

Seeing Double - financial accounting and reporting from the perspectives of both financial materiality and environmental materiality

Richard Barker and Colin Mayer, Saïd Business School, University of Oxford

Abstract

Financial accounting and sustainability reporting have remained largely distinct from one another, in the literature, in corporate practice and in standard-setting, in spite of both being related components of corporate reporting. Focusing on environmental aspects of sustainability, this paper adopts a normative approach in conceptualising a coherent reporting system in which financial accounting is complemented by, on the one hand, sustainability-related disclosures that are material to investors and, on the other hand, an accounting and reporting of externalities. By employing in this way a lens of financial materiality, and also a lens of environmental materiality, corporate reporting can be designed to allow users to 'see double'. We argue for monetising environmental degradation at current replacement cost, enabling commensuration with financial accounting within a single income statement, yet effectively placing nature outside the realm of the economic by making the physical maintenance of natural capital a precondition for recognising fully-costed profit. Our analysis aligns with evidence in the literature of the term 'sustainability' being appropriated from an environmental context to mean *financial* sustainability, subverting the social to the economic, yet we argue that this criticism is misplaced. A financial materiality lens is not designed to address externalities. Where there should instead be focus – and criticism - is a remarkable omission in both corporate reporting (and standard-setting) practice and in the sustainability reporting literature of an *accounting* for externalities, which we argue could be used to bridge financial and environmental accounting and reporting.

Seeing Double - financial accounting and reporting from the perspectives of both financial materiality and environmental materiality

Financial accounting and sustainability reporting are both aspects of corporate reporting, yet they have remained largely distinct, both in corporate practice and in the research literature. At various stages in the long evolution of financial accounting (Basu and Waymire, 2006; Waymire, 2009), additional forms of corporate reporting have been proposed, most of which take financial accounting as a starting point, and seek to offer a complement (e.g. ASSC, 1975; Burchell et al. 1985; Lev, 2018). In contrast, a significant body of work in the sustainability reporting literature is concerned primarily with corporate social and environmental impact as an object of study in itself, rather than as a point of departure from, or extension of, investor-oriented financial accounting (e.g. Guthrie and Parker, 1989; Gray, 1992; Matthews, 1997; Gray, 2002; Parker, 2005; Buhr et al., 2014). Linking these perspectives is the concept of externality, which reflects the societal limitations of private economic calculation, thereby simultaneously drawing attention to economic effects that are internalised and those that are not (Unerman, Bebbington and O'Dwyer, 2018). By design, financial accounts are constructed through the lens of financial materiality, and so externalities cannot be seen. In contrast, consideration of the material environmental impact of corporate activity requires that externalities are brought into view. The question we address in this paper is whether, and how, this separation between financial accounting and externality reporting can be bridged, in a coherent system of corporate reporting that allows for 'double materiality' (EC, 2019), enabling users to view corporate performance through the lens of both financial and environmental materiality.

Reporting practice is characterised by Unerman et al. (2018) as largely 'siloes', with the *financial* impacts of externalities excluded by definition from the financial accounts, but also absent from sustainability reporting. These authors observe that there is little research that 'has focused on systematic recording or articulation of the financial impacts of externalities' and, further, that 'the limited number of studies ... have been sporadic and fragmented, with little connection in insights.' We would add that, in a sustainability reporting literature dominated by positive studies of corporate reporting practice (Parker, 2011; O'Dwyer and Unerman, 2016), normative work is thinner still, and it comprises different (and

inconsistent) theorisations of accounting for externalities, few of which are developed in much depth (Lamberton, 2005), in spite of the research potential they contain (Cuckston, 2013; Senn and Giordano-Spring, 2020). In this respect, Gray (2002) lamented ‘the relative paucity of kite-flying, of speculation, of imagination — or, if one prefers ... the normative deductive.’ Yet Russell et al. (2017) offer him little progress, noting that while the early environmental accounting literature was ‘largely normative ... this stream of thought ... capturing “externalities” and “full cost accounting” has dwindled.’¹ Moreover, normative contributions - even in the accounting literature - are typically not grounded in the logic of accounting but instead in that of financial economics (Morgan, 1988), being guided by economic techniques for impact valuation, rather than by the accountant’s focus on verifiable, historical measurement (e.g. Milne, 1991; Herbohn, 2005; Bebbington et al., 2007).

In this paper we adopt a normative approach in exploring how users of corporate reporting can ‘see double’, viewing financially material information through a shareholder lens, and also societally material information through a broader stakeholder lens. While a norm stipulates that a certain behaviour ‘ought’ to take place, a (positive) value judgment is that actual behaviour is in accordance with the norm (Kelsen and Knight, 1966). Our approach in this paper is to take as given the norms associated with conventional financial accounting practice and to focus on identifying norms for extending that practice to embrace double materiality. This should not be taken to imply that we reject constructivist challenges to financial accounting practice (e.g. Hines, 1988; Young, 2006; Miller and Power, 2013; Barker and Schulte, 2017), nor challenges to the underlying notion of shareholder primacy (Gaa, 1986; Stout, 2012; Mayer, 2013), nor criticism of financial accounting itself is so far as it relates to environmental matters (Cook, 2009; Giner, 2014; Schneider et al., 2017). Our paper is neutral on these issues, and by design we do not seek to challenge - in the tradition of Edwards and Bell (1961), Chambers (1965) and others - the norms of financial accounting.

¹ Gray (2002) and Russell et al. (2017) are here describing a secular trend in accounting research, which even earlier concerned Mattessich (1992), as follows: ‘After a decade of preoccupation with ‘positive accounting theory’ - during which time the use of the notion of normative accounting has been slighted by the inner sanctum of leading accounting researchers - it may be time to break this circle and revive interest in the normative aspects of our discipline. But talking about normative accounting theory carries a risk, since the corresponding paradigm still seems to be branded as being unscientific.’

Instead, we take as given a financial accounting practice which, as evidenced by the centrality of equity and profit in the IASB's conceptual framework ('Framework', IFRS, 2020), is embedded institutionally in directors' legal duties with respect to shareholders. We instead focus on a question that is under-explored in the literature, rather than seeking to add to a literature that is already extensive, and we therefore address how financial accounting practice 'as is' can be extended, and not whether that practice 'gets it right'. The 'norm' in our normative approach therefore concerns how corporate reporting 'ought' to be conceptualised in this regard.

We focus on environmental aspects of sustainability, and we use the Integrated Reporting language of the 'capitals', which allows consistent application of the accountant's logic of capital maintenance (IIRC, 2013; Coulson et al., 2015; Humphrey et al., 2017). We postulate that a 'sustainable corporation' is one whose activities simultaneously maintain both financial capital and natural capital (Gray, 2006 and 2010; Milne and Gray, 2013; Bebbington and Larrinaga, 2014; Tredigda et al., 2014), and this constitutes the normative premise in our deductive reasoning (Mattesich, 1992 and 1995). Financial capital represents shareholders' beneficial ownership claim on resources, and the measurement of profit is premised on the maintenance of that capital (Whittington, 2017). In contrast, natural capital is a type of resource, with a broad range of stakeholders (Hicks, 1974; Nobes, 2015). We define natural capital as 'the stock of natural ecosystems on Earth including air, land, soil, biodiversity and geological resources ... (which) underpins our economy and society by producing value for people, both directly and indirectly' (NCC, 2016). While anthropocentric in its ultimate concern for human wellbeing, this perspective can also be understood as ecological (or 'environmental') in so far as it concerns sustaining the physical properties of natural ecosystems, and in that sense – and by analogy with financial capital – it measures ecological gain or loss against the benchmark of maintaining (natural) capital (Neumayer, 2013; Helm, 2015).

