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## Finance methodology of Free Cash Flow

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### ARTICLE INFO

#### Article history:

Received 19 September 2014

Received in revised form 6 February 2015

Accepted 13 May 2015

Available online xxxx

#### JEL classification:

G30

G31

G32

G35

G38

H32

K22

L21

M14

M40

M41

#### Keywords:

Financial reporting

Free Cash Flow

Net Working Capital

Cost of capital

Corporate valuation

Investment decision

### ABSTRACT

Free Cash Flow (FCF) was adopted in the late 1980s as a financial tool to evaluate the firm and its individual projects. We question the procedure of calculating the FCF where a significant portion of Current Liabilities is offset against Current Assets, thereby creating the hybrid asset Net Working Capital (NWC). Borrowed from accounting methodology, that procedure distorts the FCF size, composition, volatility, and estimated value. Our empirical analysis shows that the nature and extent of those distortions can misinform the firm's stockholders, lenders and borrowers, and investors at large. We propose a revised FCF that would avoid those distortions.

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## 1. Introduction

The finance-based statement of Free Cash Flow (FCF) provides a basic tool for the valuation of a firm. Projection of past periodic net cash flows to or from claimants provides corporate managers and investors-

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at-large with useful data for estimating the value of the firm and its individual investment projects. Based on traditional financial statements and consistent with standard financial-economic methodology, the FCF should report the periodic cash flow components generated by the firm's operations.

The *positive* FCF developed in this paper measures the net periodic flow. This measure differs from Jensen's (1986) *normative* FCF, which seeks the firm's valuation-based *optimal* distribution to claim holders. It also differs from the flow measured by the accounting-based Statement of Cash Flow (SCF) (FASB 95, 1987), which is designed to measure the firm's liquidity, solvency, and financial flexibility and has only indirect implications for investment and valuation (Bradbury, 2011; Kieso et al., 2010).

Note that the apparent influence of the SCF on the FCF could originate from the focus of the former on the firm's Operating activities, which include unpaid or partially paid transactions (accrual accounts) classified as Accounts Receivable (AR) and Accounts (or Notes) Payable (AP). By focusing in addition on the periodic change in the amount of cash held by the firm, the accounting-based offset AR–AP implicitly ignores the unique and permanent economic roles played by short-term AR vs. AP both individually and as part of the overall sets of Current Assets (CA) vs. Current Liabilities (CL). In this respect, the SCF approach should differ from the FCF valuation-based approach since the latter ought to focus on the flow of financial claims facing the firm's Operations and Investment activities (see Kieso et al. (2010)).

Despite conceptual differences, corporate finance textbooks often follow the SCF procedure by which the flow of CL, or a significant portion thereof, is offset against the flow of CA to define the differential flow of Net Working Capital (NWC). This procedure denies a reality in which short-term debt is the main source of funding for most firms.

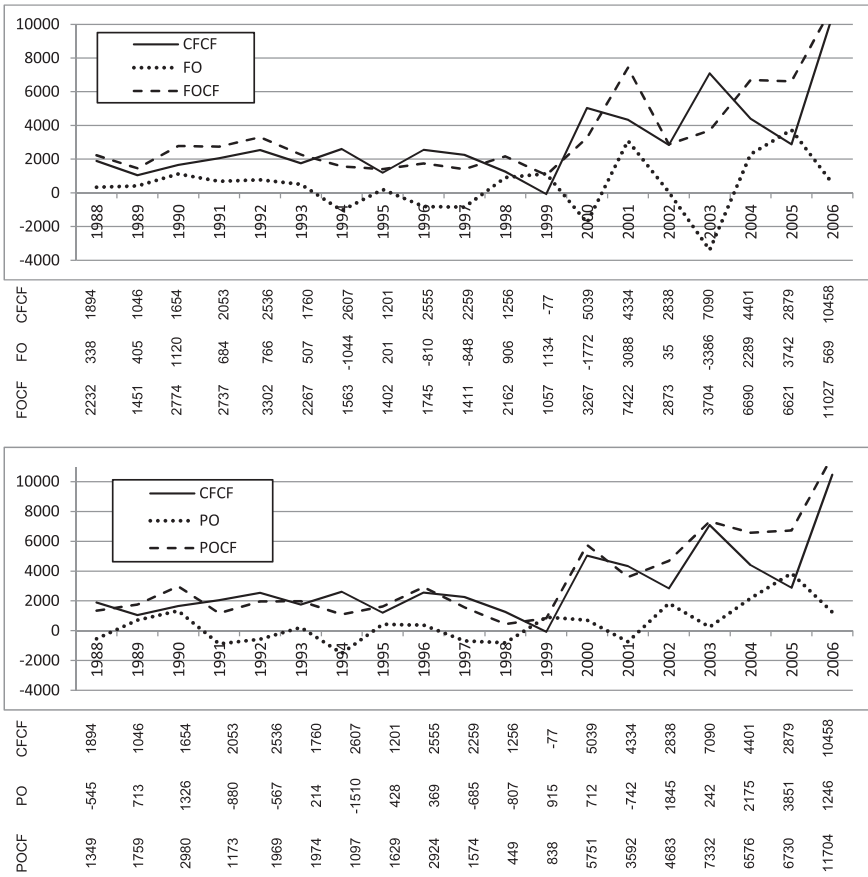
Direct consequences of the common FCF offset include distortions of the firm's size, debt and asset compositions, financial leverage, and risk profile. Indirect consequences include wider opportunities to manipulate the firm's FCF and estimated market value. The empirical analysis shows that the offset makes the FCF systematically larger and more stable. An average sample of 1220 U.S. public corporations studied over 22 years (1988–2009) reveals that the offset overstates the FCF mean by 33.7% and median by 128.2%. This result is due to the typically large share of CL that represents on average 19.8% of firms' size with a median of 24%.

