

## EVALUATION OF CREDITWORTHINESS AND THE THREAT OF BANKRUPTCY OF POLISH ENTERPRISES BASED ON FINANCIAL REPORTING

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**Abstract:** In times of globalizing business relations, transboundary cooperation of enterprises becomes more and more common practice, and on the other hand, in a great deal of situations it determines a necessity of skillful risk management. It is now present on many levels of economic activity and may refer in particular to optimizing cash flows (both safety of settling liabilities and payment collection). Due to differences in accountancy standards which occur in various countries, it is worth looking closely at the possibility of applying objective ratios used in due diligence analysis, which are particularly oriented to the evaluation of financial creditworthiness of enterprises. Tests performed on a representative sample of Polish enterprises may be a useful resource of testing methods, assisting foreign companies in efficient evaluation of the level of risk during cooperation with companies operating in Poland.

**Keywords:** risk, bankruptcy, insolvency, predictors, financial analysis, Z-Score, MDA.

### 1 Methodology of testing - assumptions and a testing sample

This article describes the results of the study of generation of boundary values (which are the most important from the point of view of creditworthiness) of selected ratios which are single-dimension bankruptcy predictors. The author has analysed a total of 310 enterprises which seats of activity are located in Poland. The tested sample included 155 enterprises which in the period 2007-2010 went bankrupt and 155 of companies of good business and financial standing. Analysis of the two populations allowed the author to draw conclusions on shaping of the variability intervals of the most significant ratios of due diligence analysis in enterprises which are near bankruptcy (a year before announcing bankruptcy by the court) as well as in solvent companies. The importance of the research described in the article may be confirmed by the fact that the group of analysed bankrupt companies was a full population of all the entities that went bankrupt in Poland in the period 2007-2010, which were not only obliged to publish their annual financial reports, but which also fulfilled that obligation.

Among 2250 bankruptcies recorded in the 4-year period of the research, a total number of 155 enterprises published their financial reports. Such a low number results from two factors. Firstly, in Polish law [the Accounting Act] entities which fulfilled at least two of the three following conditions in the year preceding the reported year are subject to evaluation and publication of financial statements: (1) average annual employment as converted into full time jobs was at least 50; (2) the sum of assets in the balance sheet at the end of financial year was an equivalent of minimum 2,500,000 EUR in Polish currency; (3) net revenues from sales of products and goods and financial operations for the financial year were an equivalent of minimum 5,000,000 EUR in Polish currency.

Thus, none of the registered enterprises keep integrated accounts in Poland. Some use simplified business record (the so-called revenue and expense ledger). Those companies are, a priori, not obligated to publish their results and their analysis is basically impossible on the basis of publically available information. The second reason of the fact that "only" 155 of 2250 enterprises, which went bankrupt in the studied period in Poland, were analysed, results from the fact that a very high number of entities which are near bankruptcy fail to respect the provisions of law and they not only fail to observe the obligation to publish their annual results in the official journal (Monitor Sądowy B) but also do not submit copies of the results to the files of the National Court Register which are, by definition, made available to third parties. In such cases, due diligence analysis of the entities is impossible.

The research of the 1<sup>st</sup> group of the entities (bankrupt) aimed at analyzing ratios based on the profit and loss balance 1-3 years

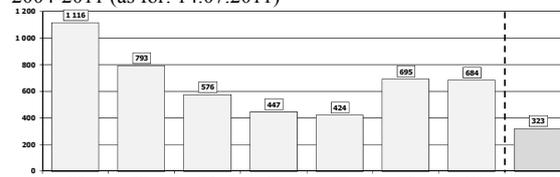
before the bankruptcy was announced. The variability intervals of those ratios are significantly different in companies which go bankrupt than in solvent companies. The companies from the 2nd group (entities which were not endangered by bankruptcy) were grouped based on the following criteria: (1) comparable value of sales revenue (allowing to group entities of similar scale of business in a given field); (2) comparable value of balance sheet total (allowing to group entities of similar value of assets); (3) identical form of business (allowing to group entities which are similar in the requirements of establishment, structure of authority and the liability of entrepreneur).

This article presents the results of the widest performed so far in Poland research project concerning a group of bankrupt enterprises and a properly selected group of "healthy" entities. The results are used in Poland as a reference for analyses performed by certified auditors, financial analysts, as well as managers who analyze on a periodical basis not only their own enterprises but cooperating entities in particular. The article includes only fragments of wider research which main objective is development of multi-dimensional models of early warning about bankruptcy of Polish enterprises (based on discriminant analysis).

