IMPACT OF LIQUIDITY MANAGEMENT

ON PROFITABILITY: EVIDENCE FROM UKRAINE

by

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Abstract

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Management of liquid funds is considered to be an important factor of company's growth. In this paper the effect of the company's liquidity on profitability is tested by using fixed effects regression to the panel dataset consisting of Ukrainian enterprises financial information in 2001-2010. The database covers state, closed and open joint stock companies and limited liabilities companies that operate in agriculture, production, construction, retail and finance industries. The methodology implies a regression of independent liquidity measures on Return on Assets.

The expected hypothesis of quadratic relationship between static and dynamic liquidity indicators is supported. Current Ratio and Quick Ratio have significant positive diminishing effect on profitability. It is profitable for the companies to increase liquid assets up to the turnover point, after which a further increase will have negative impact on profitability.

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LIST OF ABBREVIATIONS

CR - Current Ratio

QR - Quick Ratio

ART - Accounts Receivable Turnover

APT - Accounts Payable Turnover

IR - Inventory Turnover

CCC - Cash Conversion Cycle

ROA - Return on Assets

Chapter 1

INTRODUCTION

Financial optimization of a company is usually performed along two basic dimensions: long-term and short-term analysis. The former is aimed at capital structure optimization, which is the balance of debt and equity maximizing the value of the firm. Short term optimization is focused on liquidity management. Basically, current assets management is the major tool for capital structure optimization. Therefore, the task of the company's CFO is to conduct effective liquidity management in order to maximize the value of the company.

Effective working capital management implies a trade-off between liquidity and profitability of the company and thereby affects the financing and investment decisions. Each company should maintain a particular level of liquidity to support day-to-day operations. Overfinancing leads to additional expenses mainly reflected in the storage and maintenance costs. Also the surplus of cash, inventories and accounts receivable constitute the excess current assets and generate the cost of lost opportunities (Bolek, 2011). On the contrary underfinancing may affect revenues. Lower requirements of working capital budgeting leads to lower cost of capital and hence cash availability for the shareholders. The lack of liquidity causes the reduction of sales and profitability decrease.

A vivid example of liquidity management importance comes from comparing Wal-Mart and Kmart performance (as described in Shin and Soenen, 1998). Wal-Mart and Kmart used to be two big retailers in the USA. In 1994 they had similar capital structures. The major difference was in cash conversion cycle (CCC): for Kmart it was roughly 61 days, while for Wal-Mart CCC was at 40 days. Kmart

faced an additional $198.3 million per year in financing expenses. As a result, in 2002 Kmart declared bankruptcy whereas Wal-Mart soon became a leader in the Fast Moving Consumer Goods (FMCG) sector. Wal-Mart ultimately managed to develop effective working capital management. There is always sufficient stock of goods on the shelves and, at the same time, their warehouses are not overloaded. The case of Dell is another good example (Brigham and Houston, 2002), Dell's sales grew from just under $5 billion in 1995 to over $30 billion in 2000 because of the company's impressive success in managing the working capital.

Those examples show that liquidity management is crucial for financial position of a company. In this work I will study whether liquidity position of the company measured through corresponding ratios, such as Current Ratio, Quick Ratio, Cash Conversion Cycle and its components, has an impact on profitability for Ukrainian companies. In other words, should the company care of its liquidity while maximizing profit?

Liquidity management involves a decision over current assets composition and sources of their financing. Current assets are considered as one of the important components of total assets. A firm may be able to reduce the investment in fixed assets by leasing machinery, whereas working capital cannot be borrowed so easily. So, it is essential for the company to maintain sufficient level of liquidity. But excess of liquid assets creates additional expense. Theoretically, it is assumed that liquidity should be nonlinearly related to profitability (Mayers, 2003). Particularly, quadratic relationship is assumed. Liquidity increase contributes to profit growth up to some maximum level, after which a further increase of liquid funds creates additional expenses for the company. Still the results may differ depending on the industry the company is operating in. Manufacturing industry requires high level of liquidity while working capital needs

of companies providing services are quite low. Whether this relationship is quadratic is a testable hypothesis to be addressed in this work.

Although similar research has been done for a number of countries such as Poland (Bolek, 2011), Turkey (Uyar, 2009), or Greece (Sen and Oruc, 2009), where authors found a significant influence of liquidity on profitability, still no comprehensive analysis for the Ukrainian economy have been conducted. Ukraine is a transition country, and thus market mechanisms is not operating at full capacity. Underdeveloped institutional framework and restricted access to financial markets make it difficult for companies to maintain stable financial position. Moreover, excessive monopolization of some sectors is observed, which results in higher profit margins and lower liquidity requirements.

The research will be based on the panel data analysis of key financial ratios that determine liquidity position and profitability of the company. The data set comprises observations of balance sheet and income statement data of more than 18000 Ukrainian companies over 10 years (2001-2010). The obtained results will be useful for both practical application and theoretical considerations.

In the next section I will provide literature review. Chapter 3 will contain methodology description, Chapter 4 – data description. The empirical results will be presented in Chapter 5 followed by Conclusions.

