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## **EFFECTIVENESS OF MODELS FOR DETECTING ACCOUNTING MANIPULATION IN INSOLVENCY PREDICTION**

### **Introduction**

The most important function of financial statements is the information function. It involves the provision of data characterizing the financial situation of a company. On the basis of this data several strategic decisions concerning the company's operations are made<sup>1</sup>. Therefore, it is crucial that the statement is made in a reliable and transparent manner. The article discusses the issues of accounting manipulations (and the related terms) as well as of the so-called false insolvency. The article also presents the structure of two methods that were used in the research: the Beneish model and the red-flag method. The empirical part of the article presents the results of research on twelve bankrupt companies. The final chapter presents the conclusion from the research.

### **1. Accounting data manipulation**

One of the superior concepts of accounting is the principle of *true and fair view*<sup>2</sup>. The concept was developed in Great Britain in the 19<sup>th</sup> century and included in the *Joint Stock Companies Act 1844*<sup>3</sup>.

As it is pointed out by selected economists, the principle is not defined in a precise way<sup>4</sup>. However, it indicates that company accounting should be kept in an accurate, complete, and

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<sup>1</sup> Y. Ustinova, C. M. Gupta, A. Shaposhnikov, *Creative Accounting Detection Methods: Foreign Experience*, "Advances in Social Science, Education and Humanities Research" 2021, No. 632.

<sup>2</sup> M. Tuskiewicz, *The problem of preserving the principle of true and fair view on examples*, [https://www.researchgate.net/publication/329928390\\_THE\\_PROBLEM\\_OF\\_PRESERVING\\_THE\\_PRINCIPLE\\_OF\\_TRUE\\_AND\\_FAIR\\_VIEW\\_ON\\_EXAMPLES](https://www.researchgate.net/publication/329928390_THE_PROBLEM_OF_PRESERVING_THE_PRINCIPLE_OF_TRUE_AND_FAIR_VIEW_ON_EXAMPLES) (accessed: 9 August 2024).

<sup>3</sup> W. McGregor, *True and fair view — an accounting anachronism*, "Australian Accountant" 1992, No. 62 (1), pp. 68-71.

<sup>4</sup> Ł. Matuszak, *Koncepcja TFV w świetle wybranych teorii prawdy*, [in:] W. Gabrusiewicz (ed.), *Audyt w systemie kontroli; VI Ogólnopolska Konferencja Zawodowa, Krajowa Izba Biegłych Rewidentów*, Poznań 2010, p. 144.

true manner<sup>5</sup>. The main advantage of the imprecise structure of the provision is the possibility to maintain its international scope without imposing a rigid framework. However, such a solution has a drawback: the possibility of manipulating financial data under the pretext of a more accurate presentation of facts in order to conceal certain data.

For many years, *creative accounting* was the term used in Poland to describe unfair accounting practices (which most frequently involved the manipulation of financial data)<sup>6</sup>. Nowadays, a different opinion is increasingly more common. According to D.Krzywda, a certain degree of creativity is actually a desirable phenomenon among accountants<sup>7</sup>. However, it should be emphasized that this must be done in full compliance with the law.

The term that describes accounting practices that are not consistent with the law (such as artificially inflating profits) is *aggressive accounting*. A good definition of this phenomenon was given by D.Król, who states that :”this is a deliberate action that leads to an unreliable presentation of the property and financial situation of an entity”<sup>8</sup>. She also draws attention to the uselessness of financial analyses in companies where aggressive accounting is used. This is due to the inability to reflect the actual results achieved by the company<sup>9</sup>.

## 2. False insolvency

The terminology referring to insolvency should be mentioned. There are two terms that are most often used indiscriminately: insolvency and bankruptcy. Despite general consent on the need to distinguish these concepts, economists do not agree on their unified definition. For example, B.Prusak thinks that in legal terms every bankruptcy (upadłość) means economic insolvency (bankructwo ekonomiczne), but not every economic insolvency is bankruptcy in the meaning of law<sup>10</sup>. A.Tokarski has a similar view but points out an exception. As an example, he presents the strategy of reducing the entity’s costs by consciously initiating insolvency proceedings. The purpose of such proceedings is to free the entity from obligations to

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<sup>5</sup> D. Garstecki, *Zasada true and fair view a zjawisko agresywnej księgowości*, „Zeszyty Naukowe”, Uniwersytet Ekonomiczny w Poznaniu 2012, No. 248, p. 44.

