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Abstract

Purpose: The purpose of this article is to explain one of the six functions of "Cash Flow Based Corporation (CFCF) Model. Look at. Yilmaz(2022) and Yilmaz (2023).

Methodology: 14 cash flow ratios were selected from the 30 ratios CFCF Model covers for explaining this subject . They are Cash Flow Adequacy I, Cash Flow Adequacy II, CFFO to Annual Interest Payments, Overall Cash Flow, Interest Payment Coverage, Fixed Charges Coverage, Cash Interest Coverage, CFFO to Assets, Current Maturities of LTD Coverage, Operating Cash Flow, Cash Current Debt Coverage, Return of Sales to CFFO, Operating Index, and Return of Sales to Cash.Then, they were explained by this writer to explain the subject. At the Chapter 4, an application on the Apple Financial Statements (Balance Sheets, Income Statements, and Cash Flow Statements) covering the years 2017-2022 was fulfilled..

Findings: Working capital management function of CFCF model could be fulfilled by using selected 14 cash flow ratios for this purpose and it could be applied in corporations like I applied in the Apple.

Keywords: *Working Capital Management, Cash Flow Ratios, Use of Cash Flow Ratios on WCM, Cash Flow.*

INTRODUCTION

As famous American finance professor Merton Miller said "a firm may have earnings, but no cash.[1] Cash flow based working capital management is working capital management considering cash flow insight. This insight does not excuse traditional working capital management. On the contrary, it contributes traditional working capital management theory. The base of this new insight is cash flow ratios. Their number is fourteen and the ratios have been groups as three groups.

In this article, the starting point is cash flow ratios. They have been grouped in three groups. The ratios will be explained in the context of working capital management only. Actually, the ratios could be used for other purposes. However, in this study, working capital dimension of the ratios has been concentrated because of the main idea of this article is working capital management. For this reason, the organization of this article does not cover a chapter about the explanation of cash flow ratios independently from the subject. After giving the cash flow ratios in the sub-section the 2.1, the explanation of cash flow based working capital management via the cash flow ratios has started in the subsection 2.2.

After the explanation of the subject, an application has been given about the Apple Corporation's cash flow based working capital management based of its financial statements cash flow statement, balance sheet, and income statement. The fourteen cash flow ratios grouped in three groups have been calculated and commented.

Cash Flow Based Working Capital Management

Cash Flow Ratios Used in Working Capital Management

Cash flow based working capital management will be explained through 14 cash flow ratios. These ratios are seen at the Table 1 below:

[1] Miller, Merton H., "Debt and Taxes", The Journal of Finance, Vol.32, No.2, May 1977, p.261-275.

Table 1: Cash Flow Ratios Used in Cash Flow Based Working Capital Management

Ratio no.	Name of ratio	Calculation of the ratio
ACFRWCM1	Cash Flow Adequacy [2]	CFFO :(Long Term Debt Payment+ Asset Acquisition+ Dividend Paid)
ACFRWCM2	Cash Flow Adequacy II[3]	CFFO: (Capital Expenditure +Inventory Increase cash dividend)
ACFRWCM3	CFFO to Annual Interest Payments[4]	CFFO: Annual Interest Payments
ACFRWCM4	Overall Cash Flow [5]	CFFO: (Financing Cash Outflows+ Investing Cash Outflows)
ACFRWCM5	Interest Payment Coverage[6]	(CFFO +Interest Payment): Interest Payment
ACFRWCM6	Fixed Charges Coverage	(CFFO+ Fixed Charges[7]): Fixed Charges
ACFRWCM7	Cash Interest Coverage[8]	(CFFO + Interest Paid +Taxes Paid): Interest Paid
BCFRWCM1	CFFO to Assets[9]	CFFO: Total Assets
BCFRWCM2	Current Maturities of LTD Coverage[10]	(CFFO - Dividends): Current Maturities of Long-Term Debt
BCFRWCM3	Operating Cash Flow[11]	CFFO: Current Liabilities
BCFRWCM4	Cash Current Debt Coverage	(CFFO- Cash Dividend): Current Debt
CCFRWCM1	Return of Sales to CFFO[12]	CFFO: Sales
CCFRWCM2	Operating Index	CFFO: Operating Income
CCFRWCM3	Return of Sales to Cash[13]	Cash From Sales[14] : Sales

[2] Giacomino and Mielke (1993:57)
[3] Bernstein (1989:566-567)
[4] Ferris and Others (1992:219)
[5] Louderback and Others (1993:336)
[6] The ratio and ACFR13 were cited from Shim and Siegel (1992: 96 - 99 and 624)
[7] Fixed charges are to be paid to continue the production and other operations of the business. Fixed charges cover cash outflows from administrative cost, interest cost, payment of long-term debt principal, payment of short-term debt principal, and property tax (Loudeback and Others, 1993:364-365; Moyer and Others, 1995:519-520).
[8] Mills and Yamamura (1998:55-58).
[9] Giacomino and Mielke (1993:57)
[10] Shim and Siegel (1992: 96 - 99 and 624)
[11] The ratio and BCFR10 were cited from Mills and Yamamura (1998:55-58)
[12] This ratio and CCFR2 were cited from Giacomino and Mielke (1993:57).
[13]Shim and Siegel (1992: 96 - 99 and 624)
[14] The numerator "cash from sales" was calculated like that: Net sales+Decrease in Account Receivable - Increase in Accounts receivable". It could be calculated like that: "Sales" from the income statement + or - Account Receivable, net. If the "account receivable, net is negative, the "cash from sales" increases, if it is positive, the "cash from sales" decreases.

