A Critical Note on Empirical Comprehensive Income Research

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This paper presents a critical analysis of empirical comprehensive income research. We distinguish between the informational and the measurement approach to value relevance research and systematically trace the origin of the empirical specifications under both approaches. We demonstrate that value relevance regressions in comprehensive income research are often either arbitrary, underspecified or both. The second part of the paper performs a detailed investigation of the empirical findings, which reveals several peculiarities that defy economic intuition and affect the credibility of the research findings. The conclusion of the paper is that there is danger in taking the empirical findings of this research domain at face value and that the potential for informing standards setters is probably limited.

1 Introduction

An old and unresolved issue in accounting is whether income should be determined according to the principle of clean surplus accounting.[1] Clean surplus income includes all value changes in equity, except those resulting from transactions with the owners. Standard setters have departed from clean surplus accounting on many occasions, allowing certain value changes to bypass the income statement and be booked directly into equity. Examples of these so-called dirty surplus flows are unrealised gains and losses on available-for-sale securities, additional minimum pension liability adjustments, currency translations, gains and losses of cash flow hedges and asset revaluations. The practice of dirty surplus accounting has developed over the years, mostly in an ad hoc manner, as a political way out of controversial accounting issues.[2] International evidence indicates that dirty surplus flows are potentially material, often not centred on zero and subject to substantial cross-country variation.[3]

In response to this situation, concerns arose about the increasing lack of transparency of dirty surplus flows and the resulting search costs and inefficiencies.[4] Especially from the users' side grew the demand for a statement of comprehensive income, which would integrate in one statement both net income and dirty surplus flows.[5]

These concerns eventually led to the promulgation of SFAS 130 – Reporting of Comprehensive Income – in 1997 and the revision of IAS 1 – Financial Statements Presentation – in 2007. SFAS 130 requires companies to report comprehensive income in a primary financial statement, which can be the (comprehensive) income statement

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1 *Brief* and *Peasnell,* 1996.
2 *Barker*, 2004.
3 *Isidro* et al., 2004.
4 *Smith* and *Reither,* 1996.
5 AIMR, 1993.

or the statement of changes in equity. The revised version of IAS 1 requires companies to display comprehensive income, either in a single or a separate comprehensive income statement. At present, the display of comprehensive income is still on the agenda of the financial statements presentation project of the IASB and the FASB.[6]

An important consideration for standard setters' deliberations is the actual relevance of the total comprehensive income aggregate and its components for valuation purposes, as evidenced by stock market data. Accordingly, it is no surprise that several empirical research papers have explicitly tried to answer this question. This field of research is referred to in this paper as empirical comprehensive income research. Broadly defined, empirical comprehensive income research considers statistical relations between market data and different income measures, with the intention of providing information that is relevant to standard setters' deliberations of their performance reporting projects.

This paper presents a critical analysis of empirical comprehensive income research. The starting point for this investigation was the observation that, although empirical comprehensive income studies are all intended to inform standard setters on the same issue, they employ a wide variety of functional forms to perform their empirical tests. In contrast to this diversity, most researchers seem to take their functional form specification for granted, providing little or no argumentation for their particular choice. The functional specification obviously influences the statistical findings, has implications for the inferences that are allowed for[7] and potentially impacts the credibility of the research. Therefore, the variety of functional specifications might not be an innocuous issue and seemed worthy of consideration.[8]

Although the majority of empirical comprehensive income papers are value relevance studies, this paper is not an analysis of value relevance research in general. Most of the arguments developed in this study are specific to the context of comprehensive income.

To our knowledge, this is the first paper that investigates the variety of functional form specifications in comprehensive income value relevance research and systematically traces the origin of these functional forms. Through this analysis, it becomes clear that the value relevance regressions are often both arbitrary and underspecified. Another contribution is the detailed analysis of the empirical results, which reveals several peculiarities that defy economic intuition. Together with the low explanatory power of the regressions, these findings potentially have a negative impact on the credibility of the conclusions of many of these papers.

The paper is organized as follows: Section 2 starts by presenting a brief introduction to value relevance research and explains the distinction between the informational and the measurement approach. Section 3 analyzes comprehensive income value relevance studies that are conducted under the informational approach. Section 4 considers value relevance tests under the measurement approach. Section 5 consid-

6 IASPlus, 2009.

7 *Beaver,* 2002.

8 It should be noted from the outset that there is no intention of providing an exhaustive literature review or a summary of research findings. Such an overview can be found for instance in (*Thinggaard* et al., 2006).

ers in detail the nature of the empirical findings. Section 6 presents an alternative approach to value relevance research,[9] which is more in the spirit of residual income modelling (RIM) and less restrictive than the aforementioned value relevance studies.

2 The nature and specifications of value relevance tests

Value relevance studies examine associations between security price-based dependent variables and accounting variables.[10] These associations are investigated by linear regression techniques. An accounting number is termed 'value relevant' if its estimated regression coefficient reveals a statistically significant association with the dependent variable.

Value relevance tests are either relative or incremental. In the context of comprehensive income research, relative association studies compare the association between stock market prices (or returns) and alternative bottom-line measures – mostly net income versus one or more measures of comprehensive income. The income number yielding the most significant earnings response coefficient (ERC) or the highest R^2 is considered to be the most value-relevant. Incremental value relevance studies examine whether, in addition to net income, one or more components of other comprehensive income (OCI) are useful in increasing the explained portion of the variation of dependent variable. Incremental value relevance is judged by whether the earnings response coefficients of these OCI components are significantly different from zero or whether the adjusted R^2 increases after inclusion of the OCI component.

