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4/2/2020

The Influence of Internal Audit Competency on Financial Reporting Quality and
Enterprise Risk Management

Melissa E. Renschler

A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Ph.D. in Accountancy

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DEDICATION

To my Zachary.

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Abstract

The Influence of Internal Audit Competency on Financial Reporting Quality and Enterprise Risk Management

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The internal audit function (IAF) is critically important to financial reporting quality and enterprise risk management (ERM). Following both the Sarbanes-Oxley Act of 2002 and the financial crisis of 2008, there have been improvements to other monitoring functions, such as the audit committee, management, and the external auditor, but regulation over the IAF is nearly absent. Further, our understanding of how IAF competency is developed and how IAF competency impacts both financial reporting quality and ERM outcomes is limited. My dissertation consists of three archival studies that investigate IAF competency using LinkedIn data. Taken together, these three studies contribute to a stifled IAF literature that is limited in its data availability and to an emerging accounting literature that seeks to understand more about accounting and audit personnel at the individual level. Specifically, I examine determinants of IAF competency, associations of IAF competency and financial reporting quality, changes to IAF competency as an outcome of financial reporting failures, and IAF competency as a determinant to ERM quality and ERM oversight disclosure. Using a new dataset that captures ten dimensions of IAF competency, I contribute to an important area at the intersection of audit and corporate governance.

The first paper reviews the extant IAF literature, describes a data collection protocol for hand-collected, individual-level, and longitudinal IAF personnel data from LinkedIn, and develops a comprehensive and objective IAF competency measure that incorporates ten components and can easily be linked to other publicly available data sources. I use this new measure to investigate the determinants of IAF competency. Despite a niche of IAF-related studies borne from survey-based sources, prior literature has not paid much attention to investigating what determines higher levels of IAF competency. This study finds evidence consistent with IAF competency improving over time and audit committee accounting expertise influencing higher competency. This study is important as it investigates IAF competency over a six-year period and estimates associations between other monitoring characteristics. Further, this study is academically important because the data collection methodology can inform future research using LinkedIn to develop personnel-related measures.

The second paper examines firm changes to IAF competency in light of financial reporting failures. Provided the regulatory scrutiny over other monitoring mechanisms, it is possible that firms improve other sources of monitoring that are highly visible to stakeholders (e.g. the audit committee; CFO; external auditor) when a reporting failure occurs. However, it is also possible that firms committed to monitoring quality improve IAF competency ex-post as the IAF plays a direct role in potentially mitigating future failures. This study finds evidence consistent with IAF competency improving in the year following a financial reporting failure (i.e. material weakness disclosure; restatement). This study is important because it documents firms' swift movement to improve competency in light of greater reporting risk, suggesting firms recognize the importance of the IAF in the

corporate governance structure. Further, this study demonstrates that the conversation around IAF regulation is still important as not all firms are equally likely to increase IAF competency after a failure.

The third paper examines whether IAF competency is associated with ERM quality and ERM oversight disclosure decisions. Recent financial crises have prompted firms to focus on improving ERM practices, and recent governmental rulings have prompted greater disclosure about firms' risk management processes. Due to the COSO ERM framework's constraint that identifies management-specific risk responsibilities, the IAF may not have enough reach within the ERM framework to improve ERM quality or to influence ERM oversight disclosure decisions. However, it is also possible that the IAF's direct role in risk identification and monitoring of risks helps to provide information to management and to the board that enables their monitoring of ERM quality and provides about the necessary confidence to disclose ERM oversight practices. This study finds evidence consistent with IAF competency helping to improve ERM quality and the likelihood and extent of ERM oversight disclosure in the proxy statement and audit committee charter. This study is important because it documents the value the IAF contributes to the ERM process, beyond its traditional financial reporting role. Further, this study demonstrates that management and boards can take advantage of IAF's monitoring capabilities in order to bolster ERM performance and comfort around ERM monitoring processes.

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CHAPTER ONE
Internal Audit Competency: A Research Synthesis and Development of New Measure Using LinkedIn

I. INTRODUCTION

The purpose of this study is to explore the antecedents of internal audit function (IAF) competency using LinkedIn data, a new data source to the IAF literature. While previous IAF research addresses ex-post outcomes of IAF quality (e.g. financial reporting outcomes; external audit outcomes), limited research focuses on the organizational antecedents of the IAF. Using individual-level, longitudinal resume data of IAF employees from LinkedIn, I address these research questions by developing and testing a model that examines the association between various audit committee and management characteristics and IAF competency for a sample of S&P 600 index firms from 2010-2015. This study helps advance the knowledge of the IAF profile over a recent time period across multiple years as well as the governance and managerial characteristics that influence competency.

