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Cash Flow Based Corporate Finance (CFCF) Model

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ABSTRACT

CFCF model is a new model about corporate finance. It requires calculating twenty nine cash flow ratios using three financial statements -the balance sheet, the income statement and the cash flow statement. The building of the model continues with the stage of the assignment of the cash flow ratios to the functions of cash flow based corporate finance. At last, the functions being assigned the cash flow ratios were joined each other and was named as CFCF model.

Keywords: Cash, Corporate Finance, Cash Flow, CFCF Model

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1.Introduction

Finance theory is live. Its contribution to society is continuing and should continue in the future. Accrual based corporate finance is critisized because of the opinion of its inefficiency to contribute solving corporate finance matters. Of course, cash flow base is praised,too. Cash flow base, sometimes, is thought more pragmatistic than accrual base. Are there some cash flow insights allready used in corporate finance?. Of course yes, for instance, there are some methods used cash flow instead of profit in capital budgeting. Net present value, profitability ratio, and internal rate of return are cash based. However, the cash flow is considered as “profit after tax+depreciation and amortization”. It is not calculated from cash flow statement directly.

2.CFCF Model

CFCF model starts with the three financial statements - balance sheet, income statement and cash flow statement. However, the most important financial statement used in the model is “cash flow statement” because all cash flow ratios from CFR1 to CFR29 used in the model require the cash flow statement. The other financial statements require for only to calculate limited number of cash flow ratios.It will be explained more detailed at the section 2.1.

The Second stage of the model is calculating twenty nine cash flow ratios named CFR1, CFR2,CFR3……CFR29. Application of the calculation of 28 CFRs from CFR1 to CFR 28 was fulfilled on the financial statements of the Apple Corporation in Yilmaz (2021a) and Yilmaz (2021b). The application of the CFR29 was fulfilled at the section 2.3 of this article on the financial statements of the Apple Corporation.

The third stage of the model is the assignment of the cash flow ratios (CFRs) to the functions of corporate finance. At the Section 2.3 of this article, the assignment is fulfilled function by function.The assumed numbers of the corporate finance are accepted as eight function for this article purpose. About this matter, Laux (2013) was benchmarked. After this assumption, the assignment was fulfilled. The ratios were not explained at the section because they had been explained at the Section 2.2.of this article. More detailed explanation of the cash flow ratios used in the functions of corporate finance was not fulfilled in this article. This will be the subject of future article/articles.

The fourth and last stage is to build the model CFCF. The model was given at the Section 2.4. of this article.

Abbreviations of the vocabulary used through the article and for CFCF model are shown at the Abbbreviation List.

2.1 Stage 1:Financial Statements

Usage of three financial statements for calculating the cash flow ratios (CFRs) is shown at the Table 1 below:

Table 1.Usage of Financial Statements for Calculating the Cash Flow Ratios

Name of cash flow ratios	Use of statement of cash flow	Use of income statement	Use of balance Sheet
CFR1	Yes	No	No
CFR2	Yes	No	No
CFR3	Yes	No	No
CFR4	Yes	No	No
CFR5	yes	No	yes
CFR6	yes	No	No
CFR7	yes	yes	No
CFR8	yes	Yes	No
CFR9	Yes	No	yes
CFR10	yes	No	No
CFR11	yes	No	No
CFR12	yes	No	No
CFR13	yes	yes	No
CFR14	yes	No	yes

CFR15	yes	No	yes
CFR16	yes	No	No
CFR17	Yes	No	No
CFR18	yes	No	yes
CFR19	yes	No	yes
CFR20	yes	No	yes
CFR21	yes	No	yes
CFR22	yes	No	No
CFR23	yes	No	No
CFR24	yes	No	yes
CFR25	yes	No	No
CFR26	Yes	No	yes
CFR27	yes	No	No
CFR28	yes	No	yes
CFR29	Yes	No	No
Total usage	29	3	11
% usage of the financial statement in calculating the CFRs	100	10.35	37.93

As it could be seen from the Table 1, the Statement of Cash flow is used to calculate the all 29 cash ratios flow. This shows that the statement of cash flow is very important for the cash flow ratio analysis. The income statement is necessary to calculate 3 cash flow ratios only. The Balance Sheet is necessary to calculate 11 cash flow ratios.

The cash flow ratios need only the Statement of Cash Flow to calculate are Cash Flow adequacy, Cash Flow adequacy II, Dividend Payout, Reinvestment of Cash, Depreciation Effect, CFFO to Annual Interest Payments, Overall Cash Flow, Cash Flow Per Share, Cash Dividend Coverage, Capital Acqusition, Interest Payment Coverage, Fixed Charges Coverage, Cash Interest Coverage, Capital Expenditure, and Free Cash Flow. They are 15 ratios. It is 51.72% of the ratios.

The cash flow ratios need the Statement of Cash Flow and the Income Statement to calculate are Return of Sales to CFFO[1], Operating Index, and Return of Sales to Cash. They are 3 ratios. It is 10.35 % of the ratios.

The cash flow ratios need the Statement of Cash Flow and the Balance Sheet to calculate are Debt Coverage, CFFO to Assets, Cash Debt Coverage, Current Maturities of LTD[2] Coverage, Cash Return on Assets, Internal Generation of Cash Available to Creditors and Investors, Return to Stockholders, Long Term Debt Coverage, Operating Cash Flow, Cash Current Debt Coverage, and Total Debt. They are 11 ratios. It is 37.93 % of the ratios.

Numbers of the parts of of the numerator and denominators of the CFRs are 74.These numbers could be found from the three financial statements. Use of the financial statements to find the parts of numerator and denominator is shown at the Table 2 below:

Table 2: Increasing Importance of Statement of Cash Flow in Calculating the CFRs

Financial Statement	Number of the Usage	% of the Usage
Statement of Cash Flow	59	79.73
Balance Sheet	12	16.22
Income Statements	3	4.05
Total	74	100

[1] Cash Flow From Operations.

