

Does Assertion Framing Affect Professional Skepticism?

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ABSTRACT

This experimental study examines the effects of ‘assertion framing’ on auditor’s risk assessment judgments for a task involving the auditing of management assertions related to the revenue cycle. Two measures based on the auditor’s risk assessments are used to define two interrelated measures of skeptical behavior: (1) the auditor’s *belief* that an assertion may be misstated and (2) the auditor’s assessment of the *level of ambiguity* that remains as to whether an assertion may be misstated or not after considering available audit evidence.

The theory used builds on Popper’s (1959) philosophical arguments concerning verification vs. falsification to hypothesize the effect of assertion framing on auditors’ professional skepticism (PS). Also, the Theory of Belief Functions (Shafer, 1976; Fukukawa & Mock, 2011) is employed to specify risk assessment measures that are used to assess differences in PS. Importantly, we find that assertion framing does significantly affect PS. This finding implies that PS may be ‘enhanced’, as Nelson (2009) suggests, by the way assertions being audited are framed.

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Introduction

Research on auditors' professional skepticism (PS) has mainly addressed skepticism as an issue of auditors' personal traits or characteristics (Hurt, 2010; Quadackers, 2009; Brown-Liburd, Cohen, & Trompeter, 2010), but no consensus has been achieved on a definition of PS (Nelson, 2009). In addition, few studies have focused on the behavioral aspects of skepticism, that is, factors which moderate the relationship between skepticism as a trait and auditors' skeptical judgment and decision making. To enhance audit quality, it is important to determine the factors that influence and ultimately enhance auditors' skeptical behavior (Public Company Accounting Oversight Board (PCAOB), 2006; International Auditing and Assurance Standards Board (IAASB), 2008; American Institute of Certified Public Accountants (AICPA), 1997, 2002). For example, ISA 200 (para. 15) requires that an auditor plan and perform an audit with professional skepticism recognizing that circumstances may exist that causes financial statements to be materially misstated.

Most archival studies including Mock and Wright (1999) and Fukukawa, Mock, and Wright (2006) find that the relationship between auditors' risk assessments and audit planning is not strong. Enhancing auditors' PS may lead to heightened awareness of client risks and to a stronger relationship between the risk assessments and audit planning decisions, thus resulting in more effective audits.

As Nelson (2009, p. 2) argues: "Cognitive limitations affect PS in predictable ways. Some of these cognitive limitations may offer opportunities to increase PS, e.g., by reframing hypotheses so that confirmation biases favor PS..." Thus, one promising way to enhance auditors' professional skepticism and thus strengthen auditors' responsiveness to their risk assessments is to frame an audit assertion in a way so that auditors direct their attention to client features that relate directly to audit risk. Prior research

in both psychology and auditing (Tversky & Kahneman, 1981, 1986; Kida, 1984; Trotman & Sng, 1989; Fukukawa & Mock, 2011) suggest that such framing effects are important determinants of behavior and decision quality.

This experimental study tests the effects of *assertion framing*, that is framing management assertions being audited in a negative versus positive manner. Although management usually states financial statement assertions in a positive form, an auditor can consider the assertions to be audited either in a positive or negative way. For example, in investigating audit risk related to an assertion 'A' (e.g., 'A' = 'accounts receivable are properly valued'), the auditor may consider a 'positive' state ('a' = 'A' is true) of an assertion 'A' or a 'negative' state ('~a' = 'A' is false) of the assertion.¹

Our study has three main areas of contribution. The first is providing a new theoretical perspective on framing effects based on Popper's (1959) philosophical arguments concerning the use of verification versus falsification in proposition (assertion) testing. The second is presenting a series of rigorous alternative measures of PS based on the Theory of Belief Functions. The third is presenting the results of an experiment which tests the effects of 'assertion framing' on PS, that is, testing Nelson's hypothesis that framing may affect the level of PS.

Although probability-based assessments of PS could be used in this study, belief-based risk assessments are utilized,² and auditors' PS is measured in term of belief-based assessments. This approach has a significant advantage when one is researching PS in that the inherent level of uncertainty or ambiguity an auditor faces is explicitly assessed. As we will argue and as prior literature has suggested (e.g., Nelson, 2009), there is a direct relationship between the level of PS that an auditor

¹ In the notation used in this paper, an assertion is denoted as 'A' (or '~A') and the 'positive' state of the assertion ('a') is that 'A' is true (or '~A' is false). Thus 'a' may denote the 'positive' state of the assertion 'A' (or the 'negative' state of the assertion '~A') and '~a' the 'negative' state of the assertion (or the 'positive' state of the assertion '~A').

² Fukukawa and Mock (2011) show the relationship between probability-based and belief-based risk assessments and how the Cobb and Shenoy (2006) transformation may be used to compare such risk assessments.

exhibits and the level of uncertainty that the auditor believes is inherent in the audit. Thus, explicit assessment of the auditor's perceived level of uncertainty in the audit is important to the assessment of and possible enhancement of PS.