Chapter 2

LITERATURE REVIEW

The issue of trade-off between liquidity and profitability has been discussed intensively since this it is crucially important for companies. Ross (2000) and Myers (2003) mention that excess liquidity is an expense for the company. Money tied up in current assets can be alternatively deposited or invested and generate interest income. Thus, the price of working capital overfinancing is the interest rate. In the case of liquidity deficit the company must either attract short term loan or sell some liquid assets, which is also an expense. Only the optimal level of liquidity benefits profitability. Tsapin and Stephan (2008) in their research on profit determinants found that liquidity of Ukrainian firms, measured by current ratio, has a significant positive influence on profitability. One can name the size of the company, intangible assets and liquidity among other important determinants of profitability for companies operating in the emerging markets. Therefore, liquidity has a considerable impact on firm's profitability and that is why it requires proper management.

Corporate liquidity can be examined along two basic dimensions: static and dynamic (Uyar, 2009). Static analysis is focused on traditional ratios (current and quick ratios) based on the data from the balance sheet. These ratios assess to what extent current liabilities are covered by current assets. Dynamic analysis is based on cash outflows and inflows and uses cash conversion cycle (CCC) to measure effectiveness of a company's ability to generate cash. It comprises both balance sheet and income statement data to create a measure with a time dimension (cash flow within the operating cycle of the firm). To conduct a comprehensive liquidity analysis both types of ratios are used.

There are different approaches to evaluation of liquidity profitability trade-off. Most authors use panel data regressions with profitability measure as a dependent variable and liquidity indicators as explanatory variables. Thus, Bhunia (2011), analyzing association between liquidity management and profitability of 230 Indian private sector steel companies, uses return on assets as the dependent variable and current ratio, quick ratio , absolute ratio, debt to equity ratio, interest coverage ratio, inventory turnover ratio, debtors turnover ratio, and creditors turnover ratio as explanatory variables. Traditional current ratio is positively associated with profitability. But liquid ratio and absolute ratio influence profitability negatively. Still the relationship is weak. Therefore, traditional liquidity ratios are quite poor in measuring the efficiency of the firm's liquidity management.

Debt related coefficients, debt to equity and interest coverage ratio have negative and positive relationship with return on asset correspondingly. This also is shown in the research of Gill , Biger, and Mathur (2010). Negative relationship points to the fact that the firms with high leverage have usually softer positions in the market than companies with healthy capital structure. Therefore, the former may lose in the market competition (Myers, 2003). Also, debt increase creates interest expenses, which reduce profits. Accounts receivable and inventory turnover ratios are inversely related to profitability, while creditors turnover ratio has a positive impact on ROA, since the company can hold money longer in order to finance its operations.

Uyar (2009) studies the influence of the dynamic liquidity measure, CCC, on profitability of the companies listed in the Istanbul Stock Exchange. He has found that CCC is negatively associated with profitability; the shorter the CCC, the better off the company is. Also industry analysis shows that retail industry has shorter CCC than manufacturing industries. The main reason for this is that

retail industry does not produce anything, but rather keeps ready-for-sale products, which leads to a shorter inventory turnover period. The longest CCC is observed for the textile industry. The analysis of liquidity management for Belgium firms (Filbeck and Krueger, 2005) shows that liquidity requirements are relatively the same across all companies within the industry. But liquidity measurements are not stable over time. This can be explained by macroeconomic factors influence: changes in interest rates, technological development, competition etc. Similar results were found by Weinraub and Visscher (1998), who discussed the issue of aggressive (low level of liquidity) and conservative (medium level of liquidity) working capital management policies in US firms. Their study considers 10 industry groups and looks into the difference between the influences of two policies onto profitability. The research concludes that there is high and significant negative correlation between industry assets and liability policies. All examined industries have distinctive and significantly different liquidity management policies.

The liquidity requirement of firms differs depending on the circumstances of the company. According to Pandy (2005), the main factors that influence liquidity requirements are the nature and the size of business (trading and financial firms require large investments in working capital, construction firms also have to invest substantially in working capital); manufacturing cycle; business fluctuations; credit policy of the firm; growth and expansion activities (growing industries require more working capital than those that are static), operating efficiency (optimum utilization of resources), production policy and price level changes.

Negative relationship between profitability of a firm and CCC is also revealed in Shin & Soenen (1998), Deloof (2003), and Teruel & Solano (2007). Inverse relationship between liquidity, measured as current ratio and CCC, and

profitability for Saudi companies was found in Eljelly (2004). This relationship is even more apparent for firms with high current ratios and long conversion cycles. Therefore, the company is able to increase its profitability through liquidity management improvement. To perform this task it is necessary to optimize main structural parts of CCC: inventory, accounts receivable and accounts payable turnovers. A significant influence of liquidity on profitability suggests that managers focus on more aggressive working capital management to decrease liquidity to the optimal level if it is too high, while representing the conservative policy when liquidity is low (Bolek, 2011). Sen and Oruc (2009) regress assets profitability on CCC components separately. They found that a company has to decrease inventory and accounts receivable turnover and increase accounts payable turnover in order to enlarge profitability.

Negative relationship between accounts receivables turnover and profitability can be explained by the fact that customers need more time to assess attributes of goods they purchase from firms with declining profitability (Deloof, 2003). Here the question of endogeneity arises. It is possible that profitability of the company determines its liquidity. Higher profits should lead to the enlargement of accounts receivable, because more profitable companies have more funds to lend to customers. This issue was investigated by Deloof and Jegers (1996), who investigated whether Belgian firms with a shortage of cash reduced investment in accounts receivable. However their hypothesis was not confirmed.

