

Accounting for Intangible Assets: Suggested Solutions

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Abstract

Current accounting practice expenses many investments in intangible assets to the income statement, confusing earnings from current revenues with investments to gain future revenues. This has led to increasing calls to book those investments to the balance sheet. Drawing on the relevant research, this paper proposes solutions for the accounting for intangible assets that contrast with balance sheet recognition, and compares them to current practice and the IFRS standards that dictate practice. Key is the recognition that an accounting solution comes from a double-entry system which produces an income statement as well as a balance sheet, and that has features that both enable and limit the information that can be conveyed about the value in intangible assets. In this system, asset recognition in the balance sheet must consider the effect on measurement in the income statement, for the income statement conveys value added to investment on the balance sheet. A determining feature is uncertainty about investment outcome and how that affects the income statement, so our solutions centre on accounting under uncertainty. Two other accounting features are added: There has to be an investment expenditure for balance sheet recognition and that expenditure must be separately identifiable from transactions. These features rather than the tangible-intangible asset dichotomy lead to the prescribed solutions.

1 Introduction

If an entity purchases a hard copy of the IFRS Foundation's 'bound volume' of accounting standards (IFRS, 2019), does it have a tangible asset? Or is the asset intangible, because (as described in the scope of IAS 38, *Intangible Assets*) 'the physical element of the asset is secondary to its intangible component, i.e. the knowledge embodied in it'? And if the acquisition is one of electronic right of access or use, rather than a physical copy, does that sway the decision in favour of the asset being intangible?

This is not only a theoretical quibble as, under current practice, the standard that applies to the purchase of the asset differs depending on the answers to these questions. The simple question becomes even more important when applying IFRS to an asset being constructed or created by the entity. The requirements for accounting for the costs of creating inventory (physical books) differs from the accounting for the costs of creating access to the same information in an intangible form (the IFRS Foundation's eIFRS platform).

We argue that, although the distinction between tangible and intangible is longstanding in accounting practice, it is conceptually misguided. It sets up the perennially challenging puzzle of 'how to account for intangibles?' In our view, this is the wrong question. We recast the question in a form that applies to both tangible and intangible assets and in a way that conceptualises solutions to the puzzle.

The importance of the issue is evident. Intangibles are an increasing component of the assets of modern firms. They include knowledge assets acquired through research and development, human capital developed by investing in employees, the value in supply chains and product distribution systems, brands, software investments, and the organisation of the business. Few of these intangibles appear as assets on balance sheets, leading to increasing calls for reform.

Among academics, Lev (2001, 2018), and Lev and Gu (2016) are prominent voices, but there is also a myriad of practitioners and analysts who see assets missing from the balance sheet as a failure of accounting: if tangible assets are recognised, why not intangible assets? Tangibility does not seem to be the determining economic feature for recognising assets, so why not recognise assets with the same economic characteristics? Intangible assets from an acquisition such as brands, customer lists, research and even goodwill are indeed currently recognised. Why not those from firms investing internally to develop their brands, customer relations, and research? That reasoning has added appeal when it is appreciated that the current practice of expensing these investments to the income statement upsets the reporting of the profitability of conducting business: earnings from current revenues are reduced by investments to gain future revenues. The accounting confuses stocks and flows: investment is comingled with return on investment .

This paper evaluates this remedy. It points to subtleties which give pause, issues that perhaps are not understood. However, it goes further: consideration of those issues promotes alternative accounting solutions to which balance sheet recognition can be compared. With a focus on solutions, the paper is a policy document, but based on accounting research to the extent it is available. That fulfils the academic mission of bringing research to practice. Accordingly, academic research that supports the prescriptions are referenced throughout the paper to complement practical examples that demonstrate the applicability.

Consistently with the objective of financial reporting in the IASB's Conceptual Framework (2018) (CF), we frame the issue from an investors' point of view: intangible asset accounting serves the investor by informing about the determinants of value under valuation theory, expected cash flows and the rate that discounts them. Using the language of the CF, we state the issue as:

Does the recognition of intangible assets on the balance sheet help to provide information that is helpful in assessing the amount, timing, and uncertainty of future cash flows?

Market prices at which investors trade are valuations. The issue can therefore be restated as asking whether recognising intangible assets informs (efficient) pricing. The CF also adds the "stewardship" objective of providing information to monitor management. That also is of concern to the investor. Consistently with this objective, we also ask:

Does the recognition of intangible assets on the balance sheet provide information about management performance and custodianship?

We believe that these perspectives place us on common ground, not only with accounting standard setters, but also with the many who advocate greater recognition of intangible assets: they also are concerned with providing the best information to investors. The common ground is also shared by those custodians responsible for financial statement reporting, management, corporate boards and their audit committees: by law, their fiduciary duty is to the shareholders. The objectives are also those of regulators with the task of providing information for efficient capital market prices to allocate investors' savings to their most productive use.

The CF specifies its objectives in the context of 'general purpose financial reports', which are addressed in Chapters 1 and 2. The bulk of the CF, however—the six remaining Chapters—address only 'financial statements'. The former term would seem to include narrative reporting, such as that provided in Management Commentary. 'Financial statements' includes the statement of financial position and the statement(s) of financial performance, as well as other information provided in other statements and notes.

We follow this structure. We address the issues first within the context of financial statements. These are generated out of a double entry system, so we discuss how this system can satisfy the stated objectives and how it cannot. This provides an answer to the question of whether balance-sheet recognition can convey the desired information. However, it also opens up alternative accounting solutions within the double-entry system. And it also indicates when broader financial reporting (outside the financial statements) might provide the desired information when the accounting system cannot.

Here are the key properties of the double-entry system that bear on the accounting for (intangible) assets:

1. Business value cannot be communicated via the balance sheet. That questions the proposal of booking intangible assets to the balance sheet as a means of conveying information about value.

2. The expenditure on investments (costs) can be booked to the balance sheet. So the issue is whether expenditures on intangible assets should be on the balance sheet.
3. Expenditures on investments are difficult to identify when made in conjunction with current operating expenditures. This separability issue is common with intangible assets, limiting their recognition as assets.
4. While expenditure cost is not sufficient to indicate value and satisfy the objectives, the double-entry system also produces an income statement which, with the balance sheet, can provide the desired information.
5. Thus, the capitalization of (intangible) assets on the balance sheet must be made with a consideration of the effects on the information conveyed by the income statement. The income statement effect is through amortization of investment in the periods in which revenues from the investment are earned, and with possible impairments.
6. The amount of uncertainty about outcomes to investment is an important determinant of these income statement effects. In particular, amortization under uncertainty is a difficult exercise, inevitably introducing mismatching error and impairments, distorting income reported from current revenues. That effect increases with the uncertainty of investment outcomes.
7. Accordingly, not only does expensing of investments to the income statement distort earnings from current revenues, but so does the booking those investments to the balance sheet. These two effects must be weighed against each other in forging an informative solution, with the amount of uncertainty being the determining feature.

None of these points involves a tangible-intangible distinction, though their importance may be different for the two types of assets. Points 4-7 are the more subtle ones. For point 4, consider a brand asset not on the balance sheet but with the earnings from the brand reported in the income statement: to the extent that the earnings indicate future cash flows and value, there is no loss of information from omitting the asset from the balance sheet. Point 5 recognizes that investment cost must be amortized against the revenues they yield or otherwise impaired. Thus there is a potential for reducing the information in earnings with amortizations that mismatch to those revenues or with impairments that also do so. That potential increases with uncertainty, point 6. Consider research expenditures without any product as yet, let alone revenues: The revenue to follow is highly uncertain, so an amortization schedule to match to this revenues is likely to yield mismatched earnings that are

uninformative about how much the firm is making from customers.¹ Impairments are also likely. However, point 7, expensing investments immediately, as with many investments under existing accounting standards, also mismatches and thus muddies the information about earnings from current customers. So there is considerable sorting out to be done.

The paper proceeds as follows. The paper starts with a literature review in Section 2. As it is the business that generates future cash flows on which value is based, Section 3 frames the economics of business and how the double-entry accounting system reports on the business and the value it generates. This draws out the seven points above that are the basis for our proposed solutions. Those solutions are in Section 4. Section 5 then assesses the extent to which existing IASB standards to date provide a solution, or not, as a benchmark for how standard setting might proceed in the future. Acknowledging the limitations of financial statements, Section 6 discusses how disclosures in narrative reporting (such as the Management Commentary) might provide useful information that would aid an appreciation of the importance of intangibles to an entity. Section 7 provides concluding comments.

2 Literature Review

Numerous research papers have addressed the question of accounting for intangibles, adopting both empirical and normative perspectives. We are not aware of any paper that questions the presumption that a distinction between tangible and intangible is the ‘right’ place to start, and thereby works on a solution outside an intangibles framing.

Empirical research has been constrained by accounting practice, given the limited recognition of intangible assets and lack of guidance for disclosure or income statement presentation (Wyatt, 2008). In this context, studies of R&D feature most prominently, while researchers have also employed evidence on software capitalisation (Aboody and Lev, 1998) and have also constructed or otherwise estimated datasets relating to brands (Barth et al., 1998), customer satisfaction (Ittner and Larcker, 1998), advertising (Lev and Sougiannis, 1996) and other intangibles. There have also been historical episodes which have allowed empirical comparison between accounting systems, including the introduction of R&D accounting with IFRS adoption in Israel (Chen et al. 2017), allowable brand capitalisation in the UK (Kallapur and Kwan, 2004) and voluntary capitalisation in the ‘pre-SEC era’ (Ely and Waymire, 1999). In general, the value of intangibles is found to be positively associated with equity values, albeit with valuation coefficients that suggest greater uncertainty than tangibles (Kothari, 2002; Shi, 2003), and with some evidence of mispricing (Eberhart et al., 2004; Linnainmaa and Roberts, 2018), of misinformation from opaque income statement presentation (Banker et al., 2019) and of

¹ We use the term “match” to refer to the recognition of the investment consumption in the periods in which that investment is generating revenue—ie when that investment is deployed to add value to the business. When investment is expensed before it is deployed it increases the likelihood that the cost of creating value is recognised in one period but the value created is recognised in another period. Nothing in our analysis, or our use of the term matching, should be interpreted as giving primacy to matching over the need for the balance sheet to report assets, liabilities and equity. We view the inappropriate recognition of expenditure as current expenditure as a failure to recognise an asset. See Storey and Storey 1998 pp 28-29 and 47-66 for a discussion of “Nondistortion, Matching and What-You-May-Call-Its”.

possible earnings management (Ciftci, 2010; Cazavan-Jeny et al. 2011). Research has also identified value-relevance for disclosure in specific settings, for example telecom (Amir and Lev, 1996), semiconductors (Chandra et al, 1999), and biotech IPO (Guo et al., 2004). The implications for accounting practice are debatable (Zéghal and Maaloul, 2011). While arguably supporting capitalisation (e.g. Oswald and Zarowin, 2007; Lev, 2019), association might indicate the presence of correlated, omitted variables, or it might be consistent with a mechanism other than the financial accounts by which information is impounded in stock prices (Entwistle, 1999; Jones, 2007; Stark, 2008; Wyatt, 2008; Merkley, 2014). Evidence pertaining to R&D might not hold for other intangibles for which testable data are not available. The absence of such data might be evidence that its voluntary provision does not pass a cost benefit test (Botosan, 1997; Skinner, 2008), or alternatively it might be evidence of an informational market failure, requiring regulatory intervention (Lev, 2008), or at least authoritative guidance (Stark, 2008).