As it could be seen from the Table 1, the ratios are divided to three groups. How the groups are determined is explained at the Chapter 2.2.1, 2.2.2, and 2.2.3. before the cash flow based working capital management via the three group ratios A, B, and C.

Working Capital Management Via Cash Flow Ratios

Working Capital Management Via Group A Cash Flow Ratios

This group of ratios is calculated by using Cash flow Statement only. They need no other financial statement to be calculated. This group of the cash flow ratios could be thought as the most important ratio group because of the article's main idea. The article studies cash flow based working capital management and this group of ratios is calculated used only cash flow statement. It is very suitable for matching because all the numerators and denominators of these group ratios cover a number or more than a number from cash flow statement. For this reason, these ratios were grouped as Group A. The writer thinks that the Group A cash flow ratios is a starting point to cash flow based working capital management and the most important group for the explanation of the subject.

Group A cash flow ratios used during cash flow based working capital management are:

1. ACFRWCM1. Cash Flow Adequacy
2. ACFRWCM2. Cash Flow Adequacy II
3. ACFRWCM3. CFFO to Annual Interest Payments
4. ACFRWCM4. Overall Cash Flow
5. ACFRWCM5. Interest Payment Coverage
6. ACFRWCM6. Fixed Charges Coverage
7. ACFRWCM7. Cash Interest Coverage

As it could be seen from the Group A ratios, the items cash flow from operations (CFFO), long term debt payment, asset acquisition, dividend payment, capital expenditure, inventory increase, annual interest payments, financing cash outflow, investing cash outflows, interest payment, fixed charges, and taxes paid have been used to calculate ratios. All of the seven Group A ratios cover CFFO in their coverage. This shows the importance of cash flows from operations (CFFO). The CFFO could be thought cash flow-based version of operating income. CFFO is produced in a business. It is not provided from the outside.

Cash flow based working capital management could be explained via the seven Group A cash flow ratios as below:

- ACFRWCM1.Cash Flow Adequacy

$$= \frac{\text{CFFO}}{\text{Long term debt payment} + \text{Asset acquisition} + \text{Dividend paid}} \quad (1)$$

This ratio shows how much CFFO is produced in comparison with the long-term debt payment, asset acquisition and dividend payment. For example, if it is 2, the business produces 2 folds CFFO of the three sub-numbers long term debt payment, asset acquisition and dividend payment of cash flow statement. This is very important for cash flow based working capital management because a finance manager of a corporation wants if the corporation has the ability to create enough cash to finance its fixed investments and repayment of its financiers.

- ACFRWCM2. Cash Flow Adequacy II

$$= \frac{\text{CFFO}}{\text{Capital expenditure} + \text{Inventory increase} + \text{Cash dividend}} \quad (2)$$

This ratio's content is different than that of the first ratio even

if their name is same. This ratio's denominator is pretty different than that of the first. Capital expenditure and inventory increase are not covered by the first cash flow adequacy ratio. Instead of capital expenditure and inventory increase, the first adequacy ratio covers long term debt payment and asset acquisition. For this reason, the results of the two cash adequacy ratios are different than each other.

- ACFRWCM3. CFFO to Annual Interest Payments

$$= \frac{\text{CFFO}}{\text{Annual interest payments}} \quad (3)$$

It measures how many folds of CFFO are produced by the annual interest payments. Interest payments have been paid to finance a business. After production and sales, the business produces the CFFO. For this reason, the manager could wonder how successful the credit being provided paying the interest was used. The higher ratio means that the debt has been used more efficient and effective than before.

- ACFRWCM4. Overall Cash Flow

$$= \frac{\text{CFFO}}{\text{Financing cash outflows+Investing cash outflows}} \quad (4)$$

It defines if the business could produce enough CFFO or not to meet financing cash outflows and investing cash outflows. This is overall cash flows because the numerator and denominator cover all cash flows of the business. The three parts of the cash in the cash flow statement are used to calculate the ratio. Whether the business could create or not enough cash to meet cash outflows is very important for a business's success. This ratio measures this.

- ACFRWCM5.Interest Payment Coverage

$$= \frac{\text{CFFO+Interest payment}}{\text{Interest payment}} \quad (5)$$

This ratio determines how much cash a business's interest payment produces. The numerator covers CFFO + interest payment, not only CFFO. Using this ratio, the importance of financing cost to produce CFFO is determined. CFFO and interest payment means CFFO before interest payment. If interest payment is relatively high, CFFO before interest payment probably will be higher because the numerator will be higher.