[2] Long Term Debt

As it could be seen from the Table 2, if one investigates the financial statements used to calculate CFRs considering the items, which is 74 items in these ratios totally, he/she could see that Cash Flow Statement is more important than that of only the ratios are seen generally as if all of the ratios cover only two items- one in the numerator and one in the denominator. The importance of Cash Flow Statement has increased from 51.72% to79.73 %. About 80% of all data from the three financial statements has been provided from the Cash Flow Statement only. This shows that the model Cash Flow Based Corporate Finance (CFCF) and the tools used to construct the model are pretty consistent with each other.

2.2. Stage 2: Cash Flow Ratios (CFRs)

2.2.1 Calculation and Explanation

The cash flow ratios calculated using the three financial statements and used by CFCF model are CFR1 Cash Flow Adequacy I [3], CFR2. Cash Flow Adequacy II [4], CFR3. Dividend Payout, CFR4. Reinvestment of Cash, CFR5.Debt Coverage, CFR6. Depreciation Effect, CFR7.Return of Sales to CFFO, CFR8. Operating Index, CFR9. CFFO to Assets, CFR10.CFFO to Annual Interest Payments [5], CFR11.Overall Cash Flow [6], CFR12.Cash Flow per Share [7], CFR13.Return of Sales to Cash, CFR14.Cash Debt Coverage, CFR15.Current Maturities of LTD Coverage, CFR16.Cash Dividend Coverage, CFR17.Cash Acquisition, CFR18. Cash Return on Assets, CFR19.Internal Generation of Cash Available to Creditors and Investors, CFR20.Return to Stockholders, CFR21.Long Term Debt Coverage, CFR22. Interest Payment Coverage, CFR23. Fixed Charges Coverage, CFR24.Operating Cash Flow [8], CFR25.Cash Interest Coverage, CFR26.Cash Current Debt Coverage,CFR27.Capital Expenditure, CFR28.Total Debt, and CF29.Free Cash Flow.

The ratios could be calculated and explained shortly as below:

$$\text{CFR1 Cash Flow Adequacy I} = \frac{\text{CFFO}}{\text{Long term debt payment} + \text{Asset acquisition} + \text{dividend paid}} \quad (1)$$

This ratio covers some figures from the Cash Flow Statement. It shows how much CFFO is produced in comparison with long term debt payment, asset acqusition 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 acqusition and dividend payment of cash flow statement.

$$\text{CFR2 Cash Flow Adequacy II} = \frac{\text{CFFO}}{\text{capital expenditure} + \text{inventory increase}^{9} + \text{cash dividend}} \quad (2)$$

This ratio's content is different than that of the first ratio even though their name is same. This ratio's denominator is pretty different than that of the CFR1. 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 adequacy ratios are different than that of each

[3] The ratios number 1and 3-9 were cited from Giacomino and Mielke (1993:57) .

[4] This ratio with same name "cash flow adequecy" was cited from Bernstein (1989:566-567).

[5] This ratio was cited from Ferris and Others (1992:219).

[6] This ratio was cited from Louderback and Others (1993:336).

[7] The ratios number 12-23 were cited from Shim ve Siegel (1992: 96 - 99 ve 624).

[8] The ratios number 24- 28 were cited from Mills and Yamamura (1998:55-58).

[9] The "inventory increase" is calculated by substracting former year's inventory account from current year's inventory account.

other.

CFR3 Dividend Payout= $\frac{\text{Dividend paid}}{\text{CFFO}}$ (3)

This ratio calculates dividend paid to the stockholders to cash flows from operations. As it is known, the CFFO is produced by the business. It is not produced by cash flow from financing (CFFF) activities or cash flow from investment (CFFI) activities. So, it is very important for the owners. Let's assume that, the CFFO is less than the dividend paid, or vice versa, dividend paid is more than the CFFO, it could be explained that the business has provided financial source from the banks or other financial institutions with financial cost which will be paid by the business in the future. It may be in the near future.

CFR4 Reinvestment of Cash = $\frac{\text{Asset acquisition}}{\text{CFFO}}$ (4)

This ratio calculates how much cash it was invested for asset acquisition from CFFO. Whether the CFFO is enough to invest to non-current assets or not could be determined by this ratio. If it is under 1, it means that the CFFO was enough to complete missing non-current assets. However, if the ratio is over 1, its meaning is that the CFFO is not enough to add the productive capacity, the business needs financing source or selling another current and / or non-current asset or assets.

CFR5.Debt Coverage = $\frac{\text{Total debt}}{\text{CFFO}}$ (5)

This ratio determines total debt to CFFO. It answers to the question "can all debt be paid with the CFFO". If the ratio is over 1, it means that the total debt is more than the CFFO. The business could not create enough CFFO to pay all debt. If the ratio is under 1, it means that the total debt is less than the CFFO. The business could create enough CFFO to pay all debt. Actually, total debt will not be paid in the current year because except "current maturities of long term debt", long term debt will not be paid in the current year. For this reason, it could be seen enough ratio even under 1.The real payment will be short term debt plus current maturities of long term debt. To interpret the ratio, the amount of short term debt including current maturities of long term debt and long term debt should be known.

CFR6.Depreciation Effect = $\frac{\text{Depreciation}}{\text{CFFO}}$ (6)

Depreciation is an important cash source. What percent of cash is created by depreciation is important. It measures operating level of the non-current assets. With a physical investment, amount of depreciation increases. It decreases profit, but increases cash flow from operations (CFFO). The effect of an investment on CFFO could be measured through this ratio. If the ratio is near 1, it means more of the CFFO comes from the depreciation. This shows the contribution of an investment to the CFFO. A new investment project could be evaluated with this ratio beside other capital budgeting techniques such as NPV, profitability, and

internal rate of return (IRR).

CFR7.Return of Sales to CFFO = $\frac{\text{CFFO}}{\text{Sales}}$ (7)

This ratio measures how sales turns to CFFO. If it is more than 1, there are two probabilities. Either sales has decreased or the CFFO has increased extremely. The term “return” is not yield or profit in the ratio. Its meaning looks like “turnabout” or “turn around”. Fold or per cent could be used about the result of the calculation of the ratio.

CFR8.Operating Index = $\frac{\text{CFFO}}{\text{Operating income}}$ (8)

With this ratio, how many fold or per cent CFFO was created to operating income is calculated. The operating income is the income after cost of sales and operating expenses. Operating income is the income amount before other income or expense and before provision for income tax.The two items of the ratio are pretty connected because the two of them are the output of operating activities, operating income and operating cash.

