On the Importance of Free Cash Flow Metrics Bias Resulting from Static Approach to Free Cash Flow Analysis

Aleksandra Szpulak

Abstract This paper discusses the accumulation of FCF for companies operating under different industry specific conditions resulting in a positive or negative difference between the length of the operating cycle and payables deferral period. On the basis of simulations on an easy spreadsheet financial model of company operations, it proves that: (1) in the case of a growing company operating under conditions of negative cash conversion cycle the FCF are systematically overestimated by a permanent increase in surplus cash generating from credit delivered by suppliers and employees and as such do not satisfy the definition of FCF, (2) indicates that FCF from operations suffer from timing and matching problems because they count accounting periods instead of operating cycles and therefore valuations based on such FCF are systematically overestimated every time the cash inflows from operating cycle occur earlier to the corresponding cash outflows and, reversely, are systematically underestimated every time the cash inflows from operating cycle occur later to the corresponding cash outflows. To overcome these problems, the on-going approach to free cash flows analysis that matches outflows and corresponding inflows is suggested. The application of a simple NPV to evaluate cash investments in the operating cycle (i.e. cash investments in operating working capital) based on net cash flows generated by operating cycle counts adequately for the industry specific differences in timing of operating cash flows and removes the relevant bias in FCF.

Keywords Operating working capital • Operating cycle • Free cash flow from operations • Accrual accounting • Net present value

1 Introduction

Over the last 20 years, researchers have observed the increasing role of cash flows to investors based on the perception that cash flows are less prone to manipulation, are more easily measured and more intuitive compared to accounting earnings.

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Every year, more and more companies report FCF in their annual report. Unfortunately there is lack of market consensus for FCF metrics (Vernimmen 2005), some refer to pitfalls in measuring FCF (Estridge and Lougee 2007) others on attempts to manage reported cash from operations (Lee 2012). This paper elaborates on additional weaknesses of free cash flow metrics that disclose when simultaneously analyzing, similar in many respects, growing companies but operating under different industry conditions resulting in a different length of operating cycle and payment deferral period. Indicated bias origins in static approach to free cash flow analysis i.e. the operating cycle cutoff point is the arbitrary defined point and therefore the operations are left continuously unfinished.

Apart from the introduction, this paper consists of four sections. The first expounds on the dual perception of investments in operating working capital—once from the cash flow stand point i.e. cash investments in operating working capital (named cash investments in OWC, *CashOn*OWC) and the other from the accrual accounting perspective (commonly known as net operating working capital, NOWC). This part points the cash investments in OWC as a source of potential bias of FCF metrics. The second part elaborates on the bias, shows its consequences for companies operating under different industry conditions defined by the length of the cash conversion cycle, particularly consider negative and positive cycles. This section indicates the cause of the bias: it is a static approach to FCF analysis. Section 4 introduces the on-going approach to free cash flow analysis, which works on full operating cycles and treats each cycle as a separate cash investment in OWC. For valuation purposes, ordinary NPV is employed. The last section points the consequences of free cash flows bias for corporate financial management in the areas of: (1) investors' preferences comparing FCF to ordinary accounting earnings as a measure of company profitability; (2) application of DCF methods based on FCF for valuation; (3) short-term corporate financial management; (4) liquidity measurement and (5) the application of the on-going approach to free cash flow analysis suggested in this paper.

2 Cash Investments in Operating Working Capital

Net operating working capital (NOWC), as defined by many, reflects the amount of investor supplied capital employed in the operating current assets. NOWC as calculated from company balance sheet stands for the operating current assets minus the operating current liabilities. Operating current assets consist of inventories, accounts receivable and operating cash while the operating current liabilities consist of accounts payable and accruals:

$$NOWC = OCA - OCL = OC + AR + INV - AP - Ac = OC + WCR \quad (1)$$

where: OCA—operating current assets, OCL—operating current liabilities, INV—inventory, AR—accounts receivable, OC—operating cash, AP—accounts payable, Ac—accruals (mainly salaries and taxes), WCR—working capital requirements.

Does every company need to invest in the NOWC? Our intuitive answer to that question is positive, as probably no one has seen a company with zero NOWC, however in theory it is possible. Taking at first glance the cash flow perspective instead of accrual accounting zero investments means no cash outlays for OWC. Imagine a company that, for simplicity, once produces only one product, which consumes all delivered materials and simultaneously sells the final product so there are no inventories. The company gives trade credit of length T^{AR} to its customers and after that time records on its cash account operating cash inflow CF^{+} equal to revenues. The company also receives trade credit of length T^{AP} to pay all operating costs including materials and work reflected by operating cash outflow CF^{-}. Under certainty, cash investments in OWC result only from timing differences between the length of operating cycle and the payment deferral period, reflected in our simplified model by T^{AR} and T^{AP} respectively. In corporate finance such a difference ($T^{AR} - T^{AP}$) is known as the Cash Conversion Cycle (CCC) (Richards and Laughlin 1980) and stands for the length of time the investment in the operating cycle is recovered. If the operating cycle and payment deferral periods are equal ($T^{AR} = T^{AP}$). No investor supply cash is invested in the operating cycle and therefore cash investments in OWC equals 0. If the operating cycle exceeds the payment deferral period, company investors are forced to temporarily invest amount of CF^{-} in the operating cycle for the period CCC. If the payment deferral period exceeds the operating cycle, the company investors not only do not supply any cash to finance the operating cycle, but temporarily own the CF^{-} for the period CCC. It is a sort of invisible (from the cash flows perspective) credit, as ultimately after that period, the company must pay its bills in amount of CF^{-}. Now, imagine that the company operating under conditions of $T^{AR} = T^{AP}$ repeats such an operating cycle every day to produce quantity Q of its final product per day. Considering the story from the company's inception, cash investments in OWC are always zero regardless of the growth in the quantity Q produced. Under uncertainty, however, cash investments in OWC are in any case increased by safety stocks of such operating current assets as inventories and cash kept as a result of volatility in timing and magnitude of operating cash flows.

