

COMMENTARY

A Two-Step Representation of Accounting Measurement

Pingyang Gao

INTRODUCTION

Accounting provides information through a measurement system. I argue that the popular representation of accounting as a one-step mapping from economic substance to financial reports induces incorrect beliefs about how accounting measurement works. Such incorrect beliefs generate controversies about well-established accounting practices and can lead to poor accounting standards. For example, some academics question the value of conservatism by defining conservatism as a trade-off of different types of measurement errors. FASB and IASB's decision to eliminate conservatism from their joint conceptual framework seems to rely on similar reasoning. In this article, I emphasize a two-step representation of accounting measurement and demonstrate, through a number of examples, that it can improve our understanding of accounting's institutional features and clarify several controversies in accounting practice and regulation.

To provide information, accounting relies on an elaborate measurement system. The system's institutional features include: exclusive reliance on rules (created by fiat or social norms) while simultaneously being plagued with rule manipulation, various patterns of conservatism in accounting rules, pervasive use of binary classifications and thresholds, and emphasis on the difference between recognition (financial statements) and disclosure (footnotes).

Conceptually, an accounting system uses rules to convert a firm's transactions into an accounting report, aiming to capture the transactions' economic substance as accurately as possible. But what is an accounting rule? How does a rule relate a transaction's economic substance to an accounting report? What are the major frictions in the process? What instruments does a rule designer (or standard setter) control to influence properties of the report? These definitional questions arise naturally when we seek to understand an accounting system's institutional features.

In my opinion, we still do not have good answers to the question of how information is generated through a measurement system. Consider two common approaches to this question in

Pingyang Gao is an Associate Professor at The University of Chicago.

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The video presentation can be accessed by clicking the link in Appendix A.

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Corresponding author: Pingyang Gao
Email: GaoPingyang@gmail.com

accounting theories. The first approach formulates the problem as a general communication game in which we design a manager's incentive contract to optimally solicit her private information.. For example, the optimal bonus coefficient is reduced if the manager's cost of misreporting becomes lower. The other approach treats accounting measurement as a black box that emanates a signal with certain statistical properties. The question of accounting measurement is dealt with indirectly by linking these properties to accounting's institutional features. For example, in this one-step representation, conservatism is defined as trading a higher false alarm error for an equal amount of reduction in the error of undue optimism. As such, the evaluation of accounting's institutional features is transformed conveniently to an evaluation of a signal's economic consequences, which has been studied extensively in information economics.

While both approaches have greatly advanced our understanding of the economic consequences of information production, neither directly tackles the question of the supply of information through an accounting measurement system.¹ Even after an accounting signal with certain statistical properties has been identified as desirable (by answering the economic consequences question), we are still left with the task of generating such a signal through the design of an accounting measurement system. After all, it is the measurement system that determines the signal's actual properties (and is presumably the core of accounting as an independent academic discipline).

ONE REMEDY: A TWO-STEP REPRESENTATION OF ACCOUNTING MEASUREMENT

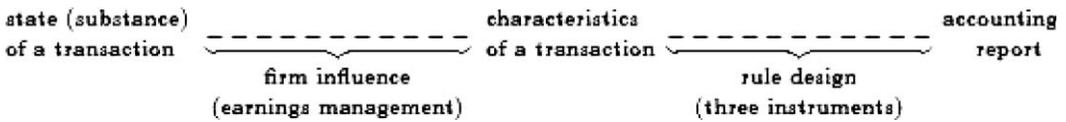
One way to open the black box of accounting measurement is to formalize a two-step representation of accounting measurement.² First, the state of nature, interpreted as a transaction's economic substance (economic earnings), manifests itself in various transaction characteristics. Second, a measurement rule prescribes a mapping from transaction characteristics to an accounting report. While the rule aims to measure the state as accurately as possible, the report is restricted to being written on observable transaction characteristics.

This restriction introduces a natural representation of two major frictions in accounting measurement. First, the correlation between a transaction's economic substance and its observable characteristics is likely to be imperfect, even in the absence of managers' influence. This correlation might be interpreted as a transaction characteristic's relevance. Second, managers can influence a transaction's observable characteristics without improving its economic substance. These influence activities might be interpreted as earnings management, which ranges from outright fabrication of evidence to sophisticated accounting-motivated transactions such as off-balance-sheet financing activities. A transaction characteristic's vulnerability to earnings management is one measure of its reliability.