- ACFRWCM6. Fixed Charges Coverage

$$= \frac{\text{CFFO+Fixed Charges}}{\text{Fixed Charges}} \quad (6)$$

The ratio shows how many folds or what per cent "CFFO+fixed charges" is produced using fixed charges. "CFFO+fixed charges" could be said as "CFFO before fixed charges". How efficient and effective the fixed charges are used could be understood via this ratio. Relatively high ratio means efficiently and effectively usage of fixed charges.

- ACFRWCM7. Cash Interest Coverage

$$= \frac{\text{CFFO+Interest paid+Taxes paid}}{\text{Interest paid}} \quad (7)$$

It measures how many times "CFFO before interest and tax payment" is produced to pay interest payment. This means that how much CFFO before interest and tax payment the interest payment produces. It shows how efficient and effective the interest payment which was paid for debt financing was used. I think, this ratio also measures the capability of paying taxes in addition to "CFFO+Interest paid". As you remember, the ACFRWCF5 (interest payment coverage) does not measure this.

Working Capital Management Via Group B Cash Flow Ratios

This group cash flow ratios uses cash flow statement and balance sheet. These ratios connect cash flow basis and accrual basis with each other. This group of ratios covers 4 ratios.

The Group B cash flow ratios used for cash flow based working capital management are:

1. BCFRWCM1. CFFO to Assets
2. BCFRWCM2. Current Maturities of LTD Coverage
3. BCFRWCM3. Operating Cash Flow
4. BCFRWCM4. Cash Current Debt Coverage

As it could be seen from the Group A ratios, the items CFFO, total assets, dividends, current maturities of long-term debt, current liabilities, cash dividends, and current debt are used to calculate this ratio. CFFO is used in all of the four ratios. This shows that the CFFO is most important item in calculating the Group B ratios.

The four Group B cash flow ratios are explained as below:

1. BCFRWCM1. CFFO to Assets

$$= \frac{\text{CFFO}}{\text{Total assets}} \quad (8)$$

BCFRWCM1 measures CFFO created by total assets. It is not asset profitability. It is the CFFO creating power of the assets. How efficient a business uses its assets could be measured by this ratio. Efficient and effective usage of assets is important to produce high BCFRWCM1 ratio.

2. BCFRWCM2. Current Maturities of LTD Coverage

$$= \frac{\text{CFFO} - \text{Dividends}}{\text{Current maturities of LTD}} \quad (9)$$

This ratio calculates "CFFO after dividend payment" to current maturities of long-term debt. If it is more than 1, it means that the business could produce more "CFFO after dividend payment" than the current maturities of long-term debt. If the ratio increases, it means that, the business can pay its current maturities of long-term debt more easily with the CFFO after dividend payment. If it decreases, it means that the business could produce less CFFO after dividend to pay the current maturities of long-term debt. This ratio decreases with the increase of dividend payment. Of course, the increase of current maturities of long-term debt decreases the ratio, too. Let's think about a business has regular current debt to be paid. In this situation, the payment ability could be not enough to pay all current debt. However, if the business watch payment power of current maturities of long-term debt via the ratio BCFRWCM2, it could control its debt payment to bondholders. In so doing, it continues its asset investment. Let us not forget that the working capital management exists for all business, its production, its growth, and its sustainability. As a result, this ratio could be thought as a strategic ratio for a business.

3. BCFRWCM3. Operating Cash Flow

$$= \frac{\text{CFFO}}{\text{Current liabilities}} \quad (10)$$

It measures how efficient and effectively current liabilities are used to create CFFO so current liabilities should be returned to CFFO to be paid in the scheduled time. If the ratio is over 1, it means that the business produces more CFFO than its current liabilities.

4. BCFRWCM4. Cash Current Debt Coverage

$$= \frac{\text{CFFO} - \text{Cash dividend}}{\text{Current debt}} \quad (11)$$

This ratio measures the ability of payment current debt with "after dividend payment CFFO".

The reason to subtract dividend payment is it's not being a CFFO item. It is a cash flow from financing activities. As a result, the ratio shows "after dividend CFFO" produced by current debt.[15]

Working Capital Management Via Group C Cash Flow Ratios

This group of ratios calculated via income statement and cash flow statement analyses the relations among sales, cash from sales, operating income, and CFFO. The Group C cash flow ratios used in cash flow based working capital management are:

1. CCFRWCM1. Return of Sales to CFFO
2. CCFRWCM2. Operating Index
3. CCFRWCM3. Return of Sales to Cash

As it could be seen from the Group C ratios, sales, operating income, cash from sales, and CFFO are the items to calculate the ratios. CCFRWCM1 and CCFRWCM2 uses CFFO to compare the sales and operating income, respectively. It is interesting that CCFRWCM2 compares accrual "operating income" and cash based "Cash Flow from Operations (CFFO)". CCFRWCM3 shows the importance of credit sales in total sales.