<sup>6</sup> A. Hołda, *Perception of the concept of creative accounting by the Polish public and by accounting professionals*, „The Theoretical Journal of Accounting” 2016, No. 87 (143), p. 45.

<sup>7</sup> D. Krzywda, *Rachunkowość finansowa*, Fundacja Rozwoju Rachunkowości w Polsce, Warszawa 1999, pp. 17-19.

<sup>8</sup> D. Król, *Rachunkowość kreatywna a rachunkowość agresywna*, „Nauki o Finansach” 2015, No. 23 (2), p. 16.

<sup>9</sup> Ibidem, p. 17.

<sup>10</sup> B. Kotowska, A. Uziębło, O. Wyszowska-Kaniewska, *Analiza finansowa w przedsiębiorstwie*, Wydawnictwo CeDeWu Sp. z o. o., Warszawa 2013, p. 149.

employees and trade unions<sup>11</sup>. On the other hand, E. Mączyńska states that the term insolvency (bankructwo) is a strictly economic term, while bankructwo (upadłość) is a legal term<sup>12</sup>.

It is also indicated that the term “bankructwo” should be associated with bankructwo only in the context of culpable insolvency (e.g., as a result of irresponsible spending of company funds) but should not include non-culpable insolvency (i.e., caused by external factors beyond the company’s control)<sup>13</sup>. Importantly, culpable insolvency in some cases may be subject to a fine, deprivation of the right to perform certain functions, and even imprisonment<sup>14</sup>.

One should mention here the provision in Penal Code art. 301<sup>15</sup> concerning harm to creditors by the debtor and the so-called false insolvency<sup>16</sup>, which consists in establishing a new business entity and transferring his/her assets into it. The usual aim of such a procedure is to make it difficult or impossible for the creditor to recover the funds owed to him/her. Pursuant to the Penal Code art. 301 § 1, this results in the liability of imprisonment for between three months to five years. The legislator clearly indicates in the Penal Code art. 301 § 2<sup>17</sup> that the same penalty applies to a debtor to several creditors, causes their bankructwo or insolvency.

Another type of culpable insolvency is the so-called reckless insolvency. This concerns wasting assets, imprudent contracting liabilities or concluding transactions that contradict principles of good management by the owner or the entity managing the company. Such actions are specified in Art. 301 (3) of the Penal Code and are subject to a fine, restriction of liberty or imprisonment for up to two years<sup>18</sup>. It is interesting to note that the legislative body clearly indicated that the provisions apply only to debtors with several creditors.

### 3. Models of manipulation detection

One of the most popular models for detecting accounting manipulation is the one developed by American professor Messod Daniel Beneish, an expert in the field of detecting accounting fraud and manipulation<sup>19</sup>. The probit model was first presented in 1999 and was

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<sup>11</sup> A. Tokarski, *Charakterystyka podstawowych rodzajów upadłości firm w edukacji przedsiębiorczości*, *Przedsiębiorczość-Edukacja* 2012, No. 8, p. 176.

<sup>12</sup> E. Mączyńska, *Upadłości przedsiębiorstw- dysfunkcje, ich przyczyny*, „Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie” 2009, No. 2, p. 173.

<sup>13</sup> *Ibidem*, p. 58.

<sup>14</sup> A. Tokarski, *Charakterystyka podstawowych...*, *op.cit.*, p. 174.

<sup>15</sup> Act of 6 June 1997 – Penal Code, *Journal of Laws of 1997*, No. 88, item. 553 as amended, art. 301 (1).

<sup>16</sup> *Pozorne bankructwo*, <https://www.infor.pl/prawo/encyklopedia-prawa/p/296514,Pozorne-bankructwo.html> (accessed: 9 August 2024).