Recall the simplified model of company operations as described above and let us now return to the accrual accounting and consider investments in NOWC as calculated from Eq. 1 for each case. First, as a result of time difference between revenues and cash inflows and expenditures and cash outflows accounts receivable and accounts payable (together with accruals referring to work used in the operating cycle) disclosure on the company balance sheet starting from the first day of operating cycle. As both revenues and costs are recognized in accordance with accrual accounting earnings, appear as well on the right side of the balance sheet

and the NOWC as a difference between revenues in form of accounts receivable and costs in form of accounts payable equals accounting earnings. When $T^{AR} = T^{AP}$ operating cash inflow and operating cash outflow appear on the same day and on this day the balance sheet cash equals accounting earnings. Under accrual accounting, if $T^{AR} = T^{AP}$ up to T^{AP} investors invest in the operating cycle profits that are accrued (i.e. cumulated and deferred) so generally the accounting earnings that will transform into cash in future, particularly at T^{AR}. Such NOWC and accounting earnings equality holds regardless of the length of CCC and only the structure of NOWC changes as the operating cycles proceed. Such changes in the NOWC structure are thoroughly described by Wędzki (2003).

In general, the difference between the accounting earnings and cash at hand equals the change in so-called accruals[1] (Dechow 1994). There are two types of accruals: long-term, resulting from changes in long term accounts (e.g. depreciation, provisions) and short-term, resulting from changes in the working capital. As our considerations limit to the investments in the operating cycle, long-term accruals are irrelevant and the cash at hand or cash from operations (CFO) equals:

$$CFO_t = E_t - \Delta WCR_t = E_t - WCR_t + WCR_{t-1} \tag{2}$$

where: CFO—cash from operations, E—accounting earnings as a difference between all recognized revenues and costs over the period t, WCR—working capital requirements, ΔWCR is a change in WCR or short—term accruals.

The idea behind Eq. 2 in light of our simplified model is obvious—as accounting earnings consist in part equal to WCR_t of revenues and costs that are not settled until the end of period t that part needs to be excluded to drive on cash at hand at the end of t. Consequently, there was a part equal to WCR_{t-1} of revenues and costs that was not settled until the end of the previous accounting period t−1 but is transformed into cash over the period t and therefore needs to be included to drive on cash at hand at the end of period t. Under conditions of $T^{AR} > T^{AP}$ accrued revenues exceed accrued costs while under $T^{AR} < T^{AP}$ accrued costs exceed accrued revenues. Figures 1 and 2 are the graphical presentations for the discussed relationships.

Cash investment in OWC refers to the area indicated by B in both situations as displayed on Figs. 1 and 2 respectively. However, under $T^{AR} > T^{AP}$ area B represents the amount of investor supplied capital invested in the operating cycle on a cash basis and under $T^{AR} < T^{AP}$ area B indicates the amount temporarily owned by company (a sort of invisible, credit delivered by suppliers and workers) as the corresponding revenues (area A) have been already settled. Ultimately, this amount of cash investments in OWC, as defined by area B, differs from traditional accrual accounting NOWC by profits included in the accounts receivable.

[1] These accruals differ from the accruals mentioned in Eq. 1 where accruals stands for position in balance sheet.