U.S. firms are currently free to publish an unofficial FCF report subject to constraints of Regulation G (2002). Since this study does not rely on data of those reports but on official, accounting based, filings of Income Statement, Balance Sheet, and SCF, the analysis is limited to identifying *opportunities* for manipulating a FCF through the use of an offset. Concern over such behavior is supported by evidence from financial statements in general and recent cash flow statements in particular.<sup>1</sup> The fact that investors often misinterpret accounting numbers that rely on managerial discretion is also well established (e.g., Chen, Liu, & Chen, 2014; Dechow & Ge, 2006; Dechow, Kothari, & Watts, 1998).

Adhikari and Duru (2006) study the role of *voluntary* FCF statements designed by filing firms during 1994–2004 (and subject to Regulation G during 2002–2004), to be published side-by-side with mandatory GAAP-based financial statements. Firms that engaged in FCF disclosure are found to pay higher dividends, but are more leveraged and less profitable, and have a lower credit rating than matched non-disclosing firms. The same pattern is observed in the behavior of individual firms over time: years of FCF disclosure are associated with higher dividends, higher leverage, and lower profitability. In other words, poorly performing firms have both the incentive and confidence to design and publish their own FCF reports side-by-side with their official financial reports, thereby mitigating the undesirable impact of the latter (see Adhikari and Duru (2006)).

Siegel (2006) questions the reliability of cash flows reported in the SCF compared to earnings presented in the more traditional Income Statement. He argues that, despite early expectations, constraints set by GAAP do not prevent firms from manipulating their cash flow. Of the various examples analyzed by Siegel (2006), the most basic one concerns the overstatement of *operating* cash flow. This objective could be accomplished, at least temporarily, by slowing down the rate of payment to vendors (which is in itself a sign of weakness) to increase Accounts Payable. A shrinking *difference* between the flows of Accounts Receivable and Accounts Payable ( $\Delta AR - \Delta AP$ ) is translated to an increasing cash flow from Operations. A more subtle variation of

<sup>1</sup> See Hackel and Livnat (1992).



**Fig. 1.** Chevron Inc., CFCF vs. FCF, Current Liabilities offset dynamics, 1988–2006. The figure shows the time series from 1988 to 2006 of three versions of the Free Cash Flow of Chevron Inc.: Full Offset of Current Liabilities against Current Assets (FOCF, top drawing), Partial Offset of Current Liabilities less short-term debt against Current Assets (POCF, bottom drawing), and no liability offset, named Corrected Free Cash Flow (CFCF, both drawings). The annual flow of Current Liabilities offset against Current Assets equals the vertical distance FOCF–CFCF or POCF–CFCF. All figures are in millions of dollars.

this device calls for the compensation of the vendor in a timely manner through a financial institution acting as a third party.

This paper refers to an offset-free FCF as the “Corrected Free Cash Flow” (CFCF), since it would accurately measure the periodic cash flow from and to those funding the firm, long and short-term lenders included, providing an unbiased and more precise estimation of the firm and its individual investment projects.

The paper proceeds as follows. Section 2 analyzes conceptual errors and implied distortions inherent to the FCF offset. Section 3 tests for opportunities to manipulate the offset-based FCF by comparison to the offset-free CFCF. Section 4 offers a summary and conclusions.