This study answers a call by the Institute of Internal Auditors (IIA) (2003) and DeFond and Zhang (2014) to develop an understanding of the primary drivers of the nature of the IAF and its competencies. Specifically, the IIA (2003) asks whether the nature of the IAF varies by key audit committee characteristics. These questions have not been fully addressed by the literature. Anderson, Christ, Johnstone, and Rittenberg (2012) test various determinants of IAF size, including audit committee characteristics (e.g. size; meetings), but do not address these factors for overall IAF competency. Similarly, Ege (2015) addresses audit committee financial expertise as a determinant of IAF competency, but does not find significant results. I extend these studies by examining various audit committee and manager characteristics in relation to IAF competency.

Understanding how IAF competency is developed over time is important as the IAF maintains a unique role in the corporate governance structure. The IIA defines the IAF's mission as one charged with enhancing and protecting organizational value by providing risk-based and objective assurance, advice, and insight (IIA 2017). The function identifies, remediates, and monitors internal control issues while interfacing with management, the board of directors, and the external auditor. An effective IAF, therefore, can act as a strong defense against financial reporting failures or audit inefficiencies. Indeed, the IAF literature finds that higher IAF quality is associated with lower material weakness disclosure likelihood, less earnings management, and lower audit fees (Lin, Pizzini, Vargus, and Bardhan 2011; Prawitt, Smith, and Wood 2009; Abbott, Daugherty, Parker, Peters 2016; Prawitt, Sharp, and Wood 2011). However, the standing IAF literature may be “placing the cart before the horse”. Understanding how organizational factors are associated with IAF competency and dimensions of IAF competency is imperative for firms to effectively achieve their organizational and financial reporting goals. That is, examining this issue is informative for boards and firm management that seek to enhance internal monitoring via the IAF.

Previous archival IAF research that relies on survey data has gained important insights into the work of the IAF (Prawitt et al. 2009; Lin et al. 2011; Messier, Reynolds, Simon, and Wood 2011; Prawitt et al. 2012; Ege 2015).¹ However, the survey data is typically confidential, impacted by self-selection bias, and limited by its non-longitudinal/individual nature. Overcoming these limitations, I conduct the tests using

¹ Much of the survey-based IAF research stems from the IIA's Global Auditing Information Network (GAIN) Benchmarking Tool survey, which annually surveys Chief Audit Executives in order to track metrics about organizations' IAF independence, objectivity, and competency.

hand-collected resume data from LinkedIn, which is a new data source to the IAF literature. LinkedIn is advantageous over survey data as this data allow for (1) individual-level, longitudinal, and public data collection of IAF employees previously unavailable in archival IAF research², (2) more objective sample composition, as firm-level IAF data can be easily matched to other publicly available data, and (3) more current data collection and analysis, as the platform acts as a living resume.³ Further, IAF employees are an ideal sample for LinkedIn data collection as business professionals are likely to use these networks (Papacharissi 2009). Previous accounting research using LinkedIn validate that accounting/finance professionals largely maintain online professional resumes (Barrios 2019; Jiang, Wang, and Wang 2018; Fracassi, Petry, and Tate 2016).

My manual data collection effort yielded a sample of 2,138 firm-years representing 437 unique firms of the S&P 600 index from 2010 through 2015. The data represent competency characteristics of individual IAF employees and of the function, such as work experience, professional certification, higher education, and IAF size. Using this data, I construct a composite IAF competency score that differs from prior research by leveraging previously developed IAF competency dimensions while including new dimensions, provided by the richness of the resume data. My measure includes characteristics related to experience (IAF tenure; Big 4 and Midtier public accounting experience), certification (Certified Public Accountant (CPA), Certified Internal Auditor (CIA), Certified Information Systems Auditor (CISA), or Certified Fraud Examiner (CFE) designation),

² A comparable study in the tax literature by Chen, Cheng, Chow, and Liu (2017) uses LinkedIn to investigate in-house human capital tax investment, a previously unknown attribute of corporate tax departments.

³ Much of the survey-based IAF research is focused on an early Sarbanes-Oxley (SOX) period, potentially limiting insights about IAF competency in a contemporary setting.

education (undergraduate and graduate accounting degree), and size (the number of IAF personnel). I focus on IAF competency characteristics as they are observable data and represent the technical skills and experience required to perform job responsibilities (IIA 2012; Ege 2015; Trotman and Duncan 2018).

In univariate analysis, I find that various characteristics of IAF competency, such as experience (e.g. employee tenure), education (e.g. graduate degrees), and investment (e.g. function size) have increased over time, thus enhancing overall IAF competency. I further find that the certification level in total has decreased over the sample period, which decreases overall IAF competency. CFO accounting expertise has increased marginally over the sample period, and firms are larger, more leveraged, more profitable, and less volatile in later sample years compared to earlier sample years.