An issue of obvious importance concerns the extent to which value relevance research has the potential to allow for standard-setting inferences, an issue which already raised considerable controversy.[11] Implicitly, all value relevance papers presume that value relevance implies superiority in some normative sense.[12]

To scrutinize the question of policy relevance, it is necessary to be more specific about the meaning of the term value relevance and differentiate between the measurement and the informational perspective. Under the measurement perspective, the specification of a value relevance regression equation is derived from a valuation model, which expresses firm value as a function of accounting variables. At the same time, the valuation model also delivers predictions for the values of the estimated regression coefficients. Association studies based on the measurement approach potentially allow for inferences with regard to „relevance" and „reliability" of accounting numbers, properties that the standard setters have adopted as their goals.[13] In other words, under the presumption that the valuation model is descriptive, failure to find the predicted coefficients may indicate that the inputs to the valuation model, i. e. the accounting data, are irrelevant, unreliable or both.

An important assumption of the measurement approach is that a valuation function in terms of accounting variables can be specified. Since the end of the 1960s, this

9 *Isidro* et al., 2006.
10 For an overview and analysis of value relevance research, see *Barth,* 2000; *Barth* et al., 2001; *Holthausen* and *Watts,* 2001 and *Kothari,* 2001.
11 *Barth* et al., 2001; *Holthausen* and *Watts,* 2001.
12 *Lee,* 1999.
13 *Barth,* 2000.

approach has been subject to severe criticism.[14] The most important source of objection was that, due to uncertainty and the existence of imperfect and incomplete markets for a company's assets and liabilities, it is impossible to maintain the assumption that accounting variables bear any simple, direct relationship to valuation.[15] The informational perspective, which grew out of this belief, relies on less ambitious assumptions and considers only whether accounting data are useful to investors.[16] Accordingly, with regard to the potential of informing standard setters, its findings pertain only to the more abstract purpose of *usefulness* of accounting data. The only assumption that is made by the informational association studies is that, if accounting variables are useful to investors, then they should show up as price revisions.[17] Accordingly, no predictions with respect to the sign and size of the coefficients are made. Usefulness is assumed when the estimate of a coefficient of an accounting variable statistically differs from zero.

The distinction between the measurement approach and the informational approach also has implications for whether the estimated relation between market and accounting data is specified in levels or in flows. The informational approach states that a signal is informative only if the signal can alter beliefs conditional upon the other information available. In other words, accounting information can only be relevant if it comes as a surprise. The determination of the surprise component requires the formulation of an expectations model. A standard approach has been to assume a naive random walk model,[18] i. e. $E_{t-1}\,[INC_t] = INC_{t-1}$. The surprise component is then simply the change in earnings or ΔINC_t.

According to the same reasoning, the corresponding dependent variable is the change in price (or return) and not the price itself since the latter reflects both expected and unexpected information. Accordingly, the econometric specification that corresponds naturally to the informational approach is a flow equation. On the other hand, the measurement approach has a levels specification as its logical starting point. The reason is that the valuation models, which underlie the estimated regressions, are defined in levels. This said, in practice, most value relevance studies that follow a measurement approach are also estimated in first difference form. Typical reasons to depart from a levels specification are concerns of heteroscedasticity and correlated omitted variables.[19] Note that, also in this case, the use of returns as a dependent variable requires the formulation of an expectations model for the right-hand-side variables. However, under the measurement approach, this issue is typically ignored.

3 Comprehensive income value relevance under the informational approach

Table 1 presents an overview of the different functional form specifications that appear in comprehensive income value relevance research. With the exception of

14 *Beaver* et al., 1968.
15 *Beaver,* 1998.
16 *Lev,* 1989.
17 *Ball* and *Brown,* 1968.
18 *Beaver,* 1998; *Bernard,* 1989; *Kothari* and *Zimmerman,* 1995; *Lev* and *Ohlson,* 1982.
19 *Barth,* 2000.

(*Brimble* and *Hodgson,* 2005) and (*Cahan* et al., 2000), all studies that we considered follow an informational perspective. In other words, they do not provide a link to a valuation model.

The absence of an underlying valuation model implies that the informational perspective lacks the necessary rigor to discriminate among different functional specifications.[20] A priori, one functional specification is as good as another and dominance can only be settled by goodness-of-fit considerations. This ad hoc character is reflected by the diversity of econometric specifications that characterizes the informational approach. This section intends to investigate this diversity.

As explained in section 2, according to the basic random walk expectations model, the specification that accords naturally to the informational perspective is a first difference relation between returns and changes in income. Accordingly, the *relative* informational value relevance regression has the following form:

$$return_{it} = \alpha_0 + \alpha_1 \cdot \Delta INC_{it} + \varepsilon_{it}. \quad (1)$$

In comprehensive income research, income (*INC*) is either net (*NI*) or comprehensive income (*CI*). The corresponding *incremental* value-relevance regression is:

$$return_{it} = \alpha_0 + \alpha_1 \cdot \Delta NI_{it} + [\alpha_2] \cdot [\Delta OCI_{it}] + \varepsilon_{it}, \quad (2)$$

where $[\Delta OCI_{it}]$ is the vector of changes of other comprehensive income (OCI) components and $[\alpha_2]$ the associated vector of coefficients. When the incremental value relevance of aggregate OCI is investigated, $[\alpha_2]$ and $[\Delta OCI_{it}]$ reduce to a scalar.

20 *Ohlson* and *Skroff,* 1992.