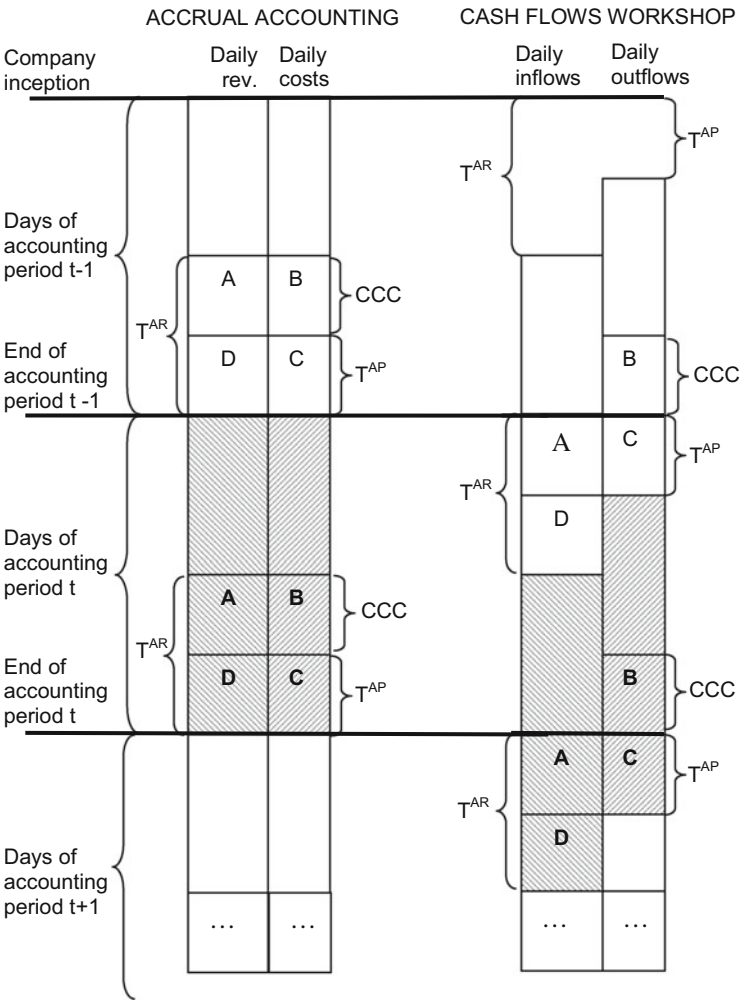

Fig. 1 Accrual accounting vs. cash flows workshop for companies operating in conditions of positive Cash Conversion Cycle, where: T^{AR}—trade credit period granted by the company; T^{AP}—trade credit period received by the company; CCC—cash conversion cycle. Under assumption of continuous operations, no inventories and constant demand (sales) the *vertical hinge* of *each box* stands for days of operations while the *horizontal hinge* stands for size of the variable listed at the *top of the box*. Area B indicates cash investments in OWC, area of A + D − C is the WCR (or short-term accruals), A and D refer to credit sales outstanding (accounts receivable) at the end of accounting period, C refers to accounts payable not settled at the end of the accounting period. Only in zero profit conditions *CashOn*OWC = NOWC, otherwise credit sales outstanding exceed costs not yet settled by the amount of profits. CFO is accounting earnings (revenues minus costs) less ΔWCR. CFO as a sum of all cash inflows and outflows as recorded over analyzed period includes *box* B. Inclusion of *box* B in CFO results in matching and timing problems of cash flows

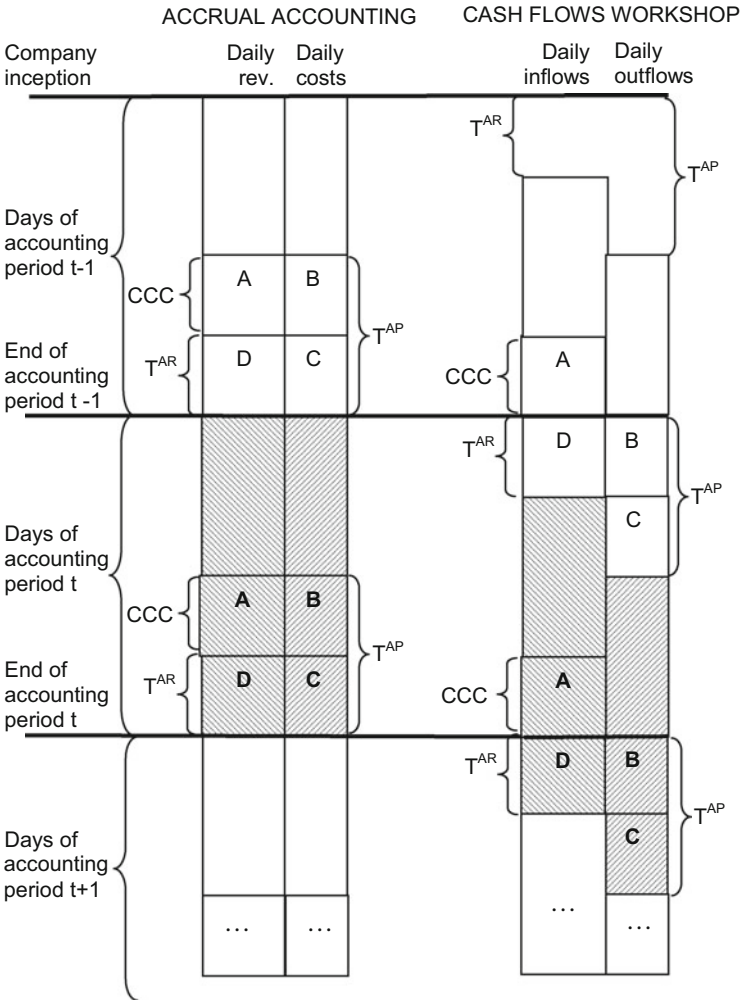

Fig. 2 Accrual accounting vs. cash flows workshop for companies operating in conditions of negative Cash Conversion Cycle, where: T^{AR}—trade credit period granted by company; T^{AP}—trade credit period received by the company; CCC—cash conversion cycle. Under assumption of continuous operations, no inventories and constant demand (sales) the *vertical hinge* of *each box* stands for days of operations while the *horizontal hinge* stands for size of variable listed at the *top of the box*. Area A indicates cash surplus as a sum of inflows, appearing prior to the corresponding outflows equal to area B. Area B stands for cash temporarily owned by the company over period CCC that serves for paying accounts payable equal to B. Therefore cash investments in OWC equals area B. WCR (short-term accruals) is the area of $D - B - C$, D equals to credit sales outstanding (accounts receivable) at the end of accounting period t, B and C are accounts payable not settled at the end of accounting period. Only in zero profit conditions *CashOn*OWC = NOWC, CFO are accounting earnings (revenues minus costs) less ΔWCR, inclusion of area A in CFO results in timing and matching problems of cash flows

In a more extended model, including the possibility of inventories, the amount AP that refers to inventories that was already paid adds to CFO by corresponding CF^- and creates investments in the future cash inflows.