CFR9.CFFO to Assets = $\frac{\text{CFFO}}{\text{Total assets}}$ (9)

The ratio measures CFFO created by total assets. It is not asset profitability. It is the CFFO creating power of the assets. How efficient the business used its assets could be measured by this ratio based on cash flow. At this ratio, data from the statement of cash flow and balance sheet are used. Efficient and effective utilization of assets is important to produce a high CFR9 ratio. For effective and efficient usage of the assets, a successfully management is a precondition.

What percentage CFFO of total assets was created could be seen from this ratio. Collecting of accounting receivable in time, qualified product policy, marketing capability, good discount policy etc.could affect this ratio.

CFR10.CFFO to Annual Interest Payments = $\frac{\text{CFFO}}{\text{Annual interest payments}}$ (10)

This ratio measures how many fold CFFO are produced by the annual interest payments. Interest payment has been paid to finance the business. After production and sales the business produces CFFO. For this reason, the finance manager could wonder how successful the credit being provided by the company was used .The more ratio means that the financing sources have been used more efficient and effective than before.

CFR11.Overall Cash Flow = $\frac{\text{CFFO}}{\text{Financing cash outflows}+\text{Investing cash outflows}}$ (11)

This ratio 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 statement of cash flows are used to calculate the ratio. Whether the business could create or not enough cash to meet cash outflows is very important for the business's success. This ratio measures this.

CFR12[10]. Cash Flow Per Share = $\frac{\text{Net cash flow}^{11}}{\text{Number of shares}}$ (12)

This ratio measures how much dollars a stock earns. Cash flow per share is different from the earning per share (EPS).This is a cash based ratio. The investor learns how much money an investor earned via the cash flow per share ratio. It is not an accrual based measure. It includes the collection of accounting receivables (and even it includes not paying account payable). This ratio could be used by investors. Potential investors could wonder how much money a business produces for a share .

CFR13.Return of Sales to Cash = $\frac{\text{Cash from Sales}^{12}}{\text{Sales}}$ (13)

The collection policy of a business could be controlled by this ratio. 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 such as market conditions. If the ratio is exactly 1, it means that collections of old accounting receivables are equal with the current year's account receivables. "Cash from sales" shows the cash a business creates from the sales. It is a very important measure to fix the collection success of a business. Cash flow statement and income statement are necessary to calculate the ratio. Decreasing "account receivables" shows increasing "cash from sales".

CFR14.Cash Debt Coverage = $\frac{\text{CFFO}-\text{dividends}}{\text{Total debt}}$ (14)

The ratio measures how many fold or percent CFFO a business produces after dividend paid to the owners to total debt. How financing with debt is productive or not is determined via this cash flow ratio. Produced "CFFO mines dividend payment" via debt is shown with this ratio.

[10] The ratio is also shown as "Cash Flow Per Share = Net Cash Flow From Operations/The Number of Shares Outstanding (Institute of Management Accountants, 1994:18).

[11] This is seen at the Cash Flow Statement as "Increase/(Decrease) in cash, cash equivalents and restricted cash"in the Form -10K of the U.S Security and Exchange Commission . Source list of this article covers five Cash Flow Statements of the Apple Corporation suitable for the Form 10-K fort he years 2016,2017,2018, 2019, and 2020.

[12] The numerator "cash from sales" was calculated like that: Net sales+Decrease in Account Receivable - Increase in Accounts receivable". It is considered connected with the previous period. The difference between current period and previous period is either possitive or negative. Increase in Account Receivable decreases the "cash from sales" and decrease in account receivable increases the "cash from sales".

CFR15.Current Maturities of LTD Coverage = $\frac{\text{CFFO}-\text{dividends}}{\text{Current Maturities of LTD}}$ (15)

This ratio measures CFFO after dividend paid to current maturities of long term debt. If it is more than 1, it means that the business could produce more CFFO after dividend paid 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 paid. 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 could decrease with the increase of dividend paid. 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. For this reason, this ratio should be watched carefully.

CFR16.Cash Dividend Coverage = $\frac{\text{CFFO}}{\text{Dividends}}$ (16)

This ratio measures CFFO to dividends. It means how many folds CFFO of dividend a business produces. If it is 0.80, it means that the business has produced itself 80% of dividend it paid. It means cash flow for dividend payment from only operating activities. It does not contain the cash flow from financing and investing activities.

CFR17.Cash Acquisition = $\frac{\text{CFFO}-\text{Dividends}}{\text{Cash paid for acquisition}}$ (17)

The cash flow ratio explains how much cash payment has been fulfilled to acquisition by "CFFO after dividend" which was produced by the business. If it is more than 1, it means that the company has produced more CFFO after dividend than that of payment for the acquisition. Let's assume that the ratio is only 10%. So, 10 folds of CFFO after dividend has been spent for cash acquisition.

CFR18. Cash Return on Assets = $\frac{\text{CFFO before interest and taxes}[13]}{\text{Total assets}}$ (18)

This ratio calculates how much CFFO before interest and taxes is produced by total assets. The numerator "CFFO before interest and taxes" is different than "earnings before interest and taxes" (EBIT). The CFFO before interest and taxes is a cash-based measure. The EBIT is an accrual based measure. It could be thought that CFFO before interest and taxes is more realistic than EBIT. Its reason is that CFFO before interest and taxes is spendable immediately. It is already cash. The EBIT could not be spendable immediately because it is accrual based. For example, it could be uncollected account receivables which could not be spent for the business's current cash needs. CFR18 shows how efficient the assets were used to produce "CFFO before interest and taxes".

[13] It is calculated adding Interest and Taxes to CFFO.

CFR19.Internal Generation of Cash Available to Creditors and Investors = $\frac{\text{CFFO}}{\text{Total debt+stockholders' equity}}$ (19)

This ratio measures how much CFFO was produced by using all financing sources because passive side of balance sheet covers short term liabilities, long term liabilities, and owner's equity. Total debt at the ratio covers short term debt and long term debt. For this reason, it covers all passive side of the balance sheet. If a business produces more CFFO, the ratio will approach to 1.

