A RESEARCH PAPER ON DETERMINANTS OF CORPORATE LIQUIDITY IN INDIA

Rohit Bansal*

Vipan Bansal**

_____

ABSTRACT:

The focus of this study is to identify the determinants of corporate liquidity for a sample of 100 firms in the Indian market. The study uses panel data pertaining to two sectors viz., textile and chemical sector undertakings over the period 1999-2008 and employs the backward stepwise regression and correlation. The results indicate that the variables like cash flow, debt ratio, and free cash flow are significant determinants of corporate liquidity for all the sectors under consideration. In addition it has been observed that Size of firm has no impact on liquidity.

Keywords: Size of firm; Panel data; Liquidity; Backward stepwise Multiple regression, correlation

* Lecturer in Baba Farid College of Management and Technology, Deon, Bathinda India.

** Assistant Professor in Lovely Professional University, Phagwara, India.

INTRODUCTION:

It is well known fact that nearly all firms hold cash reserves to fulfill future needs. If capital markets were perfect, a firm would not have needs to hold substantial cash reserves. When firms face a cash shortage, they can find the needed funds in the market at a cost which is function of the anticipated risk and profitability of their projects. Due to market imperfections a firm needs to manage cash efficiently. On one hand, a firm with cash holdings will not have to forgo projects with positive net present value because of market imperfections. On the other hand, from a corporate governance point of view, large cash holdings will remain ideal in the firm and affect the firm's profitability. In this project, we study the liquidity determinants, using Prowess and data stream for 100 Indian firms from chemical and textile industries. The data has been taken for 10 years from 1999 to 2008. By using this model we can estimate the relationship between liquidity and various determinants for liquidity decisions.

Liquidity Vs Profitability: Risk- Return trade off:

The firm would make just enough investment in current asset if it were possible to estimate working capital needs exactly. Under perfect certainty, current assets holdings would be a minimum level. Large investments in current assets would mean a low rate of return on investments for the firm, as excess investment in current assets will not earn enough return. A small investment in current assets on the other hand, would mean interrupted production and sales, because of inability to pay to creditors in time due to restriction policy. It is not possible to estimate liquidity needs accurately. The firm must decide the level of liquidity to be carried. Given the firm's technology and production cycle, sales and demand conditions, operating efficiency etc., its liquidity holdings will depend upon its working capital policy. It may follow a conservative or aggressive policy. The policy involves risk-return trade-offs. A conservative means low return and risk, while an aggressive policy produces higher risk and return.

The two important aims of the optimum liquidity position of the firm are:-

To ensure solvency i.e. the firms continuous ability to meet maturing obligation, firms should be liquid, which means larger current assets, it will have no difficulty in paying claims of creditors

when they become due. Thus, a liquid firm has less risk of insolvency, that is, it will hardly experience cash shortage or a stock out situation. However there is cost associated with maintaining a sound liquidity position. A considerable amount of the firms' funds will be tied up in current assets and to the extent this investment is idle, the firm's profitability will suffer. To have higher profitability, the firm may sacrifice solvency and maintain a relatively low level of current assets. When the firm does so, its profitability will improve as fewer funds are tied up in idle current asset, but its solvency will be threatened and would be exposed to greater risk of cash shortage and stock outs. So, it is necessary to hold optimum liquidity which will increase profitability as well as solvency. In determining the optimum level, they should balance the profitability solvency tangle by minimizing the total costs-cost of liquidity and cost of illiquidity. It is indicated in the figure that with the level of current asset the cost of liquidity increases while the cost of illiquidity decreases and vice versa. The firm should maintain the current assets at that level where the sum of these cost should be minimized.

OBJECTIVE OF THE STUDY:

Holding liquidity position in a firm is necessary for a firm. The study has been undertaken with the main objective to identifying the determinants of liquidity. Specifically, it aims at studying the impact of determinants like size, debt ratio, cash flow, FCF, Return spread, VARCFC on the liquidity of selected companies.

REVIEW OF LITERATURE:

It is necessary to review the literature of previous conducted studies to make the base for doing study. The following studies have been reviewed to complete this project work.

Sookim, Mauer and Sherman (1999) have conducted study on the determinants of corporate liquidity. This study has taken 915 US industrial firms and during 20 years period from 1975 to 1994.The study has used Panel data model to conduct the analysis of the model. The study has taken firm size, growth opportunities, cash flow uncertainty, return spread, average cash cycle, cash cycle variability, debt ratio, cash flow, bankruptcy predictor as independent variable and

applied multiple regression. The model predicts that the optimal liquidity investments is increasing in the cost of external financing, the variance of future cash flows and return on future investment opportunities, while it is decreasing in the return differential between physical assets and liquid assets.