Cash investments in OWC at any time t results from timing differences of cash flows (as reflected by area B) and its variability and equals to:

$$CashOnOWC_t = -\sum_{1}^{t} RCF_t^- - \sum_{1}^{t} CF_t^- + \sum_{1}^{t} NCF_t^+ \tag{3}$$

where: *CashOn*OWC—cash investments in OWC, CF^-—operating cash outflows, RCF^-—operating current assets safety stocks, NCF^+—operating net cash inflows, i.e. calculated on costs of goods sold basis, t—day of company operations no. (starting at 1, that stands for company inception):

$$\begin{aligned} RCF_t^- &= RM_t + RFG_t + ROC_t \\ NCF_t^+ &= S_{t-T^{AR}+1} \cdot c \end{aligned} \tag{4}$$

where: RM—materials safety stocks, RFG—finish goods safety stocks, ROC—operating cash safety stocks, S—sales in units, c—unit costs of goods sold, T^{AR}—trade credit period granted by the company.

CashOnOWC stands for cumulated sum of cash outlays as generated from company inception and engaged in on-going operations at the moment of analysis, i.e. engaged in operations that have been already started and not finished at the moment of analysis, e.g. the end accounting period. This amount appears only due to time differences between corresponding operating flows, i.e. outflows and inflows. *CashOnOWC* could be either positive or negative. Negative *CashOnOWC* stands for a sum of outflows a company has already made at the time of analysis in on-going operations, while positive *CashOnOWC* stand for a sum of outflows the company will have been making in on-going operations in consecutive future periods. The sign of *CashOnOWC* in general depends on industry and company specific conditions, i.e. negative *CashOnOWC* refers to positive CCC while positive *CashOnOWC* refers to negative CCC. Between the NOWC (Eq. 1) and *CashOnOWC* (Eq. 3) the following relationship exists[2]:

[2] Equation 5a can be easy proof in the following way. In Fig. 1 at the end of accounting period t NOWC = A + D − C. As AR = A + D and AP = C, A is a part of AR and refers to revenues i.e. costs increased by earnings: $A = B + E(B)^{AR}$ and similarly $D = C + E(C)^{AR}$, such that $E^{AR} = E(B)^{AR} + E(C)^{AR}$. Having from balance sheet AR, AP and from income statement E to get B we need to adjust AR on E^{AR} and subtract C that is $A + D - E^{AR} - C = NOWC - E^{AR}$. In Fig. 2 it would be: $D - E^{AR} - B - C = NOWC - E^{AR}$. Cash flows workshop indicates on Fig. 1 that the net cash flows (as calculated from formula 5a) are negative while on Fig. 2 are positive, therefore to get signs of *CashOnOWC* consistent with cash flows workshop the appropriate correction ("−" before bracket) is done in formula 5a.

$$CashOnOWC_t = -\left(NOWC_t - E_t^{AR}\right)$$
$$E_t^{AR} = \sum_{t-T^{AR}+2}^{t} S_t \cdot e \tag{5a}$$

where: E_t^{AR}—sum of accounting earnings included in accounts receivables as calculated on the basis of net sales, e—unit accounting earnings, i.e. unit price p_s less of unit costs of goods sold c.

The formula given in Eq. 5a allows us to estimate the amount of *CashOnOWC* on commonly available data from financial statements.

Besides the total amount of cash, investments in OWC currently held by the company, we can also investigate the additional cash investments in OWC made at the moment of analysis comparing to analogous previous moment. Incremental investment *ΔCashONOWC* equals:

$$\Delta CashOnOWC_t = CashOnOWC_t - CashOnOWC_{t-1} = \\ = -\left(\Delta NOWC_t - \Delta E_t^{AR}\right) \tag{5b}$$

If a company operates under the condition of a positive CCC, *ΔCashONOWC* equals additional cash delivered by investors for on-going operations at the time of analysis comparing to the previous time. If a company operates under the condition of a negative CCC, *ΔCashONOWC* equals additional cash delivered by suppliers and workers and refers to increments in cash surplus the investors temporarily own at the time of analysis comparing to the previous time.

The problem discussed in the next section concerns the distribution of the areas A, B, C and D within EBIT, FCF and NCF generated by a growing company operating under different industry specific conditions.

3 FCF Metrics Bias Resulting From a Static Approach to Free Cash Flows Analysis

Accrual accounting, as a fundament of accounting earnings, let it be EBIT, is outstanding for matching revenues and corresponding costs. Under this rule, however, the time of payment is irrelevant and therefore all areas: A, B, C and D are included while calculating EBIT. As time of payment is irrelevant, the differences between the length of operating cycle and payment deferral period are not reflected in EBIT et al.