<sup>17</sup> Act of 6 June 1997 – Penal Code *op. cit.*, art. 301(2)

<sup>18</sup> *Ibidem*, art. 301 (3)

<sup>19</sup> <https://kelley.iu.edu/faculty-research/faculty-directory/profile.html?id=DBENEISH> (accessed: 13 July 2024).

based on the financial data of 74 companies that were recognized by the U.S. Securities Exchange Commission as manipulators<sup>20</sup>. In order to develop a model that is as reliable as possible, the author decided to use – in addition to the data from manipulator companies – reports from 2332 companies that were not considered to be manipulators<sup>21</sup>. The structure of the 8-variable Beneish model is given in formula 1.

**Formula 1. (8-ratio) Beneish model**

$$M = -4.84 + 0.920 DSRI + 0.528 GMI + 0.404 AQI + 0.892 SGI + 0.115 DEPI \\ - 0.172 SGAI + 4.679 TATA - 0.327 LVGI$$

The selected ratios (with boundary values) are as follows<sup>22</sup>:

*DSRI* – Day’s Sales Receivables Index; boundary value – 1.412,

*GMI* – Gross Margin Index; boundary value – 1.159,

*AQI* – Asset Quality Index; boundary value – 1.228,

*SGI* – Sales Growth Index; boundary value – 1.581,

*DEPI* – Depreciation Index; boundary value – 1.072,

*SGAI* – Sales General and Administrative Expenses; boundary value – 1.107,

*TATA* – Total Accruals to Total Assets; boundary value – 0.049,

*LVGI* – Leverage Index; boundary value – 1.124.

The structure of the indices is as follows<sup>23</sup>:

$$DSRI = \frac{\frac{\text{short-term receivables } t}{\text{net sales revenues } t}}{\frac{\text{short-term receivables } t-1}{\text{net sales revenues } t-1}}$$

$$GMI = \frac{\frac{\text{net sales revenues } t-1 - \text{cost of products, goods and materials sold } t-1}{\text{net sales revenue } t-1}}{\frac{\text{net sales revenue } t - \text{cost of products, goods and materials sold } t}{\text{net sales revenues } t}}$$

<sup>20</sup> A. Hołda, *Oszustwa i manipulacje księgowość a rachunkowość kreatywna*, Polskie Wydawnictwo Ekonomiczne, Warszawa 2020, p. 101.

<sup>21</sup> A. Hołda, *Oszustwa i manipulacje księgowość a rachunkowość kreatywna*, Polskie Wydawnictwo Ekonomiczne, Warszawa 2020, p. 101.

<sup>22</sup> M. D. Beneish, *The Detection of Earnings Manipulation*, „Financial Analysts Journal” 1999, No. 55 (5), pp. 26-27.

<sup>23</sup> A. Dalecka, *Użyteczność modelu Beneisha w detekcji manipulacji księgowych*, „Zeszyty Naukowe Uniwersytetu Szczecińskiego” 2015, No. 854, pp. 1-9.

$$AQI = \frac{1 - \frac{\text{current assets } t - \text{tangible fixed assets } t}{\text{total assets } t}}{1 - \frac{\text{current assets } t-1 - \text{tangible fixed assets } t-1}{\text{total assets } t-1}},$$

$$SGI = \frac{\text{net sales revenue } t}{\text{net sales revenue } t-1},$$

$$DEPI = \frac{\frac{\text{depreciation } t-1}{\text{depreciation } t-1 + \text{fixed assets } t-1}}{\frac{\text{depreciation } t}{\text{depreciation } t + \text{fixed assets } t}},$$

$$SGAI = \frac{\frac{\text{operating expenses } t}{\text{net sales revenue } t}}{\frac{\text{operating expenses } t-1}{\text{net sales revenue } t-1}},$$

$$TATA = \frac{\text{current assets } t - \text{cash } t - \text{short-term liabilities } t + \text{income tax liabilities } t - \text{depreciation } t}{\text{total assets } t},$$

$$LVGI = \frac{\frac{\text{total liabilities } t}{\text{total assets } t}}{\frac{\text{total liabilities } t-1}{\text{total assets } t-1}}.$$

When interpreting Beneish model, attention should be paid to boundary value  $M > -2,22$  (if the correction of the model to  $M > -1.78$  is considered); if the value obtained in the calculation is higher than the boundary value, data manipulation may have occurred.