Normative research is relatively undeveloped. Four broad themes can be identified.

The first concerns classification. A distinction is made between intangible assets in a broad sense, and a subset that satisfy the definition, recognition and measurement criteria for inclusion in financial statements (Basu and Waymire, 2008; Skinner, 2008). The broad set can be grouped under headings relating to human capital (training), organisational capital (intellectual property, processes, IT), and social capital (customer relationships, external networks, reputation). The subset that satisfy the criteria is relatively small, not least because definitional criteria rule out human capital and any other intangibles without enforceable rights (albeit that goodwill is a somewhat anomalous inclusion in this subset).

The second theme concerns the defining characteristics of intangibles, which are typically described to include some, or all, of the following (overlaps and caveats in which are noted): not being separable, but instead defined by creating value in use alongside other resources (Basu and Waymire, 2008); not having well defined property rights, creating vulnerability to appropriation by others (Teece, 1986); unique in nature, reinforcing atypical absence of liquid markets and exchange value; in some cases, not having identifiable costs; often non-rival in use, with network effects enabling the possibility of high added value (Romer, 1990); relatively high outcome uncertainty; often incompatible with the writing of complete contracts, due to absence of separability, vulnerable property rights and uncertain economic outcomes.

The third theme concerns recognition and measurement, turning on the question of whether the economic importance of intangibles justifies their capitalisation and amortisation (Lev, 2019), or instead whether their economic characteristics suggest otherwise (Barker and Penman, 2020). Finally, the fourth theme concerns disclosure. Lev (2001) proposes a 'value chain scorecard' whereby information relating to intangibles is categorised into discovery, implementation and commercialisation stages, in each case including data that are quantifiable, standardisable and tested empirically for informational usefulness. While the scope for standardised disclosure is challenged by some, mainly on the grounds that it is too firm-specific, it is defended by Lev (2001) as being relatively standardised at industry level, for example with the voluntary disclosure guidelines issued by the UK's Bioindustry Association (Stark, 2008).

3 How the accounting system reflects the economics of business

A business involves:

- (1) investment in a firm by investors contributing cash or kind;
- (2) investment by the firm of those contributed funds in assets;
- (3) deployment of those assets in operations to add value to the investors' original investment; and
- (4) the distribution of cash to investors from that added value.

This process describes the underlying economics of investing as in standard asset pricing models: investors give up consumption to invest in firms (1) with the expectation of outcomes that yield higher subsequent consumption from cash distributed back to them (4). Activities (2) and (3) involve the (consumption) value creation. Economics characterizes that value creation and the ultimate consumption as being at risk. Under the financial reporting objectives of the CF, embraced above, accounting provides information about the cash flows (and the consumption they buy) that these activities yield and also the uncertainty of those cash flows. The steward in the stewardship objective is responsible for performance in these activities.

Assets are deployed in the investment activity (2). An entrepreneurial idea—the business model—governs that deployment. But more so: that entrepreneur combines the assets together in a distinctive way to generate the value that buys consumption. Thus, assets have value from being used jointly. Consider a courier service whose main physical asset is a delivery vehicle. The owner generates value from that vehicle by combining it with a customer base to create a courier service. Property and plant have no going-concern value without a distribution system for the product produced and a trained sales force. A brand has no value without this plant and the distribution system to deliver the product. Indeed, that product has little value without the production system and the supply chain for producing the product. An IT system coordinates and produces efficiencies. In short, the value of brands, software, distribution systems and other intangibles, like that of tangibles, is not realised on a separate, stand-alone basis.

While some assets may have a separable exchange value (from their sale), this is incidental to value creation actually being through use rather than exchange (e.g. Botosan & Huffman, 2015; Marshall and Lennard, 2016). Indeed, in the well-established economic theory of the firm, the very existence of the firm is based on economic separability being either absent or incomplete (Coase, 1937; Williamson, 1981). In this context, going-concern values for individual assets, tangible or otherwise, cannot be identified. For accounting, that means that individual assets booked to a balance sheet cannot be added together to give a total for the value of assets used jointly.² That poses the question: Is there an accounting solution under which the value from using assets jointly can be conveyed? To the issue at hand, can booking

² This is a special case of the classic accounting issue of the impossibility of allocating jointly determined numbers to their contributors (Thomas, 1969). In accounting terms, this is saying that, apart from separable assets, fair value accounting is not feasible. See Nissim and Penman (2008).

intangible assets to the balance sheet convey this value? Or is there alternative accounting that provides a solution?

The answer to this question requires an understanding of how the accounting system works to convey information. That understanding points to solutions, but also to the limitations of that system for conveying the value in assets.

Double-entry accounting doubles the question

A double-entry system of balance sheets and income statements requires that, if an asset is recorded on the balance sheet (a debit in accounting), an equal amount (a credit) must be recorded. If an asset is generated by an expenditure of cash or kind, that credit is readily interpreted: the investors' cash (or kind) is given up to invest (with the anticipation of adding value). However, if recognition of an intangible asset—organizational capital, market power, customer loyalty, to name a few—is proposed in absence of such an expenditure, the credit must be an increase in investors' claims on the assets. This requires interpretation. If a credit to debt is ruled out, the credit must be to equity, either directly to equity or as income through the income statement. Via both routes, the credit is added to equity, so the accounting must justify that this is equity over contributed capital from which dividends can be paid.³ And it potentially involves double counting. The asset generates future earnings so, if the asset value is not amortized, equity is increased twice as those earnings (already reflected in the value of the intangible asset) are subsequently closed to book value.⁴

“Organizational capital”, “social capital”, market share, geographical positioning, network externalities, and political connections are some of the “assets” that typically do not require explicit expenditures (and thus there is no credit entry to cash). Recognition would therefore require an explanation for the credit entry: Is recognition of the asset income to shareholders?

The insight here is that, if the accounting system is to report on the cash-to-cash cycle, it records only assets that arise from expenditures. That also satisfies the stewardship objective: the steward is rewarded for generating returns from investment but not for “social capital” utilized. The restriction to expenditures by no means dismisses the recognition of intangibles such as market share, knowledge capital, geographical positioning, brands or customer lists in which the firms invests. However, social capital provided by the stability of institutions in the country in which the firm operates falls outside the criterion. The value of sun and rain to a farmer or the value of location to a retailer are not included. However, they are included to the extent that they are in the

³ If the credit is, instead, to an equity classification, as yet unnamed, that is restricted from paying dividends, then the accounting does not forecast future cash flows to investors.

⁴ Some accounting jurisdictions have recognized revaluation reserves in equity, but these are remeasurements of investment cost, not the recognition of assets for which investors have not made an investment. The associated asset is amortized so that, for example, replacement-cost depreciation conveys information in the income statement about current cost depreciation. Even so, the dirty-surplus credit in equity, “revaluation reserve”, strains for interpretation as an increase in shareholders' wealth.

purchase price of the land. Similarly, expenditures in social capital—contributing to the firm’s neighbourhood and ESG activities more broadly—or lobbying expenditures to develop political capital fall into potential balance sheet recognition. It is the purchase price of the land, the ESG expenditures, and the lobbying costs for which the steward is responsible to investors. Indeed, to recognize the asset again is another case of double counting.

The requirement of an expenditure of investors’ funds also rules out goodwill from customer loyalty and other attributes commonly attributed to goodwill, unless they have been purchased. This issue is on the cusp of the intangible accounting debate. If the intangible asset, goodwill, is recognised in an acquisition, why is internally generated goodwill not recognised? The point is on the mark if there is an expenditure, but not for perceived goodwill which, absent an acquisition, is not an investment of investors’ contributed capital on which a return is required.

The IASB definition of an asset does not state explicitly the expenditure criterion for an accounting asset, though it may be implicit in the requirement that an asset must be “a result of past events” with rights specifically pertaining to the firm. However, it is implicit in how the accounting system mirrors the business process. Many commentators promoting the recognition of intangible assets (for example Lev and Srivastava 2020) restrict the accounting for intangible assets to the capitalization of expenditures. They are on common ground with our positioning of the issue.

The double-entry system is a representation of the business model

The accounting system mirrors the sequence of (1) raising finance from investors; (2) investing those funds in assets; (3) deployment of those funds in operating activities; and (4) cash payout to investors. This is clear from the three sections of the Cash Flow Statement for operating, investing, and financing activities (where financing of the business and cash paid out to investors are in one section, the financing section). It is also clear in having a balance sheet to represent activities (1), (2) and (4) and an income statement to report performance in activity (3).

For the shareholder investors, the representation is also in a clean-surplus statement of owners’ equity. The balance sheet (Assets minus Liabilities) increases with (1) contributed capital from owners (3) additions to equity from operating activities, less (4) any distribution of that value back to owners. The accounting system tracks the cash-to-cash (consumption-to-consumption) cycle from cash invested in the firm to the return of cash to the owners. The system represents the economics of investing. There are implications for recognition in the balance sheet:

Balance Sheet Recognition: Investment Expenditures. If the accounting system is to report faithfully on the cash-to-cash cycle, it records only assets that arise from expenditures. These include commitments for future expenditures that give rise to a liability, as with a lease commitment. This criterion does not dismiss subsequent remeasurement, for example, via amortization, impairment or revaluation.

