

The Determinants of Accounting Information<sup>1</sup>

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## **Abstract**

In all conceptual frameworks of accounting the qualitative characteristics are used to characterize the merits of accounting information. The quantitative characteristics are meant to guide the regulators, the producers as well as the users of the financial statements. The point made in this paper is that the qualitative characteristics fail to fulfill the purpose as they paint a picture of an idealized fantasy world without reference to the fundamental issues of accounting information. Accounting is a product of the interrelationship between the producers and the users of the financial statements refereed by the independent auditors. Consequently it is the delicate balance between the incentives to inform and the use of the accounting to discipline the reporting of other information sources, which determines the information content of the accounting information.

Key words: qualitative characteristics, incentives, private information, and incentive compatibility.

## **The Determinants of Accounting Information**

### **Introduction**

The point I will try to make in this paper is that the qualitative characteristics of the conceptual frameworks are too idealistic as they emphasize norms, which are not attained by the financial statement. In describing and also when regulating financial reporting it is important to keep the fundamental nature of the reporting process in mind. Management has private and proprietary information about the financial position of the firm. It is useful to have this information (or parts thereof) presented in the market. The barrier to such information transfer is the stewardship use of the accounting information, which imposes restrictions on the reporting process. Such restrictions must be acknowledged and internalized in the regulation process as well as in the interpretation of the financial statements. Given the timing of the financial report the stewardship purpose should be given priority and perhaps even more so in light of the disciplining role of the financial report. We are living in the information society and there are other information channels. In such a world the financial report can hardly be complete.

### **A Measurement Perspective**

Accounting is often referred to as the process of measuring the income and the value of the firm. Indeed the conceptual frameworks of IASB and FASB both use and define the term accounting measurement. In an abstract setting measurement is a mapping from a set of fundamental characteristics of an object to a scale. It is an isomorph mapping as the idea is that the ordering of the objects in the original set is preserved in the mapping such that the ordering of the transformed objects are identical to the ordering of the primitive objects.

### **Measurement**

At the very abstract level measurement is about representation. We want to represent a given object with an aggregated description of the same object. In the process of the representation it is important that some characteristics of the original object is preserved. When measuring length of

individuals the persons are represented by their height and in the measuring process it is important that the characteristic “higher than” is preserved such that if person A is higher than person B then the height of person A should be greater than the height of person B. Measurement of height should preserve the ordering of the individuals.

A formal analysis of measurement has its origin in mathematics and physics. The primitive assumption is that we are given a set of objects,  $A$ , and there is a binary relationship among these objects,  $R$ . Thus we have a set with a corresponding relation, a relational system denoted by  $(A,R)$ . Thus if  $a_1$  and  $a_2$  are elements of  $A$  then either  $a_1 R a_2$  or  $a_2 R a_1$ . The relation  $R$  describes an inherent relationship among the objects in  $A$ .

The set of real numbers  $\mathfrak{R}$  is one such set of objects. Furthermore the set of real numbers has five well known sets of relationships, namely,  $>$ ,  $<$ ,  $=$ ,  $\geq$ , and  $\leq$ . Part of our basic training in school is concerned with these fundamental relations of the real numbers and consequently we all have an in depth knowledge about the ordering that these relationships impose on the objects of the real line. That intimate knowledge is used in our use of measurement. This is then used to convey information about other less well-known relationships.

The formal definition of measurement is then a mapping,  $m$ , from the set  $A$  to the real numbers. The mapping should preserve the relationship among the elements of  $A$  as the elements are mapped into the real line. Consequently the mapping  $m$  maps  $(A, R)$  into  $(\mathfrak{R}, <)$ . Thus we have that  $m(a) \in \mathfrak{R}$  and if  $a_1 R a_2$  then we should have that  $m(a_1) < m(a_2)$ . The measurement  $m$  assigns a numeric value to the element in  $A$  and the relation  $R$  is represented by the natural ordering of the real numbers. A mapping like this is called a homomorphic mapping as it preserves form or relation.

If the relation  $R$  has several dimensions it might be represented through a multidimensional measure  $m = (m_1, m_2, \dots, m_n)$ . Thus several attributes related to the set  $A$  can be represented this way.

This is then useful in the communication of the characteristics of the set  $A$  to an uninformed individual as the relationship  $R$  is replaced by the well-known characteristics of the real line. A person who is ignorant about the characteristics of  $A$  might then be informed through relationships on a real line which he knows.

A further refinement of the measurement mapping is found when the mapping in addition to preserving the relation among objects in the primitive set,  $A$ , also preserves algebraic operations

such as addition. In such case the measurement mapping should satisfy the condition that  $m(a_1+a_2) = m(a_1) + m(a_2)$ . Measurement of this type is often called a ratio scale.

