

THE COMPARISON OF PREDICTION ABILITY OF SELECTED CREDIBILITY MODELS IN THE TEXTILE INDUSTRY IN THE CZECH REPUBLIC

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Abstract

Financial analysis presents one of the most important areas of interest in every successful company, where it can provide a huge amount of different indicators and models in areas of profitability, indebtedness, liquidity, and others. It is possible to use also some complex models, namely bankruptcy and credibility models, where these models usually provide one specific number and compare this number with recommended value. This article continues in the analysis of different models, as presented on previous IDSE conferences. This time, authors focus on credibility models, where several well-known models were selected for the analysis, namely Quick-test, IN 99, and Grünwald's credibility index. The authors are evaluating one particular industry sector, namely Production of other textile, with the aim to compare the results of above mentioned models themselves, and to verify whether different models provide similar or different results. The data used for calculation have been obtained in database Albertina. Covered period of time is since 2011 to 2015. The results show that there exist differences between different models of financial analysis. More details are described in this article.

Key words: Quick-test, IN 99, Grünwald's credibility index, financial analysis, Production of other textile industry.

JEL Code: G33, M41.

Introduction

The authors of this article already have an experience with the topic of financial analysis, where they published articles on previous IDSE conferences (Kovárník & Hamplová, 2015, and Kovárník & Hamplová, 2016). This time, they focus on comparison of prediction ability of different credibility models in one particular industry sector. Companies from the sector "Production of other textile" have been selected for the analysis, because of two main reasons.

Firstly, this particular industry sector has had long tradition in the Czech Republic. Second reason is closely connected with the first one. Because of this long tradition there exist a relatively huge amount of companies in this industry sector, where 150 companies with complete and available accounting reports were selected for analysis. Three relatively well-known credibility models have been used for the analysis, namely Quick-test, IN 99, and Grünwald's credibility index. These models have been selected mostly because of their popularity, where these models belong among most frequently used models in the condition of the Czech Republic.

As was already mentioned, authors themselves already published several articles about financial analysis. However, there are other authors dealing with financial analysis as well, such as Čámská (2014), Delina & Pácková (2013), Homolka, Knápková & Pavelková (2015), Kuběnka (2014), Kuběnka & Slaviček (2016), or Růčková (2014), however, these authors usually either create or evaluate one indicator. The aim of this article can be explained as the comparison of results of above mentioned credibility models. More precisely, the aim is not to compare the results of these models with real conditions in analysed companies, but to compare these models among themselves. In other words, the aim of this article is to compare whether different models present similar results or not. Data for the analysis have been obtained in database Albertina, where 150 of companies from analysed industry sector have presented accounting data required for calculation of analysed models. Covered period of time is 2011 – 2015.

1 Methodology

1.1 Quick-test

Quick-test was originally formulated by professor Kralicek, however, it was adopted on conditions in the Czech Republic's environment by professor Kislingerová. It is well described for example in Marinič (2014) or Vochozka (2011). It contains four different indicators of financial analysis, where every each of them is evaluated separately and a score is given to it, starting from Excellent (1) and ending with Threaten by Insolvency (5). Final result is calculated as an average result from all four partial scores. Four partial indicators are as follows:

- A. Equity Quota = $(\text{Equity} / \text{Total Assets}) * 100$
- B. Average Payment Period = $(\text{Short-term Liabilities} + \text{Long-term Liabilities} - \text{Financial Assets}) / \text{Cash Flow}$

- C. Share of Cash Flow = (Cash Flow / Total Revenues) * 100
- D. ROA = (EAT + interests * (1 - t)) / Total Assets
- CF according to Kislingerová = income before taxes + depreciation + change in reserves

As was already explained, every indicator is evaluated separately according to the following Tab. 1.

Tab. 1: Indicators of Quick-test

Indicator	Excellent (1)	Very Good (2)	Average (3)	Bad (4)	Threaten by Insolvency (5)
A	> 30%	> 20%	> 10%	> 0%	negative
B	< 3 years	< 5 years	< 12 years	> 12 years	> 30 years
C	> 10%	> 8%	> 5%	> 0%	negative
D	> 15%	> 12%	> 8%	> 0%	negative

Source: Marinič (2014), Vochozka (2011)

The final result of this indicator is calculated as an average of every mark, where if the indicator is lower than 2, company is considered to be healthy (very good result, safety zone), if the result is higher than 3, company is considered to be in very bad financial condition (distress zone), and between 2 and 3 is so called grey zone.

1.2 IN99

This indicator has been formulated by husband and wife Neumaier, where it also contains four partial indicators (Neumaierová, 2005). However, these indicators are not evaluated separately, but one final number is calculated in a formula as follows:

$$IN\ 99 = - 0.017 * A + 4.573 * B + 0.481 * C + 0.015 * D, \text{ where}$$

- A = Total Assets / Liabilities
- B = EBIT / Total Assets
- C = Revenues / Total Assets
- D = Current Assets / (Short-term Liabilities + Short-term Loans)

The final value of IN99 is consequently compared with following scale:

- $IN99 > 2.07$ means that company creates the value for shareholders
- $1.42 < IN99 < 2.07$ means that company rather creates the value for shareholders

- $1.089 < IN99 < 1.42$ means that it is impossible to determine whether the company creates the value or not
- $0.684 < IN99 < 1.089$ means that company rather does not create value for shareholders
- $IN99 < 0.684$ means that company does not create value for shareholders

Authors themselves describe the first option as safety zone, the last option as distress zone, and all three other options (company rather creates the value, impossible to determine, or company rather do not create the value) as grey zone.

