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ASSESSMENT OF ENTERPRISES INSOLVENCY: CHALLENGES AND OPPORTUNITIES

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Abstract

This article presents a review of existing tests of the assessment of enterprises insolvency. As for the users of non-financial market models, the authors apply the KISS principle (keep it simple, stupid) to research the development of risk index model, focussing on Kralicek Quick Test involved in this group. The authors study the assessment of Latvian enterprises insolvency based on historical data for 48 enterprises using Kralicek Quick Test.
Keywords: insolvency, risk index models, Kralicek Quick Tests, evaluation of accuracy.
JEL Classification: G33.

Introduction

One of the key issues in business management refers to the enterprise awareness of its financial state. To survive on market and be successful any enterprise should be able to promptly assess its risks of insolvency. It is common knowledge that good results of analysis are achieved by using multifactor models of the assessment of financial state which at a certain level of probability may forecast enterprise insolvency. The authors study the possibility of using such methods which are based on knowledge applied by enterprise employees in the financial management of enterprise in accordance with the Occam and KISS principles. This research was motivated by two factors. First, a variety of bankruptcies in all business spheres and second, an emphasis on cash flow by financial standards of accounting

The necessity of the system of prompt insolvency assessment was especially perceived during the crisis in the 20s and 30s of the 20th century. Growing requirements to the organization of the management of the financial risks in banking sector also stimulated activities in improving the assessment methods of insolvency and borrowers bankruptcy. This factor in its turn encouraged practical interest of enterprises of non-financial sphere in financial risk assessment.

The aim of this article is the study of the nature and development of risk index models and consideration of the problem of using cash flow indicator in insolvency assessment. The authors research the options of applying Kralicek Quick Test to assess insolvency of small and medium sized enterprises of Latvia. The object of research is risk index models and their representative Quick Tests as an instrument of enterprise insolvency assessment, based on the financial ratios data. This article is devoted to the research of challenges and opportunities of enterprise insolvency assessment. Research methods are analysis of scientific literature and statistical date.

To come to the conclusion about the financial state of an enterprise using Kralicek Quick Test it is necessary to have 6 characteristics accessible from Balance Sheet and Profit and Loss Account. The authors are aware that there are certain constraints in the implementation of Cash flow indicator in Latvia. This is caused by the fact that cash flow review is not obligatory for those subjects whose indicators conform to the legislated criteria of the Republic of Latvia. The studies prove that cash flow may be expressed in two ways and depending on the way of the calculation the gained value of indicator may fluctuate. In the first part the authors relying on statistical data about the insolvency of enterprises in the Baltic countries by using CrefoScore technique which has uniform principles of application for Estonia, Latvia and Lithuania. In the 3rd chapter the authors introduce a short review of the methods of enterprises insolvency assessment related to risk index models and the nature of methodology Kralicek and experience of using Quick Test in Poland and the Czech Republic. Next the authors offer case study of implementation of Quick Test in insolvency assessment on a sample of selection of small and medium-sized enterprises of Latvia as well as assessment of the accuracy of obtained results. The conclusion contains outcomes about the options of using Kralicek Test in the practice of insolvency assessment with a view to application of cash flow indicator which expands the sphere of the employed financial ratios. The authors mention possible trends in the further research of Quick test in Latvia.

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Influence of economic crisis on enterprise solvency

The recent data about the numbers of insolvent enterprises in Europe introduced by Creditreform International (Verband der Vereine Creditreform VVC) confirm that bankruptcy wave in most European countries was very high. Creditreform International studies from 2008 to 2010 reflect economical recovery in the Baltic States after the crisis (2008-2010) which seriously affected many branches (Table 1).

Table 1. Enterprises insolvency in the Baltic States

Country	2007	2008	2009	2010
Latvia	1272	1296	2322	2428
Estonia	333	423	693	504
Lithuania	647	731	1168	1496
TOTAL	**2252**	**2450**	**4153**	**4428**

According to the data shown in Table 1 it is possible to conclude that the number of insolvent enterprises in the Baltic countries continues to grow. The largest growth of the number of insolvent enterprises in the Baltic States was registered in Latvia, while in Estonia and Lithuania it was notably less. The reasons for this phenomenon are different in each state. If we do not take into account crisis consequences the main reasons are globalization effects and the introduction of tougher requirements to normative acts in the enterprises activities. The studies testify that out of 8 new EU member states it is the Baltic States that were most hit by financial crisis and its consequences.