Some types of measurement call for the use of a combination of several measurements. A mass index is of this type as both the nominator and the denominator are results of measurements. Such measures are called derived measures.

The important question related to the quality of a measure is to what extent does the measure represent the underlying empirical phenomenon. Suppose we want to measure the size of a person. Just measuring the height of the person is inadequate as the term size is not synonymous with the height of the person. One of the problems associated with such measurement is that the term size of a person is not well defined. This reflects that we have not described the primitive relation in the first place and then it is of course impossible for a measurement to represent it. Another example could be that we want to represent the height of a person. We might measure the weight of the person using a scale. Despite the fact that there is a positive correlation between the height and the weight of a person the weight would in most cases not be seen as a measure which provides a good representation of the height of a person.

The uniqueness of a measurement is also worth a brief consideration. In most cases measures are only unique up to an increasing transformation. Such a transformation would preserve the ordering of the real numbers. If we are looking for a measurement with the property of a ratio scale, which allows additivity, then measurement is unique up to multiplication with a positive constant. That has coined the term ratio scale.

## **Measurement in Accounting**

Accounting is often referred to as an application of measurement to the financial position of the firm. Accounting information is created in a process of measuring the firm's financial position. It is questionable to what extent the procedures of accounting meet the formal definition of measurement. Also the aggregation of the accounting measurement leading to the financials are only vaguely in line with the fundamentals of measurement. Mock (1975) provides an excellent analysis of measurement in an accounting context.

In the discussion paper from the IASB project on the Conceptual Framework the thinking of the IASB on accounting measurement is presented in great detail. Entry into the accounting system is limited to items that fit the definitions of elements of the financial statements and meet the recognition criteria. (I will return to that limitation later). When a firm is engaged in complicated activities accounting measurement might face equally complicated measurement issues. The guiding for such measurement is found in the statement of the objective of financial statements of providing useful information to existing and potential investors and this is further developed in the qualitative characteristics of useful financial information. The fundamental characteristics are relevance and faithful representation of the phenomena it purports to represent.

In summarizing the preliminary views on financial measurement the IASB reports that the objective of measurement is to contribute to the faithful representation of relevant information about the resources of the entity; that a single measurement basis for all assets may not provide the most relevant information; that both the statement of financial position and the statements of profit and loss should be considered; that the selection of the measurement should depend on how the asset contributes to future cash flows and how a liability is going to be settled; that the number of different measurements used should be as small as possible; and that a cost benefit test should be employed.

The two main scales used for measurement in the framework is cost based and fair value measures. The cost based measures follows the normal accounting procedures as time progresses using depreciation for example. Further it is stated that the most frequently used current value measure in existing IFRS is fair value measurement. It is noted that current market prices are often not directly observable and a consideration of whether market prices will result in relevant information, what should be disclosed for the information to be faithfully represented and cost of acquiring information is called for.

In some cases other cash flow based measures such as impairment can be used. Unusual circumstances lead to application of such measures. This could be the case when the market for some products fail unexpectedly and that changes the expectation of the future cash flow. A revised estimate of the value of a set of assets follows.

The general view of IASB is that the measurement used for an asset should depend on how it contributes to future cash flows. With this in mind it is concluded that for assets, which contribute

indirectly to future cash flows through production and marketing of services, a cost based measurement will normally result in a more relevant and understandable income statement compared to an income statement based upon current measurements.

On the other hand when it comes to selling assets, i.e. assets that will be sold to produce cash flows current value measurement is more likely to result in relevant information according to IASB's latest point of view.

To put it short: the primitive relationship that accounting is supposed to measure is not well specified or ill specified. It is not obvious what is being measured and what relationship the measurement should preserve. Furthermore, it is unclear whether the aggregations of accounting numbers preserve the underlying primitive relationship. Thus it is questionable if accounting measurement meets the formal definition of measurement.

## **The Reporting firm**

In order to analyze the merits of the proposed conceptual framework I find it useful to construct a model of the firm. This way the analysis becomes less abstract and it is possible to analyze the validity of the conclusions. It is well known that an alternative set of assumptions might lead to different conclusions.

The model is a clone of the model used in Christensen and Demski (2003) and the conclusions also follow from that at least partly. The aim here is to obtain a more specific set of findings related to the conceptual framework.