Activities (1), (3), and (4) affect owners’ book equity. But, for expenditures booked to the balance sheet in activity (2), there is no effect on equity, no value added. It is the

substitution of an asset (such as the cash contributed by owners) for another asset, or the acquisition of an asset in exchange for a commitment by the firm to pay cash at a future date. Consequently, the steward is not rewarded for investment (but rather only when there is return on investment). If assets other than those from investment were recognized, return on investment—consumption gained relative to consumption lost—would have little meaning. A metric for judging management stewardship of the owners' investment would be lost.

Balance Sheet Measurement: Separability. The focus on expenditures introduces a measurement problem. Expenditures on assets (to generate future earnings) are sometimes made with those for current earnings, particularly with intangible assets. Customer loyalty may be generated by sales discounts, an explicit expenditure that is embedded in revenue. A bonus to employees may be investing in human capital, an incentive to stay with the firm as well as wages for current service. Advertising can generate future sales (brand building) but can also be for current sales. In these cases the asset component is difficult to identify and separate, another instance of the problem of allocation joint numbers to components. The problem is exhibited by the relatively high proportion of Selling, General and Administrative Expense (SG&A) under current financial reporting that is estimated (in Kovacs 2004, Banker, Huang, and Natarajan 2011, and Enache and Srivastava 2018) to be expensed investment. To the extent the asset component cannot be separated, the accounting for intangible assets via a balance number is limited.

Double-entry yields an income statement as well as a balance sheet

As noted above, it is often asserted that accounting is deficient if it omits intangible assets from the balance sheet with the implication that this should be corrected. However, that fails to recognize that accounting is conducted in a double-entry system that also produces an income statement, and that statement can convey information that supplements the balance sheet (Penman, 2009; Basu and Waymire, 2010). There are a number of features that bear on the information conveyed by earnings.

1: The income statement reports a summary number from using assets jointly.

The value from using assets jointly is not captured in the balance sheet. However, the income statement supplies a remedy with its bottom-line summary number, earnings (net income, profit or loss). Using assets jointly is the essence of the business model and earnings captures the outcome. This is a remarkable feature of the double-entry system. Indeed, the income statement reports not only earnings from assets booked to the balance sheet, but also earnings from assets omitted from the balance sheet. Those earnings are a performance number for evaluating the manager-steward's choice of a business model and how the manager combines assets under that model to generate value. In other words, the income statement provides more information relating to activity (3) than that conveyed by expenditures in activity (2) that are booked to the balance sheet.

2: Balance sheets and income statements combine to convey value.

There is a special case where earnings alone convey value and the balance sheet is irrelevant. That case is laid out in Appendix 1. But generally, information is conveyed by balance sheets and income statements together. This is formally captured in a residual income valuation

model that has been used extensively in accounting research. The model yields the same value as that based on the expected cash flows that buy the investors' consumption (and to which the objective of financial reporting refers). A short-form of the model demonstrates:

$$Value_0 = Book\ Value_0 + \frac{Earnings_1 - r \times Book\ Value_0}{r - g}$$

where the numerator is referred to as residual income, r is the required return (cost of capital for the investor), and g is the expected growth rate in residual income, that is, the growth in earnings relative to book value in the future. Earnings in the numerator and the growth rate are those expected to be generated by the book value (net assets). Ohlson (1995) shows formally how earnings and book value combine to convey equity value.

It follows that the accounting for (intangible) assets must be evaluated along with the effect of that accounting on the measurement of the complementary earnings the assets yield. If, for example, intangible assets are expensed to the income statement (as in much of current accounting practice) earnings from investments are confused with investments to gain earnings; the accounting does not distinguish stocks and flows. That not only corrupts earnings as a measure of value-added to investment, but also as a performance measure: management are penalized if they invest as the cost of investment reduces current year's earnings.

3: Recognising assets in the balance sheet has consequences for the income statement.

Capitalising investments to the balance sheet affects the earnings that measure the value added from those investments because those assets must be amortised against future earnings or subject to impairment. Accordingly, a proposal to recognise intangible assets must be supplemented with a feasible amortization schedule that allocates the consumption of those assets to appropriate periods. An appropriate amortisation process will yield an income statement that shows the revenues the assets generate and the consumption of those assets (expenses) incurred to earn the revenue--a measure of value added from the investment. In accounting terms, that is called matching expenses to revenues. When these processes are misaligned, or mismatched, the value-added measure is destroyed. The mismatching error also becomes compounded, for it results in subsequent impairments or gains or losses on disposal to settle up the error which are themselves a failure to measure the consumption loss appropriately.

4: Accounting for earnings and book value is under uncertainty.

Investment is made under uncertainty. Earnings outcomes are uncertain, the investment might not pay off. This impinges on the accounting, not only to deal with uncertainty in recognition and measurement but to proactively convey information about the amount, timing, and *uncertainty* of cash flows in satisfaction of the reporting objective.⁵

⁵ We note that some accounting standards introduce uncertainty in recognising assets. FASB Statement No. 2 expenses research and expenditure because of the "uncertainty of future benefits." IAS 38 capitalizes development but not research, and the rationale appears to be the differential probability of future benefits. The capitalisation of investments in software is based on an assessment of technical feasibility.

For revenue recognition, accounting standards deal with uncertainty. Effectively, revenues are not booked until uncertainty is resolved, with the fulfilment of customer contracts and with receipt of cash “highly certain”. The IASB’s and FASB’s, largely converged revenue recognition requirements constrain revenue under these criteria.⁶ When revenues are booked, a (near) risk-free asset is added to the balance sheet in the form of cash or a receivable discounted with an allowance for the uncertainty that cash may not be received. Until that point, expected revenues remain unrealised and unrecognised.

Uncertainty also bears on the amortized expenses from a recognized asset that are to be matched as expenses incurred in gaining these revenues. An amortization schedule with high uncertainty about future revenues is problematic, introducing mismatching error and damaging earnings as a measure of value added to the investment (Barker and Penman, 2020). That, then, bears on the recognition of the asset on the balance sheet. For example the amortization schedule for R&D investment into a possible new drug, still to be discovered and with no predictable revenue stream as yet, is highly problematic, inevitably resulting in mismatching and a likely impairment. However, the alternative of expensing intangible assets immediately also introduces mismatching that can be justified only as a method of dealing with this uncertainty. Clearly there is a tension to be resolved. This we address in the next section.

As equity pricing discounts expected cash flow for uncertainty, accounting has a role in conveying the information for the amount of the discount. That is acknowledged in the objective of financial reporting with its reference to uncertainty. It has both theoretical and empirical support. Penman and Zhang (2020) connect accounting for uncertainty to the discount factor in a general, no-arbitrage model. The accounting elements are revenue recognition—waiting for risk to be resolved to book revenue—and conservative accounting for investment—expensing particularly risky investment to the income statement. Empirical support is in Penman and Yehuda (2019), Andronoudis, Dargenidou, Konstantinini, and Pope (2019), and Penman and Zhang (2019). The latter involves the interpretation of the book rate of return under uncertainty, the metric for value added to investment and for management performance evaluation. Though there is less empirical work on the stewardship issue, some analytical papers deal with stewardship in handling risk.

The section has explained the points summarized in the Introduction. In summary, balance sheet recognition of (intangible) assets is limited to those that arise from expenditure on investments and then only when that expenditure can be separately identified in transactions. Capitalization to the balance sheet must be made with consideration of the effect of subsequent income statements via amortization and impairments. That ensures the integrity of the income statement in reporting the value added to the investment. The degree of uncertainty determines this effect. Note that (in)tangibility does not enter into it.

⁶ When the selling price is variable an entity is only permitted to recognise revenue to the extent that it is highly probable that a significant reversal in the amount of cumulative revenue recognised will not occur when the uncertainty associated with the variable consideration is subsequently resolved (IFRS 15.56).

The reader will notice that these criteria do not explicitly include two criteria in the CF definition of an asset: the firm must have a right to and control of the asset. These may be implicit: a firm usually will not incur an expenditure without getting control of the asset and a right to payoffs from it. However, one can imagine cases of expenditures producing benefits without control or rights, for example, investment in employee training, loyalty incentives to customers, expenditure on ESG activities, or even advertising. Expensing those expenditures induces mismatching and they are among the intangible assets that proponents of capitalization refer to. One can also think of assets with the rights and control criteria satisfied, but with high outcome uncertainty, for example, a patent right. It may be that rights and control are relevant for indicating uncertainty, thus are features that bear on that assessment, as below. For example, for investment in employee training, the benefit is uncertain because the firm does not have rights nor control—the employee may be hired away.⁷

We acknowledge the importance of ensuring that the consequences of focusing on the income statement should not be the recognition of balance sheet items that fail the element definitions—asset and liability.

We now take these points to evaluating solutions for accounting for intangibles.

4 Financial statement solutions

Rather than prescribing one solution, we lay out alternative feasible solutions. The solutions discussed are those that can be executed within the double-entry system. This may be limiting, because it allows asset recognition only from an investment expenditure, where the asset component can be separated out, and where outcome uncertainty is not too high. Yet information about intangibles can also be conveyed through channels other than the accounting system, including disclosure through footnotes and/or management discussion in financial reports. Such approaches are discussed in Section 6.

Initial recognition as an expense

The solution in current accounting practice is to expense many investments in internally generated intangible assets to the income statement. That clearly is a mismatching to revenues. Stocks and the flows from those stocks are not distinguished; they are comingled. Accordingly, valuation based on earnings from earnings investment is frustrated. For stewardship assessment, the expensing mixes the earnings from past investment for which management is responsible with investment to gain more earnings in the future. If the manager is judged on bottom-line earnings, that is a disincentive to invest.

However, there is a trade-off: expensing investments potentially avoids the subsequent mismatching from amortization under uncertainty, an issue raised in the second solution below.

⁷ The argument that training costs cannot give rise to an asset, because you do not control an individual employee, raises the issue of the unit of account. An entity could have a strong well-trained assembled workforce. Even though individuals can leave the entity, it controls the processes and arrangements that make the assembled workforce valuable.

Further, if outcomes from expensed investments are more uncertain, this accounting does convey that uncertainty relative to assets book to the balance sheet. Investors are notified that the expected cash flows are particularly uncertain, thus satisfying the financial reporting objective to convey uncertainty about future cash flows. Investment in research to invent a new product is more uncertain than product inventory booked to the balance sheet or fixed assets to produce a known product. Complementarily, the balance sheet reports less risky assets, fulfilling a role for the balance sheet in reporting assets that back up debt. Oh and Penman (2020) report that the market discounts investment expensed to the income statement as more risky than that booked to the balance sheet.