Assessing the data from Table 2, it is possible to come to the conclusion that economic and political situation in Latvia cannot be defined as stable. Regardless of Ducroire | Delcredere credit rating B meaning stability Coface and Euler Hermes Country Risk rating indicates political and economic uncertainty in the country and possible difficulties in meeting financial obligations.

Table 2. Rating country

Country	Credit rating		
	Coface[1]	Euler Hermes[2]	Ducroire | Delcredere[3]
Latvia	B	C/ M3	B
Estonia	A3	AA/L3	B
Lithuania	A4	C/M3	B

[1]as per Coface corporate date. [2] Country Grade/ Financial Flow and Cyclical risk indicators: as per 2011 (September – November). [3] Commercial risk**:** as per Latvia - 02/24/2011, Estonia - 09/07/2010 and Lithuania 11/30/2010

Review of applied method of the assessment of enterprise insolvency in the Baltic States

The history of establishment of models referring to prediction based on the usage of financial ratios embodies more than 75 years. Information users about insolvency of enterprises are financial, state bodies and partners. For example, Creditreform Latvia studies state that a deal 71% of before entrepreneurs check the risk of non-commitment of obligations. Most (63.9%) entrepreneurs trust those clients they have had successful cooperation with and no problems with account settlement. Some entrepreneurs assess their partners according to financial data analysis (31.6%) and use automatic assessment systems, such as product CreditScore (24.8%) offered by Creditreform Latvia. According to the data from the Latvian Commercial Register, majority of enterprises belong to the 7th CreditScore risk class (insolvency above average). In 2010 the number of enterprises of 4th risk class has grown by 1.1% and at beginning 2011 was 25.5% out of all enterprises registered in the Commercial Register.

Creditreform specialists in cooperation with German Company Creditrefom Risk Management have developed a special mathematical model CrefoScore which is available online on the portal of credit risk assessment system www.crediweb.lv. Its main constituent part is Score – specially computed index with an appropriate number of points from 100 to 600 and these indicate probability of an enterprise to meet the undertaken financial commitments in the following 12 months. CrefoScore consists of 10 risk classes, where classes 1 to 8 show the enterprise status. In its turn, if an enterprise is referred to the 9th class it means that it has experienced substantial payment delays during the last year. As for the 10th class it means that an enterprise is insolvent or is in the state of restructuring or liquidation. To reach this index it is required not only to assess the recent financial information about the enterprise but also its credit history, a great number

of structural data (number of employees, age of the company, legal form etc.) risk indicators in the field of commercial activities as well as information about insolvency restructuring, liquidation, legal protection and bankruptcy process.

Assessment of Estonian insolvency system differs a bit from CrefoCore risk system. Collector's company Krediidiinfo regularly sums up enterprise financial statements and depending on the obtained results every enterprise is granted a rating. To facilitate the perception 7 ratings are made: excellent (AAA), very good (AA), good (A), satisfactory (BBB), poor (BB), bad (B) and unsatisfactory (C). As well as Latvian CrefoScore, Krediidiinfo enterprise assessment system is available online. Data used to calculate ratings are as follows: financial statements, structural data (numbers of employees, field of activity, age of the enterprise, company management, reputation etc.) as well as an enterprise image in media.

Lithuanian credit risk and insolvency assessment system is similar to the Latvian system. UAB Creditreform Lithuania regularly sums up enterprise financial statements in order to determine enterprise credit risk ratings. An index with relevant number of points from 100 to 600 is calculated. It shows probability of an enterprise to meet the undertaken financial commitments in the following 12 months. Lithuanian enterprises are divided into three groups: large enterprises, middle-sized and small. UAB Creditreform Lithuania has calculated rating of more than 47000 enterprises which are referred to one of the rating groups. With increasing number of insolvent enterprises, more and more attention is being paid to the selection of financial analysis methods, assessment of enterprise financial state and insolvency management so that enterprise management creditors and potential investors could make operational decisions in due time and prevent loss of funds. Investigating methods of insolvency analysis, special attention should be paid to limited companies for this type of business is in higher risk group.