We assume that the generic firm lives for three periods. The production is using two inputs called K for capital and L for labor. The capital is long-lived and lasts for the life of the company. Labor is specific to the periods and will be labeled as a direct cost for the production of the period. Both of the inputs are required for the production of the product but there is room for some substitution such that management of the company has a job to do in balancing the two inputs to cost minimize production. The profit maximization over three periods can be formulated as

$$\begin{aligned}
& \text{Max} \quad p_1 q_1 (1+i)^{-1} + p_2 q_2 (1+i)^{-2} + p_3 q_3 (1+i)^{-3} - (p_K K + p_{l1} L_1 (1+i)^{-1} + p_{l2} L_2 (1+i)^{-2} + p_{l3} L_3 (1+i)^{-3}) \\
& \text{st} \\
& q_1 \leq \sqrt{KL_1} \\
& q_2 \leq \sqrt{KL_2} \\
& q_3 \leq \sqrt{KL_3} \\
& K \leq K_{Max} \\
& K, L_1, L_2, L_3 \geq 0
\end{aligned}$$

The firm expects to deliver  $q_1$ ,  $q_2$ , and  $q_3$  units of its product in each of the next three years. The inputs  $K$  and  $L$  are acquired in perfect markets with perfect competition and consequently with fixed prices. Also the products of the firm are sold in perfect and complete markets. As this is a three period problem there is formally a discount rate, which is set to  $i$ . Thus the firm so to speak straddles two sets of markets. There is no market for items such as equipment and inventories within the firm's premises at intermediate dates.

The valuation of such a firm follows directly from the optimization problem, as the optimal plan is determined. Under the assumption that all cash is paid out to the stakeholders the valuation at each point in time will be the present value of the remaining cash flow using the market rate of discount. Given the assumed market conditions in terms of perfect markets the value of the firm before the initial investment is done is zero.

Cash flows:  $(CF_1, CF_2, CF_3)$

Value calculation:  $PV_t = \sum_{j=t}^3 CF_j (1+i)^{t-j}$

Accounting valuation  $(A_1, A_2, A_3)$

Accounting income:  $I_t = CF_t - (A_{t-1} - A_t)$

Residual income:  $RI_t = I_t - iA_{t-1}$



Market correspondence: 
$$PV_t = A_t + \sum_{j=t}^3 RI_j (1+i)^{t-j}$$

The discussion will reflect the above relationships. The basis for the financial reporting is the cash flows generated by the firm according to the profit maximization. Given the perfect capital market the value of the firm is found to be  $PV_t$ . The accounting values are consequences of the accounting policy and more precisely the depreciation schedule as there is one asset,  $K$ . As mentioned earlier the net present value of the investment in the firm is zero and as a consequence is the economic income in each period equal to the interest earned on the invested capital. In that case the accounting valuation follows economic valuation. The residual income measures the accounting earnings in excess of the interest earned on the accounting valuation. Following the works of Feltham and Ohlson (1995) we have the market correspondence as a relation between market value and accounting value. Independent of the accounting valuation there is a correspondence between accounting value and market value as the difference is equal to the present value of the future residual income. It is a critical assumption behind this equality that income is comprehensive income.

In the above model there is only one asset and consequently the asset valuation is not a problem. Suppose the setting calls for an increasing output over the three years. Assume further that inventory is an option. Then the production function exhibiting economics of scope would imply production smoothing and consequently positive inventories at year-end. Thus there are two assets and separate valuation in the balance sheet would be natural. One possibility would be to value capital,  $K$  and inventories at cost both using elaborate cost allocation schemes. Another option would be fair values in use. That calculation would calculate the value of each asset as the difference in present value of the firm with and without the asset in place and everything else equal. Given the non-separable production technology the sum of the two values would be higher than the total value of the firm.

The point is that even in a highly simplified setting with well behaved markets, valuation of segments of the firm is impossible, when faced with interdependencies, and only the total value of the firm is meaningful as an alternative to cost based information. The cost based accounting will reveal the past decisions.

Before it is possible to discuss information issues uncertainty has to be introduced into the setup of the model. Therefore, let us introduce uncertainty into the description of the cash flows. To maintain simplicity uncertainty in each period will consist of two terms, a permanent component and a transitory component.

Cash flows:  $(CF_0, CF_1, CF_2, CF_3) = (c_0, c_1 + \varepsilon_1 + \varepsilon, c_2 + \varepsilon_2 + \alpha\varepsilon, c_3 + \varepsilon_3 + \beta\varepsilon)$

The initial cash flow at time 0 is the investment and that is followed by net inflows in periods 1, 2 and 3. The terms  $(\varepsilon_1, \varepsilon_2, \varepsilon_3)$  are transitory terms and are assumed independent and with means of 0. The term  $\varepsilon$  is the permanent component and is also assumed independent of the transitory terms and with a mean of 0.