Three related measures are used to gauge possible differences in auditors' PS. The notation used to define these is:

$m_E(a)$: a belief that assertion 'A' is true (or assertion ' $\sim A$ ' is false). The subscript E identifies the available evidence, ' a ' implies the state that assertion 'A' is true (or assertion ' $\sim A$ ' is false), and $m_E(a)$ represents the assessed strength of belief that the assertion 'A' is true (or assertion ' $\sim A$ ' is false), based on evidence E .

$m_E(\sim a)$: a belief that assertion 'A' is false (or assertion ' $\sim A$ ' is true), with ' $\sim a$ ' implying the state that assertion 'A' is false (or assertion ' $\sim A$ ' is true).

$m_E(\{a, \sim a\})$: In the Theory of Belief Functions and in most audit situations, the sum of $m_E(a)$ and $m_E(\sim a)$ may be less than one and any extant ambiguity or uncertainty is explicitly assigned to the entire 'frame' $\{a, \sim a\}$. This level of ambiguity is represented as an unassigned (uncommitted) belief, $m_E(\{a, \sim a\})$.³

Based on this notation, two measures which may be used to gauge the level of PS are:

1. The auditor's belief assessment that an assertion may be misstated [$m_E(\sim a)$] where an auditor assessing this to be higher is said to exhibit a higher level of PS.
2. The auditor's assessment of the level of ambiguity that remains after considering available audit evidence [$m_E(\{a, \sim a\})$] where an auditor assessing this to be higher is also said to exhibit a higher level of PS.

In our study, these interrelated measures are used to address the main research question: *Does assertion framing affect professional skepticism?* Negative assertion framing is hypothesized to result in heightened skepticism as suggested by Nelson (2009) because when a negative assertion is presented, an auditor is more likely to adopt 'falsification,' rather than 'verification,' as an approach to assertion testing. Indeed, negative assertion framing does result in a higher level of skepticism in most of the cases that are examined. To discuss these issues, the paper is organized in the traditional order: a

³ The sum of all the m-values assessed based on available evidence should be one: $m_E(a) + m_E(\sim a) + m_E(\{a, \sim a\}) = 1$.

discussion of literature and derivation of hypotheses; research method; findings; and a conclusion including limitations and future research.

Literature, definitions, framework, and hypotheses

Professional skepticism and its measurement

The auditing literature has long held that professional skepticism (PS) is an important tenant of the audit profession beginning as early as with Mautz and Sharaf (1961, p. 101) who identify skepticism as an overarching concept in auditing. Auditing standards have also continued to incorporate PS as an aspect of due professional care (American Institute of Certified Public Accountants (AICPA), 1997, SAS No. 1, 2002, SAS No. 99; International Auditing and Assurance Standards Board (IAASB), 2008, ISA 200; Public Company Accounting Oversight Board (PCAOB), 2007, AS No. 5).

Recently, the AICPA (2010, p. 2), in their response to European Commission Green Paper on *Audit Policy: Lessons from the Crisis* (European Commission (EC), 2010), emphasizes that PS is a critical skill for auditors and that research should be undertaken to assess how PS is implemented and “to explore the behavioral elements that may compromise professional skepticism...” This study responds to such requests for research from audit practice.

However, even the definition of skepticism in an audit context is undecided and the literature provides several definitions of skepticism (Nelson, 2009, pp. 2 – 4) including a presumptive doubt perspective and a Bayesian unbiasedness perspective. In this paper, we operationalize Nelson’s presumptive doubt perspective which suggests that PS is:

indicated by auditor judgments and decisions that reflect a heightened assessment of the risk that an assertion is incorrect, conditional on the information available to the auditor (Nelson, 2009, p. 4, emphasis added).

The key issue in operationalizing this definition is deciding what is meant by ‘risk.’ As suggested

above, Fukukawa and Mock (2011) argue that three measures of risk are relevant to the auditor – belief, plausibility, and ambiguity as defined within the framework of belief functions. Two of the three measures form the operational measures of PS used in this study.

Hurt (2010) provides a framework on auditor's PS which suggests that skeptical behavior is affected by an auditor's 'skeptical mindset,' which in turn is affected by 'trait skepticism' and 'state skepticism.' She describes both of these as individual characteristics of an auditor as follows (p. 150):

As an individual characteristic, professional skepticism can be both a trait (a relatively stable, enduring aspect of an individual) and also a state (a temporary condition aroused by situational variables).

Hurt (2010) identifies six traits related to PS including two traits (a questioning mind and the suspension of judgment) which relate to the way an auditor may examine audit evidence. These two traits seem particularly relevant to the audit task accomplished by the auditor participants in our experiment in that we are interested in how the employment/utilization of these traits is influenced by the framing of assertions to be audited. Prior studies generally find that auditors with a higher level of these traits make more skeptical judgments (e.g., Hurt, Eining, & Plumlee, 2008). However, little research has been conducted on factors that moderate the relationship between PS as a trait and the level of skeptical behavior. According to the hypothesis proposed by Nelson (2009), we examine whether assertion framing affects auditors' skeptical judgments and decision making.