The Group C cash flow ratios are explained below:

CCFRWCM1. Return of Sales to CFFO

$$= \frac{\text{CFFO}}{\text{Sales}} \tag{12}$$

It shows the productivity of working capital to produce cash. Higher ratio means that a business produces enough cash flow from its operations to sales. If a company has less ratio than that of industry average, its finance manager should question the company's collection policy. The corporation could have some mistakes about its collecting policy such as giving more time to collect its consumers than that of the rival companies.

CCFRWCM2. Operating Index

$$= \frac{\text{CFFO}}{\text{Operating Income}} \tag{13}$$

This ratio calculates CFFO to operating income. Its result shows how many times or what percentage CFFO of operating income is created. Operating income is an accrual account that shows earnings before "other income and other expenses" but after all costs and expenditures of the main operation of a company. The other income and other expenses are non- operating income and expenses. An example of other income is interest income and dividend income, and an example of other expenses is interest expenses. That is, operating income is "Earning Before Tax and "Non-Operating Income and Expenses". It could be abbreviated as EBTNOIE[16]. Cash-based working capital management could use this ratio to measure how efficient and effective a company produces its cash flow (CFFO) instead of its profit because of profit is an accrual concept which does not guarantee cash payments. Its explanation is that a company has much costs such as labour, raw materials, consumable manufacturing supplies, and general overhead and operating expenses such as selling, general and administrative expenses and research and development expenses. EBTNOIE shows income after cost of production and operating expenses. This is not cash, but accrual concept. These does not mean cash flow.

[15] In BCFRWCM3 and BCFRWCM40, the terms "current liabilities" and "current debt" have been used in same meaning by the same writers (Mills and Yamamura,1998:55-58), interestingly. This article's writer did not change their words "liabilities" and "debt" for the sake of the writers.
[16] This abbreviation has been produced by this writer to explain the concept "operating income".

However, CFFO in the numerator of the ratio means cash flow. We could say that if cash flow from operating is more or equal than operating income, it means that costs and operating expenses could be paid as a cash flow created or produced by a corporation itself.

CCFRWCM3. Return of Sales to Cash

$$= \frac{\text{Cash From Sales}}{\text{Sales}} \quad (14)$$

It shows the collection policy of a business. A ratio over 1 means more "cash from sales" than "sales". It means that some account receivable was collected from the old account receivables. A ratio under 1 means more account receivable than the year before. The credit sales have increased for different reasons something like market conditions. If the ratio is exactly 1, it means that collections of old accounting receivables are equal with the increase of current year's account receivables. "Cash from sales" shows the cash a sale a business creates. It is a very important tool to determine the collection success of a business.

Coordination of the Three Groups of Ratios for Managing Working Capital

In this chapter, the importance of the items in the three financial statements will be explained altogether. For this reason, the Table 2 has been prepared. It shows the usage of items in the three statements used for cash flow based working capital management. The Table 2 is shown below:

Table 2: Numbers of Usage of Items in the Cash Flow Ratios Used in Cash Flow Based Working Capital Management

Names of Items	Number of usages	% Usage in the ratios	% Usage in total items
CFFO	13	92.86	33.33
Annual interest payments, interest payment, interest paid[17]	5	35.71	12.83
Dividend paid, cash dividend, dividends[18]	4	28.57	10.27
Asset acquisition, capital expenditure[19]	2	14.29	5.13
Fixed charges	2	14.29	5.13
Current liabilities, current debt[20]	2	14.29	5.13
Sales	2	14.29	5.13
Long term debt payment	1	7.14	2.56
Inventory increase	1	7.14	2.56
Financing cash outflows	1	7.14	2.56
Investing cash outflows	1	7.14	2.56
Taxes paid	1	7.14	2.56
Total assets	1	7.14	2.56
Current maturities of long-term debt	1	7.14	2.56
Operating income	1	7.14	2.56
Cash from sales	1	7.14	2.56
Total	39	------	100

[17] The item "annual interest payments" is used at the ratio ACFRWCM3 (Ferris and Others (1992:219), the item "interest payment" is used in two items at the ratio ACFRWCM5 (Shim and Siegel, 1992: 96 – 99 and 624), and the item "interest paid" is used in two items at the ratio ACFRWCM7 (Mills and Yamamura, 1998:55-58).

[18] The item "dividend paid" is used at the ratio ACFRWCM1 (Giacomino and Mielke,1993:57), the item "cash dividend" is used at the ratios ACFRWCM2 and BCFRWCM4 (Bernstein, 1989:566-567) and "dividends" is used at the ratio BCFRWCM2 (Shim and Siegel, 1992: 96 – 99 and 624).

[19] The item "Asset acquisition" (Giacomino and Mielke,1993:57) is used at the ratios ACFRWCM1 and the item "capital expenditure" is used at the ratios ACFRWCM2 (Bernstein, 1989:566-567).

[20] In BCFRWCM3 and BCFRWCM40, the terms "current liabilities" and "current debt" have been used in same meaning by the same writers (Mills and Yamamura,1998:55-58), interestingly. This article's writer did not change their words "liabilities" and "debt" for the sake of the writers.