We structure the paper as follows. In the next section, we examine financial accounting practice and we ask how effectively, in the context of natural capital, it serves its stated

function of providing financially material information to investors.² This approach enables us to draw foundations from financial accounting theory in a novel way, employing the literature to identify why financial accounting ‘fails’ to meet, first, investors’ needs for financially material, sustainability-related disclosures and, second, an incremental ‘societal’ need for informational relating to externalities. The following section then expands this analysis, classifying components of financial reporting, and thereby setting out how financial reporting and reporting on externalities are complementary yet distinct. This lays the foundation for the subsequent section, in which we conceptualise externality accounting in a way that enables it to be an extension of financial accounting, while also responsive to the ecological imperative of the maintenance of natural capital. In the final section, we apply our analysis in a broad overview of the current institutional landscape for frameworks and standards in corporate reporting, we explore our contribution to the literature, and we identify some of the limitations of our analysis and, thereby, avenues for further research.

Financial Accounting

The objective of general-purpose IFRS financial statements is defined in terms of financial materiality, whereby the information needs of equity investors are deemed to subsume those of other stakeholders (IFRS, 2020; Young, 2006).³ For clarity of argument, we make the simplifying assumption that ‘economic rationality’ defines those information needs, making investors’ interest in the reporting entity purely financial (Sen, 1987). In turn, structure in IFRS is provided by a double-entry system of accounting, which yields financial capital (Macve, 2010). As described above, we take extant IFRS as given, and our purpose is not to critique financial accounting but instead to explore how it can be extended within a broader system of corporate reporting.

Within IFRS, the representation of economic transactions and events is the outcome of a two-stage filtration. The initial filter is that of recognition, whereby the balance sheet comprises the reporting entity’s rights or obligations, arising at the reporting date as a result of past transactions and events (Chambers, 1965 and 1998; Storey and Storey, 1998). The

² The IASB’s stated objective in its Framework is to ‘provide useful financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity.’ (para. 1.2)

³ While we focus on IFRS, our analysis applies equally to US GAAP, or similar financial accounting regimes.

second filter is that of measurement attribute, typically either an exit price (fair value) or historical cost (Whittington, 2017). Measurement is sensitive to the reporting entity's incentives to mislead (Watts, 2003), against which prudence is a safeguard, supported by audit and mandatory application, which also promotes completeness, comparability and consistency (Bromwich, 1984; Christensen et al., 2019). Note that 'accounting', as described here, is concerned with measurable past financial performance only, including rights and obligations at the current balance sheet date. Over and above such information, reporting entities also provide further disclosures to investors, such as forecasts of future earnings, or information relating to the entity's strategy or business model. The notion of reporting is therefore broader than that of accounting, an important distinction to which we return later.

Natural capital is not defined in IFRS, though it is reflected in the financial statements in so far as it is implicated in (recognised) economic transactions and events (Anderson, 2019), such as: buying and selling natural resources (land, IAS 16; minerals, IFRS 6; agricultural produce, IAS 41); providing for environmental clean-up costs or litigation (IAS 37); impairment of assets resulting from environmentally-related transactions or events (IAS 36); and carbon trading (Cook, 2009; Giner, 2014). Recognition of financially material sustainability issues is likely in practice to be partial. Not least, guidance in IAS 37 turns on the distinction between a legal obligation resulting from a past event, and a legal obligation that falls due at a future date, and there is no liability for future expenses that must be incurred for the business to continue to operate, such as those related to sustainability transition - no matter how much the business is committed to the outflow (IAS 37, Example 6). Similarly, assets which could not (for example) operate in a future net zero carbon setting are not necessarily impaired currently; they might be due for replacement before (say) any carbon commitment affects their economic viability, giving no reason for impairment under IAS 36, or else there is maybe a shortening of expected useful life under IAS 16, which raises future annual depreciation expense but maintains current carrying amount. In addition, and with the notable exception of agricultural produce measured at fair value (IAS 41), natural resources are anyway likely to be carried at historical cost, and in

substance therefore not fully recognised.⁴ In general, the accounts are unlikely to provide much information concerning what can be understood as a ‘predictable discontinuity’ associated with any *future* transition from current, unsustainable business practice; we might ‘know’ that net zero lies in the future, but we find little, if any, indication of this in the accounts.

With some exceptions (e.g. Cook, 2009; Bebbington et al. 2020), these informational limitations are generally not failures of financial accounting *per se* but instead reasons why the financial statements do not, in principle, provide all of the financially material information that is relevant in the determination of enterprise value. Instead, the provision of relatively ‘reliable’ information on what is ‘known’ about the entity’s economic position is a defining characteristic of useful accounting information, a strength not a weakness (Basu and Waymire, 2006; Barker and Penman, 2020). This informational boundary in financial accounting is not specific to environmental issues, and it applies as much (for example) to intellectual capital and human capital as it does to natural capital (IIRC, 2013; Lev, 2018; Barker et al., 2021). It does, however, point to an information shortfall from an investors’ perspective. This concerns natural capital information that is relevant in determining enterprise value, yet that is not reflected in the subset of that value that is captured on the balance sheet. Such information relates to expected cash flows where rights and obligations have not yet been established, or where measurement is currently uncertain (Storey and Storey, 1998; Barker, 2015). Examples include the types of disclosure called for by the Taskforce on Climate-related Financial Disclosure, on risks and opportunities associated with prospective climate-related adaptation (TCFD, 2017), and similarly in the IFRS Exposure Draft on climate-related reporting (IFRS, 2022). This ‘missing information’ can be termed ‘sustainability-related financial disclosure’. It is a complement to financial accounting information in providing comprehensive reporting to investors.

The implications of this gap between enterprise value and book value are best understood in terms of the information content of the income statement, rather than the balance sheet (Edwards and Bell, 1961; Ohlson, 1995; Penman, 2006). The income statement provides the

⁴ A special case is mineral reserves, which are ‘gifts of nature’ that predate human institutions, such that there is no operational economic ‘past event’ that gives rise to recognition under IFRS 6. They also have uncertain yields, creating a challenge for ‘reliable’ measurement.

foundation for forecasts of future value creation, making of central concern the predictive value of past financial performance, sometimes referred to as earnings quality or persistence (Hicks, 1946; Black, 1980; Kormendi and Lipe, 1987). In a sustainability context, where business model transition is forthcoming, the expected value added from future operations is not anticipated in historical income statement data, and earnings quality is low.⁵ And while this problem of the past not guiding the future is inherent in financial accounting, there are several reasons why it has a particular resonance for sustainability-related financial disclosure (Bebbington et al., 2019).

First, while there is genuine uncertainty about future outcomes relating (for example) to the creation of value through intangible assets, there is an element of inherent predictability in science-based environmental targets, grounded as they are in observable breaches of planetary boundaries (Rockström et al., 2009; Whiteman et al., 2013; Steffen et al., 2015).⁶ Currently-available data on corporate environmental impact thereby have predictive value, in the specific sense that they alert investors to future business model changes. To illustrate, the economic implications of a corporate commitment to net zero carbon emissions will vary by business, according to the extent to which the current business model imposes emissions-related externalities. In this regard, while historical financial profit by definition excludes externalities, an entity's current external impacts may influence its future capacity to generate profit, not least by affecting its 'license to operate' (Dowling and Pfeffer, 1975; Bebbington et al., 2020). In this way, current externalities can be financially material, and so their inclusion in sustainability-related financial disclosure can help compensate for the limited predictive value of current earnings.