In addition to the Beneish model, the authors decided to consider the so-called red flags. This is a method based on the comparison of the values of selected indices and their predetermined boundary values. If the index value is lower than the boundary value of a particular index, attention should be given to selected values. If the value is higher, then the values in the index are acceptable. A significant number of red flags may be considered a signal that financial data has been manipulated in the entity.

#### 4. Methodology and results of the authors' own research

The research question set by the authors was: *is it possible to use the 8-ratio Beneish model for predicting the insolvency of Polish companies?* In addition, the authors put forward a hypothesis indicating that the terms *fraud* and *insolvency* should not be identified at the same level.

The research was based on the data from financial statements published by the companies in digital form on the website of the Ministry of Justice. It covered the period from four years before the declaration of bankruptcy to the year of its declaration. All the companies in question were limited liability companies, had been operating for at least five years and declared insolvency in 2022. In addition, the research involved only the companies whose bankruptcy risk was indicated both by the Polish discriminant analysis models (INE PAN 7 model and

Models P1 and P2 developed by B.Prusak) and a foreign model ( the second model of E.Altman of 1983).

Two methods were used in the research: the red flag technique and the Beneish model. To determine red flags, the indices from the Beneish model and their boundary values were used. If the boundary value was exceeded in a given entity, it was marked with a “red flag”. The research results are presented in tables 1,3,5,7 and 9. In addition, tables 2,4,6,8 and 10 include the interpretation of selected indices and the number of red flags.

**Table 1. Analysis results for the Beneish model and red flags in the year of the declaration of company bankruptcy**

Company	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result
A	0.92	0.65	0.00	0.47	0.16	1.06	2.76	-1.80	-12.70
B	0.16	0.88	1.17	0.69	1.02	1.01	1.18	-0.19	-4.46
C	0.01	-3.05	0.00	12.75	0.00	3.10	1.21	-1.00	-0.66
D	1.00	-19.99	0.00	1.00	0.00	0.74	1.11	0.00	-14.08
E	1.41	0.11	0.00	0.17	8.59	2.70	1.03	-0.28	-4.46
F	0.00	0.00	0.00	0.00	0.00	0.00	2.29	-1.18	-11.13
G	0.00	0.00	0.00	0.00	1.84	0.00	1.93	-2.10	-15.06
H	0.13	0.64	0.00	0.93	0.00	1.04	1.98	-1.78	-12.72
I	0.10	-0.47	0.00	9.15	0.00	0.25	0.95	-0.05	2.59
J	0.00	0.00	0.00	0.00	0.00	0.00	0.79	-0.69	-8.34
K	0.00	0.00	0.00	0.00	0.58	0.00	1.02	0.01	-5.04
L	1.01	1.31	0.00	0.92	0.00	0.90	1.37	-0.05	-3.33

Source: authors' own research.

**Table 2. Interpretation of the analysis results for the Beneish model in the year of the declaration of company bankruptcy**

Company	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result	Red-flag
A	NM	NM	BD	NM	NM	NM	M	NM	NM	1
B	NM	NM	M	NM	NM	NM	M	NM	NM	2
C	NM	NM	BD	M	BD	M	M	NM	M	4
D	NM	NM	BD	NM	BD	NM	M	BD	NM	1
E	M	NM	BD	NM	M	M	NM	NM	NM	3
F	BD	BD	BD	BD	BD	BD	M	NM	NM	1
G	BD	BD	BD	BD	M	BD	M	NM	NM	2
H	NM	NM	BD	NM	BD	NM	M	NM	NM	1
I	NM	NM	BD	M	M	NM	NM	NM	M	3
J	BD	BD	BD	BD	BD	BD	NM	NM	NM	0
K	BD	BD	BD	BD	NM	BD	NM	NM	NM	0
L	NM	M	BD	NM	BD	NM	M	NM	NM	2

Interpretation: M – result suggesting manipulation, NM – result suggesting no manipulation, BD – no data

Source: authors' own research.

In the year when the bankruptcy of the companies was declared, the Beneish model indicated accounting manipulations only in of two of them, and also in the case of these two

companies the model showed four red flags in one of them and three in the other, i.e. it showed values lower than the boundary value of a given financial index. In four companies, only one value lower than the boundary value for a given index was recorded. In two companies, due to the impossibility of calculating a specific index, not a single red flag was recorded.