## 2. The offset rationale

### 2.1. The offset in a project

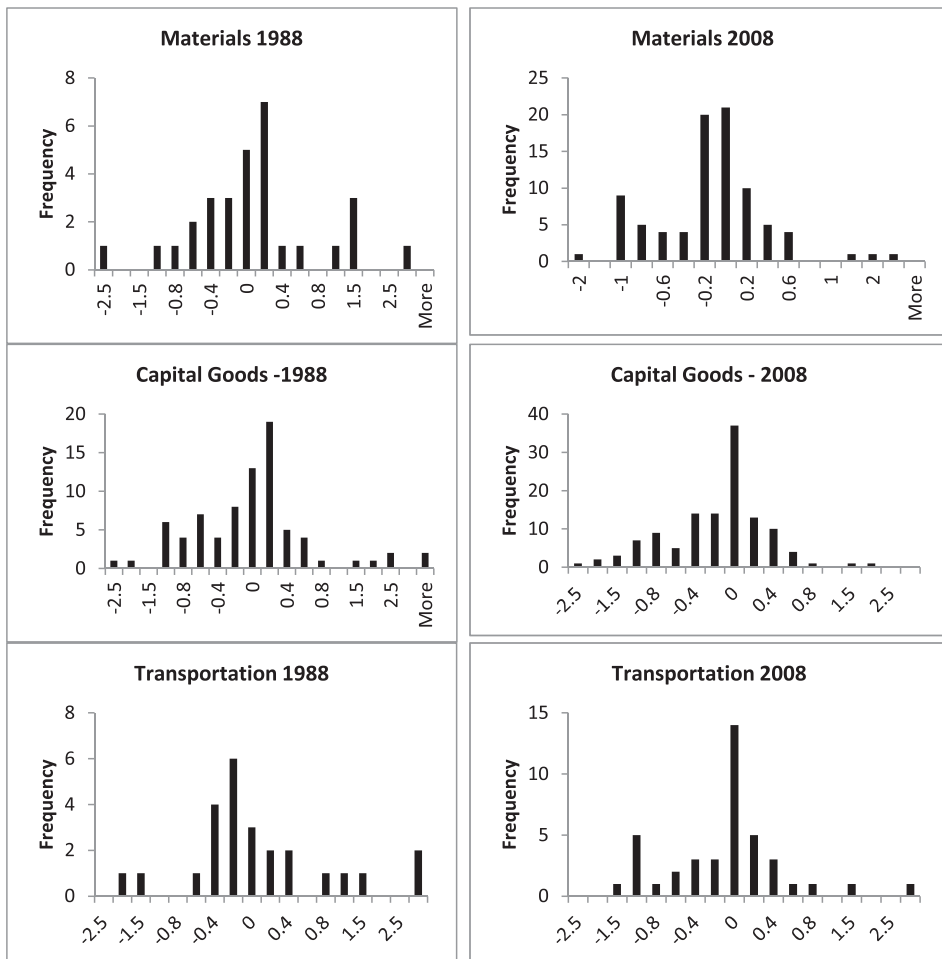
The flaw of the offsetting procedure becomes apparent when applied to the valuation of an investment project. The typical projected cash flow consists of a periodic *investment* flow side by side with a flow from

operations. The former often includes initial investment in Fixed Assets supplemented by “investment” in NWC, both to be liquidated at the end of the project life. Unlike the ambiguity between CL and Operations in the accounting SCF, the static offset in capital budgeting is explicitly that of liabilities against assets! This distortion leads to misspecifications of the project size, cost of capital, risk, and value – errors replicated at the level of the firm.

### 2.2. FCF distortion

The textbook FCF statement often subtracts the periodic cash flow of part or all of CL from the cash flow generated by CA, juxtaposing any remaining CL and a composite asset identified as NWC. Our survey of the finance literature revealed the following justifications for the offset.

- (1) “Current Liabilities are short lived.” Since the company is viewed as a going concern, the focus must be on the *flow* generated by debt contracts of any maturity. Short-term contracts roll over frequently, but remain a component of the firm’s debt.



**Fig. 2.** Distribution of the ratio  $(FOCF - CFCF) / |CFCF|$  across firms, 1988 and 2008. The figure shows the histograms of the distribution of differences between FOCF and CFCF relative to the absolute value of the CFCF for six selected industries for two years: 1988 and 2008.

