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The Effect of a Scarcity Mindset on External Auditors' Reliance on the Internal Audit Function

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THE EFFECT OF A SCARCITY MINDSET ON EXTERNAL AUDITORS' RELIANCE ON THE INTERNAL AUDIT FUNCTION

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ABSTRACT

Audit regulators are concerned that times of economic uncertainty will likely cause external auditors to misuse the work of the internal audit function (IAF). These concerns are consistent with prior psychology research finding that objective poverty *or* a subjective, perceived lack of resources induces a scarcity mindset, which then leads to counterproductive economic behaviors. Therefore, I examine the effect of such a scarcity mindset on external auditors' IAF reliance choices. In an experiment that incorporates a setting mimicking the evidence collection process, I manipulate the external auditor's scarcity mindset and the internal audit function's competence. I find that external auditors with a scarcity mindset, as compared to external auditors without a scarcity mindset, are more risk averse, which leads to a lower level of reliance on an IAF perceived as more competent. These findings contradict the concerns from regulators and indicate that, if anything, external auditors are less likely to rely on the IAF in times of economic uncertainty.

DEDICATION

To my wife, Abby, and my daughter, Evelyn.

LIST OF ABBREVIATIONS AND SYMBOLS

AICPA	American Institute of Certified Public Accountants
AS	Auditing Standard
ASB	Auditing Standards Board
ANOVA	Analysis of Variance
CI	Confidence Interval
IAF	Internal Audit Function
PCAOB	Public Company Accounting Oversight Board
LL	Lower-Level Confidence Interval
UL	Upper-Level Confidence Internal

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I. INTRODUCTION

Current auditing standards allow external auditors to use the internal audit function (IAF) to reduce the nature, timing, and extent of audit procedures that would otherwise be performed by the external audit team (AS 2605, AS 2201, AU-C 610, ISA 610). However, if adopted, a recent proposal by the Public Company Accounting Oversight Board (PCAOB) would severely limit, or eliminate altogether, external auditors' ability to rely on the IAF in "selecting items to be confirmed, sending confirmation requests, and receiving confirmation responses" (PCAOB Release No. 2022-009). In commenting on the objectives outlined in the proposal, PCAOB chair Erica Williams stated that "During times of economic uncertainty, the risk of fraud is heightened, and auditors have to be more vigilant than ever. When done right, confirmation can be a critical tool to help auditors combat fraud and keep investors protected" (PCAOB 2022). As voiced by the chair of the PCAOB in her comments, regulators fear that the option of IAF reliance poses an opportunity for external auditors to potentially lose control over the confirmation process (AS 2605.28), and the PCAOB appears especially concerned about external auditors over relying on the IAF during such economic times. I address these concerns by exploring whether the extent to which an external auditor relies on the IAF is influenced by whether the auditor adopts a scarcity mindset, which can arise when one faces an actual or perceived poverty of resources (Liang et al. 2021; Mullainathan and Shafir 2013).

I examine my research in the context of audit standards requiring external auditors to assess the IAF's competence and whether the IAF "applies a systematic and disciplined approach, including quality control" (AS 2605, AU-C 610.06). If the external auditor determines that the IAF

is not competent, the auditor must decrease the reliance on the IAF. On the other hand, if the IAF is competent, it is in the best interest of the external auditor to increase audit efficiency by using the evidence collected by the IAF. As such, I assess whether, based on the external auditor's evaluation of an IAF's competence, a scarcity mindset leads the external auditor to over (under) rely on an IAF perceived as less (more) competent as compared to an external auditor without a scarcity mindset. Compared to external auditors without a scarcity mindset, a misuse of the IAF by external auditors with a scarcity mindset would be evidenced by a greater (lesser) reliance on an IAF perceived to be less (more) competent and would provide evidence to suggest that either regulator concerns are warranted or that audit firms are missing an opportunity to gain efficiencies.

Theory related to the scarcity mindset is based on an emerging stream of research in psychology. Formally presented for the first time in Mullainathan and Shafir (2013), a scarcity mindset is induced by one's past experiences of constrained resources (Roux et al. 2015), through future expectations concerning an economic outlook (e.g., Wohl et al. 2014), or through social comparison (e.g., Xu et al. 2022). In other words, a scarcity mindset can be brought on through either situations of objective poverty or through a subjective perception that resources are scarce (Mullainathan and Shafir 2013). Under a scarcity mindset, one focuses on conserving the resource that is scarce or perceived to be scarce. However, this mindset leads to counterproductive behaviors as those suffering scarcity tend to ignore other tasks or details that fall outside the goal of current resource conservation (Mullinaithan and Shafir 2013; Zhao and Tomm 2017, 2018). A common example of such a mindset is individuals electing to forego car or health insurance to conserve money in the present while ignoring the potentially severe consequences of not having insurance (e.g., Cole et al. 2013, Casaburi and Willis 2018, Belissa et al. 2019). In consideration of such

behaviors then, I assess whether a scarcity mindset, as compared to not having the mindset, leads to suboptimal IAF reliance decisions.

While prior studies agree that a scarcity mindset leads to counterproductive economic choices, recent reviews of the scarcity mindset literature call for further understanding of the mechanisms underlying this effect (de Brujin and Antonides 2022; Adamkovic and Martoncik 2017). Liang et al. (2021) find that a scarcity mindset increases one's propensity to take risks, consistent with prior research indicating that poverty is often perpetuated by increased risk-taking behaviors such as gambling (van der Maas 2016). On the other hand, other studies (e.g., Haushofer and Fehr 2014 and Guiso and Paiella 2008) propose that poverty is perpetuated through increased risk averse behaviors such as a farmer accepting a lower bid for crops out of fear of never receiving a higher bid in the future. Though these studies do not agree on whether a scarcity mindset will lead to a propensity for risk taking or for risk aversion, they generally indicate that risk-taking propensity could act as a mediating effect between a scarcity mindset and external auditors' reliance on the IAF. Accordingly, my paper adds to the scarcity mindset literature by exploring the potential mediating effect of risk-taking propensity on IAF reliance and to understand this effect at different levels of perceived internal auditor competence.

I predict that whether a scarcity mindset leads to increased risk taking or to increased risk aversion, a suboptimal IAF reliance choice will ensue. More specifically, I propose two competing hypotheses regarding the counterproductive economic behaviors likely to manifest due to an auditor's scarcity mindset. First, I hypothesize a positive, conditional, indirect effect of an auditor's scarcity mindset such that a scarcity mindset leads to a higher risk-taking propensity, which in turn leads auditors to rely more heavily on IAFs that are perceived as less competent. Support for this hypothesis would indicate overly risky behavior such that conserving resources through IAF

reliance may come at the cost of an audit failure in the future. Alternatively, I hypothesize a negative, conditional, indirect effect of a scarcity mindset auditor could occur such that a scarcity mindset leads to a lower risk-taking propensity, which in turn leads to lower levels of reliance on IAFs that are perceived as more competent. Support for this prediction would indicate overly cautious, or risk averse, behavior such that the fear of losing additional resources through the cost of audit failure attenuates IAF reliance when it is appropriate.

I address my research question using an abstract, experimental setting where students serving in the role of an external auditor are incentivized to conserve an endowment of resources to be used in evidence collection while also minimizing the likelihood of an audit failure. To aid in the conservation of their resources, external auditor participants are allowed to rely on the work of a paired internal auditor, whose role is also filled by a student. Thus, my abstract setting analogizes to the real-world evidence collection process in that external auditors incur a higher cost for the additional individual effort exerted in collecting incremental evidence while also reducing the likelihood of an accounting failure for each piece of evidence gathered (Bowlin et al. 2015). While external auditors can reduce the cost incurred by relying more on evidence collected by the internal auditor, they must consider information related to competency differences when making their reliance decision to ensure the likelihood of an accounting failure is minimized to an acceptable level.

I employ a 2×2 between-subjects design in which I manipulate the scarcity mindset of the external auditors and the competency of the IAF. To manipulate a scarcity mindset, external auditor participants assigned to the scarcity condition complete a questionnaire adapted from Liang et al. (2021) in which participants choose from a list of resources the one they perceive to be the most scarce in their daily lives. Next, in response to their chosen resource, participants indicate the

extent to which they perceive the resource to be scarce on a scale of 0-10. Once participants have responded to each of the first two questions, they are asked to respond to a series of three open-ended questions that assess the feelings evoked by the scarcity, the greatest influence of the scarcity, and the response one would have if returned to a situation of scarcity. For participants assigned to the control condition, they are asked to complete a control questionnaire adapted from both Liang et al. (2021) and Roux et al. (2015) in which they describe activities performed throughout the past week.

To manipulate IAF competence, I draw on the requirement of AS 2605.09 that external auditors must evaluate the procedures performed by the IAF to inform their assessment of competency. As such, external auditors paired with a more (less) competent IAF are told that their internal audit partner will collect evidence via a more (less) efficient and effective procedure. On average, then, the external auditor should expect the more (less) competent IAF to collect more (less) evidence related to the same financial statement assertion, and given their incentives to conserve costs related to evidence collection, the external auditor should respond by collecting less (more) evidence of their own when paired with a more (less) competent IAF.[1]

I find that external auditors with a scarcity mindset are more risk-averse, rather than risk-seeking, compared to auditors without a scarcity mindset. Consistent with my predictions, I find that this risk aversion leads external auditors with a scarcity mindset to rely significantly less on an IAF perceived as more competent as compared to auditors without a scarcity mindset. My findings also indicate no differences in reliance between scarcity mindset conditions at lower levels

[1] For simplicity, the evidence collected in my experimental task does not vary in its quality. Rather, the "quality" of the work performed by internal auditors is represented by how much evidence they collect in their task, where the amount of evidence collected is based on the tools available to internal auditors and how well they use those tools.

of IAF competence. Taken together, my study provides evidence to suggest that regulator concerns that auditors are likely to be less vigilant regarding IAF reliance during times of economic uncertainty may be unwarranted. In fact, the scarcity mindset that arises during such economic downturns appears to lead external auditors to prefer collecting more evidence of their own rather than relying on an IAF that they perceive as being more competent.

My study contributes to audit practice and regulation, as well as the accounting and psychology literatures in several ways. First, my study contributes to practice by highlighting a potential area to gain efficiencies in an external audit of a client. A scarcity mindset appears to lead to a psychological bias such that external auditors prefer the more risk-averse choice to collect more evidence of their own during times of economic uncertainty. While such evidence collection is described by regulators as being more persuasive as compared to obtaining the evidence indirectly (AS 2605.18), audit firms may find it beneficial to opt for more reliance upon evaluating an IAF to be more competent (Abbott 2012; Schneider 1985). Importantly, the findings may generalize to audit firms of varying sizes as I do not manipulate the level of resources that an external auditor has available. Similarly, I capitalize on my experimental setting to show that the effects of a scarcity mindset also result from its subjective nature rather than only due to an objective poverty of resources. Therefore, my results generalize to any situation of resource constraints regardless of whether the constraint is objective or perceived (e.g., workforce shortages or time availability for project deadlines).

Second, my study is timely for regulators as it comes in response to the recent PCAOB concerns about the impact of economic uncertainty. I provide evidence that the psychological effect that results from economic uncertainty, if anything, leads the external auditor to be more vigilant in the evidence collection process. Thus, the concerns voiced by regulators may be

unwarranted. I also answer calls from regulators for more research on identifying potential areas in which the external auditor may over rely on the IAF (see Bame-Aldred et al. 2013). To do so, I introduce Scarcity Mindset Theory to the accounting literature (see Liang et al. 2021; Mullainathan and Shafir 2013). While some prior research on scarcity theory indicates the potential for a scarcity mindset to lead to an overvaluation of resource conservation and an ensuing over reliance on a less competent IAF, my findings indicate the contrary.

