CASH CONVERSION CYCLE
AS A COMPANY LIQUIDITY MEASURE

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Abstract

Effective and adequate management of a company's liquidity position represents a key element in securing the overall ability of a company to meet its short-term obligations using assets that are readily converted into cash. The company's liquidity position is especially important in today's globalized and highly competitive business environment, as well as in times of economic and financial hardships characterized by decreasing cash inflows and deteriorating market conditions. In order to predict, manage, and evaluate the liquidity position, the company utilizes specific analytical tools and measures. Apart from usual static measures of liquidity such as liquidity ratios (e.g. current and quick liquidity ratios), the cash conversion cycle (or cash gap cycle) represents dynamic measure, which incorporates the element of time in the consideration.

The cash conversion cycle is defined as a number of days between actual cash outflows on a company's purchase of needed productive resources and actual cash inflows resulting from product sales. It measures the time between outlay of cash and cash recovery from a company's regular course of operation. During that period of time, the financial funds are tied up in the current assets, such as payables, inventories, and receivables. The shorter cash conversion cycle, stated in a number of days, indicates better liquidity and working capital position of a company. Quick cash recovery is a permanent business consideration, especially in the short term and in smaller firms. A successful management of the cash conversion cycle implies the effective management of individual components of current assets. The company management undertakes a different set of activities to decrease inventory and receivables conversion periods, as well as to increase payables deferral period in order to shorten the cash cycle and quickly release the funds that are invested

in a working capital. The concept of cash gap is closely related to the net working capital management and it is regarded as a method for cash flow management.

Therefore, the aim of this paper is to present an overview of the cash conversion cycle concept and its importance in relation to the measurement of the liquidity position of a company. The relations between the cash gap and net working capital management will be explained, as well as basic financial management implications of the concept for the company's business operations. Additionally, the concept will be illustrated with a sample of companies that makes the index CROBEX10 of the Zagreb Stock Exchange.

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Keyword: cash conversion cycle, liquidity measure, net working capital management

1. Introduction

One of the key elements in securing the everyday operations and the overall ability of a company to meet its short-term liabilities is the effective and adequate liquidity management. The adequate liquidity position of a company is especially important in today's globalized and highly competitive business environment, as well as in times of economic and financial hardships characterized by decreasing cash inflows and deteriorating market conditions. All sorts of market and other risks directly influence business operations and the company's cash flow dynamics in a negative way, thus requiring active management of its working capital, which should result with desired liquidity position. Many different unfavorable factors, such as sudden particular and/or general fall in market demand, an increase in un-collected receivables, raising prices of specific inputs, "frozen" credit markets and similar, are threatening liquidity and survival of the company. The short-term (current) liabilities can be met only by having enough disposable cash on hands and/or having enough short-term (current) assets that are readily convertible into the cash. Therefore, it is very important to actively manage working capital of the company and keep cash balances at the required level, thus maintaining adequate liquidity. In order to predict, manage, and evaluate its liquidity position with a satisfying degree, the company must utilize specific analytical tools and measures. Apart from usual static measures of liquidity such as liquidity ratios (e.g. current and quick liquidity ratios), the cash conversion cycle (or cash gap cycle) represents dynamic measure, which incorporates the element of time in the consideration.