	Authors	R/I*	Functional form of estimated equation	Underlying assumption
Part A: Informational perspective	*Chambers* et al. (2006) *Dhaliwal* et al. (1999)	*I* *R*	*Relative value relevance (R)* $R_{it} = \alpha_0 + \alpha_1 \cdot INC_{it} + \varepsilon_{it}$ *Incremental value relevance (I)* $R_{it} = \alpha_0 + \alpha_1 \cdot NI_{it} + [\alpha_2] \cdot [OCI_{it}] + \varepsilon_{it}$	$E_{t-1}\,[INC_{it} / P_{it-1}] = r$
	Cheng et al. (1993)	*R/I*	*Relative value relevance (R)* $AR_{it} = \alpha_0 + \alpha_1 \cdot INC_{it} + \alpha_2 \cdot \Delta INC_{it} + \varepsilon_{it}$ *Incremental value relevance (I)* $AR_{it} = \alpha_0 + \alpha_1 \cdot NI_{it} + \alpha_2 \cdot \Delta NI_{it} + [\alpha_3] \cdot [OCI_{it}] + [\alpha_4] \cdot [\Delta OCI_{it}] + \varepsilon_{it}$	*Mean reversion of* INC_i / P_i
	Biddle and *Choi* (2006) *Kubota*, *Suda* and *Takehara*, (2006) *Kanagaretnam* et al. (2007)	*R/I* *R/I* *I*	*Relative value relevance (R)* $R_{it} = \alpha_0 + \alpha_1 \cdot INC_{it} + \alpha_2 \cdot INC_{it-1} + \varepsilon_{it}$ *Incremental value relevance (I)* $R_{it} = \alpha_0 + \alpha_1 \cdot NI_{it-1} + \alpha_2 \cdot NI_{it-1} + [\alpha_3] \cdot [OCI_{it}] + [\alpha_4] \cdot [OCI_{it-1}] + \varepsilon_{it}$	$E_{t-1}\,[INC_{it}] = \rho \cdot INC_{it-1}$
Part B: Measurement perspective	*Brimble* and *Hodgson* (2005) *Cahan* et al. (2000)	*R/I* *I*	*Relative value relevance (R)* $R_{it} = \alpha_0 + \alpha_1 \cdot INC_{it} + \alpha_2 \cdot \Delta INC_{it} + \varepsilon_{it}$ *Incremental value relevance (I)* $R_{it} = \alpha_0 + \alpha_1 \cdot NI_{it} + \alpha_2 \cdot \Delta NI_{it} + [\alpha_3] \cdot [OCI_{it}] + [\alpha_4] \cdot [\Delta OCI_{it}] + \varepsilon_{it}$	*RIM and LID, identical abnormal earnings' persistence* ω_1*, irrelevance of other information* v

* *R(elative) and I(ncremental)*
R = raw return, AR = abnormal return, INC = Income, NI = Net Income, CI = Comprehensive Income and OCI = Other Comprehensive Income

TABLE 1. Overview of functional specifications

Returns are measured either as raw (R) or as abnormal returns (AR). Abnormal returns are calculated as the out-of-sample forecast errors of an estimated market return model (i. e. $R_{it} = \alpha + \beta \cdot R_{Mt} + u_{it}$, where R_{Mt} is the return of the reference market).

It is standard procedure that income – or the change therein – is normalized by beginning of period stock price P_{t-1}.[21] Equations (1) and (2) are typically considered as the straightforward articulations of the research question under the informational approach.[22] Note however that, although the use of the linear form for these equations is standard practice, the restriction of linearity on the relation between unexpected earnings and returns is not implied as such by the informational approach. Consider for instance (*Ball* and *Brown,* 1968), which is the seminal paper for the informational approach to accounting research.[23] *Ball* and *Brown* only partition a sample of firms according to whether they have a negative or a positive earnings surprise and investigate whether this partition has discriminatory power with respect to unexpected stock returns. No linearity is assumed. However, over time, correlation has become a standard measure in empirical information content studies.[24] Correlation confines the discovery of co-movement between two variables to the linear form.

After consideration of part A of table 1, it is clear that none of the estimated functional forms exactly corresponds to the basic format of equations (1) and (2). Nonetheless, it can be shown that the right-hand sides of these equations, in some way or another, all proxy for unexpected earnings and that they are variations of the basic formulations in (1) and (2). More in particular, the difference in specifications is due to alternative expectations models for earnings or price/earnings ratios.

A first class of functional specifications is the one used by (*Chambers* et al., 2006) – henceforth CLSS and (*Dhaliwal* et al., 1999) – henceforth DST (see table 1). In these studies, returns are regressed on *levels* of income. None of these papers provides a link to a valuation model. In fact, the motivation of the functional form in these papers receives scarce attention. DST for example only provide (in a footnote) an (implicit) indication to the informational perspective where they state that the use of income proxies for *unexpected* income.[25] However, no further explanation is provided, apart from a reference to work of *Easton* and *Harris* (1991) and *Ohlson* and *Skroff* (1992). DST also provide no link between the functional form specification and the research question. CLSS provide even less explanation and defend their particular functional specification only by the desire to be consistent with DST. To see how the specification in DST-CLSS accords with equation (1), the latter is rewritten as:

$$return_{it} = \alpha_0 + \alpha_1 \cdot (INC_{it-1}/P_{it-1} - INC_{it-1}/P_{it-1}) + \varepsilon_{it}. \quad (3)$$

The only difference between (1) and (3) is that the normalisation by previous period price P_{t-1} is written explicitly in equation (3), which facilitates an alternative interpretation, which is that ($INC_{it}/P_{it-1} - INC_{it-1}/P_{it-1}$) represents *scaled* unexpected earnings, with INC_{it-1}/P_{it-1} serving as a measure of expected INC_{it}/P_{it-1}.

21 *Christie,* 1987; *Ohlson,* 1991.
22 *Easton* and *Harris,* 1991; *Ohlson,* 1991; *Ohlson* and *Skroff,* 1992.
23 *Beaver,* 1998.
24 *Lev,* 1989.
25 *Dhaliwal* et al., 1999, p. 50.