Finally, I contribute to psychology literature by highlighting a mechanism through which a scarcity mindset leads to counterproductive economic behaviors. In response to Adamkovic and Martoncik (2017), I assess a partial model to better understand the underlying theory of a scarcity mindset. Further, I provide evidence in support of prior literature that a scarcity mindset increases risk aversion (e.g., Haushofer and Fehr 2014), yet I build on this prior literature to find that risk aversion acts as a mediator between a scarcity mindset and the suboptimal economic decisions on which many prior studies converge.

II. BACKGROUND AND HYPOTHESES DEVELOPMENT

Regulatory Background

External auditors are permitted by regulators to use the work of the internal audit function (IAF) in carrying out tests of internal controls, in assessments of risk, and in performing substantive procedures (AS 2605, AS 2201, AU-C 610, ISA 610). A primary incentive for audit firms to use the work of the IAF is to be more efficient, thus affecting "the nature, timing, and extent of audit procedures" that the external auditor would otherwise have to perform (AS 2605, AU-C 610).[2] Prior literature notes the cost-savings benefit for audit firms utilizing work already performed by the IAF or using internal auditors as direct assistants (Prawitt et al. 2011). Specifically, Schneider (1985) finds early evidence that external auditors use the IAF to reduce their budgeted hours for clients. More recently, Abbott (2012) finds that using the IAF for assistance reduces external audit delays. Though the benefits for both audit firms and clients are well documented, regulations require external auditors to evaluate the IAF prior to implementing their work into the audit plan.

To use the work of the IAF, audit standards require that external auditors assess the internal auditor's competence and objectivity (AS 2605, AU-C 610, ISA 610). Further, the AICPA and IAASB state that internal auditors must display a "systematic and disciplined

[2] AS 2605.17 provides specific examples of substantive procedures that the external auditor can use internal auditors to provide direct evidence through. For instance, if using the IAF to "confirm accounts receivable and observe certain physical inventories", the external auditor "may be able to change…the number of accounts receivable to be confirmed or the number of locations of physical inventories to be observed."

approach" in carrying out their work (AU-C 610). Standards across regulatory bodies generally state that IAF competence can be assessed through factors such as the specific policies, programs, and procedures carried out by the IAF, the internal auditors' level of education and amount of continuing professional education, and the quality of work-paper documentation (AS 2605, AU-C 610, ISA 610). The PCAOB defines competence as "the attainment and maintenance of a level of understanding and knowledge that enables that person to perform ably the tasks assigned to them" (AS 2201.18), and the AICPA's definition is very similar (AU-C 610.A8). Therefore, when delegating tasks to be performed by the IAF, the external auditor should assign fewer tasks, and thus rely less, on an IAF that is less competent (AS 2605, AU-C 610, ISA 610). Conversely, a proper assessment and reliance on a more competent IAF allows an audit firm to capitalize on the known benefits of conserving firm resources (Schneider 1985; Abbott 2012).

Standards also require that the auditor must consider IAF objectivity, which is determined by whether the IAF is outsourced (Glover et al. 2008), whether the IAF reports to management or to those charged with governance such as the audit committee, whether the entity shows initiative to take action on the IAF's findings, and whether the IAF has direct access and reports frequently to the board of directors, the audit committee, or the owner manager (AS 2605). Prior research has explored whether external auditors consider the nuanced aspects of both competence and objectivity in making their reliance decisions, and if so, whether they weigh one more heavily than the other. Using both archival and experimental methods, Messier et al. (2011) find that, due to lower evaluations of the IAF's objectivity, external auditors charge higher fees to clients who use the IAF as a management training ground. Also focusing on the external auditors' consideration of objectivity, Munro and Stewart (2011) find that external

auditors are more (less) willing to rely on work already completed by the IAF when their reporting relationship with the audit committee is strong (weak). Highlighting the importance of both quality components, Abbott et al. (2016) find that the effect of both competence and objectivity on IAF quality depends on the level of the other component. In other words, the effect of the IAF's competence (independence) on overall IAF quality depends on whether the IAF is independent (competent). While proper assessments of both components of IAF quality are undoubtedly important, several findings from prior literature indicate that external auditors place a higher level of importance on the IAF's competence. Namely, Messier and Schneider (1988) find among their sample of external audit supervisors and managers that competence is weighted the most important IAF quality factor. Maletta (1993) finds similar results such that competence is the most important factor across all inherent risk conditions. These results align with the earlier literature such as Margheim (1986) which finds that on average, external auditors are shown to weigh the IAF quality component of competency more heavily in their reliance decisions.

While these findings provide evidence that external auditors do consider the aspects of IAF quality in their decisions to use the work of the IAF, more recent literature sheds light on at least one situation in which external auditors may fail to adjust their reliance choice after observing a negative indicator of IAF quality. Pike et al. (2016) find that external auditors who are more involved in the IAF's work plan assess the IAF as more objective, initially rely more on the IAF, and continue such level of reliance even after the discovery of a negative audit issue. Importantly, these findings highlight a departure from what is mandated by auditing standards such that IAF reliance is in accordance with levels of competence and objectivity (AS 2605, AU-C 610, ISA 610). Accordingly, I seek to build on Pike et al. (2016) by exploring whether an

external auditor under a scarcity mindset may perceive the current benefits of conserving resources through IAF reliance to outweigh the future high cost of an audit failure resulting from an over reliance on a less competent IAF. Such a scenario would reinforce regulator concerns and motivate future standards to minimize the level at which external auditors may rely on the IAF. However, under current regulation that allows increased reliance on a more competent IAF, it is also important to understand whether and how external auditors may fail to capitalize on the benefit of utilizing the IAF in the audit of clients. An external auditor that relies too much (little) on an IAF that is less (more) competent represents a common outcome from a scarcity mindset in that it is a counterproductive economic behavior (de Brujin and Antonides 2022).

Scarcity Mindset Theory and Associated Risk Preferences

Prior psychology research indicates that clear, objective resource constraints impose a "scarcity mindset" (de Brujin and Antonides 2022); however, Mullainathan and Shafir (2013) state that "the feeling of scarcity is distinct from its physical reality" (22). In other words, a scarcity mindset is subjective in that it is "having less than you feel you need," and it is not exclusive to those who experience true, objective poverty (Mullainathan and Shafir 2013, p. 10). For instance, the experience of scarcity in one's past or the expectation of scarcity in the future (e.g., an economic downturn) (Griskevicius et al. 2013) is enough to evoke the effects attributed to a scarcity mindset. So, whether it is a subjective opinion in which one simply feels resource constrained or a current, objective poverty of resources such as a low number of employees or a low income, the scarcity mindset that arises is noted for counterproductive economic behaviors (e.g., Mullanaithan and Shafir 2013, Shah et al. 2015; Fehr et al. 2019; Lichand and Mani 2020; de Brujin and Antonides 2022).

In a setting where an external auditor chooses to rely on the IAF, there are two counterproductive economic behaviors that could be made. First, an external auditor may choose an overly risky course of action by passing off work to an IAF who exhibits lower levels of competence, thereby increasing the likelihood of an accounting failure. Second, external auditors may choose an overly cautious course of action by relying too little on an IAF who exhibits higher levels of competence and taking on more work for themselves to ensure that the likelihood of an accounting failure is knowingly decreased. This particular decision also represents a counterproductive economic behavior in that it does not take advantage of current regulation and fails to minimize resource allocation. Research to date on a scarcity mindset indicates that either of these two counterproductive behaviors may occur if an auditor takes on a scarcity mindset (Cannon et al. 2018). While I do not make a prediction on the direction in which external auditors with and without a scarcity mindset differ in their reliance choices, I evaluate prior literature to examine how differences in risk-taking propensity lead to either of the aforementioned counterproductive actions.

Scarcity Mindset and Increased Risk Taking

Recent research finds that a scarcity mindset induces a present bias for payoffs and more risky decisions (Griskevicius et al. 2013; Wohl et al. 2014; Payne et al. 2017; Kirchler et al. 2017; Liang et al. 2021). Mullainathan and Shafir (2013) attribute the preference for risk taking to individuals' focus on conserving or acquiring resources in the present while ignoring the potential long-term effects of such shortsightedness.[3] For example, multiple studies find that poor individuals facing liquidity constraints prefer high deductibles or no insurance at all in order

[3] A reliance choice that conserves resources in the present yet ignores potential long-term consequences is represented in this study by an external auditor that relies too much on a less competent internal audit function.

to save money in the present (e.g., Cole et al. 2013; Casaburi and Willis 2018; Belissa et al. 2019). Similarly, in an experimental setting, Griskevicius et al. (2013) find that those from poor socioeconomic backgrounds display a higher likelihood to disregard a lower, guaranteed payment in favor of a higher payment with an approximate 50% likelihood of payout (and a lower expected return). While Griskevicius et al. (2013) provide evidence of risky behavior in a domain where the participant gambles on *gaining* a resource, Kirchler et al. (2017) provide evidence that a scarcity mindset induces risky behavior in a *loss* domain as well. They find that when facing time scarcity, participants were more likely to choose the option of participating in a 50/50 lottery to lose either 0 or 100 of the originally endowed Swedish Krona (SEK) versus the option of losing a guaranteed sum of money between SEK 30 and SEK 50. Importantly, the findings of Kirchler et al. (2017) coincide with previous research documenting poverty-stricken individuals preferring to forego insurance and demonstrating a perception that any slight chance of loss is viewed as "disproportionately severe, and the possibility of no loss at all" is viewed "as subjectively more beneficial" (Adamkovic and Martoncik 2017, p. 9).

While prior studies assess actions indicative of more risky behavior, Liang et al. (2021) directly measure differences in risk-taking preferences between those with and without a scarcity mindset. Using the Domain-Specific Risk-Taking Scale (DOSPERT, Blais and Weber 2006) to measure the propensity to take risks in five domains, they find that those with more perceived scarcity of resources are more willing to take risks across social, recreational, financial, health, and ethical domains. These results highlight a possible mechanism through which the effect of a scarcity mindset acts on an ultimate action such as choosing to forego insurance for the sake of conserving money in the present. As such, I first hypothesize that external auditors with a scarcity mindset will display more of a propensity to take risks when making their reliance

choices as compared to external auditors without a scarcity mindset. I formally state this hypothesis as follows:

H1a: External auditors with a scarcity mindset will be more willing to take risks

Scarcity Mindset and Risk Aversion

The prior hypothesis is not made without tension given that studies also reveal a propensity of those with a scarcity mindset to be more risk averse (e.g., Vieider et al. 2019). Notably, in their review of literature assessing the effect of poverty on risk-taking, Haushofer and Fehr (2014) describe that those facing an expected poverty of resources tend to exhibit a lower willingness to take risks by foregoing a larger, delayed payment in favor of a lower, immediate payment.[4] The acceptance of such payments may be done in the presence of higher background risks, such as farmers fearing crop failure, leading to an acceptance of an immediate lower payment for crops versus waiting for a potentially higher bid (Pratt and Zeckhauser 1987; Guiso and Paiella 2008). Further, other empirical studies such as Dohmen et. al (2011) and Carvalho et al. (2016) support this proposition more broadly such that poorer households display higher levels of risk aversion and that those with lower levels of savings in their bank accounts are less likely to engage in gambling behavior.

