims to evaluate the financial position of the company's operational results in a certain period.

One indicator that can be used as a criterion depicting companies' financial distress is a negative net profit for consecutive years (Whitaker, 1999) and (Platt & Platt, 2002), or for at least two consecutive years (Almilia, 2003; Widarjo & Setiawan, 2009; Hanifah, 2013). Negative net income is an indicator that describes companies declining performance in terms of profitability due to increased production costs and decreased sales. In addition to negative net income, financial distress can be marked by the value of negative earnings per share (Purnomo, 2013) or the company was delisted from the Stock Exchange (Almilia, 2004). Negative operating profit indicates the company's inability to manage resources to achieve the economic objectives of profit so that the company suffers operational losses.

Several studies have been conducted to analyze financial ratios in predicting corporate financial distress. Two financial ratios, the current ratio along with return on assets are found to be the most dominant ratios (Platt & Platt, 2002). Current ratios and return on assets have negative effects on financial distress. In addition to a current ratio and return on assets, total assets turnover can also predict the company's financial distress (Yap, 2012). Debt to assets ratio can be used to predict the company's financial distress (Purnomo, 2013). A high debt to

assets ratio shows that most assets of the company are financed by debts that triggers the occurrence of corporate financial distress as the company is suffering financial burdens.

Clearly there are a number of factors that can be attributed to the financial distress of the company, namely current ratio (Platt & Platt, 2002), return on assets (Platt & Platt, 2002), total assets turn over (Yap, 2012) and debt to assets ratio (Purnomo, 2013). Referring to these conditions, this study examines the ability of current ratio, return on assets, total assets turnover and debt to assets ratio in predicting the financial distress of the companies. The population are public companies listed on Indonesia stock exchange in the basic industry and chemical sector.

Financial distress occurs prior to the bankruptcy of a company. The condition of financial distress is the stage of decreasing financial position of a company prior to liquidation or bankruptcy (Platt & Platt, 2002). Companies that experience financial distress are likely to go bankrupt if not immediately overcome and given sufficient funds to cover the obligations. A study by Platt and Platt (2002) examines the prediction of the company's financial distress with the objects of automotive companies. This study examines twenty four companies that have potential financial distress. Meanwhile, the other thirty two companies do not have the potential to experience financial distress. Companies with potential financial distress are determined based on negative corporate net profit for several years. It shows that current ratio, EBITDA/sales, long term debt to assets ratio and debt to assets ratio can predict financial distress company. Current ratio and the ratio of EBITDA over sales negatively affect the company's financial distress while long term debt to assets ratio and debt to assets ratio have a significant positive effect on financial distress company.

Another study examines the effect of financial ratio analysis on financial distress condition of automotive companies listed in Indonesia Stock Exchange from 2004-2006 (Widarjo & Setiawan, 2009). Companies that have the potential financial distress are determined based on negative corporate net profit for two consecutive years. The results show that the current ratio and return on assets can predict the company's financial distress. The current ratio as a proxy for liquidity ratio has a negative and significant effect on the condition of financial distress. Return on assets has significant negative effect to financial distress.

Yap (2012) examines the company's financial distress in Malaysian capital market using

financial ratios and logistic regression. The results indicate that cash ratio, return on assets, total assets turnover, debt to assets ratio, and cash flow to debt ratio can predict financial distress companies. Cash ratio, return on assets and total assets turn over significantly and negatively affect the company's financial distress while debt to assets ratio and cash flow to debt ratio have a significant positive effect on financial distress companies.

An Indonesia study analyzes the role of corporate governance structure and financial ratios to the company's financial distress condition in the Indonesia Stock Exchange from years 2009 to 2011 (Hanifah, 2013). Results show that corporate governance, liquidity, profitability, and activity can predict the financial distress of manufacturing companies. Ownership of the board and the size of the board of directors as the proxies for corporate governance have negative and significant effect on the financial distress. The liquidity ratio projected by the current ratio has a significant negative effect on financial distress. Return on assets as a proxy for profitability ratio has negative and significant effect on financial distress. The activity ratio projected by total assets turn over has negative and significant effect on financial distress.