Facing these two frictions, the rule designer controls at least three instruments to influence the report's informational properties. First, what transaction characteristics are admitted to a rule? Second, how much verification is required before a transaction characteristic is accepted? Finally, what is the evidence threshold above which an accounting treatment is accorded, despite residual uncertainty about the economic substance?

¹ The lack of accounting content in analytical models has also been pointed out by [Dye \(2001\)](#).

² This two-step representation and its importance for understanding the design of accounting rules have long been noted in prior research (e.g., [Ijiri 1975](#); [Ball 1989](#); [Leuz 1998a, 1998b](#)). Lately it has been formalized and incorporated into analytical models (e.g., [Dye 2002](#)).



To make the two-step representation more concrete, consider as an example a typical revenue recognition rule. The economic substance the rule aims to capture is the revenue-earning process in a transaction. Observable transaction characteristics include terms like cash receipt, product delivery, and existence of a contract. These characteristics are imperfectly correlated with the revenue-earning process and are vulnerable to managers' influence. For example, even if a firm has not earned revenue from a transaction, the manager may simply lie about product delivery or accelerate product delivery through "channel stuffing." A revenue recognition rule has at least three components. It identifies the subset of transaction characteristics to be used, imposes a verification requirement for each transaction characteristic, and prescribes a threshold of evidence above which revenue is recognized.

WHAT CAN WE DO WITH THIS TWO-STEP REPRESENTATION?

Not only is this two-step representation arguably descriptive of accounting practice, but it also provides a tractable framework to study the design of an accounting measurement system. Here, I describe a few examples.

Relevance and Reliability

Leuz (1998b) and Dye and Sridhar (2004) study the design of the first instrument, the subset of observable transaction characteristics to be admitted in a rule. In the context of designing a measurement rule based on which dividend covenants are implemented, Leuz (1998b) considers what transactions and events are to be included (or excluded) in an accrual rule. Relative to a cash-based rule, the accrual rule could be superior because of its ability to actively choose non-cash contingencies that are relevant for the agency problems at hand. However, the inclusion of non-cash contingencies also makes the accrual rule more vulnerable to managers' manipulation. This trade-off of relevance and reliability constrains the design of the accrual rule. Dye and Sridhar (2004) consider a model with two transaction characteristics, one more relevant and one more reliable. They study the trade-off in the context of designing an optimal aggregation rule that combines the two transaction characteristics in generating an accounting report issued to a competitive capital market. They also prove that aggregation is endogenously optimal (relative to disclosure of two separate transaction characteristics).

Conservatism

The general value of conservatism as a measurement principle has long been controversial. The previous analytical literature often treats accounting measurement as a black box and models it as a one-step process from economic earnings (the state) to an accounting signal (the report). Accordingly, conservatism is defined indirectly as an informational property of the accounting signal. The evaluation of conservatism is then conveniently transformed to an evaluation of the signal's economic consequences. As a result, the previous literature concluded that conservatism is efficient if and only if the false alarms error is less costly than the undue optimism error, a condition whose generality is apparently questionable.

In contrast, in the two-step representation, one way to define conservatism is as a differential verification requirement, a property of the second instrument. This representation of conservatism is

consistent with that found in most empirical conservatism research. With this representation, Gao (2013a) shows that conservatism is optimal so long as the manager has the ability and incentive to inflate transaction characteristics, regardless of the trade-off of the costs of measurement errors for users. Thus, the two-step representation helps us formalize the long-lasting intuition about conservatism and reaches different conclusions than those from the one-step representation.

THRESHOLDS IN ACCOUNTING STANDARDS FOR RECOGNITION

All accounting standards for recognition involve thresholds. For example, an expenditure is recognized as an asset if evidence suggests that a future controllable benefit is probable. “Probable” represents a threshold of the strength of accounting evidence required for recognition. Despite its importance, the design of thresholds in accounting standards has received relatively little attention, partly because of the difficulty of even framing the problem in the one-step representation. We have to rely on our intuition, which often does not go far enough or survive further scrutiny.