With this setup it is possible to address the information content of cash flow statements as well as accounting statements. Reported cash flows will each period provide additional information about the permanent component as the current periods transitory component. Thus the cash flow will provide information for the valuation of the stock (and the future cash flow series). A classical valuation approach would calculate the expected net present value of the remaining cash flows. This will include the expected future effect of the permanent component of the cash flow given the available information in the form of the cash flows to date.

The accounting system will report information, which is equivalent to the cash flow information. The initial investment will most often be depreciated over the lifetime of the firm and only the current realizations of the noise terms will be part of the recognized income. The future effects will be recognized in future periods only. Consequently accounting valuation and market valuation as defined above will not be identical. However, the two will be equivalent in the information, which is conveyed to the decision makers.

While the cash flow each period is one-dimensional it is possible to report more dimensions within the accounting system. If the accounting system is informed of one of the error terms in the first period then it might be reported as a separate item in the accounting report. In that case the accounting system provides information in addition to the information, which is contained in the cash flows. However the accounting valuation is often confined to the realized parts of the cash

flows and does not routinely include the future effects of the permanent component. However, despite the fact that the accounting system is a perfect information system we find that accounting valuation and market valuation are not aligned. The information content of an information system is unaffected by the scaling of the information signals and the information is fully reflected in the financial report.

## **Qualitative Characteristics of Financial Information**

According to the draft of the discussion paper of the Conceptual Framework the purpose of the financial reporting is to provide information about the reporting entity that is useful to existing and potential investors, lenders and other creditors that is useful in making decisions about providing resources to the entity.

The qualitative characteristics of financial information are used to identify information, which is most useful to existing and potential investors. The two fundamental characteristics as identified by IASB are relevance and faithful representation.

Relevance means that the information is capable of making a difference in decision makers. Relevance is further specified to mean predictive value and or confirmatory value. Confirmatory value is interpreted as providing feedback about previous evaluations. It is hard not to agree to the relevance of the relevance criterion.

Faithful representation is described by the information presented being complete, neutral and free from error. This is quite ambitious as for the information to be complete means that all information, which is necessary for the user to understand the phenomenon being depicted, has to be supplied. Neutrality is equally demanding as it means that all information must be presented without bias in the selection or presentation of the financial information. The information must not be manipulated to increase the probability that users receive the financial information favorably or unfavorably.

Free from errors is also interpreted; it does not imply perfection but rather that there are no errors and no omissions in the description of the phenomenon. Furthermore it means that there is no error in the process of selection and applying the method to produce the information reported.

## The Determinants of Accounting Information

The important question I want to address in this paper is whether the qualitative characteristics are the best possible guides for regulation of accounting reporting and for the interpretation of the users of financial statements. I am including the second group here, as the conceptual framework provides the foundation for the user's interpretation of the published reports.

The most primitive form of financial reporting is the cash flows between the firm and the rest of the world. As long as cash flows are restricted to actual cash flows the information contained in cash flows can be characterized as neutral in the IASB sense of the word. It is also hard information as described by Ijiri (1975). The cash flows of companies are hardly reflecting the core of the firms' activities, as there often is a gap in time between the transaction of the services of the firm and the corresponding cash flow transaction. As described in the three-period model the firms will often make investments in assets that will be useful for several periods and in fact the financial motivation for the investment is the future benefits that accrue in future periods. Thus the investment is closely linked to the cash flows in subsequent periods. At the other end of the production cycle there is also a gap in time between sales and the collection of cash.

Accrual accounting has been used to construct the financial report such that the use of resources has been paired with generation of income. Likewise the accrual accounting has been instrumental in separating the financing of the firm from the operation such that revenue is recorded into the accounting independent of the cash flow but associated with the transfer of the ownership of the production. According to Miller and Modigliani (1958) there is independence between financing and operating decisions and consequently there is theoretical backing for the separation of the two in the financial report.

This describes in loose terms what is to be reported in the accounting system. The distinction and separation of cash flows and financial reporting creates a demand for reporting of asset items other than cash. The product of this is the accrual accounting system, which has been around for more than 500 years.

The evolution of the accounting system has proven its value in providing information about the financial position of the firm to the constituents. There is a long tradition for supplying information, which contains information about the financial activities of the firm during a period of time. The

leading indicator of the income statement has been the recognized revenue and the matching principle has been the vehicle, which is used to assign cost to the accrued revenue. Wagenhofer (2013) provides an extensive analysis of the set of problems associated with revenue recognition.