Another Indonesia study analyzes the financial ratios as a financial distress prediction tool of companies in the Sharia Stock Exchange period 2008-2012 (Purnomo, 2013). The results indicate that the variable current ratio, return on assets and debt to assets ratio can predict financial distress company. Current ratio and return on assets have a negative and significant effect on financial distress. Debt to assets ratio has positive and significant effect on financial distress.

## 2. Theoretical Review and Hypotheses

### 2.1 The Relationship between Leverage and Financial Distress Ratios

Leverage ratio measures the level to which the assets of a company are financed by debt. It indicates the companies manage to fulfill their entire liabilities, either its short-term or the long-term. Leverage ratio can be used as a proxy for debt to assets ratio. A high debt to assets ratio means that most of assets are financed by debt. This triggers the occurrence of financial distress, because the greater the burden of the company to cover the obligations and interest charged. A study (Platt & Platt, 2002) reports that leverage coefficients are negative and predictors of corporate financial distress. The findings are supported by Yap (2012).

Based on the theory and previous research hypothesis research as follows:

H<sub>1</sub> = Debt to assets ratio can predict the company's financial distress.

**2.2 The Relationship between Liquidity and Financial Distress**

Liquidity is often measured using current ratio (current assets divided by current liabilities). Current ratio measures the ability of a company to fulfill its short-term liabilities with its current assets. This means that the higher the ratio value, the better is the company's ability to meet its current liabilities (which are soon due). Current ratios can predict financial distress firms with negative coefficients (Platt & Platt, 2002). The higher the value of current ratio, the lower the company experiences financial distress, and vice versa. Current ratios can predict financial distress (Hanifah, 2013).

Based on the theory and previous research hypothesis research as follows:

H<sub>2</sub> = Current ratio can predict financial distress company.

**2.3 The Relationship between Activity Ratio and Financial Distress**

The activity ratio measures the effectiveness of company in utilizing its assets, or the level of efficiency of resource utilization. Activity ratio can be used as a proxy for total assets turnover. It measures the turnover of the assets over the sales. Assets used for operating activities will increase production. The higher the total assets turn over value, the higher the ability of company to increase sales, so the lower the company's potential to experience financial distress. Total assets turn over can predict financial distress companies with negative coefficients (Yap, 2012). Hanifah (2013) and Yap (2012) report similar finding.

Based on the theory and previous research hypothesis research as follows:

H<sub>3</sub> = Total assets turn over can predict financial distress company

**2.4 The Relationship between Profitability and Financial Distress**

Profitability ratio is the ratio to assess the ability of a company in generating profits. Companies with high profitability are less likely to experience financial distress. Profitability could be used as a proxy for return on assets. Profitability shows how capable a company uses existing assets to generate profit or profit. Return on assets can predict financial distress company with negative coefficient (Yap, 2012). That is, the higher the value of return on

assets, the lower the possibility of companies experiencing financial distress. Return on assets can predict financial distress (Platt & Platt, 2002; Purnomo, 2013).

Based on the theory and previous research hypothesis research as follows.

H<sub>4</sub> = Return on assets can predict financial distress company.

**3. Research Method**

**3.1 Population and Sample**

The population of the present study consisted of all public companies in the basic industry and chemical sector. There were 65 company in 2011-2015. The samples were determined the following criteria.

1. The company had to have full financial statements from December 31, 2011 to December 31, 2015.
2. The company had to have potential financial distress: they had negative net income for 2 consecutive years, i.e., in 2014 and 2015.
3. Financial reports data of 2014-2015 were used as a test periods to determine whether a company experienced financial distress or not. The financial reports data of 2011-2013 were the data used for testing the hypothesis.

**3.2 Operational Definition and Variable Measurement Scale**

Table 1 presents the variables operational definition and measurement examined in the study. All variables are expressed in ratio scale except for financial distress which is measured sing nominal scale.