In an equilibrium model under certainty, the expected ratio of income to price is under certain conditions equal to a constant, more specifically, the risk free rate of return r.[26] In other words, $E_{t-1}\,[INC_{it}/P_{it-1}] = r$. Accordingly then, the effect of adjusting INC_{it}/P_{it-1} for its expected value – the constant – is irrelevant in a regression context because the regression intercept picks up the constant. In other words, when investigating the relation between returns and unexpected income, one might just as well regress returns on income, which provides a rationale for the specification of DST-CLSS.

A second class of specifications is exemplified by (*Cheng* et al., 1993) – henceforth CCG. CCG regress raw and abnormal returns on income and the change in income. To justify their specification, CCG refer to work of *Easton* and *Harris* (1991), without further explanation.[27]

Returning to the specification of DST-CLSS, the property of a constant ratio between expected earnings and prices was derived under specific conditions and is probably too stylized a description of reality.[28] A less extreme assumption is that earnings/price ratios are mean reverting.[29] The implication of this mean-reverting behaviour is that INC_{it-1}/P_{it-1} is a suboptimal indicator of expected INC_{it}/P_{it-1}. Therefore, the change in *INC/P* is often included as an additional variable to the level of *INC/P*. *Easton* and *Harris* (1991) have provided evidence indicating that the inclusion of both levels and changes in income increases the explained portion of returns. This inclusion is however not supported by any formal modelling, but rather, is defended by goodness-of-fit considerations. The above reasoning explains the specification of CCG as a variant of equations (1) and (2).

Finally, another functional form under the informational approach is the one by (*Biddle* and *Choi,* 2006) – henceforth BC, (*Kubota* et al., 2006) – henceforth KST and (*Kanagaretnam* et al., 2007) – henceforth KMS. As a motivation, BC merely provide a reference to (*Biddle* et al., 1995). Instead of considering the time series properties of the price/earnings ratio, *Biddle* et al. (1995) model the time series properties of earnings themselves. In particular, they propose an AR(1) pattern as a proxy for the earnings expectations process. Furthermore, their approach to modelling the expectations process is less restrictive in the sense that they leave the determination of the persistence parameter to be settled by the data. In other words, the markets' expectations parameter is estimated jointly with the earnings response coefficient. The link to the specification of BC-KST-KMS can be seen as follows. According to the AR(1) process,

$$INC_{it} = \rho \cdot INC_{it-1} + u_{it},$$

where ρ is the persistence parameter. Equation (1) between returns and unexpected income becomes:

$$return_{it} = \alpha_0 + \alpha_1 \cdot (INC_{it} - \rho \cdot INC_{it-1}) + \varepsilon_{it},$$

26 *Ohlson,* 1991.

27 *Cheng* et al., 1993, p. 196.

28 Notice that (*Ohlson,* 1991) is actually an attempt to reintroduce the measurement perspective into the informational approach. More in particular, the equality between the price/earnings ratio and 1/r applies only when accounting income equals economic income in a Hicksian sense.

29 *Beaver* and *Morse* (1978) presented evidence supporting this assumption.

where $INC_{it} = \rho \cdot INC_{it-1}$ is the surprise component in income. Or alternatively,

$$return_{it} = \alpha_0 + \alpha_1 \cdot INC_{it} + \alpha_2 \cdot INC_{it-1} + \varepsilon_{it},$$

with $\alpha_2 = -\rho \cdot \alpha_1$, which is the specification used by BC-KST-KMS.

In conclusion, behind the diversity in functional form specifications that appears in informational value relevance comprehensive income studies lies a variety in expectations models regarding earnings or price-earnings ratios. Which of these models dominates is an empirical matter. So, even though under the informational approach, there is no underlying valuation model, the specification of the value relevance regression deserves some attention. In practice, most authors seem to take their specification for granted, providing no motivation for their particular choice.

Another problem concerning the formulations of earnings expectations models relates to the presumed uniformity over different income components. Note that this is even a problematic assumption for the different components of net income.[30] However, as a rough approximation, it might be defensible. For instance, prior research[31] has shown that most components of net income follow a random walk. However, in the context of comprehensive income, this assumption becomes more difficult to uphold. Components of other comprehensive income are typically regarded as more transitory or less persistent than net income.[32] Clearly, this causes difficulty with regard to the formulation of a uniform expectations model for comprehensive income, since each time comprehensive income – or the change therein, is included as an independent variable in an informational value relevance regression, the underlying assumption is made that a uniform expectations model for all components of comprehensive income is appropriate.

An even more particular problem arises when other comprehensive income incorporates fixed asset revaluations (FAR).[33] In practice, most firms opt not to revalue their assets each year.[34] The consequence is that in the revaluation year, $\Delta FAR = FAR$, while in the next year $\Delta FAR = -FAR$ and $FAR = 0$ in all the other years. Obviously, such a time pattern is difficult to reconcile with any of the expectations models mentioned above.

4 CI value relevance research based on valuation theories

Value relevance regressions according to the measurement perspective are derived from a valuation model, which relates company value either to book value, income or a combination of both. An important class of valuation models are residual income

30 *Sloan,* 1996.
31 *Bernard,* 1993.
32 *Barker,* 2004; Black, 1993.
33 *Barth* and *Clinch,* 1998.
34 *Cahan* et al., 2000.

valuation models (RIM), which are generally attributed to the work of *Feltham* and *Ohlson*.[35, 36]

(*Brimble* and *Hodgson,* 2005) – henceforth BH, and (*Cahan* et al., 2000) – henceforth CCGU, are, to the best of our knowledge, the only comprehensive income value relevance studies that follow the measurement perspective. Both papers explicitly refer to the work of *Ohlson* (1995) to support their specification.

