

**The Nature of Accounting Information Reliability:
Inferences from Archival and Experimental Research**

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I. INTRODUCTION

In this paper, we discuss insights into the *reliability* of accounting information from empirical accounting research. Reliability is an essential characteristic contributing to the usefulness of accounting information. Our primary goal is to help accounting standard setters, as well as preparers, auditors, users, regulators, and academics, better understand academic research evidence on the nature of accounting information reliability. Such understanding has potential to assist standard setters in establishing financial reporting standards to improve the reliability of accounting information, and thereby help preparers, auditors, and financial statement users.

Two frameworks provide the foundation for our discussion of academic research. First, we adopt the perspective of the FASB's Conceptual Framework on reliability and its characteristics. The Conceptual Framework states, "Accounting information is reliable to the extent that users can depend on it to represent the economic conditions and events it purports to represent" (FASB 1980; ¶62), and emphasizes three characteristics of reliability - representational faithfulness, verifiability, and neutrality. The Conceptual Framework further notes that reliability is not an all-or-nothing characteristic of accounting information; rather, it is a matter of degree. Accounting information must possess some threshold level of reliability to be useful to investors, creditors, and other financial statement users.

Second, we develop a framework that depicts the usefulness of accounting information. We use this framework in three ways. First, we use the framework to isolate reliability as the degree to which accounting information matches the underlying economic constructs that determine the future cash flows to the firm. Second, we use the framework to identify sources of deficiencies in accounting information reliability. Third, we use the framework to structure our review of archival and experimental academic research, and to highlight key implications about accounting information reliability.

We briefly summarize the results of our review with the following three conclusions. First, we know that accounting information is widely used in many contexts, implying that financial statement users consider it to be sufficiently reliable; however, our review finds that most research provides only indirect, rather than direct, evidence on accounting information reliability because it is difficult to observe

underlying economic constructs. Accordingly, very little research provides direct evidence on the extent to which accounting numbers match underlying economic constructs. Most research to date provides only indirect evidence on reliability, allowing deductive inferences on the degree of reliability either from the relation between accounting information and capital market share prices or future cash flows, or from aspects of the financial reporting process. Second, research consistently finds that reliability impairments are associated with the interactions between accounting standards and the incentives facing preparers. Thus, accounting information reliability is jointly determined by accounting standards that match underlying economic constructs, and preparers and auditors that appropriately apply such standards in the financial reporting process. Finally, research findings consistently highlight the importance of disclosures related to reliability. Accounting standards that require firms to provide more complete disclosures related to the underlying economic factors represented by accounting information can increase the transparency of, and perhaps enhance, accounting information reliability.

We organize this paper as follows. In section 2, we outline our accounting information framework. In section 3, we use this framework to identify factors that potentially reduce accounting information reliability. In section 4, we highlight inferences from archival and experimental research findings that relate to accounting information reliability. We also propose ideas for future research to address unanswered questions related to the reliability of accounting information. In the last section of the paper, we offer some concluding remarks about existing research and issues for future research.

II. AN ACCOUNTING INFORMATION FRAMEWORK

Despite its importance to financial reporting, reliability is a complex and elusive characteristic of accounting information. It is difficult to directly observe or measure the reliability of many types of accounting information.¹ This can lead individuals in the financial reporting process to misestimate the reliability of accounting information, or to mistakenly attribute other causes of judgment error to

¹ A number of studies create analytical models of reliability and examine its effects on the usefulness of accounting information. See, for example, Ijiri and Jaedicke (1966), Ijiri and Noel (1984) and Kirschenheiter (1997).

deficiencies in accounting information reliability. To clarify reliability as a separate characteristic of accounting information, we develop a simple framework that portrays accounting information as a representation of economic constructs that determine a firm's future cash flows. This focus is consistent with the FASB's stated objective of financial reporting, to "provide information to help investors, creditors, and others assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise" (FASB 1978, ¶51). Our framework applies to accounting information that either represents the firm's aggregate activities (e.g., net income) or specific activities (e.g., trade receivables).

Our framework comprises the following three distinct relations, which we depict in Figure 1:

1. the relation between a current-period economic construct and future-period cash flows (the economic relation),
2. the relation between a current-period economic construct and current-period accounting information representing that construct (the accounting relation), and
3. the relation between current-period accounting information and future-period cash flows (the expectations relation).

The Economic Relation (Relevance)

Stakeholders are fundamentally interested in the link between the current economic constructs of the firm and its future net cash flows, represented by relation (1) in Figure 1. These economic constructs capture the current period economic resources, obligations, activities, and events of the firm, in light of the state of the economy, and the dynamics of the industry and strategy of the firm. These economic constructs will yield the future cash flows of the firm and therefore are relevant for predicting those cash flows. The degree of relevance of economic constructs is decision-specific, i.e., the stakeholder's decision context determines the relevant future cash flows and associated economic constructs. While firm managers and stakeholders can not perfectly observe the current period economic constructs, it is important to note that they could not perfectly predict future cash flows even if they could observe economic constructs without error. Unexpected factors (i.e., random firm-specific, industry-wide, or economy-wide events) that occur in the future period affect cash flows and create prediction errors.

The Accounting Relation (Reliability)

Because a firm's underlying economic constructs are not perfectly observable, the firm must report proxies for these constructs using accounting information. Relation (2), the accounting relation, characterizes the firm's representation of current period economic constructs using current period accounting information, which consists of an accounting construct to represent the economic construct and a measured value for the accounting construct. Relation (2) embodies *reliability*—the degree to which a piece of accounting information objectively represents an underlying economic construct.

The degree of reliability of a piece of accounting information is inherent in the information itself, independent of the use of that information. However, the relevance of the economic construct represented by accounting information is a prerequisite for the reliability of accounting information to matter. Accounting information with the greatest potential to influence users' decisions triggers the greatest demand for reliable measurement and reporting. Moreover, low reliability can destroy the usefulness of even the most relevant accounting information. Thus, reliability is a *necessary but not sufficient condition* for relevant information to be useful.

The Expectations Relation

Relation (3) in Figure 1 (the expectations relation) represents the association between a firm's accounting information and future net cash flows. Relation (3) encompasses both relations (1) and (2), and reflects the usefulness of accounting information. Relation (3) depicts the potential for accounting information that is both relevant and reliable to improve financial statement users' ability to predict the amounts, timing, and uncertainty of future cash flows to the enterprise (FASB 1978, ¶37). Relation (3) indicates that the usefulness of accounting information depends on the degree to which it provides a reliable representation of the relevant economic constructs that determine future cash flows to the firm.

III. FACTORS AFFECTING ACCOUNTING INFORMATION RELIABILITY

What factors increase or impair accounting information reliability? We use our framework to identify the following three general types of potential error in estimating future cash flows from

accounting information, and to isolate errors that impair reliability (for purposes of this discussion, assume each type of error is separable from the other types, even though this is not strictly true):²

- 1) random factors that affect the future period cash flows (relation 1),
- 2) errors in accounting information as proxies for economic constructs (relation 2), and
- 3) errors made by users in specifying the relation between current accounting information and future cash flows (relation 3).

The first type of error reflects unpredictable firm-specific, industry-wide, or economy-wide factors that influence the firm's realized future cash flows. This type of error does not relate to accounting information reliability because accounting information plays no role in relation (1); therefore, this error can exist even if accounting information perfectly represents the firm's economic constructs.³ The third type of error reflects users' biases (e.g., optimism) and idiosyncratic errors in using accounting information to predict future cash flows. This type of error does not relate to accounting information reliability because the error emanates from the user, not the information itself.

