Seminar Paper

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Topic
‘The Role of Accruals in Valuation and Cash Flow Prediction’

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OLD ARTS - Rm:155 - Flr:G Ground Floor Old Arts - enter the building via the entrance off Professor's Walk - the theatre entrance is to your right after you enter. Look for the sign on the wall.

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The Role of Accruals in Valuation and Cash Flow Prediction

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1. Introduction

A key role of accrual accounting is to assign the cash flows an entity receives to the periods to which the economics of the cash flows relate. That is, earnings in any particular period is intended to reflect the economics of that period, regardless of when the entity receives or pays the cash flows. Accruals recognized as assets and liabilities in the statement of financial position reflect adjustments to cash flows received and paid in advance of or after the period of the economics to which they relate. We develop a model of firm value as a function of expected future cash flows that captures this role of accrual accounting to provide new insights into four research questions. 1. How do the roles of accruals that align subsequent and prior period cash flows with current period economics differ in valuing the firm and in forecasting one-period-ahead cash flows and earnings? 2. How do these two types of accruals differ in the information they provide relating to the valuation and forecasting tasks? 3. What do these differences imply for the relation between the accruals and firm value, future cash flow, and future earnings? 4. Does the quality of these accruals differentially affect valuation and forecasting, if so, how?

Our insights derive from a valuation model we develop based on the Ohlson (1995) model, but with two key differences. First, we assume that a firm’s cash flows are driven by an economic factor that persists, with innovations, over time. The economic factor in any given period can generate cash flows in the periods prior to, contemporaneous with, and subsequent to that period. Thus, our model is consistent with Dechow and Dichev (2002) in that a firm’s cash flows in a particular period comprise three components, where each component relates to the economic factor from one of these three periods. We restrict neither the magnitude nor the sign of each of these relations; whether each relation is positive or negative depends on the nature of
the firm’s business. Second, we model accruals as the mechanism for aligning cash flows in a particular period with the period of economic factor that generates the cash flows, but with error. In particular, we distinguish two types of accruals: those that align cash flows in the prior period with the current period economic factor—such as prepaid expenses and deferred revenue—and those that align cash flows in the subsequent period to the current period—such as accounts receivable and warranty accruals. In our model, investors use the accounting information, cash flow, and the two types of accruals, together with knowledge of the underlying accrual structure, to estimate the distribution of future cash flows in order to value the firm.

Analysis of our model reveals that each accounting amount in our model—cash flow and accruals relating to prior and subsequent periods’ cash flows—has a different multiple in valuation, in forecasting future cash flow, and in forecasting earnings. Each of these multiples is a combination of a coefficient that reflects the informational role the accounting amount plays, and valuation and forecasting multipliers that reflect differences in how that information is used in valuation and cash flow and earnings forecasting. Perhaps surprisingly to some, the model also reveals that it is possible for the signs of their multiples to differ for valuation, cash flow forecasting, and earnings forecasting. The signs depend on the signs of the relations between the cash flow components and the economic factor to which they relate. These insights are apparent only because we distinguish accruals by the way in which they align cash flows and the economic factor to which the cash flows relate. They are not apparent by distinguishing accruals according to the nature of the asset or liability, such as inventory and prepaid expenses.

Regarding the informational role of the accounting amounts, investors can extract information from the amounts about both next period’s economic factor and the temporary shock to one of the components of next period’s cash flow, both of which aid investors in their
valuation and forecasting tasks. Although investors would like to have information about the
temporary shocks to all three future cash flow components, the accounting system only provides
information about one—the component that occurs in the period subsequent to the economic
factor to which it relates. Our model shows that the informational coefficient for each
accounting amount is the same in the valuation and both forecasting tasks. This is because the
information in the accounting amount does not vary across the tasks, only how that information
is used varies. Our model also shows that the information coefficient differs across the
accounting amounts because each amount differs in the information it provides regarding next
period’s economic factor and the temporary future cash flow shock.

Current period cash flow contains information about the subsequent period’s economic
factor, but that information is noisy. This is because one, but only one, component of current
period cash flow relates to the subsequent period’s economic factor. Investors can use accruals
to reduce that noise, but different accruals do so differently. Accruals that align current period
cash flow with next period’s economic factor provide investors additional, noisy, information
about next period’s economic factor. Prior period accruals that align current period cash flow
with the prior period’s economic factor also provide investors with information about next
period’s economic factor. They do so by helping to remove some of the noise in current period
cash flow regarding the subsequent period’s economic factor. Current period accruals that align
next period’s cash flow with this period’s economic factor provide the available information
about the temporary shock to one component of next period’s cash flows.

Regarding the valuation and forecasting multipliers, our model shows that the valuation
multiplier for each accounting amount differs from its cash flow and earnings forecasting
multipliers because of the different time horizons relevant to valuation and forecasting. In
addition, the multipliers for cash flow and earnings forecasting differ. This is because accruals that align current (next) period cash flow with the next (current) period’s economic factor are helpful in cash flow (earnings) forecasting, but not vice versa. These different multipliers, when combined with the accounting amount’s information coefficient, result in each accounting amount having different multiples in valuation, in cash flow forecasting, and in earnings forecasting.

Our model also demonstrates that the effect of higher accrual quality on the association between firm value and the accounting amounts depends on the type of accrual. In particular, the information coefficient for current period cash flow, current period accruals that align current period cash flows with next period’s economic factor, and last period’s accruals that align current period cash flow with last period’s economic factor all are increasing (decreasing) in the quality of current period accruals that align next (current) period’s cash flows with the current (next) period economic factor. The opposite holds for current period accruals that align next period’s cash flow with the current period’s economic factor. A key insight from our model is that higher accrual quality results in a lower risk-related discount in price, regardless of the accrual type. That is, setting diversification issues aside, in our model higher quality accounting unambiguously results in lower cost of capital.

The remainder of the paper is organised as follows. Section 2 provides background for our inquiry and outlines related research. Section 3 describes the model and derives equilibrium equity price. Section 4 investigates the valuation and forecasting implications of the model and Section 5 considers the role of accrual quality in valuation. Section 6 offers a summary and concluding remarks.
2. The role of accruals in financial reporting and related research

2.1 Accruals and financial reporting

The Conceptual Framework underlying financial reporting (FASB 2010) states that the objective of financial reporting is to provide financial information about the entity that is useful to existing and potential investors, lenders, and creditors in making decisions about providing resources to the entity. The Conceptual Framework goes on to explain that investors’ expectations about returns on their investments depend on their assessment of the amount, timing and uncertainty of future net cash inflows to the entity. Consequently, investors need information to help them assess the prospects for future net cash inflows to an entity. Financial reports also are designed to provide information to help investors to estimate the value of the entity.

