# Using M-score Beneish model to measure the Creative Accounting: Evidence in Hanoi Stock Exchange listed firm

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**Abstract**

Creative accounting is a term for creative accounting methods, often used to deceive the reader of financial statements. However, using creative accounting to reduce taxes or increase profits is rare in Vietnam. Since 2017, the Ministry of Finance of Vietnam has issued regulations on accounting documents and fixed asset management to help businesses perform accounting in accordance with regulations and avoid the use of creative accounting. However, there are still some businesses that use innovative accounting methods to reduce taxes and increase profits, beautify their financial situation to attract more investment sources. The purpose of this paper is to systematize the basis theories related to the creative accounting and the M-score model, also identify the independent variables capable of detecting the creative economy, predicting the ability to detect ecotourism of the model is built and provide some solutions and recommendations to contribute to improving the applicability of the M-Score model to investors' investment decisions. The study uses the Beneish M-Score model to analyze 100 Hanoi Stock Exchange (HNX) listed firms. The results have shown that there are four M-score component, including TATA-Total Accrual on Total Assets, GMI-Gross Margin Index, SGI-Sales Growth Index and DSRI-Days Sales Receivable Index, have an influence on the firm' detection of the ability to use the innovative accounting. This result solves the goal that identify the measurement capable of detecting the creative economy. This paper contributes to making recommendations on improving the applicability of the M-Score in the discovery of creative accounting.

***Keywords***: *Creative Accounting, HNX Index, M- Score, Vietnam.*

## 1. Introduction

Creative accounting is a flexible and creative process by which accountants use knowledge of accounting principles, standards, and methods to adjust the numbers presented in financial statements. of an enterprise in order to "modify" the information on the financial statements, affecting the perception of users of the financial statements. The influence of ecotourism on businesses, investors as well as the investment market has been shown by many previous studies. Most recently, Abed et al (2022) have shown that although a number of procedures have been developed by researchers to identify any manipulation in financial statements, the implementation Innovative accounting practices are still common, leading to a decline in the quality of financial reporting. Meanwhile, Nguyen and Dao (2017) point out that the application of eco-economy by Vietnamese enterprises is common and tends to increase, most of them are only interested in immediate benefits. Without paying attention to the long-term negative impacts of eco-friendly behaviors. Along with Jones (2011), Khatri (2015), Bhasin (2016), Akpanuko and Umoren (2018), they both point out that the majority of collapsed corporations manipulated the accounting figures in their financial statements to satisfy their interests, meet their objectives and direct propotionly affect their image. For example, the collapse of Enron and Worldcom shook the confidence of investors as well as users of financial statements. Therefore, Popescu and Ashrafzadeh (2013) show that it is important to provide high-quality accounting information that is relevant and faithfully reflects the financial position and performance of an enterprise to regain the confidence of the customers. investors and stakeholders in the financial statements and their use to guide their decisions.

The Vietnam evidence research shows that the nature of creative accounting is to beautify reports and maintain or increase stock prices. Creative accounting is not illegal but is considered illegal if true values are distorted (Le Thi Thanh Hai and Nguyen Hong Nga, 2021). Nguyen Thi Huong Lien et al. (2017) studied the level of creative accounting use in Vietnamese businesses in many industries located in Hanoi city. The results show that the trend of applying creative economics in Vietnam is increasing, the level of The degree of application of creative accounting depends on the type of business, the business's motive for implementing

creative accounting is mainly for the purpose of optimizing tax benefits, increasing company value and completing assigned plans. Moreover, Le Thi Thanh Hai and Nguyen Hong Nga (2021) also mentioned that creative accounting affects the long-term goals of businesses, losing the trust of investors and customers. Whether creative accounting is beneficial or harmful to businesses, it depends on the reasons or motives, how it is used, the nature and control of the business's accounting practices.

Many businesses abuse creative accounting, negatively affecting investment psychology and making the market too "beautiful". This research clarifies the status of using creative accounting in listed firms as well as applying the M-Score Beneish model to identify creative accounting and errors in financial statements. It is hoped that this model will become a supporting tool for investors and auditors in assessing the reliability of financial statements. The topic of creative accounting is sensitive but also has high application value for financial and investment markets. This paper contributes to inherits previous studies in evidence of M-score Beneish et al. (1993, 1997, 1999), To (2017), Tuyen (2019) for detection of accounting Fraud. The paper result also contributes to creative accounting research and define a new approach to its measurement.