### 2 Macroeconomic analysis of the scale of bankrupt enterprises in Poland

9.25% fewer bankruptcies were announced in total in the 1st half of 2011, until 11.07.2011, as compared to the 1st half of the previous year [Antonowicz P., 2011]. In the 1st half of 2011 we noticed 323 bankruptcies and in the same period of the previous year (January - June 2010) - 357 bankruptcies. The observed increase of bankruptcies in Poland in the period 2009-2010 is stabilizing and the macroeconomic statistics show a noticeable change of the tendency, which had been indicating negative dynamics since 2002.

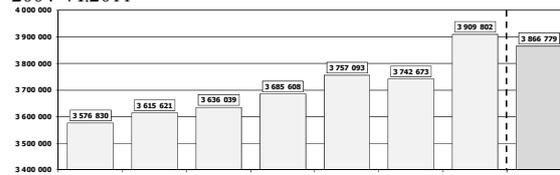
Diagram 1. Number of bankruptcies in Poland in the period 2004-2011 (as for: 14.07.2011)



Source: P. Antonowicz (own research).

More national business entities are registered year by year. As for 31.12.2010, there were a total of 3.9 mln business entities operating in Poland [Local Data Bank of the Central Statistical Office, 01.12.2011]. One can expect that 2011 will end with more than 4 mln of registered business entities.

Diagram 2. National business entities in Poland in the period 2004-VI.2011



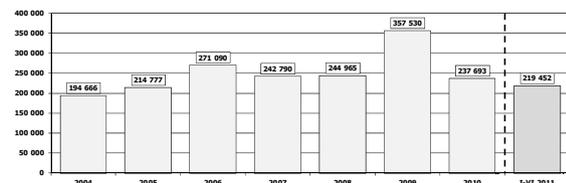
Source: P. Antonowicz (own research, based on Local Data Bank of the Central Statistical Office Bank, 01.12.2011).

On the background of the statistics, the number of bankrupting enterprises may seem a marginal phenomenon. However, while analysing the phenomenon, one should remember that a bankruptcy of a single entity has consequences for a lot of its

cooperating companies, frequently modifying situation on a local labour market, destabilizing business relations between entities in a given sector, or a given region.

The author, according to particular legal acts functioning in Poland (inter alia, Act on Freedom of Business Activity, Bankruptcy and Reorganisation Law), differentiates between liquidation (which is much more frequent in Poland) and bankruptcy of companies.

Diagram 3. Liquidated (deregistered) entities in Poland in the period 2004-2011 (as for: 14.07.2011)



Source: P. Antonowicz (own research, based on Local Data Bank of the Central Statistical Office Bank, 01.12.2011).

17 of each 100,000 business entities in Poland registered in the Central Statistical Office (GUS) were covered by bankruptcy in 2010. However, 6 of 100 entities operating at the same time were undergoing liquidation processes (have been deregistered). The above statistics are, however, very general and do not allow to draw precise conclusions. Some of the liquidated entities were reorganized and seemingly new business entities managed by the same owners occurred in their place. However, the above statistics allow to draw a general conclusions concerning the numbers of bankruptcies and liquidations which occur in the Polish economy.

### 3 Evaluation of liquidity as the basic measure of enterprise creditworthiness

When evaluating efficiency of operation of an enterprise, most analyses refer to the assessment of liquidity. An enterprise should be capable of maintaining a relevant proportion of liquid assets in relation to incurred liabilities. This guarantees financial stability and the company's ability to repay its liabilities within dates as set by creditors. Thus, in that scope, the study will mainly aim at evaluating the company's surplus of current assets above short-term liabilities. Liquidity is the capacity of an enterprise to timely repay its short-term obligations.