Dittmar et al. (2002) this study has been conducted to analyze the relation between the cash holdings and shareholder protection system in 45 countries. They found evidences that in the countries with lower shareholder protection and easier access to the capital markets, the cash holdings are higher.

Harford and Pinkowitz (2002) this study has find a negative Correlation between the likelihood of becoming a target of a takeover and the cash balances levels. This counterintuitive result can be explained by enhanced ability of a target to defend itself (because of cash reserves....) against the bidder, by repurchasing its stock, acquiring a competitor of the bidder.

Koshio(2003) The study has been conducted to analyze the determinants of corporate cash holdings in Brazil. Linear regression on panel data, with cash holdings as dependent variable and size, operational profits, standard deviation of operational profits, receivables, inventories, suppliers, total debt, short term and long term corporate bonds are taken as independent variables. Preliminary tests were conducted using data obtained from econometric. It collected the quarterly accounting data for the third quarter 1994 to the fourth quarter 2002. It excluded the firms in insurance and finance industry from the sample, resulting in panel data formed by the cross-sectional data for 396 companies and time series of 34 quarters. It has applied the OLS, GLS, Fixed Effects and Random Effects regression methods for this preliminary analysis.

Bruinshoofd and Kool (2004) The study has been conducted on the Dutch corporate liquidity management in general and long term and short term liquidity targets of firms. In this paper, Dutch corporate liquidity management is investigated. Error correction model is used which is applied on firm level data for the period 1986-1997 and contain 453 firms. Long run liquidity target of the firms are confirmed in this study. They also find that changes in liquidity holdings are driven by short run shocks as well as the urge to convergence is higher when firm specific information in the target is included. This study uses size, net working capital, near liquidity total

debt, short debt, investment, return on assets, earning uncertainty, average interest rates as independent variable.

Cuderc(2005) This study has been conducted to investigates the determinants and consequences of the corporate cash holdings this study use firm level data of 4515 firms in Canada, France, Germany, great Britain and use USA over the period 1989-2002. This study used the panel data estimation to conduct study. This study shows that financial determinants influence the corporate cash holdings. Main focus is made on the consequences of excessive cash holdings. To do so, they implement a bivariate probit model to take into account the fact that cash balances levels and the future performance of these firms are probably jointly determined.

RESEARCH METHODOLOGY:

The sample consists of data on 100 industrial firms of India from chemicals and textile industry during 10 years period from 1999 to 2008. The sample consists of 50 firms from chemical industry and 50 firms from textile industry. The study does not require complete data for all 10 years because such a requirement may introduce a survivorship bias. However there are few firms in the sample that do not have complete data. Multiple regressions have been used in this study. To get better results backward stepwise integration method has been used. It is based on secondary data. Prowess of CMIE has been used foe the secondary data.

ANALYSIS OF DATA:

Backward stepwise regression

Keeping into consideration the objectives of the study, backward stepwise regression has been used. Backward stepwise regression is used to find the improvement in the residual sum of squares for each of these resulting models relative to the starting model. It starts with all explanatory variables included the model. It then removes the least significant explanatory variable, that is, the one with the highest p-value, at each step, until all variables have been added. By scrutinizing the overall fit of the model variables will be automatically removed until

the optimum model is found. Backward stepwise regression has been used for each year from 1998-99 to 2007-08. Since in certain years no definite conclusions could be drawn regarding the determinants of corporate liquidity, so **panel data** has been used for backward stepwise regression. A data set containing observations on multiple phenomena observed over multiple time periods is called panel data. Panel Data aggregates all the individuals, and analyzes them in a period of time. Alternatively, the second dimension of data may be some entity other than time. Data sets with more than two dimensions are typically called multidimensional panel data. Panel data analysis is an increasingly popular form of longitudinal data analysis among social and behavioral science researchers. A panel is a cross-section or group of variables who are surveyed periodically over a given time span.

Application of Panel data

Panel data analysis is a method of studying a particular subject within multiple sites, periodically observed over a defined time frame. With repeated observations of enough cross-sections, panel analysis permits the researcher to study the dynamics of change with short time series. The combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions. Panel analysis can provide a rich and powerful study of a set of variables, if one is willing to consider both the space and time dimension of the data. Panel data has used to analyze the effect of determinants on the corporate liquidity. Before running regression analysis it was essential to assess the validity of the regression equation which is to be applied to find out the impact of various determinants on liquidity. For each firm in the sample and for each year during sample period, we measure liquidity as the ratio of cash plus marketable securities to the book value of total assets. We relate LIQRAT with following proxies for the hypothesized determinants of liquidity.