Second, in the case of natural capital, there is potential misinformation in the accountant's traditional matching process, whereby amounts given up in exchange are linked with associated revenue in measuring periodic financial performance (Ijiri, 1975; Penman 2009; Barker and Penman, 2020). Matching works well, as a guide to prospective decision-making only if the past serves as a guide to the future, yet this breaks down if the natural capital on which an entity depends is depleted beyond a certain level. This applies whenever

⁵ A similar claim can be made for social sustainability issues. A commitment to gender equality, for example, is a commitment to a 'knowable' future outcome.

⁶ The predictability of the related financial implications is of course much less certain.

renewable natural capital is depleted beyond a critical threshold, not least when a ‘tragedy of the commons’ arises from the over-consumption of common pool resources (Hardin, 1968). It applies also whenever renewing is not an economically viable option (i.e. where replacement cost exceeds recoverable amount), or else in cases of finite, non-renewable natural resources. In each of these cases, and especially when the natural capital itself is not owned by the reporting entity (and so there is no signal from an impairment charge), achieved financial performance is a poor guide to achievable future performance, because the resources consumed to generate profit in the current period cannot be assumed to be continually available in future periods.

Third, reporting entities are increasingly exposed to risks and opportunities resulting from the expected effects of climate change, regardless of the scale of carbon emissions resulting from that entity’s own activities (TCFD, 2017), and they are likewise exposed to broader ecosystem degradation, regardless of whether the entity’s own activities are responsible (Helm and Hepburn, 2012). Earnings quality is again low, because financial profit is measured against the maintenance of the entity’s own financial capital, and not against the maintenance of natural resources beyond its direct control. Sustainability-related financial disclosure therefore need not relate directly to the activities of the entity itself, but instead includes information about the natural capital on which the entity depends. This requires a different reporting mindset from that of the financial accountant (Spence and Rinaldi, 2014). It is reporting to investors, yet not as viewed through the lens of control over net assets. It is a perspective that is unexplored in the IFRS Framework (Barker and Teixeira, 2018), in spite of being concerned with financially material information.

Corporate Reporting

The discussion above has identified two distinct, complementary categories of information that are financially material: financial accounting and sustainability-related financial disclosure. While these categories address the information needs of investors, an additional consideration is that the interests of investors in corporate activities are a subset of the broader interests of society as a whole (Gray, 2009; Bebbington and Larrinaga, 2014). This implies a second, ‘societal’ materiality lens on corporate reporting. These distinctions are summarised in Figure 1.

Insert Figure 1 here

We take the adjective ‘financial’ to mean material to providers of finance; information is financially material if it is decision-relevant to investors, and accounting is constructed as ‘financial accounting’ if, as in IFRS, its purpose is defined by financial materiality.⁷ In practice, the terms ‘financial accounting’ and ‘financial reporting’ are commonly conflated. In contrast, the discussion in the previous section of this paper locates financial accounting as a subset of financial reporting, since the latter comprises not only historical financial performance and current financial position, but also information relating to environmental sustainability. In other words, an investor seeking to understand how an entity’s enterprise value can hold up to climate change, and to other environmental exposures, requires both financial accounting and sustainability-related financial disclosure. It is for the reason that the IFRS Foundation, in seeking to provide investors with financially material information, has supplemented the International *Accounting* Standards Board with the International *Sustainability* Standards Board.

In the absence of externalities, financial materiality would be synonymous with societal materiality, because all economic effects would be internalised in determining financial profit, and sustainability-related disclosures to investors would satisfy the informational demands of other stakeholders. In the presence of externalities, however, there is an *incremental* demand for information, for the benefit of stakeholders other than investors. This is not to say that financial reporting is irrelevant to non-investors but instead that it is insufficient. The shortfall relates - by definition - to externalities and, continuing the distinction made above between accounting and reporting, it relates both to externalities that are realised, and for which an account can be given (‘externality accounting’) and also to the prospective effects of externalities in future periods (‘externality disclosure’).

Externality Accounting

Since financial accounting is concerned with the maintenance of financial capital, and not of natural capital, the ownership, consumption or use of natural resources is represented in

⁷ Investors can be understood here as either shareholders or a broader group; the difference is not critical to the argument.

financial accounting only instrumentally, in so far as it relates directly to the measurement of financial capital (Gray, 2009). This is consistent with mainstream economic thought, in which there is nothing ‘special’ about natural capital (Norton, 1995). As Dasgupta (2008) describes, ‘I have professional colleagues who believe that the services nature provides amount at best to 2–3% of an economy’s output, which is the share of agriculture in the GDP of the United States. Why, they ask, should one incorporate a capital asset of negligible importance in macro-economic models?’

There is, in effect, an implicit assumption that natural capital is not unique but is instead substitutable, such that financial profit can be measured as the aggregate change in net assets, independently of the composition of that change. From a societal perspective, this is inadequate. Nature has no substitute as the source of essential energy, water, air, genetic materials and minerals, and as the sink that absorbs and recycles waste (Fitter, 2013); without it there can be no economic activity (Arrow et al., 1995; Helm, 2015). The financial accountant’s implicit assumption is that of weak sustainability, instead of something closer to strong sustainability (Laine, 2005; Neumayer, 2013). Moreover, by measuring transactions and events by reference to the market, financial accounting precludes consideration of any attribute that is not priced, thereby understating social cost if, as is typical for natural capital such as the atmosphere, oceans and forests, there is an absence (or lack of enforcement) of property rights or regulation (Coase, 1960; Heal, 2016), a problem which becomes especially acute when viewed through the lens of future generations (Arrow-Debreu, 1954).⁸ These external effects are unaccounted by the reporting entity, either as current-period cash outflows, or as accruals in the form of either asset impairments or legal or constructive obligations (Antheume, 2004; Unerman et al., 2018; and contrast with Cuckston, 2013).

These problems of imperfect substitutability and of incomplete costing cannot, by design, be seen through the lens of conventional financial accounting practice. They can, however, be addressed directly by adopting a second, environmental lens on corporate reporting, which views the maintenance of natural capital as an end in itself. There is an analogy here

⁸ If historical cost is used, then some form of a ‘correction’ to financial profit is called for, as an adjustment for changes in the value of natural capital that would otherwise remain unrecorded.

with financial accounting. Just as a 'legal person' is an anthropomorphic fiction, which allows the construction of financial capital, so too the concept of anthropomorphising nature gives it a legal and economic standing that helps to construct externality accounting (Stone and Hardin, 1974; New Zealand Government, 2014). Accordingly, we use the term 'environmental materiality' as analogous to financial materiality: information is environmentally material if its omission would affect users' understanding of the impact of a corporation's activities on natural capital. A benefit of this approach is in recognising that natural capital is subject to anthropogenic influence, yet (unlike other capitals) not entirely subject to anthropogenic control, as the example of climate change illustrates (IPCC, 2014). And as neither the extent of influence nor the limits of control are fully understood, there is merit in a precautionary approach in the maintenance of natural capital as an end in itself (Wilson, 2016).⁹ This is better achieved by adopting a capital maintenance concept grounded in the physical properties of natural systems, rather than in the economic value of those systems to different stakeholder groups within society.¹⁰ It also makes irrelevant the (highly subjective) determination of best economic use (Hayek, 1935; Hicks, 1974). Moreover, by placing nature outside the realm of the economic (Satz, 2010), and so distancing natural capital conservation from questions at the interface of economic valuation and social justice, this approach helps to avoid 'critical concerns ... (relating to) the distributional, anti-democratic, moral and relational effects (of natural capital valuation)' (Russell et al., 2017).