## 2. Objectives

This study aims to address the correlation between creative accounting and M-score based on a sample of listed companies in Vietnam. To address this research purpose, the remainder of the paper is organized as follows. Section 2 reviews the existing literature on creative accounting and M-score. Section 3 illustrates the research methodology/materials and Section 4 display the results and discussion. Based on research findings, Section 5 conclude on Using M-score Beneish model to measure the creative accounting.

## 3. Materials and Methods

### *3.1. Review of previous studies*

Over the years, many researchers have introduced the concept of innovative accounting such as Al-Qari (2010), Charles and Eugene (2011), Khattab (2012), etc. One of the most comprehensive and complex definitions has been given by Naser (1993) in 'Creative financial accounting: its' nature and use. These are: the process by which there is a violation of the rules, the accounting figures are manipulated and the flexibility is taken advantage of, the measurement methods and such information are selected, allowing the transformation of documents synthesize from what they must have into what managers want; and the process through which transactions are structured in a way that allows 'production' of desired accounting results.

Having the same view with Naser (1993), Nguyen and Dao (2017) said that innovative accounting is the use of accounting knowledge to influence financial statement data, in order to reflect financial position and business results. business in the manner desired by business management, rather than presenting these figures truthfully, within the framework of the law and accounting rules permitted. Similarly, Nguyen and Nguyen (2019) argue that "Accounting is the act of recording income in its own way, making the financial statements of an enterprise more beautiful than it actually is, while this behavior is still complying with accounting standards".

Regarding the factors causing creative accounting behaviors, Tassadaq et al. (2015) pointed out a number of factors such as unethical behavior, agency problems and unprofessional attitudes. According to Akpanuko et al. (2018), the motivations for creative accounting behavior are pointed out as: increasing company stock price, manager benefits, tax reduction, capital mobilization, strengthening investor confidence. private. According to research by Cugova et al. (2020), the results show that the driving forces leading to the use of creative accounting are manager benefits, valuation issues, pressure from investors, and environmental impacts. business market, minimizing risks. Meanwhile, research by Aldahiyat et al. (2021) suggests that achieving tax benefits is the most important motivation for creative accounting behaviors. According to Hussein et al. (2013), the implementation of creative accounting will have different motivations depending on the characteristics of each business in a certain period. Typically, joint stock companies often apply creative accounting to improve business results and make them more attractive to investors, pushing stock prices higher, thereby increasing the value of the business. Creative accounting is not illegal, but it is considered illegal if the true values are distorted or inflated too much overall (Le Thi Thanh Hai and Nguyen Hong Nga, 2021). Regarding the effects of creative accounting behaviors, the research results of Akpanuko et al. (2018) show that creative accounting is the root of many accounting scandals, increasing inefficiency, leading to Inappropriate resource allocation and inconsistent policies promote economic recession. Marza et al (2017) analyzed how innovative accounting techniques related to fixed assets will in some cases affect the

size of equity or debt, which then affects information presented in financial reports. Mirdan et al.'s (2017) study brought out the multidimensional nature of the ongoing financial crises and its impact on financial reporting by increasing the adoption of creative accounting. Aldahiyat and colleagues (2021), Le Thi Thanh Hai and Nguyen Hong Nga (2021) shows that creative accounting in many different forms, whether complying with accounting standards or not, affects the quality of accounting information. They have made recommendations: be clearly aware of the nature of creative accounting, research and promulgate policy mechanisms on the presentation of companies' financial statements, strengthen control of creative accounting activities, consider the use of creative accounting. Investors should carefully read financial statement items to recognize and detect signs of creative accounting for bad purposes.

Hence, given these gaps in the literature, our research is conducted based on the presumption that a firm's 8 factors in M-score to measure for creative accounting with GMI (Gross margin index, Lev and Thiagarajan (1993)), AQI (Asset quality index), SGI (Sales Growth index), DEPI (Depreciation index), SGAI (Sales, general and administrative expenses), TATA (Total accruals to total assets), LVGI (Leverage index) respectively have a direct proportion impact with the ability to use accounting principles in financial statements.