The basic form of their value relevance regressions is a relation in first differences:

$$R_{it} = \alpha_0 + \alpha_1 \cdot INC_{it} + \alpha_2 \cdot \Delta INC_{it} + \varepsilon_{it}.$$

The related levels specification from which it is derived is

$$MVE_{it} = (1 - k) \cdot BVE_{it} + k \cdot \theta \cdot INC_{it} + u_{it},$$

with k indicating rents and θ related to the discount rate.

However, it is not immediately obvious how this specification accords to the formulation of RIM. Basically, RIM translates the dividend-discounting model (DDM) into a valuation function in terms of book value and future abnormal earnings:

$$P_{it} = BVE_{it} + \sum_{j=1}^{\infty} \frac{\mathrm{E}\left[INC_{it+j} - \left(r \cdot BVE_{it+j-1}\right)\right]}{\left(1+r\right)^j} \text{ or}$$

$$P_{it} = BVE_{it} + \sum_{j=1}^{\infty} \frac{\mathrm{E}\left[INC^a_{it+j}\right]}{\left(1+r\right)^j},$$

where $INC^a_{it} = INC_{it} - r \cdot BVE_{it-1}$.

Although RIM is expressed in terms of accounting variables, a limitation is that it still requires predictions of future accounting numbers.[37] This means that it does not lend itself to straightforward application in value relevance studies like BH and CCGU, which investigate the relation between prices (or returns) and *historical* accounting numbers. To liberate RIM from the prediction of future accounting numbers, *Ohlson* (1995) imposes an autoregressive process on abnormal income. This process is called the linear information dynamics (LID):

$$INC^a_{it+1} = \omega_i \cdot INC^a_{it} + V_{it+1} + \gamma_{1,it+1}$$
$$V_{it+1} = \varphi_i \cdot V_{it} + \gamma_{2,it+1}$$

ω_i is the persistence parameter of abnormal returns for company *i* and is assumed to be smaller than one to guarantee stationarity. $\omega_i < 1$ accords to the assumption that, due to competition, abnormal income should erode over time. Of particular importance is the inclusion of the other information term V_i, which makes the autoregressive model on abnormal income less restrictive. The inclusion of V_i explicitly recog-

35 Important papers are (*Feltham* and *Ohlson,* 1995) and (*Ohlson,* 1995). *Ohlson* argues that the abandonment of the income measurement theories in the late 1960s was a fundamental error in the development of accounting research in general and in the value relevance research in particular (*Walker,* 1997).

36 Since RIM is a transformation of DDM, which is generally regarded as noncontroversial, and relies thereby only on the assumption of clean surplus accounting, RIM is generally appreciated for its versatility (*Beaver,* 2002; *Lo* and *Lys,* 2000).

37 *Dechow* et al., 1999.

nizes that other financial and non-financial information besides income is potentially relevant to determine income expectations. φ_i is the persistence parameter of these other information shocks. The LID assumption allows RIM to be rewritten as:

$$P_{it} = BVE_{it} + \phi_{1,i} \cdot INC^{a}_{it} + \phi_{2,i} \cdot V_{it},$$

with $\phi_{1,i} = \omega_i / (1 + r - \omega_i)$ and $\phi_{2,i} = (1 + r) / [(1 + r - \omega_i)(1 + r - \varphi_i)]$.

While the pattern of mean reverting abnormal returns actually frees RIM from the prediction of future accounting variables, this is only an assumption, whose validity is an empirical matter.[38] Even when the LID pattern is assumed, the valuation expression does not resemble the specification of BH and CCGU. Thereto, even further restrictions are required. First of all, both r and the persistence parameter of abnormal earnings, ω_i, need to be identical over all firms. Secondly, the other information, V_i, needs to be considered as irrelevant for predicting future income.[39] This latter assumption is particularly troublesome since several studies have shown that the inclusion of other financial and non-financial variables besides income and book value can be useful in explaining market returns.[40]

To conclude, to arrive from RID at the functional specifications of BH and CCGU, the amount and nature of the restrictions is enormous. Both BH and CCGU are silent on these restrictions. So while, by referring to the work of Ohlson, these papers try to establish legitimacy for their functional specifications, in fact, a contribution of RIM is just that it demonstrates the restrictive nature of these functional specifications.[41] In this sense, it does not seem exaggerated to claim that the functional specifications under the so-called measurement approach are no less ad hoc than the specifications that follow the informational perspective. As a matter of fact, both BH and CCGU perform their regressions in first difference form, which makes them literally indistinguishable, except for the dependent variable, from the specification under the informational approach of CCG.

5 Some empirical findings

From the previous sections, the conclusion emerged that there exists considerable latitude in the field of comprehensive income value relevance research concerning the specification of the test equations. Another related potential problem concerns the exclusive focus on book values and earnings – or, in first difference form, earnings and changes therein – as independent variables.[42] An obvious drawback to this approach is the danger of model misspecification and omitted variables bias. According to conventional econometric wisdom, a low R^2 indicates that a regression is badly specified.[43] However, R^2's in the range of 5 to 15 % have become quite commonplace

38 *Dechow* et al. (1999) presents evidence that seems to support this assumption.

39 *Lee,* 1999.

40 *Amir* and *Lev,* 1996; *Lev* and *Thiagarajan,* 1993; *Ou* and *Penman,* 1989.

41 This point was previously made by *Kothari* (2001), section 4.3.3.

42 The omission of other (non-accounting) information (V_i) in the regressions and the focus on a few accounting variables is typical of value relevance research in general. According to *Barth* (2000), this can be explained by the aim of researchers to inform standard setters, who only have control over financial statement variables and whose projects are typically focussed on one or a few accounting issues at a time.