The core of all metric for FCF defines this sort of flows available for distributions to investors as $EBIT(1-T_c)-I_n$ where T_c—is a marginal cash tax rate and I_n are cash investments in future growth (investments above the amortization). Such investments reflects capital expenditures and changes in the operating working capital, therefore $I_n = capex + \Delta WCR$. Let us assume, for practical reasons, that $capex = 0$

and analyze the effect of the changes in WCR alone, consequently the variable of interest is FCF from operations. Employing the cash flows workshop to measure the FCF from operations we see from Figs. 1 and 2 that only area B is included in FCF under $T^{AR} > T^{AP}$ and only area A under $T^{AR} < T^{AP}$. This means that two companies with the same EBIT could produce different FCF thus giving misleading signals to investors. Under $T^{AR} > T^{AP}$ positive FCF means free cash available for distribution to investors at a given point in time but the same is not true for $T^{AR} < T^{AP}$ as FCF includes cash from invisible credit as delivered by suppliers and workers which are not parties of company investors.

The detailed analysis of the influence of the sector specific length of CCC on FCF considers the finite planning horizon T and includes the accumulation of FCF until that horizon starting from company inception. Similarly, as in the previous analysis, we think of a simplified model of company operations; however, the company is a growing one (growing at a constant rate g). Under the conditions of $T^{AR} > T^{AP}$ FCF are lower from base case FCF (generated under $T^{AR} = T^{AP}$) as always the $WCR_t > WCR_{t-1}$. Under the conditions of $T^{AR} < T^{AP}$ cash flows are higher than the base case FCF as always the $WCR_t < WCR_{t-1}$ (WC is negative for that conditions). The reason is that cash flows workshop for calculating FCF cuts the operating cycle off at the arbitrary defined period (the end of the accounting period) and does not take into consideration the fact that the operating cycle will continue in the future. FCF does not capture the corresponding flows—inflows for $T^{AR} > T^{AP}$ (area A) and outflows for $T^{AR} < T^{AP}$ (area B) and therefore suffers from timing and matching problems.

Contrary to FCF other flows—net cash flows NCF are cash flows from investment that match cash outflows with corresponding cash inflows. NCF are flows that consider the magnitude and timing of operating cash flows thus are superior to EBIT (which consider only magnitude of financial flows) and are superior to FCF which mismatch operating flows. To calculate NCF the area A needs to be included under $T^{AR} > T^{AP}$ and area B under $T^{AR} < T^{AP}$.

Figures 3, 4, and 5 are graphical presentations of the discussed relationships and compare the evolution of $EBIT(1-T_c)$, FCF and NCF from company inception to the end of planning horizon T. All companies in Figs. 3, 4, and 5 have the same EBIT. All graphs are the results of simulations based on a simple spreadsheet financial model of company operations.

The operating income after taxes $EBIT(1-T_c)$ is the same in all discussed cases, however it seems on the basis of FCF, that companies that operates under $T^{AR} < T^{AP}$ generate more free cash available for distribution than the rest of companies. The point is that FCF under $T^{AR} < T^{AP}$ (negative CCC in general) is supplied by invisible credit that needs to be paid. This, however, contradicts the idea of FCF because following (Daves et al. 2004, p. 17) company does not use FCF to purchase operating assets. Figure 6 compares evolution of FCF under different length of CCC and clearly display the bias included in FCF metrics.

The cutoff point in the operating cycle at the end of accounting period defines static approach to free cash flow analysis similarly to liquidity analysis based on traditional liquidity ratios. Such static approach is in contrast to on-going concern

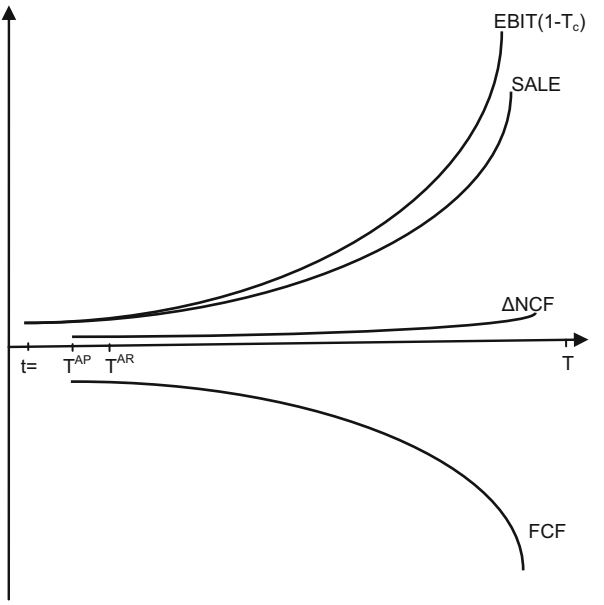

Fig. 3 The evolution of EBIT($1-T_c$), FCF and ΔNCF for growing company under $T^{AR} > T^{AP}$ (EBIT($1-T_c$) < ΔWCR). Under conditions of $T^{AR} > T^{AP}$ FCF counts for cash investments in OWC which for growing company increases in each subsequent period. As FCF cuts off future inflows from already made outflows, the result is negative FCF (while EBIT < ΔWCR). At the same time ΔNCF takes these future inflows into consideration and therefore are positive and follow the sales growth pattern

