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Contents

Detrimental Effects of Reporting the Uncertainty in Managerial Accounting Data

Tom Downen (University of North Carolina Wilmington)
Page 1

Disclosing Tax Consequences of a LIFO Repeal: Considerations Toward an Ethical Decision-Making Model Based on Potential Convergence of IFRS & U.S. GAAP

T. Brian Routh, Mark A. McKnight and Alyssa B. Moore
(University of Southern Indiana)
Page 29

A General Analysis of the Impact of Scale Differences When Interpreting R^2 as an Indicator of Value-Relevance

Hongtao Guo (Salem State University) and
Dave Ziebart (University of Kentucky)
Page 46

Are Graduate Accounting Programs Meeting the Profession's Expectations?

Ifeoma Udeh (Elon University)
Page 68

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DETRIMENTAL EFFECTS OF REPORTING THE UNCERTAINTY IN MANAGERIAL ACCOUNTING DATA*

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DETRIMENTAL EFFECTS OF REPORTING THE UNCERTAINTY IN MANAGERIAL ACCOUNTING DATA

ABSTRACT

This study examines the effects on decision making of reporting the uncertainty associated with managerial accounting information. Specifically, it describes scenarios in which reporting the uncertainty inherent in managerial accounting data can negatively impact decisions. My predictions that providing uncertainty reporting will induce certain dysfunctional prospect theory behaviors are generally supported. Decision makers provided with uncertainty reporting more often forgo gain-probable opportunities and more often pursue loss-probable opportunities, as compared to decision makers not provided with uncertainty reporting. And this results generally in reduced performance. These effects of uncertainty reporting do not seem to change much with repeated decision iterations. These results have practical implications, as organizations might consider when to include (or not include) uncertainty reporting, and also contributes to a growing literature on addressing uncertainty in accounting.

INTRODUCTION

Accounting data is often influenced by judgment and estimation, where choosing amongst allowable accounting alternatives and estimating amounts are necessary (Barth 2006; Spiceland, et al. 2018). The influence of judgment and estimation is likely greater within managerial accounting than within financial accounting, because managerial accounting often includes forecasted / future-oriented data (Datar and Rajan 2018; Garrison, et al. 2018; Hermanson, et al. 2018). Regression analysis is one approach presented in managerial accounting textbooks (e.g., Garrison, et al. 2018; Hansen and Mowen 2018), for evaluating data and predicting future outcomes; the regression approach also presents the possibility of reporting uncertainty using confidence intervals (Hansen and Mowen 2018).

Confidence interval reporting was examined in several studies in the 1970s, although they were focused on financial accounting contexts (Oliver, 1972; Birnberg and Slevin, 1976; Keys, 1978). These earlier studies generally found that replacing individual financial statement amounts with range estimates had little effect. The reasons posited for the lack of observed

effects include decision makers with confidence intervals focusing on the midpoints of the ranges (Keys 1978), or even decision makers with individual amounts recognizing and considering the effects of uncertainty (Oliver 1972). All of these early studies hypothesized positive decision effects of providing confidence interval reporting, based on the conventional wisdom that more information is preferred over less information. More recent studies have demonstrated a preference for range estimates over point estimates but only when such ranges more properly reflect the underlying uncertainty in the data (Christensen, et al. 2014; Du, et al. 2011).¹

Managerial accounting contexts involve less regulation and often include future-oriented data (Garrison, et al. 2018; Hermanson, et al. 2018), introducing added opportunities for uncertainty (and uncertainty reporting) to influence decisions. More specifically, if managerial decision makers realize the uncertainty that exists in their data reporting and even expect less precise² data, then uncertainty reporting should have increased potential to affect their decisions.

Despite predictions in earlier research, it could be expected that uncertainty reporting will actually have a *negative* influence in certain managerial decision contexts. That is because uncertainty reporting can induce decision biases. Specifically, when uncertainty reporting introduces the prospect of a loss in a scenario where a gain is otherwise probable, some decision makers are expected to behave in an aversive manner. Similarly, when uncertainty reporting introduces the prospect of a gain in a scenario where a loss is otherwise probable, some decision makers are expected to behave in a risky manner. Both risk-averse behavior,

¹ Historically, point estimates were commonly referred to as *deterministic* amounts whereas range estimates were commonly referred to as *probabilistic* amounts. See Hawkins (1974) for a detailed review.

² Downen (2014) describes financial reporting precision as the combination of accuracy and reliability. In the context of this study, greater uncertainty could be the result of lower anticipated accuracy (the difference between the reported amount and the true or prescribed amount) and/or lower anticipated reliability (the variance in estimated amounts provided by multiple measurers).

when a gain is probable, and risk-seeking behavior, when a loss is probable, are likely to be detrimental to performance on average.³

The experimental results reported herein generally demonstrate the predicted behaviors, with participants who received uncertainty reporting more often forgoing gain-probable (but loss-possible) opportunities. This risk-averse behavior is deleterious to overall performance. When an opportunity is loss-probable (but gain-possible), participants who received uncertainty reporting did more often pursue opportunities but the difference was not statistically significant; this is likely due to my experimental participants being substantially risk-averse by nature, based on responses to a risk-preference scale. Notably, the effects of uncertainty reporting do not appear to change much with repeated decisions.

This study contributes to the existing literature in several ways. For one, this is the first known study to examine confidence interval reporting in a managerial accounting context. The nature of many managerial accounting scenarios likely present new opportunities to include uncertainty reporting, with decisions effects that could differ from financial accounting and other scenarios. Also, knowledge of the circumstances in which uncertainty reporting may be helpful or harmful will aid managers and accountants in discriminating in the use of such reporting, reserving it for scenarios where unwanted behaviors are not likely to result. Lastly, this study adds to prior literature on prospect theory behaviors in identifying specific accounting scenarios in which having less information may be better than having more information.

³ Although not addressed in the current study, there are other managerial accounting scenarios in which uncertainty reporting could be beneficial. As one example, if a decision maker has improperly considered irrelevant / sunk costs in a decision context and therefore believes it to be loss-probable, then the risk-seeking behavior that results from including uncertainty reporting (indicating that a gain is possible) could be beneficial; that would be because, by properly ignoring irrelevant / sunk costs, the opportunity may not actually be loss-probable. Without the uncertainty reporting, the decision maker might forgo the opportunity.

LITERATURE REVIEW AND HYPOTHESES

Although many outside users may not realize it, accounting information is fraught with uncertainty.⁴ Essentially all amounts included in the financial statements involve some degree of judgment and estimation (Barth 2006; Maines and Wahlen 2006; Sacer, et al. 2016; Spiceland, et al. 2018), where judgment often refers to choosing among different allowable accounting alternatives and estimation refers to predicting future outcomes. As examples, liability balances such as warranty obligations or pension obligations involve substantial estimation and uncertainty, related to future product failures and repair costs or future retirement dates and salaries, respectively. Even a more certain balance, such as cash and cash equivalents, could be subject to judgment and estimation, especially related to any cash equivalents. In managerial accounting contexts, where forecasted data is often also included, the uncertainty / estimation is increased further (Datar and Rajan 2018; Garrison, et al. 2018; Hermanson, et al. 2018).

Most textbooks covering managerial accounting topics note that regression analysis can be utilized to estimate amounts (in particular, total cost amounts for manufactured products, considering variable and fixed components) (Garrison, et al. 2018; Hansen and Mowen 2018). This process typically involves utilizing data for prior periods or transactions whereby differing volume or other predictive measures exist; the prior data is regressed to provide a formula for estimating an amount for a future period based on the predicted volume or measure level (Garrison, et al. 2018; Hansen and Mowen 2018). Regression analysis not only provides a point estimate for the future amount but also provides a 95% confidence interval of possible amounts (Hansen and Mowen 2018). Therefore, utilizing this prescribed method with data for prior periods or transactions, organizations could provide a statistically-generated point

⁴ The *uncertainty* construct, as used in the current study, is consistent with reduced precision as defined in Downen (2014). Uncertainty and related terms such as “vagueness” and “ambiguity” have been explored previously in a variety of settings (Harvey and Victoravich 2009; Ho, et al. 2001; Ho, et al. 2002; Van Dijk and Zeelenberg 2003; Victoravich 2010). However, the uncertainty described in those earlier studies differs from the uncertainty described in the current study. For example, Harvey and Victoravich (2009) study uncertainty and other factors affecting project escalation decisions; in their study, uncertainty relates to the expected eventual financial success of a project rather than the degree of potential imprecision in reported amounts.

estimate, and could also report confidence interval ranges of possible values for uncertain amounts. Companies could similarly utilize varied expectations or assumptions related to a financial report amount, perhaps originating with different individuals or reflecting different possible circumstances, and regress both a point estimate and a confidence interval.

Before including such interval estimates in financial reporting, though, companies should consider how users might respond. This question was addressed rather extensively within financial accounting contexts back in the 1970s. Several studies at that time examined the effects of providing confidence interval financial statements, on decisions to provide business loans (Oliver 1972; Keys 1978) and in a more general context of predicting student performance (Birnberg and Slevin 1976). These studies all predicted that the confidence interval financial statements would provide additional relevant information that would improve decisions. Yet all three studies consistently found no discernible effects on decision making of providing confidence interval statements. Two theories for the lack of decision effects are posited. Oliver (1972) suggests that the lack of effect derives from point-estimate decision makers inferring a range of possible values, whereas Keys (1978) suggests that the lack of effect could be driven by confidence-interval decision makers simplifying their decision processes by just using the midpoint of the ranges.

Accounting uncertainty and possible methods for reporting that uncertainty have continued to draw research and practitioner interest for an extended period (Bell and Griffin 2012). Recently, several studies have noted increased scrutiny of the uncertainty in financial statement estimates (Christensen, et al. 2012; Bratten, et al. 2013). Users are demanding more information regarding that uncertainty (Blake, et al. 2011; Christensen, et al. 2014). Options for addressing this increased scrutiny and information demand that have been proposed in recent studies include requiring more range disclosures in the notes to the financial statements (Bell and Griffin 2012; Christensen, et al. 2012; Majors 2016) and/or requiring that auditors address the uncertainty for key financial statement amounts in their auditor reports (PCAOB 2013).

These more recent studies have documented a variety of effects of disclosing or reporting ranges. Christensen, et al. (2014) find that investors prefer to receive range estimates (over point estimates) in the financial statements when the range properly reflects the underlying uncertainty. They also report that investors perceive range estimates to be more informative, credible, and accurate, as compared to point estimates, when the underlying uncertainty is greater (Christensen, et al. 2014). However, range estimates in disclosures, particularly in cases of wide ranges, have also been perceived as less reliable than point estimates (Davis-Friday, et al. 2004; Elliott, et al. 2008).

There is also recent research examining the inclusion of range estimates in management forecasts. Again, as the uncertainty of the management forecast increases, investors seem to prefer range estimates over point estimates (Du, et al. 2011). This is consistent with congruity theory (Osgood and Tannenbaum 1955), which posits that individuals will prefer a forecast form that reflects the underlying uncertainty: point estimates for lower uncertainty and range estimates for higher uncertainty. Interestingly, a recent study has shown that management's true earnings expectation tends to be closer to the top of the forecast range rather than near to the midpoint (Cicotte, et al. 2014). Also related to management forecasts, Jensen and Plumlee (2018) note that a point estimate either could indicate exactness or could indicate high uncertainty. They note that providing a range estimate in the forecast not only quantifies management's expectation for earnings but also the extent of uncertainty associated with that expectation (Jensen and Plumlee 2018).

There are reasons to expect that reporting confidence intervals / range estimates could have a different effect in managerial accounting settings. For one, users of historical-cost-based external financial reporting likely expect more exactness, especially post audit (Brown, et al. 2015), and therefore may be less able to interpret uncertainty reporting. Users of managerial accounting data, which often includes forecasted data for future periods (Datar and Rajan 2018; Garrison, et al. 2018; Hermanson, et al. 2018), are likely to be more realistic about the

uncertainty that exists in the reporting. In that regard, such users seem less likely to simplify confidence interval reporting down to the mere midpoints. Instead, users of managerial financial reporting seem more likely to heed the uncertainty information contained in interval reporting, consistent with congruity theory (Osgood and Tannenbaum 1955).

Also, some of the common decision contexts associated with managerial accounting are unique and present opportunities for different and unintended effects of reporting confidence intervals. Prospect theory (Kahneman and Tversky 1979) describes scenarios that, when considered in a managerial accounting context, could result in certain dysfunctional human behaviors when accounting uncertainty is reported. Specifically, prospect theory describes generic conditions where individuals act in a risk-averse (risk-seeking) manner even when a gain (loss) is most likely to occur, choosing options that have lower expected values to avoid any possible risk of loss (to pursue the prospect of a gain). These behaviors will, on average, be detrimental to performance. Reporting the inherent uncertainty that exists in accounting information could, in some cases, create scenarios where a gain (loss) is likely and yet these generally dysfunctional risk-averse (risk-seeking) behaviors could prevail.

Feltovich, et al. (2011) examine two subtle variations of loss aversion that have more specific relevance to managerial decisions involving uncertain information: (1) possible-loss avoidance – avoiding a strategy that leads to a possible loss in favor of a strategy that leads to a sure gain; and (2) certain-loss avoidance – avoiding a strategy that leads to a sure loss in favor of a strategy that leads to a possible gain (and, thus, a possible loss). They find that decision makers in their setting will give up some expected value payoffs to avoid possible losses, and even more to avoid certain losses (Feltovich, et al. 2011).

Consider for illustrative purposes a managerial accounting setting in which a manager is reviewing a projected cost-volume-profit (CVP) graph to decide whether to manufacture a new product. Figure 1 provides an example of the graph. If the price for the new product and the associated volume demand are both known with certainty, then also knowing the exact

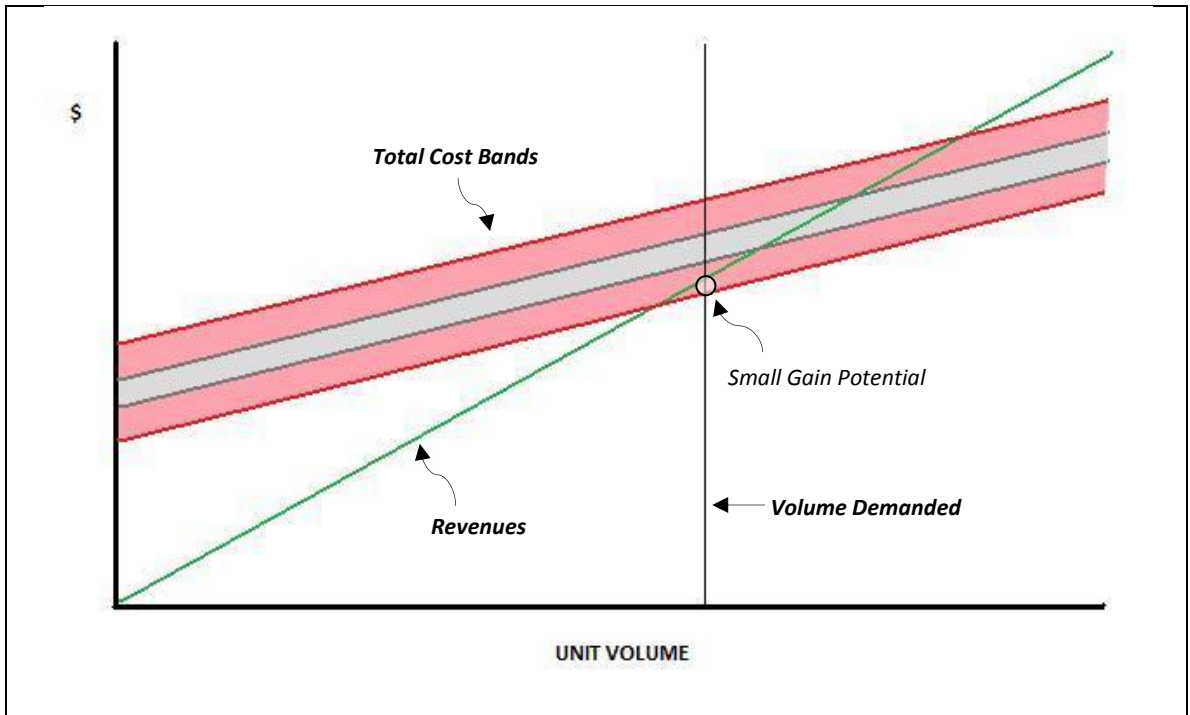


Figure 1. CVP Illustration of Loss-Avoidance Variations with Uncertain Fixed Costs

cost of the new product makes the outcome certain and the decision very straightforward. However, if there is uncertainty about the fixed cost of the new product, as represented by the interval bands in Figure 1, then different outcomes are possible. The width of the intervals, which reflects the level of uncertainty, can introduce decision scenarios where losses are possible or certain. In this example, if the narrow light-colored band represents the 95% confidence interval for expected fixed costs⁵, then selling at the known price and quantity will assuredly result in a loss (i.e., for all possible values of fixed costs in the narrow band, total costs exceed total revenues). However, using the wider dark-colored band, which represents greater uncertainty at the same 95% confidence level, there is a slight possibility for a gain (as