To be operational, such an approach would require addressing what 'counts' as natural capital, and which attributes of that natural capital are to be measured. Here we adopt the notion of 'critical natural capital' from the environmental economics literature, which Ekins et al. (2003) define to be 'natural capital which is responsible for important environmental functions and which cannot be substituted in the provision of these functions by manufactured capital.' This overlaps with the concept of planetary boundaries (Rockström et al., 2009; Whiteman et al., 2013; Steffen et al., 2015), though takes a more

⁹ There is also an option value to natural capital that is difficult to price accurately, and so a prudential approach to natural capital conservation is additionally justified by a failure to account fully for the benefit that future generations might derive from it. (Mayer, 2013).

¹⁰ Consistent with the language and logic of natural capital, these physical properties can be conceptualised as ecosystem services, being the flow of benefits that underpins the concept of capital (Helm, 2015).

anthropocentric perspective. In this regard, Helm (2015) advises that special consideration should be given to renewable natural capital, in part because the natural property of renewing provides a perpetuity ‘free lunch’ and so is especially valuable, and also because of the greater risk of reaching a critical, irreversible threshold. What makes a particular category of natural capital critical is that it has no substitute, its loss would be irreversible, and the consequence of its loss would be significant to human wellbeing (Ekins et al., 2003; Marshall and Toffel, 2005).¹¹

But how can the maintenance of natural capital, as an end in itself, form part of the same corporate reporting system that also measures (financial) performance by reference to the maintenance of financial capital? Is it plausible that a single reporting system can, in this way, combine seemingly orthogonal environmental and financial objectives?

Recall that our starting point is to take financial accounting practice as given, and to ask the normative question of whether and how this practice can be extended to embrace double materiality. And recall also that it is the activities of the corporation for which we are seeking a reporting system. In this context, there is a critical difference between the legal person of the corporation and its natural world equivalent, which is that financial accounting is designed for the former, and not the latter. Our aim here is not to produce a balance sheet for nature, in which a debit in recognition of enhanced natural resource is matched by a credit to natural capital, but instead to somehow extend corporate accounting to incorporate an accounting for natural capital maintenance.¹² A (financial) balance sheet includes net assets with respect to which financial capital represents an exclusive ownership claim, but in contrast the corporation has no exclusive ownership claim to shared resources such as oceans, ecosystems and the atmosphere, nor to natural resources that it relies upon in its supply chain (or that it otherwise impacts) but that it does not own, such as land, water or mineral resources. In short, if the motivation for externality accounting applies to

¹¹ These can be understood as the conditions for applying the concept of ‘strong sustainability’ as opposed to ‘weak sustainability’. In its extreme form, strong sustainability is a form of physical capital maintenance that implies that no substitutability is possible for natural capital, while an extreme weak sustainability implies the opposite. The extent of reporting is determined by the acceptable level of substitution (Neumayer, 2013).

¹² In any event, the corporate structure of rights and obligations is a social construction, which has no parallel in nature (Searle, 2010). The concept of a liability has no parallel in the natural world, with the implication that assets must always be equal to capital, making the concept of double entry redundant.

external impacts on natural resources outside of the reporting entity's economic control and obligation, or to the inadequate costing of resources consumed through market transactions, then a corporate balance sheet is an inherently unhelpful construction.

Somewhat paradoxically, however, given that it represents a change between two balance sheets, the concept of an income statement can be employed to connect financial accounting with externality accounting. The concept is that of an accrual-based, historical representation of performance during a reporting period. If the benchmark for that performance is financial capital, then the bottom line is financial profit. Analogously, if the benchmark is natural capital, and if measurement is incremental to financial profit, then the bottom line for externality accounting is a financial measure of the corporation's environmental externalities. The impact of corporate activities during the reporting period affects both financial capital and natural capital, and so a 'complete' performance accountability includes both. It is incidental for this purpose whether, or not, corporate activity affects net assets owned by the corporation.

Practically, the financial accounting concept of consolidation is readily applicable here. In the case of economic transactions and events, the original incidence of expenses reported in the income statement could, in principle, have been anywhere in the entity's supply chain. While the balance sheet is constrained to report assets and liabilities controlled by the entity, which requires consolidation of group companies, expenses are 'passed on' by means of transactions through the supply chain. Yet this passing on does not take place for externalities, which are therefore of two distinct types: the entity generates externalities from its own operations, while it can also be understood to be 'responsible' for externalities in its supply chain which, if internalised as costs to suppliers, would ultimately be reported in the entity's income statement.¹³

In short, it is possible to maintain the existing system of financial accounting, as a record of 'realised' business transactions and events (which yields financial profit), but then to extend

¹³ The presence of supply chain externalities means that, while the conventional scope remains unchallenged, there arises a need to gather information from the supply chain, which does not arise in the case of financial reporting.

profit measurement by including some form of externality accounting; this provides a ‘full cost accounting’, as illustrated in Figure 1. This approach is described in brief outline in Gray (1992 and 1994), yet it remains undeveloped and has instead been ‘crowded out’ by other systems of accounting and reporting, both in the literature and also in corporate practice (Deegan, 2017). This oversight in corporate practice might be explained by corporate economic self-interest. Gray (2010) speculates that because ‘the calculation would wipe out almost any company’s profit’ it would be understood to give the ‘wrong answer’, suggesting a corporate preference instead for an opportunistic appropriation of the concept of sustainability (e.g. Milne et al., 2009; Milne and Gray, 2013; Van Bommel, 2014). In academia, Parker (2005) hints that the oversight might in some sense be intended, being driven by a scholarly anxiety to protect the socially-oriented domain of sustainability reporting from the investor-oriented domain of financial accounting.

Full cost accounting requires, of course, that externalities are monetised. In this regard, our analysis above leads us to reject two alternative approaches that have been proposed in the literature. The first of these positions financial accounting and impacts on the natural world as in principle incommensurable, with reporting on each therefore being kept separate, and monetisation of externalities avoided altogether (Gray, 1992 and 1994; Espeland and Stevens, 1998; Bebbington and Gray, 2001; Milne and Gray, 2013; Davies and Dunk, 2015). There is neither commensurability with the financial statements, nor even among different metrics within an environmental report (Norman and MacDonald, 2004; and see Russell et al., 2017). Sometimes termed an ‘inventory approach’ (Gray, 1994; Lamberton, 2005), this method is most closely associated in practice with the Global Reporting Initiative (GRI, 2015). While we see merit in this approach, it has several limitations. It does not accommodate the lens of financial materiality, and so does not provide investors with sustainability-related financial disclosure, as a defined subset of corporate reporting, and a complement to financial accounting. Neither does it provide a comprehensive accounting for corporate performance that satisfies both financial and environmental materiality, thereby supporting an overall accountability for corporate impact (Roberts, 2009). In these respects, it reinforces rather than resolves the issue of siloed reporting. The second alternative in the literature differs from our approach by not taking existing financial accounting as its starting point. This second approach seeks to maintain a single bottom

line, by means of revising the financial accounts in order to accommodate considerations of sustainability (e.g. Rubenstein, 1992). So, for example, a liability would be recognised for environmental impact, even though no such liability would be required in conventional financial accounting (NCC, 2015; Rambaud and Richard, 2015; Mayer, 2016; Lev, 2018; Chabrak, 2018; Serafeim et al, 2019). Our analysis does not support such an approach because it conflates ‘actual’ legal and constructive rights and obligations of the entity with those that are hypothetical and discretionary (in the case of liabilities) and wished-for but not controlled (in the case of assets). This corrupts IFRS rather than extending and complementing it.