We therefore focus on the second type of error as the threat to accounting information reliability – error in the link between an economic construct and the accounting information about that construct (relation 2). Reliability depends on two determinations: (a) an *accounting construct* to represent the economic construct and (b) a *measured value* (consisting of a measurement attribute and specific value) to represent the economic construct. We discuss each in the next two subsections.

Reliability in Accounting Constructs

Determining an *accounting construct* to represent an economic construct involves several steps by standard setters and preparers. First, standard setters identify the set of economic constructs (resources, obligations, activities, and events) that are relevant determinants of future cash flows, as depicted in relation (1). Second, standard setters define accounting constructs for these economic constructs (e.g.,

² For example, low reliability in accounting information may lead indirectly to other types of errors. If users believe that accounting information is biased (e.g., conservative), they may adjust for this bias and make errors in such adjustments. Thus, errors in category (2) above can have indirect implications for errors in category (3).

³ Firms can provide accounting information to inform investors of exposure to random risks and uncertainties (e.g., estimates of exposure to market risks, such as the value-at-risk disclosures.)

defining “assets” and “liabilities” to represent economic resources and obligations). In turn, preparers assess their firm’s underlying economic constructs and determine the specific accounting constructs to which they correspond. This requires mapping economic constructs to financial statement elements (e.g., asset versus expense), classifying those elements (e.g., current versus noncurrent asset), and choosing appropriate account titles (e.g., cash versus marketable securities).

A number of factors can reduce reliability in accounting constructs. First, uncertainty in the relation between an economic construct and future cash flows (i.e., the random factors in relation 1) impedes the determination of an appropriate accounting construct.⁴ Second, reliability can be impaired by human knowledge limitations, which can arise if standard setters or preparers lack a complete understanding of economic constructs, and how these economic constructs should map into accounting constructs. Third, human bias (intentional or unintentional) can reduce reliability in accounting constructs. Bias can arise from external incentives (e.g., compensation) or personal traits (e.g., inherent optimism).

Errors in accounting constructs primarily reduce representational faithfulness – the accounting construct fails to faithfully portray the economic construct. Neutrality also is impaired if standard setters or preparers use biased accounting constructs to attain a predetermined outcome or influence behavior in a particular way. Finally, portraying an economic construct with an accounting construct that other, independent observers would not choose impairs verifiability.

Reliability in Measured Values

Determining a *measured value* requires specifying a measurement attribute (e.g., historical cost or fair value) and a specific value. Standard setters define measurement attributes applicable for accounting constructs, while preparers determine specific values for the measurement attributes for each of their firm’s accounting constructs. Preparers can observe values for some measurement attributes with a high degree of reliability (e.g., historical cost or fair value of a liquid asset). However, preparers must estimate values for measurement attributes that they can not observe (e.g., fair value of an illiquid asset).

⁴ For example, uncertainty in the relation between current research and development (R&D) activities and future cash inflows creates ambiguity as to whether firms should represent R&D activities as an asset or an expense.

Reliability in estimates of measured values can be impaired by errors in human judgment, the use of estimation models, and data limitations. Human judgment errors can arise from knowledge limitations, intentional or unintentional biases, and processing errors (e.g., preparers applying measurement models inconsistently). Estimation models can reduce reliability because models are inherently incomplete abstractions of economic constructs. Data limitations can reduce reliability when information systems fail to capture the data needed to measure accounting values, or when the data items themselves are estimated and fall prey to factors discussed above.

Errors in measured values can reduce all three characteristics of reliability. Representational faithfulness declines when measurement attributes and measured values do not reflect the underlying economic construct. Measurement attributes and measured values that systematically understate or overstate underlying economic constructs reduce the neutrality of accounting values. Finally, estimated measured values are less verifiable than observable measured values.

Summary of Factors Affecting Accounting Information Reliability

In summary, accounting information reliability depends on the determination of accounting constructs and measured values to represent economic constructs. We have identified four factors that can reduce reliability: (1) uncertainty in the relation between current economic constructs and future cash flows, (2) human errors and biases, (3) model limitations, and (4) data limitations. These factors diminish representational faithfulness, verifiability, and neutrality.

IV. RESEARCH ON RELIABILITY OF FINANCIAL ACCOUNTING INFORMATION

In this section, we highlight implications from research related to the reliability of accounting information, with special emphasis on inferences related to standard setting. We do not offer a complete catalog of all accounting research related to reliability; rather we provide a representative summary of the research evidence on reliability. In describing this literature, we also point out limitations of this research, and where possible, offer suggestions for future research.

The accounting research literature relating to reliability is extensive and disparate, so we impose structure on this literature in order to organize this review. Figure 2 illustrates the organizational structure of our review. We describe separately the results from archival studies and experimental studies because of the differences in the implications from each approach.⁵ We organize each methodological section into two parts using our framework in Figure 1, distinguishing evidence on the accounting relation (relation 2) from evidence on the expectations relation (relation 3). There is limited direct research evidence on the accounting relation because economic constructs are difficult to observe. Most research on the accounting relation focuses on factors influencing financial reporting, such as preparers' incentives. Research related to the expectations relation primarily provides indirect evidence on reliability because this research examines the relation between current accounting information and either future cash flows or proxies for these cash flows, such as share prices or users' expectations.

IV.A. ARCHIVAL RESEARCH

IV.A.1. Archival Evidence on Reliability within the Accounting Relation

Ideally, research studies of reliability would test the accounting relation directly by observing an underlying economic construct for a sample of firms, and then observing the accounting constructs and measured values those firms use to report that economic construct. The researcher could then directly compare the reliability of different pieces of accounting information for common underlying economic constructs. The inherent and obvious difficulties in directly testing the reliability of the relation between an economic construct and related accounting information lie in (1) the inability to perfectly observe the underlying economic constructs of the firm, and (2) the infrequency with which firms measure and report the same economic constructs with alternate pieces of accounting information.

⁵ Archival and experimental methods have unique limitations, but complementary strengths. Research based on archival data can document associations between accounting information and variables of interest (e.g., incentives facing preparers) but can not establish causality. In contrast, experimental research can establish a causal relation between accounting information and such variables, but can not test whether this relation holds in real-world situations where many factors vary at once. We discuss the limitations of these approaches within each section.

We begin our review of archival research with studies that provide relatively direct evidence on reliability within the accounting relation. We describe studies that examine economic benchmarks that relate to accounting information; the firms and accounting data that are known to have low reliability; direct observation from field studies; and tests based on simulated economic and accounting data. We follow with studies that provide indirect evidence on reliability by examining accounting choices and estimates in light of firms' incentives for reliable reporting.

Economic Benchmarks to Test Accounting Information Reliability

Only a few archival studies provide relatively direct evidence by calibrating the reliability of reported accounting numbers with exogenous economic factors. For example, reported fair values (accounting constructs) portray estimates of potential market values (economic constructs). Thus, one should be able to gauge reliability in fair value estimates with corresponding market values. For a sample of closed-end mutual funds, Chandar and Bricker (2002) predict and find that returns to market-wide portfolios (i.e., the S&P 500 Index and the Russell 2000 Index) provide useful information to enable users to gauge the reliability (e.g., overstatement or understatement) of these funds' estimates of fair value gains and losses.⁶ Alford and Boatsman (1995) use various measures of historic stock return volatility to test the reliability of estimates of expected future return volatility for purposes of estimating fair values of firms' stock option-based compensation. They document how differences in these expected return volatility estimates trigger differences in the degree of reliability (i.e., differences in material error) in estimates of options-based compensation expense.