Taken together, then, it is not clear whether those with a scarcity mindset will display more risk-taking or more risk-averse behavior. However, prior literature does indicate an expected difference one way or another in risk-taking propensity. As mentioned by Liang et al. (2021), the presence of background risks such as a penalty associated with an accounting failure

[4] Though these findings may seemingly contradict those described Griskevicius et al. (2013) in the previous section, the findings discussed in Haushofer and Fehr (2014) assess preferences for payments that differ not only in payment amount but also in the time in which payment would be received (immediate versus delayed).

may lead auditors with a scarcity mindset to display more risk-averse behavior as opposed to more risk-taking behavior. Given this, I propose an alternative hypothesis as follows:

H1b: External auditors with a scarcity mindset will be less willing to take risks

Risk-Taking Propensity and Auditor Competence

Finally, I expect that the relationship between an auditor's risk-taking propensity and their reliance on the internal audit function (IAF) to strengthen as perceived internal auditor competence increases. This prediction relies on an assumption of IAF competence and expected utility theory (Bernoulli 1738; Friedman and Savage 1952; Mishra 2014). Standards mention that the utility of using the work of the IAF is to reduce the "nature, timing, and extent of the audit" (AS 2605.12), allowing an external audit firm to conserve resources that would otherwise be employed if not for reliance on the IAF. However, such utility is negated if the likelihood of an accounting failure is not adequately reduced upon relying more on the IAF. In this instance, reliance on a less competent IAF may conserve resources in the present at the expense of incurring a penalty associated with an accounting failure. Further, if the level of external auditor reliance on the IAF is held constant across levels of IAF competence, the utility of reliance is expected to increase as the level of IAF competence increases given that more competent IAFs possess the ability to perform a more effective audit through their policies, programs, procedures, and experience level (AS 2605.09). In other words, the expected utility of relying on an internal audit function perceived as more competent should be greater than that of an internal audit function perceived as possessing lower levels of competence. Therefore, as the perception of an internal auditor's competence increases, so should the reliance of the external auditor.

According to the risk-preferring (risk-averse) utility curve posited in expected utility theory, "each additional unit of reward is valued more (less) than the last" (Mishra 2014, p. 232). Applying this to a setting where an external auditor makes a choice to rely on the IAF, I predict

that the expected utility for relying on a more competent IAF will be valued more for those displaying higher risk preferences. More specifically, I predict that there will be a positive interaction between an external auditor's propensity to take risks and the perceived level of internal auditor competence. I formally state my final hypothesis below:

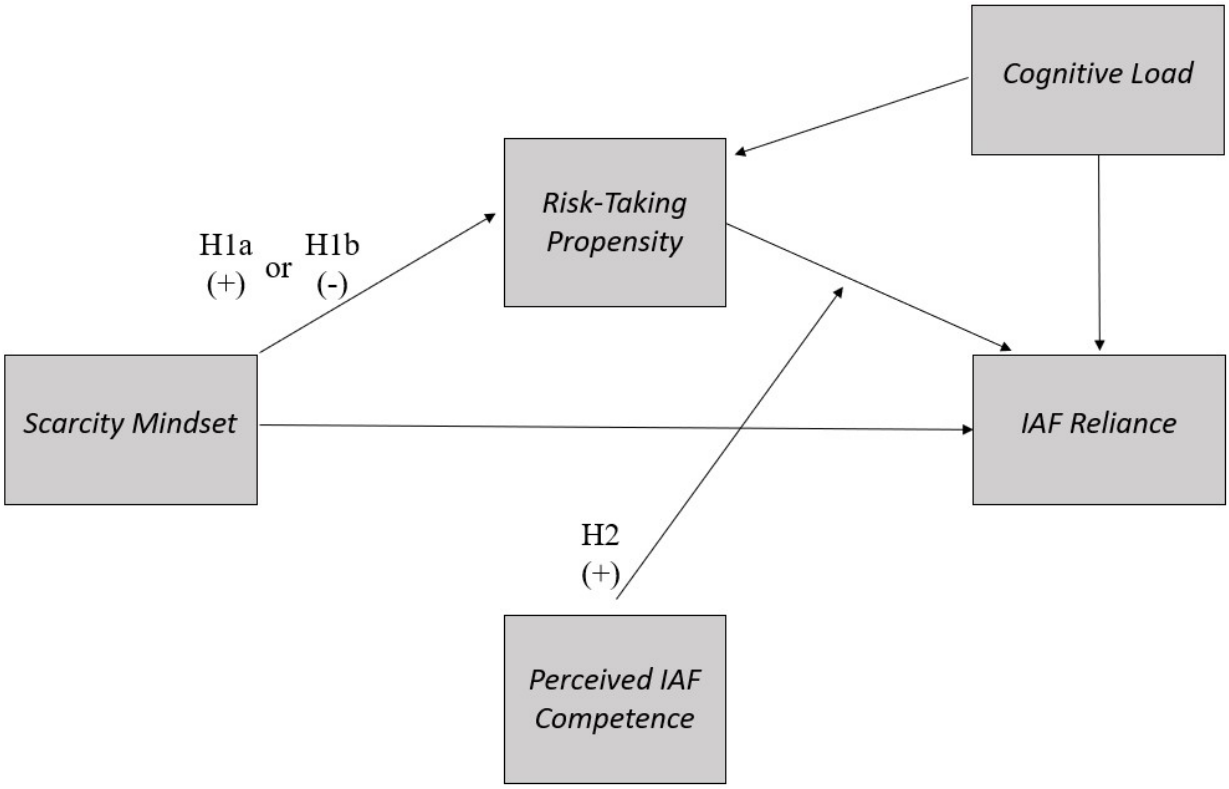
H2: The relationship between an external auditor's risk-taking propensity and their reliance on the IAF strengthens as the perception of internal auditor competence increases

Taken together, the above hypotheses predict that the level of perceived competence of the internal auditor moderates the indirect effect of a scarcity mindset on external auditors' reliance choices through their propensity to take risks.[5] Thus, a scarcity mindset is expected to lead to one of two irrational economic behaviors: either an overreliance on less competent IAFs or an under reliance on more competent IAFs as compared to external auditors without a scarcity mindset. Additionally, these behaviors are predicted to operate through an external auditor's risk-taking propensity such that a scarcity mindset will lead to either more risk-taking or risk-averse behavior. Figure 1 formally displays my proposed conditional process model.

[5] No hypothesis is made for the effect of a scarcity mindset on external auditors' reliance choices given the uncertainty of whether a scarcity mindset will lead to either higher or lower risk preferences. Following Hayes (2022), no hypothesis or associated statistical significance between Scarcity and Reliance is needed to evaluate a conditional process model.

FIGURE 1

Process Model for The Effect of a Scarcity Mindset on External Auditors' Reliance on the Internal Audit Function



III. RESEARCH METHOD

Experimental Setting

I address my research question regarding the effects of a scarcity mindset on the external auditor's reliance on the IAF using an experiment that incorporates an abstract task. This setting allows for a clean test of my hypotheses but also captures key aspects of the environment in which the external auditor makes his or her reliance choice. In this setting, an external auditor is endowed with a resource that can be exchanged for audit evidence. The external auditor receives additional evidence based on the efforts of the internal auditor. The external auditors are incentivized to balance conserving the endowed resources with minimizing the likelihood of an accounting failure and its associated penalty, which is reduced by increasing the amount of evidence collected.

I operationalize the total available evidence that can be collected regarding a financial statement assertion using a virtual bag of 30 marbles.[6] In each of 10 rounds, the external auditor is endowed with 150 points. At a cost of 5 points per marble, the external auditor chooses how many marbles he or she would like to draw from the bag. For each marble that the external auditor chooses to withdraw, the likelihood of a penalty is reduced by $3.3\overline{3}\%$. If the penalty is incurred, the external auditor's remaining points in the round is reduced to zero. Likewise, if all

[6] For ease of interpretation, I use the bag of marbles to capture a financial statement assertion at the account-balance or class-of-transaction level as discussed in AS 2605.16. However, the bag of marbles could also represent the available evidence to be collected regarding the client's internal controls. Thus, I capitalize on the abstract, experimental setting in that the decision process to rely on the IAF is the same regardless of if the bag of marbles is thought to represent a test of an account balance or a test of the client's internal controls.

30 marbles are drawn from the bag, the likelihood of a penalty is 0%, yet the auditor is left with no remaining points. Aiding in their ability to minimize the cost of evidence collection, external auditors are provided the opportunity to use the work of the IAF when making their decision of how many marbles to collect from the bag (AS2605, AU-C 610, ISA 610). Overall, the external auditor participants accumulate points over 10 rounds, and participants with the two highest point totals in each session receive a $25 Amazon gift card.

Design

My experiment incorporates a 2 × 2 between-subjects design that manipulates the external auditor's mindset, such that the auditor either has or does not have a scarcity mindset, and IAF competence, such that the IAF is either more or less competent. To manipulate a scarcity mindset, I use the scarcity questionnaire from Liang et al. (2021). Specifically, external auditors in the *scarcity* condition are asked to indicate which of the resources from a list do they believe to be most scarce in their daily life and are then asked to indicate the perceived gap between the amount of the resource that they currently have and the amount of the resource that they expect. Upon responding to these first two questions, participants are then asked to respond to three open-ended questions regarding the resource that they indicated to be most scarce in their daily life. The questionnaire provided to external auditors in the *scarcity* condition can be found in the Appendix. External auditors in the no scarcity condition respond to a control condition questionnaire used by Liang et al. (2021) and by Roux et al. (2015). In this questionnaire, participants are asked to reflect on three events or activities that they did during the past week and then to describe two of these events in detail.

I manipulate the competency of the IAF with whom the external auditor is paired as more or less competent. To develop this manipulation, I used a pilot study in which internal auditors

either used a calculator to solve a series of multiplication problems or solved the multiplication problems by hand. In the more competent condition, internal auditors used a calculator, and in the less competent condition, the internal auditor solved the series of problems by hand. The problems consisted of two, two-digit numbers (e.g., 35 x 46), and the internal auditors were incentivized to answer as many problems correctly in the two-minute period as possible. Internal auditors received 10 points per correct answer provided in each round and were deducted 5 points for each incorrect answer or problem that was voluntarily skipped.

The number of correct answers provided by the internal auditor in a round determines how many marbles are drawn from the same bag as their paired external auditor participant in the subsequent, main experiment. Thus, the amount of evidence collected (i.e., number of marbles drawn from the bag) in the main experiment is a joint product of the external auditor's resource use choice and the internal auditor's previous success in completing a series of multiplication problems. Recall that auditing standards state that the external auditors are required to inform their reliance decision through an evaluation of the competence of the IAF (AS2605, AU-C 610, ISA 610). In accordance with auditing standards, then, the external auditor should choose to withdraw less (more) marbles when paired with a more (less) competent IAF given that their expectation should be that the more (less) competent IAF will collect more (less) evidence that can be used in evaluating an assertion.