2. Key motives (reasons) for maintaining cash balances

Every businessman would say that "cash is king" when it comes to the company's operations, because only the cash can pay the company's bills. Therefore, it is of great importance that certain cash balance is maintained by the company management in order to meet its short-term liabilities. Generally, the company holds the cash for reasons of transactions, compensations, precautions and speculations, thus creating (1) transactional, (2)compensating, (3) precautionary, and (4) speculative cash balances (Brigham & Houston; 2003, 698). Transactional balance is associated with routine business transactions of payments and collections of the bills. The amount of the transactional cash varies between different companies and it is influenced by the specific industry setting. Compensating balance is often maintained in order to compensate the banks for providing loans and services to the company, while precautionary balance is associated with the cash held in reserves for random and unforeseen fluctuations in the company's cash flow. Speculative cash balance enables the company to take advantage of any bargain purchases and profit making situations that might arise, especially in times of financial crises when declining security prices and rising interest rates can be expected. The level of the overall cash (or currency) balance is strongly influenced by other current assets stated on a company's balance sheet. The degree of the liquidity of current assets is different in terms of their ability to be converted into the cash, quickly and without any price discount, in the amount sufficient to fulfill company's immediate short-term liabilities. The cash is the most liquid asset and only with the cash the company can fulfill its obligations. The importance of cash as the ultimate liquid asset is reflected in today's cash positions of corporate America. According to the Federal Reserve, U.S. nonfinancial companies had $1.984 trillion in liquid assets (cash and cash equivalents) on their books at the end of the fourth quarter of 2013, of which $464 billion in hard cash (checkable deposits and currency) or 23.39% of their total liquid assets (Financial Accounts of the U.S.; March 2014). Total liquid assets, which include foreign deposits, checkable deposits and currency, time and savings deposits, money market fund shares, security repurchase agreements, commercial paper, treasury securities, agency and GSE backed securities, municipal securities, and mutual fund shares, accounted for 5.67% of total assets held by U.S. nonfinancial corporations in the same period. However, if the company has a favorable structure of its total current assets (e.g. more current assets with a higher degree of the liquidity in the total structure of current assets when compared with some other combinations), then it can have a lower cash balance. In this case, specific current

assets can be converted on time into the currency that is needed for whatever reasons, thus making the liquidity position of the company stronger. Therefore, the effective management of each component of working capital is a precondition for achieving an adequate liquidity position of the company, thus decreasing the risk of bankruptcy.

3. Cash conversion cycle

In order to achieve optimal level of liquidity, the company must pursue strong liquidity management, which in turn requires strict and systematic financial planning of cash flows. Insufficient liquidity management may cause severe difficulties and losses due to unfavorable short-term developments even for the company with positive long-term prospects (Richards & Laughlin; 1980, 2). Liquidity has to be monitored, managed and measured. Generally, the company uses static and dynamic measures in assessing its liquidity. Static measures are defined as such because they reflect the nature of the balance sheet structure, while dynamic ones are connected to turnover metrics (Bolek; 2013, 3). The most common static measure is the current ratio(CR) and its variations (e.g. quick or acid ratio), while cash conversion cycle (CCC) represents dynamic measure, which incorporates the element of time in the consideration of liquidity (Cagle et.al.; 2013). Liquidity ratios based on balance sheet do not take into account the different degrees of liquidity of specific current assets. Therefore, two companies having the same CR might have different liquidity positions due to the different structure of their current assets. There are also other disadvantages of liquidity ratios such as difficult and ambiguous interpretation, their static nature, possibility of manipulations through balance sheet items etc. (Cagle et.al.; 2013).The CR is calculated as a ratio of current assets and current liabilities. The net working capital (NOC) is also a static measure of liquidity, which is calculated as a difference between current assets and current liabilities, thus closely related to CR. It roughly measures the company's reservoir of cash (Brealey& Myers; 2003, 813). The positive and higher NOC signals better liquidity position. On the other hand, there is a cash conversion cycle or cash gap cycle, which complements static liquidity measures and provides deeper insights into the company's liquidity position. The CCC can be defined as a length of time funds (cash) are tied up in working capital or the length of time between paying for working capital and collecting cash from the sale of working capital (Brigham & Houston; 2011, 521). It is a number of days between cash outflows needed to purchase resources for production and cash inflows resulting from product sales.

In order to compute the CCC the company must monitor and measure indicators of three time periods, such as (1) inventory conversion period (or days inventory outstanding, DIO), (2) receivables collection period (or days receivables outstanding, DRO), and (3) payables deferral period (or days payables outstanding, DPO). Inventory conversion period is the average time required to convert raw materials and other needed resources for production into finished goods and then to sell those goods to buyers. Receivables collection period (also average collection period) is the average length of time needed to convert the company's receivables into cash; it is the time to collect cash from the buyers following a sale of goods on credit. Finally, the payables deferral period is the average length of time between purchase of resources and the payment of cash for those resources. The CCC model is presented in figure 1.