One implication from these studies is that reliability can be made more transparent (and therefore perhaps enhanced) by disclosures of independent and verifiable benchmark data for underlying economic constructs. Perhaps required disclosure of independent and verifiable (financial and nonfinancial) metrics for underlying economic constructs could enable financial statement users to gauge the reliability of

⁶ Similarly, prior studies used different industry-wide and economy-wide price-level indexes and baskets of assets to test reliability across measurement attributes under SFAS 33 (e.g., Sunder and Waymire 1983, Casler and Hall 1985, and Shriver 1986 and 1987.)

reported accounting estimates (and the parameter assumptions used in those estimates) for stock options, fair values, pension and other post employment benefit obligations, loss reserves, and others.⁷

Evidence on Reliability from Violations of GAAP

Accounting standard setters can draw relatively direct inferences about reliability from archival accounting research that takes a pathological perspective, examining accounting information that is known to be unreliable. Research has examined accounting information from firms subject to Accounting and Auditing Enforcement Releases by the Securities and Exchange Commission and firms that have publicly restated prior accounting reports that violated GAAP.⁸ These studies document that restatement and fraud firms most frequently misstate core components of earnings (especially revenues), and these types of misstatements trigger the most significant negative market reactions, the greatest likelihood of enforcement actions and litigation, and largest settlement costs. Studies like these can, in a general sense, direct standard setters' attention to areas of accounting unreliability that may warrant sharper standards or measurement rules. Also, the results from studies like these reinforce the value of reliable accounting information by demonstrating the costly consequences associated with unreliable accounting information.

Direct Observation of Reliability: Field-study Evidence

The field study approach, in which the researcher obtains unique proprietary archival data, is not uncommon in research in managerial accounting (internal cost and budget data from firms), auditing (work papers from auditors), and tax (returns from the IRS), but it is thus far nonexistent in financial accounting research. The field study approach has the potential to create powerful and direct inferences related to financial reporting reliability. Perhaps with the aid and influence of the FASB and regulators,

⁷ We encourage accounting researchers to exploit the (as yet under-utilized) potential to shed light on reliability by modeling and estimating the relations between specific pieces of accounting information and the underlying economic constructs they are intended to capture.

⁸ For examples, see Kinney and McDaniel (1989), Summer and Sweeney (1998), Bonner, Palmrose, and Young (1998), Beneish (1999), Dechow, Sloan, and Sweeney (1999), Lee, Ingram, and Howard (1999), Palmrose and Scholz (2003), Rosner (2003), and others.

financial accounting researchers, under terms of strict confidentiality, could get firm-specific internal data used for financial reporting purposes, enabling direct tests of accounting information reliability.⁹

Simulated Economic Constructs to Test Reliability

Several studies circumvent the lack of observable of economic constructs by simulating data on relevant constructs and testing the reliability of various accounting measurement rules. For example, Barth, Landsman, and Rendleman (1998) simulate data on the components of corporate debt and use option pricing models to estimate fair values of those components. Their analysis sheds light on the potential reliability in fair value estimates of debt components. Healy, Myers, and Howe (2002) simulate data on R&D expenditures, and simulate the firm's financial statements while varying the length of the period over which the firm capitalizes and amortizes these expenditures. Their analysis provides insight into the reliability of potential capitalization of R&D expenditures. Simulation-based studies provide examples of academic approaches that calibrate the degree of reliability (or conversely, the potential measurement error) in accounting numbers, *prior* to the adoption of a new standard. However, simulated data are not real observations of reported accounting numbers, and therefore may not reflect all of the potential information or error in reported accounting information.

Less Direct Archival Evidence on Reliability: Incentives for Reliable Reporting

The archival research literature contains an extensive set of studies that cast indirect light on reliability by examining differences in reported accounting information across firms that face different incentives for reliable reporting. These types of studies, summarized in the following subsections, typically focus on accounting choices, estimates, and the role of accounting discretion within financial reporting. They isolate circumstances in which firms face different incentives (for strategic or opportunistic reasons) to manage reported accounting numbers by violating neutrality or representational faithfulness. These studies provide less direct evidence on the reliability because they do not test the reliability of accounting information against the firm's underlying economic constructs. We organize this

⁹ For example, in a study that predates SFAS 123, Huddart and Lang (1996) use employee stock option grant and exercise data for eight companies to describe employees' stock option exercise behavior. Perhaps similar data could now be used to test the reliability of firms' estimates of pro forma stock option compensation expense.

literature into two subsections (a) studies of firms' accounting choices given the choices allowed by accounting standards, and (b) studies of earnings management through accruals.

Accounting Choices Allowed by Accounting Standards Themselves

Accounting standards that require accounting judgment and choice permit firms greater ability to convey credibly their private information to stakeholders through their financial statements, an essential role of financial reporting. However, research also shows that some firms will exploit accounting standards that allow judgment and choice in order to report information that is technically within GAAP but is not neutral or representationally faithful. For example, certain newly adopted accounting standards, such as SFAS 106 or SFAS 115, permit firms to choose when to implement the new standard.¹⁰ Studies document that firms use this choice to strategically time adoption to manage reported earnings or other accounting numbers, or to signal information to the capital markets (Amir and Livnat 1996, Amir and Ziv 1997, and Ramesh and Revsine 2000). When some firms elect the latest allowable adoption of a new standard, the late-adopters postpone the recognition and disclosure of new accounting information, reducing the reliability of their accounting information relative to the underlying economic constructs the new standards portray (in addition to impairing comparability between early- and late-adopters).

Ironically, research also documents that some firms will report less reliable accounting information by exploiting accounting standards that *restrict* accounting judgment and choice in an attempt to improve comparability. The ongoing debate about principles-based versus rules-based standards emanates (in part) from concerns about the potential for firms to comply with rules yet provide accounting information that violates representational faithfulness or neutrality. These concerns emerge in part from firms structuring transactions around bright-line rules in standards. Standards with bright-line demarcations trigger the potential for unreliable accounting information if (a) the bright line accounting rules do not capture appropriately meaningful distinctions across underlying economic constructs, and (b) firms structure

¹⁰ Similarly, reliable reporting can be impaired when accounting standards permit firms latitude in classification decisions that determine differences in financial reporting, such as the investment security classification decisions permitted under SFAS 115, which trigger differences in the recognition of fair value gains and losses.

transactions in non-neutral ways in order to accomplish financial reporting objectives that do not faithfully represent the underlying economics of the firm's resources, obligations, or arrangements.

Together, the findings from these lines of research imply that reliable accounting information depends on the interaction between accounting standards and the preparers (and auditors) that implement them. Standards that permit firms to convey credibly their private information to stakeholders through accounting judgment and choice, and standards that rely on rules to restrict choice in the interests of comparability, may be inherently sound bases for reliable accounting, yet some firms will undermine the objective of reliable reporting by biasing their judgment and choice, and circumventing the rules. Accounting standards can enhance the informative role of accounting by requiring firms to make judgments and choices that more closely match the underlying economic constructs that the standards portray. To this end, accounting standards can (1) provide preparers and auditors more complete specification of the underlying economic constructs of a new standard, the bases for conclusions for new standards, and guidance for making appropriate choices within each new standard, and (2) require firms to make disclosures that link their judgments and choices more closely with underlying economic constructs and make their judgments and choices more transparent to external stakeholders.