43 *Gujarati,* 2003.

in value relevance tests of earnings.[44] Accordingly, they are not likely to arouse suspicion when results are interpreted. With the intention of further assessing the credibility of value relevance research in the field of comprehensive income, the next section presents a selection of empirical findings.

Relative Value Relevance Tests

It is hardly a controversial issue that, in general, other comprehensive income components – like for instance gains and losses on available-for-sale financial instruments and foreign currency translations – are less persistent than net income.[45] In fact, one of the main sources of objection against the incorporation of dirty surplus flows in net income originates from their transitory nature.[46] Accordingly, comprehensive income is a measure that lumps together both relatively more permanent and more transitory income components.

Kothari (2001) demonstrated theoretically that such an aggregate income number will be less correlated with returns than the more permanent subtotal. Empirical research already documented positive associations between earnings persistence and earnings response coefficients.[47] In his overview of this literature, *Lev* (1989) commented on these findings as not particularly revealing. Indeed, the whole idea of trying to make a link between prices, which are forward looking, and earnings, automatically brings forward the suggestion that earnings should be persistent. Empirical findings that indicate that net income is more value relevant than comprehensive income would be both non-interesting and non-surprising.[48] A finding that comprehensive income is more value relevant than net income would be puzzling.

Surprisingly, when the evidence of relative comprehensive income value relevance research is considered, only a few studies are able to confirm this basic prediction. *Cheng* et al. (1993), using a 1972–1989 sample of US companies, find that comprehensive income is less useful in explaining abnormal returns than net income. *Brimble* and *Hodgson* (2005) confirm this finding using Australian data for the period between 1988 and 1997. Using a 1998–2003 sample of Japanese companies, *Kubota* et al. (2006) find that net income dominates comprehensive income for abnormal returns. However, they do not find a significant difference for explaining raw returns. Another study that cannot discriminate between net and comprehensive income is (*Dhaliwal* et al., 1999) – at least not when financial companies are excluded.[49] The tests of DST fail to discriminate between net and comprehensive income as an explanatory variable, even after deletion of firm-years with non-material OCI numbers. When financial companies are included, comprehensive income according to SFAS 130 actually dominates net income. Also for the US, but for the period 1994–1998, *Biddle* and *Choi* (2006) find that comprehensive income defined by SFAS 130 dominates net income in explaining equity returns. Perhaps not surprisingly, *Biddle* and *Choi* offer no economic rationale for their findings.

44 *Lev,* 1989.
45 *Barker,* 2004; *Ohlson,* 1999 and *Skinner,* 1999.
46 *Black,* 1993; *Brief* and *Peasnell,* 1996.
47 *Collins* and *Kothari,* 1989; *Easton* and *Zmijewski,* 1988; *Kormendi* and *Lipe,* 1987; *Lipe,* 1986.
48 *Skinner,* 1999.
49 DST investigate a 1994–1995 sample of US companies.

In conclusion, the question of which income measure has the highest value relevance seems rhetorical and uninteresting, the dice being loaded in favour of net income. Several comprehensive income studies do not even perform a relative value relevance test. Surprisingly, the empirical findings do not speak with one voice. Given the discussion above, an obvious explanation seems to be the arbitrary nature of the specifications and the limited explanatory power of the estimated regressions. Consider for example the finding of (*Kubota* et al., 2006) that net income dominates comprehensive income with respect to abnormal returns. The underlying adjusted R^2's of the regressions on which their conclusion is based are respectively 2 and 3 percent. R^2's of such a size clearly suggest model misspecification and the need to augment the specification with other variables.

Incremental Value Relevance Tests

Under the measurement approach, valuation theory indicates that the size of the earnings response coefficient of OCI should equal one if OCI is transitory.[50] *Cheng* et al. (1993) do not provide estimates of earnings response coefficients but only compare differences between adjusted R^2's when OCI is included in the regression or not. They find little evidence of incremental value relevance of OCI. When regressions are performed year by year, CCG find that the average adjusted R^2 does not change when OCI is included. Performing the regressions industry-wise does show a significant increase in adjusted R^2 (from 0.15 to 0.18). However, this result is attributable to one sector only (rubber, metal and machinery).

Using a 1992–1997 New Zealand sample, *Cahan* et al. (2000) find little evidence that OCI items are value relevant above net income. However, due to the small sample size, the power of their test is not impressive. When their tests are repeated after winsorization of the top/bottom 1 % outliers for each variable, even the regression coefficient on net income is not significantly different from zero, which is hardly beneficial for the overall credibility of their findings.

Biddle and *Choi* (2006) claim to find incremental value relevance for both gains and losses on available-for-sale securities (SEC) and foreign currency translations (FCT). The regression on which their conclusion is based yields an adjusted R^2 of 3.3 percent. Moreover, several sub-results of their analysis are puzzling. Table 2 shows the results of their estimated regression.

$$R_{it} = \alpha_0 + \alpha_1 \cdot NI_{it} + \alpha_2 \cdot NI_{it-1} + \alpha_3 \cdot SEC_{it} + \alpha_4 \cdot SEC_{it-1} + \alpha_5 \cdot \mathrm{FCT}_{it} + \alpha_6 \cdot FCT_{it-1} + \ldots + \varepsilon_{it}$$

	NI		*SEC*		*FCT*		…	R^2
α_0	α_1	α_2	α_3	α_4	α_5	α_6		
0.13	0.24	0.01	1.17	– 0.17	– 0.52	4.46		0,03
(20.35)	(5.15)	(0.17)	(4.52)	(– 0.61)	(– 0.82	(5.24)		

TABLE 2. Source: *Biddle* and *Choi* (2006)

Firstly, a somewhat disturbing finding is that the coefficient on net income is relatively small in comparison to the coefficients of the components of other comprehensive income. Secondly, from the coefficients for *t* and *t–1* on net income on the one hand and gains and losses on available-for-sale securities on the other hand – respec-

50 *Ohlson,* 1999.

tively 0.24 and 0.01 and 1.17 and – 0.17, can be derived that the implicit estimate of the persistence factor ρ for the income series equals – 0.04 for net income and 0.17 for available-for-sale securities gains and losses.[51] In other words, net income is estimated to be less persistent than gains and losses from available-for-sale securities. Thirdly, regarding foreign currency translations adjustments, the negative coefficient for the current period (– 0.52) and the positive coefficient on the previous period (4.46) together imply that market reacts negatively to positive foreign currency translation surprises. Clearly, these counterintuitive sub-results are embarrassing for the credibility of the overall findings. *Biddle* and *Choi* do not elaborate on (or even mention) these sub-results.

