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ASSESSING THE FINANCIAL DISTRESS RISK OF COMPANIES OPERATING UNDER CONDITIONS OF A NEGATIVE CASH CONVERSION CYCLE

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Abstract

The purpose of the paper is to point out the accounting-based variables and relationships between them which enable us to measure financial liquidity in a way appropriate for assessing the financial distress risk of companies operating under conditions of a negative Cash Conversion Cycle (CCC). Contrary to the mainstream literature on bankruptcy predictions, mainly based on data modelling nested in statistics, in this article the approach is taken on modelling the bankruptcy process relevant for companies operating under conditions of negative CCC. The applied research methodology adopts Monte Carlo simulations based on a spreadsheet financial model of company operations built to simulate operating cash inflows and outflows generated by companies operating under negative CCC (following a methodology of a spreadsheet approach to financial modeling and risk analysis given by Charnes (2007)). To define financial liquidity measures the concept of Net Liquid Balance (Shulman & Cox, 1985) and cash investment in Operating Working Capital (Szpulak, 2014) is applied. The results enable us to overcome the insufficiency of existing financial liquidity indicators for assessing the financial distress of companies operating under conditions of negative CCC. The additions to theory and practice consist of theoretical underpinnings of a financial distress mechanism possible for companies operating under conditions of negative CCC and definition of financial liquidity measures relevant for these companies.

JEL classification: G33
Keywords: financial liquidity, Cash Conversion Cycle, Operating Working Capital, Net Liquid Balance, Financial Distress, spreadsheet approach to financial modeling, Monte Carlo simulation

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Introduction

Based on studies of an extensive financial literature covering the topics of analysis of financial statements it is not unreasonable to conclude that the vast majority of it is relevant to manufacturing companies, however, such a limitation is not directly specified by the texts' authors. Indeed, the statistically significant differences in average financial indicators among different sectors were empirically confirmed many times (e.g. Hawawini et al. 1986; Filbeck & Krueger, 2005; Etiennot et al. 2012), but all we know from this research is that we shall not expound on company financial performance comparing such indicators among sectors but within sectors. Still, however, the problem of incorporating sector and company specific conditions in financial analysis is, in my opinion, not well enough explored on theoretical as well as on empirical grounds, particularly in the field of financial liquidity of companies operating in some service and trade sectors. The analysis of typical financial indicators applied to measure financial liquidity of these companies, different from manufacturing, appears as a hard nut to crack for all interested in the assessment of financial distress risk, especially for the company stakeholders (investors as well as suppliers and employees).

Financial indicators typically used to assess financial liquidity such as: Net Working Capital (NWC), Net Operating Working Capital (NOWC), Working Capital Requirements (WCR), Cash Conversion Cycle (CCC) or financial liquidity ratios (current ratio, quick ratio)[1], fail when applied to analysis of financial statements of companies operating in some services or trade sectors. For these companies NWC, NOWC, WCR, and CCC are usually negative, and financial liquidity ratios are very low – all these would increase financial distress risk if a manufacturing company is analyzed, while for the companies operating in some services or trades it is not the case. The difference boils down to the operating cash flows generated by operating working capital. Typically, in manufacturing companies, OWC requires funds from investors while in some service and trade sectors OWC generates additional free funds. Therefore, profitable companies operating in some service or trade sectors may experience a great operating cash surplus, which in turn will generate substantial free cash flows from operations (i.e. before capex), as theoretically proved by (Szpulak, 2015). Free uses of such substantial free cash flows create high risk of financial distress, especially under changing market conditions. The problem is important to all company stakeholders, particularly to suppliers and employees, at least for two reasons. First, companies experiencing substantial free cash flows rarely apply for capital on the stock market. By the virtue of the business model applied, they generate enough funds to finance capital investments. As being private such companies are less transparent and exist without financial market control. Second, relying on up-to-date changes in GDP by sector structure typical for developed economies, where services (including trade) generate about 67% of all GDP in Poland (in the USA it is about 60%, in Germany 70%), such a phenomenon is widespread. Therefore, there exists a need to provide company stakeholders with suitable tools to assess the financial distress risk of the companies operating in some service and trade sectors.