Earnings Management and the Reliability of Accruals

The earnings management literature is extensive. Prior archival studies examine the potential for unreliable reporting of earnings numbers, components of earnings, balance sheet numbers, and footnote amounts. Prior studies predict and find evidence of earnings management by firms facing a wide array of differing incentives, including incentives created by: manager opportunism (bonus plans and insider trading), corporate control activities (management buyouts, proxy contests, initial public offerings, seasoned equity offerings, stock-for-stock mergers), political/economic objectives, earnings expectations (management's forecasts or analysts' forecasts), debt covenants and potential distress, tax strategies, pressure to meet regulatory requirements, and many others.

Some earnings management studies produce specific implications for standard setters. However, many earnings management studies show that incentives trigger less reliable reporting but do not examine

how firms violate reliability. These studies provide specific implications for managers, boards, investors, auditors, and regulators, but only general implications for standard setters. In this subsection, we describe the differences between general and specific evidence on reliability, and highlight potential inferences for standard setters from specific evidence on the reliability of accruals and earnings management. We do not, however, undertake a thorough and detailed review of the earnings management literature and its implications for standard setters because this topic has been covered by two recent papers, written for this conference in prior years (Healy and Wahlen 1999 and Dechow and Skinner 2000).

To illustrate the differences in general versus specific tests of earnings management, consider the growing number of studies that document discontinuities in the distribution of earnings numbers, implying earnings management by firms to avoid reporting losses, avoid earnings declines, or beat earnings expectations (e.g., Burgstahler and Dichev 1997, Burgstahler and Eames 2003). Recent studies take a more specific approach and examine which components of earnings firms appear to manage for purposes of meeting earnings targets. For example, Plummer and Mest (2001) examine discontinuities in the distribution of earnings and find that firms appear to manage revenues upward and accrued operating expenses downward to meet earnings targets. Among financial institutions, Beatty, Ke and Petroni (2002 – public and private banks) and Beaver, McNichols and Nelson (2003 – public and private property-casualty insurers) find that firms meet earnings targets by exercising discretion over loss reserve estimates and the timing of realized security gains.

Many archival research studies document suspicious differences in aggregate discretionary accruals in a given period across firms facing different incentives to manage reported earnings. Studies of aggregate accruals or regression model estimates of aggregate discretionary or abnormal accruals provide little specific evidence on which standard setters can act. On the other hand, studies that determine which accruals managers use to increase or decrease reported earnings numbers provide more relevant implications for standard setters. To illustrate, Phillips, Pincus, and Rego (2003) find that managers exercise discretion with respect to the deferred tax expense to avoid reporting an earnings decline.

The implications for standard setters from archival research examining specific accruals are similar to the implications we outlined at the end of the previous subsection. Accrual estimates require judgment and discretion, which some firms under certain incentive conditions will exploit to report non-neutral accruals estimates within GAAP. Accounting standards can enhance the information in accrual estimates by linking them to the underlying economic constructs they portray. Accounting standards can (1) provide preparers and auditors more complete specification of the underlying economic constructs that accruals capture, and more guidance for making appropriate accruals estimates within each new standard, and (2) require firms to provide disclosures that make their accruals estimates, and the underlying economic assumptions on which they are based, transparent to external stakeholders.

IV.A.2. Archival Evidence on Reliability from the Expectations Relation

As we depict in Figure 2, we next consider archival research evidence on the relation between accounting information and future cash flows (the expectations relation) in order to make inferences about accounting reliability. As we show in Figure 1, the expectations relation (relation 3) depends on both the relevance and reliability of accounting information. Therefore, studies of the expectations relation are joint tests of three factors: (a) the model relating accounting information to future cash flows (relevance), (b) the inherent relation between accounting information and the underlying economic constructs (reliability), and (c) controls for all other firm-specific factors that influence future cash flow realizations. Studies of the expectations relation must deduce the degree of reliability indirectly by examining the strength of the relation between (presumably relevant) accounting numbers and realized future cash flows (i.e., strong association in the predicted direction implies a degree of representational faithfulness). The difficulty in this approach exists in determining whether errors in the links to future cash flows are attributable to accounting information with low reliability, misspecification of the cash flow model, or inherent randomness and uncertainty in future cash flows. Despite this difficulty, we believe this approach is a promising avenue for future archival research to consider the reliability of accounting information.¹¹

¹¹ For example, one might test the reliability of different models of fair values of employee stock options grants by estimating their relation with values of options on future exercise dates. Alternately, one might test the equity

In this section, we organize topically the review of archival research on reliability related to the expectations relation. We first illustrate tests of the expectations relation using studies that calibrate the reliability of loss reserve estimates with future cash flow realizations. We follow with studies examining reliability using the relation between accounting information and stock-market measures (e.g. share prices) as proxies for future cash flows. In this vein, we describe implications from research on risk-related disclosures, asset revaluations and accounting value-relevance.

Loss Reserves and Loss Realizations

Loss reserves are accounting constructs that represent expected future cash flows from economic risk constructs (i.e., credit risk). Therefore, the reliability (neutrality) of loss reserve estimates can be tested by examining their relation with future cash flows related to loss realizations. Among tests of the expectations relation, studies of loss reserve accruals with related disclosures of *ex post* loss realizations provide the most direct inferences about reliability. McNichols and Wilson (1988) is an example of an early step in this research direction. They model the provision for bad debts as a function of the beginning balance in the allowance for bad debts and the current and future period writeoffs of accounts receivable. They find that firms performing extremely well or poorly appear to exercise discretion to overstate the reported bad debts provision (violating neutrality).

Relatedly, a number of studies test the reliability of loss reserves of property-casualty insurers by exploiting the information in loss reserve development disclosures, which explicitly disclose the relation between claim loss reserves, subsequent cash payments to settle claim losses, and re-estimates of claim loss reserves, over periods of 9 years following each accident year. Petroni (1992) utilizes these development data to show that distressed insurers understate claim loss reserve estimates.¹²

versus debt properties of components of deferred tax liabilities by examining their relations with future tax expense accruals and tax cash payments. For examples of this general approach, see Dechow, Kothari, and Watts (1998), Barth, Cram, and Nelson (2001), and Dechow and Dichev (2002).

¹² Other studies related to reliability that use loss reserve development disclosure data include Petroni and Beasley (1996), Anthony and Petroni (1997), Beaver and McNichols (1998), Nelson (2000), Petroni, Ryan, and Wahlen (2000), Beaver, McNichols, and Nelson (2003).

As compared to inferences about the reliability of insurers' claim loss reserves, it is more difficult to draw inferences about the reliability of banks' loan loss reserves because banks are not required to disclose the relation between loan loss reserve estimates and *ex post* loan loss realizations.¹³ As a consequence, the reliability of banks' loss reserves is less transparent than is the reliability of insurers' loss reserves. Banks do disclose, however, information related to credit risk, including concentrations of credit risk (types of loans outstanding), loan chargeoffs, and non-performing loans. Researchers use these data to examine the conditional reliability of banks' loan loss reserves. Studies show that banks exercise non-neutral reporting with respect to loan loss reserves to signal future earnings strength, to meet earnings targets, and to meet regulatory capital requirements.

