



Cash Estimation Model

Coursework : BUAN 5270 Analytics For Financial Decisions and Market Insights

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Understanding the Importance of Sufficient Cash

Sufficient cash flow empowers a firm by fostering operational flexibility, seizing investment opportunities, reducing debt burdens, and fueling innovation initiatives.

Impact of Cash Flow	Sufficient Cash Flow	Low Cash Flow
Operational flexibility	✓	✗
Investment Opportunity	✓	✗
Innovation	✓	✗
Debt Reduction	✓	✗

Proposed Cash Estimation Models



Model 1 for cash estimation:


Cash = Intercept + Firm size + NetWorkingCapital + Capital Expenditures + IndustrySigma + R&D +Dividend Dummy + SalesGrowth + CashfromOperations + FirmAge + TaxBurdenonForeignIncome+ YearDummies +IndustryDummies + Managerial Ability + Error

Model 2 for cash estimation:

Cash = Intercept + Firm size + NetWorkingCapital + Capital Expenditures + IndustrySigma + R&D +Dividend Dummy + SalesGrowth + CashfromOperations + FirmAge + TaxBurdenonForeignIncome+ YearDummies +IndustryDummies + Managerial Ability + Leverage + MarketToBook + InterestRates + Error

Data Overview and Data Processing

Data Source : WRDS Compustat - Fundamentals Annual for North America (1960-2022)



<u>PROCESS</u>	<u>STEPS FOLLOWED</u>
Time Period	1975 - 2022
Filter Criteria	<i>Positive Total Assets Positive Net Sales Excluded firms with year end stock price < \$2 Excluded Utility and Financial firms Excluded missing common Shareholders equity</i>
Data Cleaning	<i>Sort by relevant variables Remove duplicates Handling missing values</i>
Data Transformation	<i>'gvkey' Numeric Conversion datadate' Year Extraction 'sic' Digits Extraction</i>
Merging	<i>Identified unique key gvkey, nyear across variables</i>
Winsorization	<i>Identify and address outliers Apply winsorization at 1% and 99% to mitigate outlier impact.</i>

Insights into Descriptive Statistics on Merge Dataset

Table 1:

Descriptive statistics for the cash estimation model variables:

Variable	N	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Cash	93,289	0.352	1.280	0.023	0.080	0.241
Firm Size	93,289	6.054	2.155	4.483	5.967	7.533
Net Working Capital	93,289	0.067	0.498	-0.031	0.083	0.226
Capital Expenditures	93,289	0.077	0.086	0.026	0.050	0.093
Industry Sigma	93,289	20.488	42.486	1.677	5.367	16.580
Research & Development	93,289	0.039	0.090	0.000	0.000	0.038
Dividend Dummy	93,289	0.393	0.393	0.000	0.000	1.000
Sales Growth	93,289	0.257	0.852	-0.008	0.092	0.256
Cash from Operations	93,289	0.023	0.552	0.026	0.087	0.147
Firm Age	93,289	2.558	0.902	1.946	2.639	3.296
Tax Burden on Foreign Income	93,289	0.169	0.550	0.000	0.000	0.000
Leverage	93,289	0.320	0.432	0.128	0.260	0.408
Managerial Ability	93,289	0.537	0.286	0.300	0.500	0.800
Interest Rates	93,289	1.026	17.045	0.003	0.020	0.126
Market To Book	93,289	1.547	3.634	0.532	0.940	1.691