⁵ For simplicity here, I am assuming that fixed costs, rather than variable costs, are uncertain. However, uncertainty in variable costs (per unit), as used in the experiment described later, could also be reflected in a CVP graph. In that case, instead of the 95% confidence interval bands being of constant width, they would reflect increasing width, taking the shape of a cone. Reporting uncertainty in variable costs (per unit) also has the capability to create possible-loss scenarios from previously perceived certain-loss or certain-gain scenarios.

circled and labeled, where revenues could exceed total costs). For the wider band, a loss is possible but not certain (borrowing the language utilized by Feltovich, et al. 2011).⁶

To summarize, two notable examples of managerial accounting scenarios where prospect theory predicts that uncertainty reporting could influence decision performance are (1) when an opportunity has a positive expected value and reporting the uncertainty reveals the prospect of a loss and (2) when an opportunity has a negative expected value and reporting the uncertainty reveals the prospect of a gain. In the first scenario, prospect theory predicts that decision makers in a gain frame will experience loss aversion and will sometimes forego the opportunity.⁷ In the second scenario, prospect theory predicts that decision makers in a loss frame will act in a risk-seeking manner and will sometimes pursue the opportunity. These assertions are captured in the following hypotheses:

- H1a: Decision makers provided with uncertainty reporting that includes the prospect of a loss will more often forgo gain-probable opportunities, as compared to decision makers not provided with uncertainty reporting.**
- H1b: Decision makers provided with uncertainty reporting that includes the prospect of a gain will more often pursue loss-probable opportunities, as compared to decision makers not provided with uncertainty reporting.**

Forgoing gain-probable scenarios or pursuing loss-probable scenarios should, on average, lead to reduced profit performance. Although the outcome for some gain-probable scenarios could

⁶ The variation of this example where no uncertainty is reported would include a single total cost line, using the preparer's best estimate of fixed and variable costs – the traditional presentation of a CVP graph. If the selling price and volume demanded are known with certainty and a single line is used for the estimate of total costs, then the *expected* outcome will be certain; it will be perceived as either a certain-loss scenario, a certain-gain scenario, or a breakeven scenario. Even when a straight line is used for total costs, though, it is usually not true that fixed and variable costs are known with certainty. Instead, it is merely the preparer's best / point estimate of fixed and variable costs (per unit). Adding the uncertainty reporting, in this case the estimated total cost interval band rather than a total cost line, brings awareness to the additional scenarios that may be possible. Adding the band to a certain-loss scenario could, if the band is wide enough, result in a possible-loss (and, by definition, a possible-gain) scenario. Adding the interval band to a certain-gain scenario could also result in a possible-loss scenario.

⁷ Oliver (1972) noted in his original development of his confidence interval financial statements, when he arbitrarily determined the amounts to add and subtract from each midpoint, that it was important to avoid amounts that would result in a loss, because prospective losses cause particularly unusual behavior.

be a loss, over the aggregate these opportunities will most often result in a gain. Similarly, although some loss-probable scenarios could result in a gain, they will more often result in a loss. Thus, the behaviors predicted by H1a and H1b will generally result in reduced performance, *ceteris paribus*, over the longer-term. Therefore, I predict generally that decision performance will decline when uncertainty reporting is provided:

H2: Providing decision makers with uncertainty reporting will result in reduced decision performance.

Birnberg and Slevin (1976) note in their concluding paragraph that, as their decision makers became more familiar with the characteristics of the reporting environment, any value they got out of the confidence interval statements should decrease. Individuals do adapt to their decision environments (e.g., Atkinson, et al. 1997; Bazerman 2006; Briers, et al. 1999). So, over time, users of managerial accounting information are expected to learn the degree of uncertainty that exists even without uncertainty reporting. It would be logical then to expect the decision influence of reporting accounting uncertainty to decline in later iterations of a repeated decision, as a result of adaptation.

However, the findings of Feltovich, et al. (2011) run contrary to this expectation. Their possible- and certain-loss avoidance behaviors actually become more pronounced in later iterations of their decision setting. So, with repeated decision performance, decision makers without the uncertainty reporting are likely to adapt to their environment and begin to understand the underlying uncertainty; but decision makers with uncertainty reporting are likely to react more strongly to their loss-avoidance tendencies (for gain-probable opportunities). Because it is unclear which of these effects is likely to be more prominent, or whether they might simply offset each other, my final hypothesis is presented in the null:

H3: The effect of providing uncertainty reporting will be no different in early iterations of a repeated decision scenario compared to later iterations.

RESEARCH DESIGN AND METHODOLOGY

Experimental Design

Two slightly different computer-based experiments were used to test the stated hypotheses. Included in each experiment were two primary between-participant conditions: (1) not providing or providing uncertainty reporting and (2) gain or loss frame. Providing uncertainty reporting involved using a confidence interval for one particular data element in the experiment (variable costs per unit), whereas not providing uncertainty reporting involved using a point estimate for the data element. The gain frame condition involved a gain-probable (but loss-possible) opportunity, whereas the loss frame involved a loss-probable (but gain-possible) opportunity. This results in a 2×2 , between-participants experimental design. The experiments were programmed and conducted using the *z-Tree* software (Fischbacher 2007).

When participants arrived at the computer lab for the experimental session for which they had preregistered, they were instructed to locate their randomly assigned computer⁸ and to await further instructions. Participants were initially asked to complete a risk-preference survey, based on Holt and Laury (2002)⁹, in anticipation of the potential influence of risk preferences on the results in the experimental task. Participants were then provided with the experiment instructions and asked to complete a comprehension survey before the experiment commenced; untabulated results from the survey suggest satisfactory comprehension among participants.

Participants assumed the role of an operator of a health screening business, where they provided services for residents of rural communities. The health screenings were described as being provided from a base city. The specific base city and rural communities that were utilized varied across the experiments in an effort to avoid participants (who were undergraduate

⁸ The procedure for random assignment to computer workstations, and other aspects of the experiment administering, are generally consistent with the recommendations set forth in Downen (2012).

⁹ The Holt and Laury (2002) risk preference instrument, as modified slightly by Deck, et al. (2008), determines risk propensity ratings based on when individuals switch from Option A to Option B. The results can range from 1 (highly risk-seeking) to 11 (highly risk-averse).

students from different universities) having outside familiarity. Once all participants had arrived and had completed the risk survey and the pre-study comprehension survey, the example module of the *z-Tree* program was initiated. This module simply demonstrated for participants the two example scenarios included in the instructions but using the actual experimental application.

The specific information provided to each participant for the rural community being evaluated for possible health screening services (the “opportunity”) was (1) the known and certain volume (patient count), (2) the known and certain revenue per unit (patient screening fee, purportedly based on insurance regulations), (3) either a confidence interval estimate or a point estimate for variable costs per unit (patient), depending upon the experimental condition for uncertainty reporting, and (4) the known and certain fixed cost (facility charge)¹⁰. From that information, the risk-neutral expected value of providing services could be computed. The experimental setting was designed to be generally realistic but also simple enough to be understandable to student participants.

Before deciding whether or not to provide services for a community, participants were asked to estimate the amount of profit or loss that they thought they would experience if they decided to provide services. Participants with uncertainty reporting were anticipated to reflect some bias toward predicting more or less profit depending upon their (gain or loss) frame condition.

Participants were encouraged to make the best and most profitable decisions possible, as each participant’s profit from the experimental task would determine the course credit (experiment 1) or monetary compensation (experiment 2) that he or she would receive. After participants decided whether or not to provide services, a random draw determined the actual

¹⁰ Unrelated to the current study, the “facility charge” was avoidable in some cases, described as involving an RV that could be optionally rented to provide screening services to a particular community, or sunk in other cases, described as involving a clinic building rented for the duration to provide screening services.

variable costs per patient for the community. The actual variable costs per patient could have been either above or below the point estimate, which was also the midpoint of the confidence interval estimate. In all cases, however, the actual variable costs per patient were within the normally-distributed, 95% confidence interval for the community. The optimal *ex ante* decision was to provide services when the risk-neutral expected value was positive (gain probable) and to not provide services when the risk-neutral expected value was negative (loss probable).

After the decision whether or not to provide services to the rural community had been made, the profit results were reported to participants based on the known and certain values for the patient count, the screening fee per patient, and the facility charge, as well as the random draw of actual variable costs per patient. In essence, participants were provided with a simplified income statement (contribution-margin format) summarizing the results for the service location.¹¹ At the end, participants completed a brief computer-based questionnaire, addressing the importance of each data element in their decision process, and also a paper survey to collect demographics before departing.

Generating Experimental Data

Most of the data used in the experiment was randomly generated. The patient volume was generated randomly from a binomial distribution based on a recent census population of each actual rural community. Then, data representing 20 fictitious prior service dates for each community was generated. The randomly generated volumes and total cost amounts for the 20 fictitious prior service dates for the community were then regressed, which provided a point estimate and a confidence interval estimate for variable costs per patient (the slope of the estimated total cost line in a CVP graph). Although the regressions used in this study were

¹¹ If a participant chose not to provide services, then his or her profit for that opportunity was either \$0 or a negative amount representing the facility charge (depending on whether the facility charge was avoidable or sunk; see footnote 10). Even if a participant chose not to provide services, he or she still received a simplified income statement indicating what the profit or loss *would have been* if he or she had instead chosen to provide services.

based on fictitious prior data, most firms likely have either real data for prior periods or predictions from multiple informed parties that could be regressed in the same manner to help assess uncertainty in cost (or other accounting) information.

The screening fee for each community was strategically selected, to be either a certain increment above or below the estimated average total costs per patient.¹² That resulted in either a gain-probable (but loss-possible) or loss-probable (but gain-possible) scenario. As noted previously, the actual variable costs per patient for each community were randomly determined, assuming a normal distribution and using the mean estimate and standard error provided by the regression of the data for the fictitious prior service dates.

Experiment 1

Ninety-five (95) undergraduate students participated in experiment 1, in exchange for course credit.¹³ The points assigned to the experimental task represented a substantial portion (approximately 15%) of the overall course grade. The experimental task was completed late in the semester. Experiment 1 was administered during four separate sessions, to accommodate the limited number of workstations in the computer lab. Participants were randomly assigned to the uncertainty reporting condition. The frame condition was also randomly determined but had to be constant within each experimental session, due to the *z-Tree* coding requirements. Unfortunately, the random determination of frame resulted in only one session including an initial loss-probable scenario and the other three sessions including an initial gain-probable scenario. That resulted in an imbalance of participants assigned to

¹² For a normal distribution, which is applicable to the regression confidence intervals from which the estimates were generated, moving one standard error above or below the mean splits the distribution at 84.13% / 15.87%. For experiment 1, the screening fees (revenues) were selected to be either one standard error above (gain-probable) or one standard error below (loss-probable) the total estimated costs per patient. Using only integer amounts, that created an approximate 84% chance of gain (loss) and a 16% chance of loss (gain) in the gain-probable (loss-probable) condition. For experiment 2, the increment was selected to create loss / gain probabilities of 60% / 40%.

¹³ The use of human participants was reviewed and approved by the Institutional Review Board at the universities where the experiments were administered.

each frame condition (70 participants in the gain frame and 25 participants in the loss frame), for the first decision iteration.¹⁴

Experiment 2

One hundred fourteen (114) undergraduate students participated in experiment 2, in exchange for a relatively small amount of cash compensation (average of \$15). Experiment 2 was administered during four separate sessions, to accommodate the limited number of workstations in the computer lab. Participants were again randomly assigned to the uncertainty reporting condition. Two design modifications were included in experiment 2. First, to offset the imbalance from experiment 1, necessary for a more thorough evaluation of H1b, all sessions in experiment 2 included an initial loss-probable scenario. Second, the selected values for the screening fee (revenue per patient) were set such that there was an approximate 60% probability of a loss (gain) and a 40% probability of a gain (loss) for the loss-probable (gain-probable) condition. Otherwise, the remaining design aspects were consistent with experiment 1.

As summarized in Table 1, combining experiment 1 and experiment 2 provides healthy participant counts for all four conditions for the first decision iteration: 34 participants in the no-uncertainty-reporting / gain-frame condition; 68 participants in the no-uncertainty-reporting / loss-frame condition; 36 participants in the uncertainty-reporting / gain-frame condition; and 71 participants in the uncertainty-reporting / loss-frame condition. The numbers in parentheses in Table 1 represent the participant counts from experiment 1 and experiment 2, respectively.

¹⁴ Both experiments involved multiple decision iterations, as necessary for evaluation of H3. The reported participant counts by condition (reflected in Table 1) only relate to the first decision iteration. The uncertainty reporting condition remained the same for each participant throughout the experiment. However, later decision iterations varied between being gain-probable or loss-probable (each representing half of the decision iterations). In that regard, the frame manipulation was within-participants when considering all decision iterations.

	<i>Gain Frame</i>	<i>Loss Frame</i>	<i>Total</i>
No Uncertainty Reporting	$(34 + 0) = 34$	$(13 + 55) = 68$	$(47 + 55) = 102$
Uncertainty Reporting	$(36 + 0) = 36$	$(12 + 59) = 71$	$(48 + 59) = 107$
Total	$(70 + 0) = 70$	$(25 + 114) = 139$	$(95 + 114) = 209$

Table 1. Participant Counts by (First-Iteration) Condition

ANALYSES AND RESULTS

For purposes of simplicity, all of the variables that will be utilized in the analyses are presented and defined in Table 2 (with descriptive statistics for each provided in Table 3).

Hypotheses 1a and 1b

H1a and H1b address the frequency with which participants decide to provide services when they either do not or do receive uncertainty reporting, depending upon the frame (the gain or

<i>Variable</i>	<i>Definition</i>
<i>Decision_i</i>	0 if services were not provided and 1 if services were provided by participant <i>i</i>
<i>PredDev_i</i>	the absolute difference between the predicted profit for participant <i>i</i> and the risk-neutral expected value (lower absolute values correspond to better predictions)
<i>OptDec_i</i>	0 if the suboptimal decision was made and 1 if the optimal decision was made, by participant <i>i</i> (determined based on risk-neutral expected value)
<i>Profit_i</i>	the profit earned by participant <i>i</i>
<i>EstForm_i</i>	0 if a point estimate was provided and 1 if an interval estimate (uncertainty reporting) was provided for participant <i>i</i>
<i>Frame_i</i>	0 if a loss frame (loss-probable opportunity) and 1 if a gain frame (gain-probable opportunity) for participant <i>i</i>
<i>RiskRt_i</i>	the modified Holt and Laury (2002) survey measure of risk preference (between 1 and 11) for participant <i>i</i> (higher values correspond to more risk aversion)

Table 2. Definitions of Variables Used for Analyses

	<i>n</i>	Mean	Median	St. Dev.	Min.	Max.
<i>Decision_i</i>	209	0.598	1	0.491	0	1
<i>PredDev_i</i>	208	\$48	\$4	\$118	\$-	\$1,028
<i>OptDec_i</i>	209	0.708	1	0.456	0	1
<i>Profit_i</i>	209	-\$13	\$-	\$36	-\$100	\$44
<i>EstForm_i</i>	209	0.512	1	0.501	0	1
<i>Frame_i</i>	209	0.335	0	0.473	0	1
<i>RiskRt_i</i>	209	6.837	7	1.384	1	11

Table 3. Variable (First-Iteration) Descriptive Statistics

loss prospect). H1a addresses the frequency of pursuing opportunities in the gain frame (gain-probable opportunity); when the presence of uncertainty reporting reveals the possibility of a loss, H1a predicts that participants will more often forgo these otherwise attractive opportunities. H1b addresses the frequency of pursuing opportunities in the loss frame (loss-probable opportunity); when the presence of uncertainty reporting reveals the possibility of a gain, H1b predicts that participants will more often pursue these otherwise unattractive opportunities.