Importance of Cash Flow from Operations (CFFO)

As could be seen from the Table 2, the CFFO is the most used item to calculate the ratios. It as an item gotten from cash flow statement. It is used in the 13 ratios of the total 14 ratios. This means 92.86% of the ratios. The only ratio not used CFFO is the CCFRWCM3 of the Group C ratios. It uses "cash from sales" in its numerator instead of the CFFO. The 1/3 of all items is CFFO. It could be said that CFFO is the most important of the items. CFFO surrounds all of the ratios from the three groups. It also means that it affects all the ratios and, of course, all the outputs of the ratios. As a result, CFFO surrounds all cash flow based working capital management.

Interest Payment

The Table 2 shows that the second most important item used in the cash flow ratios in cash flow based working capital management is interest payment. It is used five times in three ratios. In the capital structure of a business, debt requires interest payment. In cash flow based working capital management, interest payment is important to continue the use of debt capital. This is investigated in three Group A ratios in cash based working capital management. This means that the three ratios ACFRWCM3, ACFRWCM5, and ACFRWCM7 measuring interest payment level and success are calculated via only cash flow statement. This shows importance of cash flow on the payment of interest. At the same time, it should not be forgotten that these ratios show using of financial leverage in a business. In using the ratios, cash flow-based control of interest cost is fulfilled. It could be added that all of the three ratios compare and relates the interest payment with the CFFO. This is because of wanting the interest payment via CFFO created by the company, not providing it via cash flow from financing activities.

Dividend Payment

The Table 2 shows that the third important item used in cash flow ratios for working capital management is dividend payment. This item is used both some Group A ratios and some Group B ratios in cash flow based working capital management. This is important because of importance of using balance sheet and cash flow statement together. In so doing, current debt and current maturities of long-term debt relates to CFFO and dividend payment. It is investigated both the two kinds of payment to financiers of a business. All sides of financing are balanced about their rights or expectations via Group B ratios BCFRWCM2 and BCFRWCM4. The Group A ratios ACFRWCM1 and ACFRWCM2 relates dividend payment to CFFO, too.

Other Coordinations

The items representing fixed investment payments, fixed charges payments, current debt, and sales each are seen two times in the ratios used by working capital management. The first two of them are elements of cash flow statement. The others, current debt and sales, are elements of balance sheet and income statement, respectively.

The other items long term debt payment, inventory increase, financing cash outflows, investing cash outflows, taxes paid, total assets, current maturities of long-term debt, operating income, and cash from sales are used only one time in the cash flow ratios. The first five of the items long term debt payment, inventory increase, financing cash outflows, investing cash outflows, and taxes paid are elements of cash flow statement. The items total assets and current maturities of long-term debt are elements of balance sheet. The item operating income is an element of income statement. The other item "cash from sales" is calculated via income statement and cash flow statement together. "Sales" is provided by income statement and "increase or decrease in account receivable" is provided by cash flow statement. If account receivable shows decrease

"sales from cash" is more than "sales". If account receivable shows increase "sales from cash" is less than "sales".

A General Evaluation

As it could be seen from the Table 2, the most used items are the items gotten from cash flow statements. The most used three items CFFO, interest payment, and dividend payment are elements of cash flow statements.

The two times used items are four items. Two of two times used items are elements of cash flow statement. One of them is an element of balance sheet and the other is an element of income table. That's half of two times used items are elements of cash flow statement. It means that the half of them are elements of cash flow statement. This group produces a mix of the three financial statements. All of the items represent production, sales, and "debt and its cost, interest payment, power" of a business.

The number of one-time used items are nine. The five of them long term debt payment, inventory increase, financing cash outflows, investing cash outflows, and taxes paid are the items gotten from cash flow statement. The one of them are "cash from sales". It is calculated using both income statement and cash flow statement. This shows that using number of cash flow statement for the calculation of one-time used items is 5.5. It means that 5.5/9 = 61.11 % of items used only one time are elements of cash flow statement. The other two items total assets and current maturities of long-term debt are elements of balance sheet. Their weight is 2/9= 22.22%. The remaining 1.5 items [21] are elements of income statement. That is, 1.5/9= 16.67% of items used only one time are elements of income statement. As it could be seen from the weights, the items gotten from cash flow statement are about 2/3. This shows the importance of cash flow idea and opinion in cash flow based working capital management.