Equation 1

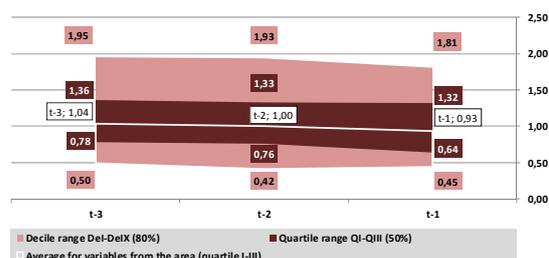
$$\text{Liquidity Ratio} = \text{Current assets} / \text{Short-term liabilities}$$

The above current liquidity ratio shows how much current assets cover current liabilities. The ratio of 1.2 j is frequently assumed as optimum, however, its upper value is 2.0 j. If the ratio is too low, it shows that the enterprise has no assets for repaying current liabilities. If it is too high, it may be a sign of the so-called excessive liquidity which results from failure to utilize cash. Financial safety of an enterprise (or its creditors) should not therefore mean that the company maintains excessive current ratio, since that way the company freezes capital and fails to allocate it in, for instance, short-term investments (possible to be realized in a short time).

#### 3.1 Liquidity in enterprises which go bankrupt and „healthy” entities

The ratio decreases dramatically when approaching the bankruptcy situation. One year before bankruptcy, companies are capable of covering on average 93% of current liabilities with current assets. A typical variability area, occurring in 50% of the “central” enterprises (having removed from the analysis the outliers - below quartile I and above quartile III), is one year before bankruptcy, within the interval 64% - 132%.

Diagram 4. Liquidity Ratio - decile and quartile range, an average for variables from the area (quartile I-III) three years before bankruptcy of polish enterprises



Source: P. Antonowicz (own research based on financial reporting of 155 bankrupt enterprises).

The data presented in diagram 4 should be supplemented with information showing modifications of the ratio in solvent companies (table 1). The ratio in typical „healthy” enterprises (the central 50%) is between 1.2 and 2.61. It means that for each 1,000 PLN of incurred current liabilities the companies maintain on average 1,200 - 2,610 PLN of current assets from which the liabilities will be repaid. Thus, the current liquidity ratio is a measure of payment capacity, which enables verifying payment potential of a cooperating company.

Table 1. Basic statistics - typical variability areas of the analysed Liquidity Ratio characteristic for: 50 / 80% of the population

Basic statistics of Liquidity Ratio	Bankrupt enterprises (N=155)			Healthy enterprises (N=155)
	t <sub>3</sub>	t <sub>2</sub>	t <sub>1</sub>	
N-important observations	135	150	40	155
MIN - minimum	0.10	0.04	0.14	0.43
MAX - maximum	8.40	21.14	4.54	243.04
Average value (for all variables)	1.23	1.30	1.07	4.00
Standard deviation	1.08	1.86	0.76	19.64
Average value (from the area of Q1-Q3)	1.04	1.00	0.93	1.68
- n-important observations (in the area of Q1-Q3)	67	74	20	77
QI - quartile I	0.78	0.76	0.64	1.20
Me - median	1.00	0.98	0.90	1.62
QIII - quartile III	1.36	1.33	1.32	2.61
DeI - decile I	0.50	0.42	0.45	0.84
DeIX - decile IX	1.95	1.93	1.81	4.33

Source: P. Antonowicz (own research based on financial reporting of 310 enterprises).

#### 3.2 Quick liquidity ratio - creditworthiness assessment corrected by the value of stocks

Concurrently, it is worth mentioning that in Polish financial reporting, current assets include not only cash in hand and on bank accounts but also financial assets (shares, stocks, other securities, loans), short-term receivables (from delivery of products and services, taxes, subventions, customs, insurance and other), stocks (products, materials, finished products, semi-products and products under manufacture, advance payments for short-term deliveries). This makes capacity assessment (based on more liquid - equation 2, and the most liquid - equation 3 - components of current assets) is possible based on further modifications of current liquidity ratio.

Equation 2

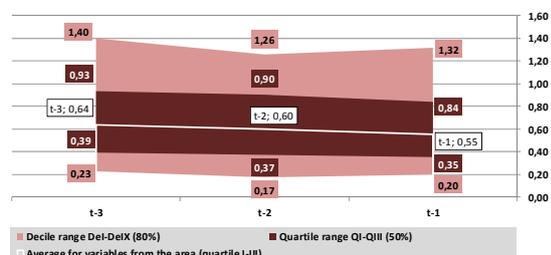
$$\text{Quick Liquidity Ratio} = (\text{Current assets} - \text{Stocks}) / \text{Short-term liabilities}$$

Quick liquidity ratio reflects the potential of repayment of short-term liabilities by an enterprise from such part of current assets which may be capitalized in short time. Therefore, the value of current assets is reduced by the least liquid components - stocks. Due to the correction of the current assets by the value of stocks, the average quick liquidity ratio will be usually lower than current liquidity ratio. In reference books, the correct level of that ratio is its lowest boundary - minimum 1.0 j.