One of the implications of these loss reserve studies is that reliability of accruals estimates is more transparent with explicit disclosure of the relation between current period accruals estimates and *ex post* realizations, which is particularly important for accruals pertaining to core elements of operations (e.g., underwriting risk of insurers and credit risk of banks). Reliability is also more transparent with disclosures of related economic and accounting factors (e.g., concentrations of credit risk and non-performing loans of banks). Further, reliability can be made more transparent by requiring disaggregated reporting of current period accruals estimates from subsequent corrections or revisions.¹⁴

Reliability of Risk-Related Disclosures

Our framework links the firm's underlying economic constructs (which are inherently difficult to observe) to accounting information, and links accounting information to future cash flows, which are inherently risky and uncertain. The degree of risk and uncertainty in future cash flows affects the reliability and relevance of accounting information (e.g., greater risk and uncertainty in future cash flows can impair the representational faithfulness and verifiability of accounting constructs and measured

¹³ Studies of bank loan loss reserves and loan loss provisions include Beaver, Eger, Ryan, and Wolfson (1989), Wahlen (1994), Collins, Shackelford, and Wahlen (1995), Beatty, Chamberlain, and Magliolo (1995), Beaver and Engel (1996), Liu and Ryan (1995), Liu, Ryan, and Wahlen (1997), Kim and Kross (1998), Ahmed, Takeda, and Thomas (1999), and others.

¹⁴ Lundholm (1999) provides a useful commentary to elaborate these ideas.

values). Several recent archival studies take a direct approach to assess the reliability of value-at-risk disclosures by testing their associations with future income volatility. Specifically, Jorion (2002) and Liu, Ryan, and Tan (2003) find that commercial banks' quarterly value-at-risk disclosures for their trading portfolios reflect exposure to interest rate risk and are reliable indicators of volatility in one-quarter-ahead trading portfolio income. Liu and Ryan also find that value-at-risk disclosures relate to banks' stock market-based risks (e.g., stock return volatility and market beta). Relatedly, Schrand (1997) examines risk-related disclosures in savings and loan associations' regulatory reports (off-balance sheet derivatives and gaps in contractual maturities of fixed-rate financial instruments.) She predicts and finds that these data explain cross-sectional differences in stock-price sensitivity to interest rate changes. Similarly, Rajgopal (1999) examines data from the SEC's required market risk disclosures and finds these data explain oil and gas producing firms' stock-price sensitivity to changes in oil and gas prices.

These risk-related studies imply that these disclosures provide representationally faithful information about differences in firms' exposure to underlying economic risks. Although the future cash flows of risky positions may be highly uncertain and difficult to measure reliably in the current period, these types of disclosures provide reliable information about firms' exposures to such risks. Regulatory and industry-specific reporting requirements and norms may provide good examples of reliable information that can potentially be adapted and required in related settings.

Asset Revaluations – A case for verifiability

Accounting standards in the U.K. and Australia permit firms to revalue upwards non-financial resources such as investment property, property, plant and equipment, and intangible assets (including brand assets). Are such (presumably relevant) upward revaluations perceived by financial statement users to be sufficiently reliable? Recent years have witnessed a surge in research related to asset revaluations.¹⁵ In general, these studies find that upward revaluations of non-financial assets are significantly positively related to future firm performance (operating income and cash flows), and to stock prices and returns, but

¹⁵ See Barth and Clinch (1998), Aboody, Barth and Kasznik (1999), Muller (1999), Dietrich, Harris, Muller (2000), Muller and Riedl (2002), Cotter and Richardson (2002), and Kallapur and Kwan (2004).

that these relations are weaker among firms with incentives favoring upward revaluations. Several studies predict and find that asset revaluations are more reliable when based on independent external appraisals and Big 6 auditors than firm directors or internal appraisers, indicated by lower frequency of subsequent reversals in upward asset revaluations. One implication from these studies is that firm-specific asset valuation estimates are potentially reliable, and more likely to be perceived to be reliable by external stakeholders, if verified by independent external appraisers or auditors.¹⁶

Value-relevance evidence

Value-relevance studies use share-price-based measures (e.g., share prices and returns) to infer whether the market considers accounting information to be sufficiently relevant and reliable to influence share prices. These studies rely on share prices as proxies for expected cash flows; therefore, these studies provide even less direct evidence on accounting information reliability than the cash-flow realizations studies described in the prior sections. Value-relevance studies are joint tests of: (a) the capital market's perception of the reliability of a specific piece of accounting information; (b) the relevance of that information in the capital markets; (c) the asset pricing model that the researcher uses to control for all the other factors that explain share prices; and (d) market efficiency. Because these studies are complex joint tests, it is difficult to draw sharp inferences about accounting information reliability from these studies. Studies in this line of research commonly deduce the reliability of accounting information by examining the strength of association between (presumably relevant) accounting numbers and share-price-based measures. This literature includes studies that span a wide variety of accounting issues, such as fair values of financial instruments, comprehensive income, goodwill and other intangible assets, research and development activities, pension assets and liabilities, other post-employment benefits obligations, deferred tax assets and liabilities, oil and gas assets and reserve disclosures, derivatives disclosures, value-at-risk and other risk-related disclosures, employee stock options, environmental liabilities,

¹⁶ An extensive archival literature examines the role of the independent audit in the verification of accounting information. In general, the results indicate the audit is a necessary condition for the perceived reliability of financial accounting information. We do not cover this literature in this review. Correspondingly, in the experimental section, we exclude audit research that examines judgments/decisions specific to the audit process.

revenues, and many others. Researchers have also used the value-relevance approach to compare the capital markets' use of accounting information across international regimes (e.g., Form 20-F reconciliations) and across measurement attributes.

Despite their wide-spread application, the usefulness of inferences from value-relevance research for standard setting has been the subject of controversy for years. Two literature review papers bring this controversy into sharp focus – Holthausen and Watts (2001; denoted HW) and Barth, Beaver, and Landsman (2001, denoted BBL). HW take a critical eye toward inferences from value-relevance research for standard setting because of limitations in: underlying theory with respect to the compound roles of accounting information in valuation and other contexts (e.g., contracting, regulation); theory to predict and explain accounting standard setter actions; and theory of the role of accounting information in valuation. In their summary indictment, HW (p. 14) conclude “the value-relevance literature is unlikely to be very informative to the standard-setting community.” In response, BBL draw the counterpoint conclusion (p. 78) that “the value relevance literature provides fruitful insights for standard setting”. BBL argue that, although value-relevance studies are not “necessary” or “sufficient” to resolve standard setting questions, they do provide useful capital-markets-based evidence on accounting information, given that the Conceptual Framework states that the objective of accounting is to inform investors (among others).