The purpose of this paper is to indicate accounting-based variables and relationships between them that all company stakeholders could observe in order to assess the financial distress risk of a company which operates under very specific conditions, i.e. in general, the length of a typical, for such companies, operating cycle is shorter than the payment deferral period. Such a difference between the length of the typical operating cycle and the payment deferral period is measured in corporate finance by the Cash Conversion Cycle (Richards & Laughlin, 1980). If the length of the typical operating cycle is shorter than the payment deferral period, the CCC is negative. The most prominent are examples of wholesalers or retailers, however, the analysis provided here is not limited to these sectors, as the companies may and do use their dominance to dictate the conditions of cooperation, which may ultimately result in negative CCC. In this paper, the negative CCC defines a broader class of companies which experience a permanent negative difference between the length of typical operating cycle and the payment deferral period regardless of the sector in which a particular company operates. Due to such a permanent negative difference, operating cash inflows occur earlier to the corresponding operating cash outflows and over the period of CCC the company temporarily owns surplus cash in the amount of future operating cash outflows, i.e. temporarily owned surplus cash is ultimately devoted to paying company bills. Such surplus cash in the amount of

1 Listed financial indicators and ratios definitions follow (Brigham & Ehrhart, 2008, pp. 95-98), while application of these financial indicators to the data available from financial statements built in compliance with the Accounting Act (Dz.U. z 2013, poz. 330) being in force in Poland follow (Wędzki, 2003, pp. 85-88, Wędzki, 2006, pp. 271-280).

future operating cash outflow is a form of invisible credit as delivered by suppliers and workers. If a company is profitable and growing, every subsequent operating cycle brings to the company additional surplus cash in the form of invisible credit. It is hypothesized in the paper that free use of this surplus cash (like: investments made in long-term operating assets or other forms of distribution of it to investors as defined for free cash flow) increases the financial distress risk of the companies operating under negative CCC. The risk materializes as soon as unfavorable market conditions occur, sales decrease and a company is unable to settle operating current liabilities.

The financial distress is defined here following (Hendel, 1996) as the likelihood of bankruptcy, which depends on the level of liquid assets as well as on credit availability. Technically, this occurs when the company generates an operating cash shortage, i.e. the sum of forecasted operating inflows and currently available liquid assets net of debt service are insufficient to cover the sum of operating outflows in the amount of credit primarily delivered by suppliers and employees. To measure the probability of generating an operating cash shortage, that is to assess the risk of financial distress, the following is done: the first section elaborates the source of surplus cash, i.e. the invisible credit received from suppliers and employees, which is generated from the concept of cash investment in OWC of (Szpulak, 2014). Section two discusses the sources of financing WCR with the application of the NLB concept, as deliberated by (Shulman & Cox, 1985). Section three clarifies the mechanism of financial distress of the companies operating under negative CCC. This section consists of two propositions of operating liquidity measures, i.e. Operating Liquidity Margin, and Prospective Operating Liquidity Index. Finally, section four, describes the application of the concept presented here to assess the financial distress risk of one of the biggest retailers operating on the Polish market. In this case study, a Monte Carlo simulation is run in Crystal Ball based on methodology presented by (Charnes, 2007).

A source of surplus cash – an invisible credit from suppliers and employees

To begin the analysis, let us assume the following simplified company model. Imagine a company that for simplicity purpose produces only one product which consumes all delivered materials and simultaneously sales of the final product, so there are no inventories. This company is financed by investors, suppliers and employees, therefore, liabilities consist of equity, debt and operating current liabilities only. The company gives trade credit of length T^{AR} to its customers and after that time records on its cash account operating cash inflow CF^{+} equal to revenues. The company, as well, receives trade credit of length T^{AP} to pay all operating costs, including materials and work, reflected by operating cash outflow CF^{-}. The length of T^{AR} and T^{AP} in our simplified model is relevant to the length of operating cycle and the payment deferral period respectively. In corporate finance, the difference between the length of operating cycle and the payment deferral period (given in our model by $T^{AR} - T^{AP}$) is known as the Cash Conversion Cycle (CCC) (Richards & Laughlin, 1983) and stands for the length of time for the investment made by the company investors (i.e. providers of equity and debt) in the operating cycle to be recovered.

We will use the above company model twofold: first, considering one separate operating cycle and its financing, and second, considering continuous operations meaning that the company starts such operating and financing cycles every day of its operations, however, considerations are limited to the case of the companies operating under conditions of negative CCC.

An analysis of one separate operating and financing cycle

If operating cycle and payment deferral period are equal ($T^{AR} = T^{AP}$) no investors' supply cash is needed in the operating cycle. If operating cycle exceeds the payment deferral period, the company's investors are forced to temporarily invest funds in the amount of CF^{-} in the operating cycle for the period of CCC. If the payment deferral period exceeds the operating cycle the company's investors not only do not supply any cash to finance the operating cycle but the company temporary owns the CF^{-} for the period of CCC. The amount of CF^{-} is a sort of *invisible* credit, as ultimately after the period of CCC the company must pay its bills in the amount of CF^{-}.