The uncertainty information cannot be conveyed if the information in these investments is aggregated in the income statement with current revenue and expenditure on current activities. To convey uncertainty, a separate section of the income statement is required for transparency. That also remedies the performance measurement problem.

However, the difficulty of separating out the investment component of transactions limits the ability to convey this information. Indeed, the impossibility of separating the investment component from transactions forces the expensing solution: if intangible assets are largely in such joint expenditures, the issue of capitalisation is mute. Many investments in intangibles are like this—investments in organizing the business, developing distribution and supply chains with customer and supplier pricing terms, investment in human capital, and advertising and promotion are examples. However, R&D is largely investment, as are film development costs and start-up costs.

Initial recognition as an asset

This is the solution commonly proposed for intangibles. It sees some of the value of (intangible) assets communicated through the balance sheet. As the value of assets used jointly cannot be determined, the balance sheet number is expenditure cost. However, the solution gains support from research that shows that expenditures on intangible assets currently not booked to the balance sheet are priced by the stock market as assets (Sougiannis, 1994, and Lev and Sougiannis, 1996, Green, Stark, and Thomas, 1996, and Tsaligkas and Tsalavoutas, 2011).

However, the recognition of an asset must be accompanied by an assessment of the implications for earnings which conveys value from using assets jointly. The effect is via (mis)matching amortizations and impairments, with the extent of matching or mismatching determined by the amount of uncertainty surrounding the investment.

For impairments, the probability of the impairment bears on recognition of the asset. If the probability of success in research for a cancer cure is only 1 percent, the complimentary probability of a later impairment is 99 percent. Should the accountant book the R&D with these probabilities? Rational expectation theory would say: no. If there is a high probability of a later impairment, a rational expectation says the impairment should be taken immediately. Recognition of an asset, with immediate impairment, is already a concept in IFRS.

For amortization, the uncertainty about future revenues also impinges on capitalisation. For investments in activities such as research and development (say) with no product as yet, the amount and timing of future revenues is very uncertain. Thus an ex-ante amortization

schedule would be elusive. Mismatching errors are probable, yielding earnings that do not capture the value added to the investment. Additional mismatching is to be expected via subsequent settling up of those amortization errors with impairments and recorded gains and losses. For inventory, matching is quite direct for the inventory cost is matched (through cost of goods sold) to the specific sales revenue it generates. For plant that produces the inventory, evidence-based depreciation seems to work—gains and losses on disposal are usually quite small though analysts sometimes adjust the more mechanical depreciation numbers. But for less certain assets, such as R&D, amortization is likely to introduce severe mismatching, with the mismatching error increasing in the amount of uncertainty. That impinges on the integrity of the income statement.⁸

With respect to the objectives of financial reporting, the capitalization of intangible assets provides the desired information if it can be done with minimal mismatching error. Inventory matched to revenue yields (gross margin) income about that informs that the firm can add value over inventory cost from sales to customers. And so with all appropriately matched expenses. But mismatching destroys this information in earnings about future cash flows. With frequent impairments, the investor can only ask: How much is this firm really making? And so for management performance measurement: well-matched expenses report the earnings for which management are responsible, mismatched expenses not so. There have been a number of instances when analysts strip out amortization of intangibles as not meaningful, for example with amortization of goodwill before IFRS 3 and of acquired intangibles. See the Elwin (2008) discussion of Skinner (2008).

Capitalising assets with significant uncertainty aggregates them on the balance sheet with assets with less uncertain outcomes; the uncertainty about future cash flows is not conveyed. For the creditor-investor, the pretence that the uncertain assets are collateral like plant is problematic; an asset/debt ratio losses meaning. The rational investor must give the uncertain asset less weight or even strip it out. If that investor turns to a coverage ratio with earnings, they will also be frustrated if those earnings are affected by mismatching.

Portfolio effects mitigate: under standard finance theory, portfolios of investments diversify and reduce risk. So, outcomes to R&D investment into one drug in a bio-tech start-up might be highly uncertain, while that in a mature pharmaceutical firm with a portfolio of other drugs

⁸ Lev and Srivastava (2020) propose amortization rates using historical industry averages. But this is not an accounting solution if the aim of accounting for a given entity is to differentiate it from the average. R&D is typically a unique activity with its specific risk profile, as is investment in advertising to build a specific product brand. If all firms are made to look like the average, they all become the average, a circularity without discriminating information. Further, with the proposed amortization, the paper does not recognize the (mismatching) gains and losses from trueing up the firm-specific mismatching errors from using industry averages, like the trueing-up gains and losses on disposal of PPE. Without this trueing-up, earnings are misstated. The accounting in the paper is further compromised by industry estimates coming from surviving firms, capturing the case where the investment in risky intangible assets was successful and omitting cases where it was not. That does not represent the amortization and impairments distribution for firms where the investments may or not pay off, risky investments rather than successful investments.

being developed is less so. Further, amortization errors net in a portfolio. Accordingly, the unit of account becomes the portfolio and the uncertainty associated with it.

These considerations aside, this solution is left with the separability problem: The asset component cannot be identified when it is imbedded in transactions also involving current expenses. That might be finessed by contracting on these components separately, but that is limited, or it might not be feasible.

There is one case where income statement errors are minimised: The asset is not expected to lose value (no amortization) and the likelihood of impairment is very low. That is the case in current accounting for land and, indeed, purchased goodwill and indefinite-lived intangibles in an acquisition. The minimum value of the asset (at cost) is communicated in the balance sheet and the income statement is not expected to be affected by mismatching.

If recognition of an asset introduces significant mismatching error in the income statement, the recognition of the asset is questionable accounting. But that raises the spectre of booking assets when an ex ante amortization schedule can be set with minimal ex post matching error, yielding informative earnings. That leads to the next solution.

Establishing a Threshold for Capitalization

The uncertainty feature suggests a solution that books an asset to the balance sheet when an uncertainty threshold is satisfied. That requires the specification of a threshold that is operational. This could involve a point at which the portfolio effects just mentioned reduce risk, but that point still requires definition. It may be that the IASB and FASB criteria of control of an assets and rights to the asset come into play as, without these criteria, outcomes are uncertain.

However, the accounting effects of uncertainty point to an operational threshold: recognize an asset when an ex ante amortization schedule can be established which, based on evidence, results in low ex post mismatching errors. Accordingly, information is conveyed via the balance sheet but with the informativeness of the income statement preserved. This is the solution for recognizing assets in Barker and Penman (2020) and advocated by the FRC (FRC 2019). As it is uncertainty that introduces mismatching error, this threshold for asset recognition is one that also distinguishes investments on the uncertainty about outcomes. The objective of providing information about the uncertainty of future cash flows is thus satisfied.

A benchmark is the recognition of fixed tangible assets when experience indicates that depreciation over useful lives typically results in few impairments and settling up errors. Though not as precise as the matching of inventory cost to revenues through cost of goods sold, this practice has typically been accepted for a long time. If an intangible asset has similar income statement effects, the treatment should be the same for the tangible asset; intangibility does not matter. The depreciation calculation is sometimes challenged by analysts, of course, but that is often because of expedient calculations (straight line depreciation, for example) rather than accountants calculating economic depreciation.

It is arguable that this threshold approach is intended by IAS 38. However, a capitalisation threshold that is too high leads to the problem of causing investment expenditure to be

aggregated with current expenses. This seems to be one of the perceived problems with IAS 38.

Conditional Capitalization

Investments that do not meet the threshold for capitalization will be expensed. However, if, as time evolves, it becomes likely that the investment will pay off, capitalization might be entertained. Under the prior solution, that would be the threshold point when, ex ante, subsequent amortization renders an informative income statement conveying value added to the investment.

The accounting works as follows. Expenditures (in research, for example) are expensed (or impaired) immediately to indicate their relative uncertainty, but to a separate part of the income statement so not to be confused with matching expenses. If the threshold for recognition is established, an asset is recognised then subsequently amortised (with low matching error) against revenue, rendering value-adding earnings from the investment. The credit to the expensed investment is income from the resolution of uncertainty. The accumulated balance of the expensed investment account indicates the accumulated success of investment, a type of suspense account but not necessarily clearing to zero. The account could include disclosure of the costs associated with investments that have been abandoned, informing an investor of successes, failures and the expenditure related to investments still being pursued. This accumulated net expensed investment account could be part of equity, but this dirty-surplus accounting fails to recognise the cost of unsuccessful investment as part of losses to shareholders in the income statement.

5 How Existing IFRS Standards Contrast with the Solutions

In this section, we review the conceptual solutions presented in Section 4 in the context of accounting practice in IFRS.

Initial recognition as an asset

One of the above solutions is to recognise expenditure as an asset. This calls for recognition criteria, along with an amortization method that minimises error in the income statement. These are mostly provided in IFRS in the standard for property plant and equipment (IAS 16) and the standard for intangibles (IAS 38).

Recognition criteria

IAS 16 and IAS 38 have a high degree of overlap in recognition and measurement criteria. The recognition criteria in IAS 16.7 and IAS 38.21 are almost identical, allowing recognition if, and only if, probable future economic benefits associated with the item will flow to the entity, and the cost of the item can be measured reliably. On initial measurement, both standards require cost, comprising purchase price and costs of preparing the asset for its intended use. There are minor differences in wording, and only IAS 16 refers specifically to end-of-life remediation costs, yet the principles in use are again consistent. Both standards provide similar examples of costs that can be capitalised (and of those that cannot), and both have essentially the same criteria for impairment testing of assets not ready for use, as well as for when the recognition of cost in carrying amount ceases.

In spite of this similarity, the IASC (and subsequently the IASB) did not challenge the convention that accounting for intangible assets warrants a separate standard. We argue that it does not. This can be seen by examining the differences between the two standards, and asking whether they are conceptually grounded in the property of tangibility.

Table 1 here

Consider first, differences in the definitions in each standard. IAS 16 defines property, plant and equipment as ‘tangible items that: (a) are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes; and (b) are expected to be used during more than one period.’⁹ IAS 16 thereby locates its definition in the function of the accounting, being to inform on business model performance. This is consistent with our earlier discussion. In contrast, IAS 38 lacks an equivalent, ostensible, purpose offering instead a circular definition: an intangible asset is ‘an identifiable non-monetary asset without physical substance.’¹⁰ This definition is detached from the informational usefulness of accounting, while unhelpfully failing to acknowledge definitional similarities between assets within the scopes of IAS 16 and IAS 38.