**Table 1 Description of Research Variables**

Variable	Variable Definition
<i>Financial distress (Y)</i>	Financial distress is a condition of financial difficulties. The indicator used is the resulting net profit showing negative value for two consecutive years. The company will be divided into two groups, i.e. companies that have the potential to experience financial distress and companies that do not have the potential to experience financial distress.
<i>Debt to assets ratio (DAR)</i>	Measure the proportion of total debt over total assets.
<i>Current ratio (CR)</i>	Measure the ability of a company in meeting its short-term liabilities or debts that are soon to be due.
<i>Total assets turn over (TATO)</i>	Measure the ability of the assets in generating the sales.
<i>Return on assets (ROA)</i>	Measure the ability assets in generating net profits.



The dependent variable is financial distress. A financially distressed company is assigned 1 and zero otherwise. The logistic regression model is shown in the following formula.

$$Y = \text{Ln}[p/(1-p)] = b_0 + b_1\text{DAR}_{i,t} + b_2\text{CR}_{i,t} + b_3\text{TATO}_{i,t} + b_4\text{ROA}_{i,t} + e_{i,t}$$

where Y is the probability that the company will experience financial distress, CR is current ratio (Current assets divided by current liabilities), ROA is return on assets (net income divided by average of total assets), TATO is total assets turn over (total assets divided by total sales), and DAR is debt to assets ratio (total debt divided by average of total assets).

## 4. Results and Discussion

### 4.1 Results

Table 2 presents the process of selecting research samples. In total there are fifty two companies as research samples. The sample is divided into two groups namely nineteen companies potentially experiencing financial distress and thirty three companies are not potentially experiencing financial distress.

**Table 1 Sample Selection Process**

Description	Number of company
Companies of basic and chemical industry sectors.	65
Companies that do not have complete financial statements for 2011-2015.	(12)
Companies delisted from the Indonesia Stock Exchange in 2011-2015.	(1)
<b>Total sample</b>	<b>52</b>

Table 3 provides the descriptive statistics of variables. The average Debt to Assets Ratio of all sample companies is 53.36% with a standard deviation of 35.96%. The average DAR value of financial distress companies is 64.35% while non-financial distress companies have an average DAR value of 47.09%. The average DAR value of a company that has potential financial distress is higher than the average DAR value of a company that does not have the potential to experience financial distress.

**Table 3 Descriptive Results Statistics of Research Variables**

Description	DAR	CR	TATO	ROA
<b>Panel A. All Firms</b>				

Minimum	0.09	0.23	0.06	-0.70
Maximum	2.55	11.20	5.65	1.40
Mean	0.53	2.36	0.69	0.07
Stand. Dev.	0.36	2.23	0.62	0.17

**Panel B. Financially Distressed Firms**

Minimum	0.18	0.23	0.06	-0.70
Maximum	2.55	3.38	5.65	0.38
Mean	0.64	1.33	0.75	0.01
Stand. Dev	0.47	0.57	0.95	0.12

**Panel C. Non-Financially Distressed Firms**

Minimum	0.09	0.58	0.21	-0.19
Maximum	1.41	11.20	2.12	1.40
Mean	0.47	2.58	0.66	0.11
Stand. Dev	0.26	2.216	0.29	0.19

**Notes:**

DAR is debt to assets ratio, CR is current ratio, TATO is total assets turn over, and ROA is return on assets. All variables are expressed in percentage.

It can be seen that the average current ratio for the entire sample firm of 2.36 or 236% with a standard deviation of 2.24. The average CR value of a financial distress company is 133% and non-financial distress is 258%. Statistical descriptive results indicate that the average CR value of companies with the potential to experience financial distress is lower than the average value of companies that do not have the potential to experience financial distress.

The average value of the entire company TATO sample was 69.38% with a standard deviation of 62.15%. The average value of TATO financial distress companies is 74.96%, while the average of non-financial distress companies is 66.17%. The average value of TATO for companies that have the potential to experience financial distress is higher than the average TATO value of companies with no financial distress potential.