Figure 1. The Cash Conversion Cycle Model
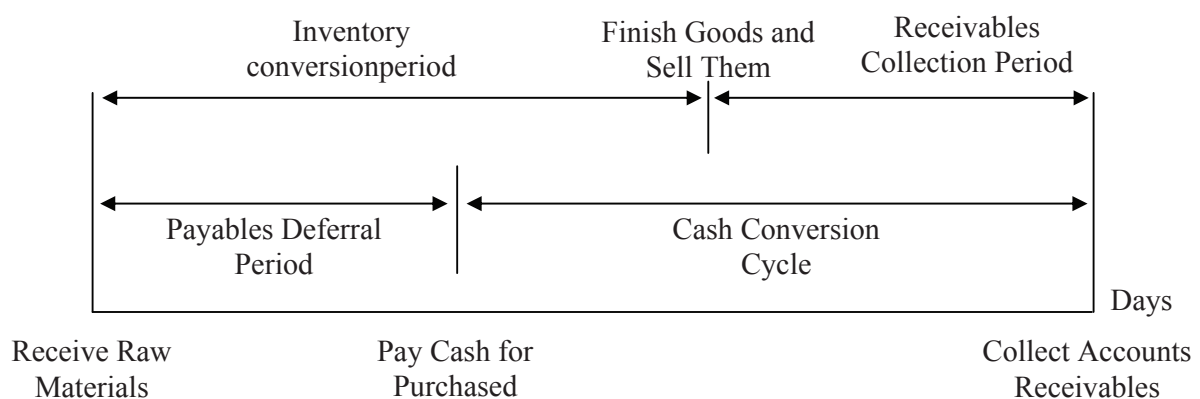
Source: Ehrhardt& Brigham; 2008, 550

The CCC can be computed by using a three-part formula as indicated in figure 1.:

$$CCC = DIO + DRO - DPO \tag{1}$$

Generally, each component (indicator) in the formula (1) would be calculated using items stated in the financial statements of the company. Thus, the days inventory outstanding (DOI)is calculated as:

$$DOI = \frac{Number\ of\ days\ in\ a\ year}{Inventory\ turnover} = \frac{Inventory}{COGS\ per\ day} \tag{2}$$

where COGS is a cost of goods sold, while the number of days in a year can be 360 or 365, depending on a selected method. Very often due to unavailability of

the COGS data in financial statements, the COGS is substituted with the net sales item.

The indicator the days receivables outstanding (DRO) is calculated as:

$$DRO = \frac{\text{Number of days in a year}}{\text{Receivables turnover}} = \frac{\text{Receivables}}{\text{Net Sales / Days in a year}} \quad (3)$$

Finally, the indicator the days payables outstanding (DPO) is calculated as:

$$DPO = \frac{\text{Number of days in a year}}{\text{Payables turnover}} = \frac{\text{Payables}}{\text{COGS / Days in a year}} \quad (4)$$

where COGS is also substituted very often with the amount of material costs from the income statement or some other item(s) of expenditures that can be related to the COGS. The management of the company undertakes different activities to simultaneously decrease inventory and receivables conversion periods, while increasing payables deferral period in order to shorten the CCC and quickly release the funds invested in a working capital. The CCC concept indicates that the company with shorter CCC also has a better liquidity and working capital position. Quick cash recovery is a permanent business consideration. Successful management of the CCC implies the effective management of individual components of specific current assets and liabilities, and as such, it is closely related to the NOC management. Additionally, it is regarded as a method for cash flow management. The CCC is different from the operating cycle, which represents the time it takes the company to turn its investment in inventory into cash and is equal to DIO and DRO.

4.. Application of liquidity measures in selected Croatian companies

The application and calculation of the static (current ratio and NOC) and dynamic (CCC)liquidity measures are presented with a sample of companies whose shares are listed on the Zagreb Stock Exchange. Shares of those firms make the CROBEX10 index, which is a specialized index of companies with the highest free float market capitalization and the trade volume. Maximum weight of each stock in the index is restricted to 20%. As of March 3, 2014, the index had a value of 981.61 (base value is 1000). The composition of the indexis presented in table 1.