Our approach instead calls for a comprehensive income statement, in which we neither presume IFRS to have ‘got it wrong’, nor to be siloed from reporting on externalities, but where impacts on both financial capital and natural capital are instead made commensurable, and in a way that protects the integrity of the joint objectives of maintaining both financial capital and natural capital. Instead of reporting a single bottom line, we call for financial profit and externality cost to be reported as distinct subtotals within an overall full cost accounting.

In practice, our approach requires taking two steps, the first being physical measurement of the natural resource itself, and the second being monetisation (Milne, 1991; Bebbington et al., 2001; Antheaume, 2004; Lamberton, 2005; MacKenzie, 2009; Gibassier and Schaltegger, 2015). The first of these steps can be unambiguously aligned with the maintenance of natural capital. The second is more contested (Cuckston, 2018), yet arguably it enables accounting to give ‘visibility’ to natural capital (Jones, 2010), providing ‘a means to fight on the terrain of “hard” financial calculation’ (Bebbington et al. 2007; see also Chabrak, 2018).

In the case of financial accounting, diverse physical activities, ranging from idea generation, to manufacturing and distribution, are made commensurable by means of transaction-based monetisation. In the case of externality accounting, however, the absence of market transactions invites plurality, with Unerman et al. (2018) noting ‘many acceptable and defensible methodologies for quantifying and financially internalising externalities.’ A common approach to monetisation is to borrow from the logic of financial economics (Morgan, 1988; Power, 2010; Barker and Schulte, 2017), conceptualising externalities as

economic impacts, measured by such means as hedonistic pricing or survey-based measures of willingness to pay (Antheaume, 2004; Bebbington et al., 2007; Bebbington and Larrinaga, 2014). This approach is commonly advocated in the literature, and it can be relevant in managerial decision-making contexts (Milne, 1991).

There are several reasons, however, to regard a financial-economic valuation approach as conceptually inconsistent with financial accounting in a full-cost income statement. This inconsistency makes the use of the term 'accounting' inappropriate for a financial-economic valuation approach. As described above, an important feature of accounting representation is its historical nature, being concerned with past transactions and events only (Morgan, 1988; Milne, 1991). A recording of the past is concerned with observable activities, making it in principle accessible to measurement, and so to verifiability, and to giving a reliable *account* (Chambers, 1998; Storey and Storey, 1998; Basu and Waymire, 2006 and 2010; Barker and McGeachin, 2013). Such properties also help to counter managerial agency in the context of accountability (Watts, 2003; Roberts, 2009). These defining features are lost when the monetisation of externalities is drawn directly from the environmental economics literature, and when the resulting subjectivity allows managerial discretion in reporting. In short, valuation is not accounting. Indeed, the sustainability reporting literature is itself rich with evidence of why that is so. There is opportunistic agency when companies control their own reporting (Boiral, 2013), and an economic self-interest in exploiting that reporting as a vehicle for socially accepted legitimacy (Dowling and Pfeffer, 1975; Suchman, 1995; Deegan, 2014; Cho et al. 2015b) and for shaping a perception of responsiveness to stakeholders (Deegan and Blomquist, 2006). Consistent with this, discretionary reporting practice varies over time, as any given corporate activity is perceived to become more or less legitimate (Brown and Deegan, 1998; Islam and Deegan, 2010), and also across different industries, as legitimacy is sustained or threatened in context-specific ways (Patten, 1992). Discretionary sustainability reporting can be understood as grounded in social salience, rather than in scientific 'reality', for which the development of institutional pressures carry a formative power (Di Maggio and Powell, 1983; Hoffman, 1999; Bebbington et al. 2008; Rankin, et al., 2011; Higgins and Larrinaga, 2014). Such pressures lead to variation across different cultural settings, and not just across industries (Cho, Chen and Roberts, 2008; Bebbington et al., 2009; Kolk, 2010). Discretionary sustainability reporting can therefore be understood as the

outcome of a (private) cost-benefit analysis, whereby the corporation can be understood as 'weighing up' the (financial impact) to itself of its own reporting. As such, it is no more consistent with a genuine commitment to sustainable business practice than to a disingenuous signal of such a commitment (Deegan et al., 2002). For these reasons, the relatively rigorous foundations of (historical, verifiable) financial accounting are especially pertinent.

A further incoherence is that environmental impact valuation does not correspond directly to the economic decisions faced by the corporation. In the logic of deprival value, an economic valuation is the appropriate measurement attribute for an asset only in the limited case when replacement is not viable and, in addition, value in use exceeds that from disposal (Edwards, Kay and Mayer, 1987). Similarly, for a liability, valuation of the impact on stakeholders is the appropriate measurement attribute only if this amount is lower than both direct costs in settling the liability and costs of outsourcing settlement to a third party. If financial accounting reports on the economics *of* the corporation, while impact valuation reports on how stakeholders are affected *by* the corporation, then bolting together data with these different attributes does not produce a conceptually coherent full-cost income statement.

Finally, and perhaps most serious, the use of valuations falls into the pernicious trap of economic logic, described above, whereby all forms of capital are presumed to be inherently substitutable, when they are actually not so, given the uniquely valuable nature of ecosystem services. The environmental criterion of natural capital maintenance is thereby not met. Instead, and consistent with one of the options indicated in Gray (1992 and 1994), we propose that replacement cost is employed as a measurement attribute, in place of impact valuation (Edwards and Bell, 1961; Whittington, 2017).

A replacement cost approach asks the following question: what cost would the reporting entity incur to make good any depletion of natural capital? This question is of course hypothetical, because if costs were actually incurred, then they would form part of the measurement of financial profit, and - whatever level of financial profit was achieved - natural capital would have been maintained. If financial profit differs from full-cost profit, it

is because the former has been achieved at the expense of natural capital; costs have been imposed externally, and not incurred internally.

The use of replacement cost grounds externality accounting in the physical measurement of the natural resources themselves. The question is not what economic value has been lost by the depletion of natural capital, but instead what ecological loss has taken place.

Accordingly, monetisation asks what financial resources must be consumed to replenish natural capital, and not what depletion of financial value has resulted from the depletion of natural resources.

Yet, in spite of being grounded in this way in the physical properties of natural resource, a critical benefit of a replacement cost approach is commensuration with financial profit. This is because cost is measured in monetary terms, notwithstanding that the objects to which cost is applied are themselves incommensurable. There is no direct comparison of, for example, carbon emissions, water contamination or deforestation, but instead measurement of the (commensurable) costs of remediation in those (otherwise incommensurable) different settings (Bebbington et al., 2007; Russell and Lewis, 2014). There is monetisation, yet because the focus is the cost of conservation, and not the economic value thereby created, the monetisation process does not take the contentious step of placing an economic value on nature (Piccolo, 2017).¹⁴ In addition, replacement cost represents the economic decision facing the reporting entity, namely the cost required to operate. This stands in contrast with a valuation approach, which concerns impacts on others, rather than reporting on the entity itself (Edwards, Kay and Mayer, 1987).