Each of these traits is operationalized in our study as follows. A 'questioning mind' implies a heightened sense of disbelief or doubt. If so, the existence of a greater or lesser level of a questioning mind can be measured by belief ($m(\sim a)$). That is, an auditor with a greater propensity to have a questioning mind will assess the belief that a particular assertion is not true at a higher level than an auditor which examines audit evidence with less of a questioning mind.

To measure whether an auditor has a propensity to exhibit "suspension of judgment" or not, we

use the Belief Function measure of ‘ambiguity’ ($m(\{a, \sim a\})$). This measures the relative level of uncertainty each auditor believes exists given the available audit evidence. If assertion framing affects the auditor’s propensity to suspend judgment, auditors with this trait would be expected, *ceteris paribus*, to assess ‘ambiguity’ to be higher and thus to exhibit a heightened level of PS.

To the extent that the audit profession would like to influence skeptical behavior, variables that affect state skepticism, such as training or aspects of the firm’s audit process, must be controlled. In this study, we test the effects of ‘assertion framing’ on the level of PS in a controlled experimental setting.

Because PS is usually thought of as relating to the risk that an assertion is incorrect (Nelson, 2009), we present our hypotheses in terms of ‘ $\sim a$ ’ (the state that assertion A is not true, or equivalently, the state that assertion $\sim A$ is true). Also, in stating our hypotheses, we assume the audit evidence is primarily ‘confirming’ of the assertion ‘ A ’, that is, it supports ‘ a ’ or equivalently, it tends to disconfirm ‘ $\sim a$ ’.⁴ This is the actual situation in the case used in our experiment and the usual case in audit practice.

Given that audit risk can be conceptualized in different ways (Fukukawa & Mock, 2011), we consider hypotheses concerning assertion framing effects on the two measures of audit risk defined above: *belief* that an assertion ‘ A ’ is false ($m(\sim a)$) and the level of *ambiguity* or uncertainty that auditor is facing ($m(\{a, \sim a\})$). Fukukawa and Mock (2011) argue that which of these measures is most pertinent in an audit depends on the risk preference of the audit team and the audit stage, that is whether the audit is at the planning stage, in process or at the opinion formulation stage. Srivastava and Shafer (1992) suggest that the plausibility definition of risk is generally the most appropriate in the audit context.

⁴ If, as Nelson (2009) and prior work in the Theory of Belief Functions suggests, skepticism is conditional on the information available to the auditor, then specific hypotheses concerning the effects of assertion framing on PS should take into account the nature of audit evidence available and how differences in audit evidence interact with the potential effects of assertion framing. In general, there are three evidence situations that need to be considered – evidence which confirms/affirms the assertion ‘ A ’ being considered, that is evidence E such that $m_E(a) > m(a)$; evidence which disconfirms/negates that assertion, that is $m_E(\sim a) > m(\sim a)$; and mixed evidence where both the beliefs that the assertion may be true and false increase. In practice, an auditor often obtains mixed evidence as a result of performing a particular audit procedure.

Also, Bell, Peecher, and Solomon (2005) emphasize the importance of not only outward skepticism (directed to management's claims) but also inward skepticism (directed to the auditors' own judgments). Prior studies that find evidence of framing effects mainly focus on auditors' information search (e.g., the number of items of positive and negative evidence auditors choose) and thus can be interpreted as being interested in auditors' outward skepticism. Grenier (2010) finds that industry specialist auditors' judgments are influenced when their skepticism is directed to their judgments, but not when their skepticism is directed to audit evidence.

Given the importance of and scarcity of research on inward-directed skepticism, this study examines the effect of assertion framing on auditors' inward-directed judgments (risk assessments) given the same set of audit evidence. That is, we investigate whether the same evidence is evaluated differently depending on the framing of an assertion to be verified.

Framing effect

In general, 'framing effect' refers to the effect that various descriptions of elements of a decision task have on judgments and decisions (Tversky & Kahneman, 1981; Levin, Schneiderb, & Gaeth, 1998; Levin, Gaeth, Schreiber, & Lauriola, 2002). Originally, the framing effect literature was based on Prospect Theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981, 1986) which suggests that one's response to a 'risky choice' decision task varies depending on whether outcomes are framed in the positive (gain) domain or the negative (loss) domain. The theory predicts a non-symmetrical assessment of gains versus losses in that the displeasure resulting from a loss is greater than the pleasure from a gain of the same magnitude. This theory generally has been found to apply to 'risky choice' situations in psychology, but not so well in 'risky choice' audit research settings.

However, the decision setting that is of significant interest in auditing differs from the traditional

framing effect setting. This setting involves evidential reasoning and risk assessment where audit evidence is collected and assessed to decide whether management assertions as reflected in financial statements are true and fair (fairly stated) or not. To understand how assertion framing might affect auditors' risk assessments for this type of task, we propose utilizing Popper's (1959) philosophical distinction between 'verification' and 'falsification' to develop our hypotheses.