Almost all typical financial indicators applied to assess financial liquidity, such as NWC, NOWC, WCR, and turnover ratios used to estimate average CCC, and typical liquidity ratios, are defined by variables derived from balance sheet or income statements. Therefore, we need to compare the above cash flow analysis to

accrual accounting. First, as a result of the time difference between revenues and cash inflows and expenditures and cash outflows, accounts receivable and accounts payable (together with accruals referring to the work used in the operating cycle) we need disclosure on the company balance sheet starting from the first day of the operating cycle. As both revenues and costs are recognized in accordance with accrual accounting, earnings appear as well on the right side of the balance sheet and the NOWC as a difference between revenues, in the form of accounts receivable, and costs, in the form of accounts payable, equals accounting earnings. When $T^{AR} = T^{AP}$ operating cash inflow and operating cash outflow appear on the same day and on this day the cash at hand equals accounting earnings. Under accrual accounting, if $T^{AR} = T^{AP}$ up to T^{AP} investors invest in the operating cycle earnings in form of *accruals*[2] (i.e. accumulated and deferred) so generally the accounting earnings that will be transformed into cash in the future, particularly at T^{AR}. Such equality of NOWC and accounting earnings holds regardless of the length of CCC and only the structure of NOWC changes as the operating cycle proceeds. These changes in the NOWC structure are thoroughly described by (Wędzki, 2003, pp. 76-85). To this point however, we see that there exists a difference between the investments made by investors in the OWC under accrual and cash accounting. This difference comes down to the accrued earnings which are included in accounts receivable, and thus, in NOWC under accrual accounting, and are excluded from cash investments in OWC in the cash accounting.

An analysis of continuous operations for the companies operating under negative CCC

Recall our simplified company model and consider additionally continuous operations, negative CCC and a case of constant demand. Let's start the analysis from the company inception (see Fig. 1 for graphical presentation of the implicit analysis). At the end of the first accounting period ending at *t* the company has started some operating cycles and has not finished them till the end of this period (i.e. corresponding outflows and inflows have not matched yet). Under accrual accounting all costs and revenues from finished and unfinished operating cycles are recognized and assigned to an accounting period ending at t regardless of time of payment. The accrual accounting results in different cash flow "status" of revenues and costs generated by unfinished operations, as depicted on Fig. 1 by areas A, B, C, and D. As trade credit period T^{AR} is less than T^{AP} a part of revenues (area A) have already been settled. However, costs (area B) corresponding to the revenues (area A) have not been settled till the end of accounting period ending at t. Additionally, due to trade credit granted by the company, T^{AR}, a part of revenues (area D) is not settled till the end of the accounting period and similarly are not corresponding to costs (area C). In the cash flow at the same time, starting from the beginning of the accounting period, daily operating cash inflows are delayed by T^{AR}. Corresponding operating cash outflows occur later, as $T^{AR}<T^{AP}$, and are delayed by T^{AP}. At the end of the accounting period the company cash accounts are increased by area A, a sum of revenues relevant to those unsettled at the end of the accounting period costs (area B). As revenues equal costs increased by accounting earnings, area A equals area B increased by accounting earnings: $A = B+E(B)^{AR}$. This very sum of operating cash outflows (area B) refers to invisible credit as delivered by company suppliers and employees.

In order to measure the amount of invisible credit we will refer to a concept of cash investments in Operating Working Capital, CashOnOWC, by (Szpulak, 2014). Cash investments in OWC at any time t results from timing differences of cash flows (as reflected by area B on fig. 1) and under certainty equals to:

$$CashOnOWC_t = -\sum_{1}^{t} CF_t^- + \sum_{1}^{t} NCF_t^+ \qquad (3)$$

where: $CashOnOWC$ – cash investments in OWC, CF^- – operating cash outflows, NCF^+ – operating net cash inflows, i.e. calculated on costs of goods sold basis, t – day of company operations no. (starting at 1, which stands for company inception):

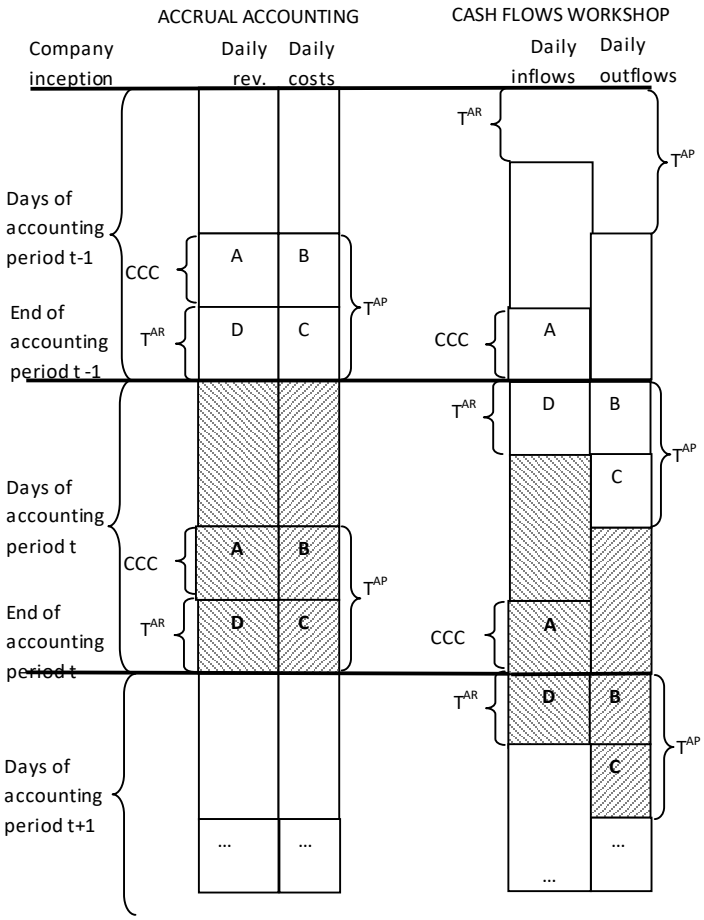
$$CF_t^- = S_{t-T^{AP}+1} \cdot c$$
$$NCF_t^+ = S_{t-T^{AR}+1} \cdot c \qquad (3a)$$