### What to report

According to the discussion paper is the purpose of financial reporting to provide financial information about the firm for the market participants. Following the above set of arguments it would be the role of accounting to provide the information symbolized by  $\varepsilon$  provided that it is or can be provided in the form of financial information as it is recognized as an element of the financial statements. Often there are no formal problems in communicating that piece of information in the depreciation schedule of the asset in the firm, if the cash flow is related to the one asset. The joint effect  $\varepsilon + \varepsilon_1$  is routinely reported in the income of the firm in the form of the cash flow, which is reported as revenue. At the initial investment in the asset the depreciation schedule is defined and adjusted according to the expected decline in the economic value of the asset. It could also be using a linear depreciation schedule. The deviation from this would inform the market participants of the permanent component of the income shock which was realized in period one.

The permanent shock can either be reported as part of the depreciation as the current shock  $\varepsilon$  or as the expected net present value of the effect of the shock on future periods  $(\alpha + (1+i)^{-1}\beta)$ . This latter expression will be consistent with the economic depreciation schedule. Usually the accounting will only allow the first of these possibilities, as only the realized part will be included in the accounts. However, the two are informationally equivalent as the information content of the depreciation component of the financial report is invariant to scaling of the information variable.

The multi-dimensional nature of the financial report enables the producer of financial statements to report on numerous items. Each information variable has to be associated with an accounting item and the shock then is reported through that variable. The key is that the recipient of the information understands how the information is presented in the depreciation such that it is possible for the user to invert the information contained in the depreciation such that the primitive information variable is known, cf Antle and Demski (1989).

The troublesome aspect of this procedure is that is if a new accounting variable has to be used for all information variables the number of variables will be overwhelming and information overflow will be the norm. There is demand for aggregation of the financial information.

### Aggregation of financial variables

The norm when it comes to aggregation of accounting number is to aggregate according to type of transaction, type of asset, etc. This makes sense from the perspective of explaining the origin of the transactions and the role the item in the organization.

The idea of aggregation changes somewhat once the information content of accounting numbers are in the focus of attention. Note the information content in accounting statements are carried by the error terms or the shocks, cf. Christensen (2010). It is the error terms that will be used in the Bayesian updating of the probabilities of the states of the world and it is from them that the user will learn of the expectation of the future cash flows. Consequently the error terms should be the focus of attention when discussing the information content of accounting numbers.

In order to gain some insight into the art of aggregation consider the following variables

$x = \alpha + \varepsilon_1, y = \alpha + \varepsilon_2$ , and  $z = \beta + \varepsilon_3$ . The persistence terms are hidden in  $\alpha$  and  $\beta$  which are of interest for estimation of the future cash flows. It is required for some unspecified reason that the accounting system only contains two variables. It is possible to aggregate  $x$  and  $y$  or  $x$  and  $z$ . In order to maintain simplicity it is assumed that all of the variables  $\alpha, \beta, \varepsilon_1, \varepsilon_2, \varepsilon_3$  are normal

distributed with mean 0 and variance  $\sigma^2$ . The question is which of the two aggregations will enable the user best to estimate the two terms of persistence. We have the following

$$\begin{aligned}
 x &= \alpha + \varepsilon_1, y = \alpha + \varepsilon_2, z = \beta + \varepsilon_3 \\
 E(\alpha|x) &= \frac{x}{2}, V(\alpha|x) = V(\beta|z)\sigma^2 \\
 E(\alpha|x+y) &= \frac{x+y}{4}, V(\alpha|x+y) = \frac{\sigma^2}{2} \\
 E(\alpha|x+z) &= \frac{x+z}{4}, V(\alpha|x+z) = V(\beta|x+z) = 3\sigma^2 \\
 E(\alpha|x+z, y) &= \frac{x+z+0.5\sqrt{3}y}{(\sqrt{3}+1)}, V(\alpha|x+z, y) = \frac{3\sigma^2+3\sigma^2}{(\sqrt{3}+1)^2}
 \end{aligned}$$

One observation is that when  $x$  and  $y$  are aggregated  $z$  is not used in the estimation of  $\alpha$  while both of the terms are used when  $x$  and  $z$  are aggregated –  $y$  also contains information on  $\alpha$ . More interesting are the variances as they give us information about the quality of the estimator of  $\alpha$  and  $\beta$  respectively. When  $x$  and  $y$  are aggregated the variances of the estimators of  $\alpha$  and  $\beta$  are  $\frac{\sigma^2}{2}$  and  $\sigma^2$ . When  $x$  and  $z$  are aggregated the variances amount to  $\frac{6}{4+2\sqrt{3}}\sigma^2$  and  $3\sigma^3$  respectively. Consequently the variances when  $x$  and  $z$  are aggregated are larger for estimators for both of the interesting variables. The intuition behind this is rather simple as the aggregation of  $x$  and  $y$  is collecting terms with the same source of variation whereas aggregation of  $x$  and  $z$  adds random noise to the estimation of  $\alpha$  and  $\beta$  simultaneously. Thus the estimation of both is handicapped and using the  $y$  in a joint estimation of  $\alpha$  cannot undo the added noise. The informational properties of accounting number are important for the efficient aggregation and consequently the source of the uncertainty and the dependence among variables must be considered in designing the accounting system.