We acknowledge, and do not wish to understate, the practical challenges of measuring the replacement cost of natural capital (Miller and Grubnic, 2011; Cuckston, 2013; Tregidga, 2013). Yet an important benefit is that, because a replacement cost approach concerns the observable state of nature at the present time, it avoids the core problem in valuation of making unavoidably speculative assumptions about economic benefits expected to arise in future periods (Kaspersen and Johansen, 2016; Barker and Schulte, 2017). There is no need

¹⁴ Such an approach precludes reporting gains from net positive externalities. In practice the 'problem' of not capturing corporate investments made purely for the public good is unlikely to be material.

to confront the widely-cited difficulties, in valuing natural capital, of value allocation and unit of account (Barton, 1999; Coulson, et al., 2015; Unerman, 2018), difficulties which increase with increasing system complexity and/or value plurality (Frame and O'Connor, 2011). The approach therefore also diminishes managerial discretion in reporting, reducing the opportunity to (mis)represent economic gain, thereby responding to the agency problem described above (Barker and McGeachin, 2013). This is not to suggest an absence of subjectivity and complexity (Gibassier and Schaltegger, 2015), and of opportunistic measurement with respect to sustainability performance (Chen et al., 2014), but instead to stress accounting's anchor in *relatively* reliable, observable measurement, precluding an interpretation of full cost accounting as embracing inherently subjective, prospective estimation (Bebbington and Larrinaga, 2014). Further, and because the (relatively straightforward) informational need concerns the income statement only, being the difference between financial profit and full-cost profit; it is the change (or flow) that is represented, and not the level (or stock). There is no need to place a value on nature, but instead only to engage in incremental costing. Overall, the approach lends itself to an operational, single income statement, which clearly delineates the gain or loss on financial capital from that on natural capital, and consistently applies an underlying logic of accounting for the performance of the reporting entity; this is illustrated in Figure 2.

Insert Figure 2 here

While externality accounting in this form concerns reporting on externalities that have been incurred, this leaves open the question of reporting with respect to future expected externalities. There is a direct analogy here between, on the one hand, financial accounting and sustainability-related financial disclosure, and on the other hand, externality accounting and externality disclosure (see Figure 1). In this regard, if the components of sustainability reporting are to be designed in a way that forms a coherent whole, providing material accounting and sustainability-related information to both investors and other stakeholders, then externality disclosure is in effect the residual category. Its scope is the extent to which neither financial reporting, nor externality accounting, provide sufficient information with respect to the sustainable maintenance of natural capital. The Hicksian logic of earnings quality again applies here (Hicks, 1946), so that, for example, externality accounting might

report on current externalities with respect to an ecosystem, while externality reporting might address the prognosis for that ecosystem, including expected further corporate activity and/or plans or targets for intervention to restore prior impacts.

Conclusion and Implications for Research

We have explored how externality accounting can extend financial accounting, and how both can be complemented by disclosures that are material to their respective audiences. Drawing both from the logic of financial accounting and from the sustainability reporting literature, we have identified four distinct components of corporate reporting, differentiated according to whether, on the one hand, there is accounting for historical performance or instead informing with respect to expected performance and, on the other hand, whether the materiality lens is either financial or environmental. We argue in favour of measuring externalities by reference to the current replacement cost of depleted natural capital, which enables both current-period accountability for externalities and a single, full-cost income statement that measures corporate performance with reference to the maintenance of both financial capital and natural capital.

Our analysis contributes to the literature by unpacking the notion of sustainability reporting, separating accounting from valuation, and financial capital from natural capital. In the absence of these distinctions, 'sustainability' - in a corporate reporting context - is conceptually vague. To illustrate, there is a strong and pervasive argument in the literature, concerning the 'regulatory capture' of sustainability reporting (e.g. Milne and Grey, 2013; Brown and Dillard, 2014; Van Bommel, 2014; Humphrey et al., 2017). Zappettini and Unerman (2016) 'contend that, by and large, the term sustainability has been appropriated, mixed with other discourses and semantically 'bent' to construct the organisation itself as being financially sustainable, that is, viable and profitable and for the primary benefit of shareholders.' The point of contention is that the term 'sustainable' has been taken to apply to whether a corporation is financially viable, and able to meet its financial obligations as they fall due, which is the usage effectively adopted by Integrated Reporting, ISSB, SASB, TCFD, and others, and which Tregidga et al. (2014) describe as what the 'sustainable organisation' has come to 'mean'. Attaching sustainability to financial capital is argued to be subversive, a 'rhetorical diversion' (Milne and Gray, 2013, p14) that gives false reassurance

about business-as-usual (Norman and MacDonald, 2004; Deegan, 2013; Cho, et al., 2015a; Schneider, 2015).¹⁵ It is consistent, for example, with the delusion that a company can claim to be a sustainability leader if it has low environmental impact *relative* to others in the industry, doing all that it can do *subject to the constraint* of maximising shareholder value (Marshall and Toffel, 2005; Spence and Rinaldi, 2014). Meanwhile, the scope for duplicity is aided by the notion of sustainability being contested (Hueting and Reijnders, 1998; Neumayer, 2013), with definitions often too vague to support the arguments advanced for them (Norman and MacDonald, 2004; Milne and Gray, 2013; Deegan, 2017), and with the notion of sustainable development itself being ‘full of latent contradictions’ (Jones, 2010, p128). In short, the challenge is that sustainability has come to be shareholder value by another name. In the language used in this paper, ‘sustainability’ has come to allow - inappropriately - for the advancement of financial capital at the expense of the depletion of natural capital (Pearce, 1988; Laine, 2005; Gray, 2006).

Our analysis is both responsive to this critique, while also in disagreement with it. Consider, for example, sustainability-related financial disclosure, which uses the term sustainability, but does so through a lens of financial materiality. This category includes Integrated Reporting, an initiative which sparked early enthusiasm in the literature for a form of corporate reporting that would be sensitive to the social impact of corporate externalities (e.g. Adams, 2015), yet which was explicitly not designed to be sensitive in this way. That there is no inconsistency in reporting guidelines between Integrated Reporting and the IASB's own Management Commentary reinforces that both are premised on financial materiality (Barker and Teixeira, 2020), and that it would therefore be overly wishful to expect Integrated Reporting to ‘deliver on sustainability’ (Stubbs and Higgins, 2014; Flower, 2015). By making a clear distinction between financial materiality and environmental materiality, we separate sustainability-related financial disclosure from accounting and reporting with respect to externalities. Viewed in this way, criticism that sustainability-related financial disclosure fails to meet the demands of sustainability reporting is misplaced. Financial reporting does not, by design, address externalities. It is instead

¹⁵ Corporations in the fossil fuel industry, for example, have remained financially profitable for decades, yet in the process they have contributed to carbon emissions beyond levels regarded as safe for continuing human existence on the planet (IPCC, 2014).

concerned uniquely with shareholder value, with respect to which investors have a legitimate interest in sustainability-related disclosures that are informative with respect to economic risk and opportunity.¹⁶ Moreover, by focusing criticism on financially material information provided to investors, attention has (ironically) been taken away from the provision of environmentally material information. In this regard, the lack of attention given to externality accounting, and to the determination of full-cost profit, is a remarkable omission in both corporate reporting practice and in the sustainability reporting literature.