Review of the methods of insolvency assessment

Studies of scientific and economic literature prove that many scholars have been doing research about insolvency forecasting using financial ratios in different combinations and developing linear function – forecasting index to determine the probability of bankruptcy. At present many various models of insolvency analysis have been developed studies. Bibliometric studies carried out by researchers (Genriha &Voronova, 2011) made it possible for the authors to come to the conclusion that methods of insolvency assessment may be divided into 2 groups: classic parametric methods and non-parametric methods. 35 years of studies on business failure allowed the authors (Balcaen &Ooghe, 2004) to conclude: *However, finding a complete answer to the question whether the more sophisticated, alternative modelling methods produce better performing failure prediction models than the classical cross-sectional statistical methods, requires further research systematically comparing all possible methods.* In their study, researchers (Balcaen &Ooghe, 2006) discriminate four general types of classic statistical methods applied in corporate failure prediction, (a) univariate analysis (в) multivariate discriminant analysis, (c) conditional probability and (d) risk index models in corporate failure prediction. As for the users of non-financial market models the authors apply the KISS principle (keep it simple, stupid) to research the development of risk index models as such type models have a simple mechanism of calculating and interpreting results.

One of the first risk index models were introduced by Tamari (1966) and they were later extended by Moses and Liao (1987). This group incorporates the models of indicating crisis situation developed by Doncova &Nikiforova (2009) along with modifications introduced by Savickaya (2009). In Poland this group of methods also includes a modified method of credit risk assessment (Lichota, 2009) where are used 10 indicators which are measured in a 6 point scale. The lower scores, the better the situation of the enterprise.

(Kralicek, 1993) was developed in 1990 and it offers fast and precise insolvency assessment. Assessment is based on the calculation of four factors (two indicators of financial stability and two indicators of efficiency). Depending on the value of indicator calculated it is granted a certain number of points. The gained points give insolvency assessment from 4 (good) to 0 (insolvency) (Table 3). The obtained assessment testifies the weak sides of the enterprise and enables to conclude which of indicator groups negatively affect the total solvency level. The fewer points the better the financial situation and more stable the situation of the analysed enterprise in the future.

Table 3. Kralicek Quick Test methodology[1]

Indicators			Calculation	Points (P_{X_i})				
				4	**3**	**2**	**1**	**0**
Financial stability	X_1	Equity in balance sheet	$\frac{Equity}{Assets}$	0.3	0.2 -0.3	0.1 -0.2	0.0-0.1	< 0.0
	X_2	Period of debt payment, years	$\frac{Liabilities - Cash}{CF}$	3<	3 -5	5-12	12-30	30>
		Assessment of financial stability indicators (arithmetic mean A)						
Efficiency	X_3	Profitability of assets	$\frac{EBIT}{Assets}$	0.15	0.12 - 0.15	0.08 – 0.12	0.00 - 0.08	<0.00
	X_4	Cash Flow/ Revenues	$\frac{CF}{Revenues}$	0.1	0.08 - 0.1	0.05 - 0.08	0.00 – 0.05	<0.00
		Assessment of efficiency indicators (arithmetic mean B)						
$KQT_M = \frac{A+B}{2}$ $KQT = \sum_{i=1}^{4} P_{X_i}$		Interpretation of a mean KQT_M: $KQT_M > 3$ stable enterprise (S), if $1 < KQT_M < 3$ – uncertainty (UC), if $KQT_M < 1$ – insolvency (I). Interpretation of a non mean KQT: $KQT > 11$ – very good situation (VGS); $11 < KQT_M < 8$ – good situation (GS); $8 < KQT < 4$ – dire financial situation (DFS); $KQT < 4$ –very dire financial situation (VDFS); $KQT > 19$ – extremely dire.					