In the two-step representation of accounting measurement, the design of thresholds can be explicitly modeled (as the third instrument). Gao (2013b) develops a number of results about the properties of optimal thresholds. When accounting evidence is susceptible to managers’ influence, the optimal threshold differs significantly from that implied by the familiar approach of balancing the type I and II errors in a decision-making setting. For example, the optimal threshold could decrease as the cost of false alarms increases or as managers’ influence becomes more problematic. Furthermore, full disclosure of accounting evidence can be dominated by recognition. Again, the two-step representation enables us to examine institutional features of accounting measurement (thresholds in this case) and explain the use of current institutional arrangements.

RULE-BASED VERSUS PRINCIPLE-BASED STANDARDS

So far, we have focused exclusively on the design of accounting rules. We could introduce auditors’ professional judgment to the framework and use it to study the trade-off of rule-based versus principle-based standards. A rule-based standard prescribes a definitive mapping from transaction characteristics to an accounting report; a principle-based standard leaves the determination of the mapping to the preparers’ and auditors’ professional judgment. Because it is difficult, if not impossible, to rule out all possible earnings management at the time of designing rules, a rule-based standard is vulnerable to earnings management. In contrast, the principle-based standard allows auditors to utilize soft information *ex post* and thus overcomes “transparent” earnings management. Its disadvantage, however, is that it relies more heavily on the auditors’ knowledge and incentives. Thus, this two-step representation of accounting measurement can help identify the determinants of the relative efficiency of a rule-based versus a principle-based standard.

TWO TYPES OF AGENCY PROBLEMS

The two-step representation also clarifies two types of agency problems, one with primary activities and the other with the measurement process. As we have seen in the previous discussions of conservatism and thresholds, agency problems arise when preparers try to evade the measurement rules. For example, after an accounting rule specifies criteria for a preferred treatment, managers have incentives to restructure transactions and contracts to satisfy the letter, but not necessarily the spirit, of the criteria. Thus, the optimal measurement rules will likely be very different than when preparers do not try to evade the rules. Agency problems with the measurement process directly constrains the design (or supply) of measurement rules.

In contrast, agency problems in primary activities indirectly constrain the design of measurement rules by affecting the demand for accounting information. For example, the primary

activity could be a borrower choosing among projects with different risks. After the borrower suffers a loss and has less equity left, he may substitute a risky project for a safe one in order to “gamble for resurrection.” One solution is to use a loan covenant that gives the lender control rights if the borrower performs poorly, which requires measuring the borrower’s performance.

IMPLICATIONS

Treating accounting measurement as a black box has many negative consequences. I illustrate them with two examples. First, the “impossibility theorem” of Demski (1973) has foreshadowed a formidable gap between accounting standard setting and academic research that treats accounting measurement as a black box generating a signal. Conceptualizing accounting standard setting as choosing the statistical properties of accounting signals, Demski (1973) points out that a signal’s value depends on the problems it is used to solve. Except in rare situations, it is impossible to decide if a given accounting standard is better than an alternative, even in a single person decision-making setting. While this fundamental insight has accentuated the issue of the proper mandates for standard setters, it has also, inadvertently, distracted attention away from the issue of designing accounting standards for a given mandate. As important as it is to question whether and when standards should be set, standards still have to be set for a given mandate, about which academic research following the impossibility theorem has little to say. To do so, we need to open the black box of accounting measurement.

Second, treating accounting measurement as a black box also confounded the two types of agency problems discussed above. As a result, managers’ opportunistic influence on transaction characteristics is often downplayed, if not ignored, in accounting standard setting. The underlying premise is that the production and use of accounting information can be separated and that managers’ incentives should be corrected for by users of the information. For example, FASB’s (2010) new conceptual framework eliminates conservatism as a measurement principle, partly because it is not useful in a naive one-step representation. A two-step representation highlights how easily managers can influence transaction characteristics, and thus, clarifies how conservatism likely reduces bias in accounting measurements.

In sum, accountants strive to understand the institutional features that generate accounting information. The reduced-form, one-step representation of accounting measurement, borrowed directly from information economics, is useful for understanding the economic consequences of accounting measurement, but has limitations for understanding the supply of accounting information through a measurement system. The two-step representation, that treats the structure of accounting measurement more concretely, can not only formalize some long-lasting intuition in classic accounting research but also generate new insights about designing accounting standards.

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APPENDIX A

The video of this presentation, as well as the presentations for the other commentaries in this issue is available by clicking on the link below.

Devils_Advocate: <http://dx.doi.org/10.2308/acch-10364.s1>

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