To illustrate two value-relevance studies that capture the elements highlighted in BBL and mitigate the criticisms in HW, we focus on Barth (1991; pension assets and liabilities) and Choi, Collins, and Johnson (1997; nonpension accumulated postretirement benefits obligations, denoted APBO).¹⁷ Both studies explicitly model reliability (i.e., measurement error), and use share prices to estimate the market's perception of the reliability of these (presumably relevant) liability estimates. Barth (1991) finds that the pension liability implicit in share prices is more closely related with the accumulated and projected pension plan obligations than the vested benefit obligation or the book value of the pension liability

¹⁷ Of course, many other studies could be used as examples of this line of research. For more complete summary and review of this literature, and the controversy over the relevance of this literature for standard setting, the reader is referred to the Holthausen and Watts (2001) and Barth, Beaver and Landsman (2001) papers. Because of the thoroughness and recency of these two papers, we elect to not cover this literature in greater detail here.

recognized under SFAS 87. Barth (1991) also finds that the projected benefit obligation has less measurement error variance among firms when it reflects the salary progression rate, including expected future inflation and productivity changes. Choi, et al. (1997) find that reported APBO amounts provide incremental explanatory power for share prices beyond the information in pension assets and liabilities, even though APBO estimates appear less reliable than analogous pension liability estimates. They also show that reliability in APBO estimates varies predictably across firms as a function of firms' retiree/active employee ratios. Thus, both studies imply that the capital markets rely on measures of underlying economic constructs that these estimates portray (salary progression rates, retiree/active employee ratios) to assess the reliability of these obligations estimates.¹⁸

We believe that value-relevance research provides important implications for standard setters, even though we share the concerns of Holthausen and Watts (2001) over the theoretical deficiencies in this research, and heed their caution that value-relevance evidence alone is not conclusive for standard setting. Value-relevance evidence provides useful inferences to deduce the capital market's perceptions of accounting reliability (and relevance) by assessing relative valuations of alternate accounting constructs, particularly by comparing the value-relevance of alternate accounting constructs against the underlying economic constructs they portray (as exemplified in Barth 1991, and Choi, et al. 1997).

IV.B. EXPERIMENTAL RESEARCH

This section discusses research based on experiments, as well as a few studies using surveys or interviews. This research directly examines perceptions, judgments, decisions, and decision processes of individuals involved in the financial reporting process, and attempts to disentangle aspects of the financial reporting process, rather than examining the end-product (financial statements). In experimental research, individuals make judgments/decisions within hypothetical scenarios that differ on one or more characteristics. In survey and interview research, individuals report their opinions, perceptions, and experiences. Most research in this area involves users and auditors due in part to their availability as

¹⁸ Relatedly, Ali and Kumar (1993) examine differences between income numbers reported under SFAS 87 and APBO 8 in the year of adoption of SFAS 87. They predict and find that managers' reporting incentives have greater influence on reported pension costs and income numbers under SFAS 87 than under APBO 8.

experimental participants; there are relatively few studies on standard setters and preparers. However, this research typically provides general insights on human judgment that are not unique to one specific group.

IV.B.1. Evidence on the Accounting Relation

This section examines research that relates directly to reliability, i.e., the relation between economic constructs and accounting information represented by relation 2 in our framework. We focus on research with implications for judgments and decisions of parties with a direct role in the process of reporting accounting information – standard setters, preparers, auditors, and regulators. We first examine a study of standard setters’ perceptions of relevance and reliability characteristics in the Conceptual Framework. We then consider research on factors affecting human judgments and decisions that can impair reliability. We conclude with research providing implications of judgments from multiple individuals for verifiability and representational faithfulness.

Standard Setters’ Perceptions of Reliability Characteristics

Joyce, Libby, and Sunder (1982) provide a rare examination of former standard setters’ perceptions of reliability. They find that standard setters do not possess a common understanding of relevance and reliability characteristics. However, standard setters’ preferences among financial reporting alternatives are well explained by their evaluations of relevance and reliability for the particular reporting alternative. Moreover, standard setters’ evaluation of relevance alone predicts their preferences quite well.

The results of this study should be interpreted with caution given some methodological problems (e.g., the study included all qualities in Figure 1 of SFAC No. 2, thus, by construction, some relevance and reliability characteristics were not independent; participants made numerous judgments, which can create inconsistency in responses). However, the evidence of little common understanding of relevance and reliability characteristics raises potential concerns about accounting information reliability and suggests that further research is needed on this important issue.

Factors Impairing Human Judgment

In this section, we first address external factors, such as incentives, that lead to directional biases in human judgment and decisions. We then turn to internal attributes of individuals, specifically knowledge

and information processing approaches, which can be sources of errors in human judgment that reduce the representational faithfulness and neutrality of accounting information.

External Incentives. Similar to archival research, experimental research examines effects of manager incentives on financial reporting, focusing on the interaction between incentives and reporting standards. Cuccia, Hackenbrack, and Nelson (1995) find in an experiment that tax preparers make reporting decisions that favor clients in the presence of both vague verbal standards and strict numerical standards. Preparers facing vague standards support their position with a liberal interpretation of the standard, while preparers facing strict standards use a liberal interpretation of the evidence as support. Although tax preparers have different incentives than financial statement preparers, Nelson, Elliott, and Tarpley (2002) describe similar results for financial reporting based on a survey in which auditors documented their clients' attempts to manage earnings. Nelson et al. (2002) find that clients use transaction structuring to manage earnings with precise standards and use other means to manage earnings for imprecise standards.¹⁹

Research involving auditors shows that when GAAP is precise, client pressure has little influence on auditors' adjustment decisions (Trompeter 1994). When GAAP is less precise, auditors facing more client pressure are more likely to use this imprecision to justify allowing the client's preferred financial reporting than are auditors facing less pressure (Trompeter 1994; Hackenbrack and Nelson 1996).

The results of this literature strike at the heart of the principles-versus-rules debate currently ongoing among parties to the financial reporting process. Specifically, this research raises questions as to whether standard setters can reduce preparers' intentional bias in financial reporting by increasing the strictness of financial reporting standards. Rather, it suggests that preparers can impair the reliability of financial reporting in both principles-based and rules-based regimes, but use different means to achieve their desired results. However, research provides some indication that more precise GAAP leads to more reliable financial statements through the effect on auditors' decisions to require client adjustments.

¹⁹ See Nelson (2003) for further discussion of earnings management under more-versus less- precise standards and the implications for principles-based versus rules-based standards.

Internal attributes. Experimental research demonstrates the importance of human attributes on the accuracy of judgments and decisions. We summarize findings of research related to two human attributes: (1) knowledge and (2) information processing.

Research consistently documents the importance of task-specific knowledge for accurate (reliable) judgments and decisions (Bonner and Lewis 1990; Libby and Luft 1993). For example, McDaniel, Martin, and Maines (2002) find that individuals acting in the role of audit committee members are more likely to identify potential impairments of financial reporting quality associated with normal business activities if they have significant financial reporting experience than if they have significant experience in other areas of business.

Research also indicates that humans exhibit both systematic and idiosyncratic errors in judgment due to faulty information processing. These errors have been documented for different groups (e.g., auditors, users); however, studies suggest that experts are less prone to these biases (Smith and Kida 1991). Systematic errors (biases) arise from individuals' use of heuristics, i.e., simple judgment or decision rules that reduce mental effort. Idiosyncratic errors typically arise from inconsistency in information processing. Research shows that linear models of individuals' judgments are more accurate than the judgments themselves (see Ashton and Ashton 1995 for further discussion). This finding occurs because the model perfectly applies the linear model of the individual's underlying judgment policy, but the individual makes unpredictable errors that lead to judgments that deviate from the policy.

Knowledge deficiencies and systematic/idiosyncratic information processing errors on the part of standard setters, preparers, auditors, and regulators can reduce the reliability of accounting information, in particular the representational faithfulness of this information. Through their educational roles, academic accountants have responsibility for reducing impairments in accounting information reliability due to knowledge and information processing deficiencies. Parties in the financial reporting process also have educational roles. For example, standard setters amass a great deal of knowledge about the mapping between economic constructs and accounting constructs in their deliberations on a standard. Standard

setters' communication of this information (e.g., through bases for conclusions in standards, discussions with representatives of constituent groups) enhances the reliability of accounting information.