where: S – sales in units, c – unit costs of goods sold, T^{AP} – trade credit period received by company, T^{AR} –trade credit period granted by the company.

As under negative CCC the sum of all realized operating cash outflows, CF^-, is less than a sum of all operating net cash inflows, NCF^+, CashOnOWC is positive indicating the amount that the company temporary owns

2 These *accruals* differ from the accruals which stand for a position in the company balance sheet. The term *accruals* is applied here following (Dechow, 1994). She defines that difference between the cash from operations and accounting earnings equals so called *accruals*. There are two types of accruals: long-term resulting from changes in long term accounts (e.g. depreciation, provisions) and short-term resulting from changes in the working capital.

Figure 1: Accrual accounting vs. cash flows for companies operating in conditions of negative Cash Conversion Cycle



where: T^{AR} – trade credit period granted by company, T^{AP} – trade credit period received by the company, CCC – cash conversion cycle. Under assumption of continuous operations, no inventories and constant demand (sales) the vertical hinge of each box stands for days of operations while the horizontal hinge stands for size of variable listed at the top of the box. Area A indicates cash surplus as a sum of inflows, appearing prior to the corresponding outflows equal to area B. Area B stands for cash temporarily owned by the company over period CCC that serves for paying accounts payable equal to B. Therefore, cash investments in OWC equals area B. WCR (short-term accruals) is the area of D – B – C, D equals credit sales outstanding (accounts receivable) at the end of accounting period *t*, B and C are accounts payable not settled at the end of accounting period.

Source: Own composition

which, however, ultimately serves to pay the company's bills. Under negative CCC, this very CashOnOWC measures the amount of invisible credit delivered to the company by suppliers and employees. To estimate the CashOnOWC we could use cash flow statements built from the company's inception with the use of a direct method, however this is almost impossible specifically because the direct method is very seldom applied by the companies. As a typically indirect method is applied, to estimate CashOnOWC we could use the following formula[3] (Szpulak, 2014):

$$CashOnOWC_t = -(WCR_t - E_t^{AR}) \quad (4)$$

$$E_t^{AR} = \sum_{t-T^{AR}+2}^{t} S_t \cdot e$$

3 Equation 4 can be easily proven in the following way. In Fig.1 at the end of accounting period ending at t WCR = D-(B+C). As AR = D and AP=B+C, D refers to revenues i.e. costs increased by earnings: D=C+E(C)^{AR}, such that E^{AR} = E(C)^{AR}. Having from the balance sheet AR, AP and from income statement E to get B we need to adjust AR on E^{AR} and subtract (C+B), that is D-E^{AR}-B-C = WCR-E^{AR}. Cash flows indicates on Figure 1 that the net cash flows (as calculated from formula 4) are positive while WCR is negative, therefore to get signs of *CashOnOWC* consistent with cash flows' the appropriate correction ("-" before bracket) is done in formula 4.

where: E_t^{AR} – sum of accounting earnings included in accounts receivable as calculated on the basis of net sales, e – unit accounting earnings, i.e. unit price p_s less of unit costs of goods sold c, $e = p_s - c$.

By calculating CashOnOWC we are able to estimate the accumulated amount of invisible credit delivered by suppliers and employees at a given time t from the company's inception. To investigate the increase in the invisible credit we calculate incremental investment $\Delta CashONOWC$ and its estimation, both equals:

$$\Delta CashOnOWC_t = CashOnOWC_t - CashOnOWC_{t-1} = \\ = -(\Delta WCR_t - \Delta E_t^{AR}) \quad (5)$$

Apart from the natural abilities of companies operating under negative CCC to create such invisible credit, they are vitally interested in increasing this source of non-interest bearing liabilities. As I have observed, the effective possibilities include, *ceteris paribus,*: (i) lengthening the trade credit period received by the company T^{AP}, (ii) pressuring suppliers to deliver materials/goods at lower prices, (iii) increasing final product/service assortment.