An Application on the Apple Corp. Financial Statements

The Application Via Group A Cash Flow Ratios

The Apple's Group A ratios are shown at the Table 3 below:

Table 3: Group A Cash Flow Ratios of the Apple Corp

Number of the ratios	2017	2018	2019	2020	2021	2022	Average
ACFRWCM1	2.24	2.31	2.08	2.37	3.03	3.48	2.59
ACFRWCM2	2.85	2.78	2.85	3.79	4.54	4.52	3.66
ACFRWCM3	30.70	25.62	20.27	26.87	38.72	42.64	30.80
ACFRWCM4	1.00	1.08	1.54	0.89	0.96	0.92	1.07
ACFRWCM5	31.70	26.62	21.27	27.87	39.72	43.64	31.80
ACFRWCM6[22]	12.49	9.10	4.81	5.86	10.12	10.84	10.21
ACFRWCM7	37.24	30.07	25.73	31.04	49.17	50.47	37.29

[21] The "cash from sales" uses two data. One of them is from income statement and the other is from cash flow statement. For this reason, it should be thought a mixed item. O.5+0.5=1.

[22] In this ratio, the items "fixed charges" of the six years have been calculated by adding "repayments of term debt" in the section of cash flow from financing activities and "cash paid for interest" shown independently from the three groups of cash flow in the cash flow statements of the Apple Corporation.

The comment of the cash flow ratios of the Apple Corp. is given below.

ACFRWCM1.Cash Flow Adequacy I

$$=\frac{\text{CFFO}}{\text{Long term debt payment + Asset acquisition + Dividend paid}} \quad =2.59 \qquad (15)$$

The Apple's cash flow adequacy I ratios were 2.24, 2.31, 2.08, 2.37, 3.03, and 3.48 in the years 2017-2022, respectively. It means that the CFFO was 2.24, 2.31, 2.08, 2.37, 3.03, and 3.48 folds of its long-term debt payment plus asset acquisition plus dividend paid in the years, respectively. The average was 2.59. The company could pay its long-term debt payment, asset acquisition and dividend payment with its own CFFO easily. It produces two and 0.59 folds CFFO to pay its long-term debt payment, asset acquisition, and dividend payment.

ACFRWCM2.Cash Flow Adequacy II

$$= \frac{\text{CFFO}}{\text{Capital expenditure + Inventory increase + Cash dividend}} =3.66 \qquad (16)$$

The Apple's cash flow adequacy II ratios were 2.30, 2.96, 2.80, 3.78, 4.54, and 4.52 in the years 2017- 2022, respectively. It means that the CFFO was 2.30, 2.96, 2.80, 3.78, 4.54, and 4.52 folds of its capital expenditure plus inventory increase plus cash dividend in the years, respectively. The average was 3.66. This means that the company could pay its capital expenditure, inventory increase and dividend payment with the CFFO it created.

ACFRWCM3. CFFO to Annual Interest Payments

$$= \frac{\text{CFFO}}{\text{Annual interest payments}} =30.80 \qquad (17)$$

The Apple's CFFO to annual interest payments were 30.70, 25.62, 20.27, 26.87, 38.72, and 42.64 in the years 2017-2022, respectively. It means that the company has created 30.70, 25.62, 20.27, 26.87, 38.72, and 42.64 folds CFFO of the annual interest payment. The average was 30.80. Its CFFO meets its annual interest payment requirement easily because it has produced 30.80 folds CFFO to be paid its interest payment. This decreases financial risk of the company.

ACFRWCM4.Overall Cash Flow

$$= \frac{\text{CFFO}}{\text{Financing cash outflows + Investing cash flows}} =1.07 \qquad (18)$$

The Apple's overall cash flow ratios were 1.00, 1.08, 1.54, 0.89, 0.96, and 0.92 in the years 2017-2022, respectively. The average was 1.07. It meets its cash outflows for financing and investing with CFFO it produces because the average ratio 1.07 is over 1.

ACFRWCM5.Interest Payment Coverage

$$= \frac{\text{CFFO + Interest payment}}{\text{Interest payment}} \quad =31.80 \qquad (19)$$

The Apple's interest payment coverage ratios were 31.70, 26.62, 21.27, 27.87, 39.72 and 43.64 in the years 2017-2022, respectively. The average was 31.80. The company produces average 31.80 folds "CFFO before interest payment" of interest payment. The interest payment could be fulfilled with the company's own cash flow easily.

ACFRWCM6. Fixed Charges Coverage

$$= \frac{\text{CFFO + Fixed Charges}}{\text{Fixed Charges}} \quad =10.21 \qquad (20)$$

The Apple's fixed charges coverage ratios were 12.49, 9.10, 4.81, 5.86, 10.12, and 18.90 in the years 2017- 2022, respectively. That means that "CFFO before fixed charges" were 12.49, 9.10,

4.81, 5.86, 10.12, and 18.90 folds of the fixed charges in the years, respectively. The average was 10.21. This means the average meeting power of fixed charges of the Apple.

ACFRWCM7.Cash Interest Coverage

$$= \frac{\text{CFFO+Interest paid+Taxes paid}}{\text{Interest paid}} = 37.29 \quad (21)$$

The Apple's cash interest coverage ratios were 37.24, 30.07, 25.73, 31.04, 49.17, and 50.47 in the years 2017-2022, respectively. It means that the company produced 37.24, 30.07, 25.73, 31.04, 49.17, and 50.47 folds "CFFO before interest and tax payment" of interest payment in the years, respectively. The average was 37.29. It produces 37.29 folds "CFFO before interest and tax payment" of interest payment.