Accruals are fundamental to financial reporting. As the Conceptual Framework explains, accrual accounting depicts the effects of transactions and other events and circumstances on an entity’s economic resources, i.e., assets, and claims, i.e., liabilities and equity, in the periods in which those effects occur, even if the resulting cash receipts and payments occur in a different period. This is important because the Conceptual Framework expresses the belief that information about an entity’s economic resources and claims and changes in them during a period provides a better basis for assessing the entity’s past and future performance than information solely about cash receipts and payments during that period. Accruals are the mechanism by which current period cash flow is modified to create a more predictive performance measure, namely earnings. Thus, financial reporting has evolved to enhance performance measurement by using accruals to alter the timing of cash flows recognition in earnings (Dechow 1994; FASB 2010).
2.2 Related research

Several prior studies address the question of whether accruals aid in the prediction of future cash flows by examining the relative predictive ability for future cash flows of past aggregate earnings and past cash flow, but report mixed findings. In particular, whereas Greenberg, Johnson, and Ramesh (1986), Burgstahler, Jiambalvo, and Pyo (1999), and Barth, Cram, and Nelson (2001) find that aggregate annual earnings has more predictive ability for future cash flow than past cash flow, and Lorek and Willinger (1996) finds similar results using quarterly accruals, Bowen, Burgstahler, and Daley (1986) does not. Finger (1994) finds that cash flow has marginally more predictive ability for future cash flow than aggregate earnings for short horizon predictions, but earnings and cash flow have the same predictive ability for longer horizons.

Other studies examine whether disaggregating total accruals, i.e., the difference between earnings and cash flow, into its components enhances the predictive ability of accruals for future cash flows incremental to current cash flow. Dechow, Kothari, and Watts (DKW, 1998) models cash flow and the accrual process related to short-term accruals—accounts receivable, accounts payable, and inventory—and, based on the model, predicts that earnings is the best predictor of future cash flows. Consistent with this prediction, DKW reports that cash flow forecast errors based on aggregate earnings are significantly lower than those based on cash flow, and that in a regression of future cash flow on current period earnings and current period cash flow both have incremental explanatory power. Barth, Cram, and Nelson (2001) extends the DKW model to show that earnings’ greater predictive ability for future cash flows is attributable to disaggregating earnings into cash flow and the components of accruals. Barth, Cram, and Nelson (2001) finds that disaggregated earnings has significantly more predictive ability than
several lags of aggregate earnings, and that long-term accruals aid in predicting future cash flows, not just working capital accruals. Barth, Cram, and Nelson (2001) also finds that cash flow and the major accrual components of earnings—related to accounts receivable, inventory, accounts payable, depreciation, amortization, and other accruals—have predictably different multiples in cash flow prediction.

In addition, Brochet, Nam, and Ronen (2009) finds that accruals improve upon current cash flow in predicting future cash flow, particularly positive accruals. Li, Lev, and Sougiannis (2009) focuses on accounting estimates embedded in accruals and examines their usefulness in the prediction of cash flow and earnings. Li, Lev, and Sougiannis (2009) finds that accounting estimates beyond those in working capital do not improve the prediction of future cash flows, although they improve the prediction of next year’s earnings. However, none of these prior studies investigates the differential predictive ability for future cash flow of accruals that differ depending on whether the accrual is associated with subsequent or past period’s cash flows; our model reveals that this distinction is important.

Cash flow prediction is closely related to assessing firm value because equity value is the present value of expected future cash flow. To examine the relevance of accruals for assessing equity value, prior research compares the abilities of earnings and cash flow to explain equity value or changes in it, i.e., returns. Some studies (e.g., Ball and Brown 1968; Beaver and Dukes 1972; Dechow 1994) find that aggregate earnings is more highly associated with equity returns than is cash flow, whereas Penman and Yehuda (2009) finds that earnings has a positive relation with equity value but, incremental to earnings, more free cash flow, i.e., cash flow from operations minus cash investment, has no association with equity returns. Other studies (e.g., Rayburn 1986; Wilson 1986, 1987; Bowen, Burgstahler, and Daley 1987; Ali 1994; Cheng, Liu,
and Schaefer 1996; Pfeiffer et al. 1998) find that aggregate earnings and cash flow are incrementally informative for returns. Some studies find that components of earnings, including accruals and their components, have different equity valuation pricing multiples consistent with their different persistence (e.g., Lipe 1986; Barth, Beaver, and Wolfson 1990; Barth, Beaver, and Landsman 1992; Barth et al. 1999, 2005). Barth, Cram, and Nelson (2001) finds that cash flow and the major accrual components of earnings have predictably different valuation multiples.

In proposing a new measure of the quality of working capital accruals and earnings, Dechow and Dichev (2002) incorporates the observation that the accrual component of earnings in the current period reflects some cash flows that occurred in the prior period and some that occur in the subsequent period (Dechow 1994). Dechow and Dichev (2002) also observes that when the cash flow occurs after the corresponding accrual is recognized, managers must estimate the cash flow and, thus, the accrued amount includes estimation error. The Dechow and Dichev (2002) accrual quality measure is based on the residuals from a regression of the change in working capital accruals on current, prior, and past period cash flow. The notion is that residuals will be larger when the change in working capital is less closely aligned with the three periods’ cash flow, regardless of whether the misalignment is systemic or the result of accrual estimation errors. However, Dechow and Dichev (2002) does not separately estimate the relation between cash flow and the accruals depending on the period of the cash flow giving rise to the accruals. Thus, Dechow and Dichev (2002) is not designed to reveal the insights that our model is designed to reveal.

We contribute to this prior literature primarily by showing that in predicting future cash flow and assessing equity value, the role of accruals depends on their origin, i.e., whether the cash flow associated with the accrual has occurred or will occur in the future, which reflects the
fundamental nature of accruals in financial reporting. Thus, our model provides new insights into the role of accruals in predicting future cash flow and assessing equity value. In particular, our model reveals not only that accruals have different relations with future cash flow and equity value depending on their origin, but also that the signs of these relations can differ depending on whether one is predicting future cash flow or assessing equity value.