Popper's (1959) distinction suggests that there are two ways of testing a proposition (assertion). How an assertion is framed can be expected to influence which way of testing an auditor adopts, and thus affect evidential reasoning, risk assessments and PS. These relationships are depicted in Figure 1. For example, auditors provided with a positively stated assertion to be audited are likely to attempt to 'verify' the assertion. A positively stated assertion usually takes the form of a 'universal' statement (e.g., "(All) sales transactions are recorded properly."). In that case, and given the propensity for a confirmation bias (e.g., Bamber, Ramsay, & Tubbs, 1997; Brown, Peecher, & Solomon, 1999), the auditors may seek and accumulate positive evidence to support the assertion being audited. Such a propensity to verify an assertion could be hypothesized to affect evidential reasoning, risk assessment and PS as follows.

Suppose that the positive assertion 'sales transactions are recorded properly' is being audited and that there exist N sales transactions. If the auditor obtains evidence that indicates that one of the N transactions has been recorded correctly, the evidence helps confirm the assertion and contributes to heightening the auditor's belief that the assertion is true by $1 / N$. Also, the auditors' belief that a positively stated assertion is true will become higher as more positive evidence is obtained. A verification approach would continue until 'enough' positive evidence is obtained, that is judgment would be suspended until that threshold was surpassed.

On the other hand, both positive and negative evidence would affect auditors' belief formation

differently when auditors are directed at a negatively stated assertion. A negatively stated assertion usually takes the form of an ‘existential’ statement (e.g., “There is a sales transaction which is not recorded properly.”).⁵ When auditors are provided with a negatively stated assertion, they are more likely to engage in ‘falsification,’ where they would seek negative evidence and consider it to be more relevant than positive evidence. Popper’s theory suggests that finding one counter-example (evidence) is enough to falsify an assertion⁶. Thus, auditors engaging in falsification would be more sensitive to negative evidence, implying that the way of testing influences auditors’ information search and interpretation/weighting of obtained evidence.

In addition, if an auditor adopts a ‘falsification’ perspective, failing to find negative evidence (and obtaining positive information), which is normal in practice, would not contribute to heightening one’s belief that an assertion is fairly stated (or one’s belief that an assertion is not fairly stated). Clearly, the extent to which assertions are framed as positive or negative can affect how audit evidence is assessed and resulting risk assessments, and thus the level of PS evident in auditors’ judgments.

Hypotheses

We examine the effects on PS of a specific type of framing, ‘assertion framing,’ which is defined as indicating whether the audit assertions to be audited are stated in a positive form (e.g., an account balance is fairly stated) or a negative form (e.g., an account balance is *not* fairly stated).

The general hypothesis derived from the above discussion is that negative assertion framing will enhance the level of observed PS by having auditors engaging in falsification rather than verification.

This can be expected to occur by activating and enhancing the potential effects of two of the trait

⁵ Popper (1959, p.47) states: “The negation of a strictly universal statement is always equivalent to a strictly existential statement and vice versa.”

⁶ In auditing, evidence is usually not unequivocal and there exists a materiality threshold, thus a single counter-example would not render an assertion to be false.

variables that Hurtt (2009) identifies, specifically a questioning mind and the suspension of judgment. Given that some studies find evidence of positive effects of PS as a trait or personal characteristic on skeptical judgment (e.g., Hurtt et al., 2008; Quadackers, 2009; Quadackers, Groot, & Wright, 2009), we expect this positive relationship may be enhanced by negative assertion framing.

Consider first the role of the trait variable ‘questioning mind’ and how assertion framing might interact with this variable. As discussed, activating and enhancing a questioning mind when auditors considers a negatively stated assertion and engage in falsification can result in the auditor weighing negative aspects of any available evidence that supports ‘ $\sim a$ ’ more heavily. This would result in a higher assessment of $m_E(\sim a)$.

Activating a questioning mind also may result in activating information retrieval from memory and recall of instances that might lead to ‘ $\sim a$ ’ being true. This possibility builds on the Nelson (2009)’s suggestion that one promising way to enhance auditors’ PS is to frame an audit assertion in a way so that auditors direct their attention to client features that relate directly to audit risk. In considering the possibility that a particular management assertion may be false, this may result in making risk features related to the client, to its environment and/or to the nature of the account more salient. Thus negative framing may increase the effect of a ‘questioning mind’ and thus lead to heightened PS as measured by the belief in ‘ $\sim a$.’ In combination, these possible effects lead to the first hypothesis:

H1: Belief assessment effects [$m_E(\sim a)$]: Given evidence E which is generally confirming of ‘ A ’, the level of PS measured as the belief that the assertion being considered is false is expected to be significantly greater for assertions stated in the negative form than in the positive form.

Consider next ‘suspension of judgment’ which is another one of the traits Hurtt (2010) suggests constitutes PS. A more skeptical auditor who exhibits this trait to a greater extent is expected to require more and better audit evidence in order to reach the conclusion that an assertion is fairly stated (Nelson, 2009). Also, as stated, when engaging in falsification, obtaining positive information which is dominant

in audit settings would not be weighed heavily, and thus would result in a greater assessment of the residual level of ambiguity present. The opposite would be expected for positively stated assertions where evidence which confirms 'a' would be weighted heavily and would reduce the relative level of ambiguity. These expectations form the basis of the second hypothesis:

H2: Ambiguity assessment effects [$m_E(\{a, \sim a\})$]: Given evidence E which is generally confirming of 'A', the level of PS measured as the level of ambiguity or uncertainty that the assertion being considered is false is expected to be significantly greater for assertions stated in the negative form than in the positive form.

