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# Detecting the Risk of Manipulation of Financial Statements for Companies on the Bucharest Stock Exchange Applying the Beneish Model

Mihaela-Maria MIHALCEA[1]

*Abstract*

*In order to protect the interests of the stakeholders regarding the economic performance of the company, econometric models have been developed in the specialized literature that can determine the possibility of manipulating financial statements. The Beneish model developed by Professor Messod Beneish calculates a score based on eight financial rates. In Romania, based on the average score calculated for 1998-2017, 55% of companies listed on the regulated market of Bucharest Stock Exchange are likely to be manipulators. The result is worrying compared to that obtained in Italy for 2009-2010 and Greece for 2011-2012 (33%), or for Vietnamese companies during 2013-2014 (48.4%), but less dramatic than in Albania (68%). By analyzing the M-scores for each company, we conclude that 67% of the analyzed companies manipulated at least half of the annual financial statements, and of these 19% companies manipulated over 75% of the annual financial statements. The result is meant to sound an alarm for the government, even if there is also an optimistic evolution of the manipulators in the second part of the analyzed period and, in general, a linear, decreasing trend. Financial performance looks better in the manipulated financial statements (average profits, ROA, liquidity and solvency rates are higher, and the degree of indebtedness is lower), but it is a distorted performance, not a real one. The individual results, for each company separately, are of real interest to investors, auditors and other stakeholders of the real performance of the company.*

**Keywords:** *Earnings manipulation; M-Beneish; financial performance; stakeholders.*

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## 1. Introduction

Accounting manipulation with its negative extensions (fraud) are topics that frustrate shareholders, investors, auditors and government. In order to protect them, econometric models have been developed in the specialized literature that can calculate the risk of handling financial statements. Their limits are given by the fact that they represent probabilistic models, which means that they cannot categorically determine whether or not a company manipulates its figures, but they are at least indicative.

The Beneish model developed by Professor Messod Beneish calculates an M-score based on eight financial rates. Broadly speaking, the profile of a manipulator, as defined by Beneish (1999), is a company that (1) grows extremely fast, (2) faces fundamental deterioration (evidenced by a decrease in the quality of assets, erosion of the profit margin and increase of the lever effect) and (3) adopts aggressive accounting practices (eg, receivables grow much faster than sales, decreasing expenses with depreciation) [3].

## 2. Problem Statement

Numerous studies, Cynthia (2005) [7], Schuetze (2007) [14], Tarjo & Herawati, N. (2015) [16] confirm the Beneish model's ability to detect the manipulation of financial statements. The model helps auditors by signaling possible issues in the financial statements [9].

### *2.1. M-Beneish model*

The variables taken into account in the determination of the M-score are the following [3]:

1. Days' sales in receivable index

$$DSRI = \frac{Receivables(t)}{Sales\ (t)} / \frac{Receivables(t-1)}{Sales\ (t-1)}$$

2. Gross margin index

$$GMI = \frac{Gross\ margin(t-1)}{Sales\ (t-1)} / \frac{Gross\ margin(t)}{Sales\ (t)}$$

3. Asset quality index

$$AQI = \left[1 - \frac{Current\ assets(t) + PP\&E(t)}{Total\ assets\ (t)}\right] / \left[1 - \frac{Current\ assets(t-1) + PP\&E(t-1)}{Total\ assets(t-1)}\right]$$

4. Sales growth index

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

5. Depreciation index

$$DEPI = \frac{Depreciation(t-1)}{Depreciation(t-1) + PP\&E\ (t-1)} / \frac{Depreciation(t)}{Depreciation(t) + PP\&E\ (t)}$$

6. Sales, general and administrative expenses index

$$SGAI = \frac{Sales,\ \ general\ and\ administrative\ expense(t)}{Sales\ (t)} / \frac{Sales,\ \ general\ and\ administrative\ expense(t-1)}{Sales\ (t-1)}$$

7. Leverage index

$$LVGI = \frac{LTD\ (t) + Current\ liabilities\ (t)}{Total\ assets(t)} / \frac{LTD\ (t-1) + Current\ liabilities\ (t-1)}{Total\ assets\ (t-1)}$$

8. Total accruals to total assets

$$TATA = \frac{\Delta Current\ assets\ (t) - \Delta Cash\ (t) - \Delta Current\ liabilities(t) - \Delta Income\ tax\ payable(t) - Depreciation}{Total\ assets(t)}$$

To use data from the cash flow statement, Beneish, Lee and Nichols (2013) replaced the latter variable with the following one [5]:

$$TATA = \frac{Net\ income\ (t) - Net\ change\ in\ cash(t)}{Total\ assets(t)}$$

The M-score is calculated by the formula:

$$M = -4.84 + 0.92 * DSRI + 0.528 * GMI + 0.404 * AQI + 0{,}892 * SGI + 0.115 * DEPI - 0.172 * SGAI + 4{,}679 * TATA - 0.327 * LVGI$$

The score above -2.22 signifies a risk of earnings manipulation.