3. The model

3.1 Cash flows and economic fundamentals

We model a single firm whose cash flows are driven by an underlying economic factor, $\theta_t$. We model the accounting system as creating accruals to adjust the firm’s cash flows to align them with this economic factor. We assume $\theta_t$ is observed at time $t$ and is known to evolve according to a first-order autoregressive process, with known parameter $\gamma$:

$$\theta_t = \gamma \theta_{t-1} + \varepsilon_t. \quad (1)$$

$\varepsilon_t$ represents a shock to the firm’s economics, where $\varepsilon_t \sim N(0, \sigma^2)$. As is standard for first-order autoregressive models, we assume $0 \leq \gamma < 1$.

To provide the basis for modelling accruals, we employ Dechow and Dichev’s (2002) assumption that the firm’s cash flow from operations, $CFO_t$, comprises cash flows related to economic factors in three periods—the prior, current, and subsequent periods. That is,

$$CFO_t = CF_{t}^{A} + CF_{t}^{C} + CF_{t}^{B}, \quad (2)$$

where $CF_{t}^{i}$ denotes a component of cash flow from operations. The $A$, $C$, and $B$, superscripts indicate the cash flow occurs after, concurrent with, and before the period of the economic factor to which the cash flow relates. The subscript $t$ denotes the period in which the cash is received.
or paid by the firm. Thus, for cash received in period $t$, $CF_i^A$ relates to $\theta_{t-1}$, $CF_i^C$ relates to $\theta_t$, and $CF_i^B$ relates to $\theta_{t+1}$.

We assume the components of cash flow in equation (2) evolve according to the following dynamics:

$$
CF_i^A = \lambda^A \theta_{t-1} + e_i^A, \\
CF_i^C = \lambda^C \theta_t + e_i^C, \\
CF_i^B = \lambda^B \theta_{t+1} + e_i^B.
$$

(3)

$e_i^A$, $e_i^C$, and $e_i^B$ are transitory cash flow shocks that are unrelated to the economic factor, $\theta_t$. We also assume that each $e_i^t \sim N(0, \sigma^2_e)$ and is independent of other random variables in the model. Figure 1A portrays the timing of cash flow components and the underlying economic factors, $\theta_t$.

Equation (3) reveals that we permit the cash flow components to have different parameters linking them to the economic factors: $\lambda^A$, $\lambda^C$, and $\lambda^B$. We do not restrict the signs on the $\lambda$s. Whether a $\lambda$ is positive or negative depends on the nature of the firm’s business. For example, if the current cash flow component relating to the previous period’s economic factor, $CF_i^A$, is predominantly cash inflows (e.g., cash receipts from customers this period relating to sales in the previous period), then $\lambda^A$ is positive. If that current cash flow component is predominantly cash outflows (e.g., cash payments this period related to expenses incurred in the previous period) then $\lambda^A$ is negative. However, to ensure that the net present value of future cash flows associated with each $\theta_t$ is positive, we require $\frac{\lambda^A}{R} + \lambda^C + R\lambda^B > 0$, where $R>1$ is one plus the risk free discount rate.
3.2 Accruals

Modelling the current period economic factor, $\theta_t$, as being associated with cash flows in three periods leads us to model cash flow from operations in period $t$ as comprising cash flows driven by economic factors occurring in three periods—the prior, current, and subsequent periods. Doing so permits us to capture the notion that accrual accounting attempts to realign the cash flows so that only those cash flows that relate to the current period’s economic factor are recognised as income in the current period—other cash flows are recognized as accruals in the statement of financial position.

To capture this notion, we define two types of accruals that result in amounts recognized as assets and liabilities in the statement of financial position. The first type, which we denote $SFP^A$, comprises assets and liabilities that arise from the $CF^A$ cash flow component. That is, $SFP^A$ represents assets and liabilities for which the associated cash flow occurs after the period of the economic factor to which the cash flow relates. Accounts receivable and accrued liabilities, e.g., warranty, restructuring, and pension liabilities, are examples of $SFP^A$ because they represent statement of financial position amounts whose associated cash flows come in the period after the economic events to which they relate. The second type of accrual, which we denote $SFP^B$, comprises assets and liabilities for which the associated cash flow occurs before the period of the economic factor, $CF^B$. Deferred revenue and operating assets other than cash and accounts receivable, e.g., inventory acquired for cash, prepaid expenses, and property, plant, and equipment, are examples of $SFP^B$.

We model the statement of financial position accruals as follows:

$$
SFP_t^A = CF_{t+1}^A + \nu_t^A,
$$
$$
SFP_t^B = -CF_t^B + \nu_t^B,
$$

(4)
where $v^A_t$ and $v^B_t$ denote the extent to which $SPF^A_t$ and $SPF^B_t$ capture the cash flow components to which they relate. $SPF^A_t$ has a positive relation with cash flow in period $t + 1$ because $SPF^A_t$ relates to cash flow in the period following the accrual. For example, accounts receivable (warranty liabilities) in period $t$ reflects cash inflows (outflows) in period $t + 1$. As we show below, $SPF^A_t$'s role is to incorporate into the firm’s current period accrual-based operating performance measure, $OPEARNS_t$, cash flows that relate to the current period economic factor but do not occur until the subsequent period. $SPF^B_t$ has a negative relation with cash flow in period $t$ because $SPF^B_t$ is associated with period $t$ cash flows driven by the period $t + 1$ economic factor. For example, inventory purchased for cash (deferred revenue) in period $t$ reflects cash outflows (inflows) in period $t$ that relate to period $t + 1$’s economic factor.

These assets and liabilities provide the mechanism by which cash flows are assigned to the period associated with the economic factor to which they relate. Specifically, as portrayed in figure 1B, using equation (4) and the usual definition of operating earnings as cash flow from operations plus changes in net operating assets yields:

$$OPEARNS_t = CFO_t + \Delta SPF^A_t + \Delta SPF^B_t$$

$$= (CF^A_t + CF^C_t + CF^B_t) + (CF^A_{t+1} - CF^A_t + \Delta v^A_t) + (-CF^B_t + CF^B_{t-1} + \Delta v^B_t)$$

$$= CF^A_{t+1} + CF^C_t + CF^B_{t-1} + (\Delta v^A_t + \Delta v^B_t),$$

which realigns cash flows so that $OPEARNS_t$ reflects only cash flows relating to period $t$’s economic factor, although it does so with error via $\Delta v^A_t$ and $\Delta v^B_t$.

Finally, we assume in equation (4) that each $v^i \sim N(0, \sigma^2_i)$ and is independent of other random variables in the model. Because each $v^i$ represents the error in accruals when measuring
and realigning cash flows, consistent with Dechow and Dichev (2002) we interpret each $\sigma^2$ as a measure of accrual quality.