Empirical research conducted by the author prove that, on average, one year before bankruptcy, enterprises maintain 55%

of liquid current assets (less the stocks) in relation to incurred current liabilities (diagram 5). Such a low level of the analysed ratio leads to loss of the payment equilibrium and extension of the days payable outstanding cycle (indicating, de facto, delay in payments and, consequentially, increasing value of overdue liabilities).

Diagram 5. Quick Liquidity Ratio - decile and quartile range, an average for variables from the area (quartile I-III) three years before bankruptcy of polish enterprises



Source: P. Antonowicz (own research based on financial reporting of 155 bankrupt enterprises).

Table 2. Basic statistics - typical variability areas of the analysed Quick Liquidity Ratio characteristic for: 50 / 80% of the population

Basic statistics of Quick Liquidity Ratio	Bankrupt enterprises (N=155)			Healthy enterprises (N=155)
	t <sub>3</sub>	t <sub>2</sub>	t <sub>1</sub>	
N-important observations	135	150	40	155
MIN - minimum	0.03	0.02	0.02	0.16
MAX - maximum	8.01	15.76	3.22	243.04
Average value (for all variables)	0.82	0.84	0.70	3.23
Standard deviation	0.94	1.42	0.60	19.66
Average value (from the area of Q1-Q3)	0.64	0.60	0.55	1.05
- n-important observations (in the area of Q1-Q3)	67	74	20	77
QI - quartile I	0.39	0.37	0.35	0.64
Me - median	0.64	0.60	0.53	1.04
QIII - quartile III	0.93	0.90	0.84	1.64
Del - decile I	0.23	0.17	0.20	0.33
DelX - decile IX	1.40	1.26	1.32	3.22

Source: P. Antonowicz (own research based on financial reporting of 310 enterprises).

In typical solvent enterprises, the Quick Liquidity Ratio is between 0.64 and 1.64. It means that companies are capable of paying 64% - 164% of the nominal value of short-term payable liabilities from short-time collected receivables and cash. Their capacity is much higher than the ratio of enterprises one year before bankruptcy.

### 3.3 Immediate liquidity – indicator of actual feasibility of liability repayment

Each company (including also a foreign client) may make use of the subsequent ratio, on the basis of a financial statement of an enterprise using integrated accounts, according to rules adopted in the Polish legal regulations, to carry out an assessment of the actual capacity. The last of indicators discussed in this paper used for evaluating the financial liquidity is the so-called cash liquidity ratio. In literature of the subject it is also called an immediate liquidity ratio, as it defines the value of cash on hand (or on bank accounts) as compared to the value of current liabilities. In other words this ratio tells us to what extent we would be able to regulate our liabilities, if their maturity day fell today.

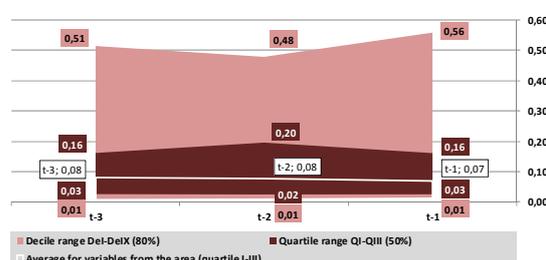
Equation 3

Cash Liquidity Ratio = (Current assets - Stocks - Short-term receivables) / Short-term liabilities

The optimum level of the cash liquidity ratio is not easy to determine, as it depends to a large extent on the specific nature of operation of each enterprise. Cash resources in hand or on bank accounts remaining at the disposal of an enterprise should be basically limited to a minimum. This is due to the fact that there is no need of keeping excessive cash that is not directly involved in economic processes and as an effect brings no

income to the enterprise. Quite often the value of 0.2-0.4 is adopted in Poland as the optimum level of the cash liquidity ratio. This is due to the fact that an excessively high level of the ratio may indicate that cash is not used in the executed business operation. Such information confirms that a financial analysis should be applied very subtly and with a great deal of touch by the person using it. This is a certain kind of art, in which one may not always act in a routine way, in accordance with one and same scheme and template. In many cases a deviation of the given ratio from the standard value is not a result of mistakes in managing an enterprise, but arises from the adoption of a specific and conscious financial policy. This may be an effect of an exceptional situation related to the market situation, but on the other hand it may also be a resultant of the investment stage, in which the given enterprise is at that particular time, or several other factors, the sources of which are both inside the organisation as such and which may also arise from conditions determined by the external environment.