Average return on assets (ROA) of all sample companies is 6.9%. The standard deviation is 0.17%. The average value of ROA owned by the financial distress company is 0.1% while the non-financial distress is 10.82%. Negative ROA indicates that the company is unable to generate profits from the total assets used for the operations of the company or the company to obtain losses in the company's operational activities. The average value of corporate ROAs with the potential to experience financial distress is lower than firms with no financial distress potential.

Table 4 presents the results of logistic regression test. Based on the results of logistic regression analysis in Table 4 we obtain the following logistic regression equation.

$$Y = \text{Ln}[p/(1-p)] = -0.894 + 0.431\text{DAR} - 9.238\text{CR} - 0.976\text{TATO} - 12.370\text{ROA} + e$$

**Table 4 Results of Logistic Regression**

Variable	Reg. Coef.	Wald Value	Significant level	Description
Constant	-0.894	3.568	0.059*	-
DAR	0.431	0.581	0.046**	Significant
CR	-9.238	0.010	0.022**	Significant
TATO	-0.976	4.157	0.415	Insignificant
ROA	-12.370	12.045	0.001***	Significant

**Notes:**

DAR is debt to assets ratio, CR is current ratio, TATO is total assets turn over, and ROA is return on assets. \*, \*\*, and \*\*\* denote significant level at 10%, 5%, and 1%, respectively.

Statistical tests to assess the fit model in logistic regression analysis are -2 Log Likelihood, Cox and Snell's R<sup>2</sup>, Nagelkerke R<sup>2</sup>, Hosmer and Lemeshow's Goodness of Fit Test, and classification test of 2 x 2. Here are described the results of testing the overall model fit in research.

The Log Likelihood value -2 indicates whether the modeling process by including the independent variable in the model will result in a better model. The Likelihood Log-2 Log is employed to determine if the independent variable is added to the model and it is expected that it significantly improves the fit model. If there is a decrease in the Log-Likelihood value then it indicates that the hypothesized model fit with the data. The results of the Likelihood Log-2 log test are presented in Table 5.

**Table 5 Results of -2 Log Likelihood-Test**

Description	Statistical Value
-2 Log Likelihood (Block 0)	202.789
-2 Log Likelihood (Block 1)	169.491

The results of the Likelihood Log-2 log-test model based on Table 3 obtained the Log-Likelihood value of 202.789 on block number 0 before the independent variables were included in the model and became 169,491 on block number 1 after the independent variables were included in the logistic regression model. Decrease in Log-Likelihood value<sup>2</sup> shows the logistic model generated by the addition of independent variables into the model to be better and fit model with the data.

Nagelkerke R<sup>2</sup> is a modification of Cox and Snell's R<sup>2</sup> coefficients to ensure that values vary from 0 to 1. Nagelkerke R<sup>2</sup> values can be interpreted as R<sup>2</sup> values in multiple regression. The value of Nagelkerke R<sup>2</sup> shows the percentage variability of the independent variable in explaining the dependent variable. Results from the Cox and Snell's R<sup>2</sup> and Nagelkerke R<sup>2</sup> statistical tests are presented in Table 6.

**Table 6 Results of Cox and Snell's R<sup>2</sup> and Nagelkerke R<sup>2</sup> Tests**

Description	Statistical Value
-2 Log Likelihood	140.305
Cox & Snell R <sup>2</sup>	0.339
Nagelkerke R <sup>2</sup>	0.463

The statistical test results show the value of Cox and Snell's R<sup>2</sup> of 0.339 and Nagelkerke value R<sup>2</sup> 0.463. This means that the dependent variable variability can be explained by the independent variables variability of 46.3%, that consist of current ratio, return on assets, total assets turn over, and debt to assets ratio.