### 3.3 Investors and equilibrium price

Our model assumes there are overlapping generations of risk averse investors. Specifically, in each period we assume there is a continuum of rational investors who have negative exponential utility with risk aversion parameter $r$. Investors choose their holdings of the risky security and a risk-free security at the beginning of the period, and liquidate the holding at the end of the period. Their utility is defined over the payoff received, which comprises the price of the security at the end of the period, $P_{t+1}$, as well as any dividend paid, $DIV_{t+1}$. We normalise the per capita supply of the risky asset to equal one in each period.

Because investors have single-period horizons they choose their demand for the security to maximise expected utility over their end-of-period payoff, $P_{t+1} + DIV_{t+1}$, given all information available to them at time $t$, i.e., $\{\theta, CFO_\tau, CASH_\tau, SFP^A_\tau, SFP^B_\tau\}, \tau \leq t$, where $CASH_\tau$ is the firm’s cash balance. Equilibrium price at time $t$ is determined by setting these demands equal to supply.

To derive equilibrium price in our model, we first assume price at time $t$ is linear in the information available to investors at that time. We then determine the coefficients in the linear price expression that, if anticipated by investors, generate demands that, when equated with supply, result in those same coefficient values. The following proposition describes the resulting equilibrium. (Proofs are in the appendix.)

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1 Effectively we assume that investors see the history of the firm’s statements of financial position, $CASH_\tau, SFP^A_\tau, SFP^B_\tau$; statements of cash flows, $CFO_\tau$; and the economic factors, $\theta$. Given this information, the statement of financial performance, $OPEARNS_\tau$, is redundant.
PROPOSITION 1. Equilibrium price is given by:

\[ P_t = CASH_t + a \theta_t + b E_t(\theta_{t+1}) + c E_t(e_{t+1}^d) - rd, \quad (5) \]

where

\[ a = R^{-1} \lambda^A, \]
\[ b = (R - \gamma)^{-1} \left( \frac{\lambda^A}{R} + \lambda^C + \gamma \lambda^B \right), \]
\[ c = R^{-1}, \]
\[ d = (R - 1)^{-1} s^2, \]
\[ s^2 \equiv \text{Var}_t(P_{t+1} + \text{DIV}_{t+1}) = \text{Var}_t\left( CFO_{t+1} + a \theta_{t+1} + b E_{t+1}(\theta_{t+2}) + c E_{t+1}(e_{t+2}^d) \right), \]

and \( E_t(\cdot) \) and \( \text{Var}_t(\cdot) \) denote expected value and variance conditional on all information available at time \( t \).

There are several interesting features of proposition 1. First, as in Ohlson (1995), the price expression does not directly depend on dividends. This results from exploiting the fact that the cash account satisfies a cash-based version of the clean surplus relation,

\[ CASH_{t+1} = CASH_t + (R - 1)CASH_t + CFO_{t+1} - DIV_{t+1}, \]

which allows us to replace dividends in investors’ expectations with \( CFO_{t+1} + CASH_t + (R - 1)CASH_t - CASH_{t+1} \). Second, the accounting variables \( CFO_t, SFP_t^A, \) and \( SFP_t^B \) do not appear directly in the pricing expression, (5). Their role is in forming investor expectations (and assessed variances) relating to next period’s realizations of \( \theta_{t+1} \) and \( e_{t+1}^d \)—that is, as might be expected, they play an informational role.

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2 In our model, we implicitly assume that cash flow from operations does not include interest earned or paid on the beginning cash balance. This results in \( CFO_t \) playing a role similar to that of abnormal earnings in Ohlson (1995).
Third, the price expression in equation (5) is the same as it would be in a risk-neutral setting where price is equal to the expected present value of future dividends, but with the addition of a risk discount term, \(-rd\). That is, $CASH_t + a\theta_t + bE_t(\theta_{t+1}) + cE_t(e_{t+1}^A)$ is equal to the expected present value of future dividends.\(^3\) Thus, equation (5) can be interpreted as showing that price depends on the current amount of cash available to pay dividends plus investors’ expectations regarding future cash available to pay dividends, less a risk-related discount that depends on investors’ perceptions of the variance of their end-of-period payoff. Accruals play an informational role in setting investors’ expectations about the firm’s future dividend paying ability as well as about the firm’s risk. We investigate each of these in the following two sections.

4. The role of accruals in valuation and forecasting

4.1 Accruals and valuation

Proposition 1 indicates that accounting amounts play an informational role in valuing the firm in that they assist investors in assessing the factors that drive the firms’ future cash flows and, thus, dividend-paying ability. Specifically, the role of accruals, and other accounting information, is embedded in $E_t(\theta_{t+1})$ and $E_t(e_{t+1}^A)$.\(^4\)

To obtain expressions for $E_t(\theta_{t+1})$ and $E_t(e_{t+1}^A)$ it is useful to recalibrate the information available at time $t$ into the following signals with equivalent information for forecasting $\theta_{t+1}$ and $e_{t+1}^A$:

\(^3\) Details of this calculation are available from the authors.
\(^4\) The exception to this is the cash account that appears in the valuation expression, equation (5), directly.
The signals in equation (6) are a reformulation of the information available from the accounting variables \( CFO_t \), \( SFP_t \), \( SFP^A_t \), and \( SFP^A_t \) incremental to current and past realizations of the economic factor, \( \theta_t \), that is useful in forecasting \( \theta_{t+1} \) and \( e_{t+1}^A \). The first three signals assist in forecasting next period’s economic factor, \( \theta_{t+1} \), and the fourth assists in forecasting \( e_{t+1}^A \), a transitory component of next period’s cash flows.5

Because of our normality assumptions, it is straightforward to derive the following lemma that details the relevant expectations.6

**Lemma.** \( E_t(\theta_{t+1}) \) and \( E_t(e_{t+1}^A) \) are given by:

\[
E_t(\theta_{t+1}) = (1 - \beta_{z_t^\theta} - \beta_{z_t^e}) \gamma \theta_t + \beta_{z_t^\theta} z_t^\theta + \beta_{z_t^e} z_t^e + \beta_{z_t^e} z_t^\theta \]

\[
E_t(e_{t+1}^A) = \beta_{z_t^e} z_t^{eA} \]

where

\[ z_{t}^{1\theta} = \frac{1}{\lambda^B} (CFO_t - \lambda^A \theta_{t-1} - \lambda^C \theta_t) = \theta_{t+1} + \frac{1}{\lambda^B} (e_t^A + e_t^C + e_t^B), \]

\[ z_{t}^{2\theta} = -\frac{1}{\lambda^B} SFP_t^B = \theta_{t+1} + \frac{1}{\lambda^B} (e_t^B - v_t^B), \]

\[ z_{t}^{3\theta} = \frac{1}{\lambda^B} (SFP_{t+1}^A - \lambda^A \theta_{t-1}) = \frac{1}{\lambda^B} (e_t^A + v_{t-1}^A), \]

\[ z_{t}^{eA} = SFP_t^A - \lambda^A \theta_t = e_{t+1}^A + v_t^A. \]

5 Section 3 specifies three transitory components of cash flows: \( e_t^A \), \( e_t^B \), and \( e_t^C \). However, information is available about next period’s realization for only one: \( e_{t+1}^A \). The other two retain their unconditional expectation of zero and, therefore, do not appear in the valuation expression in equation (5).