**Table 3. Analysis results for the Beneish model and red flags one year before the declaration of company bankruptcy**

Company	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result
A	1.26	1.90	0.00	1.14	1.08	0.90	1.03	0.07	-1.70
B	0.81	1.01	1.06	0.98	1.01	1.00	1.09	-0.06	-2.93
C	198.51	-0.19	0.00	0.00	0.00	0.17	4.58	-4.83	153.54
D	0.00	0.00	0.00	0.00	0.00	0.00	1.20	-0.45	-7.34
E	2.97	1.89	0.00	1.09	1.73	0.82	1.88	0.11	-0.19
F	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.42	-3.07
G	1.73	0.62	0.00	0.41	0.46	1.08	2.11	-0.42	-5.34
H	1.04	0.10	0.00	0.76	0.00	1.07	0.90	-0.17	-4.41
I	15.89	-1.83	0.00	0.06	0.00	3.07	1.01	0.00	8.01
J	0.00	0.00	0.00	0.00	0.00	0.00	1.04	-0.04	-5.37
K	0.00	0.00	0.00	0.00	0.70	0.00	1.06	0.00	-5.09
L	1.55	-0.52	0.00	0.46	0.00	2.72	1.33	-0.24	-5.32

Source: authors' own research.

**Table 4. Interpretation of the analysis results for the Beneish model one year before the declaration of company bankruptcy**

Firma	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Wynik	Red-flag
A	M	M	BD	NM	M	NM	NM	M	M	5
B	NM	NM	NM	NM	NM	NM	M	NM	NM	1
C	M	NM	BD	BD	BD	NM	M	NM	M	3
D	BD	BD	BD	BD	BD	BD	M	NM	NM	1
E	M	M	BD	NM	M	NM	M	M	M	6
F	BD	BD	BD	BD	BD	BD	NM	M	NM	1
G	M	NM	BD	NM	NM	M	M	NM	NM	3
H	NM	NM	BD	NM	BD	M	NM	NM	NM	1
I	M	NM	BD	NM	BD	M	NM	BD	M	3
J	BD	BD	BD	BD	BD	BD	NM	NM	NM	0
K	BD	BD	BD	BD	NM	BD	M	BD	NM	2
L	M	NM	BD	NM	BD	M	M	NM	NM	3

Interpretation: M – result suggesting manipulation, NM – result suggesting no manipulation, BD – no data

Source: authors' own research.

One year before the declaration of bankruptcy of the entities under investigation, the Beneish model indicated accounting manipulations in four companies. It is worth mentioning that in these entities, the model indicated five, three, six, and three red flags, respectively. As in the year of the bankruptcy declaration, four companies showed only one value lower than

the boundary value for a given index. In company J not a single flag appeared due to the lack of data.

**Table 5. Analysis results for the Beneish model and red flags two years before the declaration of company bankruptcy**

Company	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result
A	1.78	1.04	0.00	1.14	1.09	0.90	0.95	0.11	-1.79
B	1.02	2.33	0.15	1.14	1.01	0.92	0.85	-0.05	-2.13
C	1.31	0.94	2.97	2.65	1.39	1.01	1.91	0.46	1.95
D	0.00	0.00	0.00	0.00	0.00	0.00	0.99	-0.01	-5.22
E	0.59	0.04	0.00	0.48	0.36	1.49	2.74	-0.21	-5.92
F	7.58	0.20	0.00	0.03	0.00	2.30	1.67	-0.58	-1.37
G	-	-	-	-	-	-	-	-	-
H	1.15	-0.54	0.00	0.49	0.00	1.01	0.89	-0.55	-6.66
I	9.40	-0.59	0.21	0.08	9.99	0.39	0.99	-0.07	4.07
J	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.02	-5.09
K	0.00	0.00	0.00	0.00	0.77	0.00	1.00	0.15	-4.39
L	19.67	0.25	0.00	0.07	7.01	0.70	1.45	0.07	13.98

Source: authors' own research.