In multivariate analysis, I find a positive association between audit committee accounting expertise and IAF competency after controlling for firm characteristics, suggesting that audit committees with greater accounting expertise are more concerned with developing a competent and robust monitoring function. This result is consistent among the dimensions of IAF experience, education, and size. Consistent with Anderson et al. (2012), I find that audit committee size and number of meetings are not significantly associated with IAF competence. Further, CFO accounting expertise plays a negative role in influencing competency, suggesting that management does not play as a direct role in influencing IAF competency compared to the audit committee. Higher IAF competency is associated with larger, more complex firms, and firms with greater corporate governance quality.

In additional analysis, I find that firms with identified in-house IAFs have more audit committee meetings and greater corporate governance quality. Similarly, these firms are larger, have greater asset efficiency, and have foreign operations. That is, there is greater demand for an in-house IAF for firms exhibiting greater corporate governance quality and complexity. Firms with unidentified in-house IAFs that are likely engaging with a third-party internal audit provider, therefore, are comparably weaker. It is interesting to note that the characteristics of audit committee and CFO accounting expertise do not drive demand to institute an in-house IAF, but further influence the level of IAF competency for those firms selecting to have an internal function.

My study provides several contributions. First, I introduce LinkedIn as a data source to the IAF literature as a resource for researchers to access previously unavailable individual- and longitudinal-level IAF employee data. I develop an IAF competency measure that considers current auditing standards, prior literature, and new data availability in order to create an objective and accessible measure for future research. Second, I provide an exploratory insight into the various governance, management, and firm characteristics that are associated with the implementation of an in-house IAF and IAF competency over time not previously examined in the literature. This study considers antecedents of IAF competency on a longitudinal basis. Lastly, this study further informs standard-setters and regulators about the characteristics of the audit committee that influence IAF competence. As there are limited regulatory requirements around IAF implementation and IAF competence, having greater insight into the factors associated with higher IAF competency can guide standard-setter and regulators in ensuring future quality for this often-overlooked monitoring mechanism.

The rest of the paper is organized as follows. Section II reviews the organizational role of the IAF in addition to a synthesis of current IAF literature, Section III describes the hypotheses and Section IV describes the data, sample, and models. Section V discusses results and I conclude in Section VI.

II. BACKGROUND & LITERATURE REVIEW

The Role of the IAF in Corporate Governance

The IAF serves as a critical “boots on the ground” monitoring mechanism that feeds into the greater corporate governance structure. The IAF is in the weeds, conducting risk assessments, providing assurance over internal controls, and maintaining compliance, while directly reporting to the audit committee, working alongside management, and interfacing with the external auditors (IIA 2003). Spraakman (1997) argues that the IAF has the ability to gather organizational information (1) more easily as direct insiders (employees) of the firm who can gain the cooperation of other employees and (2) more formally/informally than the external auditors who are bound by access to systems and by generally accepted auditing standards and generally accepted accounting principles.

Indeed, the IAF plays a role in firm risk management framework as the “third line of defense” as the IAF is responsible for assuring management controls and other functions that support internal control quality and enterprise risk management (IIA 2013). These distinct advantages the IAF has over the audit committee and external auditors allow for the IAF to be an effective monitoring mechanism.⁴ In fact, Carcello, Eulerich, Masli, and

⁴ Additionally, audit committees do not directly test internal controls over financial reporting, but rather monitor the IAF’s test of controls. As corporate governance studies are typically plagued by endogeneity (e.g. audit committee quality as it relates to internal control quality), measuring IAF competency will allow me to more directly test IAF monitoring in relation to aspects of firm quality (e.g. financial reporting quality; enterprise risk management quality).

Wood (2018) find that IAF audits reduce perceived operating, financial, and overall business risk faced by business units. Thus, developing a high quality IAF is imperative for firms that seek to more effectively understand and monitor their operations.

Internal auditing professional standards emphasize the importance of IAF competency. The IIA's Attribute Standards 1130 and 1210 require that IAF personnel maintain individual and organizational independence and objectivity in performing internal audit work, while possessing the requisite professional proficiency, or competencies, in executing responsibilities (IIA 2017). A demonstration of competence is necessary in order for internal auditors to have sufficient knowledge to (1) evaluate and respond to the risk of fraud, (2) to evaluate and respond to the significant risks of material misstatement, and (3) to evaluate the adequacy and effectiveness of governance, risk management, and control processes (IIA 2017). Trotman and Duncan's (2017) interview study model the importance of technical skills and experience as baseline input attributes to their internal audit quality framework.