To sum up, various studies attempted to establish a link between liquidity management and profitability. Although various industries require different levels of liquidity in production, its impact on profitability has been estimated to be significant. Liquidity management accounts for an important direction of financial management.

Ukraine is the emerging market economy. Every year more international companies enter Ukraine, thus domestic firm have a chance to get valuable experience of financial management from them. Therefore, this research will add to the knowledge of liquidity-profitability trade-off in the transition countries and may provide a useful insight for financial managers to develop efficient liquidity management in Ukraine.

Chapter 3

METHODOLOGY

Financial management theory offers a number of models that relate working capital with profitability. They are often used to organize liquidity management of individual company. But to establish liquidity–profitability relationship for a sample of firms a more general model needs to be employed. This section will provide a methodology of this research for the sample of Ukrainian enterprises.

Liquidity and profitability indicators can be expressed through financial ratios calculated on the basis of Balance Sheet and Income Statement. To reduce estimation bias and to capture the difference between production liquidity requirements I will run the analysis by separate industry groups

The nature of data allows for the panel data analysis. The intuition behind it is that companies have specific characteristics that cannot be observed. Here we can mention such factors as management quality, corporate culture, business practice, and required labor force characteristics. Fixed effects regression captures those unobservable characteristics and thus eliminates the omitted variable bias.

According to the firm-production theory (Varian, 1992), the company's profit is a function of capital and labor used in the production: *Profit=f(K, L)*. Also we can extend this function by adding a parameter of relative performance indicators that capture basic inputs use. In the research these determinants are liquidity indicators. So, the company maximizes its profit subject to capital and labor inputs and a parameter of liquidity measures: Profit=f(K, L, Li). The resulting regression equation takes the following form:

$$Pr_{it} = \beta_0 + \beta_1 Li_{it} + \beta_2 Li^2_{it} + \beta_3 C_{it} + a_i + u_{it} \quad (1)$$

In the regression Pr_{it} stands for profitability measure, Li_{it} is a liquidity indicator, C_{it} represents control variables (Bhunia, 2011), (Deloof, 2003).

Pr_{it} is a profitability measure represented by either Return on Equity (ROE) or Return on Assets (ROA). Return on equity (ROE) is a ratio of Net Income (NI) earned in the period to the value of shareholder's equity (E) in the previous period: $ROE=NI_t/E_{t-1}$. Net Income is the money left for the company after paying all liabilities and taxes. There are three main uses for net income: dividend payments, retained earnings and reserve fund maintenance. Return on Equity shows how much money the firm earns per one unit of shareholder's equity.

Another profitability measure is Return on Assets (ROA) which is calculated as the ratio of Operating Income (EBIT) earned in the period to the value of total assets (A) in the previous period: $ROA=EBIT_t/A_{t-1}$. This indicator shows how effectively the company uses its capital, or, in other words, how productive the assets of the firm are. EBIT is the absolute measure of the company's main operating activity. Operating Income does not include interest payment and tax adjustments. It is the revenue the company's operations generate excluding investment and financial activities (unless they are among the main operations too).

I will run a regression of liquidity determinants on ROA since NI is very sensitive to the indebtedness level (Damodaran, 2007). The major difference between NI and EBIT is in the fact that NI is calculated upon earnings after interest payments; consequently, it is affected by the financing mix the firm uses to fund its activities. Therefore, Leverage ratio (LEV) is included to account for indebtedness of the firm.

Also NI is not netted out of cash as compared to EBIT. Interest on cash is included into Net Income. Therefore, ROE is a composite measure of returns

on cash and operating assets. As a result, the return for the firms with substantial cash balances will be depressed by low and riskless returns earned by cash (Damodaran, 2007).

Independent variables are major dynamic and static liquidity determinants and controlling variables. Static measures include Current Ratio (CR) and Quick Ratio (QR). Dynamic liquidity refers to Cash Conversion Cycle (CCC), Inventory Turnover (IT), Accounts Payable Turnover (APT) and Accounts Receivable Turnover (ART).

Current Ratio is calculated as relation of current assets to current liabilities: CR = Current Assets/Current Liabilities. This measure shows the company's ability to cover short-term liabilities with liquid assets. A sound financial position of the firm requires this ratio to be greater than 1one; if it is below one, the company lacks working capital to continue operations. Quick ratio is calculated as QR = (Current Assets – Inventory)/Current liabilities. This measure shows higher liquidity level than CR, as inventories, the least liquid current assets, are subtracted.

Cash Conversion Cycle measures how much time the company needs to complete the cycle of inventory acquisition, production and sales of goods. CCC begins with materials purchase and ends with receivables collection. Companies with relatively short CCC can quickly regain an access to the capital which can be used to continue operations. CCC consists of three main components, each having different effect on ROA. Those are Inventory Turnover, Accounts Receivable Turnover and Accounts Payable Turnover.

Accounts Payable Turnover shows the average length of time that the company needs to use suppliers' credit and thereby improve its liquidity position. It is

usually calculated as: APT=365/ (Cost of Goods Sold/Accounts Payable). A longer APT is better for the company.

Accounts Receivable Turnover and Inventory Turnover measure how long accounts receivable and inventories tie up the liquid funds of the company. They are measured as ART = 365/(Revenues/Accounts receivable) and IT = 365/(Cost of Goods Sold/Inventory) correspondingly. Short ART and IT decrease CCC length and thus have some positive influence on company's liquidity.