The Group A cash flow ratios of the corporation show that the company produces enough cash to pay its long-term debt, asset acquisition, dividend, inventory increase, and fixed charges. According to Group A cash flow ratios, its cash flow based working capital management seems pretty successful. It could produce its own cash to be paid its most important payments.

Application Via Group B Cash Flow Ratios

The Apple's Group B ratios are shown at the Table 4 below:

Table 4: Group B Cash Flow Ratios of the Apple Corp

Number of the ratios	2017	2018	2019	2020	2021	2022	Average
BCFRWCM1	0.17	0.21	0.20	0.25	0.30	0.35	0.25
BCFRWCM2	7.92	7.25	5.39	7.59	9.32	9.64	7.85
BCFRWCM3	0.64	0.66	0.66	0.77	0.83	0.79	0.73
BCFRWCM4	0.51	0.55	0.52	0.63	0.71	0.70	0.60

BCFRWCM1.CFFO to Assets

$$= \frac{\text{CFFO}}{\text{Total assets}} = 0.25 \quad (22)$$

The Apple's CFFO to Assets ratios were 0.17, 0.21, 0.20, 0.25, 0.30, and 0.35 in the years 2017-2022, respectively. It means that the CFFO was 17%, 21%, 20 %, 25%, 30%, and 35% of total assets in the years. The average was 0.25. That's it creates CFFO by ¼ of its total assets.

BCFRWCM2. Current Maturities of LTD Coverage

$$= \frac{\text{CFFO}-\text{Dividends}}{\text{Current maturities of LTD}} = 7.85 \quad (23)$$

The Apple's current maturities of long-term debt coverage ratios were 7.92, 7.25, 5.39, 7.57, 9.32, and 9.64 in the years 2017-2022, respectively. The ratios means that "CFFO after dividend payment" were 7.92 folds, 7.25 folds, 5.39 folds, 7.57 folds, 9.32 folds, and 9.64 folds of the current maturities of long-term debt in the years, respectively. The average was 7.85. The current maturities of long-term debt account are a short-term debt so it should have been paid in the current term. The "CFFO after dividend payment" are about 5-9 folds of the debt. The average was 7.85 folds. The company does not have any problem about the debt payment. It could create its financial source itself.

BCFRWCM3.Operating Cash Flow

$$= \frac{\text{CFFO}}{\text{Current liabilities}} = 0.73 \quad (24)$$

The Apple's operating cash flow ratios were 0.64, 0.66, 0.66, 0.77, 0.83, and 0.79 in the years

2017-2022, respectively. The average was 0.73. The company produces CFFO by about three fourths of its current liabilities. This is important because the current liabilities should be paid in one year.

BCFRWCM4.Cash Current Debt Coverage

$$= \frac{\text{CFFO} - \text{Cash dividend}}{\text{Current debt}} = 0.60 \quad (25)$$

The Apple's cash current debt coverage ratios were 0.51, 0.55, 0.52, 0.63, 0.71, and 0.70 in the years 2017-2022, respectively. The average was 0.60. It means more "CFFO after dividend payment" than half of the current debt. It could be considered that the dividends have been paid before current debt payment.

The Group B ratios of the corporation shows that its current liability could be paid with its homemade cash, the CFFO. It could be understood from its ratios BCFRWCM2, BCFRWCM3, and BCFRWCM4. They are 7.83, 0.73, and 0.60, respectively. The 7.83 shows payment power of current maturities of long-term debt. It is a meaningful amount because it represents repayment of long-term financing. The reason of long-term financing is the business's investments in non-current assets and it means growth of business. That is, the business is comfortable about its creditors' collections from the business, the Apple. The other two ratios mean playability of its total current liabilities with CFFO and "CFFO after dividend payment". The second is important for the owners. It means cash after dividend payment to the owners. It guarantees the of owners, or its stock holders, about dividend payment. The Apple supports liabilities with its CFFO. The working capital management is coherent with the liabilities or responsibilities.

Application Via Group C Cash Flow Ratios

The Apple's Group C ratios are shown at the Table 5 below:

Table 5: Group C Cash Flow Ratios of the Apple Corp

Number of the ratios	2017	2018	2019	2020	2021	2022	Average
CCFRWCM1	0.28	0.29	0.27	0.29	0.28	0.31	0.29
CCFRWCM2	1.06	1.09	1.09	1.22	0.95	1.02	1.07
CCFRWCM3	0.99	0.98	1.01	1.02	1.03	1.01	1.01

CCFRWCM1.Return of Sales to CFFO

$$= \frac{\text{CFFO}}{\text{Sales}} = 0.29 \quad (26)$$

The Apple's return of sales to CFFO was 0.28, 0.29, 0.27, 0.29, 0.28, and 0.31 in the years 2017-2022, respectively. It means that the CFFO is 28%, 29%, 27%, 29%, 28%, and 31% of the sales in the years. The average was 0.29. The denominator "sales" means an amount before all costs and expenditures. However, the CFFO means an amount after all cash payments. For this reason, the ratio could not be thought as "not enough".