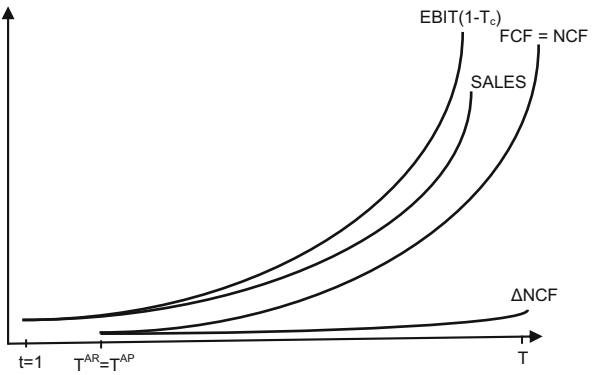

Fig. 4 The evolution of EBIT($1-T_c$), FCF and ΔNCF for growing company under $T^{AR} = T^{AP}$. Such company needs no cash investments in OWC, at the same time investments in OWC are "on paper" only unless the materials inventory investments are included. Nevertheless, this investment is done in only a few subsequent operating cycles, not for the whole upcoming accounting period and its growth. FCF follows EBIT($1-T_C$) and is shifted to the right of it

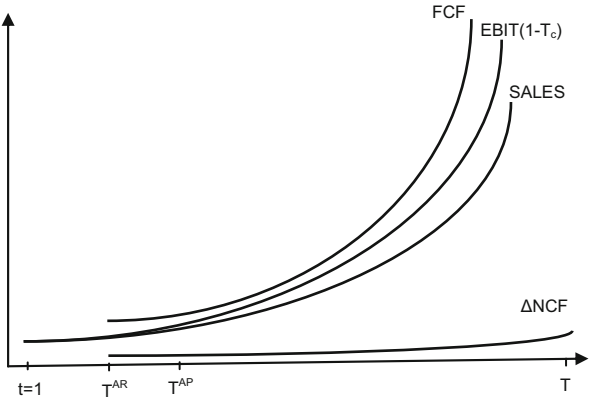

Fig. 5 The evolution of EBIT($1-T_c$), FCF and ΔNCF for growing company under $T^{AR} < T^{AP}$ ($\Delta WCR < EBIT(1-T_c)$). Under conditions of $T^{AR} < T^{AP}$ FCF counts for cash investments in OWC (invisible from cash flows perspective credit received from suppliers and workers) and therefore are at any time higher from EBIT as ΔWCR is always negative. As FCF cuts off future outflows from already recorded inflows, the result is positive FCF. At the same time NCF takes these future inflows into consideration and therefore are positive and follow the sales growth pattern

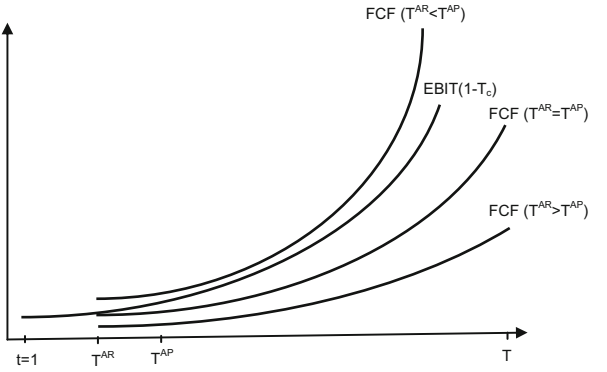

Fig. 6 The comparison of FCF under different sector conditions resulting in different lengths of CCC ($\Delta WCR < EBIT(1-T_c)$). EBIT($1-T_c$) is the same for all companies

that relies on full operating cycle—the approach to free cash flows analysis described below.

4 Ongoing Approach to Free Cash Flow Analysis

The financial model of company operations developed in this section is a general one and thus has rather pragmatic meaning for managers and students because it easily captures the core idea employed for valuation. The company operating cycle consists

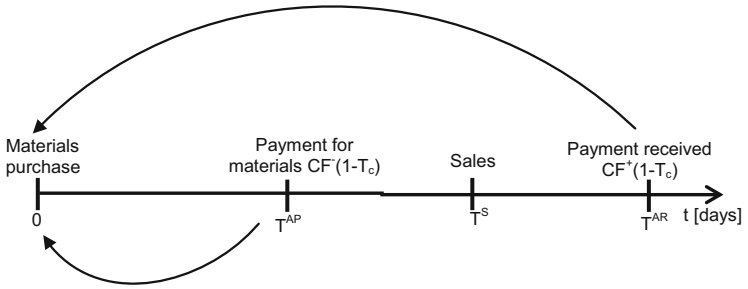

Fig. 7 The cash flows timeline for typical operating cycle

of purchasing—production—sales—collection and is spontaneously financed by accounts payable. Cash flows associated with this cycle are operating cash inflows CF^+ and operating cash outflows CF^- (see Fig. 7). As T^{AR} and T^{AP} do not coincide CF^- refers to cash investments in OWC. Both cash flows CF^+ and CF^- appears at the end of the trade credit periods T^{AR} and T^{AP} respectively as it is not economically justified to settle accounts earlier for customers or company. The model assumes the tax rate equals the marginal cash tax rate T_c and continuous flows resulting from sales means that such a timeline starts each day of company operations.