The theory assumes that static liquidity and profitability have quadratic relationship (Brigham, 2004). Therefore, I will also include squared independent static liquidity measures to reflect implied association.

As control variables I will use leverage, dummy time variable, proxy for the firm size and proxy for the exit and entry of the company into the industry. Leverage defines the capital structure of the company, indebtedness of the company. The logic for including this variable is that debt provides the company with the tax shield, which has a positive impact on profitability. I will use two measures of leverage: the share of total liabilities in the assets (LEV) and the share of long-term debt in total capital (LEV_L). Also exit and entry variables are included. When the company enters the market it will generate high profits to sustain competition. But when it leaves the business there is no need to increase or even maintain high profitability.

To account for macroeconomic indicators in the country I will include annual dummy variables. This variable will absorb macroeconomic conditions in the country as they affect both liquidity and profitability of the company.

A proxy for the company's size as well as for the capital it owns is the revenue generated. This variable is important as larger firms have better access to financial markets and have more opportunities to smooth their cash cycle and financing of operations than small firms.

An idiosyncratic error u_{it} varies with time and is assumed to be not correlated with the explanatory variables in each time period. In the research I will look into the effect of liquidity on profitability in each industry separately and across all industries in the sample.

Chapter 4

DATA DESCRIPTION

The database for the research is a panel dataset, which includes the annual financial information collected from balance sheets and income statements of Ukrainian companies. The database is a firm-level financial data set provided by National Statistics committee of Ukraine and available from KSE data center. Performance indicators reflected in the company's financial reports are taken for the 10 years (2001-2010). The total number of observations for 10 years is 47,353. On the basis of these reports financial ratios are calculated to perform the analysis. Table 1 gives the information about data characteristics.

Table 1. Descriptive statistics of the model inputs

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	47,353	0.013	0.035	-0.501	0.575
CR	47,353	1.641	1.051	0.000	5.000
QR	47,353	1.216	0.903	0.000	4.999
CCC	47353	469	166446	-1,85E+07	1,69E+07
APT	47353	2075	141547	0.000	2,77E+07
ART	47353	1839	163947	-1,85E+07	1,69E+07
IR	47353	705	59795	0.000	9,16E+06
Revenue	47,353	10.662	2.595	0.000	19.701
LEV	47,353	0.418	0.265	0.000	1.000
LEV_L	47,353	0.050	0.114	0.000	0.973

The data set is based on financial reports of state enterprises, limited liability companies (LLC), closed joint stock companies (CJSC) and open joint stock

companies (OJSC). Also the database is normalized with respect to outliers (1% of the largest and smallest values of main variables are dropped).

The dependent variable ROA is normally distributed. On average Ukrainian companies are profitable with ROA of 1.3%. This is a low profitability level compared to developed markets firms. For example, in the USA industry average ROA in 2011 was 12.21% (Damodaran, 2013). Hence, Ukrainian firms clearly have an efficiency growth potential.

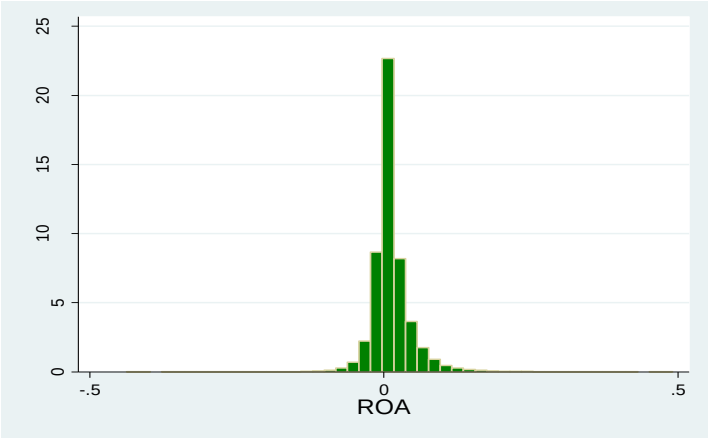

Figure 1: Distribution of dependent variable ROA

CR statistics shows that, on average, 1.64 of companies' short-term liabilities is covered by current assets. The normative value of this measure should be greater than 1. QR is 1.21 and also is considered as a high level of quick liquidity. In Europe, on average, QR stands for 0.8-0.9 (Damodaran, 2013). Distribution of Current and Quick Ratios are depicted in the Figure 2 and Figure 3.