Accounting deals with communicating financial information from the firm to the users of financial statements and consequently there is also a question of division of labor. When it comes to aggregation the question is who should do the aggregation. When we are concerned with information, which only resides within the firm this question is of course irrelevant but when the accounting system mixes information, which resides outside the firm with inside information, the question is highly relevant.

To focus the discussion it is assumed that the value of the firm  $V$  depends upon two components, firm specific information residing within the firm  $\varepsilon_A$  and market type information which is found outside the firm,  $\varepsilon_E$ . The market type information is only observed within the firm with an error term  $\varepsilon_{AU}$ . It is assumed that the financial reporting is flawless such that the reported value of the firm in the accounting system is unbiased as an estimator of the value of the firm given the information set which is included in the accounting report. No reporting incentives are present at this point. As usual all variables are assumed normal with mean 0 but the variances reflect the quality of information. The analysis here follows Christensen and Frimor (2007).

The investor also observes the market information with error different from the error of the reporting firm. In addition they observed the financial report of the firm and the price of the firm. The summary of the variables is displayed below.

Market value:	$V = \varepsilon_A + \varepsilon_E$
Firm observations:	$y_A = \varepsilon_A, y_F = \varepsilon_E + \varepsilon_{AU}$
Firm valuation historical based:	$V_H = E(V y_A) = y_A$
Firm valuation market based:	$V_F = E(V y_A, y_E) = y_A + \frac{\sigma_E^2}{\sigma_E^2 + \sigma_{AU}^2} y_E$
Investors observe:	$y_{E,i} = \varepsilon_E + \varepsilon_i, P, V_i$

If the firm uses the historical costing in the accounting system the additional information from the market is aggregated in the process of pricing the firm. The benefit of this is that the investors are getting access to the firm specific information without error. If the firm uses market-based valuation the firm performs an aggregation of the firm specific information and the market information. Consequently the firm specific information only reaches the market participants when it is garbled with the market information and the market participants must use their private and noisy information about the market to disentangle the firm specific information. The market participants are using their information to trade in the market and also the pricing will be part of their information base. The market price is formed through a rational expectations equilibrium.

The evaluation of the two alternative accounting policies will be based upon the posterior variance of the future payoff subject to all available information. No closed form solution to this problem was found, however numerical explorations are useful.

The winner of this contest depends on the set of parameters as no uniform winner across all parameter values were found. In particular the winning accounting procedure seem to follow the intuition. When the accounting system is very well informed it is optimal to perform the aggregation within the accounting system. When there is relatively little uncertainty in the market the market mechanism is very powerful and there is little room for the accounting system to outperform the market as an information aggregator and the accounting system need to very efficient in order to win the competition.



The important point to stress at this point is that optimal accounting also depends upon how the accounting system supplements other available information in an internet infected world. There is many other sources of information available for the investor and it is not obvious that the accounting system should aim at aggregating all available financial information. In some cases the user of financial statement might be better off when the aggregation of different sources of information is delegated to the user.

### **Stewardship information**

Up to now only decision use of accounting information has been the focus of attention. Stewardship also plays a fundamental role in the use of accounting information. Gjesdal (1981) formalized the stewardship information problem using the principal-agent model as described by Holmstrom (1979). In its basic form this is a very simplistic model, which describes the stewardship problem at a high level of abstraction. The central set of assumptions in the model is that the action of the agent is hidden from view of the principal and that there is an inherent conflict of interest between the two parties. In the accounting literature this is often referred to as a goal congruency problem. The agent or manager is assumed to act in his own self-interest as he is selecting the action, which will maximize his expected utility. The available information is then used to create incentives for the manager to act in the interest of the firm when he is maximizing his utility.

More information might allow the firm to reduce the agency problem and the demand for stewardship information is closely related to the conflict of interest and to the unobservability of the action of the manager. If the manager is indifferent among a set of action he can just as well pick the one that is in line with the preferences of the firm. Additional information is of value in the stewardship information problem when it provides more information about the selected act in addition to the information, which is already taken into account. This might be information, which shed more light over the actions taken by management to increase the profit of the firm, but it might also be information, that helps the user of the financial statements to interpret the result signaled in other pieces of information.

## Private or Proprietary Information

The reporting problem of financial reporting is closely related to the fact that management of the firm has private or proprietary information about the financial position of the firm. Otherwise there would be no idea in reporting and no reporting issues would exist. This information is useful for at least two purposes, one purpose is to inform decision makers of information, which is relevant for their decisions at hand, and the other purpose is to provide information, which is useful in solving the stewardship problem that the organization is facing.