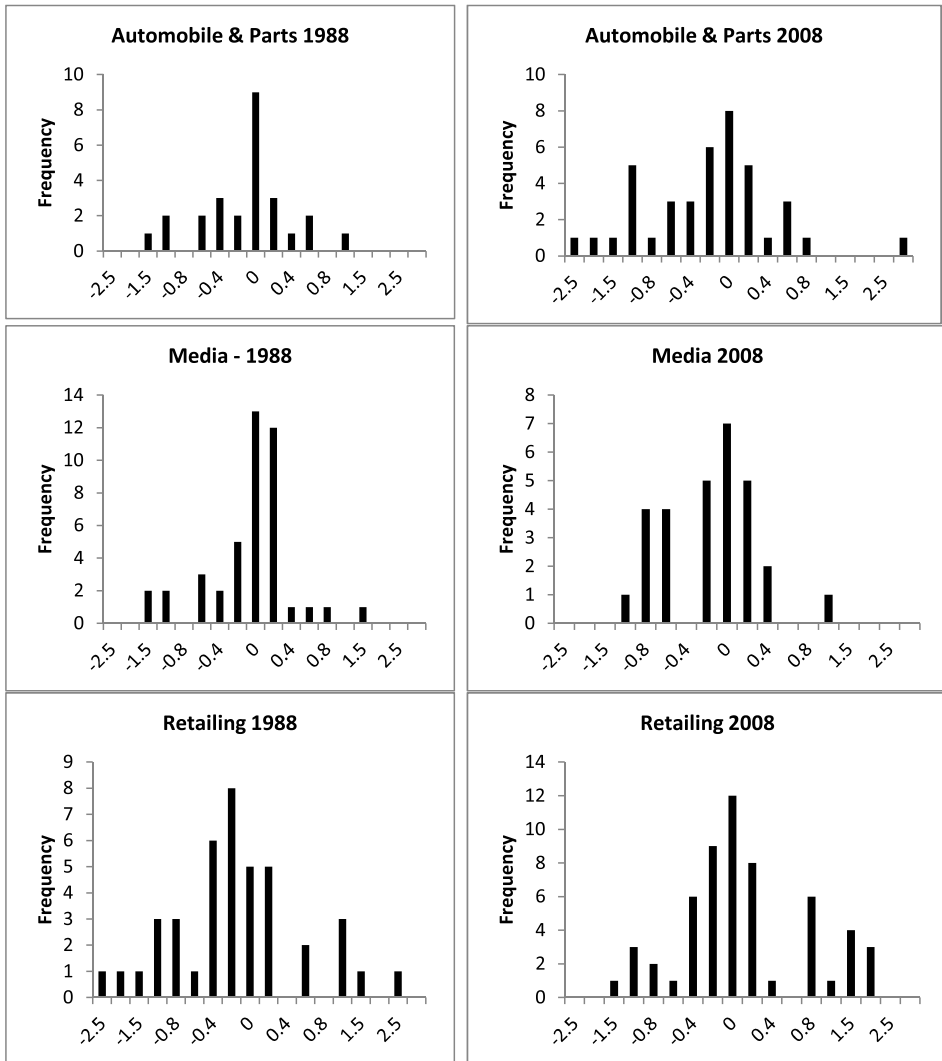


Fig. 2 (continued).

- (2) “Current Liabilities pay no interest.” There is no systematic free lunch. This statement overlooks interest paid on CL explicitly as in long-term coupon bonds approaching maturity, or implicitly as in Accounts Payable offering a discount on early repayment.<sup>2</sup> A financial claim of zero or negative effective interest would still be a claim against the company.
- (3) “Since a dollar of CL is a mirror image of a dollar of CA, the two can be restated as a net asset identified as NWC (usually  $CL < CA$ ).” Underlying this claim is the strong assumption that a dollar increase in CA is economically equivalent to a dollar decrease in CL. Such symmetry is inconsistent with economic logic or casual observation for the following reasons:
- The firm has less control over repayment of its loans from customers than it has over repayment of its debt to suppliers.
  - The offset is likely to distort the firm’s stated FCF.

<sup>2</sup> See Petersen and Rajan (1997).

**Table 1**

Descriptive statistics of CFCF and competing versions of FCF, 1988–2009. The table shows the median and mean of the three versions of Free Cash Flows (FCF): with *full* offset of Current Liabilities against Current Assets (FOCF), with *partial* offset of Current Liabilities excluding Short-Term Debt against Current Assets (POCF), and *without* offset of Current Liabilities against Current Assets, CFCF, or Corrected Free Cash Flow. CA = total Current Assets, CL = total Current Liabilities, DCL = short-term Debt in Current Liabilities, CV = Coefficient of Variation. The Relative Difference between flows is calculated as the ratio of the difference between the means of either FOCF and CFCF, or POCF and CFCF, divided by the absolute value of CFCF. All non-percentage values are in millions of dollars.

Variable	Median	Mean	CV
<i>Annual flow:</i>			
FOCF = CFCF + $\Delta$ CL	0.04	20.28	6.63
POCF = CFCF + $\Delta$ CL- $\Delta$ DCL	0.00	19.12	6.94
CFCF	-0.13	15.17	8.79
<i>Flow difference:</i>			
FOCF - CFCF = $\Delta$ CL	0.1635	5.112443	
POCF - CFCF = $\Delta$ CL- $\Delta$ DCL	0.1275	3.956955	
<i>Relative flow difference:</i>			
(FOCF - CFCF)/ CFCF	128.2%	33.7%	
(POCF - CFCF)/ CFCF	100.0%	26.1%	
<i>Year-end value:</i>			
Total assets	56.15	748.45	2.59
Total Current Assets	29.17	197.44	2.33
Total Current Liabilities	13.45	147.87	2.60
Total Debt in Current Liabilities	0.77	35.88	3.52

N = 26,864 firm years.

- c. The offset opens the door to manipulating CL by overstating and smoothing the firm's FCF to increase its estimated market value.

### 2.3. Assets, liabilities and risk distortion

Like FCF calculations, empirical studies of capital structure often ignore CL or their subset of trade credit by implicitly offsetting them against CA. This paper questions the rationale behind this practice. The offset directly distorts the firm's debt ratios of Debt/Equity and (Long-Term)/(Short-Term).<sup>3</sup> In addition, the offset hides but does not mitigate the default risk attached to short-term liabilities. The offset understates the firm's leverage. Finally, the offset distorts the firm's measured financial risk by changing the overall risk profile of its assets and liabilities.