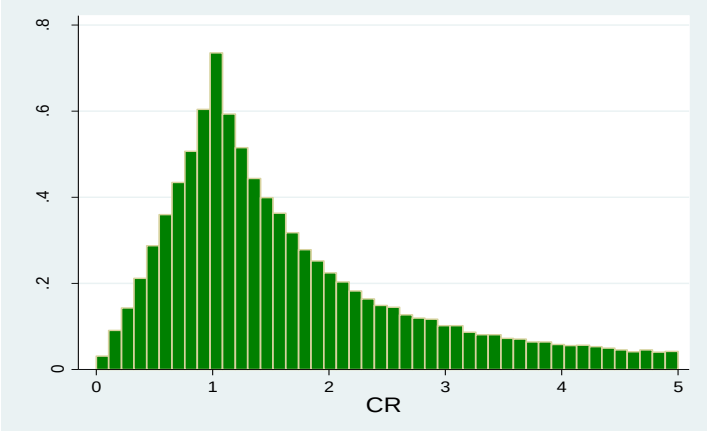

Figure 2. Distributon of CR

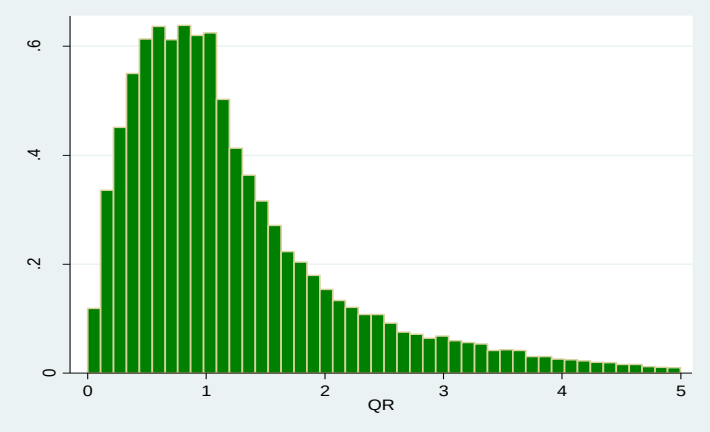

Figure 3. Distributon of QR

Dynamic liquidity indicators, calculated for the sample, are not consistent with the company operating activities. From Table 1, an average company needs around 6 years to pay its all accounts payable. From the given data, 50% of the firms collect money from their customers 1.5 times per year, turnover its inventory less than 4 times per year and pays to the suppliers less than 4 times per year (Table A2). In other words, it seems that firms operate in very inefficient way. The main reason for such inconsistency lies in the accounting issues. CCC as well as its components is a dynamic ratio, and thus in order to capture the change in these variables the analysis has to be done on monthly or quarterly basis.

Balance sheet and income statement show the situation at the particular date – the end of the year. So, ratios calculated from these reports are misleading in representation of the operation cycle of the company. The main source of the information about the cash cycle is Cash Flow Statement. But companies also report it to the National Statistics committee of Ukraine on annual basis and moreover even this information is unavailable. So, further I will concentrate only on the static liquidity ratios.

Leverage variable (LEV) shows that on average 41% of total assets account for debt. This debt includes both current and long-term liabilities, where the former stands for more than a half. The share of long-term liabilities is 5% (LEV_L), which signifies low external debt attraction. Indeed, the level of external financing is low for the Ukrainian companies because of difficulties with its attraction (due to high interest rates and restricted access to financial markets).

According to the Pecking Order Theory, the first source of finance for companies is generated in the previous periods profits, then loans from the bank and finally raising equity as a "last resort" (Myers, 2003). As external financing is low, the primary source of financing at Ukrainian firms is retained earnings.

For the analysis all companies are grouped according to KVED (Classification of Economic Activities), the operating activity they perform. I will consider companies operating in agriculture, manufacturing, construction, retail and finance, since those industries have high liquidity requirements (Deloof, 2003).

Table 2. Descriptive statistics of the model inputs by KVED

KV	Agri	Manufact	Constr	Retail	Finance	Total
ROA	0.011	0.014	0.010	0.013	0.017	0.013
CR	1.724	1.633	1.624	1.497	1.905	1.641
QR	1.087	1.237	1.540	0.888	1.895	1.216
Revenue	10.272	11.164	10.176	10.728	9.591	10.662
LEV	0.327	0.415	0.423	0.513	0.465	0.418
LEV_L	0.047	0.060	0.026	0.052	0.040	0.050

From the descriptive statistics the highest Current Ratio is observed in Finance (1.9) and Agriculture (1.72), which is explained by the nature of their these activities. Farmers keep stocks to plant crops in the spring and sell harvest in the autumn. Quick Ratio is 1.08 for agriculture, signifying high share of stocks in total assets. The highest QR of 1.89 is shown by companies operating in Finance since they produce intangible goods that do not need storage.

Table 3. Return on Assets by industry and ownership

	Ownership				
Industry	State Company	OJSC	CJSC	LLC	Total
Agriculture	0.0136	0.0056	0.0193	0.0144	0.0111
Manufsacture	0.0147	0.0106	0.0174	0.0185	0.0138
Construction	-0.0016	0.0058	0.0147	0.0163	0.0102
Retail	0.0064	0.003	0.018	0.0249	0.0131
Finance	0.0001	0.0156	0.0209	0.0136	0.0167
Total	0.0135	0.0076	0.0176	0.0176	0.0127

Table 3 gives the information about the average ROA among industries and forms of ownership. The most profitable are enterprises operating in Finance and Retail. Also CJSC and Limited Liabilities Companies have the highest ROA in the

sample. Particularly, CJST companies in Finance and Limited Liabilities Companies in Retail demonstrate the highest profitability. Construction industry, as the most severely hit by financial crises, appears to be the least profitable. Before 2009 the average ROA in the industry was 0.01. In terms of time periods, average profitability of Ukrainian enterprises grew steadily until the financial crises in late 2008 (TableA3). After the sharp drop in profitability starting from 2009 companies began to show upward growth trend.

Financial characteristics of the company also depend on its size. Larger companies have stronger positions of the market, better access to the financial resources and more diversified supplier and buyer network. For small companies access to the financial markets is restricted (due to high interest rates).