Table 1. Composition of the CROBEX10 index of the ZSE

Nr.	Ticker	Company	Industry (sector)	Market capital.* (in billions kn)
1.	ADRS-P-A	Adrisgrupa d. d.	Management and investments	1.62
2.	ATGR-R-A	Atlantic Grupad.d.	Wholesale	0.77
3.	ERNT-R-A	Ericsson Nikola Tesla d.d.	Communication equipment	1.18
4.	HT-R-A	Hrvatski Telekom d.d.	Telecommunication	2.45
5.	INA-R-A	INA – Industrijanafted.d.	Oil & gas (exploration, production, retail)	2.00
6.	KOEI-R-A	Končar – elektroindustrijad.d.	Manufacturing (generators, electro-motors, transformers)	1.26
7.	KORF-R-A	ValamarAdria Holding d.d.	Tourism & Management	0.56
8.	LEDO-R-A	Ledod.d.	Ice-cream production	1.24
9.	PODR-R-A	Podravkad.d.	Fruit & Vegetable processing	1.11
10.	PTKM-R-A	Petrokemijad.d.	Fertilizer manufacturing	0.17

* Market capitalization as of March 3, 2014

Source: Zagreb Stock Exchange (http://zse.hr/default.aspx?id=121)

Application of static measures of liquidity is presented in table 2. Current ratio (CR) and NOC were calculated for each company in the period 2010 to 2012. Generally, the company has a better liquidity position if the current ratio and NOC have higher values. Although acceptable current ratio values vary from industry to industry, a current ratio of 2:1 is generally considered to be appropriate. The current ratio higher than 1, indicates a positive NOC, which is expressed in currency units. Also, the higher NOC connotes a better liquidity. The available data indicate a general trend of deteriorating liquidity during the analyzed period. Only three companies (ADRS, KOEI and KORF) have a greater CR values in 2012 if compared with 2011, four companies have CR values higher than 2, while two companies (INA and PTKM) have CR values below 1, which can be considered as concerning because it indicates possible problems in the future with paying the bills on time. The values of NOC correspond with CR values and confirm the results on the liquidity of analyzed firms.

Table 2. Static measures of liquidity

#	Company	Net working capital (in bill. kn)			Current ratio		
		2010	2011	2012	2010	2011	2012
1.	Adrisgrupad.d.	3.428	3.575	4.049	4.34	4.17	5.51
2.	Atlantic Grupad.d.	0.512	0.980	0.913	1.40	1.97	1.84
3.	Ericsson Nikola Tesla d.d.	0.920	0.655	0.604	6.08	6.06	3.91
4.	HTd.d.	3.407	3.834	3.317	3.22	3.55	3.06
5.	INA d.d.	-0.940	0.174	-1.646	0.89	1.03	0.82
6.	Končar - elektroindustrijad.d.	1.268	1.212	1.247	2.72	2.57	2.89
7.	ValamarAdria Holding d.d.	0.037	-0.021	0.105	1.15	1.04	1.66
8.	Ledod.d.	0.398	0.538	0.537	3.01	3.52	1.57
9.	Podravkad.d.	0.156	0.696	0.672	1.15	1.71	1.70
10.	Petrokemijad.d.	-0.083	0.104	-0.029	0.90	1.11	0.98

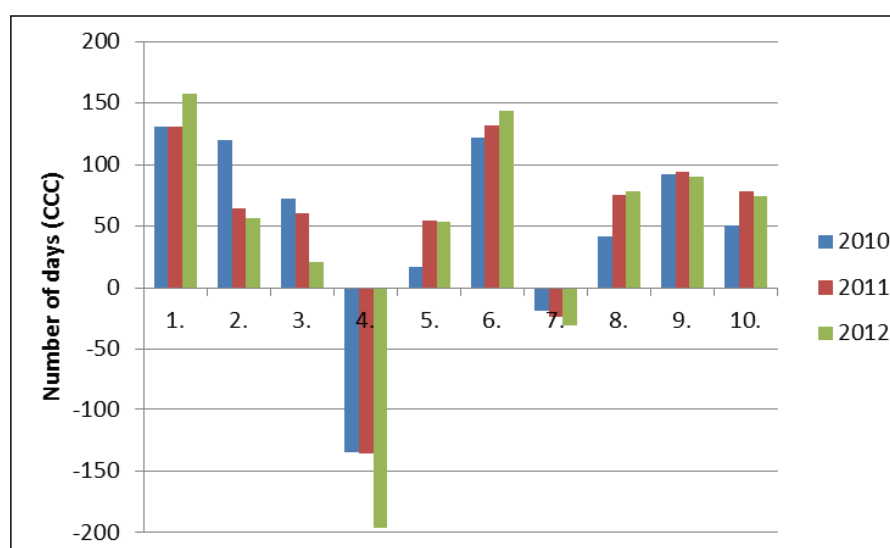Source: author's calculation according to financial statements of companies