CFR20.Return to Stockholders = $\frac{\text{CFFO}}{\text{Stockholders' Equity}}$ (20)

The ratio measures how much CFFO the business produces with its stockholders equity. It is not the return on equity (ROE). This is cash version of the ROE. It is a cash-based measurement of the ROE. The more return to stockholders ratio means the more collecting success for account receivables. The stockholders, that is the owners, could be glad if this ratio increases. At the same time, potential investors could have a positive opinion about the business if the ratio increases. If the ratio decreases, the owners will not be glad, so do potential investors.

CFR21.Long Term Debt Coverage = $\frac{\text{CFFO}}{\text{Long term debt}}$ (21)

This ratio helps to define how many fold or percent CFFO is created with the long term liabilities of the business. Actually, the long term debt except current maturities of long term debt will not be paid in the current year. However, it will continue financing the productive operations. Long term debt covers bonds that a business issues and long term bank credits a business provides. However, generally, banks can not provide enough long term debt to invest to fixed assets. This ratio shows how a business uses its assets to produce CFFO to pay its long term debt or bonds it issued.

CFR22. Interest Payment Coverage = $\frac{\text{CFFO+interest payment}}{\text{Interest payment}}$ (22)

The ratio determines how much cash a business's interest payment produces. The nominator covers CFFO + interest payment, not only CFFO. The importance of financing cost to produce CFFO is determined by this ratio. 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 nominator will be higher. A corporate manager should be careful when he/she coments the ratio during cash flow based corporate finance (CFCF).

CFR23. Fixed Charges Coverage = $\frac{\text{CFFO+Fixed charges}}{\text{Fixed charges}}$ (23)

Fixed charges are to be paid to continue the production and other operations of the business. Fixed charges covers cash outflows from administrative cost, interest cost, payment of long term debt principal, payment of short term debt principal, and property tax. This ratio shows how many fold "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 efficient and effectively usage of fixed charges.

CFR24.Operating Cash Flow = $\frac{\text{CFFO}}{\text{Current liabilities}}$ (24)

The current liabilities are the liabilities which will be paid in 1 year. That is, they should be returned to CFFO to be paid in 1 year. This ratio measures this capability. If the ratio is over 1, it means that the business produces more CFFO than the current liabilities. That is, it could pay its current liabilities via its CFFO which was created via its current liability. This is a balanced situation. If the ratio is under 1, this shows incapability about that.

CFR25.Cash Interest Coverage = $\frac{\text{CFFO+Interest paid+Taxes paid}}{\text{Interest paid}}$ (25)

This ratio measures how many fold 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 will remember,the CFR22 (interest payment coverage) does not measure this.

CFR26.Cash Current Debt Coverage = $\frac{\text{CFFO}-\text{cash dividend}}{\text{Current debt}}$ (26)

The ability of payment of current debt with "after dividend payment CFFO" could be measured by this ratio. The reason to subtract dividend payment is its 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.

CFR27.Capital Expenditure = $\frac{\text{CFFO}}{\text{Capital expenditure}}$ (27)

This ratio aims measuring how many fold or per cent CFFO is produced to meet the capital expenditure made by a business. A ratio under 1 shows less CFFO than the capital expenditure the business produces.

CFR28.Total Debt = $\frac{\text{CFFO}}{\text{Total debt}}$ (28)

Total debt ratio determines how much CFFO the business produces with its total debt. Its calculation requires balance sheet and cash flow statement. The total debt covers current liabilities and long term liabilities. Decreasing of total debt in the denominator increases the ratio. Increasing the total debt decreases the ratio. If the CFFO increases when the total debt is fixed

the ratio increases, too. It means that the total debt has been used more efficiently and effectively. For Instance, the financing source provided by the bond issue is a kind of long term debt. When CFFO is increased, the interest payment because of the bond issued by the company will be paid by the CFFO which was produced by the operations.

CF29.Free Cash Flow = $\frac{\text{Free Cash flow}}{\text{CFFO}}$[14] (29)

It shows the proportion of free cash flow in CFFO. It means a business produces how percentage of its operating cash flow as a free cash flow. To compare with other companies, this ratio is more usefull than the amount of free cash flow.

2.2.2. Application of the Calculation of the Cash Flow Ratios

The application of calculation in the Apple Corporation about the 28 cash flow ratios (the ratios numbers CFR1-CFR28) is shown in Yilmaz (2021a: 8-12 and 15-16).

An application about a part of the cash flow ratio (CFR29), that is the numerator (free cash flow) in the same corporation (the Apple) is seen in (Yilmaz,2021b:86-87).The Free Cash Flow numbers calculated will be divided to CFFO to calculate the CFR29. The calculation of the Apple Corporation's CFR29 ratio for the years 2017-2020 is shown at the Table 3 below:

[14] Jensen (1986) defines free cash flow firstly. He defines free cash flow as "cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital". This could be transformed to a formula like that: FCF= Net Cash flow- Capital Expenditures

Richardson (2006) defines free cash flow as "cash flow beyond what is necessary to maintain assets in place and to finance expected new investments". This could be transformed to a formula like that: FCF= Net Cash flow- Capital Expenditures

Lewellen and Lewellen (2016) defines the free cash flow as "cash flow in excess of capital expenditure". They use a formula for their free cash flow calculation like that: FCF=Net cash flow –capital expenditures

Moyer et al. (1995) defines free cash flow as "the portion of a firm's total cash flow available to service additional debt, to make dividend payments to common stockholders, and to invest in other projects. They calculate the quantity of free cash flow like that : FCF = CF - I (1-T) – Dp – Pf - B – Y ,where , CF : after-tax operating cash flow, I: before- tax interest payment,T: tax rate, Dp: preferred stock dividend payment, Pf : required redemption of preferred stock, B: required redemption of debt, Y: investment in property, plant and equipment required to maintain cash flows at their current levels. If a firm has interest income, this is netted out against interest expense. If interest income exceeds interest expense, FCF will increase by the amount of the net after-tax interest income

Keown et.al. (2005) defines free cash flow as "amount of cash available from operations after paying for investments in net operating working capital and fixed assets". This cash is available to disribute to the firm's creditors and owners. However, if the free cash flow is negative, the creditors and investors are the ones who make up the shortfall someone has to do it. Keown at.al calculate the free cash flows in two perspectives. The one of them is an asset perspectice. The other is financing perspective. The free cash flow is calculated using the asset perspective like that: FCF= After tax operating cash flows- investment in assets .In here, investment in assets is calculated like that: Investment in assets= Change in net operating working capital + Change in gross fixed assets and other assets. Financing perspective in calculating free cash flow is based on receiving money from or distributing money to its investors,or some of both, of a firm. The writers think that cash flows between investors and the firm occur in one of four ways generally. They are 1.Interest payment to creditors, 2.Dividend payment to stockholders, 3. Increasing or decreasing outstanding debt, 4.Issuing or repurchasing stock from current investors.