6 Table 1 summarizes the results from the lemma.
\[ \beta_{z^g} = \frac{1}{D}(\sigma_{z^g}^2 \sigma_{z^g}^2 (\sigma_{z^g}^2 + \sigma_{z^g}^2)) \]
\[ \beta_{z^g} = \frac{1}{D}(\sigma_{z^g}^2 \sigma_{z^g}^2 + (\sigma_{z^g}^2 + \sigma_{z^g}^2) \sigma_{z^g}^2) \]
\[ \beta_{z^g} = -\frac{1}{D}(\sigma_{z^g}^2 \sigma_{z^g}^2) \]
\[ \beta_{z^g} = \frac{\sigma_{z^g}^2}{\sigma_{z^g}^2 + \sigma_{z^g}^2} \]
\[ D = \left( \frac{\sigma_{z^g}^2 + \sigma_{z^g}^2}{(\lambda^B)^2} \right) \left( \sigma_{z^g}^2 \sigma_{z^g}^2 + (\sigma_{z^g}^2 + \sigma_{z^g}^2) \sigma_{z^g}^2 \right) + \left( \sigma_{z^g}^2 + \frac{\sigma_{z^g}^2}{(\lambda^B)^2} \right) \sigma_{z^g}^2 \left( \sigma_{z^g}^2 + \sigma_{z^g}^2 \right). \]

The lemma, in conjunction with equation (5) and the definitions in equation (6), indicates how each accounting amount is associated with the firm’s value. In each case, the association is the product of a valuation multiple from equation (5) and an informational coefficient from the lemma. For each accounting amount that determines \( E_t(\theta_{t+1}) - CFO_t, SFP_t^A, \) and \( SFP_{t-1}^A \)—the valuation effect comprises a common valuation multiple, \( b = (R - \gamma)^{-1} \left( \frac{\lambda^A}{R} + \lambda^C + \gamma \lambda^B \right), \)
multiplied by the relevant informational coefficient from the lemma, \( \frac{\beta_{z^g}}{\lambda^B}, \frac{\beta_{z^g}}{\lambda^B}, \) or \( \frac{\beta_{z^g}}{\lambda^B}. \)

\( SFP_t^A, \) has a valuation multiple different from equation (5), \( c = R^{-1}, \) multiplied by the informational coefficient \( \beta_{z^g}. \) Table 2 summarizes the resulting valuation coefficients.

An immediate implication of the lemma is that the coefficients on the accounting amounts generally will differ. This is for two main reasons. First, the accounting amounts provide information relating to different underlying drivers of future cash flows. In the case of \( CFO_t, SFP_t^B, \) and \( SFP_{t-1}^A, \) information is conveyed to investors about the future economic factor, \( \theta_{t+1}. \) This helps investors assess future cash flows that are driven by economic factors. \( SFP_t^A, \) provides information about the transitory component of next period’s \( A - \)type cash flows, \( e_{t+1}^A, \)
i.e., those that lag economic factors, such as future cash receipts from current credit sales.

Because these factors have different persistence, they have different implications for future cash flows, and this is reflected in the valuation multiples in table 2. Second, the accounting amounts have different levels of error relative to the underlying construct for which each provides information, which result from various combinations of accrual estimation errors and transitory shocks in the cash flow components. These differences are reflected in the informational coefficients in table 2.

In addition, table 2 reveals that the coefficients are not necessarily positive. For example, it is possible for the coefficient on \( CFO_t \) to be negative if either \( b = (R - \gamma)^{-1} \left( \frac{\lambda^A}{R} + \lambda^C + \gamma \lambda^B \right) \) or \( \lambda^B \) is negative. Similarly, the coefficients on \( SFP_t^B \), e.g., inventory, and \( SFP_{t-1}^A \), e.g., lagged receivables, can be negative. In contrast, the coefficient on \( SFP_t^A \), e.g., receivables, is always positive.

### 4.2 Forecasting cash flows and earnings

Using the definitions in section 3.1, the forecast of next period’s operating cash flows, \( CFO_{t+1} \), can be written as:

\[
E_t(CFO_{t+1}) = \lambda^A \theta_t + \lambda^C E_t(\theta_{t+1}) + \lambda^B E_t(\theta_{t+2}) + E_t(e_{t+1}^A) + E_t(e_{t+1}^C) + E_t(e_{t+1}^B).
\]

Because the information, including the accounting amounts, in period \( t \) is not useful for forecasting beyond one period ahead for \( \theta_t \) and \( e_{t+1}^A \) or even one period ahead for \( e_{t+1}^C \) and \( e_{t+1}^B \), the forecasting expression for \( CFO_{t+1} \) reduces to:

---

7 Specifically, the information available at time \( t \), \( \{ \theta_t, CFO_t, CASH_t, SFP_t^A, SFP_t^B \} \), \( \tau \leq t \), is only useful for forecasting \( \theta_{t+1} \) and \( e_{t+1}^A \). Thus, \( E_t(\theta_{t+2}) = \gamma E_t(\theta_{t+1}) \), \( E_t(e_{t+1}^C) = 0 \), and \( E_t(e_{t+1}^B) = 0 \).
Thus, as with valuation, the role of accruals, and other accounting information, for forecasting future cash flows is embedded in $E_i(\theta_{t+1})$ and $E_i(e_{t+1}^d)$. Also as with valuation, the total effect of each accounting amount on the cash flow forecast comprises a cash flow forecasting multiple multiplied by an informational coefficient. However, the cash flow forecasting multiples are not the same as the valuation multiples in table 2. The differences reflect that valuation is requires forecasting cash flows for all future periods and discounting them to the present, whereas the cash flow forecast is only for one future period.