In the main body of the standards, IAS 38 does not depart from IAS 16 on matters of principle, but instead contains superficial differences, either in the form of offering more guidance, or alternatively by being proscriptive. These differences are not symptomatic of a difference in tangibility, but instead they relate to the three issues identified above that bear on asset recognition in general: Is there expenditure? Is it separable? Is there outcome uncertainty? For example, IAS 38 offers guidance in the form of examples of intangible assets, ranging from software and patents, to customer relationships and marketing rights. The category error here is to presume that the items in this unsorted list are similar because they are intangible, rather than to question whether and how they are different according to our three criteria.

It should be acknowledged that IAS 38 does identify separability relevant for asset recognition, noting cases where ‘expenditure cannot be distinguished from expenditure to develop the business as a whole.’ (IAS 38.20) Yet it enacts separability by applying a rule, rather than developing a principle. It identifies specific expenditures where asset recognition is prohibited - internally generated brands, mastheads, publishing titles, customer lists and items similar in substance.

To the extent that IAS 38 addresses outcome uncertainty, it does lead to accounting that differs from IAS 16. IAS 38 includes two paragraphs not covered explicitly in IAS 16, yet these do no more than emphasise the need to use reasonable and supportable evidence and assumptions, as of course is also implied in IAS 16. IAS 38 also, in contrast with IAS 16, sets out additional recognition criteria for self-constructed assets, which concern the confidence with which economic benefits can be expected (see Table 2). These are again largely redundant,

⁹The IASC issued IAS 4 (depreciation accounting) in 1975, and IAS 16 (property, plant and equipment) in 1982. IAS 4 was subsequently withdrawn when a revised version of IAS 16 was issued in 1993.

¹⁰ The IASC issued IAS 9 (accounting for research and development activities) in 1978, which in due course was incorporated into a broader standard, IAS 38 (intangible assets), in 1998.

because they are implied by the IASB Framework's definitions, and recognition and measurement criteria. They are also no less relevant in principle to tangible assets under IAS 16, as to intangible assets under IAS 38. They amount to no more than an 'anxiety' that intangible assets should not be recognised imprudently.¹¹ IAS 38 also includes a specific prohibition (against the capitalisation of research costs).¹² Its wording also makes it relatively less likely for expenditure incurred after initial recognition to be capitalised, because 'the nature of intangible assets is such that, in many cases, there are no additions to such asset or replacements of part of it.' This is not a difference in principle but instead a nod to likely differences in practice.¹³

Table 2 here

At some level, it is perhaps not so important that IAS 16 and IAS 38 are largely duplicative. It may be merely inconvenient to have two standards rather than one, and (for example) to use two different terms (depreciation and amortisation) to convey essentially the same economic concept. Yet the issues raised here are also more fundamental, in ways that concern conceptual clarity within IAS 38, and consistency and coherence across IFRS.

In practice, and because IAS 16 invites a presumption of capitalisation, while IAS 38 invites the opposite, requirements that are conceptually the same are likely to lead to differences in conventionally accepted practice. Although IFRS 3 requires the recognition of acquired intangibles as assets, at cost, for many of those intangibles, IAS 38 has led to immediate expensing in practice. There are some exceptions. Sony and Netflix, reporting under US GAAP, recognise the cost of producing films and other creative works as assets, and amortises them over the expected period of benefit. It is not uncommon for software development costs to be recognised as an asset. However, any expenditure that appears related to advertising, employees or innovation tends to be expensed. The IFRS Interpretations Committee has gone further, requiring some expenditure on tangible assets related to advertising to be expensed (IFRS Interpretations Committee, 2017).

We also observe that some intangible assets have characteristics similar to financial assets. Emission trading certificates, carbon offsets and cryptocurrencies are within the scope of IAS 38, because they do not meet the definition of a financial asset. The IFRS Interpretations Committee observed that some entities account for cryptocurrencies as if they are financial assets.

Ex-ante amortization

¹¹ IFRS 3 addresses intangible asset recognition, yet it does so only to lift the prohibition in IAS 38 on the recognition of internally generated intangible assets.

¹² IAS 38 requires disclosure of the aggregate amount of research and development expenditure recognised as an expense during the reporting period, notwithstanding that the unconditionally conservative expensing of research provides different information from the amortisation of development.

¹³ IFRS 3 introduces a tension, whereby fair value is assumed to be obtainable for acquired assets, even in cases where IAS 38 criteria serve to constrain capitalisation.

Subsequent measurement is also essentially the same in IAS 16 and IAS 38, including a cost-based model and a fair value option, systematic expensing (depreciation or amortisation) and identical definitions of useful life. Both standards draw attention to the attributes of certain types of asset though, critically, this is again not a difference in principle, but instead in application: IAS 16.58 states that land has ‘an unlimited life and therefore is not depreciated,’ while IAS 38 BC 65 notes that ‘the expected physical utility to the entity of a tangible asset places an upper limit on the asset’s useful life,’ and while IAS 16 offers more guidance on residual value, IAS 38 includes a rebuttable assumption that such value is zero for intangible assets with a finite useful life.

US GAAP has special accounting requirements that Boeing uses to account for new aircraft, that contrast with the IFRS requirements applied by Airbus. Both companies amortize capitalised costs using the estimated numbers of units to be produced (and sold). However, Airbus must apply IAS 16 and IAS 38. In its annual reports, the accounting policy section of Airbus states:

Development costs which are capitalised, are recognised either as intangible assets or, when the related development activities lead to the construction of specialised tooling for production (“jigs and tools”), or involve the design, construction and testing of prototypes and models, as property, plant and equipment.

Hence, Airbus separates costs into tangible and intangible assets, and only those assets that meet the recognition criteria are capitalized. In contrast, Boeing applies *project accounting*, recognising the costs of the aircraft program, as a whole, and amortises these to each manufactured aircraft based on expected sales numbers. This approach is designed to allocate the same cost to each aircraft manufactured. Costs are accumulated and accounted for by programs rather than by individual units or individual contracts. A program consists of the estimated number of units of a product to be produced by an entity in a continuing, long-term production effort for delivery under existing and anticipated contracts. The program is used as the accounting cost center for accumulating costs and allocating costs to cost of sales.¹⁴

Boeing has available an approach that does not appear to require that it separate tangible and intangible expenditure, by focusing on the program as a whole.¹⁵ In contrast, Airbus needs to distinguish between tangible and intangible expenditure. We question what informational purpose this serves. Consider, also, how to account for the physical aircraft and the sophisticated computer systems that are integral to the aircraft, as we observed with the problems with Boeing’s 737 Max 8. IAS 38 states that if software is integral to a physical asset then it is part of the PP&E. The computer system in aircraft such as the Max 8 is, therefore, an

¹⁴ Program accounting is described in a draft of a proposed Statement of Position prepared by the Program Accounting Task Force Accounting Standards Division of the American Institute of Certified Public Accountants and is referenced in the FASB’s Accounting Standards Codification at ASC- 912-20-25-5A.

¹⁵ This is an example of practice being codified by the standard setter rather than the standard setter (FASB) developing principles.

integral part of the physical asset and, if Boeing applied IFRS, within the scope of IAS 16. Yet, if the system had been developed as a generic software system that might be transferrable to other aircraft it would be within this scope of IAS 38.

There have been significant advances in robotics, for manufacturing assembly processes and picking and packing in on-line delivery systems. Is the software, which could be the most costly part of the robot to create, integral to the hardware or is the hardware ancillary to the software? As IAS 38 states:

... (for) an asset that incorporates both intangible and tangible elements ... an entity uses judgement to assess which element is more significant. For example, computer software for a computer-controlled machine tool that cannot operate without that specific software is an integral part of the related hardware and it is treated as property, plant and equipment ... when the software is not an integral part of the related hardware, computer software is treated as an intangible asset.

These words became part of IAS 38 in 1998, 9 years before the iPhone was released, when apps, cloud-based products and similar innovations were some time away. IFRS in this regard becomes increasingly hard to defend when (for example) the development of physical accessories for products can be capitalised far more easily than software Apps for an iPhone.

A further difficulty is accounting misrepresentation in the form 'arbitrage' between IAS 16 and IAS 38. This matters if, for example, capitalisation of an item would be prohibited under IAS 38, but not under IAS 16. The potential for arbitrage arose during development of IFRS 16, when the IASB vacillated between classifying a right-of-use asset as an intangible asset or as property, plant and equipment. This example highlights that the distinction between a physical asset and the rights to some attributes of a physical asset can be small, or artificial. In practice, determining whether expenditure is potentially creating an asset will sometimes require an entity to 'decide' whether that asset is tangible or intangible, or both. An entity might, for example, design and create production equipment and develop special processes for using the equipment.

Conditional capitalization

IFRS permits conditional capitalization through the requirement to reverse impairments for all assets, including intangibles, except goodwill, if the recoverable amount increases.¹⁶ Within the pharmaceutical sector, some companies start manufacturing inventory before the drugs they have been developing have been approved, in anticipation of receiving that approval (pre-approval inventory). Guidance on the application of IFRS is that the expenditure on that inventory is recognised as an asset (inventory) but its recoverable amount is then assessed immediately. If the entity assesses that it is not probable, at the time of production, that it will recover the cost through sale the inventory is impaired to nil immediately. If (or when) the drug is approved, the impairment is reversed. (pwc, 2019) This accounting is aligned with our conditional capitalization solution. The emphasis is on uncertainty resolution as the underlying source of information.

¹⁶ GAAP does not permit impairment reversals.

A company will not impair the pre-approval inventory if it expects to realise its value in the inventory in the ordinary course of business (IAS 2). In contrast, the companies will continue to recognise expenditure on the “licence” for the drug as an expense until approval is received. The expectations requirement in IAS 2 means that expenditure on the pre-approval inventory is less likely to be expensed than the continuing expenditure on the licence to sell the drug, even after production of the inventory has begun. This is because of IAS 38’s higher recognition threshold. It sends inconsistent messages in both the balance sheet and the income statement.

The pre-approval inventory example highlights two inconsistencies in the accounting for the drug being developed, based solely on tangibility: (1) the pre-approval inventory and licence have different recognition thresholds; (2) inventory is conditionally capitalized whereas the licence costs are not recognised as an asset.