It is observed from this equation that the variables DEPI, SGAI and LVGI are less significant, their coefficients being close to 0, respectively 0.115, -0.172 and 0.327. Beneish considers the probability that these variables are associated with earnings management rather than their manipulation. As for the DEPI index, this means that changing the depreciation method or revising the useful life is not imply accounting manipulation.

This model consists of eight reports that capture either distortions of financial statements that may result from earnings manipulation (DSRI, AQI, DEPI and TATA) or indicate a predisposition to engage in earnings manipulation (GMI, SGI, SGAI, LEVI) [11]. In other words, GMI, SGI, SGAI, LEVI are causes of manipulation, and DSRI, AQI, DEPI and TATA indicate the effect of manipulation.

### *2.2. Robu Model*

Robu & Robu (2013) have applied these indicies for companies listed on the Bucharest Stock Exchange obtaining the following model for the determination of the risk of fraud [13]:

$$Z_{fraud\ risk-Beneish} = -0.383 * DSRI + 0.039 * GMI - 0.325 * AQI + 0.448 * SGI + 0.273 * DEPI + 0.915 * DGAI + 0.478 * LVGI - 0.153 * TATA$$

The results of this classify the company in one of the following groups of risk:

- Interval [-2,841; -0,355] – area without risk of financial fraud
- Interval (-0,355; 0,313) – area of uncertainty regarding the possibility of risk of fraud, situation which implies applying supplementary audit procedures
- Interval [0,313; 2,453] – area with risk of financial fraud **[1].**

## 3. Aims of the research

In this research we apply the Beneish model at the Romanian level, looking to find out the percentage of manipulators and its evolution during 1998-2017, comparing the results with other studies, from other countries, and with the results obtained by applying the Robu model.

Then, dividing the companies into manipulators and non-manipulators, we will compare the financial performance for the two categories.

## 4. Research Methods

To collect data, we accessed the Thomson Reuters database from which we extracted data from the financial statements of listed companies on the regulated market of the Bucharest Stock Exchange from which we eliminated the banks. We also eliminated companies whose financial statements were published in foreign currency. The calculations targeted the period 1998 - 2017, but at the level of each year, for some companies the data were incomplete to calculate the final score. Thus, we obtain a total number of 887 observations and an average number of 47 observations / year. Given the size of the sample, we cannot extrapolate the results to the whole country, but at the level of the companies listed on the BSE the result is representative.

The M-score could be calculated for 2-19 years, depending on the data available for each company. Two companies for which the final score could not be calculated for any year were eliminated (Fondul Proprietatea and SIF Banat Crisana). On average, the score could be calculated for 13 years / company.

In the same conditions, we calculated the Z score for the determination of the risk of fraud proposed by Robu & Robu (2013) [13] for the companies listed on the Bucharest Stock Exchange, then comparing the results.