Of note is that it is possible for the valuation and cash flow forecasting multiples on $E_i(\theta_{t+1})$ to have different signs. That is, for example, a higher $E_i(\theta_{t+1})$ can lead to higher valuation but a lower forecast for next period’s cash flow (and vice versa).\(^8\) Thus, lower anticipated one-period-ahead cash flows need not be associated with lower firm value.

Regarding the forecast of next period’s earnings, $E_i(\text{OPEARNS}_{t+1})$, it is straightforward to calculate that:

$$E_i(\text{OPEARNS}_{t+1}) = \lambda^d \theta_t + (\lambda^c + \gamma \lambda^b) E_i(\theta_{t+1}) + E_i(e_{t+1}^d) - \text{SFP}^d_t - \text{SFP}^b_t. \quad (10)$$

Thus, again, the total effect of each accounting amount comprises an earnings forecasting multiple multiplied by an informational coefficient. However, there is an additional effect for $\text{SFP}^d_t$ and $\text{SFP}^b_t$—the final two terms in equation (10)—that results from the fact that accruals reverse.

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\(^8\) This can happen, for example, if $\lambda^b$ is so negative that the cash flow forecasting multiple, $(\lambda^c + \gamma \lambda^b)$, is negative but the valuation multiple, $b = (R - \gamma) \left( \frac{\lambda^d}{R} + \lambda^c + \gamma \lambda^b \right)$, is positive, e.g., $\lambda^d$ is sufficiently positive.

Economically, this would reflect a situation in which cash flows that lead economic factors are negative (e.g., current investment in inventory in anticipation of better future economic factors), but much of the cash inflows relating to next period’s economic factors is deferred, i.e., $\lambda^d$ is large and positive.
Table 3 summarizes the above discussion and provides the effects of the four accounting amounts—\( CFO_t, SFP^A_t, SFP^B_t, \) and \( SFP^A_{t-1} \)—on forecasts of next period’s cash from operations and earnings. Tables 2 and 3 reveal, as discussed above, that each accounting amount generally has different valuation and forecasting effects.

5. Accrual quality and valuation

Accrual quality is captured in our model by the variance of the error terms for the two statement of financial position accrual accounts, \( SFP^A_t \) and \( SFP^B_t \): \( \sigma^2_{v_t} \) and \( \sigma^2_{v_{t-1}} \). Higher accrual quality, i.e., lower variance, potentially has two types of effects on valuation. First, higher accrual quality affects how value varies with the accounting amounts via the informational coefficients linking accounting amounts to the factor driving future cash flows, as summarized in table 2. Second, higher accrual quality affects the discount in price captured by the \( \text{Var}(P_{t+1} + DIV_{t+1}) \) term in proposition 1. We investigate comparative statics relating to each of these effects in sections 5.1 and 5.2.

5.1 Accrual quality and valuation coefficients

Table 1 and the discussion in section 4.1 indicates that in our model accrual quality affects the association between the accounting amounts and firm value only through the informational coefficients, that is, how the accounting amounts are related to expectations of \( \theta_{t+1} \) and \( e^A_{t+1} \). The following proposition provides straightforward comparative statics regarding these coefficients and accrual quality.

**Proposition 2.**

i. \( \beta_{21} \) is increasing (decreasing) in the quality of \( SFP^A_t \) (\( SFP^B_t \)) accruals;
ii. $\beta_{z^a}$ is decreasing (increasing) in the quality of $SFP_{t}^A$ ($SFP_{t}^B$) accruals;

iii. $\beta_{z^b}$ is increasing (decreasing) in the quality of $SFP_{t}^A$ ($SFP_{t}^B$) accruals;

iv. $\beta_{z^c}$ is decreasing (unchanging) in the quality of $SFP_{t}^A$ ($SFP_{t}^B$) accruals.

Proposition 2 indicates that the effect of accrual quality on the association between accounting amounts and firm value depends on the type of accrual. In fact, for the first three informational coefficients an improvement in accrual quality has opposite effects for the two accrual types. Moreover, because $\beta_{z^a}$ and $\beta_{z^b}$ are positive and $\beta_{z^c}$ is negative, proposition 2 indicates that an improvement in accrual quality relating to $SFP_{t}^A$ increases the magnitude of $\beta_{z^a}$, the informational coefficient on $CFO$, but decreases the magnitudes of $\beta_{z^b}$ and $\beta_{z^c}$, the coefficients on $SFP_{t}^B$ and $SFP_{t-1}^A$. An improvement in accrual quality relating to $SFP_{t}^B$ has the opposite effects. These different effects reflect the different informational roles played by the various accounting amounts as captured by the informational coefficients.

As indicated in table 1, both $CFO$ and $SFP_{t}^B$ are used by investors as signals of $\theta_{t+1}$, next period’s economic factor. The noise in $CFO$ comprises the three transitory cash flow components, $e^A_t$, $e^C_t$, and $e^B_t$, whereas the noise in $SFP_{t}^B$ comprises the transitory cash flow component, $e^B_t$, and the accrual error, $\nu^B_t$. In contrast, $SFP_{t-1}^A$ provides only indirect information that assists investors in forecasting $\theta_{t+1}$. $SFP_{t-1}^A$ provides information about $e_t^A$, which is part of the noise in $CFO$, but does so with its own accrual error, $\nu^A_{t-1}$. As a result, higher accrual quality relating to $SFP_{t-1}^A$ means investors are better able to extract part of the noise in $CFO$.

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9 This is why the coefficient on $SFP_{t-1}^A$, $\beta_{z^c}$, is negative.
that part relating to the transitory cash flow shock $e^d_t$. This extraction ability causes the magnitude of the coefficients on both $CFO_t$ and $SFP_{t-1}^A$ to increase. At the same time, the magnitude of the coefficient on $SFP_t^a$, which is competing information about $\theta_{t+1}$, is lower because $SFP_t^a$ now provides relatively noisier information than $CFO_t$. In contrast, when the accrual quality relating to $SFP_t^a$ improves, $SFP_t^a$ provides less noisy information about $\theta_{t+1}$ and the magnitude of its coefficient is higher, whereas the magnitudes of the coefficients on both $CFO_t$ and $SFP_{t-1}^A$ are lower.

To place this discussion in an accounting context, consider the situation in which $SFP_t^a$ represents inventory and is linked to the economic factor in the following period via management making inventory decisions in the current period in anticipation of next period’s expected sales. But, the inventory amount is a noisy signal about the future economic factor, e.g., it may include inventory that was not purchased in anticipation of future sales. Reducing this noise, or increasing accrual quality, results in a more informative signal and investors will place more weight on the inventory amount.