*3.2. Measuring variables*

In this paper, use financial statement data of the top 100 biggest HNX listed firms in total assets from 2019 to 2021, the data is aggregated according to panel data. The advantage of panel data is that unobserved heterogeneity is not a problem, since panel estimation techniques largely capture its effects. Non-randomized secondary data collection. Specifically, the financial statements for the period of 2019-2021 corresponding to 100 companies listed on the HNX (400 financial statements) have been audited and published publicly on mass information sites. These are the web portal - SSI Securities Joint Stock Company (www.ssi.com.vn), the SSC Mass Information Disclosure System (www.ssc.gov.vn), the Securities Market Portal. HNX (www.hnx.vn) and general website (www.cafef.vn).

One of the methods to discover innovative accounting without having to carefully calculate the financial ratios and dig into the financial statements that the authors will use to measure the dependent variable is to compare the current money with net income (Alnujaimi, 2022). These two metrics can be found easily on the cash flow statement. The case when net income increases, but cash flow doesn't - that's a warning sign to use creative accounting behavior, because income increases a lot, but cash flow stays the same or declines. We look at what really is the net cash flow from operating activities and cover the cash flow from financing activities, the cash flow from investing activities, and the free cash flow. If a company uses creative behavior when deliberately classifying cash flows from investing and financing activities into operating activities, the company's free cash flow will remain negative, investment cash flow over the years will be negative, and operating cash flow is not enough to cover this amount for many years.

Creative Accounting determined as dummy variables that equal to 1 for observations fall into the state of eco-friendly behavior on the financial statements and 0 otherwise for the observations that do not have eco-friendly behavior on the financial statements.

In addition, based on M-Score model of Beneish (1999), each independent variable is measured using separate calculation formulas

$$\text{DSRI} = \frac{\text{Net receivables(t)}}{\text{Sales(t)}} / \frac{\text{Net receivables(t-1)}}{\text{Sales(t-1)}}$$

$$\text{GMI} = \frac{\text{Gross profit margin(t-1)}}{\text{Gross profit margin(t)}} \text{ with Gross profit margin} = \frac{Sales - COGS}{Sales}$$

$$\text{SGI} = \frac{\text{Sales(t)}}{\text{Sales(t-1)}}$$

$$\text{SGAI} = \frac{\text{SGA(t)}}{\text{Sales(t)}} / \frac{\text{SGA(t-1)}}{\text{Sales(t-1)}} \text{ with SGA is Sales, General and Administrative expenses}$$

$$\text{LVGI} = \frac{\text{Financial Leverage(t)}}{\text{Financial Leverage(t-1)}} \text{ with Financial Leverage} = \frac{Total\ Debts}{\text{Total Assets}}$$

$$\text{TATA} = \frac{\Delta \text{ Current Asset} - \Delta \text{ Cash} - (\Delta \text{ CL} - \Delta \text{ Current maturities of LTD} - \Delta \text{ Income Tax payable}) - \text{Depreciation(t)}}{\text{Total Assets(t)}} \text{ with CL is Current Liability}$$

$$\text{DEPI} = \frac{\text{Depreciation rate(t-1)}}{\text{Depreciation rate(t)}} \text{ with Depreciation rate} = \frac{Depreciation}{Depreciation + PPE}$$

$$AQI = \frac{1-\frac{PPE(t)+CA(t)}{Total\ Assets(t)}}{1-\frac{PPE(t-1)+CA(t-1)}{Total\ assets(t-1)}}$$ with PPE is Plant, Property and Equipment and CA is Current asset

ISSUE is Issuance of shares during the year. The variable ISSUE takes the value 0 when the company does not issue more shares during the year and takes the value 1 when the company issues shares during the year.