Table 4. Descriptive statistics of the model inputs by the company size

	Small	Medium	Large	Total
ROA	0.002	0.021	0.027	0.013
CR	1.650	1.680	1.621	1.641
QR	1.195	1.218	1.246	1.216
Revenue	8.977	11.337	13.094	10.662
LEV	0.354	0.435	0.512	0.418
LEV_L	0.031	0.045	0.079	0.050

Table 4 contains summary statistics of the firms according to their size. As it was expected, large companies have higher ROA (2.7%) than small (0.2%) and medium (2.1%). Also they are more leveraged because they have more possibilities to borrow. Long-term liabilities account for 7.9% of total assets for large companies, while this number is 3.1% for small companies.

In terms of liquidity, there is no significant difference in Current Ratio and Quick Ratio across firms. It means that general liquidity management policies do not differ with the size of the company.

To summarize, on average, Ukrainian companies demonstrate low levels of profitability expressed as ROA. At the same time they have rather high level of static liquidity.

Chapter 5

EMPIRICAL RESULTS

The first part of this section will be devoted to the influence of static liquidity measures (CR and QR) on Return on Assets. Two different models are run for CR and QR as key independent variables. They cannot be included into the same regression since they are highly correlated, which could cause multicollinearity issues (Table A1). In the Table 4 Model 1 estimates the impact of current ratio on profitability, and Model 2 shows how Quick Ratio influences ROA.

According to the regression results, static liquidity measures have a strong significant positive effect on profitability. Moreover, the hypothesis about the quadratic relationship is supported: an increase of CR induce ROA enlargement only to some margin point after which its effect becomes negative. If an average company increases its current ratio by 1 (either due to the increase in current assets or a decrease in current liabilities) from 1.72 to 2.72, the expected positive change of ROA at an average Ukrainian firm would be 0.0027 (0.0092-2*0.0012*2.72). Taking into consideration the fact that average ROA is 1.3%, the expected change is 20% increase in profitability. The effect is diminishing as the increase of CR from 2.72 to 3.72 results in ROA increase only by 0.0002.

Quick Ratio has approximately the same effect on profitability. If an average company increases its QR by 1, it will cause ROA to rise by 0.0025 (0.01-2*0.0017*2.2). The negligible difference in the coefficient is due to a small share of inventories in the assets. For an average enterprise inventories account only for 6%. The rest is divided between accounts receivable, cash and short-term

securities. As there is no difference in CR and QR coefficients I will concentrate on the impact of CR on ROA from now on.

Table 5. Empirical results of CR influence on ROA

	Model 1	Model 2
CR	0.009***	
	(0.001)	
CR^2	-0.001***	
	(0.000)	
QR		0.011***
		(0.001)
QR^2		-0.002***
		(0.000)
Revenue	0.006***	0.006***
	(0.000)	(0.000)
LEV	0.005***	0.005***
	(0.002)	(0.001)
LEV_L	-0.015***	-0.015***
	(0.002)	(0.002)
Entry	0.006***	0.006***
	(0.001)	(0.001)
Exit	0.000	-0.001
	(0.001)	(0.001)
Constant	-0.055***	-0.055***
	(0.002)	(0.002)
N	47,353	47,353

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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The quadratic impact of CR on ROA is shown at the Figure 2. It is profitable for an average Ukrainian company to increase CR up to 3.83. This is the maximum point after which the impact of further CR increase becomes negative. In the given sample 90% of companies maintain CR under the maximum point. And particularly a half of the sample can double its current ratio and thus improve profitability. Only 5% of the firms have exceeded the maximum point. So there is definitely a room for profitability improvement through a static liquidity increase.

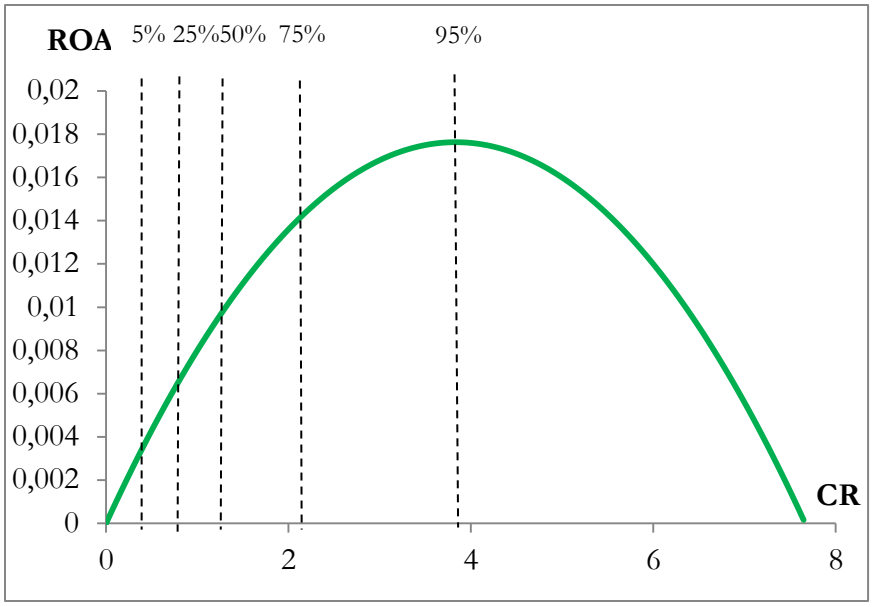

Figure 4. Impact of CR on ROA[1]

Other variables also have a significant influence on ROA. Companies that enter the market, on average, have 0.0062 higher ROA that those which already operate in the industry. No significant effect of a firm exit on ROA was found. Leverage, measured as a share of all liabilities in the total assets, has a positive impact on profitability. Leverage creates tax shield, savings from which can cover interest

[1] Percentiles of firms distribution are shown.

expenses. Also accounts payable are considered as short-term credit to the producers. On the contrary, an increase of long term liabilities (LEV_L) negatively affects profits. Long-term debt generates considerable interest payments, while short-term liabilities contain mostly accounts payable.