Similarly, external auditing standards consider IAF competence through the lens of the relying on IAF testing of internal controls. PCAOB Auditing Standard 2201 addresses performing an audit of management's assessment of the effectiveness of internal control over financial reporting. PCAOB AS 2201.16-19 *Using the Work of Others* specifically states how external auditors may use the work performed by the IAF in its assessment of ICFR effectiveness or of control risk, as a function of (1) assessing the competence and objectivity of the IAF personnel and (2) the level of risk associated with the specific control being tested. PCAOB Auditing Standard 2605 *Consideration of the Internal Audit Function* specifically addresses the expectations of the external auditor's evaluation of the

competency and objectivity of the IAF. Paragraphs 9-11 provide a battery of competency and objectivity metrics for external auditors to evaluate in their determination of whether or not to leverage the work of IAF. Competency measures the auditor should obtain include: educational level, professional experience of internal auditors, and professional certification, among others (PCAOB 2016b).

While the IAF arguably maintains a most unique role in the corporate governance structure, regulatory oversight of the IAF is scant. New York Stock Exchange (NYSE) listed firms are the only publicly traded firms required to have an IAF (NYSE 2003).⁵ Further, there is a notion that internal audit primarily runs as a cost function and does little to add value to organizations (Carcello et al. 2018). As such, there may be variation by which firms choose to adopt an IAF, and further, invest in IAF competency. Thus, open questions exist in the literature as to whether IAF competency evolves over time and what governance and firm characteristics are associated with IAF competency.

IAF Literature Synthesis

The IAF quality literature is defined by two main research streams: IAF quality as it relates to (1) financial reporting quality (FRQ) and (2) external audit efficiency (DeFond and Zhang 2014). These studies focus on ex-post outcomes of IAF quality and are described further below.

The only studies to my knowledge that evaluate any antecedents of IAF competency are Anderson et al. (2012) and Ege (2015). Using survey data of Chief Audit

⁵ The NASDAQ proposed a since-rescinded requirement for all listed companies to maintain an IAF (SEC 2013; Protiviti 2013).

Executives (CAEs) and Internal Audit Directors, Anderson et al. (2012) test a conceptual model of the determinants of one dimension of IAF competency, internal audit size. Findings show that IAFs are larger when: (1) audit committees are larger, (2) audit committees have more meetings with the CAE, (3) there is a higher percentage of CIA certified employees, (4) the CAE has more organizational experience, (5) firms are larger, and (6) firms have more foreign operations. In this study, I expand upon Anderson et al. (2012)'s model by evaluating determinants of IAF competency based on audit committee and management characteristics. Ege (2015) uses the IIA Global Audit Information Network (GAIN) survey data, described in detail in Section IV, which includes audit committee financial expertise as an independent variable in his model examining whether IAF quality changes for misconduct firms following a misconduct, but does not find that IAF quality or competence is significantly associated with this audit committee characteristic. This lack of significance of audit committee financial expertise may be due to a number of items: (1) the IAF quality measure he employs, which may not fully incorporate quality dimensions to find support, (2) the matched sample of misconduct firms, whereby the author finds misconduct firms have lower IAF quality and competence, or (3) the low number of observations, resulting in limited model power.

Internal Audit and Financial Reporting Quality

Relevant studies in this area focus on how IAF competency and objectivity impact financial reporting quality. Asare, Davidson, and Gramling (2008) experimentally assess how IAF employees prevent and detect fraud due to differing management incentives and audit committee quality and find that the fraud risk assessment of an acquisition target increases significantly when management incentives to misstate financial results are high

and when audit committee quality is low. Budgeted audit hours (i.e. audit effort) increase when management incentives are high. Similarly, in an archival study, Abbott et al. (2016) find a lower likelihood of IAF reporting of inappropriate income-decreasing opportunistic reserve behaviors when the IAF is used as a management training ground. Together, these results suggest that IAF judgment and decision making as it relates to financial reporting quality are impacted by incentives, both of themselves and of management.

Other financial reporting quality metrics studied in the archival IAF literature include material weakness disclosures, abnormal accruals, meeting or beating analyst expectations, and management misconduct. These reporting outcomes are mapped to IAF competencies, consisting of education, experience, certification, and other measures. IAF education is significantly associated with preventing SOX 404 material weakness disclosures, where education is a proxy for employee ability and human capital (Lin et al. 2011). Higher quality IAFs are significantly related to lower abnormal accruals and have a lower propensity to meet or beat analyst expectations (Prawitt et al. 2009; Abbott et al. 2016). Prawitt et al. (2009) find IAF quality is highest in a sample of firms that just missed analyst forecasts, compared to firms that just meet or beat expectations, or firms that missed analyst forecasts by a large margin. Higher quality and more highly competent IAFs are also related to a lower propensity of management misconduct (i.e. fraud or other intentional misconduct), while misconduct firms improve both IAF quality and competence in response to a misconduct event (Ege 2015). Overall, higher quality IAFs evidence a moderating effect on potential earnings management and management misconduct. These results align with Asare et al.'s (2008) experimental results, in which the IAF appears to function as a governance mechanism over management behavior.