*3.3. Research methods*

Based on previous studies along with inheriting the arguments that have been built as the foundation in building the research model and research method of the topic. The topic uses quantitative research methods to accomplish two main goals, firstly to find out the relationship between dependent and independent variables in the research model, secondly to build a quantitative model to Detecting accounting behavior on financial statements based on the M-Score model of Beneish (1999). The Beneish model was used to calculate the manipulation of enterprises' financial statements. Both variants, that is, the 5-parameter model and 8-parameter model, were used for the calculation. The results of these models were plotted using graphs and receiver operating characteristic (ROC) curves (Pavol Durana, 2022)

The study builds a regression model consisting of nine independent variables developed on the basis of the M-Score model of Beneish (1999). Based on this model, we use descriptive statistical analysis, testing the suitability of the Classification model, and binary logistic regression analysis. In addition, we use the Fixed Effect Model and the Univariable test, including the T-test and the non-parametric test. After building the estimation model, verifying the accuracy of the model on excel software with data from audited financial statements of enterprises listed on HNX in the period of 2019-2021. In addition, the topic also combines the use of qualitative methods to overview the existing research models and theories to identify independent variables capable of detecting Create Accounting on financial statements.

Based on the theoretical basis and overview of previous studies, in addition to applying the M-score model of Beneish (1999) and using binary logistic regression to build a quantitative model used to detect eco-friendly behavior in the financial statements, the authors propose a research model that includes nine independent variables as follows:

$$Creative\ Accounting_{i,t} = \widehat{\beta_0} + \widehat{\beta_1} * DSRI_{i,t} + \widehat{\beta_2} * GMI_{i,t} + \widehat{\beta_3} * AQI_{i,t} + \widehat{\beta_4} * SGI_{i,t} + \widehat{\beta_5} * DEPI_{i,t} + \widehat{\beta_6} * SGAI_{i,t} + \widehat{\beta_7} * TATA_{i,t} + \widehat{\beta_8} * LVGI_{i,t} + \widehat{\beta_8} * ISSUE_{i,t} + \varepsilon_{i,t}$$

## 4. Empirical Results

*4.1. Descriptive statistics*

From the data compiled by the authors in Table 1, information is extracted from the financial statements of 100 industrial enterprises listed on the HNX in the period from 2019-2021. Thus, a total of 300 financial statements were consulted. Here in the research sample size, there are only 76 financial statements that are able to use eco-friendly accounting, accounting for 25.33%, and the remaining 224 financial statements belonging to the group that cannot use eco-friendly accounting, accounting for 74.67% of the total sample.

**Table 1** Classify the status of businesses capable of using Creative Accounting and not using Creative Accounting

| Year | 2019 | 2020 | 2021 | Total | % |
|---|---|---|---|---|---|
| Be able to use Creative Accounting | 22 | 30 | 24 | 76 | 25.33 |
| Unable to use Creative Accounting | 78 | 70 | 76 | 224 | 74.67 |
| Total | 100 | 100 | 100 | 300 | 100 |

From Table 2, the average rate of enterprises that have issued additional shares in the year of 100 corporate companies listed on the HNX in the period of 2019 - 2021 as shown by the ratio of the ISSUE variable is about 16 .7% accounted for quite a bit with the minimum and maximum values being 0 and 1, respectively. Days Sales Receivable Index (DRSI) with an average value of 1.3627 had a minimum value of 0 and a price. The maximum value is 33.9648. The Gross Margin Index (GMI) is 1.1505 where the minimum is -3.3818 and the largest is 20.0444. The Asset Quality Index (AQI) factor has an average value of 1.0515

with the lowest value of 0.0995 and the highest value of 8.5656. The Sales Growth Index (SGI) has the largest and smallest values of 0 and 5.6592, respectively, in which the average value is 1.0543. With the factor of Depreciation index (DEPI) has an average value of 1.6997 including the minimum value of 0 and the maximum value up to 221.7953. The Sales, general and administrative expenses index (SGAI) has the average value of 1.3466 and the largest value is 51,6220, the smallest is -3.8687. The Total Accrual on Total Assets (TATA) has the largest and smallest values of 0.6614 and -0.8122 with the average value of -0.0326. The last is the Leverage index (LVGI) with the average value of 0.9944 and the minimum value of 0.0011 and the maximum value of 5.784.