Diagram 6. Cash Liquidity Ratio - decile and quartile range, an average for variables from the area (quartile I-III) three years before bankruptcy of polish enterprises



Source: P. Antonowicz (own research based on financial reporting of 155 bankrupt enterprises).

As may be seen from a review of diagram 6, the cash liquidity ratio of Polish enterprises a year before bankruptcy amounts to 0.07. This means that Polish enterprises in the process of going bankrupt a year prior to declaration of bankruptcy by the court receive on average PLN 70 in cash per each PLN 1000 of incurred current liabilities. Practice shows that such a state is absolutely insufficient to cover current regulation of liabilities and leads as a consequence to filing of an application for instigation of proceedings related to declaration of bankruptcy by the creditors. Typical companies (the central 50%) endangered by bankruptcy maintain on average 3-16% cash in relation to the liabilities which have to be repaid in a short time.

Table 3. Basic statistics - typical variability areas of the analysed Cash Liquidity Ratio characteristic for: 50 / 80% of the population

Basic statistics of Cash Liquidity Ratio	Bankrupt enterprises (N=155)			Healthy enterprises (N=155)
	t <sub>3</sub>	t <sub>2</sub>	t <sub>1</sub>	
N-important observations	134	149	40	155
MIN - minimum	0.00	0.00	0.00	0.01
MAX - maximum	2.95	2.95	0.92	242.19
Average value (for all variables)	0.21	0.18	0.17	2.34
Standard deviation	0.45	0.34	0.24	19.60
Average value (from the area of Q1-Q3)	0.08	0.08	0.07	0.25
- n-important observations (in the area of Q1-Q3)	66	75	20	77
QI - quartile I	0.03	0.02	0.03	0.07
Me - median	0.07	0.06	0.07	0.22
QIII - quartile III	0.16	0.20	0.16	0.69
Del - decile I	0.01	0.01	0.01	0.03
DelX - decile IX	0.51	0.48	0.56	1.78

Source: P. Antonowicz (own research based on financial reporting of 310 enterprises).

However, typical solvent enterprises maintain this relation at the level ranging from 7 to 69%. They are principally on average able to repay 25% of their liabilities with cash in hand and on their bank accounts (table 3). However, it should be emphasised once again that monitoring the cash liquidity ratio in Polish enterprises (and in others as well) should in each case reflect financial needs of an enterprise over a short period. Consequently, in evaluations of financial liquidity the importance of the latter indicators, without knowledge of the

specific nature of operation of the given enterprise and the adopted financial policy, may prove to be of a smaller importance.

#### 4. Summary

To recapitulate, indicators of the economic and financial analysis presented in this paper allow to evaluate one of the most important aspects from the viewpoint of a risk of loss of capacity – financial liquidity of the Polish enterprises. Apart from analysing: (1) the ability of servicing a debt, (2) assessment of the productivity of assets and sale profitability, (3) as well as the effectiveness and turnover (concerning among others the analyses of the average cycle of payment collection and liability rotation) this analysis remains a very important criterion to diagnose the hitherto effectiveness of the company and to verify the possibility of continuing business operation by the analysed entity. Naturally, the examination of a foreign enterprise (in this case – a company operating in Poland) by subcontractors from other countries would always require an in-depth analysis of several factors (not merely quantitative ones, but also qualitative ones), indicating the stage of its development in the life cycle of such an enterprise and the life cycle of the given sector. Of particular importance in evaluation of the safety of business transactions with such an entity is also the verification of potential tax arrears, as well as the timeliness of making payments of obligatory insurance premiums to Zakład Ubezpieczeń Społecznych (Social Insurance Institution, <http://www.zus.pl/>). Despite the fact that – as has been proven in this paper – the phenomenon of the bankruptcy of enterprises in Poland concerns a marginal per mille value of entities (in 2010 – 0.017% of the total number of registered entrepreneurs), a reliable indicator-based analysis, supplemented by single- or multi-dimensional models for predicting the bankruptcy of enterprises and by their appropriate interpretation may prove to be an invaluable analytic tool that could help minimise the risk of potential issues with debt collection.

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**Primary Paper Section:** A

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