Another example of conditional capitalization is observable in the extractives sector. An entity developing an oil field or a mine is allowed to recognise exploration costs as an asset. IFRS 6 leaves the preparer to decide whether that asset should be presented as tangible or intangible.¹⁷ The choice suggests a lack of clarity as to whether an exploration right is an intangible licence or gives the holder an interest in the underlying physical assets. The costs of exploration are, generally, capitalised. Entities applying successful efforts accounting will transfer the expenditure to property, plant and equipment if the exploration is successful, or expense it to the income statement if it abandons that effort. This means the exploration is capitalised and impaired if the effort is unsuccessful. For a successful well, the total is depleted on a units-of-production basis (they estimate the total number of barrels in the field and work out the cost per barrel to expense as they extract the oil).¹⁸

In contrast, an entity that develops a new drug generally cannot recognise an asset until much later in the process (because of the six additional criteria in IAS 38). Yet both activities are about exploring for a product. There are similarities also in terms of the unit of account (a field and a compound that could be developed into different drugs), for which cost recoverability is a more reasonable assumption at a portfolio level, while greater confidence in amortisation might also be expected at higher levels of aggregation. The most common threshold when applying IFRS for capitalising development costs for pharmaceuticals appears to be when the entity receives regulatory approval. This contrasts directly with extractive activity accounting. Extractive activities are recognised as an investment but expensed either when they are

¹⁸ IFRS does not prescribe the accounting for extractive activities. The relevant standard was published as a temporary Standard that allowed entities to continue to apply their current practice until the IASB could develop its own requirements. Hence, this conditional capitalisation is not a principle embedded in the Standard. Nevertheless, this practice, and project accounting, demonstrate that conditional capitalisation has developed as generally accepted practice.

abandoned or amortised to associate the investment with expected revenues. Pharmaceutical activities are, largely, recognised as an expense when they take place.

We also observe that other tangible assets are likely to be conditionally capitalized. The IASB's Standard for property, plant and equipment requires recognition if it is "probable that future economic benefits associated with the item will flow to the entity" (IAS 16). The requirement is only that the benefits will flow to the entity, not that the benefits must exceed the cost. This suggests that conditional capitalization is common in IFRS. We conjecture that recognition and immediate impairment of property, plant and equipment is unlikely to be prevalent and unlikely, or rarely, to be observable from published financial statements.

Initial Recognition as an Expense

Our solutions require that an investor be able to identify current and investment expenditure, separately, including the post-capitalization amortization and impairments. IAS 16 and IAS 38 both require a reconciliation of the carrying amounts of assets within their scope, which will include expenses recognised. IAS 38 also requires the disclosure of additional information about research and development activities. However, entities must disclose the aggregate amount of research and development expenditure recognised as an expense during the period. This is a mixture of research expense, development amortisation and any impairment expense.

In either of the general cases in which the solution of initial recognition as an expense applies, however, IFRS has remarkably little to say. These are the cases of inseparable expenditures and uncertain investments. In such cases, the information in the income statement is distorted by expensing, a topic on which IAS 1 is in substance silent.

The new Conceptual Framework

The discussion above mainly addresses existing standards, most of which were developed by the IASB's predecessor, the IASC, and, of course, influenced by the then current CF. One of the subsequent achievements of the IASB has been to update its Framework. We believe that the suggestions for improvement urged above are assisted by the improvements made by the new Framework.

The old Framework relied on the idea of 'a resource controlled by the entity'. Although that was generally interpreted to admit items that, although not physical, would be expected to produce cash, such as a contractual right to receive cash, it resonated with the idea of something physical rather than an intangible. In contrast, the new Framework refers to 'a present economic resource' which is in turn defined as 'a right that has the potential to produce economic benefits'. Because 'rights' are intangible, it is clear that all assets, conceptually are intangible, notwithstanding the acknowledgement in paragraph 4.12 of the CF that it might provide a 'more concise and understandable' faithful representation of an asset to label it as a physical asset rather than the rights that the entity holds over that asset.

Furthermore, the IASC's old CF embodied 'the expectation' [i.e. probability] of a future inflow of economic benefits' in the definition of an asset. The new CF takes a different stance (in paragraphs 4.14–4.15):

An economic resource is a right that has the potential to produce economic benefits. For that potential to exist, it does not need to be certain, or even likely, that the right will produce economic benefits. It is only necessary that the right already exists and that, in at least one circumstance, it would produce for the entity economic benefits beyond those available to all other parties.

A right can meet the definition of an economic resource, and hence can be an asset, even if the probability that it will produce economic benefits is low. Nevertheless, that low probability might affect decisions about what information to provide about the asset and how to provide that information, including decisions about whether the asset is recognised.

The restriction of assets to ‘rights’ is consistent with the proposals made in this paper. Absent rights—which not only include legal rights, but those that are enforceable by other means—there is likely to be considerable uncertainty about the economic benefits obtained by investment expenditures, and the extent to which those benefits are attributable to past investment or to other assets.¹⁹

As a consequence, probability of future inflow of economic benefits is relegated to recognition. According to the new CF, there are two considerations that are relevant to the recognition of an item as an asset: (i) A low probability of an inflow of economic benefits (CF paragraphs 5.15–5.17); (ii) Measurement uncertainty (CF paragraphs 5.19–5.23). These align well with our discussion of uncertainty.

6 Implications for the Management Commentary and other supplementary disclosure

The analysis above is likely to lead to limited recognition in cases where cost identification is challenging, and outcome uncertainty is high. This does not necessarily restrict the information conveyed by accounting under double entry, because the income statement reports earnings from intangible assets that are off-balance sheet. This informational signal is distorted, however, outside an (unrealistic) ‘steady state’, in which there is no growth in investment in intangible assets. Thus, the issue arises when there is such growth. If balance sheet recognition is restricted in this case, other channels of communication outside the financial statements must be entertained. Disclosure within the financial reports is one such channel. Indeed, understanding how the information can be conveyed in the double-entry system points to the additional disclosure that may be required when that system is limiting.

IAS 38 encourages disclosure of a brief description of significant intangible assets controlled by the entity but not recognised as assets because of IAS 38’s recognition criteria (assets that are generating a return). IAS 16 encourages the disclosure of the carrying amount of temporarily idle or retired property, plant and equipment (which indicates an error in amortization). In general, however, the information gap here leads to consideration of the IASB’s management commentary.

¹⁹ The FASB’s Proposed Statement of Financial Accounting Concepts (FASB 2020) proposes that the definition of an asset should be ‘a present right of an entity to an economic benefit’.

The approach employed by the Framework emphasises asset recognition and measurement as the route to satisfying its objectives (Barker and Teixeira, 2020). In contrast, a useful approach here is to consider ‘resources’ rather than ‘assets’, in other words to be unconstrained by the hurdle of recognition criteria and instead to consider potentially complementary information, with respect to the economic resources of the entity (FRC, 2019). The effect here is to ‘reverse’ the lens conventionally applied by the IASB, and to start with presentation and disclosure, rather than with recognition and measurement.²⁰ The value of this perspective is that it brings back into consideration economically relevant information that is otherwise ‘dismissed’ because it fails the test of initial recognition.

To illustrate, consider the research and development activity of a pharmaceutical company, which lies at the core of its business model. At present, IAS 38 requires that research the entity undertakes is expensed, while in effect allowing entities the option of expensing development also. The effect is a double ‘mismatching’, with expenses recognised concurrently with value-creating activity, and subsequent revenues recognised without corresponding expenses. In contrast, acquired R&D is capitalised as an asset, although it is typically amortised over the period of continued development, and not the period in which revenues are generated. Pharma companies sometimes acquire new drugs by acquiring existing businesses, often with royalty conditions to share uncertain benefits with the seller. In a business combination the future royalties are contingent consideration and the estimated future royalties must be recognised as a liability when the business is acquired. When uncertainties are resolved any change in the future royalties must be recognised in the current period. The effect is to “amortize” future anticipated expense against current revenues—another mismatch.

It is not surprising that the value creation process can be difficult to assess. There is a considerable loss of information in this unconditionally conservative approach for investment undertaken by the entity. In practice, pharmaceutical development involves specific milestones, at which outcome uncertainty is reduced, leading ultimately to a point at which commercial viability can confidently be established. If successful, there is a specified patent protection period, which has the properties of a reliably estimable useful economic life. Overall, there is substantially all of the information here that is required for an operating asset footnote, albeit one that cannot be reported in the financial statements but instead in the management commentary. The amount ‘capitalised’ in each period, in such a statement, corresponds to the ‘mismatched’ expense in that period’s income statement.²¹ This information constitutes the ‘pre-work’ required to apply our solution of conditional capitalisation: the accounting records ‘investments’ that are expensed through the income statement, and accordingly ‘assets’ that are off balance sheet, offering the basis for capitalisation if and when uncertainty becomes sufficiently resolved.

The possibility opens up here for the IASB to work with industry or professional bodies in the development of standardised, off-balance-sheet reporting. This would also connect the

²⁰ We are grateful to Anne McGeachin for this insight.

²¹ The informational requirement here aligns well with the IASB's current exposure draft on General Presentation and Disclosures.

approaches of the IASB and (for example) the Sustainability Accounting Standards Board, given that the latter has developed standards at an industry-specific level. Because this information is not included in the financial statements, a greater degree of subjectivity is not only possible, but also desirable. Useful information is not in practice binary, as the constraint of recognition implies, and outcome uncertainty can be low enough to provide useful information, even though not sufficiently low for recognition; such information would be 'approximately right' as opposed to the 'precisely wrong' value of zero arising from nonrecognition.

This analysis has an implication for stewardship. This is because 'revenue investment' is no longer 'ignored' by the accounting system, as a consequence of being expensed immediately, but instead management remain held to account for their cumulative, ongoing performance with respect to this activity. There is confirmatory value in contrasting prior expectations at the time of making investments, with subsequent realisations over time. This contrasts with the 'bygones are bygones' approach implicit in unconditional conservatism.

7 Conclusion

The double-entry system is one that produces both a balance sheet and an income statement. The balance sheet reports assets that have the potential of adding value for investors from employing them in operations while the income statement reports the actual value added. Thus the accounting for (intangible) assets cannot be determined without consideration of the effect on the income statement. Income is determined by recognizing revenues and the expenses incurred to generate those revenues, so the accounting for intangible assets must be evaluated on the implication for recognizing expenses to match to revenues. That determines an informative income statement that reports value added. This is the key point of this paper.

The immediate expensing of investment in intangible assets to the income statement, as in much of current practice, upsets the income calculation, failing to differentiate expenditure that supports current revenues from that which is intended to generate future revenues (investment). However, calls to book all intangible assets to the balance sheet face the same issue: the income statement is affected by subsequent amortization and impairments and poor amortization and impairments result also in mismatched earnings and uninformative income statements. In short, mismatching in the income statement is inevitable and the issue in accounting for intangible assets is the minimization of that mismatching to preserve the income statement.