Information also is available from cash flow from operations because it includes the amount spent on inventory in the current period. But, cash flow from operations also includes cash flows that are not related to next period’s factor, e.g., it includes cash received on receivables from the prior period. Investors would like to extract this noise from $CFO_t$. They can do this, but with error, by looking at receivables from the previous period, i.e., $SFP_{t-1}^A$. That is, receivables from the previous period provide some information about the cash received in the current period and included in cash flow from operations. As a result, investors can remove some of the noise in $CFO_t$ as an indicator of next period’s economic factor. Thus, improving
the quality of $SFP^A_{t+1}$ indirectly improves the $CFO_t$ signal, which results in investors weighting it more heavily and the inventory information less heavily. In sum, changing the qualities of the accruals—receivables and inventory—can change which accrual investors rely on more heavily to extract information about the future economic factor. These differences, in turn, result in different effects on the valuation implications of the accounting amounts, as our results indicate.

5.2 Accrual quality and the discount in price (cost of capital)

Proposition 1 reveals a risk-related discount in equilibrium price that is driven by investors’ assessment of the variance of their end of period payoff, $\text{Var}_t(P_{t+1} + DIV_{t+1})$. Using the clean surplus relation applied to the cash balance and the pricing expression in equation (5), it is straightforward to show:

$$\text{Var}_t(P_{t+1} + DIV_{t+1}) = \text{Var}_t\left(CFO_{t+1} + a\theta_{t+1} + bE_{t+1}(\theta_{t+2}) + cE_{t+1}(e^A_{t+2})\right). \tag{11}$$

Equation (11) indicates that accrual quality affects the discount in price in two ways. First, it affects investors’ uncertainty regarding next period’s realizations of the accounting amounts, $CFO_{t+1}$, $SFP^A_{t+1}$, and $SFP^A_{t+1}$, that drive their end-of-period payoff via their effect on next period’s expectations, $E_{t+1}(\theta_{t+2})$ and $E_{t+1}(e^A_{t+2})$. Improving accrual quality reduces this uncertainty and decreases the variance in equation (11). Second, accrual quality affects the informational coefficients on the accounting amounts embedded in $E_{t+1}(\theta_{t+2})$ and $E_{t+1}(e^A_{t+2})$. As indicated in the previous section, improving accrual quality can increase or decrease the magnitude of these informational coefficients and, thus, the variance in equation (11), depending on which type of accrual is improving in quality, and which coefficients are being considered. Consequently, the net effect of an improvement in accrual quality is not immediately clear.
Nonetheless, the following proposition indicates that in our model the effect of accrual quality on the discount in price is unambiguous.

**Proposition 3.** Improving quality of both types of both types of accruals, i.e., decreasing $\sigma_{v_i}^2$ or $\sigma_{v_T}^2$, decreases $\text{Var}(P_{t+1} + \text{DIV}_{t+1})$.

Thus, in our model, improving accrual quality results in a smaller risk-related discount in price, i.e., a lower cost of capital, regardless of which type of accrual improves in quality.

6. Conclusion

This study provides new insights into the role of accruals in cash flow prediction and equity valuation. In particular, we adopt the view that the role of accrual accounting is to assign the cash flows an entity receives to the periods to which the economics of the cash flows relate. We base our insights on a model that we develop that expresses firm value as a function of expected future cash flows. Our model follows Ohlson (1995), with two key differences. First, our model incorporates a fundamental economic factor that is the primary driver of cash flows, but the cash flows related to the factor can occur in the prior, contemporaneous, or subsequent period. Second, we model two types of accruals that differ depending on the period in which associated cash flows occur relative to the period of the economic factor—accruals that assign cash flows from the prior period to the current period, and accruals that assign cash flows from subsequent period to the current period.

We derive three primary results. First, each accounting amount in our model—cash flows and accruals associated with prior and subsequent periods’ cash flows—has a different multiple in equity valuation and in forecasting future cash flows that reflects the different informational roles it plays. For example, the multiples on accruals associated with cash flows in
the period subsequent to the economic factor differ from the multiples on accruals associated
with cash flows in the period prior to the economic factor. Second, the equity valuation multiple
for each accounting amount differs from its one-year-ahead cash flow and earnings forecasting
multiples because of the different time horizons relevant to valuation and forecasting. In fact, it
is possible for a particular accrual’s multiples to have different signs for valuation, cash flow
forecasting, and earnings forecasting. Our model also demonstrates that the effect of higher
accrual quality on the association between firm value and each accrual depends on whether the
accrual relates to prior or subsequent period cash flows. However, in our model higher accrual
quality results in a lower risk-related discount in price, regardless of the accrual type.
References


Appendix – Proofs

[To be added]
Table 1: Summary of role of accounting measures in forecasting $\theta_{t+1}$ and $e_{t+1}^A$

<table>
<thead>
<tr>
<th>Information about</th>
<th>Variable</th>
<th>Signal</th>
<th>Coefficient on the Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E_t(\theta_{t+1})$</td>
<td>$CFO_t$</td>
<td>$z_1^\theta = \frac{1}{\lambda^B} (CFO_t - \lambda^A \theta_{t-1} - \lambda^C \theta_t)$</td>
<td>$\beta_{z_1\theta} = \frac{1}{D} (\sigma^2_e \sigma^2_{\theta} (\sigma^2_{e^A} + \sigma^2_{v^A}))$</td>
</tr>
<tr>
<td></td>
<td>$SFP_t^B$</td>
<td>$z_2^\theta = -\frac{1}{\lambda^B} SFP_t^B$</td>
<td>$\beta_{z_2\theta} = \frac{1}{D} (\sigma^2_e \sigma^2_{\theta} (\sigma^2_{e^B} + \sigma^2_{v^B}))$</td>
</tr>
<tr>
<td></td>
<td>$SFP_{t-1}^A$</td>
<td>$z_3^\theta = \frac{1}{\lambda^B} (SFP_{t-1}^A - \lambda^A \theta_{t-1})$</td>
<td>$\beta_{z_3\theta} = -\frac{1}{D} (\sigma^2_e \sigma^2_{\theta} \sigma^2_{v^B})$</td>
</tr>
<tr>
<td>$E_t(e_{t+1}^A)$</td>
<td>$SFP_t^A$</td>
<td>$z_{e^A} = SFP_t^A - \lambda^A \theta_t$</td>
<td>$\beta_{z_{e^A}} = \frac{\sigma^2_{e^A}}{\sigma^2_{e^A} \sigma^2_{v^A}}$</td>
</tr>
</tbody>
</table>

$$D = \left( \sigma^2_e + \frac{\sigma^2_{e^B}}{\lambda^B} \right) \left( \sigma^2_e \sigma^2_{v^B} + (\sigma^2_{e^A} + \sigma^2_{e^C}) \sigma^2_{v^A} \right) + \left( \sigma^2_e + \frac{\sigma^2_{e^B}}{\lambda^B} \right) \sigma^2_{v^B} \left( \sigma^2_{e^A} + \sigma^2_{v^A} \right)$$
Table 2: Summary of valuation coefficients on accounting measures