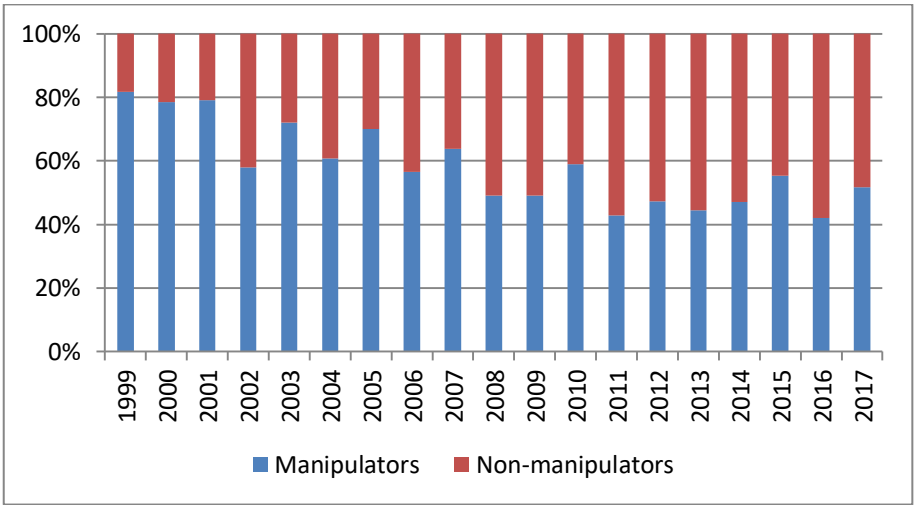
## 5. Findings

### *5.1. Results applying Beneish model*

For the years 1999-2017, we obtain an average of 55% manipulators. The highest weightings of the manipulators appear in the years 1999-2001 (79% -82%). These percentages are, however, less relevant, because for these years the number of observations is lower. The minimum weight of the

manipulated financial statements appears in 2016 (42%). The entire evolution can be observed in graph 1.

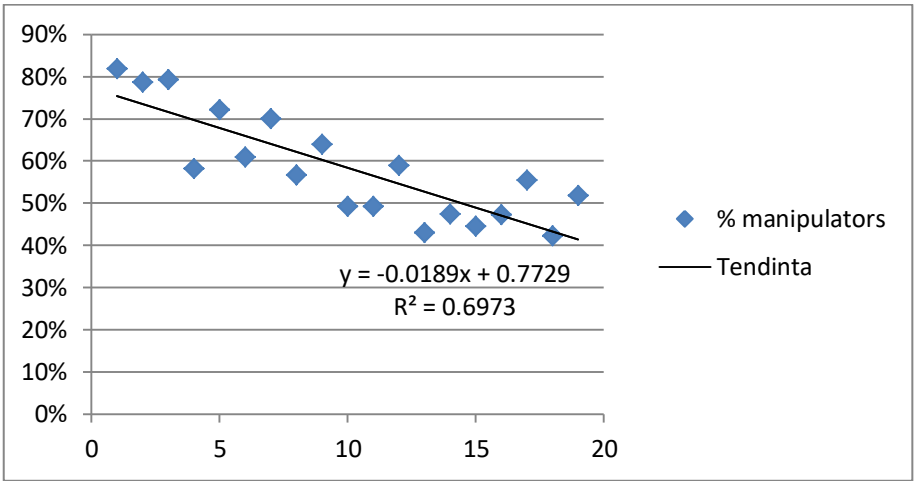
**Graph 1.** Dividing into manipulators / non-manipulators according to Beneish




Source: author's projection

There is also an optimistic evolution of the manipulators in the second part of the analyzed period and, in general, a linear, decreasing trend.

**Graph 2.** Evolution over time of the percentage of manipulators




Source: author's projection

By analyzing the M-scores for each company, we conclude that 67% of the analyzed companies manipulated at least half of the annual financial statements, and of these 19% companies manipulated over 75% of the annual financial statements. For a company (MedLife SA) of the 70, M-score indicates that all the annual financial statements are 'clean', but it is only 4 years for which the data were complete so we can calculate the M-score. Also, one company, out of 70, manipulated its annual financial statements each year (3 out of 3 years) for which the M-score on manipulation could be determined. Given that a number of 3-4 years is not very relevant for the present research, we will consider only the companies for which we have had complete data for more than 10 years, and in this case the minimum of the financial statements manipulated is 13% (2 of 15 years), and the maximum of 87% (13 of 15 years).

In the case of manipulated financial statements, the average of the reported profits is higher than in the case of non-manipulated financial statements. This may mean, on the one hand, that larger companies are more tempted to manipulate their earnings, and on the other hand, increasing profits may be the goal of accounting manipulation. The average cash flow is lower for accounting manipulations. Also, the ratio between cash flow and profit is lower (even negative). ROA, the liquidity and solvency rates are higher when manipulating the financial statements, and the degree of indebtedness is lower, as shown in table 1. Contrary to expectations, the average earnings quality reported by Thomson Reuters is approximately the same in the two situations in which the quality of earnings is defined as the extent to which previous earnings are reliable and are likely to persist. Basically, this result is contrary to the theory of Beneish, Lee & Nichols (2013) that claims that earnings of companies with high M-scores are more likely to disappear next year, unlike those of low-scoring companies that tend to persist.