Internal Audit and External Audit Efficiency

Several studies evaluate the external auditor's reliance on the IAF in light of the quality of IAF's work and the professional standards surrounding external auditor evaluation of IAF quality (PCAOB 2016b). For example, experimental research finds external audit fees (i.e. audit effort) are higher when the IAF is used as a management training ground, signaling a lower propensity to rely on the IAF's work (Messier, Reynolds, Simon, and Wood 2011). Interestingly, external auditors perceive the IAF management training ground setting as less objective, due to the incentive structure, but not less competent. Other factors may moderate the extent to which the external auditors rely on the IAF too, such as anticipated litigation or regulatory costs. Audit fees are found to be lower when the extent of internal audit contribution is higher in the archival literature. Felix, Gramling, and Maletta (2001) find higher internal audit contribution as IAF availability to perform audit-related work and IAF quality while Prawitt et al. (2011) show IAF contribution as providing direct assistance to the external auditor compared to other financial-related tasks. However, audit delay is significantly shorter when the IAF independently performs work compared to when the employees act as direct assistants to the auditors (Pizzini, Lin, and Ziegenfuss 2015). Thus, the net effect of lower audit fees with higher audit delays on audit efficiency is unknown.

III. HYPOTHESIS DEVELOPMENT

IAF Competency over Time

The extant IAF literature does not effectively evaluate whether and how IAF competency changes over time. Data limitations limit research to evaluating IAF competency from a cross-sectional basis or to interpolating IAF characteristics to fiscal

periods which are missing data. While the literature demonstrates the importance of IAF competency as it relates to earnings management and internal control quality (e.g. Ege 2015; Lin et al. 2011), it is an unanswered question as to whether firms are focused on developing IAF competency over time.

On the one hand, firms seeking to maximize financial reporting and audit quality are likely to focus on investing in the monitoring mechanisms that determine high quality. That is, firms will optimize various monitoring mechanisms, including the IAF, by continually investing in IAF competency over time. Prior literature shows that firms that invest in greater audit committee and CFO accounting expertise (e.g. higher monitoring abilities) have higher financial reporting quality (e.g. Hoitash and Hoitash 2009; Hoitash, Hoitash, and Johnstone 2012). That is, firms with higher monitoring quality at the board and management level may invest in IAF competency over time in order to strengthen the lower-level reporting that audit committees and CFOs depend on.

While there may be an expectation of increased IAF competency over time, the lack of direct regulatory requirements over IAF quality may lead to firms interpreting compliance around the IAF in different manners (Ege 2015). That is, firms can maintain an IAF, but commit resources to increase monitoring quality through other means, such as developing the accounting staff competency or hiring a high quality external auditor. In turn, IAF competency would not change. Additionally, IAF competency may decrease over the sample period. Traditionally, the IAF is viewed as a cost-center. Considering the 2008 financial crisis, the sample period of 2010-2015 may include firms with liquidity issues that had to decrease investment in the IAF or completely divest of the in-house function to outsource the role. Similarly, the sample period represents a mature post-SOX era wherein

firms are adjusted to the regulatory requirements and do not require as much substantial investment in the IAF.

Based on my ability to test for differences in IAF competency over time using the LinkedIn data, I posit the following research question:

RQ: How does IAF competency change over time?

Antecedents of IAF Competency

As other firm monitoring mechanisms can impact the level of IAF competency, in the following sections, I develop hypotheses that examine whether particular audit committee and management characteristics are associated with IAF competency.

Audit Committee Responsibility over the IAF

In its monitoring capacity, the audit committee oversees financial reporting, internal control, audit, and compliance processes (SEC 2003a). The audit committee achieves its duties by interacting with internal and external parties in order to monitor management behavior, namely the internal auditors. The audit committee must take responsibility for the organizational status of the IAF through (1) overseeing employment decisions related to the IAF and (2) providing a direct reporting line to the function (PCAOB 2016b). Based on the tenets of agency theory and professional standards, the audit committee should influence IAF competency through hiring practices and organizational structure. Therefore, audit committee characteristics that represent higher audit committee quality are expected to be associated with a higher level of IAF competency. These audit committee characteristics are detailed below.