Research method

Overview of the experiment and sample

To address the hypotheses stated above, we conducted an experiment completed by sixty-one auditors from one US Big 4 firm. The participants were randomly assigned to either the positive assertion treatment or the negative assertion treatment with thirty-one and thirty auditors, respectively. All the participants were seniors and their average audit experience was 4.0 years.

The case materials used in the experiments were developed by the researchers and validated by practitioners and by pilot testing. The experiment was administered by the researchers during a training session of the participating firm.

Manipulations and tasks

In the experiments, the assertion framing ('positive' vs. 'negative') was manipulated to assess its effect on auditors' professional skepticism measured by their risk assessments on various assertions and audit planning decisions. Following the instruction section which provided the participants with instructions with six examples about how to express their assessments using beliefs, background information on a hypothetical client was provided. The client was described as a manufacturer of tools

for cutting materials and parts. The client's business had been steadily expanding over the past several years. The company had gone public one year ago, and their control environment was described as not being strong. Also, the information regarding the audit engagement, the results of the prior years' audit, a materiality threshold, and the summarized financial statements was included.

Then the participants were asked to assume that they were working on the audit of accounts receivable. They were provided with three assertions to be verified: the existence of accounts receivable, the valuation of accounts receivable, the accuracy of sales transaction records, and were asked to make assessments of these assertions based on the background information using belief function assessments.

More specifically, in the positive assertion treatment, the auditors were asked to express the belief assessment that each of the positively stated assertions concerning existence, accuracy, and valuation was true ($m(a)$), the belief assessment that the assertion was false ($m(\sim a)$), and the uncommitted belief or level of ambiguity ($m(\{a, \sim a\})$) so that the sum of these three assessments equals to one, that is they were 'additive.'⁷ Similarly, in the negative assertion treatment, the auditors were asked to express the belief assessments that the negatively stated assertion was true ($m(\sim a)$), the belief assessment that the assertion was false ($m(a)$), and the uncommitted belief ($m(\{a, \sim a\})$). The auditors were then asked to make assessments of an overall assertion regarding the accounts receivable ('The balance of the accounts receivable is fairly presented.' or 'The balance of the accounts receivable is not fairly presented.') based on the background information.

After the assessments based on the background information were made, audit evidence was provided for each assertion, and the auditors were asked to update the assessments, that is provide 'posteriors', based on the evidence. The provided items of audit evidence for the existence assertion, the valuation assertion and the accuracy assertion were the results of confirmations of the accounts

⁷ All of these assessments are contingent on E , the current amount of evidence. To simplify the notation, the E is not included.

receivable; the results of enquiries to the company's credit department concerning the estimate of the allowance for bad debts (and other information obtained to support their responses); and the results of the statistical sampling of the sales transactions and related documents, respectively. When updating the assessments of each assertion, the auditors were asked to take only the item for a particular assertion into account and not to consider the evidence for other assertions.

Then the auditors made final assessments of the overall assertion regarding the fair presentation of the accounts receivable based on all the information provided in the case materials including the background information and the audit evidence provided for each assertion. The final assessments require the auditors to aggregate the prior risk assessments and the strength of evidence assessments. Given that the evidence items considered were generally confirming but different in nature and strength, that the overall assessment requires aggregation across the various evidence items and across assertions, and that prior research has shown that auditors have difficulty in the aggregation (Fukukawa & Mock, 2010), we do not state or test assertion framing effects on PS at this level. Finally, the auditors were asked to provide their decision on additional audit hours necessary to complete the audit of accounts receivable based on their risk assessments, which also is not included in the analyses because this decision depends upon the aggregated risk assessments.

In sum, the explanatory variable manipulated in this experiment is the assertion framing (*Assertion*) (a between-subjects variable), and the dependent variables are auditors' belief assessments ($m(\sim a)$) (H1) and ambiguity assessments ($m(\{a, \sim a\})$) (H2). Also, the experiment adopts a repeated-measure design, thus we include *Assertion* (the existence, valuation, and accuracy assertions) as another possible explanatory variable (a within-subjects variable).

Results

Descriptive statistics

In general, the hypotheses predict that the risk assessments made for assertions stated in the negative form will be significantly greater than those made for assertions stated in the positive form, thus indicating a higher level of PS. The basic results are presented in Table 1.

If we consider the results across assertions, the most comparable results are the ‘priors’, that is, the assessments made before the audit test results are presented. For this situation, the evidence available is the same across assertions and only includes the general case information provided to the auditors. Thus this case presents a ‘repeated measures’ test where the treatment effect is observed over three assertions. The assessments for the ‘overall assertion’ that the accounts receivable are ‘fairly presented’ represents a fourth replication, but it differs somewhat because of the need to aggregate across assertions.