CCFRWCM2.Operating Index

$$= \frac{\text{CFFO}}{\text{Operating Income}} = 1.07 \quad (27)$$

The Apple's operating income was 1.06, 1.09, 1.09, 1.22, 0.95, and 1.02 in the years 2017-2022, respectively. The average was 1.07. It means more CFFO than operating income. The CFFO is over operating income. It could be thought that cash based working capital management is successful about creating CFFO.

CCFRWCM3.Return of Sales to Cash

$$= \frac{\text{Cash From Sales}}{\text{Sales}} = 1.01 \quad (28)$$

The Apple's return of sales to cash ratio was 0.99, 0.98, 1.01, 1.02, 1.03, and 1.01 in the years 2017-2022, respectively. The average was 1.01. It seems from the ratios of the six years that there is no problem about the collection of account receivables in the company. The ratios of all years analysed are very close to 1. That is the company has no collection problem. It is managed good enough about its working capital.

The Group C ratios of the Apple show sales, operating income, and CFFO coherency of the Apple. CFFO is more than operating income. The account "Sales" turns cash exactly.

Coordination of the Three Ratio Groups

It seems that the three groups of the ratios of the Apple are pretty coherent. The Group A ratios shows that the Apple could pay its interest payments, dividend payments, long term debt payments, investment expenditure in non-current assets, and fixed charge. The CFFO it creates could meet its financing and investing cash needs. The Group B ratios shows the Apple's CFFO creating power using its financing sources. Especially, short term liabilities are the main idea of cash based working capital management. Its current debt and current maturities of long-term debt could be paid with the CFFO the Apple produces itself. If it is considered that "total assets = total debt", CFFO is seem good about repaying it's all debt or liabilities. 0.25 average of BCFRWCM1 could be thought good if CFFO is considered as net of CFFO after cash outflows because debt covers all liabilities including accruals for taxes, wages, insurances, short- and long-term bank credits, bond principal payments etc. From the Group C, it could be seen that the CFFO of the Apple is pretty good if comparing with its sales and operating income. These two items are very important for cash flow based working capital of corporations including the Apple. The Apple could produce CFFO more than operating income and a reasonable CFFO to its sales. At the same time, its cash from sales seems good to sales. That is, it has not any collection problem. It means that cash based working capital management is very successful. All cash flow ratios used in working capital management have been useful during cash flow based working capital management.

CONCLUSION AND RECOMMENDATIONS

Cash flow based working capital management could be used as an additional tool for working capital management of corporations. Many important issues about working capital management could be found out via cash flow ratios.

Interest payment and dividend payment to the financiers using CFFO status of a corporation could be determined through ACFRWCM1, ACFRWCM2, ACFRWCM5, ACFRWCM7, BCFRWCM2, and BCFRWCM4.

Payment power of current debt with CFFO could be watched through BCFRWCM2, BCFRWCM2, and BCFRWCM4. Financing ability of long-term debt payment, acquisition of fixed assets, inventory increase with CFFO could be watched through the cash flow ratios ACFRWCM1 and ACFRWCM2. Comparison of CFFO to financing and investing cash outflows could be done via ACFRWCM4. Fixed charges payment ability using CFFO could be measured through ACFRWCM6.

Cash flow based working capital management insight could not be thought as an alternative for traditional working capital management. It could be thought as an additional tool for traditional working capital management. It could be thought as an improvement study of traditional

working capital management. The writer has wanted to contribute to the working capital management theory. His intention is not any cancellation in the theory of corporate finance.

In my opinion, all af the corporations operating all industries should use the CFCF model including working capital management function of it. Thus, they could complete their missing points about working capital management. They could extend their points of view about the issues about working capital management. In addition, the working capital could be managed more easily.

Appendix

Codes Used in Cash Flow Based Working Capital Management and Their Meanings

Code	Full name of the code	Code	Full name of the code
ACFRWCM1	Group A cash flow ratio 1 for working capital management	BCFRWCM2	Group B cash flow ratio 2 for working capital management
ACFRWCM2	Group A cash flow ratio 2 for working capital management	BCFRWCM3	Group B cash flow ratio 3 for working capital management
ACFRWCM3	Group A cash flow ratio 3 for working capital management	BCFRWCM4	Group B cash flow ratio 4 for working capital management
ACFRWCM4	Group A cash flow ratio 4 for working capital management	CCFRWCM1	Group C cash flow ratio 1 for working capital management
ACFRWCM5	Group A cash flow ratio 5 for working capital management	CCFRWCM2	Group C cash flow ratio 2 for working capital management
ACFRWCM6	Group A cash flow ratio 6 for working capital management	CCFRWCM3	Group C cash flow ratio 3 for working capital management
ACFRWCM7	Group A cash flow ratio 7 for working capital management	CFFO	Cash flow from operations
BCFRWCM1	Group B cash flow ratio 1 for working capital management	--------	------

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