1.3 Grünwald's Credibility Index

This indicator contains six partial indicators, where final result is again average of partial results of each indicator (for example Grünwald, 2001, or Sedláček, 2011). However, author himself suggested to use three points as maximum, to avoid distortion in case of extremely good result of one partial indicator, and on the other hand, he suggested to use zero in case of negative result of some partial indicator. Six partial indicators are as follows:

- $ROE = EAT / \text{shareholder's equity}$
- $ROA = EBIT / \text{total assets}$
- $\text{Quick Ratio} = (\text{Cash and Cash Equivalents} + \text{Short-Term Investments} + \text{Accounts Receivable}) / \text{Current Liabilities}$
- $\text{Inventories Covered by Working Capital} = (\text{Current Assets} - \text{Current Liabilities} - \text{Short-term Loans}) / \text{Inventories}$
- $\text{Payment Period} = (\text{Liabilities} - \text{Reserves}) / (\text{EAT} + \text{depreciation})$
- $\text{Interest Coverage Ratio} = EBIT / \text{Interest Expense}$

For every indicator has been formulated limit acceptable value, where for ROE is this value as average interest rate, for ROA is this value average interest rate multiplied by tax shield $(1 - t)$, for quick ratio is this value 1.2, for inventories covered by working capital is this value 0.7, for payment period 3.5 years, and finally for interest coverage ratio is this value 2.5.

Final evaluation of this index (average result from all partial indicators) is as follows:

- A = Strong Health Condition, when index is at least 2 points, and every indicator is at least 1 point

- B = Good Health Condition, when index is between 1.0 and 1.9, and both quick ratio and interest coverage ratio are at least 1 point
- C = Weak Health Condition, when index is between 0.5 and 0.9, and quick ratio is at least 1 point
- D = Sickness, when index is lower than 0.5

2 Analysis of Results

As was already explained, Quick-test has three possible zones in total (safe, grey, and distress), IN99 has five possible results, however, authors of this indicator themselves present three results as grey zone, therefore this indicator has three zones too (safe, grey, and distress). Grünwald's model has four possible results, namely strong health, good health, weak health, and sickness. Authors of this article have decided to put together weak health condition and sickness as distress zone, and after that can be this indicator also divided into three zones (strong health as a safe zone, good health as a grey zone, and weak health together with sickness as a distress zone).

As was already mentioned, the aim of this article is to compare results of three different models in the real situation of 150 companies between 2011 and 2015. Only three zones have been used for better orientation, as was described above, and Quick-test is called "Q", IN99 is called "IN", and Grünwald's index is called "G". Following Tab. 2 presents results of every model in three zones.

Tab. 2: Results of All Analysed Models (Number of Companies)

Indicator	Zone	2011	2012	2013	2014	2015
Q	safe	15	15	16	26	31
	grey	42	46	53	49	41
	distress	93	89	81	75	78
IN	safe	14	13	17	19	20
	grey	59	71	66	74	70
	distress	77	66	67	57	60
G	safe	6	8	12	13	13
	grey	35	48	47	55	47
	distress	109	94	91	82	90

Source: own processing

It is quite obvious that the worst results are presented by Grünwald's credibility index, where this model has not only the highest number of companies within distress zone, but also the lowest number of companies in safe zone. It is necessary to remind that in case of Grünwald's index in this article are "weak health condition" zone sum up with "sickness". The number of companies in sickness zone only is lower (for example 77 companies in 2011), but on the other hand, according to the authors of this article and with respect to mutual comparison of analysed models can be "weak zone" and "sickness" calculated together. Interesting fact is that even if IN99 has the lowest number of companies in distress zone, it has not the highest number of companies in safe zone. The highest number of companies in safe zone (and mostly the lowest number of companies in grey zone) has Quick-test. Nevertheless, this Tab. 2 presents only total results of every model. Authors of this article would like to compare models among themselves, therefore following Tab. 3 presents number of companies with same or different results.

Tab. 3: The Comparison of Results of Different Models (Number of Companies)

Indicator	2011	2012	2013	2014	2015
Q, IN, G, same results	73	60	65	57	53
Q and IN same results, G higher	5	9	6	10	9
Q and IN same results, G lower	10	13	11	14	12
Q and G same results, IN higher	27	30	25	25	31
Q and G same results, IN lower	6	6	9	8	12
IN and G same results, Q higher	11	14	13	16	14
IN and G same results, Q lower	6	11	11	12	8
Q, IN, G. different results	12	7	10	8	11

Source: own processing

This Tab. 3 presents relatively surprising results. Based on the previous table is interesting that at least 35% of companies had same result according to all models (in 2015, where in 2011 it was almost 49% of them). More interesting is the fact that even if IN has not presented the best results (it has the highest number in grey zone, not in the safe zone), relatively huge number of companies has shown same result according to the Quick Test and Grünwald's index, where IN99 has described better result (that means safe zone in IN99 and either grey or distress zone in Quick-test and Grünwald's index, or grey zone in IN99 and

distress zone in Quick Test and Grünwald's index). This situation occurs at least in 25 companies (16.6%), but it is growing up to 31 companies (20.6%).