For the ‘prior’ assessments, the basic descriptives support the general hypothesis in every case except for the valuation assertion assessment of the ambiguity level. That is, the risk assessments made when the auditor assesses a negative assertion exceed those made when a positive assertion is being assessed in all cases except one.

For the ‘posteriors’, that is, the assessments made following consideration of the audit test results, the assessments are possibly affected by audit test result differences in both the ‘direction’ of the evidence, that is whether it is confirmatory or not, and the ‘strength’ of the evidence. Prior evaluation of the strength and nature of the evidence by experienced partners and via a prior similar experiment (see Fukukawa & Mock, 2011) imply that the audit test result related to ‘existence’ is mixed and of moderate strength; the audit test result related to ‘valuation’ is confirmatory and of low strength; and the audit test result related to ‘accuracy’ is also mixed and of moderate strength.

Two observations are noteworthy when looking at the ‘posterior’ assessments. First, the evidence in all cases was diagnostic and in the expected directions in that all of the assessments of ambiguity

decreased. This result is a manipulation check of the strength and direction of evidence expectations. Second, in ten of the 12 cases, the differences support the general hypothesis, that is that negative assertion framing will lead to a higher level of PS.

Hypothesis testing

In testing H1 and H2 statistically, ANOVA was run to discern if the differences in the overall means are significant. The results are documented in Tables 2 through 5.

The explanatory (source) variables in these tables are *ASSERTION* and *FRAMING*. As indicated, *ASSERTION* is a within-subjects variable and *FRAMING* a between-subjects variable. The dependent (explained) variables are two measures of risk assessment. This test allows us to ascertain whether there are significant differences across assertions and whether there are significant interactions (there are not in any case). Also, this allows us to interpret the effects of the assertion framing independently. These results are reported in the lower section of Tables 2 through 5.

Tables 2 and 3 show the results for H1 for the ‘prior’ and ‘posterior’ risk assessments ($m(\sim a)$) that the positive assertion is false or the negative assertion is true, respectively. If assertion framing has a significant effect on these assessments as hypothesized, the ANOVA will show a significant effect as it does at a significance level of 0.003 for the ‘prior’ assessments (Table 2). A similar result is shown in Table 3 for the ‘posterior’ assessments made after audit test results were presented. In this case the difference is significant at $p < 0.000$ (Table 3). Thus assertion framing is confirmed to enhance PS for the auditor’s assessment of the likelihood measured as belief that a particular management assertion may be misstated, which supports H1. Also, for the ‘posterior’ assessments which reflect the difference in nature and strength of provided audit evidence, the effect of *Assertion* is significant ($p = 0.002$).⁸

⁸ Another risk measure that may be relevant to this study is auditors’ plausibility assessments that an assertion may be misstated, which is defined as $PI(\sim a) = m(\sim a) + m(\{a, \sim a\})$. When conducting the same analyses using

Tables 4 and 5 shows ANOVA results for the auditor's assessment of the inherent ambiguity level. In this experimental setting, the between-subjects effects of assertion framing on the ambiguity assessments are not significant both before and after audit evidence is provided. Thus H2 is not supported by the ANOVA results.

Discussion, conclusions, limitations, and future research

This experimental study builds on Popper's (1959) philosophical arguments concerning verification and falsification and the Theory of Belief Functions to investigate the effects of 'assertion framing' on auditors' risk assessments for a task involving the auditing of three assertions related to the revenue cycle. The study has three main areas of contribution.

First, by basing our theoretical background on Popper (1959), we provide a new perspective on why assertion framing affects auditors' professional skepticism. We propose that assertion framing determines the approach to testing an assertion (verification vs. falsification) and thus influences evidence evaluation and resulting risk assessments, and find experimental evidence to support our expectation. Which of the two approaches to testing an assertion is adopted is an important issue because it has a potential for reforming the whole structure of audit process including audit planning, evidence evaluation, and risk assessments in the context of the audit risk model.

Second, it presents two alternative measures of risk based on the Theory of Belief Functions which may be used to operationalize the level of PS in studies of auditors' risk assessments, audit planning decisions and audit opinion formation. These measures allow us to operationalize two of the trait skepticism variables suggested by Hurtt (2010) which may affect skeptical behavior: questioning mind and suspension of judgment.

this risk measure, exactly the same results as those reported here were observed. In this case, the differences in the risk assessments between the assertion framing treatments are significant at the 0.003 level for the 'prior' assessments and at the 0.001 level for the 'posterior' assessments.

Third, it presents the results of an experiment which tests the effects of ‘assertion framing’ on PS. These results test and support Nelson (2009)’s hypothesis that psychological factors such as framing may enhance the level of PS.

Two measures of audit risk derived from Fukukawa and Mock (2011) are used to define three interrelated measures of skeptical behavior. One risk measure is based on the auditor’s belief that a management assertion may be misstated; the second on assessed level of ambiguity at a particular point in the audit. As noted, each risk measure is contingent on the audit evidence available at that particular point in the audit.