Concerning my manipulation of IAF competence, AS 2605.19 broadly states that external auditors should evaluate the internal auditors' performance, and in doing so, should assess information related to their understanding of the "audit policies, programs, and procedures" carried out by the IAF. In my manipulation of competence, the conditions represent differing procedures to gather evidence (i.e., pulling marbles from the bag) related to the same financial

statement assertion. One represents a more efficient and effective method to gather evidence on average (i.e., through using a calculator to solve multiplication problems) and the other represents a less efficient and effective method (i.e., through solving multiplication problems by hand). Accordingly, the more (less) efficient and effective method of gathering evidence aligns with the real world where more (less) competent internal auditors are more (less) likely to be efficient and effective in gathering audit evidence given their amount of time available. This manipulation is designed to provide an opportunity to external auditor participants for a straightforward assessment of the differences between the conditions in the amount of evidence expected to be collected by the IAF. In other words, the IAF will either gather substantial amounts of evidence related to the financial statement assertion (i.e., a more competent IAF) or the IAF will gather minimal amounts of evidence (i.e., a less competent IAF) related to the assertion and leave more evidence that should be gathered by the external auditor.

My dependent variable is the average number of marbles that the external auditor chooses to withdraw from the bag across 10 rounds. External auditors assigned to both competency conditions are informed that their paired internal auditor will answer a series of multiplication problems where correct answers will allow them to pull marbles of their own. External auditors can use the information about the procedure with which (i.e., using a calculator or not) their internal audit partner will use to solve multiplication problems to aid in their decision of how many marbles to withdraw. Finally, although external auditor participants are never made aware of exactly how many marbles are drawn by their internal audit partner in any given round (i.e.,

the number of correct multiplication problems answered), external auditors are shown payoff information at the end of each round, providing a noisy signal of the IAF's competence.[7]

Participants

My participants are 152 undergraduate and graduate students.[8] Given the abstract nature of my experimental setting, no background knowledge is required; thus, students are considered appropriate participants (Peecher and Solomon 2001; Libby, Bloomfield, and Nelson 2002). Of the 152 participants, 46.1 percent are female, and all of the participants are accounting majors. Additionally, 12.5 percent of the participants are graduate students, 21 percent are seniors, 7.9 percent are juniors, and 58.6 percent are sophomores. I conduct 15 experimental sessions in which participants spend approximately 30 minutes per session. In exchange for their time, two winners from each session receive a $25 Amazon gift card, and at the discretion of each participant's instructor, all privy participants receive course credit.

Detailed Procedures

Prior to conducting the main experiment, I recruit students to serve as internal auditor participants in a pilot study to complete multiplication problems online via Qualtrics. Their procedure of solving a set of problems during a round depends on whether the internal auditor is assigned to either the more or less competent condition. Once assigned to a condition, the internal auditor remains in that condition for the entirety of 10 rounds. As a result, if an internal auditor is assigned to the more (less) competent condition, he or she works to solve a series of multiplication problems using a calculator (by hand). Internal auditors work through the

[7] For example, if the external auditor continues to earn 0 points (i.e., receives the penalty), this implies that the external auditor must collect more evidence of their own to overcome the incompetence of their paired internal auditor.

[8] The university's Institutional Review Board approved the study prior to recruiting participants.

problems for two minutes in each round and are told that they earn 10 points for each correct answer provided and are penalized 5 points for each incorrect answer or intentionally skipped question throughout the entire 10-round period. The internal auditor in each competency condition with the highest number of points earned throughout the 10 rounds is awarded a $25 Amazon gift card. I use the answers provided from the internal auditors in each of the competency conditions to randomly assign their results from each round to the external auditors in the main experiment.[9] External auditors remain paired with the same internal auditor's results for all 10 rounds.

In the sessions of the main experiment, external auditor participants are assigned to a computer where they complete the experiment and post-experimental questions online via Qualtrics. I begin each session by reading instructions to the participants as they follow along with a written copy. Following prior literature, I use neutral terminology for player roles to avoid demand effects (Haynes and Kachelmeier 1998). Specifically, external auditors assume the role of "Player A" and their paired internal auditor, who has already completed their portion through answering multiplication problems in an earlier pilot study, are referred to as "Player B" in the instructions to the external auditor participants. For purposes of a clear explanation in this manuscript, however, I will continue to refer to "Player A" as the external auditor and "Player B" as the internal auditor.

Prior to the beginning of the first round, the external auditors work through a series of multiplication problems for two, two-minute periods using a calculator and by hand,

[9] The aim of my study is to evaluate the decisions of external auditors and not the decisions or performance of internal auditors. Thus, my design does not require an interactive setting between internal and external auditors.

respectively.[10] This portion of the experiment is conducted to ensure that the external auditors have a clear understanding of the work performed by the internal auditors, which will be used to determine how many marbles are drawn by the internal auditor in each round. Participants are then randomly assigned to a mindset condition and to an internal audit function (IAF) competency condition. If assigned to the scarcity (control) condition, participants complete the scarcity mindset (control) questionnaire following Liang et al. (2021).

In each of ten rounds, external auditor participants are endowed with 150 points, which they can use to withdraw marbles at a cost of 5 points per marble. For each marble withdrawn from the bag, the likelihood of a penalty equal to the participant's remaining points in the period is reduced by $3.3\overline{3}\%$, and the penalty is meant to be analogous to the penalty suffered in the event of an accounting failure. In each round, information on the screen informs the external auditors that the internal auditor "will assist in withdrawing marbles from the bag" such that for each multiplication problem answered correctly by the internal auditor in a two-minute period, one marble will be withdrawn at no cost to the external auditor. Additionally, for participants assigned to a more (less) competent IAF, the screen details that their paired internal auditor has worked to solve a series of multiplication problems in a two-minute period using a calculator (by hand). The screen also provides information that these problems are similar to the ones performed at the beginning of the experiment.

Finally, using this information, the external auditors are asked to input the number of marbles that he or she would like to withdraw from the bag between 0 and 30. The average number of marbles elected to be withdrawn by the external auditor across 10 rounds serves as my

[10] I randomize whether participants are first exposed to the period of solving multiplication problems either using a calculator or by hand.

dependent variable of interest. Further, after each round, external auditors are also asked how many problems they expected their internal audit partner to answer correctly in that period (i.e., marbles to be drawn). Importantly, the average response to this question across the 10 rounds from each participant serves as my measure of *Perceived IAF Competence* and is the moderator in my conditional process model as depicted in Figure 1.[11]

External auditor participants accumulate points across 10 rounds, and the number of points retained in each round is a function of their decision regarding how many marbles they choose to withdraw, how many marbles are drawn by their randomly paired internal auditor, and whether they avoided the penalty. Participants receive feedback regarding the number of points they earned at the end of each round, and the game repeats for a total of ten rounds. At the conclusion of ten rounds, participants respond to two post-experimental questionnaires.[12]

First, following Liang et al. (2021), participants respond to the Domain-Specific Risk-Taking Scale (DOSPERT, Blais and Weber 2006), which is a 30-item questionnaire measuring an individual's propensity to take risks across five domains: social, recreational, financial, health/safety, and ethical. While I gather responses to all 30 items, I use only the responses from the financial domain as a mediator in my conditional process model seen in Figure 1. Felix et al. (1998) provide survey results indicating that external auditors primarily rely on the internal audit function to decrease costs for the audit firm. Accordingly, I focus on external auditors' risk preferences for conserving resources such as cash as opposed to their risk preferences in domains not applicable to my setting (e.g., health/safety and recreational).

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[11] I use the continuous measure of *Perceived IAF Competence* not only for its increased power but also to further understand external auditors' irrational behaviors. For example, an external auditor may choose to rely heavily on an internal audit function even when they perceive them to be very low in competence.

[12] I randomize the order in which participants receive the two post-experimental questionnaires.

Second, participants also respond to the NASA Task Load Index (Hart and Staveland 1988) to measure participants' cognitive load. While prior literature notes that an increase in cognitive load leaves fewer cognitive resources available to make rational economic choices (e.g., Mani et al. 2013), findings are "almost absent" that cognitive load acts as an underlying mechanism between scarcity and subsequent economic decisions (de Brujin and Antonides 2022). Therefore, to control for the effect that an increase in an auditor's cognitive load may have on his or her subsequent reliance choices, I use responses to the NASA Task Load Index (Hart and Staveland 1988) as a control variable for cognitive load in my conditional process model to minimize an alternative explanation and to focus solely on the causal associations between a scarcity mindset, risk-taking propensity, and an external auditor's subsequent reliance on the IAF (Hayes 2022).[13]

[13] Untabulated results show a significant effect of cognitive load on external auditors' reliance choices, yet no interactions with the manipulations. As such, the covariate of cognitive load accomplishes its purpose of controlling for extraneous variance in the dependent variable of *Reliance* (Piercey 2023; Kerlinger and Lee 2000).

IV. RESULTS

Manipulation Checks

To ensure my manipulations of *Scarcity* and *IAF Competence* would be successful, I conducted two pilot studies. In the first, participants assigned to the *Scarcity* condition responded to a scarcity questionnaire adapted from Liang et al. (2021) while participants assigned to the *No Scarcity* condition responded to a control questionnaire adapted from Liang et al. (2021) and Roux et al. (2015). Upon responding to each questionnaire, participants from both conditions in the pilot study responded on a 1-7 Likert scale the extent to which they agree with the statements "My resources are scarce," "I don't have enough resources," "I need to protect the resources that I have," and "I need to acquire more resources." Responses to all four questions were averaged to obtain a single measure of perceived scarcity. Participants in the *Scarcity* condition perceived their resources in their daily lives to be significantly scarcer than the participants assigned to the *No Scarcity* condition ($t = 2.354$, $p = .021$), supporting the *Scarcity* manipulation I use in my main experiment.

In my second pilot study, I manipulate IAF competence. Participants are assigned to a *More Competent* (*Less Competent*) condition, in which they are asked to solve as many multiplication problems as possible in ten, two-minute periods using a calculator (pencil and paper). To assess how effective and efficient participants are in solving multiplication problems (i.e., collecting evidence), I average the number of correct answers across all 10 rounds for each participant. Participants in the *More Competent* condition answered, on average, 12.21 more

questions correctly than did participants assigned to the *Less Competent* condition, and this difference is significant ($t = 14.852$, $p < .001$).

In analyses, I use a continuous measure of *Perceived IAF Competence*, which measures external auditor participants' expectations of how many marbles their paired internal auditor will withdraw each round. I average each external auditor's response across the 10 rounds to obtain one measure for each participant. Interestingly, no significant differences are noted between the *Less Competent* and *More Competent* conditions in their expectations of how many marbles their internal auditor partner will withdraw across the ten rounds ($t = 0.597$, $p = .551$, two-tailed). However, as depicted in Table 1, in a two-way analysis of variance (ANOVA) conducted on my manipulated factors of *Scarcity* and *Competence* to assess differences in IAF *Reliance*, I find a significant main effect of *Competence*, providing evidence to suggest that external auditors rely significantly less (more) on internal auditors assigned to the *Less Competent* (*More Competent)* conditions ($p = .003$). Regardless, by using the continuous measure of *Perceived IAF Competence*, I am able to observe if, or when, participants are relying irrationally on the IAF based on how much evidence they expect the internal auditor to collect. For example, for additional (fewer) pieces of evidence that the external auditor expects the internal auditor to collect, the incentive structure in place is such that the external auditor should respond by collecting less (more) evidence of their own.