Table 4 provides a summary of frequency of pursuing initial opportunities separated by experimental condition. Related to H1a, the data included in Table 4 suggest that, as predicted, participants receiving uncertainty reporting more often forgo a gain-probable opportunity than do participants not receiving uncertainty reporting (91.67% versus 100.00%; one-tailed *t*-test, $p = 0.042$). Related to H1b, the data included in Table 4 suggest that participants receiving uncertainty reporting more often pursue a loss-probable opportunity than do participants not receiving uncertainty reporting (45.07% versus 38.24%); however, the difference is not statistically significant ($p = 0.209$). One likely factor driving this non-signif-

	No Uncertainty Reporting	Uncertainty Reporting	<i>p</i> -Value ^a
Gain Frame – H1a	100.00%	91.67%	0.042
Loss Frame – H1b	38.24%	45.07%	0.209
^a Reported <i>p</i> -values are based on one-tailed, heteroscedastic <i>t</i> -tests.			

Table 4. Frequency of Pursuing Opportunities (Decision_{*i*}) by Condition, for H1a and H1b

icant result is that the behavior predicted by H1b is risk-seeking by nature. Yet my experimental participants were overall quite risk-averse by nature.¹⁵

Hypothesis 2

H2 predicts that providing uncertainty reporting will have a negative overall effect on decision performance. Evaluating decision performance is complicated in real business environments, and also in this experimental design. *Ex ante*, decision performance can be determined by whether a manager efficiently utilizes available information and, from that, makes the best possible decisions. Profit is also a good measure of performance, *ex post*, although it could be impacted over the short term by factors outside of the manager’s control (including, in my experimental design, the random determination of variable costs per patient). In my experimental design, short-term (first iteration) decision performance is best evaluated considering the participant’s ability to utilize available information to accurately predict profits and then to make optimal decisions. The optimal decision is assumed to be pursuing a gain-probable scenario and forgoing a loss-probable scenario (consistent with risk neutrality). Thus, H2 essentially predicts that providing uncertainty reporting will result in larger prediction deviations¹⁶ and less frequent optimal decisions. Table 5 provides the mean values

¹⁵ Participants in my experiments indicated a high level of risk aversion overall: 6.84 on a 1-to-11 scale. For comparison, participants in other earlier studies utilizing the same or a very similar risk preference scale reported an average risk rating of only 6.2 (Deck, et al. 2008; Holt and Laury 2002).

¹⁶ As noted in Table 2, the prediction deviation is determined by comparing the profit prediction provided by each participant to the risk-neutral expected value. The absolute value of each prediction deviation provides a measure of efficient information analysis, with higher deviations reflecting poorer decision performance.

	Uncertainty Reporting	No Uncertainty Reporting	<i>p</i> -Value ^a
(Absolute) Prediction Deviation (<i>PredDev_i</i>)	\$81.43	\$13.76	< 0.001
Optimal Decision (<i>OptDec_i</i>) Frequency	67.29%	74.51%	0.126
^a Reported <i>p</i> -values are based on one-tailed, heteroscedastic <i>t</i> -tests.			

Table 5. Decision Performance by Condition, for H2

by condition for each of these decision performance measures.

The data reported in Table 5 provides moderate support for H2. Consistent with H2, the absolute prediction deviation was significantly higher when uncertainty reporting was provided (\$81.43 versus \$13.76; $p < 0.001$). The optimal decision frequency was lower when uncertainty reporting was provided (67.29% versus 74.51%), but the difference is not statistically significant ($p = 0.126$).

Hypothesis 3

The longitudinal effects of the uncertainty reporting are addressed in H3, which presents conflicting theories regarding whether (1) participants with no uncertainty reporting will adapt in later iteration and behave more like participants with uncertainty reporting and/or (2) participants with uncertainty reporting will become even more prone to risk aversion in later iterations. Ultimately, H3 is presented in the null, predicting no change in the effect of providing uncertainty reporting. Figure 2 illustrates the effects over repeated decision iterations of providing uncertainty reporting, for (absolute) prediction deviation (Panel A), optimal decision frequency (Panel B), and cumulative profit (Panel C).

Prediction deviation is the one measure of performance that was consistently worse with uncertainty reporting being provided, as shown in Panel A of Figure 2. For all of the decision iterations except 5, the prediction deviation when uncertainty reporting was provided was sig-

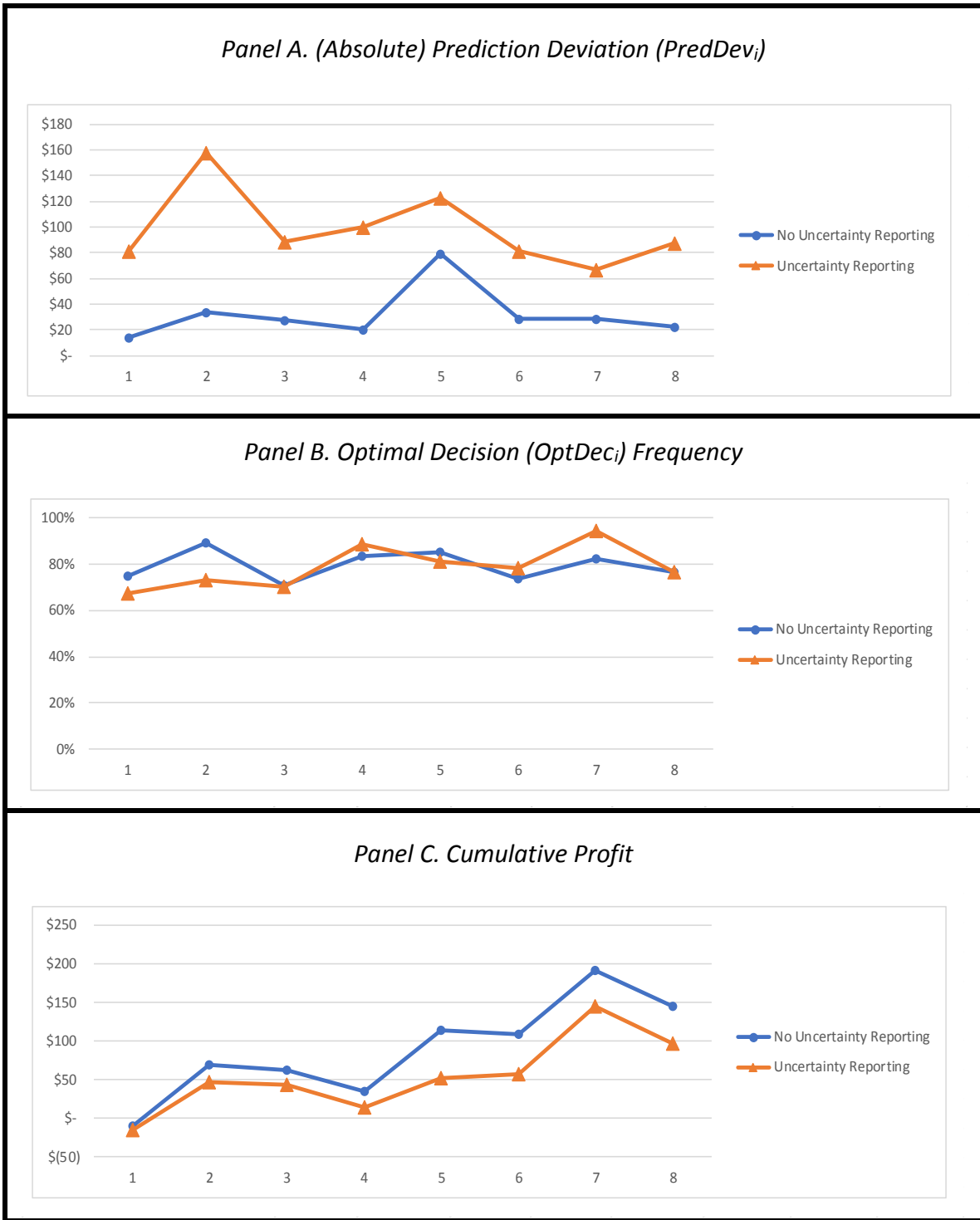


Figure 2. Decision Performance over Repeated Iterations, for H3

nificantly higher than the prediction deviation when no uncertainty reporting was provided (all one-tailed t -tests, $ps < 0.050$).

As shown in Panel B of Figure 2, after a couple of decision iterations, any difference in optimal decision frequency (which was not quite significant in the first iteration anyway) mostly disappeared. There were even a few decision iterations (iterations 4, 6, and 7) in which those with uncertainty reporting had a higher frequency of optimal decisions; however, only for decision iteration 7 is the difference statistically significant (94.39% versus 82.35%; two-tailed t -test, $p = 0.007$).

Panel C of Figure 2 illustrates that cumulative profit remained better throughout when no uncertainty reporting was provided. The difference in cumulative profit did not widen much except in decision iteration 5 (mean change of \$79.06 for no uncertainty reporting versus \$38.32 for uncertainty reporting; one-tailed t -test, $p = 0.049$). Overall, it does not appear that the effects of uncertainty reporting on profit got worse with repeated decision iterations, but it also does not appear to have gotten better.

In summary, the longitudinal data illustrated in Figure 2 do not seem to allow for rejection of the null H3. Over repeated decision iterations, the uncertainty reporting appears to have continuing (but relatively constant) negative impacts on profit predictions but does not appear to have initial or continuing significant impacts on optimal decision frequency or on profit earned (considering random effects). This could be the result of two offsetting effects, with decision makers without uncertainty reporting adapting to the uncertainty (as predicted by Birnberg and Slevin 1976) as well as decision makers with uncertainty reporting reacting more strongly to possible-loss avoidance tendencies (as predicted by Feltovich, et al. 2011).

SUMMARY AND CONCLUSIONS

A careful review of prior theory and research suggested that, in certain managerial accounting scenarios, providing uncertainty reporting in the form of confidence interval estimates of

critical data elements could be detrimental to decision performance. This was expected to be driven by (1) decision makers in a gain-probable (but loss-possible) scenario behaving in a risk-seeking manner and pursuing an opportunity, and (2) decision makers in a loss-probable (but gain-possible) scenario behaving in a risk-averse manner and forgoing an opportunity. The results of the experimental study generally support this prediction of a detrimental effect. Decision performance, measured by way of deviations in profit predictions and optimal decision frequency, was generally worse for participants provided with uncertainty reporting. Indeed, participants provided with uncertainty reporting more often forwent a gain-probable opportunity and more often pursued a loss-probable opportunity (although that difference was not statistically significant). These effects of reporting uncertainty did not appear to change much with repeated decision iterations.

Generally speaking, providing as much information as possible in financial reports should be desirable. If there is uncertainty associated with accounting data, it seems appropriate to make decision makers aware of that uncertainty. However, this research demonstrates that, in certain scenarios, reporting the specific level of uncertainty could induce dysfunctional decision behavior that is detrimental to performance.

Potential Limitations / Future Research

The use of student participants as a proxy for business managers in this experimental study creates a potential limitation, although it is well accepted that the use of professional participants for experimental accounting research is best avoided unless absolutely necessary (Libby, et al. 2002). The decision task used in this study was designed to be a much-simplified version of the comparable real business scenario, to make it less onerous on participants and more suitable to students. Also, the principle underlying (i.e., prospect theory) behaviors being studied are psychological in nature, suggesting that professional experience is not necessary to influence results. Even so, likely advantages that higher-level students or professional participants could offer are a better sense of what uncertainty represents and a better understanding of confidence interval distributions.

Birnberg and Slevin (1976) note that the level of variance, or the width of the confidence interval, could have an impact on the usefulness or effect of the additional information provided by the uncertainty reporting. In other words, relatively narrow confidence intervals may be ignored by decision makers but relatively wide confidence intervals might garner greater attention and influence decisions. In this study, the width of the confidence interval estimate was determined by the regression analyses of fictitious prior service dates. This study does not provide any analysis of differing effects dependent upon the width of the interval, though such analysis might be meaningful. Also, future similar research that strategically selects varying confidence interval widths to evaluate differential effects might help to clarify further the situations in which reporting uncertainty could be helpful or harmful.

One limitation of using students, and particularly business students, as participants in this study is that they may tend to be more risk-averse than the population in general. Especially related to the prediction of risk-seeking behavior in the loss-probable (but gain-possible) condition, having less risk-averse participants could be more informative.

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**DISCLOSING TAX CONSEQUENCES OF A LIFO REPEAL:
CONSIDERATIONS TOWARD AN ETHICAL DECISION-MAKING
MODEL BASED ON POTENTIAL CONVERGENCE OF IFRS & U.S.
GAAP**

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DISCLOSING TAX CONSEQUENCES OF A LIFO REPEAL: CONSIDERATIONS TOWARD AN ETHICAL DECISION-MAKING MODEL BASED ON POTENTIAL CONVERGENCE OF IFRS & U.S. GAAP

ABSTRACT

The United States has debated and deliberated the potential convergence of U.S. GAAP (Generally Accepted Accounting Principles) and IFRS (International Financial Reporting Standards) for decades. Several key issues have limited the movement of the United States toward adoption of IFRS, including the potential repeal of LIFO (Last-In, First-Out) inventory method employed by many U.S. firms. Given the overall movement of the world economy toward a universal adoption of IFRS, this paper explores the issue and proposes an ethical decision-making model that would guide voluntary disclosures related to a potential LIFO repeal for U.S. companies.

PURPOSE AND INTRODUCTION

The purpose of this paper is to use normative ethical theories and the accounting conceptual framework (SFAC 8) to develop an ethical decision-making model. The proposed model could be used to ascertain information that would be included as non-required disclosures for financial statements. Specifically, an example might include whether a company, such as ExxonMobil, which possesses extremely high LIFO reserves, should disclose the potential tax consequences of a LIFO repeal. In turn, a LIFO repeal could theoretically impact a firm's going concern. ExxonMobil is an especially interesting case because of the high LIFO reserves, which allows for the greatest potential distortion of inventory valuation on the financial statements and the largest tax consequences if it is repealed (Li & Sun, 2014). Although it is unlikely that ExxonMobil would cease to be a going concern due to the tax consequences of a LIFO repeal, it makes the ethical issue less obvious, as law does not currently require these disclosures.

BACKGROUND

CONVERGENCE THEORY

The United States is one of the few remaining capital markets without an International Financial Reporting Standards (IFRS) mandate. PWC (2017) notes three capital markets that do not have the IFRS mandate: “(i) the U.S., with no current plans to change; (ii) Japan, where voluntary adoptions are permitted but not required; and (iii) China, which intends to fully converge at some undefined future date.” The potential international convergence of accounting standards has been an issue for over a half century, as a more globalized economic marketplace has grown from a distant possibility to current reality. While original efforts aimed to harmonize and reduce differences between international standards and U.S. GAAP (Generally Accepted Accounting Principles), the Financial Accounting Standards Board (FASB) notes that “by the 1990s, the notion of harmonization was replaced by the concept of convergence” upon the development and implementation of a unified set of international accounting standards that would be used in “at least all major capital markets” (2017).

In 2010, the Securities and Exchange Commission (SEC) issued a position that IFRS was “best positioned to serve as the single set of high-quality globally accepted accounting standards” (Poon, 2016, p. 45). In 2012, the SEC issued the *Work Plan for the Consideration of Incorporating International Financial Reporting Standards into the Financial Reporting System for U.S. Issuers*. Though the report identified key issues related to the incorporation of IFRS in the U.S., no specific recommendation was made for convergence. Unresolved issues included “among others, the diversity in how accounting standards, including IFRS, are interpreted, applied and enforced in various jurisdictions around the world; the potential cost to U.S. issuers of adopting or incorporating IFRS; investor education; and governance” (FASB, 2017).

The SEC continues to evaluate potential paths forward related to the incorporation of or alignment with IFRS (FASB, 2017). Indeed, James Schnurr, Chief Accountant of the Securities and Exchange Commission, has indicated that he is “hopeful to be in a position in the coming months to commence discussions with the Chair and Commissioners about the different alternatives for

potential further incorporation of IFRS and the related issues/concerns of each alternative” (SEC, 2014). Bogopolsky (2015) points out that the SEC has indicated in its strategic planning that it is willing to consider the idea of a single set of accounting standards, but he points out it is a much longer-term goal and not likely in the immediate future.