Independent variables

Firm size: Firm size is measured by revenue of the firms. Firm size can also be measured by the market value of firm's assets plus the difference between the market and book values of equity. Revenue is used as a measure of firm size in this project work.

Cash Flow Uncertainty: Two variables are used to measure cash flow uncertainty. The first is the variability of operating cash flow (VARCF), measured as the difference in earnings before interest, depreciation and taxed minus non operating income

Variability of free cash flow (VARFCF): variability of free cash flow is measured as the difference in earnings before interest, depreciation and taxed minus non operating income and capital expenditure

Return Spread: The attractiveness of investment in physical assets vs. liquid assets is measured by the difference between the return on the firm's assets and return on Treasury bills (RSPREAD).The return on assets is measured by the ratio of earnings before interest depreciation and taxes minus non operating income to the book value of assets. Treasury bill rate are taken from RBI site and Google.

Average cash cycle: The Average cash conversion cycle (CASHCC) is measured by the sum of average inventory age and receivable collection period minus the average payment period for accounts payable.

Debt Ratio: The debt ratio is measured by the ratio of total debt (long –term debt plus debt in current liabilities) to the book value of assets.

Cash Flow: The study use cash flow measures as the ratio of earnings before interest, depreciation and taxes to sale.

Free Cash flow (FCF): FCF is find out by Ratio of earnings before interest, depreciation and taxes minus capital expenditure to sales (FCF).

HYPOTHESIS DEVELOPMENT:

The following hypotheses have been set for the purpose of running regression analysis:-

H1: The size of a firm has a negative impact on its liquidity

H2: The Cash Flow Uncertainty has a positive impact on its liquidity

H3: The Variability of free cash flow has a positive impact on its liquidity.

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Incuded in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage, India as well as in Cabell's Directories of Publishing Opportunities, U.S.A.
International Journal of Marketing and Technology
http://www.ijmra.us
109

H4: The RSPREAD has a negative impact on its liquidity.

H5: The CASHCC has a negative impact on its liquidity.

H6: The DEBTRAT has a negative impact on its liquidity.

H7: The cash flow has a negative impact on its liquidity

H8: The FCF has a negative impact on its liquidity.

ANALYSIS AND DISCUSSION:

Backward Stepwise Regression Model

Backward stepwise regression has been used to identify the determinants of corporate liquidity. The purpose of backward step-wise regression is to select, from a large number of predictor variable a small subset of variables that account for most of the variation in the dependent variable. The regression equation run to see the impact of various specific determinants in liquidity for the period of study can be framed as follow

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8$$

Where

Y = Liquidity

X1 = Size of firm

X2 = CF uncertainty

X3 = VARCFC

X4 = Return Spread

X5 = Average CC

X6 = Debt Ratio

X7 = cash flow

X8 = FCF

β = Slope of the independent variables while β0 is a constant or the value of y when all value of x are zero.

Backward step-wise regression was applied and variables are eliminated from the model in an iterative process. The fit of model is tested after the elimination of each variable to ensure that the model still adequately fit the data. The analysis is complete when no more variables could be eliminated from model

Assessing the validity of the model

It was necessary to check the existence of multicollinearity among the explanatory independent variable before proceeding to the result of regression analysis. Multicollinearity is a situation where two or more independent variables are highly correlated and can have damaging effects on the result of multiple regressions. **Backward regression using panel data**

Table: 1 Coefficient Correlations Matrix (10 years)								
Model correlation	FCF	Size	RETURN_SPREAD	Debt ratio	VARFCF	CF uncertainty	AVERAGE_CC	Cash flow
FCF	1.000	-.087	-.019	.000	-.420	.349	-.001	-1.000
Size	-.087	1.000	.049	-.083	.309	-.669	-.037	.087
RETURN_SPREAD	-.019	.049	1.000	.243	-.044	-.057	.262	.018
Debt ratio	.000	-.083	.243	1.000	-.005	.066	.940	.001
VARFCF	-.420	.309	-.044	-.005	1.000	-.770	-.016	.420
CF uncertainty	.349	-.669	-.057	.066	-.770	1.000	.022	-.349
AVERAGE_CC	-.001	-.037	.262	.940	-.016	.022	1.000	.001
Cash flow	**-1.000**	.087	.018	.001	.420	-.349	.001	1.000