**Table 1.** Comparison of financial performance for manipulators and non-manipulators

| | Manipulated financial statements | Non-manipulated financial statements |
|---|---|---|
| Net income | 52.067 | 13.711 |
| Operating income | 64.558 | 35.548 |
| Net change in cash | (14.551) | 30.981 |
| Cash from operating activities | 73.681 | 95.159 |
| Net profit margin (Net income/Sales) | -88% | -15% |

| | | |
|---|---|---|
| Operating profit margin (Operating income/Sales) | -133% | -17% |
| Net change in cash-to-Net income | -0,47 | 5,21 |
| Cash from operating activities-to-Operating income | 0,55 | -0,49 |
| Liquidity current ratio | 274% | 262% |
| ROA | 6% | -2% |
| Debt ratio (Total liabilities/Total assets) | 37% | 50% |
| Shareholder equity ratio (Equity/total assets) | 63% | 50% |
| EQ | 40,6 | 41,8 |

Source: author's projection

Each of the explicative variables of the model can also be individually analyzed in order to identify the part of the financial statements that is cause for concern. The averages defined by Beneish (1999) [3] for these variables are presented in the table below in comparison with the averages obtained for the companies listed on the BSE regulated market:

**Table 2.** Averages of indicators signaling risk of manipulation

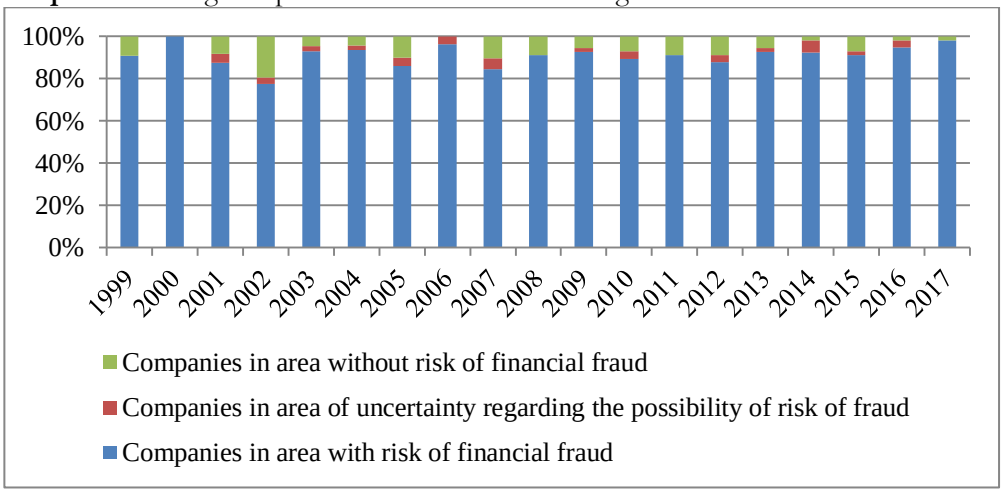
| | Averages(Beneish) | | Averages(BSE companies) | |
|---|---|---|---|---|
| Variables | Manipulated financial statements | Non-manipulated financial statements | Manipulated financial statements | Non-manipulated financial statements |
| DSRI | 1,465 | 1,031 | 4,777 | 0,904 |
| GMI | 1,193 | 1,014 | 1,764 | 0,678 |
| AQI | 1,254 | 1,039 | 6,863 | 0,914 |
| SGI | 1,607 | 1,134 | 1,255 | 1,035 |
| DEPI | 1,077 | 1,001 | 1,541 | 1,098 |
| SGAI | 1,041 | 1,054 | 1,273 | 1,085 |
| LVGI | 1,111 | 1,037 | 1,020 | 1,176 |
| TATA | 0,031 | 0,018 | 0,072 | -0,038 |

Source: author's projection

### *5.2. Results applying Robu model*

Applying the Robu model, the results are more dramatic. On average, 91% of the companies considered are in the area at risk of financial fraud.