Audit Committee Size. The association of audit committee size on financial reporting outcomes is not well documented. Most studies find that audit committee size is not significantly related to restatement firms, going concern opinions of financially distressed firms, or the propensity of either restatement or receiving a going concern opinion (Abbott, Parkers, and Peters 2004; Carcello and Neal 2000). While the conceptual model in Anderson et al. (2012) demonstrates a predictive value of audit committee size on internal audit size, this result may be indicative of a size effect, as the model also evidences a positive and significant association between firm size and internal audit size. In this study, IAF size, as a proxy for IAF investment, is only one of four main measurement components of IAF competency. There is no a priori evidence that audit committee size may significantly impact the other IAF competency components (i.e. experience, certification, and education). I formulate this prediction in the null form:

H1a: There is no relationship between IAF competency and AC size.

Audit Committee Meetings. The association of audit committee meetings on financial reporting outcomes is mixed in the corporate governance literature. Farber (2006) finds fraud firms' audit committees have fewer audit committee meetings while Beasley (1996) observes no difference between fraud and non-fraud firms' number of audit committee meetings. Abbott et al. (2004) find audit committees who meet a minimum of four times during the year have a lesser incidence of restatement. However, Carcello, Hermanson, and Raghunandan (2006) and Hoitash, Hoitash, and Bedard (2009) find that the audit committee meets more frequently when the company disclose a material weakness, suggesting that audit committees meet more in reaction to poor FRQ. Anderson et al. (2012) find mixed results regarding audit committee meetings: the number of

meetings overall is not significantly associated with internal audit size, but the number of meetings with the CAE is positively and significantly associated with internal audit size. Based on prior research, it is difficult to predict the directional association the number of audit committee meetings may have on IAF competency. On the one hand, firms with greater IAF competency may have more audit committee meetings as the audit committee is concerned with investing in monitoring and maintaining diligent monitoring at the board-level. On the other hand, firms with greater IAF competency may have less audit committee meetings (or the standard number) if the audit committee is confident with the monitoring quality as evidenced by the IAF's work. As such, I formulate this prediction in a non-directional hypothesis:

H1b: There is a relationship between IAF competency and the number of audit committee meetings.

Audit Committee Accounting Expertise. Financial expertise of audit committee members is more strongly evidenced in the literature as improving financial reporting outcomes.⁶ Increased accounting-specific expertise on audit committees is associated with lower likelihood of material weakness, restatement disclosure, and earnings management, in addition to higher audit quality, suggesting that experts are more vigilant monitors due to their experience (Hoitash and Hoitash 2009; Zhang, Zhou and Zhou 2007; Krishnan 2005; Abbott et al. 2004). I therefore expect that audit committees with a higher percentage of accounting experts are more apt at monitoring due to their background, and as such, are

⁶ Regulation requires the audit committee to have at least one financial expert, defined as the committee member having either a direct financial background (e.g. auditor; CFO) or an indirect financial background (e.g. CEOs who have a supervisory role over the financial reporting process) (SEC 2003b).

more concerned with establishing a more competent IAF. While Ege (2015), does not find an association between IAF competence and audit committee financial expertise, it is possible that a more inclusive IAF competency measurement, a more representative sample of firms, and a more precise look at accounting-specific expertise, as found in this study, will more strongly test for this association. I formulate this prediction in a directional hypothesis:

H1c: IAF competency is positively associated with audit committee accounting expertise.

Management Characteristics

Public company management teams (e.g. CFOs) are also directly responsible for the financial reporting process per SOX Section 404a, through their personal certification of the financial statements. To that end, management has incentive to exert influence over employment decisions related to the IAF positively, to ensure higher IAF competency. CFOs are more likely to be replaced after a restatement or suffer a decrease in compensation (Hennes, Leone, and Miller 2008; Hoitash, Hoitash, and Johnstone 2012). As CFOs have direct oversight over the financial reporting process, CFOs with accounting backgrounds may have greater monitoring abilities, and thus greater ability to influence IAF competency. CFOs who have personal experience as an auditor or CPA may have strong salience to the importance of IAF as a monitor for assuring financial reporting and audit quality. I therefore expect CFOs with accounting expertise may identify and prioritize IAF competency as a key objective in their managerial capacity. I formulate this prediction in a directional hypothesis:

H2: IAF competency is positively associated with CFO accounting expertise.

IV. RESEARCH DESIGN

Data

I hand-collected individual IAF employee data from LinkedIn, the world's largest professional online networking platform with over 500 million users (LinkedIn 2016). LinkedIn leverages virtual networks to introduce members' mutual contacts to facilitate trust in the network ecosystem in order to build relationships for future career transitions (Papacharissi 2009; Kietzmann, Hermkens, McCarthy, and Silvestre 2011). The platform, therefore, acts as a virtual resume, where users can document past and current credentials and achievements (Papacharissi 2009). The professionally-related information featured on members' pages represents individuals' relevant competencies and can include education information, past and current employment information, certification information, and affiliations with professional societies and other organizations (PCAOB 2016b).