Table 6. Impact of CR on ROA by industry

	Agriculture	Manuf	Construction	Retail	Finance
CR	0.009***	0.010***	0.013***	0.009***	-0,001
	(0.001)	(0.001)	(0.003)	(0.002)	(0.005)
CR^2	-0.001***	-0.002***	-0.002***	-0.001**	-0,002
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Revenue	0.006***	0.006***	0.009***	0.006***	0.005***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
LEV	0.008***	0.008***	0.011**	0.001	-0.016**
	(0.003)	(0.002)	(0.005)	(0.004)	(0.008)
LEV_L	-0.019***	-0.017***	-0.024***	-0.003	-0.027*
	(0.005)	(0.003)	(0.009)	(0.005)	(0.016)
Entry	0.006***	0.006***	0.005**	0.010***	0
	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)
Exit	0.003**	0.003***	-0,001	-0.003**	-0,005
	(0.001)	(0.001)	(0.002)	(0.001)	(0.005)
Constant	-0.063***	-0.065***	-0.087***	-0.053***	-0,002
	(0.004)	(0.003)	(0.006)	(0.005)	(0.009)
N	10,371	18,831	6,451	9,030	2,670

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Liquidity requirements differ among industries. To address this, separate regressions are run for each industry. The highest dependence of ROA on CR is observed in Retail – an increase of 1 above the average CR will result in ROA growth of 0.004, which is 30% increase. Companies, operating in this industry,

need to have enough assets to fulfill consumer's demand. Coefficient is also high for agricultural companies, for which the expected change in ROA is 0.003.

Table 7. Impact of CR on ROA by ownership

	State company	OJSC	CJSC	LLC
CR	0.006***	0.010***	0.009***	0.005
	(0.002)	(0.001)	(0.002)	(0.004)
CR^2	-0.001**	-0.001***	-0.001***	-0,001
	(0.000)	(0.000)	(0.000)	(0.001)
Revenue	0.008***	0.005***	0.006***	0.006***
	(0.001)	(0.000)	(0.000)	(0.000)
LEV	0.001	0.006***	0.005*	-0.005
	(0.005)	(0.002)	(0.003)	(0.006)
LEV_L	-0.044***	-0.015***	-0.014***	-0,011
	(0.013)	(0.003)	(0.004)	(0.008)
Entry	0,002	0.006***	0.008***	0.009***
	(0.003)	(0.002)	(0.001)	(0.002)
Exit	0.001	0.001	-0.001	0.003
	(0.003)	(0.001)	(0.001)	(0.003)
Constant	-0.082***	-0.058***	-0.056***	-0.063***
	(0.009)	(0.002)	(0.004)	(0.009)
N	3,197	22,299	15,810	5,180

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Liquidity and profitability relationship varies among different forms of ownership. Thus the highest impact of CR on ROA is observed in OJSC and CJSC – an increase of CR by 1 in both groups will increase ROA by 0.006 in both groups (30% increase). Joint stock companies' main goal is to increase the value of a firm that is why they conduct effective financial management.

In the state companies the same CR change will result in 15% ROA increase. The impact is weaker since state companies are often subsidized by the government. Usually state companies provide important services for the economy and the government comes to support them in case of emergency.

The size of the firm also determines liquidity requirement of the companies. Ukrainian Tax Code divides companies by the revenue size into small (<UAH 70 mln), large (>UAH100 mln) and medium (all in between). The regression estimation results with respect to the firm size are shown in Table 7.

The effect of CR increase on ROA is much stronger for small enterprises than for large. Taking into account that average ROA for small enterprises is 0.2% and for large 2.7%, the estimated impact of CR growth by 1 is 0,019 (55%) and 0.027 (24%) rise correspondingly. It is more important for small business to generate enough liquidity to meet its obligations than it is for large firms, since the latter have more possibilities to attract external financing. Large companies usually have more developed customer's network that provides stable demand and revenue growth. It is easier for them to cope with liquid funds deficit than for small enterprises.

Another group of liquidity measures are dynamic ratios: CCC and its components. They are used as explanatory variables in many similar studies ((Gill,2010), (Uyar, 2009), (Shin and Soenen, 1998)). It is expected that CCC is a good determinant of management of liquid funds at the enterprise as it shows how quick the firm convert resources into income from consumers.