### 3. Empirical evidence

A significant number of finance textbooks define FCF as follows:

$$FCF = EBIT + Depreciation - Taxes - Capital expenditures - Increase in NWC^4$$

where EBIT stands for Earnings Before Interest and Tax. The change in Net Working Capital ( $\Delta$ NWC) includes Full or Partial Offset of CL against CA, calculated by

<sup>3</sup> This error is avoided by some authors, more recently Levy and Sarnat (1990), Palmon and Yaari (1991), Kahya et al. (1992), Weston and Copeland (1992), Lemmon et al. (2008), and Welch (2010).

<sup>4</sup> With greater detail and reference to actual COMPUSTAT items, Free Cash Flow with full offset (FCF(F)) is calculated as the sum of net cash flows from operations (excluding deferred taxes, extraordinary items, and interest paid) plus net cash flows from investing activities, minus increase in cash and marketable securities, plus exchange rate effect:

$$FCF(F) = \text{Net cash from operations (308)} - \text{Deferred taxes (126)} - \text{Interest paid (315)} \\ - \text{Extraordinary items (124)} + \text{Net cash from investing activities (311)} \\ + \text{Interest paid} - \text{Increase in cash (274)} + \text{Exchange rate effect (314)} \\ + \Delta \text{in ST debt (301)}$$

Numbers in parentheses represent item identifiers in the COMPUSTAT annual file. The Net Cash flow from Operations includes changes in Net Working Capital, and the addition of changes in Short-Term Debt insures the full-offset.

**Table 2**

Time patterns of three Free Cash Flows, 1988–2009. The three FCF versions are with Full Offset of Current Liabilities against Current Assets (FOCF), with Partial Offset of Current Liabilities excluding short-term debt against Current Assets (POCF), and without offset of Current Liabilities against Current Assets, CFCF, or Corrected Free Cash Flow. The relative difference between flows is calculated as the ratio of the difference between the means of either FOCF and CFCF, or POCF and CFCF, divided by the absolute value of CFCF. The Coefficient of Variation, CV, is presented in absolute value. All non-percentage values are in millions of dollars.

Year	Medians			Means			Relative difference	
	FOCF	POCF	CFCF	FOCF	POCF	CFCF	FOCF	POCF
1988	0.87	0.72	0.31	44.85	44.21	37.91	18%	17%
1989	0.76	0.52	0.20	38.26	33.73	25.49	50%	32%
1990	1.17	0.94	0.59	42.82	37.02	33.57	28%	10%
1991	1.01	1.16	1.12	37.04	39.28	38.00	−3%	3%
1992	0.34	0.20	0.06	26.25	24.63	22.00	19%	12%
1993	0.12	0.07	−0.01	32.08	32.41	29.46	9%	10%
1994	0.21	0.13	−0.03	35.77	34.64	29.70	20%	17%
1995	0.20	0.06	−0.07	32.13	30.71	25.39	27%	21%
1996	0.10	0.00	−0.21	26.86	26.46	20.44	31%	29%
1997	0.01	−0.02	−0.27	20.38	17.56	14.42	41%	22%
1998	0.00	−0.05	−0.32	19.39	17.42	13.93	39%	25%
1999	0.01	−0.01	−0.23	19.35	12.45	8.32	133%	50%
2000	0.00	−0.15	−0.49	21.01	14.56	4.75	342%	206%
2001	0.01	0.00	−0.01	5.82	8.64	11.08	−47%	−22%
2002	0.01	0.00	0.03	15.30	20.65	18.71	−18%	10%
2003	0.00	−0.01	−0.11	12.15	15.42	13.50	−10%	14%
2004	−0.08	−0.26	−0.67	12.52	13.89	7.06	77%	97%
2005	−0.02	−0.23	−0.77	15.71	12.50	4.11	282%	204%
2006	0.00	−0.16	−0.62	15.39	13.94	11.05	39%	26%
2007	−0.02	−0.24	−0.79	4.70	2.46	−0.94	603%	363%
2008	0.06	0.00	−0.05	6.75	4.27	3.81	77%	12%
2009	0.42	0.57	1.42	16.15	22.13	28.82	−44%	−23%
Serial correlation	0.84	0.70	0.53	0.85	0.77	0.67		
Standard deviation	0.37	0.39	0.55	12.01	11.66	11.64		
Abs. value of CV	1.58	2.63	13.10	0.53	0.54	0.64		

The number of firms (N) varies from the lowest 644 in 1988 to the highest 1732 in 2005, adding to a total of N = 26,864 firm years.

$$\Delta NWC_t = \{(CA_t - CA_{t-1}) - (CL_t - CL_{t-1})\}$$

where the content of CA remains intact, but that of CL may vary from partial to full offset, depending on the inclusion of short-term “unfunded” debt. Other things equal, an increase of the CL offset will raise the apparent FCF, and vice versa. Since the publication of the FCF statement by U.S. firms is voluntary and the offset is left to the discretion of the individual firm, the range of the offset, and therefore the FCF error, is significant.