LinkedIn serves as an appropriate data source to collect information about individual IAF personnel competencies for three reasons. First, individuals in business-oriented occupations (e.g. IAF employees) are likely to be users of this type of service. Executives from all Fortune 500 companies are members of LinkedIn (Barrios 2019; LinkedIn 2016). Barrios (2019) finds that LinkedIn lists over 650,000 U.S. CPAs while Jiang et al. (2018) and Fracassi, Petry, and Tate (2016) find that between 80 and 87 percent of rating analysts post profiles on LinkedIn.^{7,8} Further, Chen et al. (2017) find that the number of tax employees is comparable to surveys of chief tax officers about average

⁷ NASBA confirms there are over 650,000 actively licensed CPAs as of 2016 (NASBA 2016).

⁸ Jiang et al. (2018) searches for a sample of former ratings agency analysts while Fracassi et al. (2016) searches for a sample of rating analysts with corporate rating experience.

corporate tax department size. Second, users' furnishing of professional information paired with externally validating features, such as skill endorsements and personalized recommendations, create incentive to maintain honesty on the network due to the personal cost of misrepresentation (Kietzmann et al. 2011; Bird, Ho, Li, and Ruchti 2016). Li, Lin, and Lu (2016) find that technical competence and social connections, represented on LinkedIn, improve analyst forecast accuracy. Third, joining LinkedIn is free, and requires only an e-mail address to create a profile. Individuals currently utilize professional online networking platforms like LinkedIn as a primary platform for job searches compared to alternative search modes (Garg and Telang 2018). Thus, barriers to entry are low, while motivation for professionals to maintain an online resume presence are high.

Previous archival IAF research has been limited due to the lack of publicly available information. Much of the literature relies on survey-based sources, primarily stemming from the IIA's GAIN Benchmarking Tool, which annually surveys CAEs (IIA 2017; Prawitt et al. 2011). Other studies have surveyed CAEs, chief internal auditors, and external audit partners (Felix et al. 2001; Abbott et al. 2016). While the GAIN survey tool has resulted in important insights into the IAF, researchers have recognized the inherent limitations with these sources. Using LinkedIn allows me to overcome certain limitations.

First, participation in the GAIN survey is voluntary, allowing for self-selection bias (Lin et al. 2011). LinkedIn allows for more objective sample composition as individuals do not need to be recruited to be included on the platform and IAF employees are likely users. Second, CAEs complete the instrument for the entire IAF, which may contribute to a lack of accuracy or completeness for each individual employee. Further, while administered yearly, previous research notes that not all participating firms respond each

year (e.g. Ege 2015), and the reason for the lack of participation could potentially be related to financial reporting issues. This survivorship bias also impacts accuracy in defining IAF competency as real-time changes to the function year over year are not captured. LinkedIn provides information at the discrete profile level, thus allowing for more accurate and complete data collection about individual personnel on a longitudinal basis.

Third, as the GAIN survey tool is confidential, previous studies have relied on matching participants' self-reported financial metrics to public information sources (Prawitt et al. 2009; Lin et al. 2011; Prawitt et al. 2011; Ege 2015; Pizzini et al. 2015). Using LinkedIn allows researchers to map individual IAF competencies directly to publicly available information. Lastly, previous GAIN research largely focuses on the years 2000-2005. This timeframe encompasses the pre-SOX and early implementation period of PCAOB Auditing Standard No. 2. Similar to Abbott et al. (2016), I examine a time period following the implementation of Auditing Standard 2201, in which public companies were mandated to maintain effectiveness over internal controls and to have an audit over the effectiveness of internal controls. Using LinkedIn allows me to track firms' IAF competency in a contemporary setting in order to evaluate how the function has evolved over time.

Overall, there is an opportunity for academic research to champion LinkedIn as a data resource to understand more about organizational functions at the individual employee level. It is further an important resource for functions like the IAF which historically have little to no public data available for analysis. The use of LinkedIn in accounting-related academic research is growing, specifically related to audit quality. Barrios (2019) finds that the state-level adoption of the 150-hour education rule for CPA licensing is associated with

an increase in CPA exam pass rates and a decrease in the supply of new candidates, evidencing an increased barrier to entry to the accounting profession as well as an increased quality of CPA-certified professionals. Bird et al. (2016) find that firms with a higher proportion of non-executive, auditor alumni accounting employees have higher audit quality through lower absolute abnormal accruals and a lesser propensity to issue misstatements. Similarly, Bird, Lennox, Li, and Ruchti (2017) demonstrate that firms with adverse internal control opinions hire more accounting employees with public accounting experience ex-post, which significantly improves internal control over financial reporting performance. Lee, Nagy, and Zimmerman (2019) find that firms focused on gender-diversity at the board and management level are more likely to have a female lead audit partner, leading to higher audit quality, while more experienced boards are associated with more experienced audit partners.