Table 8. Impact of CR on ROA by the size of the firm

	Small	Medium	Large
CR	0.005***	0.008	0.013***
	(0.001)	(0.006)	(0.002)
CR^2	-0.001***	-0.001	-0.002***
	(0.000)	(0.001)	(0.000)
Revenue	0.004***	0.012*	0.013***
	(0.000)	(0.007)	(0.001)
LEV	0.007***	0.027***	-0.006**
	(0.002)	(0.010)	(0.003)
LEV_L	-0.003	-0.004	-0.018***
	(0.004)	(0.015)	(0.003)
Entry	0.002**	0.018***	0.012***
	(0.001)	(0.004)	(0.001)
Exit	-0.002**	0.002	0.000
	(0.001)	(0.006)	(0.002)
Constant	-0.041***	-0.122	-0.140***
	(0.002)	(0.078)	(0.006)
N	26,681	3,013	17,659

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Although dynamic liquidity is widely used as an explanatory variable they cannot be used in this research since there is no available information to calculate them in a proper way. From the given data calculated CCC as well as its components are not economically significant. Average values for these variables are too high – more than a year. For comparison, in Turkey CCC constitutes 35 days for Retail, 99 for Food industry (Uyar, 2009). For Belgian non-financial firms CCC stands for 44 day, APT for 56, ART for 54 and IR for 47 (Deloof, 2003).

CCC and its components are dynamic variables, and therefore they should account for the changes in accounts receivable, accounts payable and inventories turnover during the year. In order to get cash cycle characteristics needed for this study it is essential to have average values of the variables during the year. Balance sheet provides only absolute change for the whole year. So methodologically, it would be incorrect to use in the analysis dynamic ratios calculated on the base of static reports.

Chapter 6

CONCLUSION

The purpose of this paper is to investigate the relationship between liquidity management and profitability of enterprises in the Ukrainian market. The research was based on the panel dataset consisting of company's financial reporting information in 2001-2010. For the analysis industries with high liquidity requirements were chosen (agriculture, production, construction, retail and finance).

All liquidity measures can be divided into static (Current Ratio and Quick Ratio) and dynamic (Cash Conversion Cycle, Accounts Payable, Accounts Receivable and Inventory Turnover). This research indicates that static liquidity has a significant positive diminishing effect on profitability. The hypothesis of quadratic relationship between Current Ratio, Quick Ratio and ROA is confirmed. For an average Ukrainian enterprise it is profitable to increase Current Ratio up to 3.83, after which the impact turns to negative. The effect is approximately the same across industries with the highest coefficients in Retail and Agriculture. In terms of ownership, liquidity has a high impact on ROA for closed and open joint stock companies compared to the state companies. Also marginal increase in profitability due to Current Ratio growth is higher for the small entities than for the large ones.

Although dynamic liquidity parameters are intensively used as independent variables by many researchers, they cannot be included into the regression as explanatory variables. Calculation of dynamic ratios on the base of Balance sheet and Income statement invalidate their usage, since these reports are static in

nature. For the proper CCC calculation Cash Flow Statement is needed, which is not reportable in Ukraine.

Overall, liquidity management is an important component of financial management. The paper has provided justification that static liquidity is a significant determinant of profitability in Ukraine. Therefore, careful consideration and planning of liquidity management is one of the ways to improve efficiency of Ukrainian enterprises.

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APPENDIX

Table A1. Correlations of main variables

	ROA	CR	QR	CCC	APT	ART	IR	Rev	LEV	LEV_L
ROA	1.00									
CR	0.12	1.00								
QR	0.14	0.84	1.00							
CCC	-0.02	-0.01	-0.01	1.00						
APT	-0.05	0.01	0.01	-0.20	1.00					
ART	-0.02	-0.01	-0.01	0.82	0.06	1.00				
IR	-0.04	-0.02	-0.01	0.43	0.22	0.01	1.00			
Revenue	0.41	0.04	0.04	-0.05	-0.11	-0.04	-0.12	1.00		
LEV	0.06	-0.50	-0.40	-0.01	-0.03	-0.00	-0.02	0.27	1.00	
LEV_L	0.06	0.03	0.04	-0.01	-0.01	-0.01	-0.01	0.19	0.37	1.00

Table A2. Quantile distribution of CCC components turnover times

Quantile	10%	25%	50%	75%	95%	99%
CCC	-167.24	46.26	171.63	469.71	2727.56	23542.5
APT	0	19.7	68.27	178.82	957.6	6411.83
ART	-67.67	25.59	136.17	415.35	2876.31	24491.2
IR	0	3.6	48.96	171.14	677.94	2188.84
# of IR	0.41	1.29	4.05	12.85	154.82	2179.88
# of ART	-0.05	0.36	1.48	4.43	33.59	293.87
# of APT	0.18	1.35	3.88	10.16	66.22	508.37

Table A3. Descriptive statistics of the model inputs by year

Year	Agriculture	Manuf	Construction	Retail	Finance	Total
2001	0.002	0.008	0.005	0.006	0.025	0.006
2002	0.003	0.005	0.002	0.005	0.015	0.004
2003	0.006	0.009	0.007	0.010	0.019	0.009
2004	0.011	0.013	0.012	0.014	0.018	0.013
2005	0.012	0.014	0.011	0.014	0.026	0.013
2006	0.013	0.018	0.017	0.018	0.015	0.017
2007	0.021	0.022	0.019	0.023	0.021	0.022
2008	0.024	0.023	0.020	0.028	0.018	0.023
2009	0.017	0.019	0.009	0.019	0.009	0.017
2010	0.020	0.021	0.010	0.018	0.010	0.018
Total	0.011	0.014	0.010	0.013	0.017	0.013