<table>
<thead>
<tr>
<th>Accounting measure</th>
<th>Valuation multiple (A)</th>
<th>Informational coefficient (B)</th>
<th>Valuation coefficient (A) x (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CFO_t$</td>
<td>$(R - \gamma)^{-1}\left(\frac{\lambda^A}{R} + \lambda^C + \gamma\lambda^B\right)$</td>
<td>$\frac{\beta z^{\theta}}{\lambda^B}$</td>
<td>$(R - \gamma)^{-1}\left(\frac{\lambda^A}{R} + \lambda^C + \gamma\lambda^B\right)\frac{\beta z^{\theta}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP_t^B$</td>
<td>$(R - \gamma)^{-1}\left(\frac{\lambda^A}{R} + \lambda^C + \gamma\lambda^B\right)$</td>
<td>$-\frac{\beta z^{\theta}}{\lambda^B}$</td>
<td>$-(R - \gamma)^{-1}\left(\frac{\lambda^A}{R} + \lambda^C + \gamma\lambda^B\right)\frac{\beta z^{\theta}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP_{t-1}^A$</td>
<td>$(R - \gamma)^{-1}\left(\frac{\lambda^A}{R} + \lambda^C + \gamma\lambda^B\right)$</td>
<td>$\frac{\beta z^{\theta}}{\lambda^B}$</td>
<td>$(R - \gamma)^{-1}\left(\frac{\lambda^A}{R} + \lambda^C + \gamma\lambda^B\right)\frac{\beta z^{\theta}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP_t^A$</td>
<td>$R^{-1}$</td>
<td>$\beta z^{\theta}$</td>
<td>$R^{-1}\beta z^{\theta}$</td>
</tr>
</tbody>
</table>
Table 3: Summary of forecasting coefficients on accounting measures

Panel A: Forecasting $CFO_{t+1}$

<table>
<thead>
<tr>
<th>Accounting measure</th>
<th>Forecasting multiple (A)</th>
<th>Informational coefficient (B)</th>
<th>Forecasting coefficient (A) x (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CFO_i$</td>
<td>$(\lambda^C + \gamma \lambda^B)$</td>
<td>$\frac{\beta_{z^t}}{\lambda^B}$</td>
<td>$(\lambda^C + \gamma \lambda^B) \frac{\beta_{z^t}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP^B_i$</td>
<td>$(\lambda^C + \gamma \lambda^B)$</td>
<td>$\frac{\beta_{z^t}}{\lambda^B}$</td>
<td>$-(\lambda^C + \gamma \lambda^B) \frac{\beta_{z^t}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP^A_{t-1}$</td>
<td>$(\lambda^C + \gamma \lambda^B)$</td>
<td>$\frac{\beta_{z^t}}{\lambda^B}$</td>
<td>$(\lambda^C + \gamma \lambda^B) \frac{\beta_{z^t}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP^A_i$</td>
<td>1</td>
<td>$\beta_{x^t}$</td>
<td>$\beta_{x^t}$</td>
</tr>
</tbody>
</table>

Panel B: Forecasting $OPEARNS_{t+1}$

<table>
<thead>
<tr>
<th>Accounting measure</th>
<th>Forecasting multiple (A)</th>
<th>Informational coefficient (B)</th>
<th>Forecasting coefficient (A) x (B) less accrual reversal if applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CFO_i$</td>
<td>$(\lambda^A + \lambda^C)$</td>
<td>$\frac{\beta_{z^t}}{\lambda^B}$</td>
<td>$(\lambda^A + \lambda^C) \frac{\beta_{z^t}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP^B_i$</td>
<td>$(\lambda^A + \lambda^C)$</td>
<td>$\frac{\beta_{z^t}}{\lambda^B}$</td>
<td>$-(\lambda^A + \lambda^C) \frac{\beta_{z^t}}{\lambda^B} - 1$</td>
</tr>
<tr>
<td>$SFP^A_{t-1}$</td>
<td>$(\lambda^A + \lambda^C)$</td>
<td>$\frac{\beta_{z^t}}{\lambda^B}$</td>
<td>$(\lambda^A + \lambda^C) \frac{\beta_{z^t}}{\lambda^B}$</td>
</tr>
<tr>
<td>$SFP^A_i$</td>
<td>1</td>
<td>$\beta_{x^t}$</td>
<td>$\beta_{x^t} - 1$</td>
</tr>
</tbody>
</table>
Figure 1A: The link between the components of cash flow from operations ($CFO_i$) and economic fundamentals ($\theta_i$). $CFO_i$ comprises three components: $CF_i^A$ which is driven by economic fundamentals from period $t-1 (\theta_{t-1})$, $CF_i^C$ which is driven by economic fundamentals from period $t (\theta_t)$, and $CF_i^B$ which is driven by economic fundamentals from period $t+1 (\theta_{t+1})$. 

$$CFO_i = CF_i^A + CF_i^C + CF_i^B$$

$$CF_i^A = \lambda^A \theta_{t-1} + \epsilon_i^A$$

$$CF_i^C = \lambda^C \theta_t + \epsilon_i^C$$

$$CF_i^B = \lambda^B \theta_{t+1} + \epsilon_i^B$$
Figure 1B: The link between the accrual based performance measure \( (\text{OPEARNS}_t) \) and economic fundamentals \( (\theta_t) \). The accrual process, \( \text{OPEARNS}_t = \text{CFO}_t + \Delta \text{SFP}^A_t + \Delta \text{SFP}^B_t \) results in an accrual based performance measure which aligns cash flow components with the underlying economic driver, \( \theta_t \), but with error. \( \text{SFP}^A_t \) is ‘statement of financial position accruals’ relating to next period’s cash flows driven by the current period’s economic fundamentals \( (\text{CF}_{t+1}^A) \). \( \text{SFP}^B_t \) is statement of financial position accruals relating to last period’s cash flows driven by the current period’s economic fundamentals \( (\text{CF}_{t-1}^B) \).