The determining feature is the degree of uncertainty about future outcomes to the investment, for that determines the ability to establish an ex ante amortization schedule with low probability of an impairment. That threshold determines the capitalization of intangible assets, otherwise mismatching via immediate expensing is the alternative. The latter does have the feature of conveying the uncertainty surrounding investment, differentiating these investments from those booked to the balance sheet.

It is likely that the current IFRS requirements for intangible assets do not recognize fully these issues. The recognition threshold in IAS 38 is significantly higher than for tangible assets. A consequence is that current and investment expenditure is aggregated—IAS 38 exacerbates the separability problem. The high threshold also implies that most expenditure on intangibles

is highly uncertain. Again, the income statement suffers because the recognition threshold masks the real level of uncertainty. However, the solution is not to capitalise all investments to the balance sheet. If the investment has highly uncertain cash flows the assets are overstated and the income statement fails to recognise value lost. Any asset will also need a means for allocating its consumption to appropriate periods, to yield an income statement that shows the revenues the assets generate and the consumption of those assets—a measure of value added from the investment. When these processes are misaligned, or mismatched, the value-added measure is destroyed. The mismatching error also becomes compounded, for it results in subsequent impairments or gains or losses on disposal to settle up the error which are themselves a failure to measure the consumption loss appropriately.

The problems are rooted in the special accounting for intangibles required by IFRS. There are inconsistencies between the accounting for tangible and intangible assets that have no clear basis. The general principles we have laid out in this paper apply to the accounting for any investment in an asset that is intended to generate future cash flows. Separability and uncertainty reflect the attributes of an asset. There are tangible and intangible assets with indefinite lives, including land, creative works, digital currencies and brands. Some machinery and natural resources are able to produce only a defined number of units, and a licence might give the holder the right to a defined number of uses of an (intangible) asset. Tangibility, per se, is unlikely to be an attribute that is useful in developing accounting requirements.

Presentation within the income statement is also important, to separate current expenses from investment activity. For example expenditure that is intended to generate future cash flows, but is too uncertain to be shown as an asset in the balance sheet, should be separated from current expenditure. Similarly, the consequences of the resolution of an uncertainty, including impairments, conveys different information to that in current expenditures. This approach is consistent with the proposal in the IASB's General Presentation and Disclosures (Primary Financial Statements) to separate operating, investing and financing activities in the income statement. Appropriate aggregation allows management to convey their perception of uncertainty.

The importance of the income statement does not mean that the balance sheet is unimportant. It conveys information about investments that management has concluded will generate cash flows in the future. The income statement and the balance sheet work hand-in-hand, which is the essence of the double-entry model.

There will always be limits on how much information the financial statements can convey to help investors assess future cash flows. Although the accounting system relies on assumptions about the future, it is limited to capturing transactions and events that have taken place. Management has information beyond that in the financial accounting system that can help investors estimate future cash flows. Management commentary, which is part of financial reporting, can be used to present this information. The IASB is revising its guidance on management commentary and has already decided that management commentary should “provide information and analysis to help investors and creditors understand how the entity's business model creates value and converts that value into cash flows.” (IASB, 2020)

Our focus in this paper is on setting out how to build the foundations for consistent accounting for assets. Measurement of assets after initial recognition is also important in ensuring that the income statement conveys information helpful to investors. However, discussions of measurement are more likely to be productive if they build on the foundation of consistent accounting for assets generally.

Appendix 1

There is no loss of information if assets are missing from the balance sheet but the earnings from the asset are coming through the income statement.

Balance sheets and income statements combine to indicate value, but there is a case where earnings alone are sufficient: If earnings from assets are flowing through the income statement, the omission of the assets from the balance sheet is of no consequence.

The operating feature is the cancelling error property of accounting. The reference to “error” is an error in the balance sheet from not booking assets. Expensing an investment such as research and development (R&D) immediately to the income statement (rather than booking it to the balance sheet) results in an “error” in the balance sheet. But the property says that earnings so calculated are the same as earnings under a policy of booking the investment to the balance sheet and then amortizing it to the income statement as long as the business is in a steady state, that is, *if* there is no growth in investment.

In a steady-state case, the “error” in the balance sheet at the end of the period is the same as at the beginning—the two errors cancel and the balance sheet accounting is irrelevant. This is the exercise assigned to first-year accounting students when asked to calculate the difference in earnings when R&D is capitalized versus expensed immediately if there is no growth in R&D investment over periods. (Full marks if you say: zero.)

Accordingly, in mature brand or pharmaceutical companies where advertising or R&D is roughly a constant percent of revenue, there is little issue in the accounting for intangible assets. The Coca-Cola Company’s brand is missing from the balance sheet, yielding a price-to-book ratio of about 10, but that is no problem as the earnings from the brand are reported in the income statement.²² Penman (2009) supplies other examples.

Thus, booking the asset to the balance sheet provides no additional information for valuation. This is demonstrated again with the residual income model. A firm has 100 in book value, earning 20 in earnings with no growth. Thus, with a 10% required return:

$$Value = 100 + \frac{20 - 0.10 \times 100}{0.10} = 200$$

An accountant perceives the earnings are coming from a brand asset that is missing from the balance sheet, so recognises another 100 on the balance sheet for the brand. The value is now:

$$Value = 200 + \frac{20 - 0.10 \times 200}{0.10} = 200$$

²² Forbes (2019) reports that the Coca Cola brand was valued, in 2017, at USD73.1 billion by Interbrand. Forbes’ own valuation was USD56.4 billion and that Brandirectory measures it at USD34.2 billion. This variation highlights the challenge if an accountant was charged with measuring and recognising brand value.

Recognising the intangible asset has no effect on the value. Furthermore, this value expression reduces to one involving only earnings:

$$Value = 200 + \frac{20}{0.10} - \frac{0.10 \times 200}{0.10} = \frac{20}{0.10} = 200$$

Book value drops out and value is just capitalized earnings.

The case is an extreme to demonstrate a point. But it raises the question (for mature companies, for example) of the extent to which balance sheet recognition conveys additional information over that conveyed by earnings.

The conditioning *if* in the cancelling error property is critical—i.e., there is no growth in investment. Growth depresses earnings below the steady-state level (and adds expected growth, g , to the valuation model). That focuses the accounting issue on whether recognising investments in intangible assets as assets in the balance sheet improves the information about the amount, timing and uncertainty of future cash flows when there is growth in investment. From a stewardship perspective, does the recognition of intangible assets improve manager performance evaluation over that indicated by earnings?

Table 1: Differences between IAS 16 and IAS 38

Recognition basis	All internally generated assets must meet six specific recognition criteria as well as the general recognition criteria. Additional requirement to place more reliance on external sources of evidence and to consider the benefits over the life of the intangible asset.
Specific prohibitions	IAS 38 identifies some expenditure that is prohibited from being recognised as an internally generated intangible asset (brands, mastheads, publishing titles, customer lists and items similar in substance, training activities, advertising and promotional activities (including mail order catalogues)
Fair value model	Must be an active market for the intangible asset
Impairment	All indefinite-life intangible assets must be tested for impairment every reporting period.
Residual value	Intangible assets are assumed to have zero residual value.

Table 2 – illustration of additional guidance in IAS 38: Self-constructed PP&E versus self-constructed intangibles

<p>If an entity self-constructs an item of property, plant and equipment IAS 16 seems to require that the costs be capitalised (para 7):</p> <p><i>The cost of an item of property, plant and equipment shall be recognised as an asset if, and only if:</i></p> <ul style="list-style-type: none"> <i>(a) it is probable that future economic benefits associated with the item will flow to the entity; and</i> <i>(b) the cost of the item can be measured reliably.</i> <p>This is a relatively low hurdle. Once recognised the carrying amount needs to be assessed for impairment if there are any indications that the carrying amount will not be recovered.</p>	<p>If an entity self-constructs an intangible asset, such as a software system, it appears to have a much higher hurdle in IAS 38 before it is allowed to recognise any asset (para. 57):</p> <p><i>An intangible asset arising from development (or from the development phase of an internal project) shall be recognised if, and only if, an entity can demonstrate all of the following:</i></p> <ul style="list-style-type: none"> <i>(a) the technical feasibility of completing the intangible asset so that it will be available for use or sale.</i> <i>(b) its intention to complete the intangible asset and use or sell it.</i> <i>(c) its ability to use or sell the intangible asset.</i> <i>(d) how the intangible asset will generate probable future economic benefits. Among other things, the entity can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself or, if it is to be used internally, the usefulness of the intangible asset.</i> <i>(e) the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset.</i> <i>(f) its ability to measure reliably the expenditure attributable to the intangible asset during its development.</i> <p>While these criteria appear to set a substantially higher hurdle than IAS 16, they are typically not particularly hard to meet, and can be interpreted as ‘spelling out’ the IAS 16 criteria, as opposed to requiring something meaningfully different.</p> <p>Practice has evolved to be very conservative, a convention which most likely reflects an unintended consequence, that the presence of more guidance somehow signals ‘tighter’ requirements.</p>
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References