Even though convergence of US GAAP and IFRS may not be in the near future, the purpose of the model proposed in this paper is to provide a model that guides ethical decision-making if (and when) convergence does occur. The model should inform ethical decision-making in such a way that non-required disclosures are more valuable and useful to those who use financial statements to make decisions, whether the decision makers are focused on US GAAP, IFRS, or a convergence of the two.

A U.S. adoption of IFRS would effectively prohibit the use of the last-in-first-out (LIFO) inventory valuation method (unless the U.S. Congress passes a law to allow LIFO for tax purposes). LIFO lowers a company’s tax liability in times of rising prices by calculating cost of goods sold (CGS) using the newest prices of inventory purchased and theoretically leaving the oldest purchases of inventory on the books (Johnson & Dhaliwal, 1988). For purposes of this paper, it is assumed that if IFRS is adopted in the U.S., the IRS and the U.S. Congress will not allow companies to continue using LIFO.

This effective repeal of LIFO could have potentially devastating effects on the going concern of many U.S. companies that use LIFO due to the tax consequences of the repeal (Frankel & Hsu, 2014). Currently, companies are not required to disclose (nor do they voluntarily disclose) this information. Companies in the oil industry are particularly at risk for negative consequences because the majority of these companies currently use LIFO. Specifically, ExxonMobil is the largest of these companies and would be negatively impacted the most. Therefore, the model proposed is generated based on whether or not the CFO of ExxonMobil should disclose the tax consequences of a LIFO repeal and the financial impact that disclosed would have on the company and the shareholders.

CORPORATE DISCLOSURE

With devastating corporate scandals, from fraud and misconduct, such as those at Wells Fargo and Enron, firm credibility and transparency have never been more imperative. Wells Fargo continues to receive negative attention from negative practices that have included opening unauthorized accounts, overcharging mortgage customers for unreasonable fees, and causing customers to default on auto and mortgage loans (Egan, 2018). Enron's fraud centered around "fake holdings and off-the-books accounting" (Segal, 2018) and ultimately destroyed what was once considered a "darling" of Wall Street. Continually faced with information asymmetries, investors are rarely provided no better alternative than to rely on information presented in a firm's financial statements when assessing the overall health and longevity of the firm.

Though GAAP augments the ease with which investors interpret and analyze financial information, investors have recently voiced their discontentment with the mandatory disclosures encompassed in financial statements. Burdened with the timeless battle of principle-agent relationships, investors feel that the breadth of information available to them in the financial statements is inadequate and, accordingly, have demanded "voluntary disclosures of more comprehensive information about the companies' long-term strategies and performance" (Sarkar & Bhattacharjee, 2017, p. 125). As the significance of corporate transparency reaches new heights, investors have turned to corporate disclosures to shed light on the breadth and depth of firm operations and planning (Bushman, Piotroski, and Smith, 2004).

In order to fully consider investors' calls for more comprehensive disclosures, a rudimentary understanding of current GAAP disclosure requirements is necessary. According to Gunawan and Lina, (2015) disclosure is not only integral in financial reporting but is also technically the final step in the presentation of financial statements. Moreover, financial statement disclosures are divided into two broad categories: mandatory disclosures and voluntary disclosures. As their names allude, mandatory disclosures are required by law, while voluntary disclosures are issued at the discretion of firm management. Adina and Ion (2006) describe mandatory disclosures as "those aspects and information which must be published as a consequence of the existence of

some legal or statutory stipulations, capital markets, stock-exchanges commissions or accounting authorities' regulations" (p. 1408).

Complementing this explanation of mandatory disclosures, FASB summarizes voluntary disclosures as "information primarily outside of the financial statements that are not explicitly required by accounting rules or standards" (2001). Serving as an independent U.S. government agency, the Securities Exchange Commission (SEC) mandates what information must be presented in the financial statements but has no authority over what information firms voluntarily disclose beyond their minimum (mandatory) requirements (Gunawan & Linda, 2015). However, should investor demands be met, the flexibility of voluntary disclosures that firms presently enjoy will be lessened.

While firms are not currently required to include voluntary disclosures, doing so may yield considerable benefits. Investors increasingly call for voluntary disclosures that contain greater scope and substance than those currently offered, and in providing this supplementary information, firms stand to gain investor confidence and credibility while simultaneously cutting capital costs. Beginning with cost reduction, "information asymmetries create costs by introducing adverse selection into transactions between buyers and sellers of firm shares" (Leuz & Verrecchia, 2000, p. 92).

In order to reduce agency costs, firms should work to minimize information asymmetries through extensive voluntary disclosures. In addition, supporting economic theory with their empirical research, Leuz and Verrecchia (2000) found that a firm's commitment to "increased disclosures" curtails information asymmetries between firms and shareholders, yielding positive outcomes such as lower bid-ask spreads and higher share turnover (p. 121). Further, Gunawan and Linda (2015) assert that the issuance of further information to the financial statements will boost investor and community confidence in the firm, leading to an expected increase in stock price and sales volume. Building on the advantages of more comprehensive voluntary disclosures, Adams (2008) reports that firm credibility and image can be enhanced even with the reporting

of negative news. Thus, with numerous benefits available for firms willing to disclose more inclusive information, firms may consider voluntarily meeting the disclosure demands of investors.

In short, corporate transparency and credibility are essential components of success in today's business world. Though GAAP specifies stringent reporting requirements for financial statements, investors are still dissatisfied with the information available to them. In order to reduce information asymmetries, investors have demanded more extensive voluntary disclosures, which firms stand to benefit from issuing. By providing additional information, firms may reduce capital costs while increasing both investor confidence and credibility. Exemplified best in their report on voluntary disclosures, FASB stated "that improving disclosures makes the capital allocation process more efficient and reduces the average cost of capital" (2001). Additionally, FASB found that many prominent firms have improved communication with investors through disclosure of comprehensive corporate information and expects the significance of voluntary disclosures to increase as the business world continues to evolve at a dizzying pace (2001). Thus, while voluntary disclosures currently lack regulation, investors have made their demands, and the benefits of offering more exhaustive information in their disclosures leave firms with much to consider.

LITERATURE REVIEW

AGENCY THEORY

Principals (wealth-maximizing shareholders) want agents (managers) to adopt policies (such as LIFO) that will maximize their wealth (Dye, 1985). Agency theory attempts to explain the relationship (costs) between the principals of a firm and their agents. Jensen and Meckling (1976) find that agency costs will exist anytime there is a separation of ownership and control – the principal and agent are not the same people. Problems emerge when agents provide principals with incomplete information or inefficiencies exist in productivity or the use of resources. In addition, desires and goals of principals and agents are often in conflict due to information asymmetry. Specifically, principals may not know what the agent is doing because that

information is difficult or expensive for the principal to ascertain. These conflicts often arise due to the risk tolerance of principals versus that of agents, ultimately creating opposing views on information disclosure.

UNDERSTANDABILITY OF INFORMATION

Investors are expected to have some level of responsibility and be “informed” and able to interpret the provided financial accounting information in order to make educated decisions with regards to their investments. Research shows that the Internet increasingly plays a larger role in the dissemination of the massive financial data currently provided to shareholders. Dull, Graham, and Baldwin (2003) find that adding hyperlinks to electronic financial data affects user judgments. Shareholders with access to systems that reduce cognitive effort may actually use more of the data in their decision making (Denton, 2001). These results suggest that shareholders may prefer less information for decision-making purposes because they do not seem willing to muddle through the excessive amounts of information provided to them (Todd & Benbasat, 1992, 1993).

Even for an educated, savvy investor, a surfeit of information may lessen the marginal utility of the entirety of information provided. A current 10-K of a publicly traded company can range upward to 100 pages of financial data and include accompanying notes with approximately 10 pages or less devoted specifically to financial statements. This extensive documentation is due to the amount of explanation needed for understanding the financial statements.

Since the late 1960s, researchers, based much on the work of Schroder, Driver, and Streufert (1967), have believed that information overload reduces decision-making effectiveness of both internal decision-makers (i.e. management) as well as external stakeholders. Countermeasures to information overload, such as raising the general quality, usefulness, and conciseness of provided information, have been suggested (Schick, Gordon, & Haka, 1990). In addition, the interlinking of internal and external information has also been suggested as a potential countermeasure to information overload (Eppler & Mengis, 2004; McWhorter, 2003).

FULL-DISCLOSURE AND VERIFIABILITY

Information provided to shareholders regarding the potential effects of a LIFO repeal would be considered nonproprietary information and, if publicly provided, would accompany financial statements in the annual report. According to the full-disclosure principle, if investors are aware of this nonproprietary information, the company will release it (Dye, 1985). However, cost constraints and a lack of verifiability are pervasive factors in a company's lack of disclosure of non-proprietary information (Dye, 1985; FASB, 2010).

STATEMENT OF FINANCIAL ACCOUNTING CONCEPTS (SFAC)

The SFAC are a series of publications "intended to set forth objective and fundamental concepts that will be the basis for development of financial accounting and reporting guidance" (FASB, 2010). The SFAC "objectives and fundamental concepts ... may provide some guidance in analyzing new or emerging problems of financial accounting and reporting in the absence of applicable authoritative pronouncements" (FASB, 2010). Using SFAC 8 as the conceptual framework and Jones' (1991) adaptation of Rest's (1986) four-component model for individual ethical decision making and behavior, this paper proposes a new model to determine whether voluntary information should be disclosed in the financial statements.

THE ROLE OF THE FINANCIAL ACCOUNTING STANDARDS BOARD (FASB)

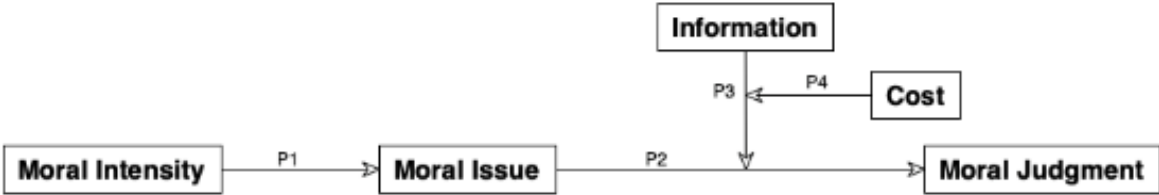
Accounting information is collected, analyzed, and processed into reports and disbursed to external users. Because decision-makers outside a company use this accounting information, it is highly regulated and must follow certain rules and principles set by the accounting profession with the premise of protecting investors (FASB, 2010). However, FASB does not explicitly require the disclosure of potential negative effects of changes to standards. Following the works of Leftwich (1980), Watts and Zimmerman (1986), and Beaver (1998), Healy and Palepu (2001) find that companies view accounting information as a public service that is funded by the current shareholders; however, potential shareholders also reap the benefits of this information without having to pay for it. This discourages companies from disclosing information that is not required.

Currently, the U.S. requires financial reporting follow U.S. GAAP set by the FASB. In the SFAC No. 8, the FASB states that reported financial information is more useful “if it is comparable, verifiable, timely, and understandable” (FASB, 2010, p. 19). Information from one reporting entity is most useful when it can be compared to similar information from another reporting entity for investment and other decisions; consistency among accounting methods helps to achieve this goal (FASB, 2010). Supporters of a LFO repeal argue that such a repeal would create more comparability among companies and their method of valuing current inventory and cost of goods sold and, therefore, a more comparable net income (Pear, 2011). Unfortunately, a repeal of the LIFO method of inventory valuation would cause enormous tax consequences for many companies thereby potentially affecting their going concern (Frankel & Hsu, 2014).

MODEL DEVELOPMENT

The proposed model is based on a set of theoretical premises. The premises serve as a basis to link the primary constructs associated with the model. Those constructs include moral intensity, a specific moral issue, information that is applied to the moral issue, costs that are assigned to the issue, and a moral judgment. The model is presented below as Figure 1.

FIGURE 1: Proposed Ethical Decision-Making Model



Each of the elements of the model, as well as associated premises, are described in the paragraphs that follow. Each premise is numbered as P1, P2, etc.

MORAL INTENSITY

Moral intensity is a construct which captures the extent of issue-related moral imperative in a situation (Jones, 1991). Three components of moral intensity mentioned by Jones are most

germane to the current ethical question: (1) magnitude of consequences deals with the amount of potential (financial) harm to shareholders; (2) probability effect; and (3) temporal immediacy is important in this model because of the uncertain timing of events. The more apparent the magnitude, probability, and immediacy effects are, the higher the moral intensity. Moral issues of high intensity are recognized as having consequences for others, which is a vital component in the recognition moral issues (Jones, 1991).

P1: *The higher the level of moral intensity, the higher the likelihood that a moral issue is present.*

MORAL ISSUE AND MAKING MORAL JUDGMENTS

Using the proposed model to determine whether a moral issue exists, the first step is an examination of the level of moral intensity using the three factors mentioned. If a significant level of moral intensity exists, it is assumed that a moral issue exists, and a moral judgment must, therefore, be made. To make a moral judgment, normative ethical theories are examined as well as eternal law.

P2: *If a moral issue is present, we make a moral judgment.*

USEFUL INFORMATION

Financial information provided to shareholders must be useful. As defined in the FASB conceptual framework SFAC 8, useful information must be relevant and faithfully presented (FASB, 2010). Relevant information is information that would potentially make a difference in the decisions made by the users, even if some users would not utilize that information or if some users already have the information from other sources. When financial information has predictive value it is capable of impacting decisions (FASB, 2010). Financial information that is faithfully represented would be complete, neutral, and free from error. To be considered complete, the financial statements must include enough information such that users can fully understand what the financial reports are reporting. Neutral information is a depiction of information without bias one way or the other.

P3: *Useful information will positively moderate the relationship between the existence of a moral issue and the act of making a moral judgment.*

COST OF PROVIDING INFORMATION

Financial information is not presented without cost. Shareholders are most impacted by costs in the form of reduced returns. Costs are created if users must obtain information from outside sources or estimate it because it is not readily provided to them (FASB, 2010). Therefore, if companies do not provide information that shareholders believe to be necessary in making informed decisions, shareholders will incur the costs individually to procure that information. The cost in this model refers to all costs incurred by the firm in presenting the financial information or the costs that would be incurred by shareholders for procuring financial information not provided by the firm. The benefit of reporting information on the financial reports must outweigh the cost involved in presenting the information.

P4: *The cost of reporting voluntary financial information negatively impacts the effect that useful information has on the relationship between occurrence of a moral issue and making a moral judgment.*

CONCLUSION AND FUTURE RESEARCH

DISCUSSION

The premises provided in the proposed model suggest that it would be ethically and morally correct for a company to disclose the potential tax consequences of a LIFO repeal. Even though companies with extremely high LIFO reserves will have significant retroactive taxes to pay back if LIFO is repealed, it is not likely that the tax liability will necessarily affect the going concern of these companies. However, there are smaller companies and industries for which going concern would theoretically become an issue. For example, post 2010, the president and CEO of Jewelers of America (a LIFO coalition member) sent out a letter to all organizational members urging them to call Congress and oppose a LIFO repeal due to the devastating effects that it would have on the jewelry industry. In addition, in 2009 the National Association of Wholesaler-Distributors sent a letter to the acting secretary of the SEC, including 48 pages of comments from association members, regarding the repeal of LIFO. Moreover, many of the comments indicate that results

could be catastrophic, perhaps ending the going concern of many businesses (West, 2009). An additional ramification of a LIFO repeal is the fact that many companies, large and small, would have to decrease their workforce and reduce benefits.

Trust in the accounting field and corporate America in general is consistently in decline due to decades of financial debacles such as Enron, Wells Fargo, and others. With that, failing to reveal potentially devastating financial consequences to shareholders will not boost positive public opinion. Because Rodgers and Gago (2004) find ethical theories influence management's reporting of firm operations and financial status, the proposed model suggests to management that disclosing potential events (however probable and devastating) is the ethical thing to do.

Even though ExxonMobil possesses extremely high LIFO reserves and will have significant retroactive taxes to pay back if LIFO is repealed, it is not likely it will affect the going concern of the company. Thus, ExxonMobil shareholders would not lose all of their investment and would likely, at some point, fully recover. However, there are other smaller companies and smaller industries in which going concern may be an issue.