TABLE 1

Analysis of a Scarcity Mindset and Internal Audit Function Competence on Reliance

Panel A: Two-way ANOVA results for *Reliance*

	df	**MS**	**F**	***p*-value**
Scarcity	1	43.271	2.040	0.155
Competence	1	189.908	8.954	0.003
Scarcity x Competence	1	7.035	0.332	0.566
Error	148			
n=152				

Panel B: Pairwise Comparisons

Source of Variation	**df**	**F**	***p*-value**
Scarcity vs Non-Scarcity when IAF is Less Competent	1	0.363	0.548
Scarcity vs Non-Scarcity when IAF is More Competent	1	2.008	0.159

Notes: All *p*-values listed are two-tailed.
Scarcity indicates whether the external auditor received the scarcity mindset manipulation. Participants receiving the manipulation were coded as "1" and "0" otherwise.
Competence indicates whether the external auditor was paired with an internal auditor assigned to either the more or less competent manipulation. External auditor participants assigned to the more competent internal auditor were coded as "1" and "0" otherwise.
Reliance represents the average number of marbles across 10 rounds that the external auditor left in the bag for the internal auditor to collect. Means for *Reliance* across the four experimental conditions are provided in Table 2.

Descriptive Statistics

Table 2 reports descriptive statistics for key measurements from the main experiment and includes the following: *Reliance* (the average number of marbles across 10 rounds that the external auditor left in the bag for the internal auditor to collect), *Risk-Taking Propensity* (external auditors' average response on a 1-7 scale on six items assessing participants' financial risk-taking propensity following Liang et al. (2021)), *Perceived IAF Competence* (the average number of marbles that the external auditor expected the internal auditor to collect across 10 rounds), *Cognitive Load* (participants' average response on a 1-20 scale to four items assessing how mentally demanding the task was), and *Performance* (the total number of points retained throughout the 10 round experiment).

TABLE 2

Descriptive Statistics for Key Measurements
Mean, Median, (Standard Deviation)

	Scarcity		Competence	
	Non-Scarcity	**Scarcity**	**Less Competent**	**More Competent**
Reliance	19.22 19.40 (4.56)	18.15 18.90 (4.86)	17.57 18.35 (4.90)	19.80 19.85 (4.30)
Risk-Taking Propensity	3.28 3.17 (1.28)	2.75 2.67 (1.15)	2.89 2.83 (1.23)	3.14 3.00 (1.25)
Perceived IAF Competence	10.57 10.75 (4.56)	11.28 (10.10) (4.66)	11.15 10.50 (4.26)	10.70 9.75 (4.95)
Cognitive Load	4.62 4.38 (3.14)	4.89 4.13 (3.53)	4.65 4.25 (3.47)	4.86 4.13 (3.20)
Performance	599.61 637.50 (256.40)	548.42 567.50 (244.60)	390.72 390.00 (175.24)	757.30 752.50 (167.63)
Observations	76	76	76	76

Notes: Every cell displays the mean, median, and standard deviation for the corresponding measure.
Reliance represents the remaining number of marbles out of 30 that the external auditor left for the internal auditor to collect. This number was averaged for each participant across 10 rounds. A higher number indicates a higher level of reliance.
Risk-Taking Propensity represents the external auditor's financial risk-taking propensity measured on a 1-7 Likert Scale.
Perceived IAF Competence represents the average number of marbles across 10 rounds that the external auditor participant expects their internal audit partner to withdraw.
Cognitive Load represents the toll on participants' cognitive resources and is measured on a 1-20 scale according to the NASA Task Load Index (Hart and Staveland 1988). Higher numbers reflect a higher toll on cognitive resources.
Performance represents the total number of points that a participant retains at the end of the 10-round experiment.

Analysis of the Conditional Indirect Effect of a Scarcity Mindset on IAF Reliance

I conduct my analysis using Model 14 of the PROCESS Macro, a regression-based approach designed to test my individual hypotheses and the underlying theory (Hayes 2022). As evidenced by Table 3 and Figure 2, scarcity mindset external auditors have a lower *Risk-Taking Propensity* (coeff = -0.548, p = .006, two-tailed), supporting H1b. Further, the effect of *Risk-Taking Propensity* on IAF *Reliance* is contingent on the *Perceived IAF Competence* such that *Risk-Taking Propensity* increases IAF *Reliance* more as *Perceived IAF Competence* increases (coeff = 0.121, p = .023, two-tailed), supporting H2. A probing of the interaction using the Johnson-Neyman technique reveals a region of significance at a *Perceived IAF Competence* level of greater than or equal to 12.87, which is higher than both the median and the mean of 10.25 and 10.92, respectively. In using the continuous measure of *Perceived IAF Competence*, results provide evidence to suggest that regardless of an auditor's mindset, external auditors do not appear to rely on an IAF who is perceived to be low, or even average, in competence. However, auditors are sometimes willing to rely on an IAF who is perceived to be high in competence.

To expound, Figure 3 graphically depicts the overall conditional process model tested using Model 14 of the PROCESS Macro (Hayes 2022). The index of moderated mediation of -0.066 reveals that, when controlling for an external auditor's cognitive load, as *Perceived IAF Competence* increases by one unit, auditors with a scarcity mindset increase their reliance significantly less as compared to auditors without a scarcity mindset (CI: LL = -0.144; UL = -0.006).[14] According to this analysis, compared to an external auditor without a scarcity

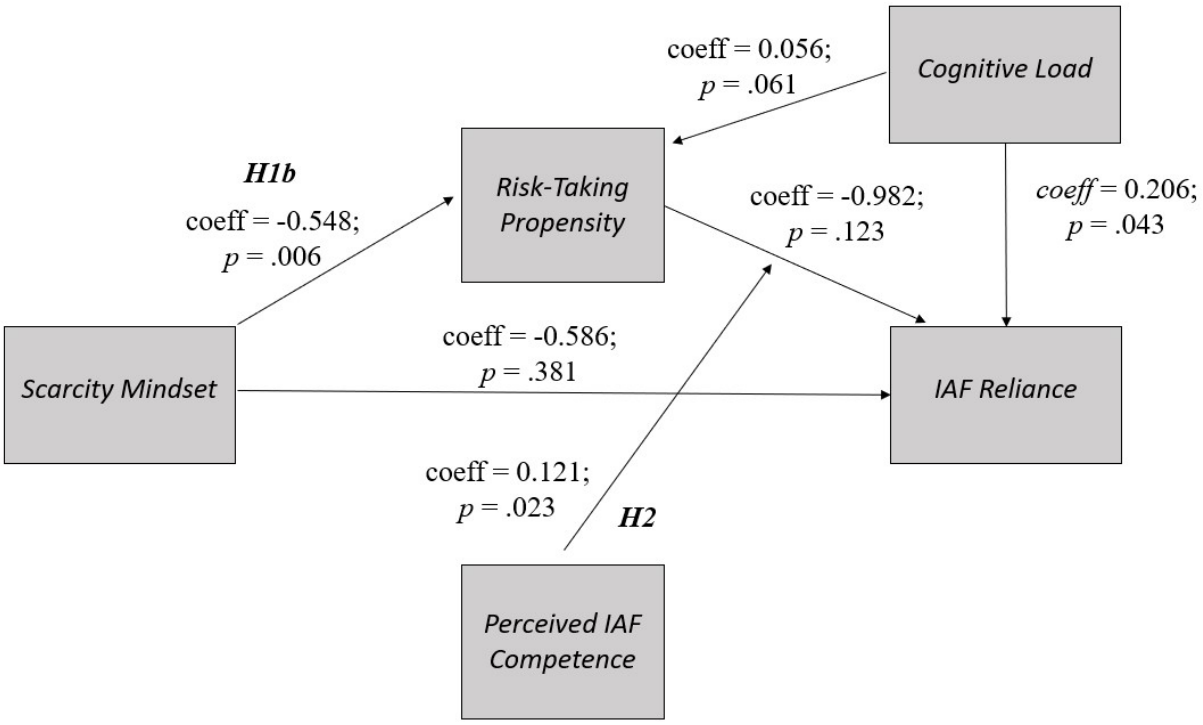
[14] Untabulated analyses conducted to determine if an overall, conditional, indirect effect of *Scarcity* on *Reliance* operates through *Cognitive Load* and *Risk-Taking Propensity* provide insignificant results. As evidenced by Table 2, despite *Cognitive Load* having a significant effect on *Reliance*, untabulated analyses show it does not act as a mediator.

mindset, an external auditor with a scarcity mindset relies significantly less on an IAF perceived as highly competent (i.e., perceived IAF competence at the 84th percentile) as a result of being more risk averse (CI: LL = -1.110; UL = -0.27). Further, auditors with and without a scarcity mindset do not differ in their IAF reliance choices at low (CI: LL = -0.224; UL = 0.595) or median (CI: LL = -0.490; UL = 0.146) levels of perceived IAF competence.

These results align with expected utility theory such that risk-averse auditors do not appear to value the expected utility afforded by relying on an IAF that is perceived as more competent. While external auditors with a scarcity mindset do not appear to rely on an IAF perceived as less competent any more than an external auditor without a scarcity mindset, a scarcity mindset appears to induce a risk aversion such that external auditors fail to take advantage of a more competent IAF by choosing to expend their own resources and collect evidence themselves. As such, these results may quell regulator concerns voiced in response to PCAOB Release No. 2022-009 such that the mindset induced during times of economic uncertainty may actually lead the external auditor to forego reliance on the IAF in the evidence collection process even when it is most appropriate.

FIGURE 2

Statistical Diagram for the Effect of a Scarcity Mindset on External Auditors' Reliance on the Internal Audit Function



Conditional Indirect Effects at Different Levels of Perceived IAF Competence

Perceived IAF Competence 16th percentile = 0.140
(Bootstrapped CI: LL = -0.224; UL = 0.595)
Perceived IAF Competence 50th percentile = -0.142
(Bootstrapped CI: LL = -0.490; UL = 0.146)
Perceived IAF Competence 84th percentile = -0.524
(Bootstrapped CI: LL = -1.110; UL = -0.27)[1]

Index of Moderated Mediation[2] **=** -0.066
(Bootstrapped CI: LL = -0.144; UL = -0.006)

Notes:

[1] To test the statistical significance of the conditional indirect effects, I use bootstrap confidence intervals (Hayes 2022) and estimate a 95% confidence interval. Bootstrap confidence intervals are based on 10,000 bootstrap samples. The coefficient is considered statistically significant equivalent to $p < 0.05$, two-tailed, if the confidence interval does not contain 0.

[2] The index of moderated mediation quantifies the rate of change of the indirect effect of *Scarcity* on *IAF Reliance* through *Risk-Taking Propensity* as *Perceived IAF Competence* increases by one unit.