Kanagaretnam et al. (2007) compare the incremental value relevance of OCI items before and after the implementation of SFAS 130 in 1997, the idea being that market participants better understand the value implications of OCI items after SFAS 130 came into effect. For the post-implementation period (1998–2003), they find that OCI items are incrementally value relevant and more so than in the pre-implementation period (1994–1997). However, the empirical findings of *Kanagaretnam* et al. (2007) also contain some remarkable sub-results. For instance, for the pre-implementation period, the earnings response coefficient for net income is 0.097. While the absolute size of this coefficient is puzzling, even more suspect is the finding that the coefficient on available-for-sale securities is approximately five times as large (0.47). The authors do not discuss these particular outcomes. Again, it could be argued that they contaminate the overall credibility of the findings. The R^2's, which are in the area of between 0.6 and 3 %, are hardly comforting in this respect.

A particularly interesting paper is *Pinto* (2005), which demonstrates the vulnerability of test results to the specification of comprehensive income value relevance regressions. *Pinto* uses a levels specification to investigate the incremental value relevance of foreign currency adjustments for US firms with direct investment located primarily in either Mexico or Germany. Translation adjustments arise when multinational firms restate their foreign domiciled assets and liabilities, denominated in local currency units, into home currency units at the balance sheet date.

$$P_{it} = \alpha_0 + \alpha_1 \cdot BVE_{it-1} + \alpha_2 \cdot EPS_{it} + \alpha_3 \cdot \Delta CTA_{it} + \varepsilon_{it}$$

α_0	α_1	α_2	α_3	R^2
11.66	0.31	8.64	– 7.10	0.48
(13.91)	(4.76)	(19.40)	(– 4.17)	

TABLE 3. Source: *Pinto* (2005)

According to the results in table 3, foreign currency translations (ΔCTA[52]) are value relevant, but in the opposite direction of what one would expect, i. e. appreciation of a foreign subsidiary's currency leads to a lower stock price for the parent company. This result is consistent with (*Biddle* and *Choi,* 2006). However, and contrary to the aforementioned studies, *Pinto* does not ignore this economically implausible result,

51 Because of the underlying AR (1) earnings expectations model, $\alpha_2 = - \rho\alpha_1$, where ρ is the persistence parameter of the AR (1) process.

52 ΔCTA is the per-share change in the cumulative translation adjustment from period t to period t–1.

but rather explicitly addresses it as an indication of model misspecification.[53] *Pinto* enriches the regression analysis with interaction terms. The latter serve as proxies for theoretical factors which are relevant to determine the true economic exchange rate exposure to which a company is exposed through it foreign operations. CAPITALINTENSITY indicates the percentage of non-monetary assets of a subsidiary. According to the theory of purchasing power parity, local prices and exchange rates move in opposite directions. In other words, non-monetary assets tend to immunitize the effect of exchange rate changes.[54] COUNTRY is a dummy indicating whether the exchange rate change occurs in a developed or in an emerging country, the underlying idea being that currencies of developed countries tend to follow a random walk pattern, while the currencies of emerging countries tend to be more serially correlated. 1994 is a dummy for the Mexican peso crisis.

$$P_{it} = \alpha_0 + \alpha_1 \cdot BVE_{it-1} + \alpha_2 \cdot EPS_{it} + \alpha_3 \cdot \Delta CTA_{it} + \alpha_4 \cdot (\Delta CTA_{it} \cdot CAPINT_{it}) + \alpha_5 \cdot (\Delta CTA_{it} \cdot CNTRY_{it}) + \alpha_6 \cdot (\Delta CTA_{it} \cdot 1994_{it}) + \varepsilon_{it}$$

α_0	α_1	α_2	α_3	α_4	α_5	α_6	R^2
11.9	0.25	8.91	8.26	– 22.08	– 14.45	13.62	0.49
(14.34)	(3.82)	(19.57)	(1.94)	(– 2.04)	(– 3.75)	(2.93)	

TABLE 4. Source: *Pinto* (2005)

The results of this augmented regression analysis (table 4) show that the sign of the coefficient of foreign currency translation has turned from significantly negative to significantly positive. Granted that the absolute value of this coefficient is still puzzling, these results clearly demonstrate the sensitivity to omission of correlated variables. Given that the regressions that were performed in the aforementioned studies all suffer from exceedingly low (adjusted) R²'s, the danger that they may suffer from the same problem looms large.