Although this ethical decision-making model was derived specific to ExxonMobil, the results can be generalized to other companies, not only large companies nor companies in the oil industry, but also all companies that are publicly traded in the United States. ExxonMobil is the largest oil company in the world. Determining that it is ethical for ExxonMobil to disclose the potential tax consequences of a LIFO repeal would provide guidance for other companies and industries.

FUTURE RESEARCH

The model proposed in this paper is conceptual at this stage. Certainly, the model should be tested – in a variety of scenarios – in order to validate its efficacy.

An initial extension of the current theory-building research would be to apply the model fully to a company with high LIFO reserves, such as ExxonMobil (a company used as an example earlier

in the paper). This would allow the model to be reviewed and applied in such a way as to attempt to answer managerial dilemmas from an ethical standpoint. Such research might also suggest additions or changes to the model based on a “goodness of fit” test.

Pending model changes and revisions, this topic deserves additional quantitative inquiry. Specifically, investigating a firm that has made a transition from LIFO to FIFO and the financial consequences on the firm. As the U.S. is the only country currently using the LIFO inventory valuation method, it may be beneficial to investigate the financial effects on an international firm where a country repealed LIFO.

In addition, this study used only two parts of the Rest 1986 four-component model. It would be beneficial to further this study beyond making a moral judgment to and include additional components of Rest’s model – including issues of establishing moral intent and engaging in moral behavior (Rest, 1986). Rodgers and Gago find that ethical theories influence the decisions of management (2004). Therefore, this study could change the intent of CFOs from currently not disclosing to disclosing the effects of a potential LIFO repeal and, thereby, causing firms to engage in more positive ethical behavior.

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A GENERAL ANALYSIS OF THE IMPACT OF SCALE DIFFERENCES WHEN INTERPRETING R^2 AS AN INDICATOR OF VALUE- RELEVANCE

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A GENERAL ANALYSIS OF THE IMPACT OF SCALE DIFFERENCES WHEN INTERPRETING R^2 AS AN INDICATOR OF VALUE- RELEVANCE

ABSTRACT

This paper demonstrates analytically the problem of using R^2 in empirical accounting studies to examine changes in the value-relevance of accounting numbers. Specifically, we analyze the bias in R^2 resulting from scale differences among sample firms. We show that the bias in R^2 is not systematic over time. In addition, the bias exists even when the regression coefficient estimators are unbiased. Therefore, the pattern in the true R^2 may be quite different from the pattern in the observed R^2 . Using a general framework, we demonstrate how attributes of the scale proxy, as well as attributes of the variables in the analyses, are linked to bias in the observed R^2 . Accordingly, our analysis provides insights into when one might expect problems. To correct for this scale difference problem, we discuss one approach that could potentially reduce the bias in R^2 . We suggest researchers use a scale proxy deflator. However, due to the difficulty of observing the true scale factor, the relative efficacy of this approach will need further analyses.

INTRODUCTION

A large number of empirical accounting studies have used changes in explanatory power of a cross-sectional valuation regression (R^2) to infer changes in the value-relevance of accounting numbers over time (see for example, Lev and Zarowin (1999)). The typical research design in these studies employs a levels-based regression in which stock price is regressed on earnings and/or book value, deflated by some measure of size. Common size deflators include number of shares outstanding, book value of equity, total assets, and market value of equity. In addition to econometric specification issues regarding omitted variables, linearity, or interaction effects, such a design gives rise to the question of whether or not the scale differences across sample firms matters. Gu (2007) provides a comprehensive discussion of the issues related to using the coefficient of determination (R^2) to infer differences in explanatory power across different samples. We complement the analysis by Gu through focusing solely on the problems associated with scale effects.

A scale effect occurs when an endogenous act of management changes the share price of the

firm while the underlying economic characteristics of the firm remain constant. In other words, while the economic characteristics of the firm remain unchanged, the firm's share price changes. Accordingly, cross-sectional differences in stock prices may be attributable to scale differences rather than economic activities. Barth and Clinch (2009) point out that for scale differences to result in spurious inferences, the scale effect must be unrelated to the research question and mitigation requires specifying both the scale effect and how it relates to the research variables being studied. Accordingly, they note that scale may be difficult to define since it is unobservable, and that alternative proxies may exist.

Barth and Clinch (2009) suggest that researchers "investigate the sensitivity of their inferences to alternative remedies for scale." This study assists researchers in identifying the potential for inference problems and relates the degree of bias to observable attributes of the scale factor as well as observable attributes of the other variables in the study. Through the use of our results, a researcher can better understand the expected bias and can use our results in specifying remedies. Unfortunately, these remedies may only be useful under certain conditions which are specified by Gu (2007).

Brown, Lo, and Lys (1998) theoretically investigate the effect of scaling on R^2 in accounting valuation studies. They examine the scale effects due to stock splits on the bias of R^2 in level studies. Their analysis shows that the observed R^2 in accounting valuation studies is upwardly biased and the bias is increasing as the scale factor's coefficient of variation increases. While our analysis is similar, we examine this issue in a more general framework and conclude that the bias in the observed R^2 is dependent upon a number of factors, not just the coefficient of variation of the scaling factor. Variation in all of these factors may result in the bias of the observed R^2 being either positive or negative. Our results also demonstrate that the magnitude of the bias is not systematic across periods. Accordingly, our results suggest that the recommendations of Brown, Lo, and Lys (1999) are not appropriate in all cases, and generally only are applicable in certain cases.

The econometrics literature on panel data has suggested that there may be various unobservable individual effects which may be correlated with the true independent variables of interests. This problem may result in inconsistent estimators when using OLS regression. One of these unobservable individual effects that may be present in value-relevance research in accounting results from there being a scale-related effect. We refer to this as the scale difference among sample firms. Unfortunately, since most of the accounting variables used in the value-relevance research are time-specific and/or period-specific, there exists the potential for severe scale differences across the observations.

Numerous explanations or causes for the scale difference exist. For example, a simple explanation for the scale difference in accounting data is that firm size is correlated with many of the accounting variables. Large firms, on average, tend to have larger values for many accounting variables than smaller firms. This problem exists even after controlling for firm size through the use of financial ratios. Foster (1986) discusses that the use of ratios to control for size is predicated on a strict proportionality between the numerator and denominator. This strict proportionality is assumed both cross-sectionally (across firms) and over time (for a single firm). Frecka and Ziebart (1992) demonstrate that size continues to be correlated with other financial statement variables even after using ratios to control for size.

A more complicated case of a scale difference in accounting data could be that two firms with the same amount of total assets may have had different initial investments when they were formed. For example, one firm starts out with a \$100 million initial investment and it grows at 10% per year. By the end of the eighth year, this firm's total assets will be \$214 million. Another firm, starting with an initial investment of \$200 million will also have total assets of \$214 million at the end of seventh year if the firm is growing at 1% a year. While both firms have the same amounts for total assets, ignoring the potential scale (the initial investment) difference across the two cases may cause the regression model to overfit or underfit the data.¹ Thus, the

¹ A related issue is that many level studies in accounting use "per-share" variables. This does not solve the scale

coefficient of determination (R^2) may not converge to its true value. This potential bias in R^2 is even worse when researchers run valuation regression models cross-sectionally, period by period, over relatively long horizons. Accordingly, the issue is: Can changes in R^2 in such mis-specified models represent changes in the value-relevance of accounting information over time?

While numerous causes for scale differences exist, our analysis investigates the potential problem in a general manner and does not focus on a single type of scaling problem. Given a scale effect (regardless of cause), we demonstrate how the scale effect impacts the use of R^2 in studies of value-relevance. We examine analytically the bias in R^2 as a result of the scale differences among sample firms within the context of empirical accounting value-relevance studies. This issue is very important since some researchers may be using biased R^2 estimates; resulting in erroneous inferences regarding the value-relevance of accounting information over time.

To the extent that the evaluation criterion for assessing value-relevance, R^2 , is biased in certain accounting studies, it is hard to reach an agreement regarding the appropriate inferences to be drawn. This study suggests one approach for reducing the bias. However, the actual efficacy of this approach has not been ascertained empirically. It is our hope that the results in this paper will improve the effectiveness of research designs by capital market researchers when they investigate value-relevance. In addition, we expect that our results may assist in interpreting the mixed results of previous studies.

The remainder of this paper is organized as follows. Section 2 demonstrates analytically the bias in R^2 in cross-sectional level studies. Section 3 suggests one approach to resolving this problem. Conclusions are summarized and future empirical applications are discussed in Section 4.

related problems since there are scale-related effects even after one controls for size. In addition, stock splits or similar types of changes affecting the numerator may exacerbate the problem.

BIAS IN THE COEFFICIENT OF DETERMINATION (R^2) IN LEVEL STUDIES OF VALUE-RELEVANCE

In a linear regression model where stock price is regressed on earnings and/or book values, the model's R^2 (coefficient of determination) is used by some researchers as an indicator of the explanatory power of the accounting information - earnings, book value, and/or other accounting variables. However, if the regression model is mis-specified, then the appropriate interpretation of differences in the explanatory power across years or samples may be problematic. Although other specification errors may exist, we focus on the potential effects of differential scaling across the sample of observations used in the regression. When scaling differences exist, the model's R^2 is generally biased, and inferences regarding the value-relevance of the exogenous variables may be in error. Next we show formally how this happens.

Suppose we are interested in examining the linear relationship between Y (stock price) and X (accounting variables), where $Y = (Y_1, Y_2, \dots, Y_N)$, $X = (X_1, X_2, \dots, X_N)$.

Assume the true relation between them is:

$$Y_i = a + bX_i + e_i \quad (1)$$

where: $i = 1, 2, \dots, N$.

However, what we can observe in reality is some multiplicative scaled variables $S_i Y_i$ and $S_i X_i$, where S_i may vary across firms. Variations in $S_i Y_i$, due to the variations in S_i , are not of direct interest to our research, but confound our testing of the relationship between Y_i and X_i . Since explicit techniques for purging out the scale effects are generally not available to researchers, using the observed variables to formulate a linear relationship results in the following mis-specified model:

$$s_i Y_i = \alpha + \beta s_i X_i + \varepsilon_i \quad (2)$$

or equivalently
$$Y_i^* = \alpha + \beta X_i^* + \varepsilon_i \quad (3)$$

where $Y_i^* = s_i Y_i$, $X_i^* = s_i X_i$, and $Y^* = SY$, $X^* = SX$, $S = (S_1, S_2, \dots, S_N)$.

Notice that the difference between (2) or (3) and (1) is that equations (2) and (3) omit the scale

variable S_i as a regressor, and have an intercept term labeled α .² Since the model structure has changed between (1) to either (2) or (3) because of the scaling, the coefficient of determination, R^2 from equation (1) compared to the R^2 either from equation (2) or (3) also changes because of the multiplicative effects of the scaling. Consequently, we should not rely on the explanatory power of equation (2) or (3) to represent the explanatory power of the initial model, equation (1).

The difference in the observed R^2 s between equation (1) (truth) and equations (2) or (3) (observed) can be demonstrated as follows: suppose we have the true relation depicted in model (1), then let us define R^2 as

$$R^2 = \frac{SS_{reg}}{SS_{total}} \quad (4)$$

where SS_{reg} denotes the regression sum of squares and SS_{total} denotes the total sum of squares.

A further derivation of (4) gives the following expression of R^2 :

$$R^2 = \hat{b} * \frac{\sum_i (X - \bar{X})(Y - \bar{Y})}{\sum_i (Y - \bar{Y})^2} \quad (5)$$

Denote: R_{xy} as $\sum (X - \bar{X})(Y - \bar{Y})$, R_{yy} as $\sum (Y - \bar{Y})^2$, and R_{xx} as $\sum (X - \bar{X})^2$, expression (5) can be rewritten as

$$R^2 = \hat{b} * \frac{R_{xy}}{R_{yy}} = \frac{R_{xy}^2}{R_{xx} * R_{yy}} \quad (6)$$

Since X_i and Y_i are random variables, we cannot derive the finite sample solution for R^2 from expression (6). However, based on the Weak Law of Large Numbers (WLLN),

$$\frac{1}{N} R_{xy} \xrightarrow{p} Cov(X, Y) \quad (7)$$

$$\frac{1}{N} R_{xx} \xrightarrow{p} Var(X) \quad (8)$$

$$\frac{1}{N} R_{yy} \xrightarrow{p} Var(y) \quad (9)$$

as $N \rightarrow \infty$.

Consequently,

$$R^2 = \frac{R_{xy}^2}{R_{xx} * R_{yy}} \xrightarrow{p} \frac{Cov(X, Y)^2}{Var(X)Var(Y)} = \rho_{xy}^2 \quad (10)$$

² However, the intercept term may not be a constant. Similarly, the slope coefficient as well as the error structure may also differ from equation (1).

Where ρ_{xy} is the correlation of coefficient, as $N \rightarrow \infty$. Therefore, the R^2 in model (1) is shown as follows:

$$1 - \frac{RSS}{TSS} = R^2 \xrightarrow{p} 1 - \frac{Var(e)}{Var(Y)} \quad (11)$$

as $N \rightarrow \infty$.

However, when either equation (2) or (3) is used,

$$R^2 = \hat{\beta} * \frac{\sum_i (X^* - \bar{X}^*)(Y^* - \bar{Y}^*)}{\sum_i (Y^* - \bar{Y}^*)^2} \xrightarrow{p} \frac{Cov(X^*, Y^*)^2}{Var(X^*)Var(Y^*)} \quad (12)$$

Let us assume, for tractability, that the scale factor S_i is independent of both dependent variable Y_i and independent variable X_i . The impact of relaxing this assumption could be readily assessed using simulations, but it is beyond the scope of this study. Based on the assumption that the scale factor S_i is independent of both dependent variable Y_i and independent variable X_i , we can depict the bias in the most general case through the following: (see the appendix for the derivation)

R^2

$$\begin{aligned} \xrightarrow{p} & \left(1 + \frac{\frac{a}{b} * \frac{EX}{Var(X)}}{1 + \frac{(ES)^2}{Var(s)} + \frac{(EX)^2}{Var(X)}} - \frac{a * \frac{EY}{Var(Y)}}{1 + \frac{(ES)^2}{Var(s)} + \frac{(EY)^2}{Var(Y)}} - \frac{\frac{a^2}{b} * \frac{EX}{Var(X)} * \frac{EY}{Var(Y)}}{\left[1 + \frac{(ES)^2}{Var(s)} + \frac{(EX)^2}{Var(X)} \right] * \left[1 + \frac{(ES)^2}{Var(s)} + \frac{(EY)^2}{Var(Y)} \right]} \right) \\ & - \frac{(ES^2) * \frac{Var(e)}{Var(S)Var(Y)}}{1 + \frac{(ES)^2}{Var(s)} + \frac{(EY)^2}{Var(Y)}} - \frac{\frac{a}{b} * \left[\frac{EX}{Var(X)} \right] * \left[(ES^2) * \frac{Var(e)}{Var(S)Var(Y)} \right]}{\left[1 + \frac{(ES)^2}{Var(s)} + \frac{(EX)^2}{Var(X)} \right] * \left[1 + \frac{(ES)^2}{Var(s)} + \frac{(EY)^2}{Var(Y)} \right]} \end{aligned}$$

as $N \rightarrow \infty$. (13)

Since the denominators in the expression above (13) are positive, we need to focus on the sign and magnitude of the numerator for determining the five components of the bias. Accordingly, the bias in R^2 depends on the sign of a, b, EX, EY, ES as well as the magnitude of $\frac{EX}{Var(X)}, \frac{EY}{Var(Y)}, \frac{ES^2}{Var(s)}, Ee^2$, and ES^2 .

Note that the bias in R^2 exists even when the coefficient estimator is unbiased. The following expression gives R^2 under the condition that $\hat{\beta}$ is unbiased: (see the appendix for details regarding this derivation)

$$\begin{aligned}
 R^2 &\xrightarrow{P} \left(1 - \frac{(ES^2) * Var(e)/Var(S)Var(Y)}{\left[1 + \frac{\bar{S}^2}{Var(S)} + \frac{(EY)^2}{Var(Y)}\right]}\right) \\
 &= 1 - \frac{Var(e)}{Var(Y)} * \frac{(ES^2)/Var(S)}{\left[1 + \frac{(ES)^2}{Var(S)} + \frac{(EY)^2}{Var(Y)}\right]} \\
 &= 1 - \frac{Var(e)}{Var(Y)} * \frac{ES^2}{\left[ES^2 + \frac{(EY)^2 Var(S)}{Var(Y)}\right]}
 \end{aligned}$$

as $N \rightarrow \infty$. (14)

It is clear from the above expression that when $\hat{\beta}$ is unbiased, R^2 is always positively biased. In addition, the higher the variance of the scale factor, the higher the positive bias. This result is similar to that of Brown, Lo, and Lys (1999), who demonstrate a positive bias. The positive bias which occurs when $\hat{\beta}$ is unbiased holds irrespective of the signs of b , EX , and EY .