TABLE 3

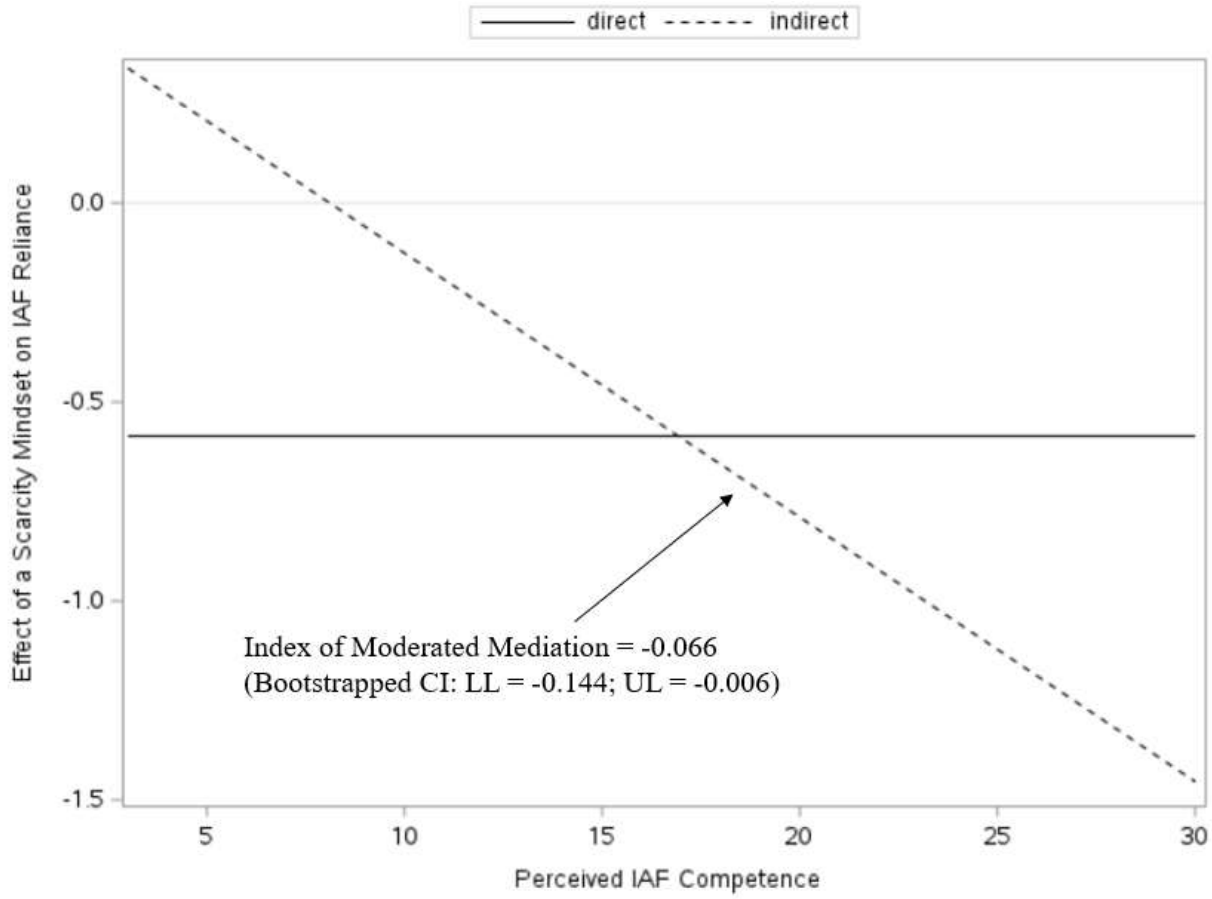
Coefficients for the Moderated Mediation Analysis of an External Auditor's Scarcity Mindset on the Reliance on the Internal Audit Function Mediated by the External Auditor's Risk-Taking Propensity, Moderated by the Perceived Competence of the Internal Audit Function

		Consequent						
		Risk-Taking Propensity				*Reliance*		
Antecedent		**Coeff.**	***SE***	***p***		**Coeff.**	***SE***	***p***
Scarcity	***a***	-0.548	0.196	.006	***c'***	-0.586	0.666	.381
Risk-Taking Propensity					b_1	-0.982	0.634	.123
Perceived IAF Competence					b_2	-0.892	0.176	<.001
RTPxPercIAFComp					b_3	0.121	0.053	.023
Cognitive Load	c_1	0.056	0.030	.061	c_2	0.206	0.101	.043
Constant	***iM***	3.025	0.194	<.001	***iY***	26.650	2.056	<.001
		R^2 = 0.069				**R^2 = 0.316**		
		$F(2, 149) = 5.504$, $p = .005$				**$F(5, 146) = 13.511$, $p < .001$**		

Notes: The table displays results of OLS regressions. All *p*-values listed are two-tailed.
Scarcity indicates whether the external auditor received the scarcity mindset manipulation. Participants receiving the manipulation were coded as "1" and "0" otherwise.
Risk-Taking Propensity represents the external auditor's financial risk-taking propensity and is measured on a 1-7 Likert scale.
Perceived IAF Competence represents the external auditor's perceived competence of the internal auditor and is measured by taking the average of how many marbles the external auditor expects the internal auditor to withdraw across the 10-round period.
RTPxPercIAFComp represents the interaction between *Risk-Taking Propensity* and *Perceived IAF Competence*
Cognitive Load represents the toll on participants' cognitive resources and is measured on a 1-20 scale according to the NASA Task Load Index (Hart and Staveland 1988).

FIGURE 3

Graphical Depiction of the Index of Moderated Mediation for the Process Model of the Effect of a Scarcity Mindset on External Auditors' Reliance on the Internal Audit Function



Notes:

The index of moderated mediation quantifies the rate of change of the indirect effect (i.e., the dashed line) of *Scarcity* on IAF *Reliance* through *Risk-Taking Propensity* as *Perceived IAF Competence* increases by one unit. The slope of the line is -0.066 and corresponds to scarcity mindset auditors collecting 0.066 more pieces of evidence on their own as *Perceived IAF Competence* increases by one unit because of their risk-aversion. A 95% confidence interval constructed to test the statistical significance of the index does not include zero, indicating that the rate of change of -0.066 is considered statistically significant equivalent to $p < 0.05$, two-tailed (Hayes 2022).

Supplemental Analyses

In evaluating the effect of the inefficiency of a scarcity mindset external auditor not increasing reliance on an IAF perceived as being more competent, I conduct a two-way analysis of variance (ANOVA) on my manipulated factors of *Scarcity* and *Competence* to assess differences in *Performance* across the four experimental conditions. As depicted in Table 4, I find a significant main effect of *Scarcity*, such that external auditor participants with a scarcity mindset earn significantly fewer points with their paired internal auditor as compared to auditors without a scarcity mindset ($p = 0.066$, two-tailed). When paired specifically with an internal auditor assigned to the more competent condition, scarcity mindset auditors earn significantly fewer points as compared to auditors without a scarcity mindset ($p = 0.051$), revealing that because of their failure to increase reliance on a more competent IAF, scarcity mindset external auditors are particularly inefficient in collecting evidence alongside an internal auditor who is more competent.

TABLE 4

Analysis of a Scarcity Mindset and Internal Audit Function Competence on Performance

Panel A: Two-way ANOVA results for *Performance*

	df	**MS**	**F**	***p*-value**
Scarcity	1	99553.289	3.437	0.066
Competence	1	5106444.737	176.311	<0.001
Scarcity x Competence	1	24760.526	0.855	0.357
Error	148			
n=152				

Panel B: Pairwise Comparisons

Source of Variation	**df**	**F**	***p*-value**
Scarcity vs Non-Scarcity when IAF is Less Competent	1	0.432	0.512
Scarcity vs Non-Scarcity when IAF is More Competent	1	3.860	0.051

Notes: All *p*-values listed are two-tailed.
Scarcity indicates whether the external auditor received the scarcity mindset manipulation. Participants receiving the manipulation were coded as "1" and "0" otherwise.
Competence indicates whether the external auditor was paired with an internal auditor assigned to either the more or less competent manipulation. External auditor participants assigned to the more competent internal auditor were coded as "1" and "0" otherwise.
Performance represents the total number of points that a participant retains at the end of the 10-round experiment. Means for *Performance* across the four experimental conditions are provided in Table 2.

V. CONCLUSION

This study examines the effect of a scarcity mindset on external auditors' reliance choices across differing levels of perceived competence of the internal audit function (IAF). I find that external auditors with a scarcity mindset have a lower propensity to take risks, which leads them to rely less on an IAF perceived as more competent as compared to auditors without a scarcity mindset. My study provides experimental evidence to suggest that during times of economic uncertainty, external auditors may prefer to collect evidence on their own, regardless of how competent they perceive the IAF to be. This finding runs contrary to the concerns voiced by regulators such that external auditors may be *more* vigilant when facing perceived resource constraints, yet an under reliance on a more competent IAF is costly and inefficient from an audit firm's perspective. Accordingly, additional analyses reveal that external auditor participants under a scarcity mindset performed significantly worse in the evidence collection task as compared to auditors without a scarcity mindset.

My study contributes to regulation, practice, and the accounting and psychology research streams. First, in response to the recent PCAOB proposal in Release No. 2022-009, my findings provide initial evidence that external auditors do not misuse the option of IAF reliance, even when they are under a perceived resource constraint and most inclined to rely on the IAF. Though regulators imply that internal auditors have an incentive to intercept and alter evidence exchanged between a confirming party and the external auditor, recent comment letters from internal audit groups strongly oppose these concerns (PCAOB Release No. 2022-009). While my study does not examine internal auditor actions nor manipulate internal auditor incentives, my

experiment provides a controlled setting in which external auditors are incentivized to rely on the IAF to conserve resources. Future research may find it worthwhile to examine the *internal* auditor's varying incentives and subsequent actions to determine whether the quality of evidence collected by an IAF is compromised when under a scarcity mindset.

Second, I add to the accounting literature concerning IAF reliance (e.g., Pike et al. 2016) by introducing Scarcity Mindset Theory to an accounting setting. In doing so, I find that when facing a perceived scarcity of resources, external auditors become less likely to take risks, which then leads to a counterproductive economic behavior of relying too little on an IAF perceived as more competent. My study adds to the growing literature on a scarcity mindset to show that an individual's risk-taking propensity could be one of several underlying mechanisms posed in prior literature (de Brujin and Antonides 2022). Future research should examine how background risks such as a potential accounting failure moderates the effect of a scarcity mindset on risk-taking propensity given recent literature finding that a scarcity mindset increases risk taking (Liang et al. 2021). As noted by the authors in the study of Liang et al. (2021), cultural differences may influence the effect of a scarcity mindset on risk-taking behavior. If so, future research should also examine this given the many cultural backgrounds prevalent in auditing today.

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APPENDIX

Appendix A: Participant Instructions

Ground Rules

- **NO TALKING**
  I hope that you enjoy participating in this study, but it is serious research. Accordingly, I ask that you refrain from talking to each other during the session—comments, even if intended in jest, could contaminate others' decisions. If you have a question, please raise your hand. Finally, please keep your eyes on your own screen and do not look at other's screens.

- **NO DECEPTION**
  I promise that I will conduct the experiment in the exact manner described in these instructions, without any form of deception.

How will you be compensated?

I will provide a $25 Amazon gift card to the two players who earn the most points. Furthermore, at the discretion of your instructor, you will be awarded extra credit for your participation in today's session.

In today's session, you will be granted a certain number of points each period. You have the opportunity to keep this allotment of points based on the decisions you and others make. Each point you keep in each period will increase your chances of being one of the two winners of the gift card.

Please note that the number of points you keep each round will depend on three things as described on page 4

(1) the action you choose
(2) the performance of your partner
(3) random chance.

The decisions that you and the others will make are described in more detail below, but the important thing to keep in mind is that ***the goal is to earn as many points as possible throughout the session.***

Overview of Session

This is a computerized, decision-making study. I expect the entire session to last no longer than 30 minutes. The session will consist of 10 rounds of a computerized, simple decision-making game.

The following pages outline the detailed procedures to be used during this session.

Role Assignment

Just prior to the first round, the computer will assign you to be PLAYER A. You will remain the same player type for all 10 rounds.