Judgments from Multiple Individuals

SFAC No. 2 states that verification implies consensus among independent measures; verifiability can be measured by the dispersion of a number of independent measurements of a phenomenon (FASB 1980, ¶84). Research on consensus takes two opposite approaches; some research assumes that consensus implies reliability and uses consensus to measure accounting information reliability, while other research questions the appropriateness of using consensus as a surrogate for accuracy (verification).

Parker (1975) is an example of the first approach. Using a survey approach, he compares the degree of consensus for net realizable values versus book values for a used calculator. He obtained offers to purchase the calculator from office equipment dealers and book values from companies that owned the calculator. He found greater consensus among purchase offers (net realizable value) than among book values, due primarily to variation in firms' depreciation methods and useful life estimates. Parker suggests that these results provide some evidence that book values may be less reliable than net realizable values.

Research in the second approach takes a cautionary note about using consensus as verification that measured values are accurate. This research suggests that individuals often agree because they make similar errors. Dependence among measurers arises from multiple sources, including common incentives, the accountability of one measurer to another measurer, common training, and use of common heuristics.

Academic research has studied whether consensus is a good surrogate for accuracy by examining tasks in which multiple individuals provide estimates for variables with known outcomes (e.g., a forecast of sales). Initial research in this area found a strong positive relation between consensus and accuracy (e.g., Ashton 1985); however, this finding was likely due to the overall high accuracy for the tasks used in these studies. Subsequent research using tasks with greater variation in individuals' accuracy have found only a moderate relationship between consensus and accuracy (Davis, Kennedy, and Maines 2000). In addition, results indicate that individuals exhibit high consensus on incorrect answers due to reliance on knowledge gained from common experiences that have little relevance to the current task. Overall, this

research suggests that caution is needed in using high agreement among measurers as a sign of verification and high reliability, due to the fact that individuals undertaking the verification often view situations similarly and therefore are not independent in a statistical sense.

Despite concerns about dependence among measurements, research documents that combining estimates from multiple models or individuals improves the reliability (representational faithfulness) of estimates.²⁰ Accounting research finds increased accuracy from averaging multiple individual judgments (Libby and Blashfield 1978, Ashton and Ashton 1985).²¹ For example, Libby and Blashfield (1978) find that the 25th percentile of three-person consensus judgments is more accurate than the median (50th percentile) accuracy of individual judgments. This research also shows that most of the benefits of consensus estimates come from combining two or three individual estimates.

While this literature documents the benefits of combining a few different sources of estimates, the magnitude of the incremental benefit depends on the level of dependence between sources (Clemen and Winkler 1985). Overall, in terms of financial reporting, this research suggests that preparers may wish to investigate the use of combined measurements from multiple models or other sources to arrive at reported values. However, future research can provide needed input to preparers by examining the increase in accuracy obtained by combining some common models/approaches used to determine accounting values, and whether this increased accuracy exceeds the costs of obtaining multiple measures.

IV.B.2. Evidence on the Expectations Relation

Experimental research on the expectations relation (relation 3) examines financial statement users' beliefs about the relation between accounting information and future cash flows. These studies provide evidence about the impact of accounting information unreliability on users' judgments/decisions and the types of disclosures that help users understand accounting information reliability.

²⁰ These benefits are not unlike those obtained from diversification in an investment portfolio. Note that this research examines the combination of judgments from multiple individuals, not judgments made by interacting groups of individuals. Research provides mixed results on the benefits of group judgments.

²¹ Clemen and Winkler (1986) demonstrate similar benefits of combining multiple forecasts of macroeconomic variables emanating from different forecasting *models* (e.g., Wharton Econometrics, Chase Econometrics, and Bureau of Economic Analysis).

Impact of Reduced Reliability for Users' Judgments

A number of studies indicate that standard setters'/preparers' classification decisions (i.e., accounting construct choices) influence investors' judgments and decisions, particularly when investors do not fully understand the nature of the commercial arrangement. For example, Hopkins (1996) reports that analysts make higher stock valuation judgments when firms classify mandatorily redeemable preferred stock as a liability rather than equity. Luft and Shields (2001) find that expensing versus capitalizing intangibles reduces the accuracy of individuals' profit forecasts, because framing intangibles as expenses inhibits individuals in learning the magnitude of the relation between current intangible costs and future profits. Both of these studies highlight the important of accounting classification in helping users understand underlying economic constructs.

A number of studies examine individuals' ability to detect and adjust for bias in information. Results of this literature highlight the importance of repeated exposure and feedback. When individuals receive feedback about actual outcomes, they learn to detect and adjust for bias in forecasted information, but are less likely to purchase biased forecasts than unbiased forecasts (Ackert, Church, and Shehata 1997). Financial statement users do not adjust for bias without such feedback. For example, Kennedy, Mitchell and Sefcik (1998) find that bias in contingent liability disclosures affects users' judgments.

Overall, results of these studies highlight the importance of standard setters and preparers choosing accounting constructs and measures that faithfully represent economic constructs. Errors in these choices harm users' understanding of the firm's economic situation, and impair users' ability to learn from historical accounting data. Research also documents the importance of disclosures that compare estimates to actual outcomes, such as those provided in the insurance industry for claim loss reserves. Findings in Hirst, Jackson, and Koonce (2003) indicate that such disclosures should explicitly show implications of any mis-estimation on both the balance sheet and net income to be most effective for users.

Information on the Reliability of Accounting Information

Information about the reliability of accounting information can take at least two forms: (1) information about the process by which firms determine accounting information and (2) summary

statistics about reliability. Experimental research suggests that users take into account process information. For example, results in Hirst, Koonce, and Simko (1995) suggest that users react more strongly to information when the source of the information acts counter to incentives (i.e., the firms issues an unfavorable report when it has incentives to issue a favorable report). Additionally, Maines, McDaniel, and Harris (1997) find that analysts have more confidence in segment information when external financial reporting is congruent with internal reporting. These results indicate that users infer accounting information reliability from contextual factors that influence the process generating these numbers.

Research on the implications of summary statistics on users' perceptions of accounting information reliability is less conclusive. Research indicates that users' judgments reflect summary statistics on the historical accuracy of information sources, but typically do not reflect statistical information on the dependence among sources (Maines 1990). Other studies examine whether providing confidence intervals around accounting numbers (point-estimates) affects users' judgments. Oliver (1972) and Keys (1978) both find that loan officers make similar judgments and decisions with confidence interval financial statements as with point-estimate statements. This finding either indicates that users understand the inherent reliability in financial statements (Birnberg and Slevin 1976) or fail to understand how confidence-interval information should affect judgments and decisions.

This line of research suggests that users benefit from disclosures that identify contextual factors that enhance or reduce accounting information reliability. However, to date there is mixed evidence about users' ability to use statistical information to assess reliability. Further research can assess whether and how to convey statistical information on reliability. For example, firms currently provide statistical data on the sensitivity of accounting estimates to underlying assumptions (e.g., the sensitivity of OPEB estimates to health care cost assumptions). Research could examine how individuals use this information and whether other information would help users better assess accounting information reliability.

V. DISCUSSION, FUTURE RESEARCH DIRECTIONS, AND CONCLUSIONS

In this paper, we summarize inferences from academic research related to accounting information reliability. Our review offers the following three general conclusions. First, our review finds that research provides little direct evidence on accounting information reliability, because it is difficult to observe the fundamental economic constructs underlying reported accounting information. Most research provides indirect evidence on reliability, drawing inferences from the relation between accounting information and capital market share prices or future cash flows, or from aspects of the financial reporting process. Second, research evidence finds that deficiencies in reliability arise from the interactions between accounting standards and the incentives facing preparers. Thus, accounting information reliability is jointly determined, depending on accounting standards that appropriately capture underlying economic constructs, and preparers that appropriately apply such standards in the financial reporting process. Finally, research consistently highlights the importance of disclosures related to underlying economic factors that can increase the transparency of, and perhaps enhance, accounting information reliability.