The Hosmer and Lemeshow's Goodness of Fit Test is used to test the feasibility of a logistic model. A model is said to be feasible if the Hosmer and Lemeshow's Goodness of Fit Test has a significant value of greater than 5%. This means that the model has the ability in predicting the observed value. In other words, the model is acceptable as it fits with the observed data. The Hosmer and Lemeshow's Goodness of Fit Test statistics show a Chi-Square value of 8.093 (p=0.424). This value is insignificant. This means that the models and the data is equal. Thus, the model is fit and is able to predict the value of observation. Thus, it can be concluded that the model is acceptable and fit with the data.

The 2 x 2 classification test calculates the correct and incorrect estimates. If the model is perfect, then all cases will be on the diagonal having 100% accuracy of prediction. The results of the 2 x 2 classification table test to determine the accuracy level of the company's distress financial predictions are presented in Table 7.

**Table 7 Results of 2 x 2 Classification**

Description	Prediction		
	Not-financially Distressed	Financially Distressed	Accurate Level
Not-financially Distressed	92	8	92.9 %
Financially Distressed	16	42	71.9 %
Percentage (%) of Total			85.3 %

As shown in Table 7, the overall percentage value of the model based on the company's financial ratio is 85.3%. According to predictions, there are 19 companies experienced financial distress. While the results of the observation of only 16 companies so the accuracy of model predictions produced by 85.3%. The prediction accuracy of the predicted model is good because the accuracy value is more than 50%

(Teng, 2002).

#### 4.2 Discussion

Based on four statistical tests conducted to assess the overall fit model, the results consistently show that logistic regression models are made fit with research data and are able to predict the value of their observations. The model shows that the variability of independent variables explains 46.3% of the variability of dependent variable. The prediction accuracy value is equal to 85.3%.

The coefficient of regression debt to assets ratio is positive and significant. Thus,  $H_1$  is accepted. The positive regression coefficient shows that the higher the debt to firm ratio of the company, the higher the risk of the company experiencing financial distress. Debt to assets ratio shows the ratio of total debt over total assets. It reflects how much of the company's assets are financed by debt. A high debt to assets ratio describes many corporate assets financed by debt. This triggers the occurrence of financial distress company because the greater the burden of the company to cover the obligations and interest charged. In addition to triggering the occurrence of financial distress for the company, high debt to assets ratio causes the company difficulty getting a loan/additional funds because it is feared the company is not able to cover its debts with assets owned.

Basic industry and chemical companies that have the potential to experience financial distress tend to have a high debt to asset ratio that indicates that many of the assets are financed by debt. Debt to assets ratio can be employed to determine the company's financial difficulties (Gumanti, 2011). A company is said to be sensitive to financial hardships that lead to bankruptcy if the debt ratio shows high numbers. The higher the debt to assets ratio, the higher the risk facing the company.

This study finds that debt to asset ratio can predict financial distress company. Changes that occur in the debt to assets ratio can predict the distress or lack of financial performance of basic and industrial sector companies. The results of this study support previous studies such as Platt and Platt (2006), Yap (2012), and Purnomo (2013). These studies assert that debt to assets ratio can predict financial distress companies and have a positive influence. This means that the higher the debt to assets ratio of the company, the higher the company's potential to experience financial distress and vice versa.

The test results show the current ratio has negative and significant coefficient. Thus,  $H_2$  which states that current ratio can predict financial distress

is accepted. The negative regression coefficient indicates that firms with higher ratio will have lower risk of experiencing financial distress. Current ratio is a ratio used to measure the ability of a company in meeting all the short-term liabilities. Current ratio reflects the ability of a company in satisfying all of its short term financial obligations. Higher current ratio value shows the ability of a company to cover its current liabilities. This means the possibility of companies experiencing financial distress the smaller, and vice versa.

This study finds that current ratio can predict financial distress company. Changes that occur in the current ratio can predict the distress or lack of financial performance of the companies. The results of this study support the studies of Platt and Platt (2002), Hanifah (2013), and Purnomo (2013). These studies assert that current ratio can predict financial distress and have a negative effect. This means that the higher the current ratio, the lower is the potential of the company to experience financial distress and vice versa.