Less frequent is combination, where IN99 and Grünwald's index has had same results, while Quick-test has been better (11 to 16 companies, which means from 7.3% to 10.6%), even less frequent is situation where either Quick Test and IN99 have shown same results and Grünwald's index has been lower (from 10 to 14). The other combinations are really unlikely.

Based on these tables could be made partial conclusion that Grünwald's index can be considered as relatively pessimistic, where it is really difficult to achieve good result in this model. However, all models relatively frequently show same results, or at least two of them present same results. Situation, where all models have different results, is relatively extraordinary (from 7 to 12 cases).

In the following Tab. 4 is more briefly analysed the situation, where all three models have presented same results.

Tab. 4: Number of Companies with Same Results

Indicator	2011	2012	2013	2014	2015
safe zone in all models	1	1	2	1	2
grey zone in all models	12	15	18	16	12
distress zone in all models	60	44	45	40	39

Source: own processing

This Tab. 4 also presents relatively surprising results. Despite the fact that even in 2014 and 2015 were at least 13 companies in the safe zone according to the most critical model (Grünwald's index), only one company in 2014 and two companies in 2015 were in safe zone according to all analysed models. Moreover, the majority of same results are in distress zone, where for example according to the IN99 were 77 companies in this zone in 2011 and 60 of them had distress zone according to all models. Another partial conclusion can be made based on this Tab. 4 that positive results are difficult to be achieved according to different models, but once the company has problems, this problems can be seen according to different models as well.

Last presented Tab. 5 describes more briefly situation, where every model have presented different results. In this Tab. 5 is presented number of companies, where first model has shown safe zone, second model grey zone, and last model distress zone.

Tab. 5: Completely Different Results of Analysed Models (Number of Companies)

Indicator	2011	2012	2013	2014	2015
Q, IN, G	4	1	3	5	8
Q, G, IN	2	2	1	1	1
IN, Q, G	5	3	3	1	1
IN, G, Q	0	0	1	0	1
G, Q, IN	0	0	1	0	0
G, IN, Q	1	1	1	1	0

Source: own processing

This Tab. 5 only support already mentioned partial conclusion about pessimistic point of view in Grünwald's index. Situation, where this indicator has shown safe zone, while other two models shows grey and distress zone, is quite extraordinary. However, situation, where Grünwald's model has shown distress zone and other two models safe or grey zone, is not so unique. For example, in 2015, 8 companies have had safe zone according to the Quick Test, grey zone according to the IN99, and distress zone according to the Grünwald's model.

Conclusion

The aim of this article was the comparison of results of different credibility models, namely of Quick-test, IN99, and Grünwald's credibility index. Analysed period of time is 2011 – 2015, and 150 companies from the sector "Production of other textile" have been selected for the analysis, because of two main reasons. Firstly, this particular industry sector has had long tradition in the Czech Republic. Second reason is closely connected with the first one. Because of this long tradition there exist a relatively huge amount of companies in this industry sector with available data for financial analysis.

The comparison shows that the most critical model is Grünwald's credibility index, where authors have discovered not only the highest number of companies in distress zone, but also the lowest number in safe zone. These results are little bit distorted by the fact that the "weak health condition" and "sickness" zones have been sum up in this article, however, despite this fact has had this model the lowest number of companies in safe zone. The deep analysis of this model shows one interesting fact. Every zone in this model has two conditions. First one is connected with overall average result of Grünwald's index, where the second one is connected only with results of every partial indicator. The most important

indicator is quick ratio, which is of course connected with credibility, but according to the Grünwald this indicator has to be at least 1. Even if the company has the overall average result higher than 2, which means safe zone (strong health condition) with excellent results in all other partial indicators, if quick ratio is below 1, the company is in “sickness zone”. Such additional conditions exist for other zones as well. This situations have happened several times, of course. Moreover, such additional conditions do not exist in other analysed models.

Despite different results, all models have relatively huge number of same results in distress zone, where in safe or grey zone are only few companies with same results. It can be explained in such way that it is relatively easy to fail in all models, but it is very difficult to be successful in all of them. That also means that even if these models measure same aspect of financial health, namely credibility, every each of them use a little bit different approach and only extremely successful company is able to “survive” according to different points of view. The most difficult model to beat is Grünwald’s credibility index, where this model has shown better result than the other models only exceptionally. It can be recommended that every company should use different models in evaluation of its financial health and not only one of them, because the company can have different problems, where these problems can be revealed by one model, but not by the other one.

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