Also it is noteworthy that reporting incentives are not an issue when the firm is not faced with a stewardship problem. There would hardly be an incentive not to report all information truthfully to any constituents of the firm.

When the stewardship purpose of information is taken into account it is not hard to see that the agent/management has some incentives to bias the reporting such that the pay off to the manager is higher. If the report is used as if it was a public information source the consequences might be fatal. A conservative option is to disregard the reported information for stewardship purposes. In that case the report is not used.

When modeling reporting of private information the revelation principle is often used. This confines the search for optimal reporting strategies to the ones that induces honest reporting. When the timing of the information game is such that the one with superior information goes last, the price the firm pays for this honest revelation is that the organization is not able to use the reported information as aggressively as it would have if the information had been public.

Using the revelation principle is impossible in most practical situations. Most firm live for more than one period and consequently the players will take the consequences of the following periods in consideration when making their choices. Furthermore it is often not possible to commit to not using the information as if was public as there is not a contractual arrangement among the users and the producers that would prevent the users from using the information. The point in this is that when the agent has to report his private information it is expected that such report will be biased reflecting his stake in the outcome of the reporting.

Within this context there are two types of information, the self reported information and the hard undisputable information. The hard information is thought to be information, which is provided by

a public source of information and there is no room for dispute over the content and interpretation of this type of information. Ijiri (1975) and Gjesdal (1981) refer to this type of information as hard information.

Absent any hard information it is not possible to use any information of the self-reported type for contracting purposes. Also when the private information and the hard information are statistically independent there is no information content in the self-reported information system. In both cases the self-reported information would convey the signal independent of the private information at hand, which is most favorable for the agent and consequently there is no information content of such self-reported information.

The hard information fulfills two roles in this context. One is to provide information on its own for use in decision-making and for use in contracting. The other role is to discipline the self-reported information of the agent. In the first role it is the information about the actions of management that is in center and in the second role it is the information about the self-reported information that is in focus, cf. Christensen and Demski (2003) and Christensen (1981).

Cash flow information, which is entered into the accounting system, is of the hard type of information. Most of the accruals, which are accounting constructs, are at least partly self-reported. The argument for this is that the accruals are constructed with a base in the historical transactions and transformed to accruals by means of a cost allocation mechanism. This cost allocation mechanism is often using the expectations of management as basis for separating the current periods expenses and future periods expenses in form of the assets. Accruals are to some extent forward looking as noted in Christensen and Demski (2003). The difficulty associated with controlling such accruals is acknowledged in the accounting system as some allocations among periods are allowed inside the accounting system whereas some are not. Thus costs of research activities are expensed immediately despite the fact that the aim of such resource utilization is to increase long-term profit. A similar argument applies to the asset valuation as market value or cost based valuation are both considered. The accruals are the self-reported information, which is inside the accounting system.

Other types of self-reported information such as press releases and public meetings for analysts are also commonplace in the corporate world. Observed from the outside such information transfer is unregulated in terms of the content but certainly not in terms of how (and to whom) the information

is released. This is a legitimate concern of the functioning of the market to ensure all participants equal access to the information. The point to be made here is that this type of information is also disciplined by the accounting system as the analyst community and the investors are evaluating the consistency of such information with the reported financial statements. Information content in deviations from expectation is routinely researched by empirical research in accounting.

## **The Auditor**

The auditor is hired to provide an opinion about the quality of the financial statements. He has to certify that the published financial statements are reflecting the economic position of the firm and that the income statement provides a fair description of the activities of the firm in a given period. It is the management who is producing the financial statements.

The auditor is coming to this task with expertise in financial reporting being an expert in the codification of the proprietary information of the firm into a set of financial statements. Compared to the management the auditor is less well informed such that the management has access to information, which stochastically dominates the information of the auditor. The comparative advantage over the managers reporting is that the auditor does not have a stake in the outcome and consequently the incentive problems, which was discussed in the previous section, is not a problem.

The organization of the reporting arrangement is that the firm is producing the financial statements and then subsequently the auditor is approving them. Thus the auditor produces in some sense hard information about the information produced by the manager, cf. Antle (1984). This type of arrangement is found when the manager defines the depreciation schedule, which is then approved by the auditor as the calculation and conditions for the chosen depreciation schedule is verified. Such a method is designed to be auditable.

In some other case the auditor replaces the information provided by management by another information system. Note in those cases a better-informed information system is replaced by a less informed information system.