Ross et.al (2003) think that cash flow from assets sometimes is called free cash flow. The writers add their opinions that, actually no such thing as "free" cash. It refers that the firm is free to distribute to creditors and stockholders because it is not needed for working capital or fixed asset investment. They say the free cash flow should be thought as "cash flow from assets" because in practice there is some variation in exactly how free cash flow is computed. They are sure that whenever the prase "free cash flow" is talked about, the people should understand that what is being discussed is cash flow from assets or something quite smilar. Accordingly, cash flow from assets or free cash flow is calculated as below:

Free Cash Flow = Operating Cash Flow – Net capital spending - Change in net working capital (NWC)

They explain the calculation more detailed as below:

Operating Cash Flow= Earning before interest and taxes (EBIT) +Depreciation - Taxes

Net capital spending = Ending net fixed assets - Beginning net fixed assets +Depreciation

Change in net working capital (NWC)= Ending net working capital (NWC)-Beginning net working capital (NWC) .

Stice et al.(2017) adopt a definition for free cash flow that "operating cash flow mines capital expenditures". The ratio could be arranged as below: FCF= OCF-Capital Expenditures

Bhandari and Adams (2017) assert that since Jensen's (1986) definition of FCF has subjective components, it allows analysts, researchers, and managers to use their discretion and personal biases in calculating a firm's FCF. Analyst's choice of "all projects that have positive net present value" and "cost of capital" can influence the measurement of FCF. Therefore, unless a standardized metric is agreed upon by academics and professionals, FCF will be more suitable for intra-company analysis, discussion and decision making rather than inter-company comparison. They offer a calculation for free cash flow like that: FCF= CFO- Capital Expenditure – Debt Payments.

Rupic at al (2017) define free cash flow to the firm (FCFF) as the cash flow available to the firm's suppliers of capital after all operating expenses have been paid and necessary investments in working capital and fixed capital have been made. Free cash flow to equity is the amount of cash flow that accrues to equity shareholders after all operating, growth, expansion and even financing costs of the firm have been met. The article accepts two way to calculate the free cash flow. They are direct way and indirect way. The direct way is:

FCFF= Operating Cash Flow (OCF) – Capital Expenditures (CAPEX)

The indirect way is: FCFF=Net Income + Depreciation and Amortization – Change in working capital - Capital expenditures..

Table 3: CFR29 Ratios of the Apple Corporation

	2017	2018	2019	2020	% change 2017-2018	% change 2018-2019	% change 2019-2020
Free Cash Flow[15]	-12,646	-7,689	13,816	-17,744	+39.20	+279.69	-228.40
CFFO	63,598	77,434	69,391	80,674	21.76	-10.39	16.26
CFR29 (%)	-19.98	-9.93	19.91	-21.99	50.30	300.50	-210.45

This calculation is only a complementary part of CFR1-CFR28 given by Yilmaz (2021a).

2.3.Stage 3: Assignment of the CFRs to the Functions of Corporate Finance

In the CFCF model, use of cash flow ratios in corporate finance are explained function by function. The eight functions of corporate finance are financial analysis, working capital management, capital budgeting, merger & acqusition, capital structure, dividend policy, leverage, and valuation. Which cash flow ratio or ratios could be used in the functions of cash flow based corporate finance will be explained as below:

1.During cash flow based financial analysis (CFFinAn), all of the cash flow ratios could be used. It could be thougt that cash flow ratio analysis provides an important contribution to the financial analysis function of corporate finance. Actually, cash flow ratio analysis was used by the writer as a part of Yilmaz cash management model[16]. This is a kind of financial analysis. This is a cash flow based financial analysis. So, the 29 cash flow ratios this article adopts could be used for cash flow based financial analysis. It could be thought a complementary part of financial analysis.

2.During cash flow based working capital management (CFWCM), all of the cash flow ratios could be used. Its reason is the management of cash and cash equivalents is a part of working capital management. Actually, as it was said above, all cash flow ratios cover at least a number from the cash flow statement in the numerator or denominator, so it could be used for cash flow management covered by working capital management.

3. During cash flow based capital budgeting (CFCapBud), the cash flow ratios used are shown as below:

$$\text{CFR1}= \frac{\text{CFFO}}{\text{Long term debt payment} + \text{Asset acquisition} + \text{Dividend paid}} \quad (30)$$

$$\text{CFR2}= \frac{\text{CFFO}}{\text{Capital expenditure} + \text{Inventory increase}^{17} + \text{Cash dividend}} \quad (31)$$

$$\text{CFR4} = \frac{\text{Asset acquisition}}{\text{CFFO}} \quad (32)$$

$$\text{CFR6} = \frac{\text{Depreciation}}{\text{CFFO}} \quad (33)$$

$$\text{CFR9} = \frac{\text{CFFO}}{\text{Total assets}} \quad (34)$$

$$\text{CFR11}= \frac{\text{CFFO}}{\text{Financing cash outflows} + \text{Investing cash flows}} \quad (35)$$

[15] This numbers are provided from (Yilmaz,2021b:87).