**Table 6. Interpretation of the analysis results for the Beneish model two years before the declaration of company bankruptcy**

Company	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result	Red-flag
A	M	NM	BD	NM	M	NM	NM	M	NM	3
B	NM	M	NM	NM	NM	NM	NM	NM	NM	1
C	M	NM	M	M	M	NM	M	M	M	6
D	BD	BD	BD	BD	BD	BD	NM	NM	NM	0
E	NM	NM	BD	NM	NM	M	M	NM	NM	2
F	M	NM	BD	NM	BD	M	M	NM	M	4
G	-	-	-	-	-	-	-	-	-	-
H	NM	NM	BD	NM	BD	NM	NM	NM	NM	0
I	M	NM	NM	NM	M	NM	NM	NM	M	3
J	BD	BD	BD	BD	BD	BD	NM	M	NM	1
K	BD	BD	BD	BD	NM	BD	NM	M	NM	1
L	M	NM	BD	NM	M	NM	M	M	M	5

Interpretation: M – result suggesting manipulation, NM – result suggesting no manipulation, BD – no data

Source: authors' own research.

In the period of two years before bankruptcy, the Beneish model identified four entities that committed accounting fraud. It should be pointed out that three to six flags (i.e., values lower than the boundary value for a given index) appeared in these companies. In the case of three companies, only one index had a lower value than the boundary value. In the remaining three companies no red flags were recorded due to the lack of financial data necessary for the analysis.



**Table 7. Analysis results for the Beneish model and red flags three years before the declaration of company bankruptcy**

Com pany	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result
A	2.55	0.17	0.00	0.23	0.97	1.21	3.98	-2.67	-16.08
B	1.93	0.78	2.51	0.39	1.00	1.03	1.22	-0.10	-2.20
C	1.79	0.41	0.00	1.25	0.45	1.06	0.70	-0.59	-4.99
D	1.58	1.61	0.00	0.64	0.00	0.87	1.00	0.01	-2.40
E	1.02	6.94	0.00	0.86	2.39	0.89	0.80	-0.04	0.18
F	0.17	0.26	0.00	0.23	1.00	1.31	11.84	-9.69	-53.68
G	0.82	0.99	0.00	1.32	0.79	1.00	1.61	0.06	-2.73
H	0.99	5.54	0.00	1.45	0.00	1.02	1.03	0.20	0.71
I	0.91	0.43	0.07	0.42	0.84	0.92	2.34	-1.09	-9.28
J	0.00	0.00	1.23	0.00	0.00	0.00	1.02	-0.04	-4.86
K	0.00	0.00	0.90	0.00	0.55	0.00	1.02	0.28	-3.44
L	1.52	4.09	0.00	0.61	0.90	1.47	1.91	-0.89	-5.67

Source: authors' own research.

**Table 8. Interpretation of the analysis results for the Beneish model three years before the declaration of company bankruptcy**

Com pany	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result	Red-flag
A	M	NM	BD	NM	NM	M	M	NM	NM	3
B	M	NM	M	NM	NM	NM	M	NM	NM	3
C	M	NM	BD	NM	NM	NM	NM	NM	NM	1
D	M	M	BD	NM	BD	NM	NM	NM	NM	2
E	NM	M	BD	NM	M	NM	NM	NM	M	3
F	NM	NM	BD	NM	NM	M	M	NM	NM	2
G	NM	NM	BD	M	NM	NM	M	M	NM	3
H	NM	M	BD	M	BD	NM	NM	M	M	3
I	NM	NM	NM	NM	NM	NM	M	NM	NM	1
J	BD	BD	M	BD	BD	BD	NM	NM	NM	1
K	BD	BD	NM	BD	NM	BD	NM	M	NM	1
L	M	M	BD	NM	NM	M	M	NM	NM	4

Interpretation: M – result suggesting manipulation, NM – result suggesting no manipulation, BD – no data

Source: authors' own research.

Three years before the bankruptcy declaration of the companies, the Beneish model indicated accounting manipulations only in the case of two of them, and for the same companies it showed three red flags (i.e., values lower than the boundary value for a given index. Moreover only one value lower than the boundary value for a given index was recorded in the case of four entities.