Strategically the auditor might challenge the reporting by the management and often this is the case when the auditor finds the assets to be over valued. Christensen and Demski (2004) analyze this in an agency model. In some case the auditor discharges the report by the management and an

impairment test is performed. This might be viewed as a process in which the auditor or the firm is collecting evidence of the valuation of the item in question. In both cases additional information about the reported information is collected and included in the report.

### **The determinants of accounting information**

Accounting is often referred to measurement and consequently I reviewed some of the measurement literature at the beginning of this paper. Measurement take an ordered set an maps that into a measurement scale. The primitive assumption is that there is an ordering in the first place and that the mapping preserves this ordering. Measurement in accounting focuses on the mapping, it is possible to use a cost based measurement or a fair value measurement and these are evaluated on an item-by-item base<sup>2</sup>. The underlying ordering is of less concern in accounting regulation. The implicit ordering that will lead to cost bases or fair value measurements are for sure different. Also such measurements are local as they are confined to the assets, which are measured. The applied measurement scale in different firms might be different.

Next step in the process is adding the measurement of different assets to form a grand “measurement” of the set of assets of a firm. Given the use of different measurement scales the output of such aggregation is certainly not a measurement as the underlying primitive ordering of the objects is non existing or can be referred to as a deep philosophical discussion, cf. Beaver and Demski (1979). Furthermore, as the discussion on the reporting firm reveals, even when different measurement scales are not the issue, economics of scale and scope implies that the sum of the individual values are not identical to the value of the total. Different groupings of assets will lead to different accounting valuations. The importance of this observation follows from the idea that the firm is a collection of assets for which the markets do not exist or are imperfect. This discussion makes it obvious that there is no scientific basis for making and understanding the accounting system as one which is internally consistent and which can be derived through a set of logic arguments.

It is perhaps better idea to view the accounting system as a managed information system with an oversight body which closely monitors the evolution of the accounting system and the overall

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<sup>2</sup> There is a concern over too many different scales are used, but it remains an item-by-item exercise.

information content in such a system. Whenever some dimensions of the accounting system seem to be malfunctioning the oversight body will change the course of the information system as new rules are implemented and old ones discharges.

The accounting system is a multi purpose information system, which simultaneously provides information for the decision makers and the stewards of the company. The explicit or implicit use of accounting for stewardship purposes has a fundamental impact on the information. It is virtually impossible to neglect the bias in reporting. This is documented in many studies of earnings management. There are analytical, empirical and questionnaire types of research documenting this, Demski (1998), Burgstahler and Dichev (1997), and Nelson et al. (2003). Other studies have emphasized the conservative bias of accounting regulation; Wagenhofer (2013) provides an excellent summary of those. As a consequence it is emphasized that the private information in the hand of management is the primary driver of accounting information and the hard evidence to control the information transfer of that information is of vital relevance for interpretation of the financial statements.

It is hard to dispute the relevance of relevance. The other qualitative characteristic of financial information is faithful representation, which is later split up into being complete, neutral and free from error. Financial reporting is hardly providing a complete coverage of the position of the firm. The assets characterized by human capital of the firm are carefully avoided. Likewise the neutrality is questionable given the conservative biases which are found everywhere in the reporting environment. The inherent nature of the auditing technology imbeds a bias in the reporting function.

Financial reporting is hardly timely. It is produced once a year or perhaps quarterly and when it is published it has been through an elaborate process first in the firm and secondly at the auditor. Press releases and direct publication on the Internet is much more timely but that is not a new phenomenon. The famous Ball and Brown (1968) finding provides evidence on this as only a small fraction of the information which is consistent with the resulting income reporting is reflected in the stock return at the time of the earnings announcement. Much of the information is released earlier through other and timelier information channels as suggested by Lev (1989). This observation should change the dominant purpose of financial reporting to have a more confirmatory role such the financial reporting is constructed to discipline the reporting by management which uses other and timelier channels of communication. One comparative advantage of the financial statements is that they are hard to manipulate, as they are consistent over time and checked by the auditor.

The point I tried to emphasize in this paper is that the qualitative characteristics of the conceptual frameworks are too idealistic as they emphasize norms, which are not attained by the financial statement. In describing and also when regulating financial reporting it is important to keep the fundamental nature of the reporting process in mind. Management has private and proprietary information about the financial position of the firm. It is useful to have this information (or parts thereof) presented in the market. The barrier to such information transfer is the stewardship use of the accounting information, which imposes restrictions on the reporting process. Such restrictions must be acknowledged and internalized in the regulation process as well as in the interpretation of the financial statements. Given the timing of the financial report the stewardship purpose should be given priority and perhaps even more so in light of the disciplining role of the financial report. We are living in the information society and there are other information channels. In such a world the financial report can hardly be complete.

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