Sources of financing Working Capital Requirements

As the above analysis assumes that investors provide adequate capital to finance operating cycle, i.e. WCR, we will now concentrate on the sources of financing. A concept of Net Liquid Balance of (Shulman & Cox, 1985) may be applied to report on sources of financing which a company uses to finance WCR. Recall from the theory of corporate finance that current assets consist of:

$$CA = NCA + INV + AR \quad (6)$$

where: CA – current assets, NCA – non-operating current assets (i.e. short term investments, including all reported in the balance sheet cash), INV – inventories, AR – accounts receivable.

Current liabilities consist of:

$$CL = OCL + NCL \quad (7)$$

where: CL – current liabilities, OCL – operating current liabilities (i.e. accounts payable and accruals), NCL – non-operating current liabilities (i.e. notes payable and other short term interests bearing liabilities).

Working Capital Requirements, WCR, equals:

$$WCR = INV + AR - OCL \quad (8)$$

WCR stands for amount of funds required from investors to finance the operating cycle, and if provided by all the company's investors consists of equity and debt.

Net working capital, NWC, equals:

$$NWC = CA - CL \quad (9)$$

NWC stands for amount of long-term funds invested in the current assets.

Providing that capital delivered by investors may be as well invested in non-operating assets, we have:

$$NWC = CA - CL = NCA + INV + AR - (NCL + OCL) \quad (10)$$

Grouping the right-hand side of the above equation in accordance with formula 8 we have:

$$NWC = INV + AR - OCL + NCA - NCL = \\ = WCR + NCA - NCL \quad (11)$$

Referring to (Shulman, Cox 1985) the difference between the non- operating current assets NCA and non-operating current liabilities NCL, constitutes Net Liquid Balance:

$$NLB = NCA - NCL \quad (12)$$

Solving formula 11 for WCR and given equation 2 we have:

$$WCR = NWC - NLB \quad (13)$$

meaning that WCR is financed by long-term funds delivered by the investors net of net liquid balance.

The companies operating under conditions of positive CCC usually display positive WCR, while companies operating under negative CCC usually display negative WCR. Shulman & Cox (1985) analyze changes in WCR resulting from permanent sales increase, presumably for companies operating under positive CCC. Referring to them, permanent increase in WCR should be financed by increase in long-term capital, NWC. Financing permanent increase in WCR by increase in non-operating current liabilities, NCL, may result in financial liquidity problems, as repayment of borrowed capital, *ceteris paribus*, occurs before the company accumulates enough entirely generated funds (i.e. earnings) to finance both: ongoing operations and repayment of borrowed capital. However, up to the level of NCA the company is free to decide whether to keep short term investments and use short term debt or sell currently held short term investments. Thus Vernimmen (2005, p. 24), and Sierpińska & Wędzki (1997, p. 86) advise treating these NCA and NCL as if they were interchangeable.

To assess the liquidity Shulman & Cox (1985) construct a financial liquidity ratio of NLB to company

assets. Although the predictive power of this ratio in predicting company bankruptcy, as proven by Shulman & Cox (1985) has not been confirmed on the Polish market, as revealed in research done by Wędzki (2000), the concept of NLB is still an interesting starting point to analyze the situation of the companies operating under conditions of negative CCC.

The mechanism of financial distress: a clarification

As mentioned in section 2, permanent sales increase experienced by the companies operating under negative CCC results in permanent increase in invisible credit as delivered by suppliers and employees. Such an increase in invisible credit leaves the companies with increasing sources of idle cash. Wędzki (2003, pp. 91-92) indicates that retailers and some companies operating in the service sector disclose negative NWC and WCR, and if NLB is positive and $|WCR| > NLB$ there is nothing to worry about. Referring to Fig. 1 idle cash (which generates NCA) consists of both: earnings and invisible credit (area A on the fig. 1). As NWC under negative CCC is usually negative, investors do not provide any long-term capital to finance current assets, however similarly to positive CCC, company uses interchangeably non-operating liabilities and non-operating current assets, therefore, we observe NCA net of NCL, which is NLB. At the same time, when compared to companies operating under positive CCC and a given size of operating activity, the companies operating under negative CCC earn much higher Return on Invested Capital, ROIC. This is due to lower Net Operating Capital, NOC, invested in the operating assets. When ROIC is higher than return on short term financial investments of equivalent risk currently available on financial markets, managers choose one of the alternatives: (i) decide to invest idle cash from both: earnings and invisible credit in operating activity, or (ii) decide to pay off a part of idle cash, i.e. earnings in form of dividends and remaining part, i.e. invisible credit, invest in the operating assets, or (iii) primary invest idle cash, both: earnings and invisible credit, in operating activity and later pay off this accumulated earnings from currently available idle cash in some consecutive periods. As financial theorists report (Sierpińska & Wędzki, 1997, p. 78, Dudycz, 1998, p. 59) financing long-term assets with current liabilities is a normal course of action for the companies operating in trade and some services' sector, and as deliberated above, is financially tempting. The question is to which extent this practice is wise? The well-known fact about the economy is that what brings large profits at the same time bears large risk. The company which uses the inflows from sales gained over the currently held operating cycle to finance outflows generated over previous operating cycle exposures company stakeholders to financial distress risks that materialize as soon as sales slow, stabilize or declines. Unfavorable sales changes over the currently held operating cycle, *ceteris paribus*, indicate the slow, stop or fall in amount of inflows which are insufficient to cover outflows generated over previous operating cycles (to cover area B on Fig. 1). This shortage should be covered by funds available from NLB. However, as funds primarily delivered by the company suppliers and employees have been already frozen in long-term operating assets, the company is unable to settle accounts payable. Unfavorable sales changes result in a need to pay off the corresponding part of invisible credit delivered by suppliers and employees. Therefore, two liquidity ratios to investigate are: one to measure the level of safety margin, the company keeps it in the case of unfavorable market conditions, and a second to measure the company ability to pay off invisible credit. The former is a type of static liquidity measure originating in the static approach to financial liquidity analysis, the latter is a type of dynamic financial liquidity measure originating in an on-going approach to liquidity analysis.