We illustrate these points in Figure 3, which applies our analysis in a broad mapping of the institutional landscape of standard-setters and similar bodies in corporate reporting. We identify these actors from frequent, corroborating references to them across several sources, including the research literature (e.g. Andrew and Cortese, 2013; Milne and Gray, 2013; Humphrey et al., 2017), and prominent, self-selecting groups in which the actors themselves are represented, such as the Corporate Reporting Dialogue (CRD, 2019) and the Impact Management Project (2021). We structure Figure 3 around our earlier discussion of financial accounting which, at the risk of oversimplification, identified two critical, conceptual steps that underpin the design of IFRS.¹⁷ These are the lens of financial materiality, and a recognition, measurement and presentation structure that yields an income statement (and so a single measure of performance) that is grounded in historical transactions and events (Storey and Storey, 1998; Camfferman and Zeff, 2015). In Figure 3, we apply these two steps in filtering, and so mapping out, leading institutional actors. The algorithm in Figure 3 leads to the same four categories identified in Figure 1.

Insert Figure 3 here

Applying both of the filters, we arrive at financial accounting (described as 'IFRS' but equally US GAAP or other). If the first of these filters applies, but not the second, we arrive at sustainability-related financial disclosure. Meanwhile, environmental materiality, combined

¹⁶ Historically, sustainability reporting has arguably not met this need (Cho et al., 2015b).

¹⁷ They also lead, equivalently, to US GAAP, or indeed to any generally accepted set of financial accounting standards.

with either accounting or disclosure, leads to either externality accounting or externality disclosure, respectively.

Several observations can be made using Figure 3. First, the financial accounting category is relatively stable and uncontested, in the sense that standard-setting authority is clear and generally accepted practice is well established. This is consistent with taking IFRS as the institutionally-embedded starting point for our analysis. Second, and consistent with related evidence from the research literature of an investor-oriented ‘appropriation’ of the concept of sustainability reporting, discussed above, a plethora of actors occupies the sustainability-related financial disclosure category (Laine, 2005; Milne and Gray, 2013; Tschopp and Nastanski, 2014; and see also Unerman et al., 2018). This space has been neither stable nor uncontested; it is where much of the debate around sustainability reporting has been taking place. Third, and consistent with our earlier analysis, and with the motivation for our paper, the externality accounting category is an empty set. This is again consistent with the research literature, albeit in the negative sense that this category has been overlooked both in practice and in academia. There is no reason why, in principle, the EU and GRI should not interpret their double materiality perspective to include externality accounting, rather than more narrowly externality reporting. This would parallel the move made by the IFRS Foundation to recognise sustainability-related financial disclosure as a discrete category from financial accounting. That neither EU nor GRI has recognised the possibility of externality accounting is consistent with the earlier discussion of this category having been overlooked. Consistent with the research literature, a stated commitment to double materiality has instead been expressed in the negative, as something that the IFRS Foundation should *not* do, rather than as something that the EU and GRI *ought* to do. Headlining its comment letter to the IFRS Foundation, on the subject of creating the ISSB, GRI advised on a need to “clarify the term ‘sustainability reporting’ and its underlying concepts, as we believe that the term as used in the Consultation Paper does not reflect established practice” GRI (2020). This is to criticise a defensible use of the term sustainability in the context of financially material disclosure, while simultaneously failing to acknowledge that ‘established practice’ in sustainability reporting does not make a meaningful distinction between accounting for externalities and reporting on externalities. Figure 3 suggests that the relevant question is not ‘why are standards being set for

sustainability-related financial disclosure?’ but instead ‘who should be setting standards for externality accounting, and why is this not happening?’

In this regard, our analysis suggests that the concept of the ‘monetisation frontier’ (O’Connor, 2006; Bebbington et al., 2007; Frame and O’Connor, 2011) has not been sufficiently developed in the realm of sustainability reporting. The notion here is one of a border, within which monetisation is relatively uncontested, yet beyond which a purely economic calculation is problematic, for reasons of either physical system complexity and measurement uncertainty, or of conflicting values over the use of natural resources. We would argue that our notion of externality accounting helps to locate the monetisation frontier, conceptually at least. Our focus on (*ex post*) cost, rather than (*ex ante*) valuation, reduces measurement uncertainty. This approach, by design, parallels the frontier between financial accounting and other financially material disclosures: the IFRS recognition and measurement criteria serve to separate relatively objective and verifiable measurement required for inclusion in the financial statements, from the less certain disclosures that are made more generally in financial reporting. So, too, our approach to the monetisation of externalities is limited to the sphere of accounting, leaving broader externality reporting on the other side of the monetisation frontier. In this regard, the use of replacement cost as a measurement attribute grounds monetisation in the physical maintenance of natural capital, thereby not raising the question of alternative use of natural capital, and of associated conflicting values, as would arise for example in the felling of rainforest to allow road construction.

In qualifying this conclusion, however, we identify three important limitations of our analysis, each of which we suggest is an avenue for further research. First is the practical question of measurement. Our argument is conceptual, and while its practical application is arguably straightforward in cases such as carbon offsets, we readily acknowledge much more substantial measurement challenges in, for example, replacement cost with respect to the partial depletion of an ecosystem (Miller and Grubnic, 2011; Cuckston, 2013; Tregidga, 2013). Second, we have defined full-cost profit as the (hypothetical) financial profit that the company *would* make *if* it internalised its externalities, including those in its supply chain. In contrast with the ‘reality’ of the financial accounts, there is therefore a form of

misrepresentation in our externality accounts, and the possibility of a 'hyperreality', representing as 'expenses' transactions and events that have not actually taken place, perhaps creating the (false) perception that sustainability is 'achieved' (Macintosh, et al., 2000; Bougen and Young, 2011; Tregidga et al., 2014). Third, our analysis is perhaps insensitive to human agency and to institutional reality, in 'wishing' for externality accounting and reporting when, consistent with the literature reviewed above, what corporations 'ought' to do in this regard is commonly subverted by, in effect, making the claim that sustainability-related financial disclosure is sufficient to meet the demands of sustainability reporting for all stakeholders (Kitzmueller and Shimshack, 2012). In this regard, we acknowledge the evidence that economic self-interest, rather than a direct concern for externalities, is the better description of practice (Patten, 1992; Deegan et al., 2002; Deegan, 2014; Higgins and Larrinaga, 2014).

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Figure 1: Components of Corporate Reporting