[16] For the model, look at Yilmaz H, "Another Perspective to Corporate Cash Management. A New Model and Definition", International Journal of Humanities and Social Science, Vol.1, No. 11 (Special Issue, August 2011), pp.284-289 and Yilmaz H., "Was Yilmaz Cash Management Model Accepted by the Theory of Finance", American Journal of Finance Vol.5, Issue 1, pp 16-23, 2020

[17] The "inventory increase" is calculated by substracting former year's inventory account from current year's inventory account.

$$CFR17=\frac{\text{CFFO}-\text{Dividends}}{\text{Cash paid for acquisition}} \quad (36)$$

$$CFR18=\frac{\text{CFFO before interest and taxes}}{\text{Total assets}} \quad (37)$$

$$CFR19=\frac{\text{CFFO}}{\text{Total debt}+\text{Stockholders' equity}} \quad (38)$$

$$CFR27=\frac{\text{CFFO}}{\text{Capital expenditure}} \quad (39)$$

$$CFR29=\frac{\text{Free cash flow}}{\text{CFFO}} \quad (40)$$

4.During cash flow based merger&acquisition (CFM&A), the cash flow ratios used are shown as below:

$$CFR4=\frac{\text{Asset acquisition}}{\text{CFFO}} \quad (41)$$

$$CFR17=\frac{\text{CFFO}-\text{Dividends}}{\text{Cash paid for acquisition}} \quad (42)$$

$$CFR29=\frac{\text{Free cash flow}}{\text{CFFO}} \quad (43)$$

5.During cash flow based capital structure (CFCapStr), the cash flow ratios used are shown as below:

$$CFR1=\frac{\text{CFFO}}{\text{Long term debt payment}+\text{Asset acquisition}+\text{Dividend paid}} \quad (44)$$

$$CFR5=\frac{\text{Total debt}}{\text{CFFO}} \quad (45)$$

$$CFR10=\frac{\text{CFFO}}{\text{Annual interest payments}} \quad (46)$$

$$CFR11=\frac{\text{CFFO}}{\text{Financing cash outflows}+\text{Investing cash flows}} \quad (47)$$

$$CFR14=\frac{\text{CFFO}-\text{Dividends}}{\text{Total debt}} \quad (48)$$

$$CFR15=\frac{\text{CFFO}-\text{Dividends}}{\text{Current maturities of LTD}} \quad (49)$$

$$CFR19=\frac{\text{CFFO}}{\text{Total debt}+\text{Stockholders' equity}} \quad (50)$$

$$CFR20=\frac{\text{CFFO}}{\text{Stockholders' equity}} \quad (51)$$

$$CFR21=\frac{\text{CFFO}}{\text{Long term debt}} \quad (52)$$

$$CFR22=\frac{\text{CFFO}+\text{Interest payment}}{\text{Interest payment}} \quad (53)$$

$$CFR24=\frac{\text{CFFO}}{\text{Current liabilities}} \quad (54)$$

$$CFR25=\frac{\text{CFFO}+\text{Interest paid}+\text{Taxes paid}}{\text{Interest paid}} \quad (55)$$

$$CFR26=\frac{\text{CFFO}-\text{Cash dividend}}{\text{Current debt}} \quad (56)$$

$$CFR28=\frac{\text{CFFO}}{\text{Total debt}} \quad (57)$$

$$CFR29=\frac{\text{Free cash flow}}{\text{CFFO}} \quad (58)$$

6. During cash flow based leverage management (CFLev), the cash flow ratios used are shown

as below:

$$CFR5=\frac{\text{Total debt}}{\text{CFFO}} \quad (59)$$

$$CFR10=\frac{\text{CFFO}}{\text{Annual interest payments}} \quad (60)$$

$$CFR14=\frac{\text{CFFO}-\text{dividends}}{\text{Total debt}} \quad (61)$$

$$CFR15=\frac{\text{CFFO}-\text{dividends}}{\text{Current maturities of LTD}} \quad (62)$$

$$CFR18=\frac{\text{CFFO before interest and taxes}}{\text{Total assets}} \quad (63)$$

$$CFR21=\frac{\text{CFFO}}{\text{Long term debt}} \quad (64)$$

$$CFR22=\frac{\text{CFFO}+\text{interest payment}}{\text{Interest payment}} \quad (65)$$

$$CFR25=\frac{\text{CFFO}+\text{Interest paid}+\text{taxes paid}}{\text{Interest paid}} \quad (66)$$

$$CFR28=\frac{\text{CFFO}}{\text{Total debt}} \quad (67)$$

$$CFR29=\frac{\text{Free cash flow}}{\text{CFFO}} \quad (68)$$

7.During cash flow based dividend policy (CFDiv Pol), the cash flow ratios used are shown as below:

$$CFR1=\frac{\text{CFFO}}{\text{Long term debt payment}+\text{Asset acquisition}+\text{Dividend paid}} \quad (69)$$

$$CFR2=\frac{\text{CFFO}}{\text{Capital expenditure}+\text{Inventory increase}+\text{Cash dividend}} \quad (70)$$

$$CFR3=\frac{\text{Dividend paid}}{\text{CFFO}} \quad (71)$$

$$CFR12=\frac{\text{Net cash flow}}{\text{Number of shares}} \quad (72)$$

$$CFR14=\frac{\text{CFFO}-\text{Dividends}}{\text{Total debt}} \quad (73)$$

$$CFR15=\frac{\text{CFFO}-\text{Dividends}}{\text{Current maturities of LTD}} \quad (74)$$

$$CFR16=\frac{\text{CFFO}}{\text{Dividends}} \quad (75)$$

$$CFR17=\frac{\text{CFFO}-\text{Dividends}}{\text{Cash paid for acquisition}} \quad (76)$$

$$CFR26=\frac{\text{CFFO}-\text{Cash dividend}}{\text{Current debt}} \quad (77)$$

$$CFR29=\frac{\text{Free cash flow}}{\text{CFFO}} \quad (78)$$

8.During cash flow based valuation (CFVal), the cash flow ratios used are shown as below:

$$CFR12=\frac{\text{Net cash flow}}{\text{Number of shares}} \quad (79)$$

$$CFR29=\frac{\text{Free cash flow}}{\text{CFFO}} \quad (80)$$

Explanation of the CFRs was fulfilled at the Section 2.2. The explanations are valid for the CFRs written in this section, too. The assignments are shown as a summary at the Table 4 as below.