- Aboody, D. and Lev, B. (1998), 'The Value Relevance of Intangibles: The Case of Software Capitalization'. *Journal of Accounting Research*, 36: 161–91.
- Andronoudis, D., C. "Dargenidou, E. Konstantinidi, and P. F. Pope. (2019). Conservative Accounting and Risk: The Case of Research & Development. Working paper, Bocconi University.
- Airbus (2019), Annual Report
- Amir, E. and Lev, B. (1996). 'Value-relevance of Non-financial Information: The wireless Telecommunications Industry'. *Journal of Accounting and Economics*, 22: 3–30.
- Banker, R., R. Huang, and R. Natarajan and S. Zhao. (2019). 'Market Valuation of Intangible Asset: Evidence on SG&A Expenditure'. *The Accounting Review*, 94 (6): 61-90.
- Barker, R. and Penman, S. (2020). 'Moving the Conceptual Framework Forward: Accounting for Uncertainty'. *Contemporary Accounting Research*, 37(1): 322-357
- Barker, R. and Teixeira, A. (2018). 'Gaps in the IFRS Conceptual Framework'. *Accounting in Europe*, 15 (2): 153-66.
- Barker, R. (2015). 'Conservatism, Prudence and the IASB's Conceptual Framework'. *Accounting and Business Research*, 45 (4): 514-538.
- Barth, M. E., M. B. Clement, G. Foster, and R. Kasznik. (1998). 'Brand Values and Capital Market Valuation'. *Review of Accounting Studies*, 3 (1-2): 41-68.
- Basu, S., and G. Waymire (2008). 'Has the Importance of Intangibles Really Grown? And if so, Why?'. *Accounting and Business Research*, 38 (3): 171-190.
- Basu, S., and G. Waymire (2010). 'Sprouse's What-you-may-call-its: Fundamental Insight or Monumental Mistake?'. *Accounting Historians Journal*, 37 (1): 121-148.
- Boeing (2019), Annual Report
- Botosan, C.A. (1997). 'Disclosure Level and the Cost of Equity Capital'. *The Accounting Review*, 72: 323–349.
- Cazavan-Jeny, A., Jeanjean, T. and Joos, P. (2011), 'Accounting Choice and Future Performance: The Case of R&D Accounting in France'. *Journal of Accounting and Public Policy*, 30 (2): 145–65.
- Chandra, U., Procassini, A. and Waymire, G. (1999). 'The Use of Trade Association Disclosures by Investors and Analysts: Evidence from the Semiconductor industry'. *Contemporary Accounting Research*, 16: 643–670.
- Chen, E., Gaviols, I. and Lev, B. (2017), 'The Positive Externalities of IFRS R&D Capitalization: Enhanced Voluntary Disclosure'. *Review of Accounting Studies*, 22 (2): 677–714.
- Ciftci, M. (2010), 'Accounting Choice and Earnings Quality: The Case of Software Development'. *European Accounting Review*, 19 (3): 429–59.
- Coase, R. (1937). 'The Nature of the Firm'. *Economica*, 4 (16): 386–405
- Eberhart, A. C., Maxwell, W. F., & Siddique, A. R. (2004). 'An Examination of Long-term Abnormal Stock Returns and Operating Performance Following R&D Increases'. *Journal of Finance*, 59 (2): 623–650.

- Ely, K., and G. Waymire. (1999). 'Intangible Assets and Stock Prices in the Pre-SEC Era'. *Journal of Accounting Research*, 37 (Supplement): 17-44.
- Elwin, P. (2008). 'Discussion of "Accounting for intangibles—a Critical Review of Policy Recommendations" '. *Accounting and Business Research*, 38 (3): 209-213.
- Enache, L. and A. Srivastava. (2018). 'Should Intangible Investments be Reported Separately or Comingled with Operating Expenses? New evidence'. *Management Science*, 64: 3446-3468.
- Entwistle, G. M. (1999), 'Exploring the R&D Disclosure Environment'. *Accounting Horizons*, 3 (4): 353–85.
- FASB (2020), 'Proposed Statement of Financial Accounting Concepts': Concepts Statement No. 8, Conceptual Framework for Financial Reporting: Chapter 4 Elements of Financial Statements.
- FRC (2019). Discussion Paper - Business Reporting of Intangibles: Realistic Proposals. London: FRC.
- Green, J.P., Stark, A.W. and Thomas, H.M. (1996), 'UK Evidence on the Market Valuation of Research and Development Expenditures'. *Journal of Business Finance and Accounting*, 23 (2), March: 191–216.
- Guo, R., Lev, B. and Zhou, N. (2004). 'Competitive Costs of Disclosures by Biotech IPOs'. *Journal of Accounting Research*, 42 (Supplement): 319–355.
- Haskel, J., and Westlake, S. (2017), *Capitalism without Capital: The Rise of the Intangible Economy* (Princeton: Princeton University Press).
- IFRS Interpretations Committee (2017), September 2017 IFRIC Update.
- IASB (2018), *Conceptual Framework for Financial Reporting* (London: IFRS Foundation).
- IASB (2020), IASB Agenda Paper 15B, *Management Commentary: Business Model*.
- Ittner, C, and D. Larcker. 1998. 'Are Nonfinancial Measures Leading Indicators of Financial Performance?'. An Analysis of Customer Satisfaction. *Journal of Accounting Research*, 36 (Supplement): 1-35.
- Jones, D. A. (2007), 'Voluntary Disclosure in R&D-intensive Industries'. *Contemporary Accounting Research*, 24 (2): 489–522.
- Kallapur, S. and Kwan, S. (2004). 'The Value Relevance and Reliability of Brand Assets Recognized by U.K. Firms'. *The Accounting Review*, 78 (1): 151–172.
- Kothari, S.P., Laguerre, T. and Leone, A. (2002). 'Capitalization vs. Expensing: Evidence on the Uncertainty of Future Earnings from Capital Expenditures vs. R&D Outlays'. *Review of Accounting Studies*, 7: 355–382.
- Kovacs, E. (2004). 'The Future Benefits in Selling, General and Administrative Expenses'. PhD dissertation, Columbia University.
- Lev, B. (2001). *Intangibles: Management, Measurement, and Reporting*. Washington, D.C.: Brookings Institution Press.
- Lev, B. (2018), 'The Deteriorating Usefulness of Financial Report Information and How to Reverse It'. *Accounting and Business Research*, 48 (5): 465–493.
- Lev, B. (2019), 'Ending the Accounting-for-Intangibles Status Quo'. *European Accounting Review*, 28 (4): 713-736.

- Lev, B. and Gu, F. (2016), *The End of Accounting and the Path Forward for Investors and Managers* (New Jersey: John Wiley & Sons).
- Lev, B., Sarath, B. and Sougiannis, T. (2005), 'R&D Reporting Biases and their Consequences'. *Contemporary Accounting Research*, 22 (4): 977–1026.
- Lev, B., and Sougiannis, T. (1996). 'The Capitalization, Amortization, and Value Relevance of R&D'. *Journal of Accounting and Economics*, 2 (February): 107-138.
- Lev, B., and A. Srivastava. (2020). 'Explaining the Recent Failure of Value Investing'. Working paper, New York University and University of Calgary.
- Lev, B. and Zarowin, P. (1999). 'The Boundaries of Financial Reporting and How to Extend Them'. *Journal of Accounting Research*, 37: 353–385.
- Linnainmaa, J. T., & Roberts, M. R. (2018). 'The History of the Cross-section of Stock returns'. *The Review of Financial Studies*, 31 (7): 2606–2649.
- Marshall, R. and Lennard, A (2016). 'The Reporting of Income and Expense and the Choice of Measurement Bases'. *Accounting Horizons*, 30 (4): 499–510.
- Merkley, K. (2014), 'Narrative Disclosure and Earnings Performance: Evidence from R&D Disclosures'. *The Accounting Review*, 89 (2): 725–57.
- Nissim, D., and S. Penman. (2008). *Principles for the Application of Fair Value Accounting*. White Paper No. 2, Center for Excellence in Accounting and Security Analysis, Columbia Business School.
- Oh, H. and S. H. Penman. (2020). 'Income Statement Mismatching is Not the Reason for the Decline in the Information Content of Accounting Over Time'. Unpublished paper, University of Washington, Bothell and Columbia University.
- Ohlson, J. (1995). 'Earnings, Book Values, and Dividends in Equity Valuation'. *Contemporary Accounting Research* 12: 661-687.
- Oswald, D. R. and Zarowin P. (2007), 'Capitalization of R&D and the Informativeness of Stock Prices'. *European Accounting Review*, 16 (4): 703–26.
- Penman, S. H. (2009), 'Accounting for Intangible Assets: There is also an Income Statement'. *Abacus*, 45 (3): 358–71.
- Penman, S. H. and N. Yehuda. (2019). 'A Matter of Principle: The Identification of Cash-flow News and Discount-rate News in Financial Statements'. *Management Science*, 65 (12): 5584-5602.
- Penman, S. H. and X. Zhang. (2020). 'A Theoretical Analysis Connecting Conservative Accounting to the Cost of Capital'. *Journal of Accounting and Economics*, 69 (1): 1-25.
- Penman, S. H. and X. Zhang. (2019). 'Connecting Book Rate of Return to Risk and Return: The information Conveyed by Conservative Accounting'. Forthcoming, *Review of Accounting Studies*. At <http://ssrn.com/abstract=2402933>.
- pwc. (2019). *International Financial Reporting Standards (IFRS): Issues and Solutions for the Pharmaceuticals and Life Sciences Industries*. Accessed at <https://www.pwc.com/gx/en/industries/pharmaceuticals-life-sciences/publications/ifrs-issues-solutions-for-the-pharmaceutical-industry-2019.html>
- Romer, P. (1990). 'Endogenous Technological Change'. *Journal of Political Economy*, 98(5): 71-102.

- Shi, C. (2003). 'On the trade-off between the future benefits and riskiness of R&D: a bondholders' perspective'. *Journal of Accounting and Economics*, 35: 227–254.
- Skinner, D. J. (2008), 'Accounting for Intangibles – A Critical Review of Policy Recommendations'. *Accounting & Business Research*, 38 (3): 191–204.
- Sougiannis. (1994). 'The Accounting Based Valuation of Corporate R&D'. *The Accounting Review*, 69 (1): 44-68.
- Stark, A.W. (2008), 'Intangibles and Research – an Overview with a Specific Focus on the UK'. *Accounting and Business Research*, 38 (3): 275-285.
- Storey, R., & Storey, S. (1998). *FASB special report, the framework of financial accounting concepts and standards*. Norwalk, CT: FASB.
- Teece, D. (1986) 'Profiting from technological innovation'. *Research Policy*, 15 (6): 285- 305.
- Thomas, A. (1969). *The Allocation Problem in Financial Accounting Theory*. Sarasota, FL: American Accounting Association.
- Thomas, A. (1975). *Accounting for Depreciable Assets*. Accounting Research Monograph, No. 1, AICPA, New York.
- Tsoligkas, F. and Tsalavoutas, I. (2011), 'Value Relevance of R&D in the UK after IFRS Mandatory Implementation', *Applied Financial Economics*, 21 (13): 957–67.
- Williamson, O. (1981), 'The Economics of Organization: The Transaction Cost Approach'. *The American Journal of Sociology*, 87 (3): 548-577.
- Whittington, G. (2017). 'Book Review: The End of Accounting and the Path Forward for Investors and Managers'. *Accounting History*, 22(4): 559-561.
- Wyatt, A. (2008). 'What Financial and Non-Financial Information on Intangibles is Value-Relevant? A Review of the Evidence'. *Accounting and Business Research*, 38 (3): 217–56.
- Zéghal, D. and Maaloul, A. (2011), 'The Accounting Treatment of Intangibles – A Critical Review of the Literature'. *Accounting Forum*, 35 (4): 262–74.