This paper argues that an economically legitimate FCF must be offset free. To avoid confusion, we define Corrected Free Cash Flow (CFCF) as a special case of the FCF that is free of a CL offset:

$$VCF = EBIT + Depreciation - Taxes - Capital expenditures^5 - \Delta CA$$

The following reported empirical tests do not rely on FCF filings. Instead, they estimate the extent of the freedom available to U.S. firms in publishing their voluntary FCF – namely, the range of the FCF error.

<sup>5</sup> We realize that there is no single definition of FCF used in practice. Nevertheless, until recently most finance textbooks calculating FCF included the offset. To adjust any version of FCF to reflect the true economic cost of short-term capital, the offset (increase in NWC) should be removed and the changes in Current Assets put back in.

**Table 3**

Free Cash Flows across industry groups, 1988–2009. The three FCF versions are with Full Offset of Current Liabilities against Current Assets (FOCF), with partial offset of current liabilities excluding short-term debt against current assets (POCF), and without offset of current liabilities against current assets, CFCF, or Corrected Free Cash Flow. The relative difference between flows is calculated as the ratio of the difference between the means of either FOCF and CFCF, or POCF and CFCF, divided by the absolute value of CFCF. Industry groups correspond to GICS industry classification standards. Mean values and their differences are in millions of dollars. All non-percentage values are in millions of dollars.

Industry name	Group	N	Means			Relative (FOCF – CFCF)/  CFCF	Differences (POCF – CFCF)/  CFCF
			FOCF	POCF	CFCF		
Energy	1010	1701	–12.84	–12.90	–17.25	26%	25%
Materials	1510	1527	28.18	28.41	26.14	8%	9%
Capital goods	2010	2537	13.60	11.65	8.59	58%	36%
Commercial & professional services	2020	1124	8.13	7.68	5.43	50%	41%
Transportation	2030	368	–1.55	1.17	–6.08	75%	119%
Automobile & components	2510	384	14.77	12.15	7.04	110%	73%
Consumer durables & apparel	2520	1485	18.53	17.97	15.34	21%	17%
Consumer services	2530	813	9.51	8.41	6.70	42%	26%
Media	2540	586	11.12	9.55	4.36	155%	119%
Retailing	2550	1100	18.91	16.95	5.90	221%	187%
Food & staples retailing	3010	203	92.02	93.41	77.32	19%	21%
Food, beverage & tobacco	3020	731	48.96	45.27	41.22	19%	10%
Household & personal products	3030	501	12.73	12.73	10.03	27%	27%
Health care equipment & services	3510	2179	–1.44	–1.31	–3.33	57%	61%
Pharmaceuticals, biotechnology & life sciences	3520	1880	–6.06	–6.16	–7.23	16%	15%
Banks	4010	6	0.02	0.11	0.08	–88%	38%
Diversified financials	4020	313	15.44	15.00	12.63	22%	19%
Insurance	4030	78	0.79	2.35	–0.39	303%	703%
Real estate	4040	199	2.18	2.10	1.67	31%	26%
Software & services	4510	2278	–2.28	–1.90	–3.44	34%	45%
Technology hardware & equipment	4520	2500	–2.52	–2.48	–5.66	55%	56%
Semiconductors & semiconductor equipment	4530	752	–1.85	0.40	–3.35	45%	112%
Telecommunication services	5010	404	56.59	52.79	45.52	24%	16%
Utilities	5510	2908	123.48	116.49	106.75	16%	9%
Unspecified industry group		438	–12.49	–12.58	–13.05	4%	4%

N = 26,864 firm years.

### 3.1. Data and methodology

This study uses data from two sources. The accounting information is extracted from the COMPUSTAT annual dataset, and the stock market information from the CRSP monthly stock files. To ensure consistency in reported numbers and provide adequately long time series, the study includes all publicly traded firms in the 22 year period from 1988 through 2009 (Fig. 1).

Chosen as an example for its common features, this case demonstrates a firm's *access* to manipulating the common FCF in terms of its *size* and *volatility*. The choice between full and partial offset flows (FO, PO), shown respectively as dotted curves at the top and bottom graphs, is subject to management discretion. The offset flows equal the modification in the firm's CL and CA flows, and the vertical shift in the overall FCF<sup>6</sup> (FOCF, POCF) shown as segmented curves. The offset *impact* is measured by the vertical distance between each version of the FCF and the offset-free CFCF represented by a solid curve common to both graphs. A positive difference FCF – CFCF measures an *overstatement* of the firm's performance as seen under full offset in 2001. Here the positive value of the dotted FO curve equals the positive difference between FOCF and CFCF, namely \$7422 – \$4334 = \$3088 million. In 2003, a negative offset causes FOCF that is smaller than CFCF, namely \$7090 – \$3704 = –\$3386 million. Further comparison among the three versions of FCF reveals that the offset generally lowers the FCF volatility.