Now, let us assume the more complicated case when β is biased, as in expression (13). A biased regression coefficient is probably the case in most cross-sectional studies of the value-relevance of accounting information. It is hard to determine if R^2 will be biased consistently in one direction or the other. However, Barth and Kallapur (1996) provide a detailed discussion as to why the signs of α , EX , and EY are expected to be positive in the context of valuation analyses in empirical accounting research. Although Barth and Kallapur do not discuss explicitly the expected sign of b , an analysis of prior value-relevance studies in accounting finds only two instances of a negative estimate for the coefficient; Collins et al. (1997) and Francis and Schipper (1996). Consistent with most of the previous research, we make the assumption that α , b , and EX are positive, this leads to a positive EY . Thus, the sign of the difference between the R^2 's in the mis-specified model and the correct model is

determined by:

$$\begin{aligned}
& \left(\frac{a}{b} - a\right) (Var(s)^2)Var(X)EX + \left(\frac{a}{b} - a\right) Var(s)Var(X)EX(ES)S^2 \\
& + \left(\frac{a}{b} - a\right) (Var(s))^2 (EX)^3 + \left(\frac{2a}{b} - \frac{a^2}{b} - a\right) (Var(s))^2 (EX)^2 \\
& + \left(\frac{a}{b} - \frac{a^2}{b}\right) (Var(s))^2 EX - a(Var(s)^2)Var(X) - aVar(s)Var(X)ES + \\
& \frac{(Var(s)^2)Var(X)Var(e)EY}{Var(Y)} + \frac{Var(s)Var(X)Var(e)(EY)^2(ES)^2}{Var(Y)} + \frac{Var(s)Var(e)(EY)^2(EX)^2}{Var(Y)}
\end{aligned}
\tag{15}$$

It is clear from (15) that when the coefficient estimator in the mis-specified model is unbiased (that is, $a = 0$ as shown in the appendix), the difference in R^2 s between the mis-specified model and the correct model is always positive. However, this special case is not representative of the more general condition when the coefficient estimator in the mis-specified model is biased, as shown in Barth and Kallapur (1996). In cross-sectional accounting value-relevance studies, where the coefficient estimator is biased, the sign of the difference in R^2 s is much more complicated than in the case of an unbiased estimator.

To investigate the effect of various accounting variables and regression estimators on the sign of the difference in R^2 s between the mis-specified model and the correct model, we conduct two analyses. In the first analysis, we examine the general determinants of the sign of the difference in R^2 s using alternative values for the component parameters. This simulation demonstrates how the sign of the bias is determined by the components identified in our theoretical analysis. In the second analysis, we use the same accounting variables and the regression estimators obtained in previous value-relevance studies, specifically Collins et al. (1997), and Kothari and Zimmerman (1995), to simulate the sign and the degree of bias in R^2 in previous studies.

To be consistent with our theoretical analyses, we conduct these analyses based on the assumption that the scale factor is independent of both the dependent variable and the independent variable. In the first set of simulations, we start with the simple case in which we set every parameter equal to one. We then change each of the parameters systematically and compute the effect on the bias

in the R^2 specified in equation (15).³ We then combine variations of different parameters to examine their joint effect on the bias in R^2 .

Our simulation analysis is simple and easy to implement. More importantly, it is aimed at examining the influence of systematic variation of each parameter on the sign and magnitude of the difference in R^2 s between the mis-specified model and the correct model. For example, we reduce the mean of the independent variable from one to one tenth, we also increase the variance of the independent variable a hundred fold (and increases in its standard deviation by a factor of ten). We investigate both of these effects individually and then in combination.

Table 1: Simulations using random numbers. R^2 (est) is R^2 in the mis-specified model, as shown in equation (13), R^2 (true) is R^2 in the correct model, as shown in equation (11). Bias represents the bias in mis-specified model, i.e., R^2 (est) – R^2 (true).

³ This is not a pure simulation in the sense that we don't use a random number generator with a specified distribution to generate the random variables in equation (15). Instead, we are systematically choosing the magnitudes to examine the effects of varying the parameter values.

<i>EX</i>	<i>Var(X)</i>	<i>a</i>	<i>b</i>	<i>Var(e)</i>	<i>ES</i>	<i>Var(S)</i>	$R^2(est)$	$R^2(true)$	<i>Bias</i>
1	1	1	1	1	1	1	0.667	0.5	0.167
0.1	1	1	1	1	1	1	0.425	0.5	-0.075
1	100	1	1	1	1	1	0.985	0.99	-0.005
1	1	10	1	1	1	1	0.451	0.5	-0.049
1	1	1	10	1	1	1	0.992	0.99	0.002
1	1	10	10	1	1	1	0.886	0.99	-0.104
1	1	1	1	100	1	1	0.026	0.001	0.025
1	1	1	1	1	0.1	1	0.749	0.5	0.249
0.1	1	10	1	1	1	1	0.0425	0.5	-0.4575
0.1	1	1	10	1	1	1	0.985	0.99	-0.005
1	100	10	1	1	1	1	0.686	0.99	-0.304
1	100	1	10	1	1	1	0.99	0.99	0
1	100	10	10	1	1	1	0.995	0.999	-0.004
1	1	10	1	100	1	1	0.394	0.091	0.303
1	1	1	10	100	1	1	0.939	0.909	0.03
1	1	10	1	1	0.1	1	0.583	0.5	0.083
1	1	1	10	1	0.1	1	0.993	0.99	0.003
1	1	10	10	1	0.1	1	0.898	0.99	-0.092
1	1	10	1	1	1	100	0.583	0.5	0.083
1	1	1	10	1	1	100	0.993	0.99	0.003
1	100	10	1	1	0.1	1	0.551	0.99	-0.439
1	100	1	10	1	0.1	1	0.9998	0.9999	-0.0001
1	100	10	10	1	0.1	1	0.99	0.999	-0.009
0.1	1	10	1	100	0.1	1	0.02	0.01	0.01
0.1	1	1	10	100	0.1	1	0.505	0.5	0.005
0.1	1	10	10	100	0.1	1	0.381	0.5	-0.119
0.1	1	10	1	100	1	1	0.015	0.01	0.005
0.1	1	1	10	100	1	1	0.502	0.5	0.002
0.1	1	10	10	100	1	1	0.425	0.5	-0.075
1	100	10	1	100	1	1	0.425	0.5	-0.075
1	100	1	10	100	1	1	0.9901	0.99	0.0001
1	100	10	10	100	1	1	0.985	0.99	-0.005
1	100	10	1	100	1	1	0.38	0.5	-0.12
1	100	1	10	100	0.1	1	0.9901	0.99	0.0001
1	100	10	10	100	0.1	1	0.981	0.99	-0.009
0.1	100	10	1	1	0.1	1	0.505	0.99	-0.485
0.1	100	1	10	1	0.1	1	0.9998	0.9999	-0.0001
0.1	100	10	10	1	0.1	1	0.99	0.999	-0.009
0.1	100	10	1	100	0.1	1	0.339	0.5	-0.161
0.1	100	1	10	100	0.1	1	0.99	0.99	0
0.1	100	10	10	100	0.1	1	0.9805	0.99	-0.0095

Table 1 reports the results from our first set of simulations. From Table 1, we can see that the difference (bias in the mis-specified model) in the R^2 s in the mis-specified model and the correct model can be both positive and negative. For instance, when all the parameters are equal to one, the bias in R^2 equals 0.167, and is positive. However, when the mean of the independent variable is reduced to one tenth, the bias in R^2 equals -0.075, and becomes negative, given all else equal. We can see from Table 1 that combinations of the variations in the different parameters can yield both positive and negative bias in R^2 . In addition to the sign of the bias, the magnitudes also vary across the parameter values and combinations of parameter values.

For discussion purposes, we hold all other factors constant and discuss the effect of varying particular parameters on the bias. In the case where both a and b are positive, the difference in R^2 s will tend to be negative when we increase the variance of the independent accounting variable or when we reduce the mean of the independent accounting variable. The negative difference implies a negative bias in the mis-specified model. Furthermore, reducing the mean of the independent variable results in a larger negative bias than occurs from increasing the variance of the independent variable. Similarly, when the variance of the dependent variable increases or the mean of the dependent variable decreases, R^2 is also biased downward. When the variance of the independent variable increases or the mean of the independent variable decreases, the bias will become negative if the estimator of the constant term, α , increases.

However, the bias in the R^2 of the mis-specified model will increase from negative to positive as the variance of the regression error term increases. Accordingly, the higher the variance of the error term relative to the variance of either the independent or the dependent variable, the larger the bias. Similarly, as the variance of the regression error term increases, increasing the coefficient of variation ($\sigma_s\sqrt{S}$) of the scaling factor results in an increased bias. In addition, the larger the coefficient of variation of the scaling factor, the larger the positive bias.

In our simulations, not all combinations of the seven parameters are reported since the direction and

degree of bias remains consistent when the coefficient of variation of the scaling factor remains constant. Thus, we focus on the bias in R^2 of changing the coefficient of variance of the scaling factor.

Table 2: Simulations using accounting variables and regression estimators in previous studies.⁴ Adj. R^2 is the regression R^2 if we assume there is no scaling difference among sample firms. Bias in R^2 is calculated based on the simulated R^2 s between the correct model and the mis-specified model.

Panel A: Kothari and Zimmerman (1995)								
Model: $P_t = \alpha + \beta E_t + \varepsilon_t$								
	P_t (mean)	P_t (S.D.)	E_t (mean)	E_t (S.D.)	α	β	Adj. R^2	Bias
Pooled	24.41	18.23	1.97	1.81	11.47	6.55	0.63	0.207
Cross-section	24.41	18.23	1.97	1.81	10.2	7.9	0.615	0.143
Time-series	27.77	18.76	2.27	1.79	17.3	4.6	0.192	0.31
Panel B: Collins et al. (1997)								
Model 1: $P_t = \alpha + \beta E_t + \varepsilon_t$								
Model 2: $P_t = \delta + \gamma E_t + \eta_t$								
period	β	Adj. R^2	Bias	γ	Adj. R^2	Bias		
1953-1962	9.28	N/A	N/A	0.60	0.206	0.20		
1963-1972	9.09	N/A	N/A	0.78	0.348	0.17		
1973-1982	4.67	0.272	0.131	0.69	0.272	0.194		
1983-1992	7.13	0.633	0.063	1.30	0.973	0.009		
Pooled	6.04	0.553	0.076	0.90	0.463	0.159		

The second set of simulation results are summarized in Table 2. Panel A gives the simulation results using the accounting variables and the coefficient estimates of the price model in Kothari and Zimmerman (1995). Similarly, Panel B reports our simulation results based on the accounting variables and coefficient estimates provided by Collins et al. (1997). Since the intercept term is not reported in Collins et al. [1997], we calculate it as the mean difference between the stock price (dependent variable) and accounting earnings or book value (independent variable). For simplicity, we set both the mean and the variance of the scaling factor to one. Recall that the greater the coefficient of variation of the scaling factor the higher the bias. Thus, the results reported in Table 2 are conservative estimates of the bias.

⁴ Note this number may be different from those reported in previous studies due to the scale effect.

It is important to note that our simulated R^2 for both the correctly specified model and the mis-specified model are based upon simplifying assumptions and should not be directly compared to the R^2 s reported by either Kothari and Zimmerman (1995) or Collins et al. (1997). Instead, our simulation results indicate, given our simplifying assumptions about the true scaling factor and its properties, the amount of bias one could expect.

The results of Table 2 show that in empirical accounting value-relevance studies, the bias in R^2 due to the scaling difference is generally positive. However, the degree of upward bias is not consistent. For example, in Panel A, our simulation results indicate the bias is largest for the time-series analysis, and smallest for the cross-sectional analysis. The pooled analysis results in a bias that is between that of the cross-sectional and time-series analyses. Panel B shows the simulation results across alternative periods. The degree of bias is not consistent across the four decades.⁵ As the results in Panel B of Table 2 illustrate, even if we assume R^2 is generally biased upward, the degree of upward bias may change from period to period when cross-sectional regression analyses are conducted. This potential for changes in the degree of bias (the bias is not systematic over time) makes drawing inferences about the value-relevance of accounting information difficult. If the bias were to remain constant across the periods of analysis, inferences could still be drawn regarding changes in accounting information's value-relevance. Unfortunately, this is not the case.

The inconsistency in the degree of bias in R^2 across years is due to the fact that the magnitude of the factors that determine the bias may vary over time. For instance, cross-sectional analyses may generate different estimators for a and b in different years. This may be especially true when the stock market exhibits different levels of volatility across the periods of analysis (Fridman and Harris (1998)). In addition, stock price, book value, and market value of equity also change over the life of a firm.⁶

⁵ We do not report the computed bias of the earnings model for either of the first two periods because the simulations revealed that our simplifying assumptions result in inappropriate amounts for the error variance of the regression.

⁶ Previous studies have shown that the mean structure of these variables is not constant over time (Finger (1994)).

A lack of consistency in the degree of bias in R^2 across years may lead us to observe an erroneous pattern in the behavior of R^2 and make incorrect inferences regarding the value-relevance of accounting information. Although a systematic trend in R^2 can be observed over time in the misspecified analyses, the true R^2 pattern may be decreasing, or increasing, depending upon the magnitude of bias in the particular periods of the analyses.

Furthermore, the actual bias may be even worse since the above results are based on the assumption that the true scale factor S_i is independent of X_i and Y_i . In reality, however, the scaling factor probably is not independent and may be highly correlated with the variables in the analysis. For example, book value is correlated with earnings and investments whereas market value of equity is correlated with total assets or number of shares outstanding. To the extent that the scale factor and the variables of interest are correlated, the R^2 bias becomes even more complicated since this correlation also enters into the determination of the bias. Therefore, we must be cautious in interpreting the results of previous studies regarding the value-relevance of accounting information. While some studies have found evidence of a decline in the value-relevance of accounting information, other studies fail to find evidence of a decline in the value-relevance of accounting information. Our illustration of an upward bias and inconsistent size of the bias in R^2 for cross-sectional value-relevance analyses may help explain why some prior studies of value-relevance fail to find a decrease in value-relevance of accounting information over time while some others do find a decrease.

CORRECTION OF BIAS IN R^2

In this section we examine one approach for reducing the bias in R^2 due to the scale differences among sample firms. While Barth and Kallapur (1996) provide two approaches to eliminate the bias in coefficient estimates, our goal is to examine potential means for correcting the bias in R^2 . First, we show formally how this approach may eliminate or reduce the bias. We then discuss the complexity and difficulty in empirically implementing this approach. Although this approach should remove the bias theoretically, actual implementation may be problematic.

Recall the mis-specified model (2), where

$$S_i Y_i = \alpha + \beta S_i X_i + \varepsilon_i$$

Dividing both dependent variable and independent variable by S_i , we obtain

$$S_i Y_i / S_i = a + b S_i X_i / S_i + e_i \quad (16)$$

where $e_i = \varepsilon_i / S_i$. Note, however, that equation (16) is not completely equal to equation (1). The scale differences cause the error terms to be heteroskedastic since $e_i = \varepsilon_i / S_i$. There is no heteroskedasticity in the correctly specified equation (1).

The coefficient of determination (R^2) in model (16) are asymptotically equal to $1 - \frac{Var(e)}{Var(Y)}$, which is the true R^2 . Thus theoretically, there exists one way to correct the bias in R^2 due to scale factors S_i . This approach is to deflate both dependent and independent variables by the scale factor. Unfortunately, the true scale factor S_i is unobservable in most cases.

In order to employ this approach for reducing the bias, accounting researchers must utilize a scale proxy to mitigate the mis-specification. Let the scale proxy be δ_i . If we use the scale proxy as a deflator, we obtain

$$S_i Y_i / \delta_i = a_2 + b_2 S_i X_i / \delta_i + \eta_i \quad (17)$$

where $\eta_i = e_i / \delta_i$.