Prior to the first round, PLAYER A will be paired with a partner, PLAYER B, who has already completed their portion of the experiment. Note that these pairings are anonymous and random. Therefore, you will never know exactly with whom you are paired. All you will know for sure is that you are paired with one of the participants assigned to the other player type.

Action Choices

You, PLAYER A, and your partner, PLAYER B, will work to withdraw marbles from a virtual bag containing 30 marbles. In each period, you will be endowed with 150 points. At a cost of 5 points, you can withdraw a single marble. For each marble that you choose to withdraw, the likelihood of a penalty equal to your period's remaining points will be reduced by $3.3\overline{3}\%$. Thus, if all 30 marbles are drawn between you and your partner, the likelihood of a penalty is equal to: (100% - (30 marbles x $3.3\overline{3}\%$) = 0%).

Your action choice that partially determines your payoff will be how many marbles you elect to withdraw from the bag at a cost of 5 points.

Minimizing the cost that you incur for drawing marbles, PLAYER B performs a series of multiplication problems in a two-minute period. For each multiplication problem that he or she answers correctly in a two-minute period, the number of marbles that he or she will withdraw from the bag ***AT NO COST TO YOU.*** Also, for each marble that PLAYER B withdraws (i.e., the number of correct multiplication problems solved), the likelihood of incurring the penalty is decreased by $3.3\overline{3}\%$.

IMPORTANT: You will always make your choice ***without knowing*** how many marbles PLAYER B was able to withdraw by solving multiplication problems correctly.

Next, I describe the points for each possible outcome in a round.

Earning Points

In each period, you will be endowed with 150 points. The number of points that you retain in each period can be calculated as follows:

- If the sum of PLAYER A marbles withdrawn plus PLAYER B marbles withdrawn is less than a random number between 1 to 30, then PLAYER A's payout equals 0 points.

  Otherwise

- PLAYER A payout = (150 points – (5 points × # of marbles withdrawn by PLAYER A)

PLEASE NOTE: The number of marbles withdrawn by your partner, PLAYER B, is determined by the number of multiplication problems that he or she answers correctly in each two-minute period.

Notice from the description above that PLAYER A'S payout depends not only on their choice of how many marbles to withdraw, but also PLAYER B'S success in withdrawing marbles and random chance.

Feedback

After each player has made his/her action choice, you will learn how many points you earned in that round based on the information on page 4. Each person will only be told their own point outcome, but will not be told the number of points earned by any other player. After you receive this report, click "OK" to continue on to the next round.

Post-Session Questionnaire and Payment

At the end of the session, I will ask you to complete two brief questionnaires. When you have completed the questionnaire, please wait patiently and the supervisor will pay you for your participation.

Please do not remove these instructions or other materials from the laboratory, except for your copy of the information sheet.

Game Summary

The following is a brief step-by-step outline of the game:

1. In each period, you will be given 150 points.
2. In each period, you will elect how many marbles to withdraw at a cost of 5 points to you. For each marble that you or PLAYER B withdraw, the likelihood of a penalty equal to your remaining points in the period decreases by $3.3\overline{3}\%$.
3. At the end of each period, you will be given feedback on your performance. Aiding in the cost that you take on for withdrawing marbles, your partner, PLAYER B, is able to withdraw one marble from the same bag for each multiplication problem that he or she answers correctly in a two-minute period. It is no cost to you for each marble that PLAYER B withdraws, and the likelihood of a penalty is reduced by $3.3\overline{3}\%$ for each marble he or she withdraws.
4. The steps above repeat for 10 periods. The total number of points that you retain across 10 rounds will be summed to determine whether you are one of two winners in the session.

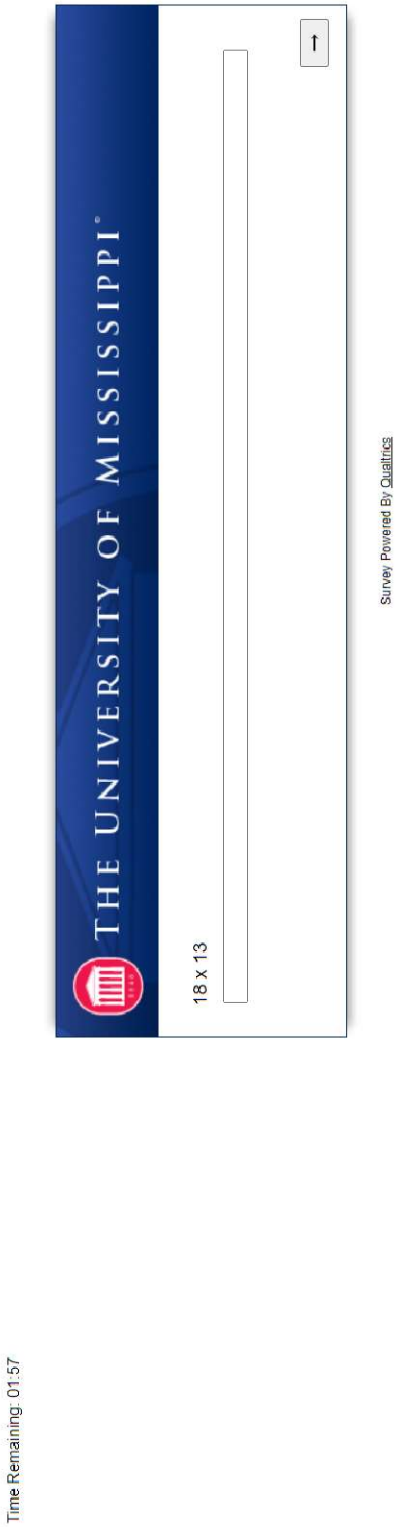
Appendix B: Qualtrics Screenshots

[Introduction screen for experiment]

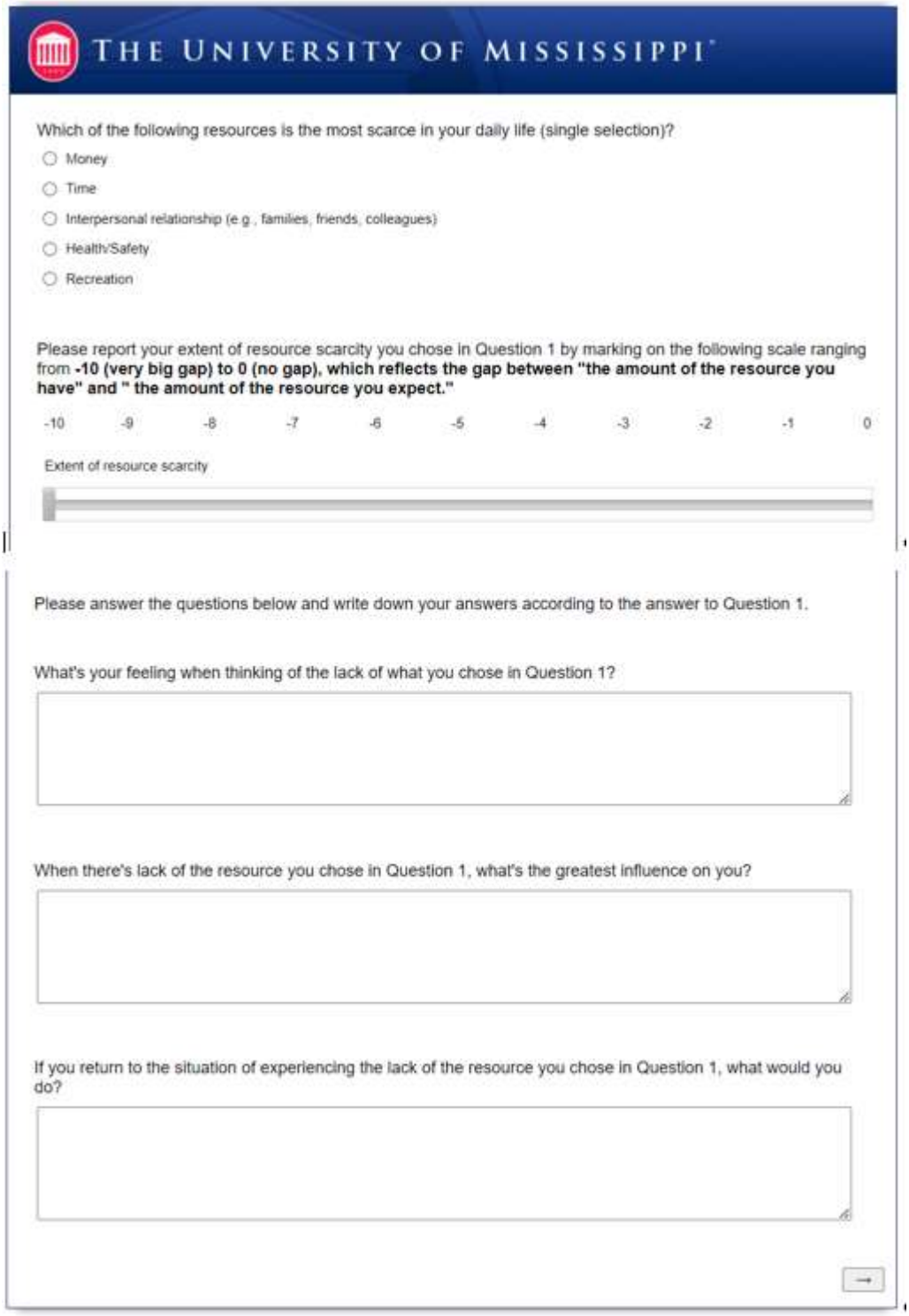
[Screen preceding two-minute period of multiplication problems – calculator allowed]

[Screen preceding two-minute period of multiplication problems – calculator not allowed]

[Example multiplication problem in the two-minute period]



[Scarcity Manipulation]



[Non-Scarcity Control Condition]

[Appears at the beginning of round 1 for all conditions]

[Appears in rounds 1-10 for auditors assigned to the more competent IAF condition]

THE UNIVERSITY OF MISSISSIPPI

You are "Player A". You are working together with "Player B" to pull marbles from the bag in the picture below.

The bag consists of 30 marbles. For each marble that you and "Player B" withdraw together, the likelihood of a penalty is reduced by 3.33%.

If you receive the penalty, your remaining points in the period will be taken away, meaning your payoff for the period will be 0 points.

In this period, you have been given 150 points. You, "Player A", can withdraw one marble at a cost of 5 points for each marble.

Helping you to minimize this cost, "Player B" can withdraw one marble for each multiplication problem that he or she answers correctly in a two-minute period this round. These problems are similar to those that you worked prior to the start of the game, and "Player B" is using a calculator to solve the multiplication problems.

Using the information above, please respond to the question below:

0 5 10 15 20 25 30

Between 0-30, select how many marbles you would like to withdraw at a cost of 5 points per marble

Using the information above, please respond to the question below:

0 5 10 15 20 25 30

Between 0-30, select how many marbles you expect "Player B" to withdraw

→

[Appears in rounds 1-10 for auditors assigned to the less competent IAF condition]

THE UNIVERSITY OF MISSISSIPPI

You are "Player A". You are working together with "Player B" to pull marbles from the bag in the picture below.

The bag consists of 30 marbles. For each marble that you and "Player B" withdraw together, the likelihood of a penalty is reduced by 3.33%.

If you receive the penalty, your remaining points in the period will be taken away, meaning your payoff for the period will be 0 points.

You are beginning the period with 150 points. You, "Player A", can withdraw one marble at a cost of 5 points for each marble.