Correlation Matrix

Variable	Cash	Net Working Capital	Capital Expenditures	Size	Sales Growth	Cash from Operations	Research & Development	Tax Burden on Foreign Income	Firm Age	Industry Sigma	Dividend Dummy	Managerial Ability	Interest Rates	Leverage	Market to Book
Cash	1.000	-0.450 <.0001	0.126 <.0001	-0.127 <.0001	0.158 <.0001	-0.620 <.0001	0.359 <.0001	0.008 <.0001	-0.154 <.0001	0.080 <.0001	-0.140 <.0001	-0.011 <.0001	0.125 <.0001	0.349 <.0001	0.133 <.0001
Net Working Capital	-0.450 <.0001	1.000	-0.118 <.0001	-0.018 <.0001	-0.084 <.0001	0.418 <.0001	-0.256 <.0001	-0.002 <.0001	0.065 <.0001	-0.100 <.0001	0.049 <.0001	0.036 <.0001	-0.115 <.0001	-0.508 <.0001	-0.230 <.0001
Capital Expenditures	0.126 <.0001	-0.118 <.0001	1.000	-0.108 <.0001	0.168 <.0001	-0.062 <.0001	0.051 <.0001	-0.049 <.0001	-0.216 <.0001	-0.033 <.0001	-0.095 <.0001	0.048 <.0001	0.012 <.0001	0.005 <.0001	0.063 <.0001
Size	-0.127 <.0001	-0.018 <.0001	-0.108 <.0001	1.000	-0.143 <.0001	0.188 <.0001	-0.214 <.0001	0.186 <.0001	0.391 <.0001	0.165 <.0001	0.434 <.0001	0.036 <.0001	-0.097 <.0001	0.020 <.0001	-0.157 <.0001
Sales Growth	0.158 <.0001	-0.084 <.0001	0.168 <.0001	-0.143 <.0001	1.000	-0.138 <.0001	0.116 <.0001	-0.030 <.0001	-0.239 <.0001	0.021 <.0001	-0.148 <.0001	0.043 <.0001	0.034 <.0001	0.052 <.0001	0.149 <.0001
Cash from Operations	-0.620 <.0001	0.418 <.0001	-0.062 <.0001	0.188 <.0001	-0.138 <.0001	1.000	-0.480 <.0001	0.068 <.0001	0.140 <.0001	-0.053 <.0001	0.133 <.0001	0.108 <.0001	-0.144 <.0001	-0.392 <.0001	-0.180 <.0001
Research & Development	0.359 <.0001	-0.256 <.0001	0.051 <.0001	-0.214 <.0001	0.116 <.0001	-0.480 <.0001	1.000	0.040 <.0001	-0.136 <.0001	0.049 <.0001	-0.205 <.0001	0.071 <.0001	0.070 <.0001	0.184 <.0001	0.229 <.0001
Tax Burden on Foreign Income	0.008 <.0001	-0.002 <.0001	-0.049 <.0001	0.186 <.0001	-0.030 <.0001	0.068 <.0001	0.040 <.0001	1.000	0.115 <.0001	0.064 <.0001	0.041 <.0001	0.081 <.0001	-0.013 <.0001	-0.006 <.0001	0.030 <.0001
Firm Age	-0.154 <.0001	0.065 <.0001	-0.216 <.0001	0.391 <.0001	-0.239 <.0001	0.140 <.0001	-0.136 <.0001	0.115 <.0001	1.000	0.045 <.0001	0.365 <.0001	0.046 <.0001	-0.051 <.0001	-0.027 <.0001	-0.121 <.0001
Industry Sigma	0.080 <.0001	-0.100 <.0001	-0.033 <.0001	0.165 <.0001	0.021 <.0001	-0.053 <.0001	0.049 <.0001	0.064 <.0001	0.045 <.0001	1.000	0.015 <.0001	-0.001 <.0001	0.009 <.0001	0.071 <.0001	0.053 <.0001
Dividend Dummy	-0.140 <.0001	0.049 <.0001	-0.095 <.0001	0.434 <.0001	-0.148 <.0001	0.133 <.0001	-0.205 <.0001	0.041 <.0001	0.365 <.0001	0.015 <.0001	1.000	0.055 <.0001	-0.043 <.0001	-0.059 <.0001	-0.081 <.0001
Managerial Ability	-0.011 <.0001	0.036 <.0001	0.048 <.0001	0.036 <.0001	0.043 <.0001	0.108 <.0001	0.071 <.0001	0.081 <.0001	0.046 <.0001	-0.001 <.0001	0.055 <.0001	1.000	0.005 <.0001	-0.067 <.0001	0.076 <.0001
Interest Rates	0.125 <.0001	-0.115 <.0001	0.012 <.0001	-0.097 <.0001	0.034 <.0001	-0.144 <.0001	0.070 <.0001	-0.013 <.0001	-0.051 <.0001	0.009 <.0001	-0.043 <.0001	0.005 <.0001	1.000	0.022 <.0001	0.200 <.0001
Leverage	0.349 <.0001	-0.508 <.0001	0.005 <.0001	0.020 <.0001	0.052 <.0001	-0.392 <.0001	0.184 <.0001	-0.006 <.0001	-0.027 <.0001	0.071 <.0001	-0.059 <.0001	-0.067 <.0001	0.022 <.0001	1.000	0.115 <.0001
Market to Book	0.133 <.0001	-0.230 <.0001	0.063 <.0001	-0.157 <.0001	0.149 <.0001	-0.180 <.0001	0.229 <.0001	0.030 <.0001	-0.121 <.0001	0.053 <.0001	-0.081 <.0001	0.076 <.0001	0.200 <.0001	0.115 <.0001	1.000