Two hypotheses predict that negative assertion framing will significantly enhance PS. Basic descriptive results in Table 1 show that the levels of PS are greater for the negative assertion framing condition in 21 of the 24 comparisons.

ANOVA results confirm that the variable *Assertion* was not significant, that is the risk assessments do not differ significantly across the three assertions that were assessed. Also, none of the interactions between *Assertion* and *Framing* were significant. These results show that the variable *Framing* is driving the results. In fact, the differences related to *Framing* were highly significant for both the ‘prior’ assessments and ‘posterior’ assessments for the auditor’s *beliefs* that the management assertions may be misstated. These results strongly support H1. However, for the assessments of level of *ambiguity*, the differences were not statistically significant, thus H2 is not supported.

Some limitation should be noted in interpreting the results of this study. First, while we are able to examine whether the relationship between auditors’ skepticism as traits and their skeptical judgments is affected by the framing of an assertion to be audited, variations across auditors in the level of the traits is not addressed. Future research could assess the impact of innate differences among auditors using the scale developed and validated by Hurtt (2009). Second, the participants in the experiment were drawn

from a single audit firm. Thus our results may not hold for auditors from other firms. Lastly, given that positively stated assertions are normally used in practice, the participants in the negative assertion treatment may have had greater difficulty in expressing their beliefs and this may have affected the results.

However, importantly, we find strong evidence that assertion framing does significantly enhance professional skepticism in terms of indicating a greater effect of a ‘questioning mind’ and that these findings persist even after obtaining the results of audit tests and irrespective of the nature of evidence considered. These findings imply that PS may be enhanced, as Nelson (2009) suggests, by the way assertions being audited are framed and the effect may be generalized over different assertions, audit evidence and risk measures. Our results may also be interpreted as indicating assertion framing relates most directly to the trait variable ‘questioning mind,’ but not to ‘suspension of judgment.’

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Figure 1
The Study Research Framework

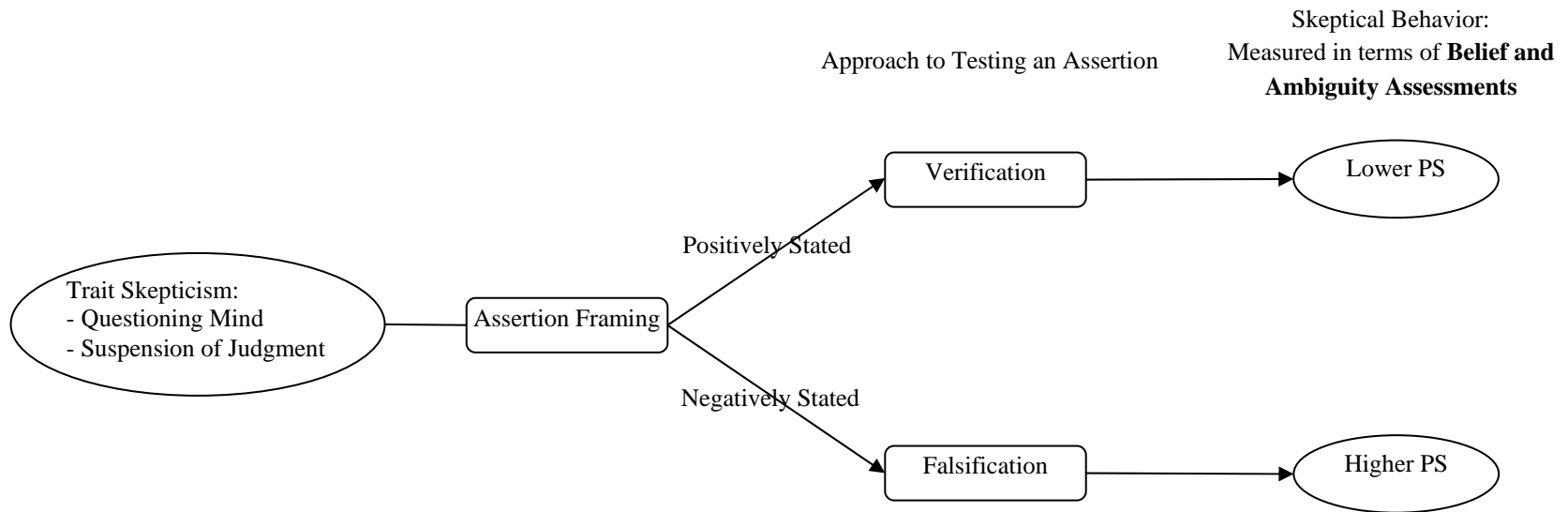


Table 1

Descriptive statistics on risk assessments

[N = 61 (31 for PA treatment, 30 for NA treatment)]

[Assessments highlighted in yellow are consistent with the general hypothesis, and those in blue are inconsistent with the general hypothesis.]