To measure the safety margin, we may compare NLB to CashOnOWC. NLB indicates the currently available sources of repaying invisible credit, and CashOnOWC indicates the amount of the liability. The relation of NLB to CashOnOWC shows how much of the invisible credit company is able to pay off at the moment of analysis. The implicit ratio, Operating Liquidity Margin OLM, takes a form of:

$$OLM = \frac{NLB}{CashOnOWC} = \frac{NCA - NCL}{-(WCR - E^{AR})} \qquad WCR < 0$$

To measure the company ability to pay off invisible credit we may calculate the relation of NLB increased by forecasted operating cash inflows generated by future operating cycles (the forecast of area A on Fig. 1) to operating cash outflows generated by previous operating cycles (area B on Fig. 1). The implicit ratio, Prospective Operating Liquidity Index POLI, takes a form of:

$$POLI = \frac{NLB_t + \sum_{t+1}^{-CCC} OCF_t^+}{CashOnOWC_t} \qquad CashOnOWC > 0, CCC < 0$$

where $\sum_{t+1}^{-CCC} OCF_t^+$ indicates the sum of forecasted operating cash inflows over the CCC. The ratio below 1 indicates the company which, under current level of NLB, is forecasted to be unable to settle accounts payable on time from cash generated in subsequent operating cycles. It means that cash on hand generated from operations (i.e. numerator minus denominator) is negative, when the POLI ratio is less than 1.

Assessing the financial distress risk based on the level of the POLI ratio is reduced to the answer to the following question: what is the probability of receiving the ratio below 1 which means the company generates an operating cash shortage under given NLB?

Application of the concept to assess the financial distress risk of one of the biggest retailers operating on the Polish market – Jeronimo Martins Dystrybucja S.A.

To test the suggested behavior of the POLI ratio in conditions of unfavorable sales changes, stochastic simulations based on the financial model of a company's operations are performed. The model was built taking a spreadsheet approach to financial modeling following the methodology of Charnes (2007), i.e. by transforming the company model's assumptions defined in section 3 into the adequate Excel formulas[4]; the simulations were performed with the application of Crystal Ball.

As an example of this application the author chose one big retailer operating on the Polish market named Jeronimo Martins Dystrybucja S.A., The company's assets sum to approximately 10 billion PLN at the end of 2013, net sales revenues sum to 32 billion PLN and have risen 300% over the last 7 years, and net income gained at the end of 2013 was equal to 1,2 billion PLN. Financial data required to perform the above-mentioned analysis was taken from original financial statements available in the Emerging Markets database. Table 1 consists of financial indicators and financial ratios calculated over the period 2006 – 2013. Both OLM and POLI ratios were calculated using estimations suggested in the paper (Szpulak, 2014). The following figures (no. 2 and 3) are graphical presentations of a simulated Prospective Operating Liquidity Index ratio and accompanying level of cash on hand as generated from operations.

The first simulation, on 2014, assumes sales increase over 2014 is a realization of Triangular probability distribution with parameters: min = -4 ml PLN, likeliest = 4,5 ml PLN, max = 13 ml PLN. The maximum increase is relevant to average increase over the whole analyzed

4 the Excel model is available upon request from Author.