The values of CCC give further insights into the liquidity position of selected companies. The results of CCC, which is a dynamic measure of liquidity, are presented in table 3. All components of cash gap are calculated in a three-year period, thus providing better comprehension of liquidity and management efficacy in dealing with specific current assets and liabilities, explicitly with inventory, receivables and payables. The calculation of components had to be adjusted to the availability of data in financial statements, meaning that specific balance sheet and income statement items had to be used in order to get needed values. Therefore, CCC components are calculated as follows: DOI equals 365/(net sales/inventory), DRO equals 365/(net sales/receivables), and DPO equals 365/(material costs/payables). The available data shows a general deterioration of the CCC for the most companies in the sample. The number of days of the CCC is increasing for five firms (ADRS, INA, KOEI, LEDO and PTKM), while one firm has a stagnant CCC (PODR). Two firms have decreasing CCC (ATGR and ERNT), while two firms have a negative CCC (HT and KORF).

Table 3. Elements of Cash Conversion Cycle for companies in CROBEX10

#	Com.	2010				2011				2012			
		DOI	DRO	DPO	CCC	DOI	DRO	DPO	CCC	DOI	DRO	DPO	CCC
1.	ADRS	93	114	77	130	93	115	77	131	92	138	72	158
2.	ATGR	99	178	156	120	52	87	74	65	49	85	77	57
3.	ERNT	13	145	86	72	7	117	63	61	6	62	47	21
4.	HT	9	63	208	-135	8	59	203	-136	8	60	264	-197
5.	INA	41	51	75	17	45	45	36	55	41	40	28	53
6.	KOEI	72	131	82	121	79	144	92	132	73	142	71	144
7.	KORF	6	20	44	-18	5	12	42	-24	4	13	48	-31
8.	LEDO	50	55	64	42	55	81	61	75	69	55	45	79
9.	PODR	73	103	83	93	74	103	83	94	70	107	86	90
10.	PTKM	79	34	62	50	82	45	49	78	82	56	63	74

Source: author's calculation according to financial statements of companies

The determinants of changes in CCC values can be found in management efficacy of each component. The two companies that decreased their CCC were very successful in inventory and receivables management (thus decreasing their operating cycle, i.e. DIO and DRO), although they had to pay their bills (DPO) in shorter periods.

Figure 2. Cash Conversion Cycle, 3-year comparison for CROBEX10 companies

Source: according to author's calculation

On the other hand, the companies with deteriorating CCC had problems with their operating cycle, i.e. with the management of their current assets. They did not find a proper set of management activities in order to shorten their DIO and DRO, while being confronted with suppliers to pay their bills faster at the same time. The companies with the negative CCC managed to keep their operating cycle very short, while compelling their suppliers to accept not so favorable credit terms. In order to better comprehend and see relevant changes in a number of days of cash conversion cycle in a sample of selected companies during the analyzed period, the available data are presented additionally in figure 2.

5. Conclusion

The appropriate liquidity position should secure the capacity of the firm to pay its short-term liabilities on time and maintain its business operations. Different activities, aimed at optimization of current assets and current liabilities, have to be undertaken by the management in order to achieve appropriate liquidity. To be able to manage and evaluate its liquidity, the company utilizes specific analytical tools and measures. Static and dynamic liquidity measures such as current ratio and net working capital, as well as cash conversion cycle are used to assess the company's liquidity position and to determine proper course of action in the future. The CCC concept, which expresses the length of time (in days) that it takes for a company to convert resource inputs into cash flows, is closely related with NOC and its management. It clearly indicates where additional effort is needed regarding the management of CCC specific components. Shorter CCC can be realized by simultaneously decreasing the inventory and receivables conversion periods,while increasing payables deferral period. The application and calculation of liquidity measures for ten firms that make CROBEX10 stock index on the ZSE, evidently showed a deterioration of their liquidity position during the analyzed period from 2010 to 2012. The values of net working capital and current ratio correspond to cash conversion cycle values; those measures together give clear insights in liquidity positions of the analyzed firms. Additionally, the calculation of CCC components revealed key determinants of their (un)favorable liquidity, thus directing further working capital management activities in the field of inventory, receivables and payables in order to shorten the CCC.

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