Table 4:Summary List of the Assignments

Code of the Function of CFCF	Number of CFRs used in the function	Codes of the Ratios Assigned
CFFinAn	29	CFR1,CFR2,CFR3,CFR4,CFR5,CFR6,CFR7, CFR8,CFR9,CFR10,CFR11,CFR12,CFR13, CFR14,CFR15,CFR16,CFR17,CFR18,CFR19, CFR20,CFR21,CFR22,CFR23,CFR24,CFR25, CFR26,CFR27,CFR28,CFR29
CFWCM	29	CFR1,CFR2,CFR3,CFR4,CFR5,CFR6,CFR7, CFR8,CFR9,CFR10,CFR11,CFR12,CFR13, CFR14,CFR15,CFR16,CFR17,CFR18,CFR19, CFR20,CFR21,CFR22,CFR23,CFR24,CFR25, CFR26,CFR27,CFR28,CFR29
CFCapBud	11	CFR1, CFR2, CFR4, CFR6, CFR9, CFR11, CFR17, CFR18, CFR19, CFR27, CFR29
CFM&A	3	CFR4, CFR17,CFR29
CFCapStr	15	CFR1,CFR5,CFR10,CFR11,CFR14,CFR15,CFR19,CFR20, CFR21,CFR22,CFR24,CFR25,CFR26,CFR28,CFR29
CFLev	10	CFR5,CFR10,CFR14,CFR15,CFR18,CFR21,CFR22,CFR25,CFR28,CFR29
CFDiv Pol	10	CFR1,CFR2,CFR3,CFR12,CFR14,CFR15,CFR16,CFR17,CFR26,CFR29
CFVal	2	CFR12,CFR29

2.4.Stage 4: CFCF Model

Cash flow based corporate finance (CFCF) model adopts that corporate finance has eight functions to fulfill.The functions are financial analysis, working capital management, capital budgeting, merger&acqusition, capital structure, dividend policy, leverage, and valuation.[18] This limitation with eight function could be thought as an assumption. The purpose of the model is to bring cash flow point of view to overall corporate finance. To do that, 29 cash flow ratios were used. The model's logic is to add cash flow insight to accrual based corporate finance. In so doing, the writer (me) aims to contribute the theory of corporate finance. His aim is not to invent a new corporate finance theory. It has allready been invented by the finance theoreticians such as Williams, Hicks, Treynor, Modigliani, Miller, Sharp, Linther, Mossin, Black,Scholar etc.

In this study, a new model has been built to articulate this cash flow insight. The model is shown in Figure 1:

3. Conclusion

Cash flow base is broadly accepted by theoreticians and praticians in the finance field. In this article, cash flow base is used on a strong base something like financial statements such as balance sheet, income statement and cash flow statement.

After the three financial statement were provided, the twenty nine cash flow ratios were determined to build the CFCF model. Their names are CFR1 Cash Flow Adequacy I, CFR2 Cash Flow Adequacy II, CFR3 Dividend Payout,

[18] This classification was adopted using the opinion of " Laux Judy, "Financial Management: An Organic Approach", American Journal of Business Education, July/August 2013, Vol.6, No.4, pp.409-416.

CFR4 Reinvestment of Cash, CFR5.Debt Coverage, CFR6.Depreciation Effect, CFR7.Return of Sales to CFFO, CFR8.Operating Index, CFR9.CFFO to Assets, CFR10.CFFO to Annual Interest Payments, CFR11.Overall Cash Flow, CFR12.Cash Flow per Share, CFR13.Return of Sales to Cash, CFR14.Cash Debt Coverage, CFR15.Current Maturities of LTD Coverage, CFR16.Cash Dividend Coverage, CFR17.Cash Acquisition, CFR18.Cash Return on Assets, CFR19.Internal Generation of Cash Available to Creditors and Investors, CFR20.Return to Stockholders, CFR21.Long Term Debt Coverage, CFR22. Interest Payment Coverage, CFR23. Fixed Charges Coverage, CFR24.Operating Cash Flow, CFR25.Cash Interest Coverage, CFR26.Cash Current Debt Coverage, CFR27.Capital Expenditure, CFR28.Total Debt, and CF29.Free Cash Flow.

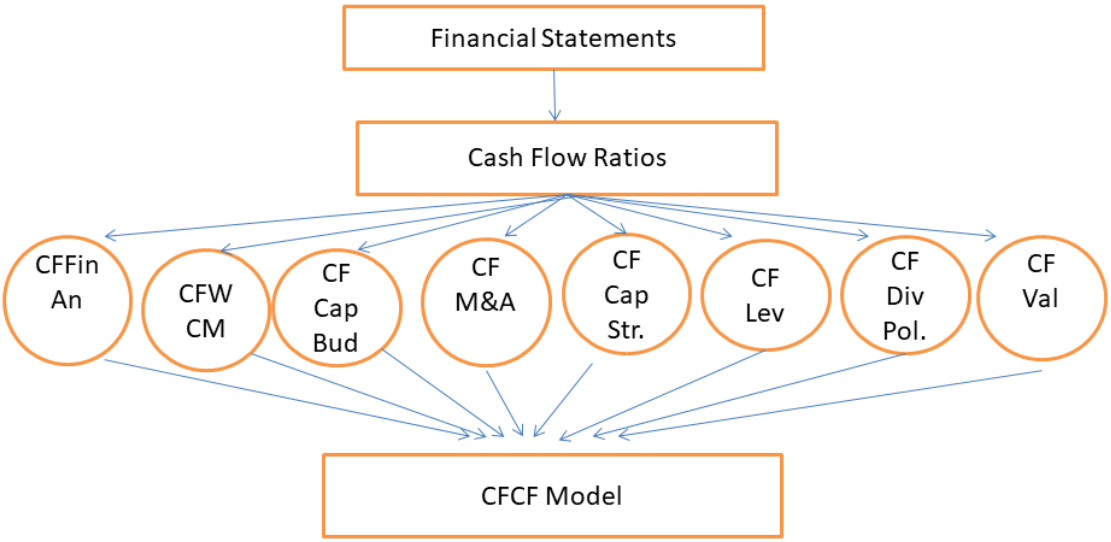

Figure 1:Cash Flow Based Corporate Finance (CFCF) Model

Then, these ratios were assigned to the functions of corporate finance. The assignments are shown at the Table 4 in the Section 2.3.

At last, the CFCF model was built. At the Figure 1 in the Section 2.4.

This model could be used to contribute corporate finance in context of cash flow dimension of the corporate finance. It is pretty systematic way to use this model because its base is the three financial statements- balance sheet , income statement, and cash flow statement. Especially, cash flow statement was used to calculate the cash flow ratios (CFRs). All CFRs used by the model cover at least one item from the cash flow statement.