<sup>6</sup> Note that an apparent increase in the firm's FCF can be achieved without increasing the firm's debt by (1) expanding the set of CL accounts subject to offset, or (2) compensating for any increase in offset borrowing by a decrease in non-offset debt of short or medium term.



**Table 4**

Free Cash Flows by size quintiles, 1988–2009. The three FCF versions are with Full Offset of Current Liabilities against Current Assets (FOCF), with Partial Offset of Current Liabilities excluding short-term debt against Current Assets (POCF), and without offset of Current Liabilities against Current Assets, CFCF, or Corrected Free Cash Flow. The relative difference between flows is calculated as the ratio of the difference between the means of either FOCF and CFCF, or POCF and CFCF, divided by the absolute value of CFCF. All non-percentage values are in millions of dollars. Size quintiles are based on year-end market capitalizations obtained from the CRSP dataset.

	Size quintile				
	1 = small	2	3	4	5 = big
<i>Annual flow:</i>					
FOCF = CFCF + $\Delta$ CL	−0.01	−0.62	−3.56	4.88	107.11
POCF = CFCF + $\Delta$ CL- $\Delta$ DCL	−0.10	−0.66	−3.90	4.95	101.79
CFCF	0.04	−0.62	−5.11	1.94	86.05
<i>Flow difference:</i>					
FOCF − CFCF = $\Delta$ CL	−0.05	−0.01	1.55	2.94	21.06
POCF − CFCF = $\Delta$ CL- $\Delta$ DCL	−0.14	−0.04	1.21	3.01	15.74
<i>Relative difference:</i>					
(FOCF − CFCF)/ CFCF	−121%	−1%	30%	151%	24%
(POCF − CFCF)/ CFCF	−343%	−7%	24%	155%	18%
<i>Year-end value:</i>					
Total Assets	23.98	81.71	200.76	643.72	3397.84
Total Current Assets	13.57	40.49	94.36	243.99	941.24
Total Current Liabilities	8.68	22.77	48.39	142.07	722.49
Total Debt in Current Liabilities	3.15	6.28	10.48	27.38	174.45

N = 26,864.

**Table 5**

Correlation among the three versions of Free Cash Flow, 1988–2009. The correlations are Pearson and Spearman correlation coefficients with 95% confidence intervals. We calculate correlations for each firm and then equally-weight them to calculate the cross-sectional average. The three versions are: the FCF with Full Offset of total Current Assets by total Current Liabilities (FOCF), the FCF with Partial Offset of the total Current Assets by Current Liabilities without the short-term debt (POCF), and the FCF with no offset which we call CFCF (Corrected Free Cash Flow).

Variable	Variable	N	Correlation coefficient	95% Confidence limits	
<i>Pearson correlation statistics</i>					
CFCF	FOCF	26,905	0.92	0.919	0.923
CFCF	POCF	26,905	0.98	0.980	0.981
FOCF	POCF	26,905	0.94	0.940	0.943
<i>Spearman correlation statistics</i>					
CFCF	FOCF	26,905	0.79	0.782	0.791
CFCF	POCF	26,905	0.89	0.894	0.898
FOCF	POCF	26,905	0.87	0.865	0.871

The basic economic relationship among the three curves, CFCF vis. FOCF or POCF, can be summarized as follows. (1) The level and changes of CFCF are the basic factors determining FOCF (or POCF); (2) FO (or PO) modifies the level and changes of FOCF (or POCF); specifically, (3) FOCF (or POCF) runs above CFCF if FO (or PO) is positive, or below CFCF if FO (or PO) is negative. In short, offset > 0 causes FCF > CFCF, and offset < 0 causes FCF < CFCF (Fig. 2).

The following salient features are observed. (1) Even within industries, the errors of FCF vis. CFCF are systemic and robust but not consistently ordered. (2) The mode of distributions within industries is close to zero, the point of parity between FOCF and CFCF. The graphs *do not* indicate the relationship FOCF > CFCF, suggesting the absence of significant FCF size manipulations by firms in those industries. The graphs demonstrate a widespread *neglected opportunity* to gain from overstatement of the FCF through the use of an offset.<sup>7</sup>

<sup>7</sup> The absence of widespread corporate manipulation should make it easier for policymakers to switch to CFCF.

(3) Limited to one method, firms above parity would prefer the FOCF for its flexibility in promoting a good image. (4) Firms positioned significantly below parity would prefer the CFCF. (5) There is no presumption that the first group of firms is economically superior. (6) All firms may prefer the current regime of a flexible FCF with voluntary reporting (Table 1).

There are over 26.8 thousand firm-year observations with an average of 1340 unique firms per year. The average firm asset size is about \$750 million, with CA of \$200 million (26% of total assets) and CL of \$150 million (19.7% of total assets). If all current debt (including the short-term portion of long-term debt) were removed from CL, the remainder would still represent a substantial amount relative to Total Assets (\$112 million or 15%).