Helping you to minimize this cost, "Player B" can withdraw one marble for each multiplication problem that he or she answers correctly in a two-minute period this round. The problems that "Player B" will work are similar to those that you worked prior to the start of the game, and "Player B" is solving the multiplication problems by hand using pencil and paper.

When you are ready, click the "next" button below to proceed to the question where you will input how many marbles you would like to withdraw from the bag.

Survey Powered By Qualtrics

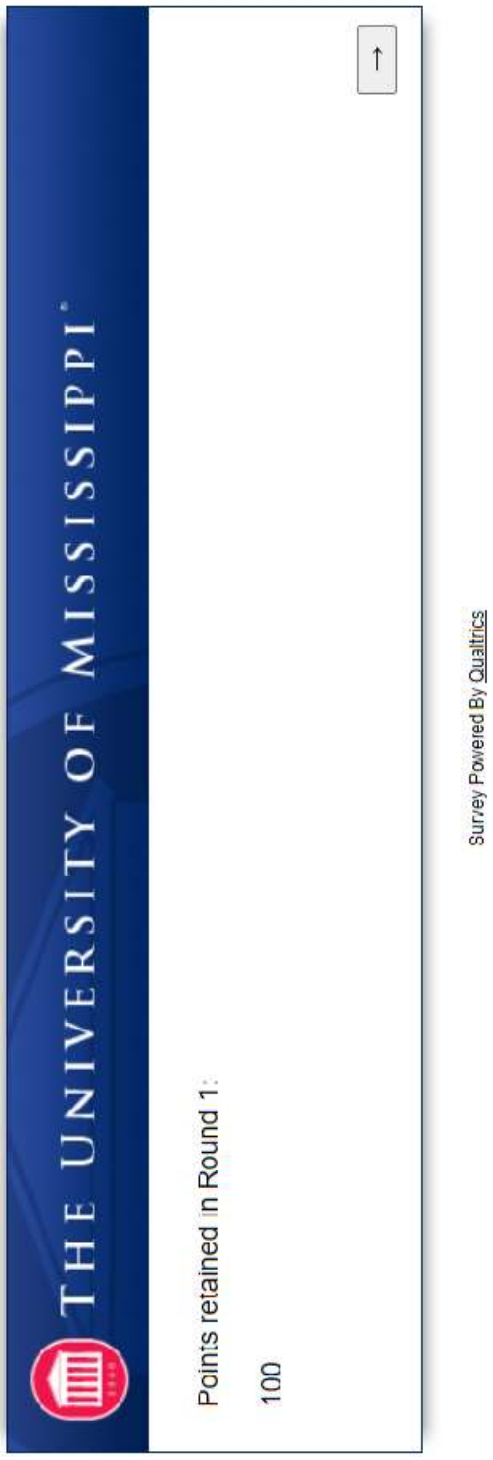
0 5 10 15 20 25 30

Using the slider, select how many marbles between 0-30 that you would like to withdraw at a cost of 5 points per marble

0 5 10 15 20 25 30

Using the slider, select how many marbles you expect "Player B" to withdraw between 0-30

[Payoff information provided in rounds 1-10 for all conditions]



Appendix C: Post-Experimental Questionnaires

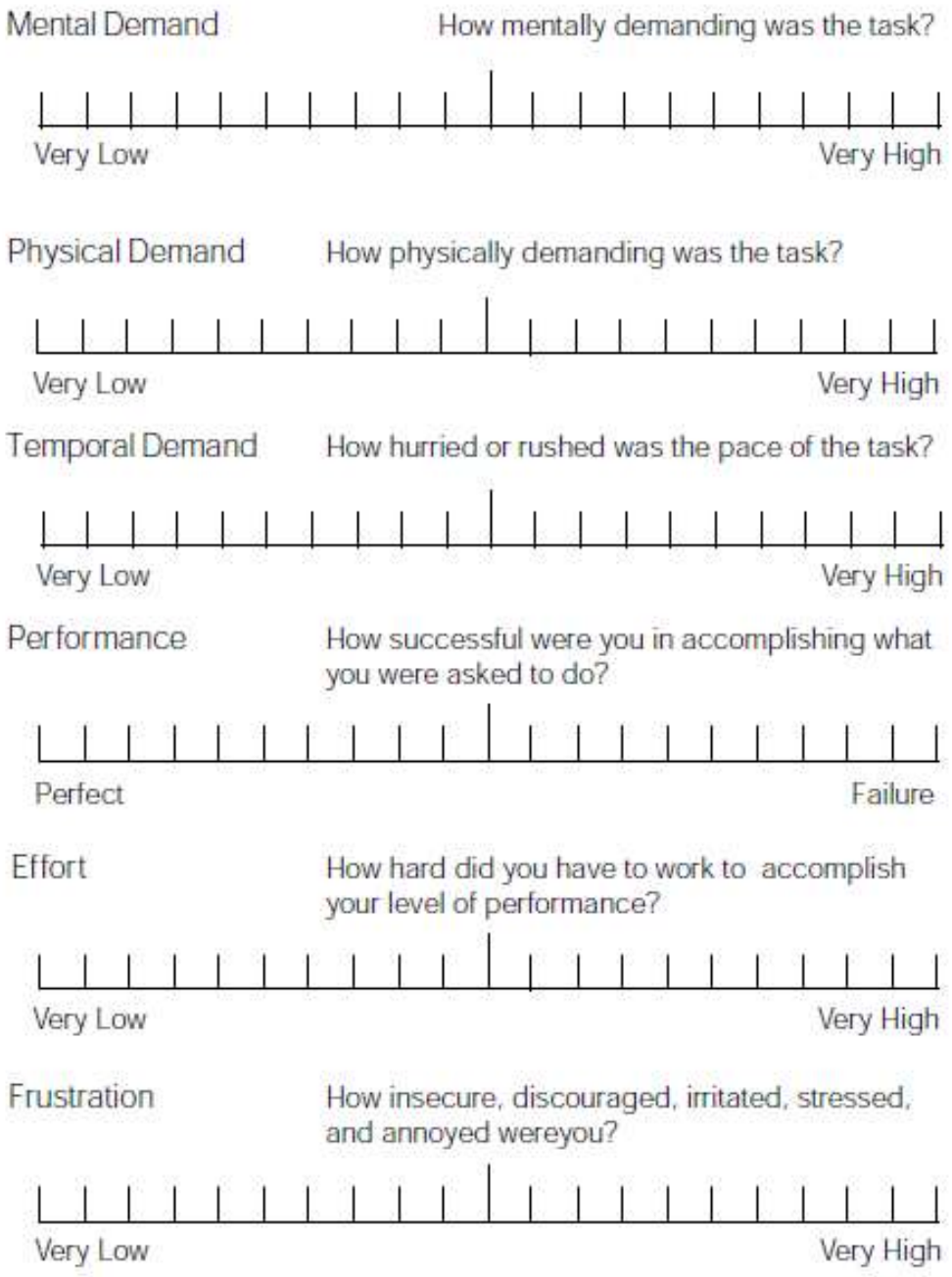
[Domain Specific Risk-Taking Scale]

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extermely Likely

1. Admitting that your tastes are different from those of a friend. (S)
2. Going camping in the wilderness. (R)
3. Betting a day's income at the horse races. (F/G)
4. Investing 10% of your annual income in a moderate growth diversified fund. (F/I)
5. Drinking heavily at a social function. (H/S)
6. Taking some questionable deductions on your income tax return. (E)
7. Disagreeing with an authority figure on a major issue. (S)
8. Betting a day's income at a high-stake poker game. (F/G)
9. Having an affair with a married man/woman. (E)
10. Passing off somebody else's work as your own. (E)
11. Going down a ski run that is beyond your ability. (R)
12. Investing 5% of your annual income in a very speculative stock. (F/I)
13. Going whitewater rafting at high water in spring. (R)
14. Betting a day's income on the outcome of a sporting event (F/G)
15. Engaging in unprotected sex. (H/S)
16. Revealing a friend's secret to someone else. (E)
17. Driving a car without wearing a seat belt. (H/S)
18. Investing 10% of your annual income in a new business venture. (F/I)
19. Taking a skydiving class. (R)
20. Riding a motorcycle without a helmet. (H/S)
21. Choosing a career that you truly enjoy over a more secure one. (S)
22. Speaking your mind about an unpopular issue in a meeting at work. (S)
23. Sunbathing without sunscreen. (H/S)
24. Bungee jumping off a tall bridge. (R)
25. Piloting a small plane. (R)
26. Walking home alone at night in an unsafe area of town. (H/S)
27. Moving to a city far away from your extended family. (S)
28. Starting a new career in your mid-thirties. (S)
29. Leaving your young children alone at home while running an errand. (E)
30. Not returning a wallet you found that contains $200. (E)

Note. E = Ethical, F = Financial, H/S = Health/Safety, R = Recreational, and S = Social.

[NASA Task-Load Index]



VITA

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Research

Research Interests: Financial statement fraud, auditor-client interactions, strategic reasoning, auditor-manager personalities

Working papers:

- "The Dark Triad and Impression Formation: The Effects on the Strategic Choices of Auditors and Managers" (2nd summer paper)
- "The Effect of a Scarcity Mindset on External Auditors' Reliance on the Internal Audit Function" (Dissertation)
    - Committee: Kendall O. Bowlin (co-chair), Jeffrey S. Pickerd (co-chair), Christine S. Nielson, and John P. Bentley of the University of Mississippi

Teaching

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Principles of Accounting I, Instructor Fall 2020 – Spring 2023
Instructor Rating: 4.3/5.0

Principles of Accounting II, Instructor Spring, Summer 2022
Instructor Rating: 4.8/5.0

Cost Control, Instructor Fall 2023
Instructor Rating: 4.5/5.0

Conference Participation & Attendance

AAA Auditing Section Midyear Meeting, Discussant	2023
AAA Accounting Behavior and Organizations Research Conference/Doctoral Consortium	2022
AAA/Deloitte Foundation/J Michael Cook Doctoral Consortium	2022
AAA Auditing Section Midyear Meeting, Reviewer	2022
FARS Doctoral Consortium	2021

Graduate Work Appointments

Teaching Assistant – Dr. Kendall Bowlin Spring 2023
- Auditing Seminar

Teaching Assistant – Dr. Brett Cantrell 2019 - 2022
- Managerial Accountancy & Business Intelligence

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Professional Experience

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Senior Accountant, Specialty Tax Services April 2018 – June 2018
Staff Accountant, Specialty Tax Services October 2016 – April 2018
Intern, Specialty Tax Services January 2016 – April 2016

Academic Honors & Awards

- AAA/Deloitte Foundation/J Michael Cook Doctoral Consortium Fellow June 2022
- Outstanding Doctoral Student – Patterson School of Accountancy April 2022
- Graduate Achievement Award – Patterson School of Accountancy April 2021
- Moore School Excellence Award Fellowship June 2018
- Conference USA Scholar Athlete of the Year 2014, 2015
- Golf Coaches' Association of America Academic All-American 2014, 2015
- MTSU Jones College of Business Outstanding Student 2013, 2014, 2015
- MTSU President's Award – Top MTSU Student-Athlete 2012, 2014

Professional Certification and Memberships

Certified Public Accountant, Tennessee	2017 – Present, Active
SAP Certified Application Associate – SAP S/4 HANA 1709	May 2019
Member, American Accounting Association	2019-2022
Member, Tennessee Society of Certified Public Accountants	2017-2019, 2022
Member, American Institute of Certified Public Accountants	2017-2019, 2022