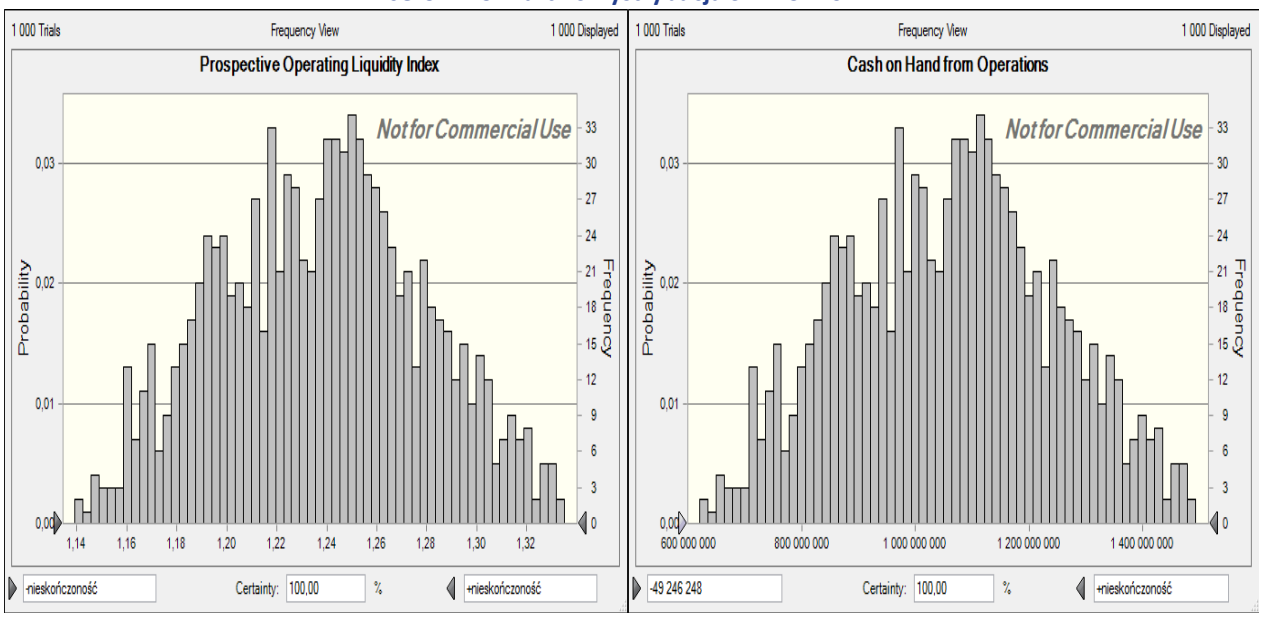
Table 1: Chosen financial indicators and financial ratios for Retailer S.A. over 2006-2013

Financial indicator/ financial ratio	Year							
	2006	2007	2008	2009	2010	2011	2012	2013
CCC [days]	-25	-50	-65	-54	-63	-58	-59	-53
Days of Inventory [days]	9	13	17	14	15	15	20	23
Days of OCL [days]	35	66	84	71	79	74	80	78
DSO [days]	1	3	2	3	1	1	1	2
E^{AR} [ml PLN]	1	3	3	7	2	5	8	11
WCR [ml PLN]	-752	-1 491	-2 171	-2 338	-3 292	-3 749	-4 366	-4 445
CashOnOWC [ml PLN]	752	1 494	2 174	2 345	3 294	3 754	4 374	4 456
NLB [ml PLN]	400	692	1 229	528	728	952	505	219
sum of OCF^+ over CCC [ml PLN]	775	1 650	2 363	2 731	3 447	4 064	4 826	5 063
Operating Liquidity Margin	0,53	0,46	0,57	0,23	0,22	0,25	0,12	0,05
Prospective Operating Liquidity Index*		2,72	2,04	1,82	1,69	1,45	1,54	1,27

*Source: Own calculation on the basis of data form Jeronimo Martins Dystrybucja S.A. financial statements, * POLI ratio was calculated on year to year basis, i.e. (NLB+ sum of OCF^+ over CCC)$_{t+1}$/ CashOnOWC$_t$*