Cash flow based functions of corporate finance will be explained in other article/articles.

References

[1]. Bhandari S.B and M.T. Adams, 2017, On the Definition, Measurement, and Use of the Free Cash Flow Concept in Financial Reporting and Analysis: A Review and Recommendations, *Journal of Accounting and Finance*, 17,11-19.

[2]. Bernstein L.A, 1989, Financial Statement Analysis: Theory, Application, and Interpretation, Richard D. Irwin, Fourth Edition, Illinois.

[3]. Ferris K. R., K. L. Tennant and S. I. Jerris, 1992, How To Understand Financial Statements, Prentice Hall, New Jersey.

[4]. Giacomino D.E. and D.E. Mielke, 1993, “Cash Flows: Another Approach to Ratio Analysis”, Journal of Accountancy, Vol. 175, No.3, 55-58.

[5]. Institute of Management Accountants, 1994,Management Accounting Glossary, Prentice Hall, New Jersey.

[6]. Jensen M. C.,1986, Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers, *American Economic Review,* 76, 323-329.

[7]. Keown A.J., J.D. Martin, J. W.Petty, and D. F. Scott ., 2005, *Financial Management Principles and Applications*, Pierson Prentice Hall, New Jersey.

[8]. Laux J.,2013, “Financial Management: An Organic Approach”,American Journal of Business Education, July/August 2013, Vol.6, No.4, 409-416.

[9]. Lewellen J. and K. Lewellen, 2016, Investment and Cash Flow: New Evidence, *Journal of Financial and Quantitative Analysis*, 51,1135-1164.

[10]. Louderback J.G., G.T. Friedlob and F.J. Pleva,1993, Survey of Accounting, West Publishing Comp., Minneapolis.

[11]. Mills J. R. and J.H. Yamamura, 1998, “ The Power of Cash Flow Ratios”, Journal of Accountancy,Vol.186, No.4 (October), 53- 61.

[12]. Moyer R.C., J.R. McGuigan and W.J. Kretlow,1995, *Contemporary Financial Management*, West Publishing Company, Minneapolis.

[13]. Richardson S.,2006, Over-investment of Free Cash Flow, *Review of Accounting Studies,*11,159-189.

[14]. Ross S.A., R.W Westerfield., and B.D. Jordan, 2003, *Fundamentals of Corporate Finance*, McGraw Hill, New York.

[15]. Rupic I.B., D.B Obradovic, and B.Rupic, 2017, Free Cash Flow Valuation Model in Capital Budgeting, *European Project Management Journa*l, 7, 75-84.

[16]. Shim J. K. and J.G.Siegel, 1992, The Vest - Pocket CFO, Prentice Hall, New Jersey.

[17]. Stice D., E.K Stice., and J.D.Stice, 2017, Cash Flow Problems Can Kill Profitable Companies, *International Journal of Business Administration*, 8, 46-54.

[18]. US Security and Exchange Commission, Form 10-K, September 26, 2020, Apple Inc., Commission File Number:001-36743

[19]. US Security and Exchange Commission, Form 10-K, September 28, 2019, Apple Inc., Commission File Number:001-36743.

[20]. US Security and Exchange Commission, Form 10-K, September 29, 2018, Apple Inc., Commission File Number:001-36743.

[21]. US Security and Exchange Commission, Form 10-K, September 30, 2017, Apple Inc., Commission File Number:001-36743.

[22]. US Security and Exchange Commission, Form 10-K, September 24, 2016, Apple Inc., Commission File Number:001-36743.

[23]. Yilmaz H, 2011,“Another Perspective to Corporate Cash Management. A New Model and Definition”, International Journal of Humanities and Social Science, Vol.1, No. 11 (Special Issue, August 2011), 284-289.

[24]. Yilmaz H., 2020, “Was Yilmaz Cash Management Model Accepted by the Theory of Finance”, American Journal of Finance Vol.5, Issue 1, 16-23.

[25]. Yilmaz, H., 2021a,“ Utilization of Cash Flow Ratios in Financial Management”, American Journal of Financial Management, 2021a,Vol.4, No.8 82-91

[26]. Yilmaz, H., 2021b, “Free Cash Flow Based Corporate Finance”, British Journal of Economics, Finance and Management Sciences, Vol.18, No.1 (December 2021b), 82-91

Appendix:

Codes Used in CFCF Model and Their Meanings

Level	Code	Full name of the code
Corporate Finance	CFCF	Cash flow based corporate finance
Functions of the Corporate Finance	CFFinAn	Cash flow based financial analysis
	CFWCM	Cash flow based working capital management
	CFCapBud	Cash flow based capital budgeting
	CFM&A	Cash flow based merger&acquisition
	CFCapStr	Cash flow based capital structure
	CFLev	Cash flow based Leverage
	CFDiv Pol	Cash flow based Dividend policy
	CFVal	Cash flow based Valuation
Cash Flow tools used by the Functions of Corporate Finance	CFR1	Cash Flow Adequacy I
	CFR2	Cash Flow Adequacy II
	CFR3	Dividend Payout
	CFR4	Reinvestment of Cash
	CFR5	Debt Coverage
	CFR6	Depreciation Effect
	CFR7	Return of Sales to CFFO
	CFR8	Operating Index
	CFR9	CFFO to Assets
	CFR10	CFFO to Annual Interest
	CFR11	Overall Cash Flow
	CFR12	Cash Flow Per Share
	CFR13	Return of Sales to Cash
	CFR14	Cash Debt Coverage
	CFR15	Current Maturities of LTD Coverage
	CFR16	Cash Dividend Coverage
	CFR17	Cash Acquisition
	CFR18	Cash Return on Assets
	CFR19	Internal Generation of Cash Available to Creditors and Investors
	CFR20	Return to Stockholders
	CFR21	Long Term Debt Coverage
	CFR22	Interest Payment Coverage
	CFR23	Fixed Charges Coverage
	CFR24	Operating Cash Flow
	CFR25	Cash Interest Coverage
	CFR26	Cash Current Debt Coverage
	CFR27	Capital Expenditure
	CFR28	Total Debt
	CFR29	Free Cash Flow Ratio