**Table 2** Descriptive statistics of the M-score measurement in the model

| Variable | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|
| DSRI | .0000 | 33.9648 | 1.3627 | 2.4146 |
| GMI | -3.3818 | 20.0444 | 1.1505 | 1.5936 |
| AQI | .0995 | 8.5656 | 1.0515 | .6861 |
| SGI | .0000 | 5.6592 | 1.0543 | .4484 |
| DEPI | .0000 | 221.7953 | 1.6997 | 12.7736 |
| SGAI | -3.8687 | 51.6220 | 1.3466 | 3.1488 |
| TATA | -.8122 | .6614 | -.0326 | .1350 |
| LVGI | .0011 | 5.7843 | .9944 | .4337 |
| ISSUE | .0 | 1.0 | .167 | .3733 |

**Table 3** Correlation between the independent variables

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LVGI | ISSUE |
|---|---|---|---|---|---|---|---|---|---|
| DSRI | 1 | | | | | | | | |
| GMI | .003** | 1 | | | | | | | |
| AQI | -.035 | -.022 | 1 | | | | | | |
| SGI | -.290*** | -.028 | -.036 | 1 | | | | | |
| DEPI | -.009 | -.015 | .005 | -.004 | 1 | | | | |
| SGAI | .176*** | -.032 | -.003 | -.102 | .001 | 1 | | | |
| TATA | .017 | .040 | .054 | .180*** | .006 | .028 | 1 | | |
| **LVGI** | -.044 | .010 | -.048 | .236*** | -.124* | -.049 | -.048 | 1 | |
| **ISSUE** | -.042 | .033 | -.065 | .080 | -.025 | -.020 | .175*** | -.060 | 1 |

***, **, * Correlation is significant at the 1, 5 and 10% (2-tailed)

Table 3 is a statistical table of correlation coefficients between independent variables. We see that most of the pairs of variables have relatively low correlation coefficients and are all less than 0.3. Therefore, the variables have a weak correlation with each other. Since then, the phenomenon of multicollinearity among the variables in the model is relatively low.

*4.2. Testing model*

Check the existence of the model based on the Omnibus test

**Table 4** Omnibus Tests of Model Coefficients

| | | Chi-square | df | Sig. |
|---|---|---|---|---|
| Step 1 | Step | 104.318 | 9 | .000 |
| | Block | 104.318 | 9 | .000 |
| | Model | 104.318 | 9 | .000 |

Based on the Omnibus Tests of Model Coefficients table, we see the Sig value. = 0.000 and less than 0.05. Thus, at 5% significance level or 95% confidence level, the model always exists.

Check the fit of the model through R2 Nagelkerke:

**Table 5** Model Summary

| Step | -2 Log likelihood | Cox & Snell RSquare | Nagelkerke RSquare |
|---|---|---|---|
| 1 | 233.500[a] | 0.296 | 0.436 |

a. Estimation terminated at iteration number 9 because parameter estimates changed by less than .001.

Based on the Model Summary table, the value of Nagelkerke R Square = 0.436 means that in the independent variables that affect the ability to use or not to use the accounting system of the enterprise, the factors in the model have explained 43.6%. With the remaining 56.4% being explained by other factors that have not been included in the model. This is also a reasonable ratio that leads to a relatively consistent model.

Check the accuracy of the model's prediction is showed in Table 6.

**Table 6** Classification Table

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Creative Accounting | | Percentage Correct (%) |
| | | | No possibility | Ability | |
| Step 1 | Creative Accounting | No possibility | 216 | 5 | 97.7 |
| | | Ability | 39 | 37 | 48.7 |
| | Overall Percentage | | | | 85.2 |

a. The cut value is .500

The Classification Table provides predictive information that the model can make. Specifically, the 300 financial statements used to test innovative accounting findings of the firms in the sample:

With 221 financial statements that are not able to use creative accounting, the model will correctly predict 216 financial statements, the accuracy rate is 97.7%. For the remaining 76 financial statements belonging to the group capable of using creative accounting, the model will correctly produce 37 financial statements and the correct prediction rate is 48.7%. So the model's average prediction accuracy rate is 85.2%. This is a relatively high accuracy.

Determine whether the independent variables have an influence on the dependent variable and their importance through Wald's test in Table 7.