Regression Results

Dependent Variable: Cash and cash equivalents

Variable	Model 1		Model 2	
	Estimate	Pr > t	Estimate	Pr > t
<i>Intercept</i>	0.498	<.0001	0.270	0.0002
<i>Firm size</i>	-0.039	<.0001	-0.009	<.0001
<i>Net Working Capital</i>	-0.826	<.0001	-0.544	<.0001
<i>Capital Expenditures</i>	1.806	<.0001	1.546	<.0001
<i>Industry Sigma</i>	0.001	<.0001	0.001	<.0001
<i>Research & Development</i>	-1.194	<.0001	-0.293	<.0001
<i>Dividend Dummy</i>	-0.070	<.0001	-0.057	<.0001
<i>Sales Growth</i>	0.064	<.0001	0.064	<.0001
<i>Cash from Operations</i>	-1.210	<.0001	-1.110	<.0001
<i>Managerial Ability</i>	0.408	<.0001	0.225	<.0001
<i>Firm Age</i>	-0.101	<.0001	-0.067	<.0001
<i>Tax Burden on Foreign Income</i>	0.067	<.0001	0.068	<.0001
<i>Leverage</i>			0.144	<.0001
<i>Market To Book</i>			-0.022	<.0001
<i>Interest Rates</i>			0.002	<.0001
Observations	115,664		93,289	
F-Score	1017.30	<.0001	825.32	<.0001
R-square	46.82%		47.46%	
Adj R-square	46.77%		47.40%	

Key Recommendations

Working Capital Management:

- Streamline inventory and improve accounts receivable collection.
- Strategically manage accounts payable by negotiating favorable terms.

Sales Growth Strategies:

- Implement strategies for sustainable revenue growth.
- Expand market share, introduce new products, and enhance sales efforts.

Capital Expenditures and Strategic Investments:

- Firms must prioritize projects aligned with their long-term goals, optimize financing, and carefully monitor returns which closely ensures effective capital management,
- Strategic investment helps to acquire, upgrade, and maintain physical assets such as property, plants, buildings, technology, or equipment.

Cash from Operations Optimization:

- Enhancing operational processes for increased cash generation.
- Helps to provide liquidity for day-to-day activities in business.

Interest Rates and Leverage:

- Stay vigilant to changes in interest rates for strategic financial planning.
- Manage debt levels carefully helping in balancing growth and financial stability.

Limitations

Along with our findings, it's crucial to acknowledge the limitations we encountered.

Data Limitations:

- Unavailability of 'Cash from operations' data before 1987 restricts historical analysis.
- Numerous missing values replaced with zeros, potentially introducing bias.
- Need for broader data coverage in future analyses.

Industry and Environment Variability:

- Different sectors or unique company characteristics may exhibit distinct cash management patterns.
- Exclusion of the utility and financial firms due to their unique additional regulatory constraints on the cash and investments bring restrictions to analysis.

External Factors and Unforeseen Events:

- Model may not fully capture the influence of external macroeconomic factors or unforeseen events on cash reserves.
- Economic fluctuations, regulatory changes, or crises could impact cash in ways beyond our modeled variables.

Caution in Generalizing Findings:

- Findings and recommendations do not universally apply to all companies.
- Each organization is unique and adjustments should be made accordingly.



Thank You

Q&A