**Graph 3.** Dividing companies into risk areas according to Robu

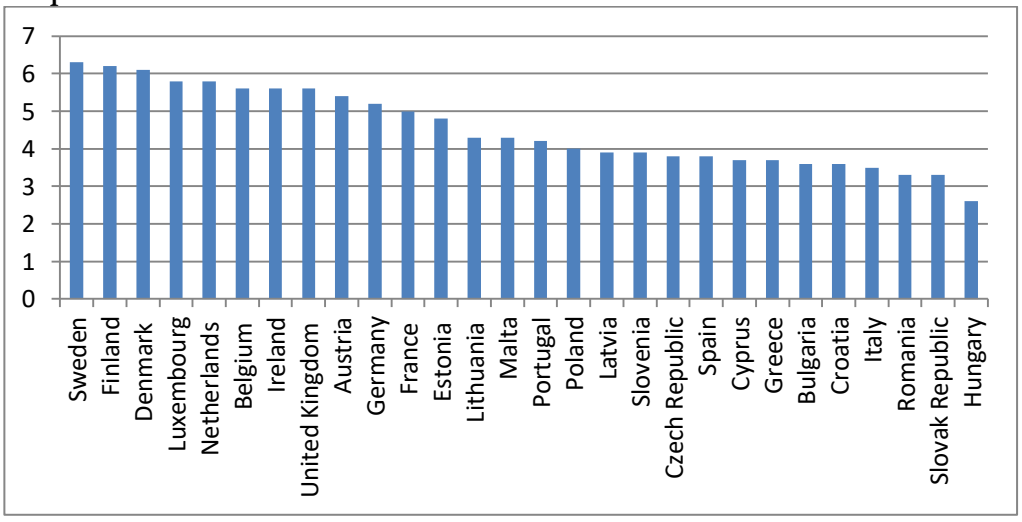



Source: author's projection

### *5.3. Companies' ethical behaviour according to World Economic Forum*

In the ranking made by the World Economic Forum in The global Competitiveness report regarding the ethical behavior of the companies, Romania ranks third in the queue, with a score of 3.3 out of 7. By difference, in a proportion of 53% the companies have a corrupt behavior.

**Graph 4.** Ethical behaviour of firms 2016-2017




Source: author's projection

The Beneish model was also applied at the level of Greece on a number of 25,468 companies for the years 2011-2012. For 33% of these, the score obtained was greater than -2.2, which ranks them in the manipulators category [12]. Of the 229 Vietnamese companies listed on HOSE in 2013-2014, 48.4% were resorted to earnings management [2]. For 34 of the 50 companies in Albania (68%), the M score indicates a manipulation of the financial statements [15]. In Italy, in the period 2009-2010, immediately after the beginning of the financial crisis, 33% of the sample presents a high risk of earnings manipulation [6].

## 6. Discussions

The average percentage of manipulators on the regulated market of Bucharest Stock Exchange is a medium one (55%), higher than in Greece, Italy (33%), Vietnam (48%), but lower than in Albania (68%). The decreasing trend shows that companies are making efforts to apply good practices.

We note that, in general, the average values of the M-score variables for the analyzed companies are higher than those calculated by Beneish (1999), which means that the manipulation is more aggressive in Romania.

A SGI score of over 1,607 indicates that sales were manipulated. At the level of the companies analyzed on the BSE, the manipulation occurred less at this level and more at the level of:

- Receivables (DSRI averages provide an indication that the company has changed its lending conditions and granted more credit)
- Intangible assets and advance expenses, a fact indicated by the AQI values
- gross profit (the average GMI of 1,764 is higher than the average obtained by Beneish of 1,193),
- at the assets level by re-evaluating them or extending their useful life if we observe the DEPI averages in table 2

Investors may be deceived by the better financial performance of manipulators, but it is a dissimulated performance, not a real one. That is why it is recommended to analyze the risk of manipulation.

The results obtained on the basis of the Robu model can be slightly exaggerated, appearing more realistic those obtained on the Beneish model, because at a comparable level we are also in the ranking made by the World Economic Forum in The global Competitiveness report regarding the ethical behavior of the companies [4].

We cannot extrapolate the results to the whole country, but at the level of the companies listed on the BSE the result is representative.

## 7. Conclusions

We noted that, in general, the averages of indicators that explain the risk of manipulation for the analyzed companies are higher than those calculated by Beneish (1999), which means that the manipulation is more aggressive in the case of Romania.

For the years 1999-2017, we obtain an average of 55% manipulators and a general tendency to decrease them. We consider the percentage to be high compared to that obtained in Italy and Greece (33% manipulators), or Vietnamese companies (48.4%), but less dramatically than in Albania (68%).

Applying the Robu model, the results are more dramatic: on average, 91% of the companies considered are in the area at risk of financial fraud. However, we note the results obtained by applying the Beneish model, which are comparable to the level at which we are in the ranking made by the World Economic Forum in the Global Competitiveness report on the ethical behavior of companies.

Financial performance is better in the manipulated financial statements (Average profits, ROA, liquidity and solvency rates are higher, and the degree of indebtedness is lower), but it is a distorted performance, not a real one.

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