The large amounts and relative values of current assets and liabilities lead to economically significant differences between the three versions of the FCF – full offset, partial offset, and no offset of CL against CA. While each of the three versions has a positive mean, the median CFCF is negative, implying that the other versions overstate the FCF of the median firm. In dollar terms, the average FCF with full offset exceeds the CFCF by more than \$5 million per year (33.7%). The more popular POCF artificially increases the average cash flows to claimholders by almost \$4 million per year (26.1%). The median and mean annual FCF at the level of the firm increases monotonically from CFCF to FOCF, namely  $\text{FOCF} > \text{POCF} > \text{CFCF}$ , implying the same order in dollar and relative terms. In contrast, the volatility of FCF as measured by the CV decreases monotonically from CFCF to FOCF. The combination of these two features is confirmed by the common preference of firms for FOCF or POCF. The offset facilitates low-cost enhancement and stabilization of the voluntary FCF.

The effect of the offset as measured by the Relative Difference is far greater in the median FCF firms which tend to be smaller as opposed to large firms about the mean. The same is true for full and partial offsets (Table 2).

During the first 13 years, the full-offset and partial-offset FCF exhibits systematically higher values than the CFCF. The year 2000 records the largest differences between the offset-based FCF and CFCF – over 200%! The most plausible explanation lies in the bubble in equity market prices. As equity values rose during 1999 and 2000, firms gradually increased their liabilities, including CL, to maintain an optimal capital structure. With the market collapse in 2001, the FCF – CFCF difference dropped sharply and became negative, encouraging companies to reverse the process by paying off CL. A similar pattern repeated itself in the housing market bubble of 2007–2009.

Despite the systematic ordering  $\text{FOCF} > \text{POCF} > \text{CFCF}$  in large and small firms, an individual firm's POCF can be larger or smaller than the parallel FOCF in any given year, depending on the sign of the incremental CL offset. This suggests that a switch across versions of FCF should be viewed as a form of manipulation that can affect financial appearance. In addition, both the mean of larger firms and the median of smaller ones show that the positive serial correlation across years is the highest under FOCF and the lowest under CFCF. These statistics confirm the advantage of smoothing facilitated by the CL offset, a potential element of FCF manipulation. A higher annual standard deviation of CFCF is common only in smaller, less diversified firms (Table 3).

The FCF size ranking of  $\text{FOCF} > \text{POCF} > \text{CFCF}$  at the level of the firm is preserved within individual industries, reconfirming the reliable advantage of the CL offset in that context. The private advantage of avoiding CFCF may vary significantly across industries. Industries with the largest differences between offset and non-offset FCF are food companies and retailers, followed by telecoms and utilities. The groups with the smallest differences are banks, financials, real estate, and insurance companies. Companies that rely more on trade credit (food and retailers) would gain more by a greater offset, inviting a greater distortion in their valuation. The valuation of financial institutions would be the least affected (Table 4).

To determine the effect of firm size, we divide our sample of over 26 thousand firm-year observations into size quintiles with an approximately equal number of observations in each. A positive (negative) offset difference would improve (damage) the firm's cash flow appearance regardless of whether CFCF is positive or negative. As seen in the two smallest quintiles, the systematic negative offset difference deprives such firms of access to this reporting advantage. In contrast, the dollar and relative offset differences in the three largest quintiles is systematically positive and large, suggesting overstatement of FCF and estimated value (Table 5).

One observes that all pairs exhibit relatively high correlation above 90% with a 95% Pearson confidence interval. The highest correlation is between CFCF and FCF with partial offset. The lowest correlation is between CFCF and FCF with full offset. Spearman correlations exhibit the same pattern but with lower values in the 70's and 80's due to the non-parametric nature of this statistic.

The high correlation across versions of FCF suggests a low cost of potential manipulation. A positive offset would boost FCF and with it the firm's financial appearance without significantly modifying FCF volatility. This may explain the absence, until now, of a serious challenge to the different versions of FCF.

#### 4. Summary and conclusions

This paper challenges the common valuation procedure adopted in corporate finance in which the flow of Current Liabilities, or a significant portion thereof, is offset against the flow of Current Assets to create the hybrid flow of Net Working Capital. While consistent with the methodology of the accounting Statement of Cash Flow, this offset is inconsistent with the economic-based FCF, a financial tool designed for firm and project valuation. This paper demonstrates that the offset can significantly distort the FCF in terms of size, composition and volatility, leading to additional distortions in the firm or project size, debt and asset compositions, financial leverage, risk profile, and estimated value. The conceptual and empirical analyses indicate that management may prefer the offset-based FCF, which can be better controlled in terms of size and stability. The corrected, narrower definition of FCF would eliminate this flexibility. The proposed offset-free CFCF is a logical substitute, which would better serve investors and their loyal company management, lenders, and other stakeholders by leading to more accurate, unbiased value estimates of the firm and its planned projects.

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