4.1 Valuation Under Constant Credit Sales

Assuming that the sales is constant over the whole planning horizon T cash flows for any operating cycle follow the same pattern described by timing and magnitude of cash flows. Timing is designed by working capital policy decision variables: T^{AR} and T^{AP} and as a result of constant credit sales CF^+ and CF^- magnitude does not change over the planning horizon. In this case, it is enough to evaluate investment in one typical operating cycle. The net present value NPV of cash flows associated with this typical operating cycle equals to:

$$NPV = -\frac{CF_{T^{AP}}{}^{-}(1-T_c)}{(1+r)^{T^{AP}}} + \frac{CF_{T^S+T^{AR}}{}^{+}(1-T_c)}{(1+r)^{T^S+T^{AR}}} \tag{7}$$

where: r—required rate of return, T^S—time of sales.

Introducing infinite horizon the value of such infinite net cash flow is a value of perpetuity:

$$V_0 = \frac{NPV}{r} \tag{8}$$

4.2 Valuation Under Discretionary Time Pattern of Credit Sales

As sales are rarely constant over the planning horizon T, in practice it is more realistic to assume that sales follow a time pattern: *CS(t)*. It can be a time pattern of any type including seasonal variations and, moreover, the sales pattern is free to change over time. Cash flows CF^{+} and CF^{-} are functions of sales and follow a sales time-series pattern, therefore cash flows are functions of time $CF^{+}(t)$ and $CF^{-}(t)$. The timing of cash flows results from T^{AP} and T^{AR}. Cash flows pattern properties generate from both: working capital policy parameters T^{AP} and T^{AR} and sales time pattern. As each operating cycle cash flows may differ due to sales time pattern and its changes, we need to include all cash flows generated from sales to evaluate cash investments in OWC over the whole planning horizon T. Introducing more convenience for analysis continuous discounting, first we calculate the NPV_t representing the net present value of cash flows for each operating cycle beginning at t:

$$NPV_t = -CF(t)^{-}(1-T_c)\cdot e^{-rT^{AP}} + CF(t)^{+}(1-T_c)\cdot e^{-r\left(T^{S}+T^{AR}\right)} \tag{9}$$

Secondly, we calculate the NPV of the whole project—cash investments in OWC made over the entire planning horizon T[3]:

$$\begin{aligned} NPV &= \int_0^T \left| \left(-CF(t)^{-}(1-T_c)\cdot e^{-rT^{AP}} + CF(t)^{+}(1-T_c)\cdot e^{-r\left(T^{S}+T^{AR}\right)}\right) e^{-rt} \right| dt = \\ &= \int_0^T |NPV_t \cdot e^{-rt}| dt \end{aligned} \tag{10}$$

Introducing infinite horizon the value of such infinite net cash flows is a value of:

$$V_0 = \lim_{T\to\infty} \int_0^T \frac{NPV_t}{(1+r)^t} \tag{11}$$

[3] Valuation model developed in this section origins in the paper of (Sartoris and Hill 1983). Their model is a very general one to evaluate changes in working capital policy and, in fact, reduces to general valuation model.

5 Managerial Implications for Corporate Financial Management

5.1 What Measures of a Company Performance Do Investors Prefer?

There is quite a large debate in the literature on which measure of company performance is better—traditional accounting earnings or cash flows while predicting stock market returns. Apart from that, none, to the best of my knowledge, describes the variability of stock market returns at a reliable level, the results concerning the significance effects are mixed. Based on empirical investigation some argue that accounting earnings outperform cash flows (like Dechow 1994; Sloan 1996). Conclusions concerning FCF metrics bias resulting from static approach to free cash flows analysis as described in this paper ads additional argument against application of FCF. The problem is more severe for young companies (where cash investments in OWC are quite large comparing to gained EBIT), companies with quite large variability in the level of OWC (for that companies FCF tends to change direction from period to period) and companies with long CCC (where the amount of cash investments in OWC are quite large). Not surprisingly though, (Dechow 1994) observe the disadvantage of cash flows over accounting earnings in this listed situations. There will also be some situations in which the FCF metrics bias would not create a bias at all, e.g. constant sales (there are no additions to cash investments in OWC for such case) and CCC close to zero (there are no cash investments in OWC at all for CCC equals zero).

5.2 Valuation Based on FCF

Financial theorists assume that only cash flows matter when valuing an asset—these are investment outlays and corresponding inflows. However, what creates a value is not the change in the cash position but net additions (i.e. earnings) to wealth (Vernimmen 2005). FCF from operations exhibit the change in the company operating cash position not the wealth *per se* because considering the wealth we need to include future flows from currently held investments. Additionally, these end of period cash investments in OWC take into consideration only a few future subsequent operating cycles not the whole upcoming accounting period therefore we rather should calculate investments in WCR as $\Delta WCR = WCR_{t+1} - WCR_t$ not $\Delta WCR = WCR_t - WCR_{t-1}$.[4] Although financial theorists (Shrieves and Wachowicz 2001) prove that FCF and NPV give adequate results and both are

[4] Only linear trend in EBIT requires constant additions to cash investments in OWC and for this special case these additions are the same over future and current year.

just a variation of the DCF valuation method, this is only the truth when the end of horizon FCF includes repayment of the whole cash investment in OWC. Under conditions of $T^{AR} > T^{AP}$ these would be very large positive flows and under conditions of $T^{AR} < T^{AP}$ these would be very large negative flows. Both offset the preliminary bias in FCF, thus discounted NCF, and discounted by the same cost of capital FCF produce the same result. Considering the infinite horizon however FCF does not include such repayment of the whole cash investments in OWC therefore FCF are biased. It is reasonable to conclude that valuation based on FCF produce biased results: undervalued for $T^{AR} > T^{AP}$ (positive CCC in general) and overvalued for $T^{AR} < T^{AP}$ (negative CCC in general).