		Before audit evidence is provided (Priors)			After audit evidence is provided (Posteriors)		
		Belief in ' $\sim a$ ' = $m(\sim a)$	Ambiguity level = $m(\{a, \sim a\})$	Plausibility of ' $\sim a$ ' = $m(\sim a) +$ $m(\{a, \sim a\})$	Belief in ' $\sim a$ ' = $m(\sim a)$	Ambiguity level = $m(\{a, \sim a\})$	Plausibility of ' $\sim a$ ' = $m(\sim a) +$ $m(\{a, \sim a\})$
Existence	Positive	.082 (.141)	.577 (.375)	.660 (.315)	.071 (.104)	.252 (.242)	.323 (.231)
	Negative	.270 (.274)	.611 (.326)	.883 (.178)	.321 (.301)	.212 (.197)	.533 (.357)
Valuation	Positive	.136 (.239)	.597 (.359)	.732 (.298)	.126* (.197)	.479* (.316)	.605* (.244)
	Negative	.290 (.312)	.590 (.347)	.880 (.185)	.280 (.262)	.477 (.338)	.757 (.297)
Accuracy	Positive	.126 (.227)	.584 (.387)	.710 (.311)	.288** (.340)	.238** (.254)	.527** (.354)
	Negative	.267 (.256)	.616 (.315)	.883 (.190)	.392 (.295)	.298 (.245)	.691 (.345)
Overall	Positive	.126 (.210)	.584 (.393)	.710 (.328)	.187** (.216)	.298** (.257)	.485** (.259)
	Negative	.277 (.273)	.597 (.329)	.873 (.205)	.320 (.251)	.370 (.243)	.690 (.276)

* Data are missing for two participants.

** Data are missing for one participant.

Table 2Two-way ANOVA results: Prior risk level ($m(\sim a)$) [N = 61]Within-Subjects Effect of *Assertion*(As Mauchly's W is 0.600 ($p = 0.000$) for the effect of *Assertion*, sphericity is not assumed and the Greenhouse-Geisser correction is used.)

<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
<i>Assertion</i>	.041	1.429	.029	.752	.433
<i>Assertion * Framing</i>	.018	1.429	.012	.325	.649
Error (<i>Assertion</i>)	3.216	84.313	.038		

Between-Subjects Effect of *Framing*

<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
Intercept	6.959	1	6.959	54.426	.000
<i>Framing</i>	1.186	1	1.186	9.276	.003
Error	7.544	59	.128		

Descriptions of variables:

Assertion: Three audit assertions are adopted in this study (i.e., the existence assertion, the valuation assertion and the accuracy assertion).

Framing: A positively stated assertion or a negatively stated assertion is provided.

Table 3
Two-way ANOVA results: Posterior risk level (m(~a)) [N = 59]

Within-Subjects Effect of <i>Assertion</i>					
<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
<i>Assertion</i>	.844	2	.422	6.662	.002
<i>Assertion * Framing</i>	.188	2	.094	1.480	.232
Error (<i>Assertion</i>)	7.222	114	.063		
Between-Subjects Effect of <i>Framing</i>					
<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
Intercept	10.860	1	10.860	135.384	.000
<i>Framing</i>	1.230	1	1.230	15.333	.000
Error	4.572	57	.080		

Descriptions of variables:

Assertion: Three audit assertions are adopted in this study (i.e., the existence assertion, the valuation assertion and the accuracy assertion).

Framing: A positively stated assertion or a negatively stated assertion is provided.

*Data are missing for two participants.

Table 4Two-way ANOVA results: Prior ambiguity level ($m(\{a, \sim a\})$) [N = 61]Within-Subjects Effect of *Assertion*(As Mauchly's W is 0.496 ($p = 0.000$) for the effect of *Assertion*, sphericity is not assumed and the Greenhouse-Geisser correction is used.)

<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
<i>Assertion</i>	.002	1.330	.001	.025	.928
<i>Assertion * Framing</i>	.017	1.330	.013	.285	.661
Error (<i>Assertion</i>)	3.575	78.468	.046		

Between-Subjects Effect of *Framing*

<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
Intercept	65.062	1	65.062	208.233	.000
<i>Framing</i>	.019	1	.019	.062	.804
Error	18.434	59	.312		

Descriptions of variables:

Assertion: Three audit assertions are adopted in this study (i.e., the existence assertion, the valuation assertion and the accuracy assertion).

Framing: A positively stated assertion or a negatively stated assertion is provided.

Table 5
Two-way ANOVA results: Posterior ambiguity level ($m(\{a, \sim a\})$) [N = 59]

Within-Subjects Effect of <i>Assertion</i>					
<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
<i>Assertion</i>	2.007	2	1.003	17.034	.000
<i>Assertion * Framing</i>	.082	2	.041	.692	.503
Error (<i>Assertion</i>)	6.715	114	.059		
Between-Subjects Effect of <i>Framing</i>					
<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
Intercept	19.111	1	19.111	188.201	.000
<i>Framing</i>	.000	1	.000	.000	.984
Error	5.788	57	.102		

Descriptions of variables:

Assertion: Three audit assertions are adopted in this study (i.e., the existence assertion, the valuation assertion and the accuracy assertion).

Framing: A positively stated assertion or a negatively stated assertion is provided.

*Data are missing for two participants.