**Table 9. Analysis results for the Beneish model and red flags four years before the declaration of company bankruptcy**

Com pany	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result
A	1.52	0.31	0.00	0.66	0.95	1.03	1.10	-0.13	-3.72
B	1.26	0.36	0.50	0.82	1.10	1.08	1.27	-0.53	-5.52
C	1.52	0.31	0.00	0.66	0.95	1.03	1.10	-0.13	-3.72
D	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	-3.00
E	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-0.07	-2.80
F	1.12	0.40	0.00	0.90	0.00	1.07	1.01	0.00	-3.31
G	1.00	1.00	0.00	1.00	1.00	1.00	1.00	-0.01	-2.94
H	0.96	1.80	0.00	1.41	0.00	1.02	0.95	0.19	-1.35
I	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-0.03	-2.60
J	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	-4.76
K	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	-2.48
L	1.00	1.00	0.00	1.00	1.00	1.00	1.00	-0.01	-2.92

Source: authors' own research.

**Table 10. Interpretation of the analysis results for the Beneish model four years before the declaration of company bankruptcy**

Com pany	DSRI	GMI	AQI	SGI	DEPI	SGAI	LVGI	TATA	Result	Red-flag
A	M	NM	BD	NM	NM	NM	M	NM	NM	2
B	M	NM	NM	NM	M	NM	M	NM	NM	3
C	M	NM	BD	NM	NM	NM	M	NM	NM	2
D	NM	NM	BD	NM	BD	NM	NM	BD	NM	0
E	NM	NM	NM	NM	NM	NM	NM	NM	NM	0
F	NM	NM	BD	NM	BD	NM	NM	BD	NM	0
G	NM	NM	BD	NM	NM	NM	NM	NM	NM	0
H	NM	M	BD	M	BD	NM	NM	M	M	4
I	NM	NM	NM	NM	NM	NM	NM	NM	NM	0
J	BD	BD	NM	BD	BD	BD	NM	BD	NM	0
K	NM	NM	NM	NM	NM	NM	NM	BD	NM	0
L	NM	NM	BD	NM	NM	NM	NM	NM	NM	0

Interpretation: M – result suggesting manipulation, NM – result suggesting no manipulation, BD – no data

Source: authors' own research.

Four years before the bankruptcy, the results of the Beneish model indicated accounting manipulations only in one entity, it had four red flags. It should be pointed out that in the case of as many as eight companies, it was impossible to indicate a red flag.

## 5. Research conclusions

After the research, several important issues can be identified. First of all, the hypothesis that the terms *insolvency/bankruptcy* and *fraud* are not identical has been positively verified. Obviously, a situation described in the theoretical part of the article, i.e., false insolvency, may occur but the research showed that this is rather a marginal case. This was also confirmed by

the statistics made available on the website of the Polish Police, which showed that in 2022 and 2023 only 9 and 18 such crimes were committed, respectively<sup>24</sup>.

Unfortunately, it is a significant limitation of the M.Beneish model that the use of this model requires the certainty that in the year preceding the audit of the company's financial statement, no manipulation of the financial data took place. Otherwise, the results obtained in the model become worthless.

However, it should be emphasized that the Beneish model, despite the fact that it does not have the capacity to predict company insolvency, may be (especially together with other analytical tools such as discriminant analysis) an extremely helpful tool to indicate entities in which accounting data was manipulated.

The authors draw attention to the low level of data accessibility of companies that received a disclaimer audit opinion. Such a database could certainly be a useful tool for potential company investors as well as for research purposes.

## Conclusions

The article confirms the hypothesis that the terms *insolvency* and *fraud* are not identical. Although false insolvency is possible, research shows that this is a marginal phenomenon, which is confirmed both by the own research and the data obtained from other statistics. Despite the lack of insolvency predictability of the Beneish model, it can – together with other tools – effectively indicate accounting manipulations. In the course of the research, attention was drawn to the inaccessibility of data concerning companies that received a disclaimer audit opinion, which could be a valuable tool for investors and researchers.

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### **Abstract**

The article discusses the issues of accounting manipulation and false insolvency. It also discusses the difference between the terms insolvency and bankruptcy, as well as between creative and aggressive accounting. Two research methods are presented: M.Beneish model and the methods of red flags. The empirical part presents research results of twelve bankrupt companies; the final part includes conclusions and the observations of the authors.

### **Key words**

Insolvency, bankruptcy, fraud, bankruptcy prediction, manipulation detection, creative accounting, aggressive accounting.