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Inclued in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage, India as well as in Cabell's Directories of Publishing Opportunities, U.S.A.
International Journal of Marketing and Technology
http://www.ijmra.us

111

If the pair-wise or zero order correlation coefficient between two regression is high say, in excess of 0.8, then multicollinearity is a serious problem [Gujrati, 2006,P. 359]. The solution is to drop that variable. The correlation was computed to examine the correlation between the dependent and independent variables. A correlation matrix of all variable along with dependent variable was constructed for each year from 1999 to 2008. A combined correlation matrix was also constructed taking whole data for 10 years together variable and thereafter run regression analysis with rest of variables.

The result of correlation as shown in table 1 reveal that problem of high value of r appear to be in case of CF and FCF(-1.000) at 5% level of significance. The problem of multicollinearity exists among these explanatory variables to cope up problem. So it was decided to drop FCF.

Table 2 shows that 3 cross section regression equations have been framed for the final analysis. The result of regression analysis (first regression equation) shows the value of R square (.049). It explains that 4.9% variations in the model is explained by all independent variables jointly. The adjusted R square (.037) states that only 3.7% variables in disclosure score are explained by variation in independent variables. The cash flow (positive at 1% significance) and FCF (at 1% level of significance) influence the liquidity. The value of F (4.123) is significant at 5% level of significance. Afterwards, variables are removed one by one to see the impact of independent variables on liquidity to get the best fit model. The regression equation 2 has been chosen for the final analysis. The selected regression equation in table 2 approximates the value of R square (.048) explain hereby that 4.8% variation in liquidity is explained by attributes namely size, CF uncertainty, VARCFC, Return spread, cash flow, FCF and debt ratio. The VARFCF, return spread and cash flow (positive at 1% level of significance), CF uncertainty and FCF (negative at 5% level of significance). The value of F (.189) is significant at 5% level of significance.

Table 2 Backward stepwise Regression analyses (combined 10 years)

Model / Variables	1	2	3
(constant)	.710 (16.330)	.706 (16.587	-702 (16.546)

Size	.002* (3.415)	.002 (3.403)	.002 (3.272)
CF uncertainty	-.010** (-2.099)	-.010** (-2.091)	-.009** (-1.956)
VARFCF	.011* (2.610)	.011* (2.605)	.011* (2.641)
RETURN SPREAD	.001** (2.215)	.001* (2.415)	.001* (2.403)
AVERAGE_CC	-3.272E-7 (-.435)	×	×
Debt Ratio	-.016** (-.798)	-.008** (-1.143)	×
Cash Flow	.585 (1.726)	.585* (1.728)	.585* (1.726)
FCF	-.582 (-1.717)	-5.82* (-1.719)	-.581* (-1.716)
R^2	.049	.048	.046
Adjusted R square	.037	.038	.038
F	4.123	.189**	1.307**
DW	1.793	1.793	1.793

Note *,**,*** significant at 1%, 5% & 10% respectively.

The results indicate that cash flow, FCF, Debt ratio, return spread, VARCFC and CF uncertainty have impact on the corporate liquidity at a given level of significance. In table 22 complete data of 10 years is taken together. The results shown in table 22 are better as compared to the results shown by taking data for individual years.

Table 3 Testing of Hypotheses

Hypotheses	Regression analysis	Significance
Size (Negative)	Backward step wise regression	1% (Accepted) (Positive association)
CF uncertainty (positive)	Backward step wise regression	5% (Accepted) (Negative association)
VARCFC (positive)	Backward step wise regression	1% (Accepted) (Positive association)
Return spread (Negative)	Backward step wise regression	1% (Accepted) (Positive association)
Cash Flow (Negative)	Backward step wise regression	1% (Accepted) (Positive association)

FINDINGS AND CONCLUSION:

The study has been undertaken to analyze the impact of various variables on the liquidity. The major findings of the study are divided into two parts i.e. Effect of variables on liquidity and the association of liquidity and determinants of liquidity.

Effect of variables on liquidity

1.   The variables like cash flow, debt ratio, and free cash flow have more impact on liquidity. These variables influence liquidity more as compare to other variables.