6 An alternative: The Valuation Approach of (Isidro et al., 2006)

Isidro et al. (2006) – henceforth IHY – explore the association between dirty surplus flows and valuation errors from a standard empirical application of RIM. IHY calculate the intrinsic value per share *VPS* using a three-period per-share RIM:

$$VPS_t = bps_t + \sum_{s=1}^{2} \frac{inc^a_{t+s}}{(1+r)^s} + \frac{inc^a_{t+3}}{(1+r)^2 * (r-g)},$$

where *bps* is book value per share, inc^a are expected abnormal earnings per share and g is a constant growth rate for residual income per share as of $t+3$. Predictions

53 A similar analysis is presented in (*Louis,* 2003). According to *Louis,* 'sticky wages' might cause foreign currency depreciations to actually increase parent company profits. The reason is that foreign inflation, which according to purchasing power theory, coincides with depreciation, is not fully matched by wage increases when wages are sticky. Accordingly, labour-intensive firms might benefit from foreign currency depreciations. When this is not explicitly taken into account in a regression analysis, the estimated coefficient on foreign currency translation might pick up this effect.

54 Note that this argument relies on historical cost measurement of the assets of the subsidiary.

for inc_{t+1} and inc_{t+2} are obtained from I/B/E/S mean consensus forecasts. The forecasts for inc_{t+3} are estimated by the country-industry specific average return on equity over the previous seven years to the date of valuation. Dividends per share are predicted by using the average country-industry specific dividend payout ratio over the previous seven years. Given forecasts of *eps* and dividends per share, forecasts for bps_{t+1} and bps_{t+2} are obtained through the mechanics of the per-share clean surplus relation. The discount rate *r* reflects a country-industry specific estimation of a company's beta. The constant growth rate *g* is the product of the estimated return on equity and (1- the estimated dividend ratio). Finally, the valuation error is measured as the intrinsic value per share *VPS* less the market price at the valuation date.

Note that, when compared to the aforementioned value relevance studies that claim to be based on RIM, the valuation approach by IHY is far less limiting. Firstly, since the RIM specification is used in its original form, there is no need to squeeze RIM into a linear function in terms of book value and earnings. In addition, since earnings predictions are obtained through I/B/E/S estimates, there is no need to rely on the linear information dynamics (LID). Another advantage of the use of I/B/E/S estimates is that the 'other information' (*V*) is no longer ignored, since one can assume that analysts incorporate all available information in their predictions.

IHY find only limited evidence of a relation between dirty surplus flows and valuation errors and conclude: *'Overall, our results do not suggest that dirty surplus accounting flows are a consistent source of error in applications of accounting-based valuation models.'*[55] Note that the contemporaneous effect on book value of dirty surplus flows at time *t* is included into the valuation model of IHY through the incorporation of b_t.[56] Therefore, IHY need to rely on the assumption that current dirty surplus flows predict future dirty surplus flows in order to expect a relation between dirty surplus and valuation errors. In other words, the lack of association between dirty surplus flows and valuation errors in IHY only confirms the aforementioned property that dirty surplus flows are generally transitory in nature.[57] Obviously, one might wonder whether a more straightforward approach might not have been to directly investigate the time series properties of surplus flows themselves. Nonetheless, the results of IHY are relatively more credible than the results of value relevance studies, given the less restrictive nature of their research assumptions.

7 Conclusion

This paper assesses the credibility of comprehensive income value relevance research through an investigation of the functional form specifications of the value relevance regressions therein and an in-depth analysis of the empirical findings.

55 *Isidro* et al., 2006, p. 303.

56 Note that since dirty surplus flows are included in book value of equity, which is included in RIM, the study of Isidro *et al.* is not able to investigate the 'book value' relevance of dirty surplus flows.

57 An alternative explanation might be that there are dirty surplus flows are indeed persistent, but that dividend payments from future dirty surplus flows are expected to arise long after the flow itself, for example as part of a liquidating dividend. Other potential explanations are related to lack of data accuracy, the undescriptive nature of RIM and accounting diversity among firms due to the composite nature of the sample (*Tarca,* 2006).

The analysis of the functional form specifications revealed that the regressions are generally ad hoc and underspecified. A detailed study of the empirical results uncovered several counterintuitive findings, which affect the overall credibility of the main research results. The central conclusion of our analysis is that the credibility of comprehensive income value relevance research limits its potential usefulness of informing standard setters.

Our analysis is fundamentally distinct from the one presented by *Holthausen* and *Watts* (2001). Their issue with value relevance research originates from the perception that the statistical properties investigated by value relevance research do not match the objectives of standard setters. The analysis that was presented here does not even consider this relation.

A suggestion that follows naturally from our analysis is that value relevance researchers investigating comprehensive income should at least be sensitive to the potential of omitted variable bias and consider augmenting their value relevance regressions with other (non-accounting) variables. *Liu* and *Thomas* (2000), for example, show that the inclusion of other variables besides earnings increases the R^2 substantially and reduces the bias in coefficient estimates. The valuation approach, as exemplified by (*Isidro* et al., 2006), was suggested as an alternative to value relevance research that merits further consideration for future work.

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Eine kritische Anmerkung zur empirischen Comprehensive Income Forschung

Der Beitrag umfasst eine kritische Analyse der empirischen Comprehensive Income Forschung. Dabei wird in den informativen Ansatz und den Messansatz zur Wertrelevanz differenziert und den Ursprüngen der empirischen Spezifizierungen beider Ansätze systematisch nachgegangen. Es erfolgt eine Darstellung, dass Wertrelevanzregressionen in der Comprehensive Income Forschung oft entweder arbiträr, unspezifiziert oder beides sind. Der zweite Teil des Referats ist eine detaillierte Untersuchung von empirischen Ergebnissen, die mehrere Eigenheiten enthüllen, die wirtschaftliche Intuition herausfordern und die die Glaubwürdigkeit der Forschungsergebnisse treffen. Die Schlussfolgerung des Referats ist, dass sich im kritiklosen Hinnehmen der empirischen Ergebnisse dieses Forschungsbereichs eine Gefahr verbirgt und, dass das Potenzial über Rechnungslegungsstandards zu informieren, aller Wahrscheinlichkeit nach beschränkt ist.

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