[1]Indicators and assessment of Quick test scale compiled by the authors on the basis works (Kralicek, 1993; Kislingerova&Hnilica, 2005; Strouhal, 2007; Grünwald &Holečkova, 2009; Mannke, 2011)

At the beginning Kralicek Quick Test was widely used in German speaking countries (Germany, Austria and Switzerland). Czech scholars (Novotná&Svoboda, 2010) proved that Kralicek Quick Test can be successfully applied also in East European countries. Czech scholars have developed Kralicek Quick Test indicators average values for four branches – manufacturing industry, processing industry, wholesale and retail trade. Quick test group incorporates Mrkvick Quick Test (Mrkvička, 1997) and Kislingerova Test (Kislingerova et al., 2005). Mrkvick Quick Test has distinctions in the method of assessing the values of indicators (the better the indicator – the more points the enterprise receives). The second test has distinction in determining cash flow with a view to the peculiarities of the Czech Republic.

In order to assess insolvency risk, cash flow is used rather rarely (Bellovary et al., 2007). There are different opinions about the possibility of using cash flow information in general to forecast enterprise bankruptcy. Some researchers (e.g. Zavgren, 1989; Watson, 1996) have come to the conclusion that cash flow is information sufficient enough to assess bankruptcy, others (e.g. Beaver, 1966; Aziz&Lawson, 1989; Foster&Ward, 1997; Sharma, 2001) argue that by using cash flow information to analyse bankruptcy it is possible to reach appropriate results. In their research Rujoub et al. (1995) single out 8 cash flow ratios to predict enterprises failures. The indicators necessary for Kralicek Quick Test are available in enterprises' financial statements (balance sheet, profit and loss account). IAS 7 lays down a formal structure for the cash flow statement (Alver, 2004). Czech scholars in their research about the options of using Kralicek Quick Test offer different ways of calculating Cash Flow (CF) (Kislingerová&Hnilica, 2005):

$$CF = EBITDA + depreciation + changes\ in\ reserve\ funds \quad (1)$$

The volume of depreciation is not indicated either in balance sheet or profit and loss account; that is why it is possible to calculate this indicator, if detailed information of an enterprise is available. In case when the cash flow statement is available, the value of cash flow (from formula (1)) is similar to the indicator "gross cash flow". However, application of Cash Flow indicator may be limited. This is connected with the fact that it is allowed not to prepare cash flow statement and equity change statement for those subjects of Latvian law whose indicators in their annual statements do not exceed two out of those defined in article 54 Part 2: net turnover of LVL 500000, balance sheet total of LVL 250 000 and average number of employees in the accounting year of – 25 (Annual Accounts Law with amendments of 12.03.2009). With these regulations coming into force (Law on Annual Statement and Consolidated Annual Statement" subjects do not need to enforce Latvian Accounting Standards 1 (LAS) "Basic Provisions for preparation of Financial Reports" and LAS 2 "Cash Flow Statement" (Cabinet of Ministers of the Republic of Latvia Regulations No.481 of 21 June 2011). It means that subjects do not have to prepare statements about equity changes and

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cash flow. In further these standards can be used only as a description of good practice. During their work the authors faced the situation when not all enterprises make their cash flow statements available to the public, though balance sheet or profit and loss account are available on Lursoft portal. One of ways how to determine cash flow value from publically available financial statements is usage of Formula 2.

CF = EBITDA + Cash at the end of the period – Cash at the beginning of the period (2)

By using formula 2 it is possible to determine cash flow volume from the item "assets" of the balance.

In Russian business practice, it is customary to use a seven-factor model of net cash flow sufficiency and its dependence on the system of financial indicators as an example of applying an indicator of cash flow to analyse financial stability of an enterprise. This model was developed by A. Grigoryan (2001). There are examples of comparative analysis of using Kralicek Quick Test (1990) and model Holda (2001) in 469 small and medium-sized enterprises in the conditions of Polish economy executed by Maciejczak (2008). The research results did not show substantial differences in assessing enterprises.

Case study of the usage of Kralicek Quick Test for assessing insolvency: Latvian experience

The authors studied 48 enterprises, however, in each time period from 2007 to 2010 the number of enterprises changed under the influence of different reasons (new objects turned up, some went bust or there was no relevant information). An example of determining indicators, points received, resulting indicators (A, B and KQT_M) and assessment of obtained results is given in Table 4.