2.   The variable size has no impact on liquidity.

Association between liquidity and determinants of liquidity

There is different association between liquidity and determinants of liquidity in each year. The association between variables and liquidity is shown in table 24. The association between

liquidity and determinants of liquidity of combined data by taking ten years together is determined. The results of the study are as follows:

1.   The variables like Debt ratio, FCF, Average cash flow and cash flow uncertainty are showing negative relation with the liquidity which means with the increase of these variables liquidity will decrease and with the decrease of these variables liquidity will increase.

2.   The variables like size, VARFCF, return spread and cash flow are showing positive relationship with liquidity which means with the increase in these variables liquidity will also increase.

3.   Only in two years size is showing negative relation as set in hypotheses. Rest of the years is showing positive association.

4.   CF uncertainty shows positive relationship in five years as set in hypotheses. Rests of the year are showing negative association.

5.   VARCFC shows positive relationship in five years as set in hypotheses. Rests of the year are showing negative association.

6.   Return spread shows negative relation in three years as set in hypotheses. Rests of the year are showing Positive association.

7.   Average CC shows negative relation in two years as set in hypotheses. Rests of the year are showing Positive association.

8.   Debt ratio shows negative relation in all years as set in hypotheses except one year.

9.   Cash flow shows negative relationship in two years as set in hypotheses. Rests of the year are showing positive association.

10.   FCF shows negative relationship in six years as set in hypotheses. Rests of the year are showing positive association

Table 4 testing of hypothesis

Association with Disclosure score

Year \ Hypotheses	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	**Panel data**
Size	+	+	+	_	+	+	+	+	_	+	+

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Incluided in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage, India as well as in Cabell's Directories of Publishing Opportunities, U.S.A.

International Journal of Marketing and Technology
http://www.ijmra.us

115

(Negative)											
CF uncertainty (positive)	+	_	_	_	+	_	+	+	+	_	_
VARCFC (positive)	+	+	+	+	_	_	_	_	+	_	+
Return spread (Negative)	+	_	+	_	+	+	_	+	+	+	+
Average CC(Negative	_	_	+	+	+	+	+	+	+	+	_
Debt Ratio (Negative)	_	_	_	+	_	_	_	_	_	_	_
Cash Flow (Negative)	_			_	+	+		+	+	+	+
FCF (Negative)	+	+	_	+	_	_	+	_	_	_	_

CONCLUSION:

Many factors affect the liquidity requirements of a firm. Some factors have more impact as compared to other factors. The characteristics of industry also affects requirement of liquidity. The study concludes that liquidity requirement are increased on the increase of VARFCF, return spread and cash flow but decreased on the decrease of debt ratio, average cash flow and cash flow uncertainty.

The study concludes that FCF, debt ratio, cash flow, return spread, VARCFC and CF uncertainty have impact on the corporate liquidity of Indian firm. Size of firm did not impact on corporate liquidity.

REFRENCES:

- Arellano, M. and S. R. Bond, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, vol. 58, 1991, pp. 277-297.

- S Baltagi, B. H. and C. Kao, "Nonstationary Panels, Cointegration in Panels and Dynamic Panels: A Survey," In: *Advances in Econometrics, Volume 15, Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, edited by B. D. Baltagi, Elsevier Science, 2000, pp. 7-51.

- S Brealey, A. and S. Myers, *Principles of Corporate Finance*, 5th edition, New York, McGraw Hill Book Co., 1996.

- S Calomiris, C. W., Himmelberg, C. P. and P. Wachtel, "Commercial Paper, Corporate Finance and the Business Cycle: A Microeconomic Perspective," *National Bureau of Economic Research Working Paper Series*, no. 4848, 1994.

- S Carr, J. and M. R. Darby, "The Role of Money Supply Shocks in the Short-Run Demand for Money," *Journal of Monetary Economics*, vol. 8, no. 2, 1981, pp. 183-199.

- S Chirinko, R. S. and H. Schaller, "Why Does Liquidity Matter in Investment Equations," *Journal of Money, Credit, and Banking*, vol. 27, no. 2, 1995, pp. 527-548.

- S Diamond, D. W., "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, 1984, pp. 393-414.

- S Diamond, D. W., "Debt Maturity Structure and Liquidity Risk," *Quarterly Journal of Economics*, vol. 56, 1991a, pp. 709-737.

- S Diamond, D. W., "Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt," *Journal of Political Economy*, vol. 99, 1991b, pp. 689-721.

- Freixas, X. and J.-C. Rochet, *The Microeconomics of Banking*, The MIT Press, Cambridge, Massachusetts, 1997.

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage, India as well as in Cabell's Directories of Publishing Opportunities, U.S.A.
International Journal of Marketing and Technology
http://www.ijmra.us

117