5.3 *Short-Term Financial Management as Abandoned Source of Wealth*

Under the theory of a growing company (Copeland et al. 2005, p. 498), it seems that what creates growth are future new investments and what creates value is the rate of return on that investment higher than the required one. The rate of return gained by the company comes from both: *capex* and cash investments in OWC. The former is known as capital budgeting and the latter as short-term financial management or working capital management. It is not an easy task, however, to find a paper referring to efficiency of working capital management, especially merging working capital management efficiency evaluation with the wealth maximization framework. A few exceptions to list are: (Sartoris and Hill 1983; Kim and Chung 1990; Arcelus and Srinivasan 1993; Rutkowski 2000; Wędzki 2003; Szpulak 2014). It is more like a stereotype that managing working capital concerns managing financial liquidity and conjunction with efficiency is delivered only by the minimization of costs of operating current assets stocks. Contrary, Eqs. 7, 9, and 10 define this straightforward relationship between efficiency of working capital management and wealth maximization criterion. Describing the inflows and outflows occurring at the date of trade credit periods, both granted and received, as functions of sales in units and such additional parameters like: discount rate, prices sale, materials, labor and inventory carrying and shipping, the delay of salaries payments, penalty charges for late payments, rate on overdue payment from collection agency and time the company decides on selling overdue balances, limits of materials consumption, ordering cycle, delivery batch and delivery cycle and operating assets safety stocks to mention only the most common enables managers to decide on optimal working capital policy in line with wealth maximization. Working on cash flows at the same time enables the control of financial liquidity.

5.4 Measuring Financial Liquidity

There is a very special business situation that could be a potential source of financial abuse: Let us imagine a growing company with negative CCC. In light of the analysis of FCF from operations made in this paper, increments of cash investments in OWC increase with every operating cycle, *ceteris paribus*, leaving a company with increasing sources of surplus cash. This is due to increments in the invisible credit as delivered by suppliers and workers. Free use of such a temporary cash surplus—particularly financing *capex* or, worse, distribution of it in form of dividends may result in company bankruptcy as soon as the sales stops increasing or declines. In general, for companies with negative CCC cash investments in OWC as measured by Eq. 3 should be covered with non-operating current assets net of non-operating current liabilities: (non-operating current assets sums up to short-term investments, assuming they are liquid i.e. may be used at any time without much lost in the value):

$$\frac{NLB_t}{-\left(WCR_t - E_t^{AR}\right)}, \qquad WCR < 0 \tag{12}$$

where: NLB—net liquid balance as a difference between non-operating current assets and non-operating current liabilities, WCR—net operating working capital (Eq. 1), E^{AR}—sum of accounting earnings included in accounts receivable (Eq. 5a).

Ratio close to 0 indicates very high financial risk and high probability of bankruptcy particularly in the event of declining market conditions.

5.5 What Needs to Be Done to Apply the Concept of an Ongoing Approach to Free Cash Flows Analysis?

To apply the concept on publicly available financial data it is enough to forecast sales, estimate industry specific characteristics of the operating cycle: the length of operating cycle and the length of payment deferral period and build adequate spread sheet financial model. A task that's easy in theory is often complicated in practice. The first and the most severe problem is the unbiased estimation of the above-mentioned periods. In practice, it requires calculating such financial ratios as: the inventory conversion period, receivable collection period and payables deferral period. All these ratios are highly inaccurate, apart from perhaps such an unreal business situation such as constant sales, inventories only in amount of safety stocks and constant working capital policy over whole analyzed past period. Going inside the company the application of these on-going approach complicates even further as the traditional financial model, like the one used in this paper, assumes continuous inflows and outflows resulting from sales which produces a smooth curve of NCF over the whole planning horizon being unfortunately totally inaccurate.

One reason is that such a traditional financial model does not include ordering cycles and delivery cycles that cause cash flows to appear from time to time not every day of company operations. It seems therefore that the application of on-going concern to free cash flows analysis open the waste space for future research.

6 Conclusions

This paper aimed to disclose a bias incorporated into FCF metrics resulting from timing and matching problems that cash flows suffer from compared to EBIT. The sources of the bias are cash investments in OWC, which differ depending on the length of the Cash Conversion Cycle. Under the conditions of negative CCC, the FCF as calculated on the basis of commonly applied metrics ($EBIT(1-T_c)-I_n$) do not satisfy the definition of FCF. That is, they do not sum cash available for distribution to investors as a part of it, namely $\Delta CashOnOWC$, need to be paid to suppliers and workers, which are not company investors parties. The consequences of this bias refer to such areas of corporate financial management as (1) investors preferences comparing FCF to ordinary accounting earnings as a measure of company profitability, (2) application of DCF methods based on FCF for valuation, (3) short-term corporate financial management or (4) liquidity measurement. To obey the bias in the FCF metrics but still satisfy the requirements of financial theory to rely on cash flows for valuation, the alternative valuation based on NPV of net cash flows, NCF, as generated by the operating cycle is suggested in this paper.

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