Furthermore, let $S_i / \delta_i = W_i$, then (17) can be rewritten as:

$$W_i Y_i = a_2 + b_2 W_i X_i + \eta_i \quad (18)$$

Following the procedure that we use to derive (13), R^2 in equation (18) (when b_2 is unbiased), is shown as:

$$R^2 \xrightarrow{p} \left(1 - \frac{(EW^2)Ee^2 / Var(W)Var(Y)}{1 + \frac{(EW)^2}{Var(W)} + \frac{(EY)^2}{Var(Y)}} \right) \quad (19)$$

Thus, the degree of bias depends upon the coefficient of variation for the ratio of the scale proxy and the true scale factor.

To test whether this use of a scale deflator can mitigate bias we need to compare the bias in model (18) with that in model (2). Let the following expression represent the ratio of the degree of bias in the mis-specified model relative to the degree of bias when using the scale deflator, given the regression coefficient is unbiased.

$$P = \frac{(ES^2)Var(W)[1 + \frac{(EW)^2}{Var(W)} + \frac{(EY)^2}{Var(Y)}]}{(EW^2)Var(S)[1 + \frac{(ES)^2}{Var(S)} + \frac{(EY)^2}{Var(Y)}]} \quad (20)$$

Accordingly, when $P > 1$ then the use of a scale deflator reduces the bias. Alternatively, when $P < 1$ the use of a scale deflator actually exacerbates the bias. In summary, we suggest one approach to mitigate the bias in R^2 due to the scale effect in level studies: deflating the variables by a scale proxy.⁷ However, the efficacy of this method awaits empirical testing.

SUMMARY AND CONCLUSIONS

This study demonstrates analytically the problem of using R^2 in empirical accounting level studies which examine changes in the value-relevance of accounting numbers. Our analysis calls for a more careful interpretation of the results of previous studies since many of these previous studies may be mis-specified because of scaling problems. Typically, in such level based studies, R^2 may deviate from its asymptotic true value due to the scale effects occurring in most of the observed accounting variables. This study further demonstrates that although this deviation (bias) can be both upward and downward cross-sectionally, it is generally upward in the accounting value-relevance studies, and the bias exists even when the coefficient estimators from these regressions are unbiased.

While Barth and Clinch (2009) suggest running analyses multiple times to determine the sensitivity of the inferences to various scale proxies, this study provides guidance for evaluating how various attributes of the scale proxies as well as attributes of the other variables in the analysis impact the

⁷ Note that the intercept in (17) is not deflated.

bias in R^2 . For example, if the regression coefficients for the variable(s) of interest is (are) unbiased, then the R^2 is positively biased and a scale factor with a higher variance will produce a higher positive bias. Accordingly, a conservative sensitivity analysis should include the scale proxies with large and small variances to make sure that the inferences are not sensitive to the scaling proxy. When the regression coefficient(s) is (are) not unbiased, the researcher must be even more careful since the degree of bias in R^2 is a function of numerous attributes of the scaling factor and the other variables in the analysis.

To correct this scale effect, we discuss one approach that could reduce the bias in R^2 . However, due to the difficulty of observing the true scale factor, the usefulness of this approach remains unanswered. This leaves future avenues for accounting researchers to examine this approach for mitigating the bias in the coefficient of determination in studies of the value-relevance of accounting information. By understanding the usefulness of this approach, accounting researchers may better understand the appropriate inferences to be drawn from cross-sectional value-relevance research. Furthermore, once the degree of bias is better understood, future research may be able to investigate and draw correct inferences regarding changes in value-relevance of accounting numbers both across time and across different samples.

APPENDIX

This appendix shows the procedure we use to derive the asymptotic value of R^2 in mis-specified models (2)/(3).

From equation (12), we have

$$R^2 \xrightarrow{p} \frac{Cov(X^*, Y^*)^2}{Var(X^*)Var(Y^*)} \quad (A1)$$

A decomposition of (A1) shows

$$R^2 \xrightarrow{p} \frac{Cov(X^*, Y^*)Cov(X^*, Y^*)}{Var(X^*)Var(Y^*)} \quad (A2)$$

From (3), we can rewrite (A2) as

$$R^2 \xrightarrow{p} \frac{Cov(SX, SY)Cov(SX, SY)}{Var(SX)Var(SY)} \quad (A3)$$

which is equivalent to

$$R^2 \xrightarrow{p} \frac{[E(SX*SY)-E(SX)*E(SY)][E(SX*SY)-E(SX)*E(SY)]}{[(ES^2X^2)-(ESX)^2]*[(ES^2Y^2)-(ESY)^2]} \quad (A4)$$

Notice that $Y = a + bX + e$, where $E(e|X) = 0$, this implies

$$E(XY) = E(aX + bX^2 + eX) = aEX + bEX^2 \quad (A5)$$

$$EY = a + bEX \quad (A6)$$

Similarly, $X = -a/b + Y/b - e/b$, thus, if $b \neq 0$,

$$E(XY) = E(-a/b * Y + Y^2/b - eY/b) = -a/bEY + 1/bEY^2 - 1/bEe^2 \quad (A7)$$

$$EX = -a/b + 1/bEY \quad (A8)$$

Assume S is independent with X and e , substituting (A5), (A6), (A7), (A8) into (A4) yields:

$$\begin{aligned} R^2 \xrightarrow{p} & \left\{ \frac{[ES^2 - (ES)^2] * aEX + b[ES^2EX^2 - (ES)^2 * (EX)^2]}{[(ES^2) * (EX^2) - (ES)^2 * (EX)^2]} \right\} \\ & * \left\{ \frac{[ES^2 - (ES)^2] * (-\frac{a}{b}EY + \frac{1}{b}[ES^2EY^2 - (ES)^2 * (EY)^2] - \frac{1}{b}ES^2 * (Ee^2))}{[(ES^2) * (EY^2) - (ES)^2 * (EY)^2]} \right\} \\ = & \left[b + \frac{a * EX * Var(S)}{Var(S) * Var(X) + (ES)^2 * Var(X) + (EX)^2 * Var(S)} \right] \\ & * \left[\frac{1}{b} - \frac{\frac{a}{b} * EY * Var(S) + \frac{1}{b}(Es^2)Var(e)}{Var(S) * Var(Y) + (ES)^2 * Var(Y) + (EY)^2 * Var(S)} \right] \end{aligned}$$

$$= \left(b + \frac{a * \frac{EX}{Var(X)}}{1 + \frac{(ES)^2}{Var(S)} + \frac{(EX)^2}{Var(X)}} \right) * \left[\frac{1}{b} - \frac{\frac{a}{b} * \frac{EY}{Var(Y)}}{1 + \frac{(ES)^2}{Var(S)} + \frac{(EY)^2}{Var(Y)}} - \frac{\frac{1}{b} (Es^2) Var(e)}{Var(S) Var(Y)} \right]$$

(A9)

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ARE GRADUATE ACCOUNTING PROGRAMS MEETING THE PROFESSION'S EXPECTATIONS?

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Keywords: Generic skills, ethics, accounting education, graduate programs

ARE GRADUATE ACCOUNTING PROGRAMS MEETING THE PROFESSION'S EXPECTATIONS?

ABSTRACT

The paper examines how graduate accounting programs are responding to the accounting profession's demands to incorporate generic skills and ethics into the accounting curriculum. The study examined the structure and content of thirty-nine U.S. graduate accounting programs and surveyed eighteen accounting professionals to determine their perceptions about graduate accounting programs. Sixty-nine percent of the graduate accounting programs sampled offer a specific course on data analytics, while over sixty percent of the programs offer a course that addresses ethics. However, these courses were not all required.

The survey responses suggest a preference for graduate accounting programs to be practice-oriented and broad-based, with options for more tracks beyond auditing and taxation. This study highlights the efforts of graduate accounting programs towards ensuring that accounting graduates are principled and possess the necessary diverse skills to function effectively in the ever-changing business environment.

INTRODUCTION

Employers desire that accounting graduates possess technical knowledge, generic skills, and professional identity that will align accounting degrees and ability to perform work (Frecka and Reckers, 2010; Wilkerson, Jr., 2010). Academic transcripts reflect technical skills acquired, and certifications (e.g. the certified public accountant certification) often establish a professional identity. However, educating students to develop generic skills, or those higher-order, non-technical skills transferable across fields, entails incorporating in courses, skill-based learning activities that link theory to practice (Tempone and Martin, 2003). This study uses the following generic skill definition to inform the analysis:

“The range of general education skills that are not domain- or practice-specific, which include communication and interpersonal skills, problem-solving skills, conceptual/analytical and critical skills, visual, oral and aural skills, and judgement and synthesis skills” (Boyce, Williams, Kelly, and Yee, 2001, p. 37).

This study examined thirty-nine graduate accounting programs to determine how they incorporate generic skills and ethics into the accounting curriculum. The findings indicate that graduate accounting programs are responding to the demands of employers, but there is room for improvement. Specifically, the paper finds graduate accounting programs are offering specific courses that address analytical and communication skills, the top critical generic skills identified in literature (Frecka and Reckers, 2010). Stand-alone ethics courses are offered, though mostly as electives.

Further, this paper documents the views of surveyed¹ professionals about graduate accounting programs, to provide additional insight about the findings from the sampled graduate accounting programs. The underlying message from the responses is that graduate accounting programs should be broad-based and practice-oriented. This paper provides insight about the status of accounting graduate programs, and how accounting graduate programs align with the expectations of accounting professionals.

The next section describes the background literature and research questions. Thereafter, the methodology, scope of the study, and data are presented. The findings and discussion are presented next, and the final section presents the conclusions.

BACKGROUND LITERATURE AND RESEARCH QUESTIONS

Following the 150 credit hours of education requirement by the American Institute of Certified Public Accountants (AICPA), accounting programs offer alternative paths to help students meet this AICPA requirement (Mauldin, Braun, Viosca, Jr., and Chiasson, 2013). These alternative paths include a 150-hour bachelor's degree, a Master of Accountancy (M.Acc.), and a Master of Business Administration (M.B.A.) in accounting. Studies (Donelan and Philipich, 2001; Mauldin et al., 2013) show accounting students that follow the 150-hour bachelor's degree path are less marketable and less satisfied with their choice in comparison to students that pursue a graduate degree. Bierstaker, Howe, and Seol (2004) in their survey of 247 accounting students noted an

¹ IRB approval obtained.

overall preference for the M.B.A. degree because it is broad in scope, although students, mostly those pursuing careers in public accounting, chose the M.Acc. degree program (Donelan and Philipich, 2001). Given these, this study focuses on accounting graduate programs.

In 2014, graduates of master's in accounting programs increased by seven percentage points, while M.B.A. in accounting graduates decreased by five percentage points (AICPA, 2015). This is attributed to the technical content of the master's in accounting programs that prepare students better for the Uniform Certified Public Accountant (CPA) examination and entry-level accounting jobs (Donelan and Philipich, 2001; Raghunandan, Read, and Brown, 2003; Nelson, Vondrzyk, Quirin, and Kovar, 2008; Brink, Norman, and Wier, 2016). However, in 2014, the percentage of graduates with M.Acc. degrees hired by public accounting firms² decreased, whereas, the percentage of graduates with M.B.A. in accounting recruited by these firms increased (AICPA, 2015). This suggests public accounting firms may be seeking recruits that possess both technical knowledge and generic skills (Donelan and Philipich, 2001; Frecka and Nichols, 2004; Kavanagh and Drennan, 2008).

There may exist some similarities, mostly technical skills, and differences, mostly generic skills, between the skills accounting graduates possess, and the skills desired by employers (Jackling and De Lange, 2009). The generic skills have been studied from different aspects including, their relevance to career success (Hutchison and Fleischman, 2003; Barrie, 2004; Hassall, Joyce, Montanto, and Anes, 2005), and how they can be incorporated into accounting education (Albrecht and Sack, 2000; Ashbaugh and Johnstone, 2000; Boyce et al., 2001; Howieson, 2003). This demand for generic skills is a global issue, impacting all accounting fields; Hassall et al. (2005), in their study of employers of management accountants in Spain and U.K., found employers felt universities paid inadequate attention to generic skills. Collectively, these studies pushed for the development of generic skills during graduate accounting programs that exceeded disciplinary expertise to enable accounting graduates to be prepared for the workplace.

² This paper focuses primarily on the public accounting sector, since it is one of the highest recruiters of accounting graduates.

Additionally, Howieson (2003) predicted a decline in the demand for accounting compliance work and an increase in the demand for accountants with analytical and problem-solving skills. These generic skills are at odds with the traditional minutiae approaches learned by accountants (Albrecht and Sack, 2000; Boyce et al., 2001; Howieson, 2003; Jackling and De Lange, 2009). In support, Hunton (2002) argues that an accountant's value increasingly will be demonstrated in the exercise of higher-order skills, and not in the traditional accounting regimens, that are low value in nature, and can be performed using information technology. So, a question that remains is, how are graduate accounting programs responding to these demands for generic skills? This paper aims to address this question.

Very limited studies have explored how graduate accounting programs have designed their curriculum to meet the demands of employers. One such study, Frecka and Nichols (2004) used data from 42 universities from 1998-2001, amongst other things, to analyze the designs and curriculum of programs. They found some evidence of functional (e.g. research), personal (e.g. problem-solving and decision-making), and broad business (e.g. strategic thinking) skills in the curriculum. This study uses data that reflects the current state of graduate accounting programs, and extends beyond the programs studied by Frecka and Nichols (2004), thus providing additional evidence on how graduate accounting programs are responding to employers' demands for the inclusion of generic skills in the accounting curriculum.

In addition, this study provides some evidence about the incorporation of ethics in the accounting curriculum. While ethics is not usually considered a generic skill, discussions about ethics within the accounting domain have heightened since the recent corporate scandals (e.g. Enron), and studies (e.g. Albrecht and Sack, 2000) pointed to the insufficiency of discussions about ethics in the accounting curriculum. Hence, this paper also addresses the question of how graduate accounting programs are responding to the demand for ethics in the graduate accounting curriculum.

METHODOLOGY, SCOPE OF RESEARCH, AND DATA

Several organizations rank graduate accounting programs and these programs share the rankings on their websites to demonstrate quality and accomplishment, amongst other reasons. This study identified graduate accounting programs to include in the sample, by analyzing data from the following four organizations that provide a ranking of the Top 50 accounting programs: (1) Accounting Today, (2) Accounting.com, (3) Accounting Degree Review, and (4) College Choice. Data obtained from these sources were based on the 2016 rankings, except for Accounting Today, which was based on the 2015 rankings. The four sets of rankings were compared and the accounting programs that ranked in at least three sources were included in the original sample of 40 programs. One accounting program was eliminated because the information on their website was imprecise, thus making the final sample, 39 programs. Table 1 presents the graduate accounting programs in the sample. Data about the graduate accounting programs were obtained from their respective, publicly available websites.

Insert Table 1

Universities offer different graduate accounting programs (e.g. Master of Accountancy, Master of Science in Accounting) designed for different student groups (e.g. students with or without a bachelor's degree in accounting). To scope this study, graduate accounting programs included in the sample were: (1) full-time traditional programs, (2) not Masters of Taxation, and (3) not designed primarily for students without a bachelor's degree in accounting. Masters of Business Administration programs were not included unless they had a specific and stated track for accounting. In addition to the program website data, eighteen³ practicing auditors were surveyed and their responses are incorporated in the discussions. The link to the survey was emailed to practicing auditors in two Big 4 accounting firms, one regional accounting firm, and one local accounting firm.

³ This study acknowledges that the size of the survey participants is relatively small. This limitation does not minimize the informational value of their responses and the inferences that can be drawn from them. The survey was conducted to enrich the information from program websites. It was not intended to be the primary source of data.

Data - Graduate Accounting Program Websites

The sample includes 28 public universities (approximately 72%) and 11 private universities (approximately 28%). Table 2 presents data from the graduate accounting program websites. Master of Accounting degree programs comprise approximately 59 percent of the sample, and is thus, the highest degree designation observed. The second highest is Master of Science in Accounting, comprising about 28 percent of the sample. The top two tracks offered by the graduate accounting programs are taxation at about 64 percent, and auditing/assurance at about 51 percent. Interestingly, one program offers a track in “academic”. Five tracks was the highest number of tracks observed, and twelve programs had no tracks. The most occurring number of tracks in the graduate accounting programs is three tracks, and programs with no tracks follow closely.