The regression coefficient of total assets turnover is negative but insignificant. Thus,  $H_3$  is rejected. That is, the size of the total assets turn over does not determine whether the company will experience financial distress or not. Total assets turnover reflects the turnover of all assets owned by the company and measures the sales that the firm derived from its assets. The higher value of total assets turn over indicates the company's ability to manage assets in an effort to increase sales the better. Increased earnings will provide cash flow for the company so that the company may experience financial distress is lower, and vice versa. The total value of total assets turnover indicates a faster asset rotating in generating sales to make a profit.

This study finds that total assets turnover cannot predict the company's financial distress. These results are inconsistent with Yap (2012) and Hanifah (2013) who found total asset turnover can predict corporate financial distress and have a significant negative effect. According to Teng (2002), one indicator that can be used as a reference to determine the potential financial distress company is a decrease in performance as reflected by the decline in sales value. Falling sales will have an impact on the decrease in operating income, resulting in a net loss for the year. The company's financial statements of the basic and chemical industry sectors show that there is no decrease in sales volume owned by the company and even sales increase so there is not much difference between the total assets turn over the company potentially experiencing financial distress and not having the potential to experience financial



distress. Referring to these conditions, it is acceptable that the total value of assets turnover cannot predict the financial distress condition of basic and chemical industry sectors.

The regression coefficient of return on assets is negative and significant. Thus,  $H_4$  cannot be rejected. The negative regression coefficient indicates that the higher the return value on the firm's assets, the lower the risk of the company experiencing financial distress. A company is said to have a good return on assets if the value obtained is greater than its cost of capital. Return on assets is the financial ratios related to the profitability of a company to obtain profits or earnings at a given level of income, assets, and capital stock.

The result of return on assets analysis in predicting the possibility of financial distress of the company shows that the return on assets is usable for predicting the financial distress of a company and it has a significant negative effect. Basic and chemical industry sectors that have the potential to experience financial distress tend to have a low and even negative return on assets indicating the company's inability to manage resources in order to achieve the economic objectives of profit so that the company suffers an operational loss. The results of this study is in support of previous study (Teng, 2002). Changes that occur on return on assets can predict the distress or lack of financial performance of a company. The results of this study support Widarjo and Setiawan (2009), Platt and Platt (2002), and Hanifah (2013). These studies contend that return on assets can predict financial distress companies and have a negative effect. That is, the higher the return on assets of the company, the lower the company's potential to experience financial distress and vice versa.

Overall, the study support the existing theory that some accounting variables are useful for predicting the potential of the companies to experience financial distress (Altman, 1968). Thus, we might argue that, other thing held constant, in the absence of the possibility of earnings management of the companies, accounting data are informative. They can be used to predict the probability of companies to experience financial distress.

Referring to the findings of the study, we believe that the study has two limitations. Firstly, the sampling in this research has constraints that is not yet publication of several financial statements of basic industry and chemical sectors in 2015 which caused a decrease in the number of samples being studied. Secondly, this study used limited data for only two years for the determination of companies with the potential to experience financial distress. The prediction ability will be better if the period of data

used is longer.

## 5. Conclusion

This study aims to analyze the ability of financial ratios, namely current ratio, return on assets, total assets turn over and debt to assets ratio in predicting financial distress firms by using logistic regression analysis tools. The results of the analysis show that 19 companies have the potential to experience financial distress and 33 companies do not have the potential to experience financial distress. In short, it finds that current ratio has negative effect, return on assets has negative effect, and debt to assets ratio has positive effect as the potential predictors of financial distress. While total assets turn over cannot predict financially distressed companies.

Referring to the limitations of the research, future study is expected to use the object of research not limited to the basic industry and chemical companies in order to obtain better predictive models. Future study may use longer periods with data more than two years for the determination of companies that have the potential to experience financial distress for better prediction ability.

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