Table 4. Kralicek Quick test calculated for 2010 (by gross cash flow principle)

	Indicators				Points				Assessment			Classification	
	X_1	X_2	X_3	X_4	P_1	P_2	P_3	P_4	A	B	KQT_M	of the test	the actual situation
2	0.63	2.25	0.04	0.12	4	4	1	4	4	2.5	3.25	S	1
3	0.23	8.43	0.01	0.15	3	2	1	4	2.5	2.5	2.5	UC	1
5	-6.76	288.55	-0.90	0.01	0	0	0	1	0	0.5	0.25	I	0
7	0.69	5.86	-0.02	0.02	4	2	0	1	3	0.5	1.75	UC	1
…													
16	0.69	1.56	0.04	0.08	4	4	1	3	4	2	3	S	1
18	0.04	901.33	-0.03	0,00	1	0	0	1	0.5	0.5	0.5	I	0
…													
21	-3.30	84.44	-1.86	0,02	0	0	0	1	0	0.5	0.25	I	1
…													
30	0.03	21.41	-0.14	0.03	1	1	0	1	1	0.5	0.75	I	0
31	0.23	16.11	-0.33	0.04	3	1	0	1	2	0.5	1.25	UC	1
33	-0.11	-565.6	-0.05	-0.02	0	0	0	0	0	0	0	I	0
35	-0.25	0.15	0.05	0.97	0	4	1	4	2	2.5	2.25	UC	1
36	-0.43	9.69	-0.49	0.04	0	2	0	1	1	0.5	0.75	I	0
…													
42	0.05	-78.89	-0.10	-0.02	1	0	0	0	0.5	0	0.25	I	0
43	0.20	1.04	0.19	0.12	3	4	4	4	3.5	4	3.75	S	1
44	-0.16	7.92	0.12	0.04	0	2	3	1	1	2	1.5	UC	1
45	-1.58	-113.6	-1.23	-0.01	0	0	0	0	0	0	0	I	0
46	-0.04	-3.71	-0.01	-0.13	0	0	0	0	0	0	0	I	0
48	0.41	-0.17	0.64	0.43	4	0	4	4	2	4	3	S	1
Correctly classified the number of enterprises													26

Source: Authors' own calculation

After summing up the results of determining KQT_M for the period from 2007 to 2010, (Figure 1) the authors note that the majority of analysed enterprises are located in uncertainty zone (from 1 to 3 points).

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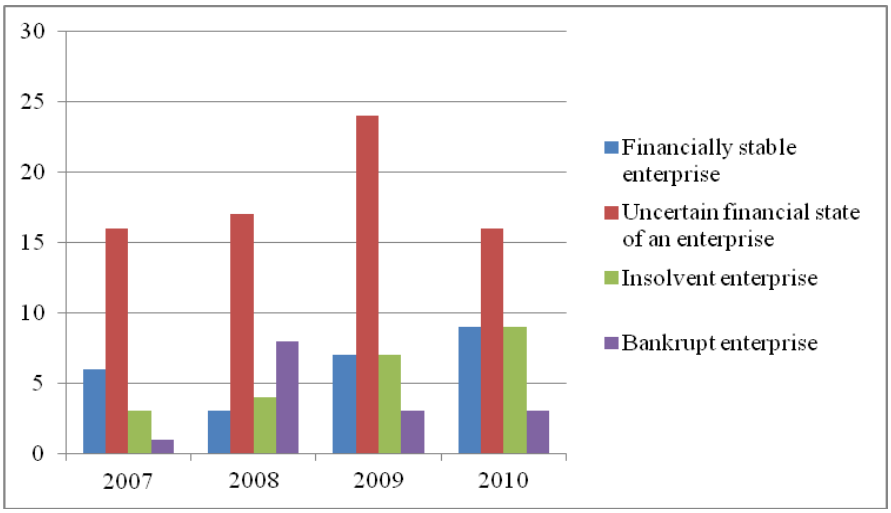

Figure 1. Distribution of enterprises according to the classes of financial state

Kralicek test used cash flow factor. According to the data collected all analysed enterprises submitted data about gross cash flow from cash flow statement although, this figure may differ from definitions of cash flow determination introduced by different authors. Thus, instead of one test we consider the options of Kralicek Quickle Test realization with above-mentioned gross cash flow.