Insert Table 2

Data - Survey

Survey participants are from different public accounting firms in the U.S., and include eleven audit staff, two audit seniors, three audit managers, one audit senior manager, and one audit partner. Eleven participants (approximately 61%) work for Big 4 audit firms, three participants (approximately 17%) work for a regional audit firm, and four participants (approximately 22%) work for a local audit firm. Eight participants (approximately 44 %) are certified public accountants. Eleven participants (approximately 61 %) have a master’s degree in accounting, a M.B.A or both. Four participants (approximately 22%) indicated that their master’s degree had a track. See table 3 for data about participants.

Insert Table 3

FINDINGS AND DISCUSSIONS

This paper examines how graduate accounting programs are responding to the demands for the inclusion of generic skills and ethics in their curriculum. The curriculum for each graduate

accounting program in the sample was reviewed for courses specifically addressing ethics and the generic skills identified in literature (e.g. Boyce et al., 2001; Frecka and Reckers, 2010). Table 4 presents the results of the analysis of generic skills addressed by specific graduate accounting courses. Six skills were identified across programs. These are data analytics, communication, leadership, negotiation, strategy/decision-making, and team building. These skills were addressed by specific courses that were either required or electives. Some courses addressed multiple generic skills, or ethics and at least one generic skill. Forty-seven (47) elective courses addressing at least one generic skill, and 43 required courses addressing at least a generic skill, were observed.

Insert Table 4

Of the six observed generic skills, communication is the generic skill most addressed by programs as a required course. Sixteen programs (approximately 41%) had a required course focused on communication. Following is data analytics with thirteen programs (approximately 33%) offering a required course. However, the number of programs offering data analytics as an elective (14 programs) exceeds significantly the number of programs offering communication as an elective (four programs). Combined, more programs (approximately 69%) are offering courses that address data analytics skill. These findings suggest that accounting programs are making strides to increase the supply of accounting graduates possessing the top critical skills of analytics and communication identified in literature as being important for a career (Frecka and Reckers, 2010). Team building is the skill least addressed by a specific course. Only one program had a required course that addressed team building. The finding is not necessarily disappointing considering evidence suggests courses usually include teamwork activities (Tempone and Martin, 2003).

Table 5, panel A shows no program offers courses that collectively address all six observed generic skills. In three programs, no specific course addressing any skill was observed, and one is the modal number of the generic skills addressed by the programs. With respect to ethics, as shown in table 5, panel B, 25 programs (approximately 64%) offer a course that specifically addressed ethics. The course addressing ethics is required by 12 programs (approximately 31%).

These findings are not altogether surprising considering that 69.5 percent of accounting department chairs surveyed leaned towards integrating ethics throughout accounting curriculum instead of offering stand-alone ethics courses; while about 30.5 percent felt ethics should be a stand-alone required course, in addition to being integrated throughout the accounting curriculum (Madison and Schmidt, 2006).

Insert Table 5

This study also surveyed practicing auditors, and in response to an open-ended question (see Appendix 1) asking what graduate accounting programs should include, some participants mentioned technical content explored from the perspective of different types of organizations (e.g. government not-for-profit, public, private companies), and from diverse industries. These comments support Bloom's (2002) suggestion that "more emphasis needs to be placed in our curricula on accounting for sole proprietorships, partnerships and start-up firms, in a variety of different industries, especially not-for-profit and governmental agencies" (p. 59). Other participants suggested internship experience, use of multiple 'real world' examples, case studies, exposure to finance, human resources, marketing, general business, business writing, communication, use of Excel, and data analysis. These comments align with Albrecht and Sack's (2000) criticisms about accounting programs being too narrowly focused.

When asked about their views regarding tracks in graduate accounting programs, most participants favored having tracks, primarily because they would provide more depth for students. Some participants suggested that tracks in other practice areas (e.g. advisory, forensic accounting) instead of the usual tracks (e.g. auditing) would be beneficial; one explained, 'audit turnover is high, and many individuals start in audit because they do not know otherwise, and end up transferring to other areas.' However, some participants suggested generalized accounting programs that would offer more flexibility, especially for students still undecided about their career paths. Similarly, some participants expressed a preference for the M.B.A. as a graduate degree option because it was 'less concentrated' and 'more valuable in the long-run.'

The comments about the M.B.A. degree are supported by studies (e.g. Brink et al., 2016) that found that an M.B.A. degree increases the likelihood of promotion from senior manager to partner in public accounting firms. Additionally, Donelan and Philipich (2001) found that accounting graduates employed in the non-public accounting sector were more satisfied with their education if they followed the M.B.A. path, as opposed to a master's of accounting path.

Combined the underlying message is that a broad-based, practice-oriented program, with more track options may be optimal for developing accounting graduates able to integrate business knowledge (Hunton, 2002; Tempone and Martin, 2003). The findings from the program websites show that graduate accounting programs are on the right path towards incorporating generic skills and ethics into the curriculum. However, more track options and a broader approach to the curriculum may be beneficial.

CONCLUSIONS

Changes in the business environment motivate expectations about future employees. In the accounting community, employers expect accounting graduates to develop generic skills needed for career success as they acquire accounting technical knowledge. These expectations place a demand on graduate accounting programs to keep their curriculum current. This paper examined a sample of thirty-nine graduate accounting programs and found evidence indicating that graduate accounting programs are heeding the expectations of employers, especially the need for graduates to possess communication and analytical skills. Additional evidence points to the incorporation of ethics in the accounting curriculum.

While these findings are promising and should be of interest to graduate accounting programs, the broader accounting community should remain aware that learning is a continuous process, and the goal is to develop a culture of learning (Tempone and Martin, 2003; Kavanagh and Drennan, 2008). The findings of this paper are by no means, a call for complacency. Rather, the accounting profession needs to continuously strive towards the integration of "the common body of knowledge for an accounting generalist; the signature pedagogy that develops professional

judgment/skepticism; and the technology used by the accounting profession or used for the teaching, learning, and assessment of accounting” (Pathway Commission, 2015, p. 4). By doing so, the accounting profession will remain relevant in an ever-changing world. This study recommends that graduate accounting programs consider ways to make more visible the generic skills addressed in their courses, for students and potential employers. An option could be to add more information in the course descriptions available on their websites.

The findings of this paper are subject to limitations. First, they may not generalize to traditional and online graduate accounting programs not included in the data sources. Secondly, the sample includes only U.S. graduate accounting programs, and so the generalizability of the findings to non-U.S. graduate accounting programs may be limited. Thirdly, responses from the survey participants may be biased since they all work for public accounting firms.

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Table 1
Master's in Accounting Programs in Sample, Type of University, Degree Designation and Program Tracks

University	Type	Degree Designation	Tracks									
			Academic	Audit / Assurance	Consulting / Advisory	Data Analytics	Financial Reporting	Generalist / Professional / Experiential	Information Systems / Technology	Managerial / ERM	Taxation	
Baylor University	Private	M.Acc.	-	-	-	-	-	-	-	-	-	
Bentley University	Private	M.S.A.	-	-	-	-	-	-	-	-	-	
Brigham Young University	Private	M.Acc.	-	-	-	-	-	Yes	-	-	Yes	
College of William and Mary	Public	M.Acc.	Yes	Yes	Yes	-	-	Yes	-	-	Yes	
Florida State University	Public	M.Acc.	-	Yes	-	-	-	Yes	-	-	Yes	
Indiana University - Bloomington	Public	M.S.A.	-	Yes	-	Yes	-	-	-	-	Yes	
Miami University - Ohio	Public	M.Acc.	-	-	-	-	-	-	-	-	-	
Michigan State University	Public	M.S.A.	-	Yes	-	-	-	-	Yes	-	Yes	
New York University	Private	M.S.A.	-	-	-	-	-	-	-	-	-	
North Carolina State University	Public	M.Acc.	-	-	-	-	-	-	Yes	Yes	Yes	
Northern Illinois University	Public	M.A.S.	-	-	-	Yes	Yes	-	-	-	Yes	
Pennsylvania State University	Public	M.Acc.	-	-	-	-	-	-	-	-	-	
Southern Methodist University	Private	M.S.A.	-	Yes	-	-	-	-	-	-	Yes	
Texas A & M University	Public	M.S.A.	-	Yes	-	-	-	-	-	-	Yes	
Texas Christian University	Private	M.Acc.	-	Yes	-	-	Yes	-	-	-	Yes	
The Ohio State University	Public	M.Acc.	-	Yes	-	-	Yes	-	-	Yes	Yes	
The University of Texas at Austin	Public	M.P.A.	-	-	-	-	Yes	Yes	-	Yes	Yes	
The University of Texas at Dallas	Public	M.S.A.	-	-	-	-	-	-	-	-	-	
University of Alabama	Public	M.Acc.	-	-	-	-	-	-	-	-	-	
University of Arizona	Public	M.Acc.	-	Yes	-	-	-	-	-	-	Yes	
University of Arkansas	Public	M.Acc.	-	Yes	-	-	-	Yes	-	-	Yes	

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University	Type	Degree Designation	Tracks									
			Academic	Audit / Assurance	Consulting / Advisory	Data Analytics	Financial Reporting	Generalist / Professional / Experiential	Information Systems / Technology	Managerial / ERM	Taxation	
University of Connecticut	Public	M.S.A.	-	-	-	-	-	-	-	-	-	
University of Florida	Public	M.Acc.	-	Yes	-	-	-	-	Yes	-	-	Yes
University of Georgia	Public	M.Acc.	-	Yes	Yes	-	-	-	-	-	-	Yes
University of Illinois Urbana-Champaign	Public	M.A.S.	-	Yes	-	-	-	-	-	-	-	Yes
University of Iowa	Public	M.Acc.	-	Yes	-	Yes	-	-	-	-	Yes	-
University of Michigan - Ann Arbor	Public	M.Acc.	-	-	-	-	-	-	-	-	-	-
University of Mississippi	Public	M.Acc.	-	-	-	-	-	-	-	-	-	-
University of North Carolina at Chapel Hill	Public	M.Acc.	-	Yes	-	-	-	-	-	-	-	Yes
University of Notre Dame	Private	M.S.A.	-	Yes	-	-	-	-	-	-	-	Yes
University of Pennsylvania	Private	M.B.A.	-	-	-	-	-	-	Yes	-	-	-
University of Southern California	Private	M.Acc.	-	-	-	-	-	-	-	-	-	-
University of Tennessee	Public	M.Acc.	-	Yes	-	-	-	-	-	Yes	-	Yes
University of Utah	Public	M.Acc.	-	Yes	-	-	-	-	-	Yes	-	Yes
University of Virginia	Public	M.S.A.	-	-	-	-	Yes	-	-	-	-	Yes
University of Wisconsin - Madison	Public	M.Acc.	-	-	-	-	-	-	-	-	-	Yes
Virginia Tech University	Public	MACIS	-	Yes	Yes	-	-	-	-	Yes	-	Yes
Wake Forest University	Private	M.S.A.	-	Yes	-	-	-	-	Yes	-	-	Yes
Washington University in St. Louis	Private	M.Acc.	-	-	-	-	-	-	-	-	-	-

Table 2
Website Data on Accounting Graduate Programs (n = 39)

Variable	Number	Frequency
Type of University:		
Private	11	28.21%
Public	28	71.79%
Degree Designation:		
Master of Accounting (M.Acc.)	23	58.97%
Master of Accounting and Information Systems (MACIS)	1	2.56%
Master of Accounting Science (M.A.S.)	2	5.13%
Master of Business Administration (M.B.A.)*	1	2.56%
Master of Public Accounting (M.P.A.)	1	2.56%
Master of Science in Accounting (M.S.A.)	11	28.21%
Tracks:		
Academic	1	2.56%
Audit / Assurance	20	51.28%
Consulting / Advisory	3	7.69%
Data Analytics	3	7.69%
Financial Reporting	5	12.82%
Generalist / Professional / Experiential	8	20.51%
Information Systems / Technology	5	12.82%
Managerial / Enterprise Risk Management (ERM)	4	10.26%
Taxation	25	64.10%
Number of Tracks:		
Five tracks	1	2.56%
Four tracks	3	7.69%
Three tracks	13	33.33%
Two tracks	8	20.51%
One track	2	5.13%
None	12	30.77%
* <i>With an accounting track</i>		

Table 3
Survey Data on Participants' Characteristics

Variable	Number	Frequency
Master's in Accounting	9*	50.00%
Master of Business Administration	3*	16.67%
Tracks	4	22.22%
Auditing	1	5.56%
Taxation	2	11.11%
Other - Professional	1	5.56%
CPA	8	44.44%

** One participant has both graduate degrees.*

Table 4
Observed Generic Skills Addressed by Specific Courses

Observed Generic Skills	No. of Programs (n = 39)	Frequency
<i>Communication*</i>		
Required stand-alone course	14	35.90%
Required course addressing two or more generic skills, or the generic skill and ethics	2	5.13%
Elective stand-alone course	4	10.26%
Elective course addressing two or more generic skills, or the generic skill and ethics	-	0.00%
<i>Data Analytics</i>		
Required stand-alone course	11	28.21%
Required course addressing two or more generic skills, or the generic skill and ethics	2	5.13%
Elective stand-alone course	14	35.90%
Elective course addressing two or more generic skills, or the generic skill and ethics	-	0.00%
<i>Leadership</i>		
Required stand-alone course	2	5.13%
Required course addressing two or more generic skills, or the generic skill and ethics	2	5.13%
Elective stand-alone course	8	20.51%
Elective course addressing two or more generic skills, or the generic skill and ethics	1	2.56%
<i>Negotiation</i>		
Required stand-alone course	2	5.13%
Required course addressing two or more generic skills, or the generic skill and ethics	-	0.00%
Elective stand-alone course	4	10.26%
Elective course addressing two or more generic skills, or the generic skill and ethics	2	5.13%

Table 4 Continued
Observed Generic Skills Addressed by Specific Courses

Observed Generic Skills	No. of Programs (n = 39)	Frequency
<i>Strategy / Decision-Making</i>		
Required stand-alone course	4	10.26%
Required course addressing two or more generic skills, or the generic skill and ethics	2	5.13%
Elective stand-alone course	10	25.64%
Elective course addressing two or more generic skills, or the generic skill and ethics	1	2.56%
<i>Team building</i>		
Required stand-alone course	1	2.56%
Required course addressing two or more generic skills, or the generic skill and ethics	-	0.00%
Elective stand-alone course	-	0.00%
Elective course addressing two or more generic skills, or the generic skill and ethics	-	0.00%
<i>*Four programs had separate writing and speaking courses. All were electives except in one program.</i>		

Table 5
Observed Generic Skills and Ethics Addressed by Specific Courses

Panel A: Number of Observed Generic Skills (n = 6) addressed by Programs:

	No. of Programs (n = 39)	Frequency
Five skills	4	10.26%
Four skills	5	12.82%
Three skills	5	12.82%
Two skills	10	25.64%
One skill	12	30.77%
None	3	7.69%

Panel B: Number of Programs with a Course addressing Ethics:

	No. of Programs (n = 39)	Frequency
Required stand-alone ethics course	9	23.08%
Required course addressing ethics and at least one generic skill	3	7.69%
Elective stand-alone ethics course	11	28.21%
Elective course addressing ethics and at least one generic skill	2	5.13%
No observed ethics course	14	35.90%

**Appendix 1
Survey**

1. Which of the following best describes your employer?

- A big 4 audit firm
- An international audit firm
- A U.S. national audit firm
- A U.S. regional audit firm
- A small (local) audit firm
- A sole proprietorship
- Other (please specify) _____
- None

2. What best describes your current audit career position/level?

- Audit staff
- Audit senior
- Audit manager
- Audit senior manager
- Audit Partner
- Other (please specify) _____
- None

3. What professional certifications do you hold? (Select all that apply).

- CPA
- CMA
- CIA
- CISA
- CFE
- CFA
- Other (please specify) _____
- None

4. If you hold a master's degree, please indicate the degree you have (Select all that apply).

- Masters of Accountancy
- Masters of Business Administration
- Masters of Public Administration
- Masters of Science in Accounting
- Masters of Taxation
- Other (please specify) _____
- I do not have a master's degree

5. If you hold a master's degree, did your master's program have a concentration or track (e.g. taxation, auditing)?

- Yes
- No

6. If you responded 'Yes' in "5 above", please state the concentration or track_____

7. What should graduate accounting programs include?

8. What are your views about tracks or concentrations in graduate accounting programs?

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