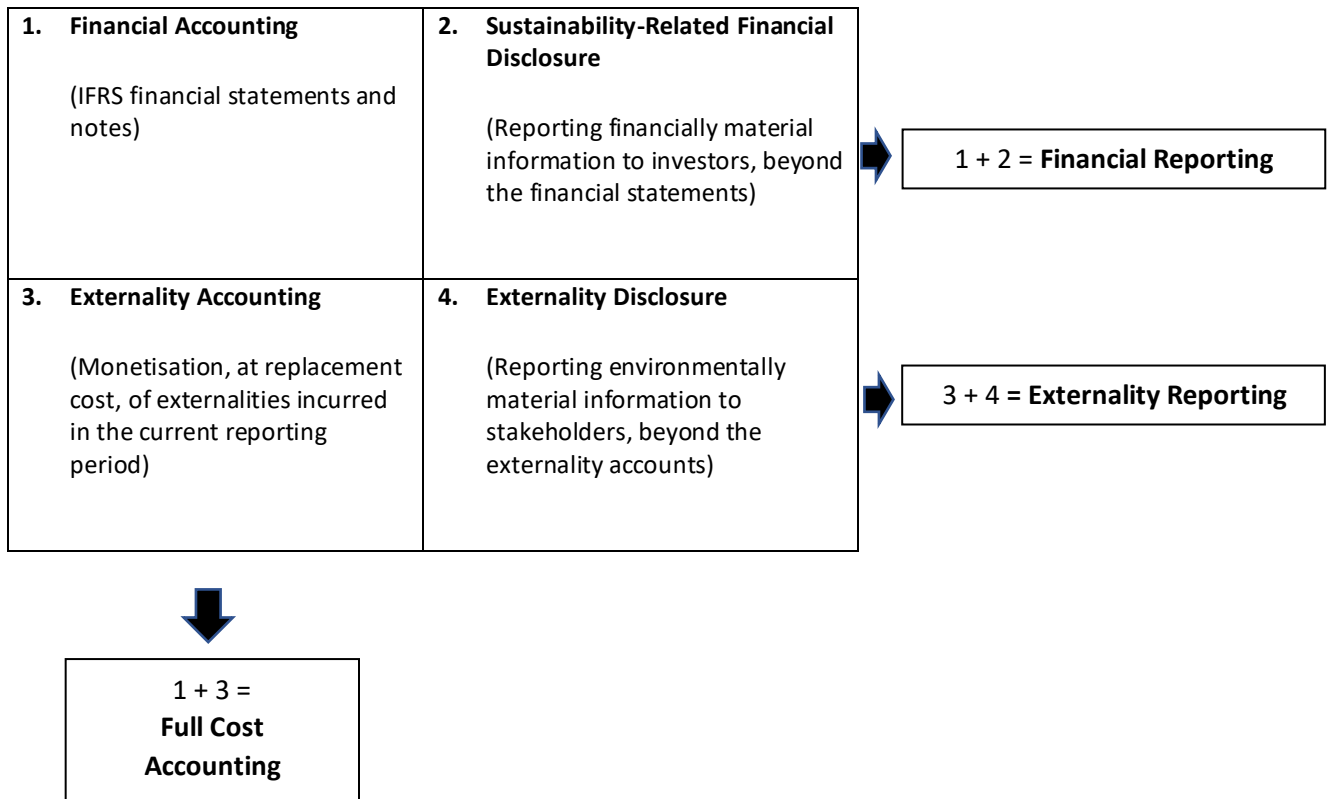


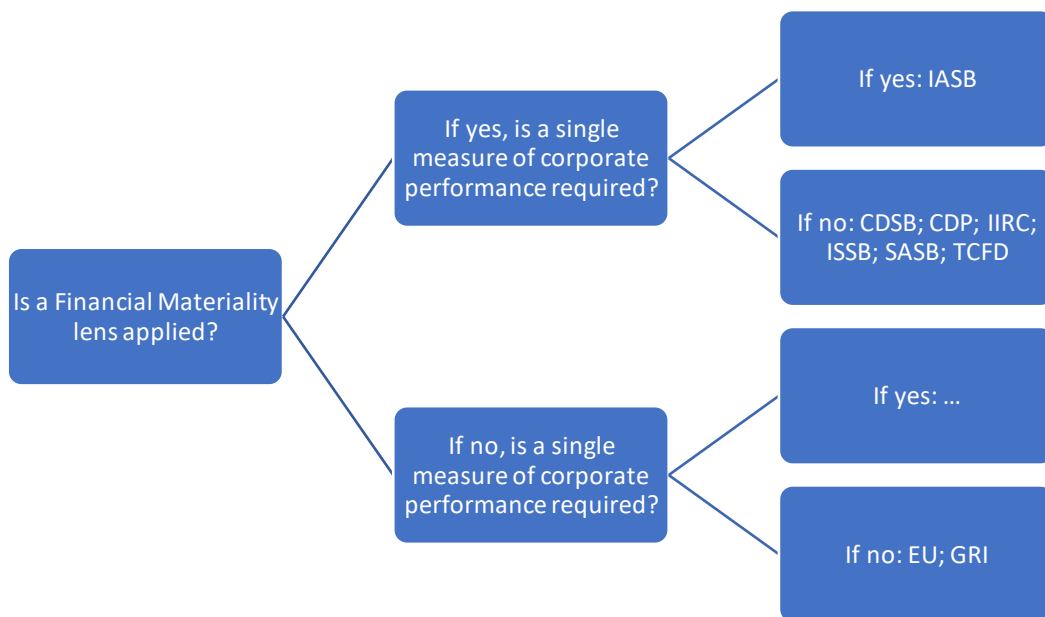
Figure 2: Income Statement – from Financial Profit to Full-Cost Profit

| SUSTAINABLE INCOME STATEMENT | | |
|---|--|------------|
| Revenue | | 950 |
| Expenses | Consumption of renewable natural capital | (80) |
| | Consumption of non-renewable natural capital | (60) |
| | Other expenses (cash outflows) | (660) |
| Financial Profit under IFRS | | 150 |
| Adjustment for changes in unrecognised net assets | | 10 |
| Adjusted Financial Profit | | 160 |
| Externalities – upstream | | (15) |
| Externalities – own operations | | (35) |
| Full-Cost Profit | | 110 |

Notes to Figure 2:

- For simplicity of presentation, the line items from revenue to financial profit are intended as a shorthand representation of a conventional income statement, with expenses categorised according to relationship with natural capital. All other line items are concerned with adjustments that reconcile financial profit with sustainable profit.
- Financial profit is maintained, given its central role in capital markets, but the approach also yields 'full-cost profit' as a second bottom line, which serves a different, complementary informational purpose.
- The adjustment for changes in unrecognised net assets concerns gains or losses on assets that are owned by the company but that are not fully captured on the balance sheet (for example, land carried at historical cost). Accordingly, the subtotal 'adjusted financial profit' can be considered to be a 'comprehensive' measure of financial profit.
- Financial profit for the shareholder is adjusted for externalities, and thereby reconciled with full-cost profit. These are 'expenses' not actually incurred by the corporation but that would be required to be incurred in order to restore depleted natural capital.
- Externalities might arise upstream, outside the boundary of the financial reporting entity, or else they might be consequences of activities undertaken by the reporting entity itself. These two categories are presented separately, in order that the source of the externality can be understood. Again, the presentation here is kept simple. In practice, of course, there would be numerous sources of externality, each measured with different levels of complexity.
- As we define full-cost profit as the (hypothetical) financial profit that the company would make if it internalised its externalities, including those in its supply chain, the possibility remains that natural resources remain depleted. An accounting choice therefore arises over whether to measure replacement cost historically or currently, where the latter would require re-estimation in each subsequent accounting period (similar to that in IAS 37) for the current cost of making good prior damage. This would in turn require some form of (off balance sheet) 'liability' accounting, from whichever year is deemed to be the base. There is a simple trade-off here between the costs of maintaining such a system and the increased economic relevance of the data provided.

Figure 3: Corporate Reporting Taxonomy



| | |
|------|--|
| CDP | Carbon Disclosure Project |
| CDSB | Climate Disclosure Standards Board |
| GRI | Global Reporting Initiative, and Global Sustainability Standards Board |
| EU | Corporate Sustainability Reporting Directive; EFRAG Sustainability Reporting Board |
| IIRC | International Integrated Reporting Council |
| IASB | International Accounting Standards Board |
| ISSB | International Sustainability Standards Board |
| SASB | Sustainability Accounting Standards Board |
| TCFD | Task force on Climate-Related Financial Disclosure |