Our review also offers potential inferences for researchers interested in reliability. Even though it is difficult to obtain direct evidence on how reliably accounting information represents economic constructs, archival and experimental research has developed insightful approaches for assessing the reliability of specific pieces of accounting information. These approaches include: (1) comparing accounting numbers to economic benchmarks, (2) examining restatements of accounting information, (3) comparing accounting estimates against future cash flow realizations, (4) inferring the impact on reported accounting numbers from external incentives, and (5) inferring the reliability of accounting information from the use of this information in the capital markets and other contexts. Research to date also offers evidence on factors that influence accounting information reliability through their effects on judgments and decisions. These factors include: (1) external incentives, (2) the interactive effects of incentives with characteristics of financial reporting standards (e.g., the precision of standards), (3) knowledge/expertise, and (4) information processing biases and errors.

We believe additional research in several areas could provide new insights about the reliability of accounting information. First, we encourage future research on the component elements of reliability (including analysis that may discover components of reliability beyond those identified in the Conceptual Framework). Archival researchers can shed new light on components of reliability, such as representational faithfulness and neutrality, by modeling and estimating the relations between accounting information, the underlying economic constructs of the firm, and future cash flow realizations related to those accounting numbers. We believe accountants trained in analytical modeling can bring rigorous analysis to the role of accounting reliability in valuation and agency settings, with formal models of components of accounting reliability. We believe that accountants trained in experimental methods can contribute by conducting research to assess the interpretations and applications of accounting constructs and components of reliability within carefully controlled settings. The participation of standard setters, preparers, auditors, and users is crucial to such research.

Second, we encourage research that focuses on preparers because of their central role in the financial reporting process. Some archival research examines reported accounting numbers, but much of this research focuses on the effects of incentives on preparers to manage earnings. Experimental studies have involved primarily auditors, with little focus on preparers. Archival and experimental work can shed new light on factors other than incentives that affect preparers' reporting decisions (e.g., effects of knowledge limitations in light of increasingly complex economic constructs). Theoretical analysis, archival data analysis, controlled experimental tests, field studies, and descriptive studies through surveys and interviews, are all potentially fruitful avenues to new inferences about accounting reliability.

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Figure 1
Schematic Representation of the Accounting Information Framework

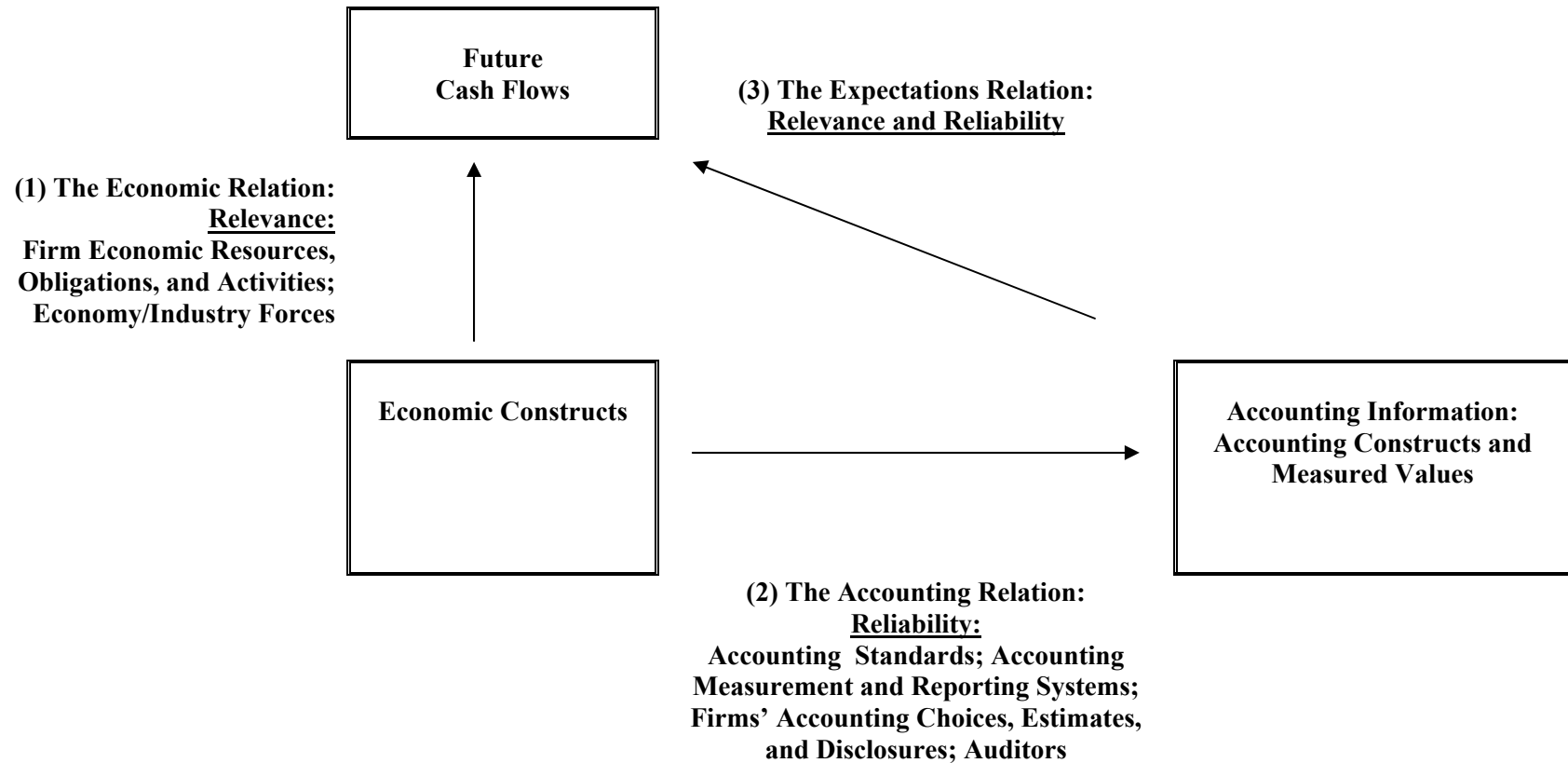


Figure 2
Illustration of the Organizational Structure of Our Review of the Research Literature

Research Relating to Accounting Information Reliability			
Archival Methods		Experimental Methods	
Accounting Relation $EC_t \rightarrow AI_t$ (Relation 2)	Expectations Relation $AI_t \rightarrow FCF_{t+1}$ (Relation 3)	Accounting Relation $EC_t \rightarrow AI_t$ (Relation 2)	Expectations Relation $AI_t \rightarrow FCF_{t+1}$ (Relation 3)
Direct tests of the relation between accounting information and underlying economic constructs. Tests of factors potentially influencing the financial reporting process and reliability of accounting information.	Direct tests of the relation between accounting information and future cash flows. Tests of the relation between accounting information and proxies for future cash flows, such as share prices.	Tests of factors potentially influencing the financial reporting process and reliability of accounting information.	Tests of the relation between accounting information and proxies for future cash flows, such as users' expectations.