**Table 7** Variables in the Equation Step 1a

| Variable | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for EXP(B) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower | Upper |
| DSRI | .833 | .222 | 14.012 | 1 | .000 | 2.299 | 1.487 | 3.556 |
| GMI | 1.180 | .389 | 9.197 | 1 | .002 | 3.254 | 1.518 | 6.976 |
| AQI | .691 | .373 | 3.442 | 1 | .064 | 1.996 | .962 | 4.143 |
| SGI | 1.175 | .476 | 6.086 | 1 | .014 | 3.239 | 1.273 | 8.238 |
| DEPI | .489 | .728 | .450 | 1 | .502 | 1.630 | .391 | 6.796 |
| SGAI | -.538 | .275 | 3.817 | 1 | .051 | .584 | .340 | 1.002 |
| TATA | 7.910 | 1.799 | 19.337 | 1 | .000 | 2723.966 | 80.183 | 92538.121 |
| LVGI | -.010 | .537 | .000 | 1 | .986 | .990 | .346 | 2.836 |
| ISSUE | .273 | .442 | .382 | 1 | .536 | 1.314 | .553 | 3.126 |
| Constant | -5.522 | 1.289 | 18.353 | 1 | .000 | .004 | | |

a. Variable(s) entered on step 1: DSRI, GMI, AQI, SGI, DEPI, SGAI, TATA, LVGI, ISSUE.

The variables that have a significant influence on the dependent variable are those with the value Sig. less than 0.05. Based on the Table of Variables in the Equation, it shows that the variables: DSRI, GMI, SGI, TATA have Sig values of 0.000; 0.002; 0.014; 0.000 and both are less than 0.05. This proves that they

have a significant influence in detecting whether enterprises are capable of using eco-friendly accounting with a confidence level of 95%.

The regression coefficient of the DSRI is 0.833 and has a positive proportion value. Moreover, GMI, SGI and TATA have positive relationship with creative accounting with coefficient of 1.180, 1.175, 7.910, respectively. DSRI, GMI, SGI, TATA have a positive proportion impact with the dependent variable or have a direct proportion relationship with the ability to use Creative Accounting of enterprises. The results of DSRI, GMI, SGI and TATA are consistent with the research results of Beneish (1999), Dechow et al (2011), To (2017) and Tuyen (2019). In contrast, the variables AQI, DEPI, SGAI, LVGI, ISSUE give a Sig value of 0.064; 0.502; 0.051; 0.986; 0.536 is greater than 0.05. Show that these independent variables are not statistically significant and that these factors do not have a significant effect on the creative accounting dependent variable. This is similar to the results of Tuyen (2019), Hoang Khanh and Tran Thi Thu Hien (2015), To (2017). The results support the previous studies, DRSI ratio increases abnormally, with asymmetry between customer receivables and sales, most likely due to businesses intentionally inflating revenue to increase profits, is the sign of creative accounting (Abed et al, 2022).

Finally, the variable ISSUE, this variable is also removed because it is not statistically significant for the model. Therefore, the possibility of using economization will be higher if the company issues more shares during the year is not correct and the hypothesis H9 is rejected. This is in stark contrast to the study of Tuyen (2019). In addition, it is also possible to evaluate the importance of the influence from high to low of the factors on the dependent variable of Creative Accounting, respectively: TATA, GMI, SGI, DSRI.

## 5. Conclusion

The paper results proposed model is completely consistent with the research objectives of using M-score to measure the creative accounting. It is a useful tool to evaluate and detect creative accounting. Through studying the application characteristics of the M-score Beneish model and related index factors, the Logistic regression model with a research sample size of 100 enterprises listed on the Hanoi Stock Exchange (HNX) within 3 years from 2019-2021 was developed by the authors with 1 dependent variable, Ability to use Creative Accounting and 4 independent variables including: TATA GMI, SGI, DSRI. This result is completely consistent with the results of previous studies including: Beneish (1999), Dechow et al (2011), To (2017), together with research Research by Tuyen (2019) and contribute more evidence about M-score to detection financial statement fraud. In addition, the study shows the new approach of creative accounting and measure by M-score (Kukreja et al (2020), Ratmono et al (2020) and Bhavani and Amponsah (2017)). The effects affecting the discovery of Creative Accounting in enterprises also depend on the data characteristics, other in-depth factors that the research team is limited in the topic. From the stated conclusion will be the foundation to help the author make appropriate recommendations and suggestions for companies, businesses and stakeholders to bring certain insights, effectiveness and benefits.

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