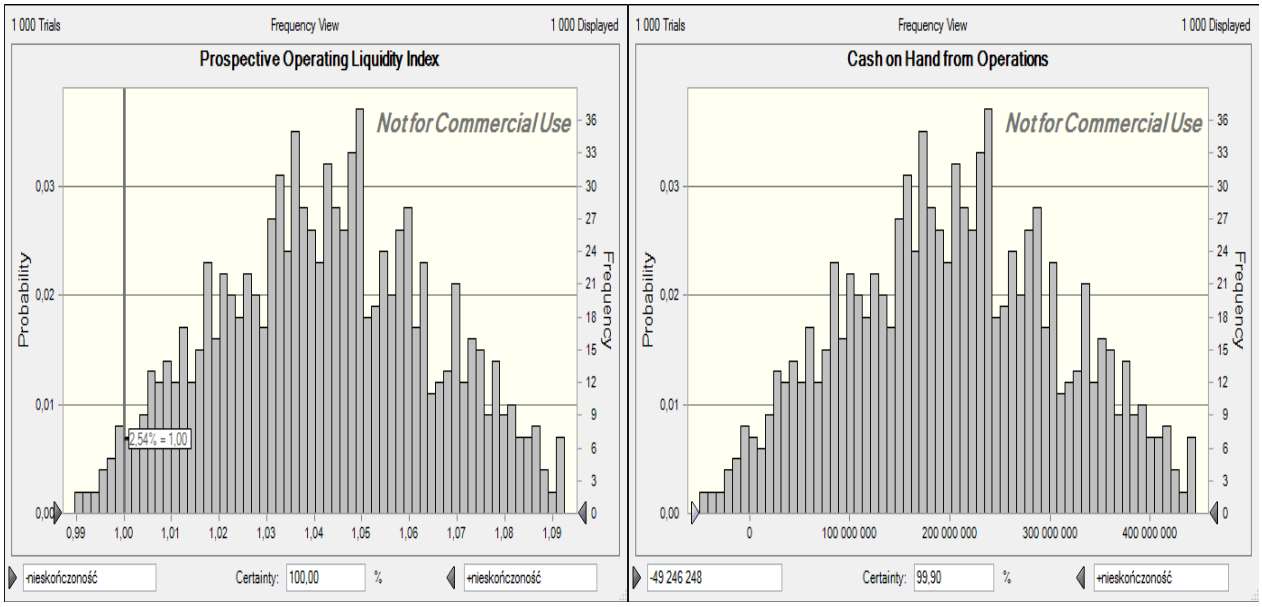
past period, while the middle value corresponds to the increase realized over the previous period. It is assumed that the substantial growth realized over the past period is almost unlikely to repeat in the future, at least for two reasons: (i) saturation level of new company outlets is almost reached and (ii) competition within the retail sector dramatically increased over the last 5 years. The most likely is to get the increase to the level equaled to the previous year, and the minimal value is a symmetrical to the maximal.

Figure 2. Simulated distribution of Prospective Operating Liquidity Index and cash on hand from operations of Jeronimo Martins Dystrybucja S.A. for 2014



Source: output from Crystal Ball; simulation run under assumption of Triangular distribution of increments in daily operating cash inflows (min = -4 ml PLN, likeliest = 4,5 ml PLN, max = 13 ml PLN)

Figure 3. Simulated distribution of Prospective Operating Liquidity Index and cash on hand from operations of Jeronimo Martins Dystrybucja S.A. for 2015



Source: output from Crystal Ball; simulation run under assumption of Triangular distribution of increments in daily operating cash inflows (min = -10 ml PLN, likeliest = -5 ml PLN, max = 0 ml PLN) and 8% increase in CashOnOWC.

The second simulation, run on 2015, similarly assumes Triangular probability distribution of sales increase, however sets different distribution parameters. First, it is assumed that the maximum value indicates no growth when compared to the previous year 2014 and the most probable is to meet a sales decrease of -5 ml PLN. It is a consequence of: (i) deflation observed in food prices, a basic Jeronimo Martins Dystrybucja S.A. assortment, (ii) increasing costs, at a normal rate of 8% p.a. Both of these factors make it unable to continue the strategy of the lowest price on the market. The minimum value is symmetric to the maximum value.

The simulations result on 2015 indicates that there exists about a 2,5% of chance of receiving a POLI ratio no higher than 1, with the minimal value of cash shortage of about 50 ml PLN. It should be mentioned however, that the NLB concept, as invoked here, classifies all cash balance as non-operating current assets. Referring to (Daves et al. 2004, pp. 114 – 115) some operating cash is required to maintain ongoing operations. The authors suggest this amount should be about 5% of cash balance. As depicted in Table 1, OLM equals at the end of 2013 5% of invisible credit delivered by suppliers and employees. Including the 5% adjustment, suggested by Daves et al., (adjNLB = 0,95NCA – NCL) will increase the probability of having a POLI ratio no higher than 1 from 2,5 to 5%.

Conclusions

The goal of this paper was to point out accounting-based variables to be observed by the company's stakeholders in order to assess the financial distress risk of the companies operating under conditions of negative CCC, such as retailers or those providing some services. For this reason, two financial indicators were described: first, a concept of CashOnOWC which enables us to estimate the amount of invisible credit delivered by suppliers and employees, and second, a concept of NLB which enables us to point out currently available sources of repaying invisible credit. The relation between them defines the Operating Liquidity Margin which describes the size of a buffer which the company keeps in the case of unfavorable sales changes. Further, the forecasted inflows from operations, corresponding to CashOnOWC outflows, and current level of NLB was related to the amount of invisible credit in order to assess the Prospective Operating Liquidity Index. The POLI ratio was subject to a spreadsheet financial model used to assess the financial distress risk with the application of stochastic simulations.

The discussion and the case study provided here support the stated hypothesis which shows that free use of surplus cash originating in invisible credit increases the financial distress risk of the companies operating under negative CCC. The Ratios and risk analysis suggested in the paper may serve as a creditable tool for assessing the financial distress risk of such companies.

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