In Kralicek Test 1 indicator Cash Flow is determined on the basis of the statement "Cash flow". In Kralicek Test 2 Cash Flow is determined on the basis of the data about balance. In this case Cash Flow is determined as a difference of cash at the beginning and the end of one year period and EBITDA. Table 4 gives a fragment of initial data of financial stability and efficiency assessment as well as final meaning of KQT for 2010. Correctly classified enterprise denomination is 1 and incorrect – 0 (Table 4). Those enterprises are considered to be correctly classified whose "poor" situation coincides with the actual bankruptcy year, as well as the enterprises that survived the relevant year and the model testified to it. In order to calculate the correctly and incorrectly classified enterprises we introduce 0 and I indicators (Table 4 and Table 6). By using this indicator and knowing the total number of enterprises including insolvent ones it is possible to calculate model efficiency and the level of mistakes (Table 5).

Table 5. An example of assessment of the accuracy of Kralicek test (an example of 2010)

Actual group membership	**Predicted group membership**			
	Insolvency		**Non-insolvency**	
Insolvency	H	2	M1	1
Non-insolvency	M2	7	H	24
Classification matrix	Number Correct	Per cent correct	Per cent Error	n
Type I	2	67	33	3
Type II	24	77	23	31
Total	26	76	24	34

Source: the authors' calculations using the method of Altman (1968)

To assess model accuracy (Table 5) it is necessary to follow two criteria – the H's standard for correct classification (Hits) and the M's Standard for mis-classification (Misses). Type I mistake shows percentage when according to forecast an enterprise will remain stable but actually an enterprise goes bankrupt but mistake M2 appears when an enterprise is solvent but is forecasted us bankruptcy. For example according to Kralicek test for 2010 the total number of correctly classified enterprises is 34, incorrectly – 9, then a mistake will be calculated as 8/(26+8)*100% =24% (see Table 5).

Obtained results (see Table 6) prove similarity of tests that can be clarified by existence of common structures with the exception of cash flow factors. In our case these differences extend to the range of nearest point groups, i.e. if an enterprise according to the results of one test is qualified as stable, according to the results of the second test it can be granted the status of the nearest group (uncertainty) rather than insolvency.

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Table 6. Calculation of accuracy by Kralicek tests

Results	KQT_M Test 1				KQT_M Test 2			
	2007	**2008**	**2009**	**2010**	**2007**	**2008**	**2009**	**2010**
Number correct	23	20	31	26	6	18	6	21
Number error	3	4	7	9	2	6	9	13
Total	26	24	38	34	8	24	15	34
Per cent correct	88	83	82	76	71	75	60	62
Per cent error	12	17	18	24	29	25	40	34

Conclusions

By using Kralicek Quick Test, the authors of the research find it feasible to determine the influence of the two group factors such as financial stability (A) and efficiency (B) on resulting meaning of financial state assessment. (KQT_M **).**

Cash flow is dynamic information about money inflow and outflow for a period of time. All the literature about the importance of cash flow information in preparing forecasts about insolvency indicates that the data collected are uncertain and inconsistent. In order not to omit key information for forecasting cash flow it is necessary to focus on its determination technique taking into account available data and dynamics. After comparing the accuracy of the two Kralicek methods, it can be concluded that Kralicek test 1 ($KQT_M Test\ 1$) is more accurate than Kralicek test 2 ($KQT_M Test\ 2$) by approximately 27% for 2009 and 18% for 2010.

When compared with other models, Kralicek Quick Test looks the most tolerant for here are used data about cash flow before tax deductions. In other models for assessing financial stability, cash flow indicator is not applied at all. Negative equity indicator is one of the signs which could testify to an enterprise's inability to meet its financial obligations which demonstrates potential threats of insolvency. The obtained results confirm similarity of the realization of both Kralicek Quick Tests which, of course, can be explained by the existence of common methodology to identify indicators, besides CF factors.

The authors find it necessary to carry out research on determining criteria meanings for each of their indicators used in model Kralicek Quick Test to take into account the specifics of the industry in Latvia.

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