Sample

I collected IAF data for public company firms within the S&P 600 index, which measures the small-cap segment of the US equity market of corporate valuations ranging from US \$400 million to US \$1.8 billion (S&P 2016). The S&P 600 is an attractive segment to evaluate the IAF as small-cap companies are “typically known for less liquidity and potentially less financial stability than large caps”, indicating the index holds more distinctive risk and may be subject to greater instances of audit- and corporate governance-related failures (S&P 2016). Tracking firms’ IAF in a contemporary setting allows me to examine how the function has evolved over time during the SOX regulatory regime that is not afforded by prior research.

The initial dataset for the S&P 600 index firms was created from a merge of Compustat and Audit Analytics and contained 6,320 firm-year observations of 982 firms from 2010-2015.⁹ I eliminated observations with missing audit-related data and excluded financial industry firms (SIC code 6000-6999). The final sample is 3,616 firm-year observations of 600 firms from 2010-2015. There are two overarching reasons why I limit data collection to the 2010-2015 time period. First, while founded in 2002, LinkedIn did not start achieving rapid growth until mid-2007 through 2010, prior to its IPO in 2011.¹⁰ Therefore, there is a risk for earlier years of data collected that IAF personnel who were toward the end of their career or newly retired never created a LinkedIn profile. Second, Case, Gardiner, Rutner, and Dyer (2012) note that early career information may be sparse or not as reliable.

To perform my search of IAF employees, I used the LinkedIn Premium: Business Plus plan in order to access the greatest number of user profiles. The search methodology I employed is as follows: (1) identify the structure of the search (here, the sample of firms), (2) determine the search parameters, (3) categorize and synthesize the relevant data, and (4) consider validity threats to the data (Andiola, Bedard, and Hux 2015).

The entry point of the search on LinkedIn is the target firm name. After entering the target firm name, I selected the advanced search option, and searched the following keywords for all online members under “Title” (both current and past): *internal audit*, *internal auditor*, *audit*, *auditor*, *SOX consultant*, *accounting consultant*, *financial*

⁹ To combat potential survivorship bias, I include data for any firm that was listed on the S&P 600 index during the sample period 2010-2015, including those that were dropped and/or added to the index.

¹⁰ LinkedIn reached 1 million members in 2004, 10 million in 2007, and 102 million in 2010 (Byers 2013; LinkedIn 2015). In 2016, the year data was collected, LinkedIn reached nearly 500 million users (Elder and Gallagher 2017).

*consultant, accounting, accountant, financial analyst, and compliance analyst.*¹¹ I queried for both “current and past” employees in order to ensure I am capturing individuals who worked at the target firm during the sample period. For the purposes of this study, I collected data for IAF employees who work specifically with testing ICFR. This distinction is typically denoted through either the individual’s employment title or employment description. However, many individuals who were included as part of data collection had experience in testing internal controls over financial reporting as well as with other internal audit responsibilities (e.g. testing IT-related controls, risk assessment, operations management).

To the extent an individual is returned through the company and keyword search, and has been employed within the IAF of the target firm at any point from 2010-2015, the following data were collected. For employment, an individual’s employment history is collected from career inception through 2015. Company name, start date, end date, employee role, and location are collected for each discrete job or role an employee has. For education, an individual’s bachelor degree type, institution, and years attended are collected as well as an individual’s graduate degree type (if applicable). For certification, an individual’s certification types are collected. This data collection allows for competencies to be tracked leading up to, during, and after employment at a sample firm.

¹¹ These search terms were refined after performing initial searches of the IAF of 50 firms within the sample. The terms are both specific and broad-based enough to capture variation in firms’ employment and designation of individuals who work in any internal audit-related capacity. For broader based terms, such as *accountant*, the individual role description must illuminate the extent (if any) to which the individual in that position, past or present, worked in an IAF-related capacity. For example, if a search of *accountant* yields an individual who lists their position at the target firm as a staff accountant with responsibilities related to G/L accounting, he or she would not be included in the data collection. However, if an individual under the same search criteria lists responsibilities including testing and documenting financial controls under SOX, they would be included in data collection.

Thus, the panel data can provide insights on how the IAF may have evolved over time. In order to validate LinkedIn data accuracy, I cross-reference a random sample of hand-collected data with publicly available information (Thibodeau, Williams, and Witte 2017).¹²

This data collection yielded 19,544 individual-year observations for 2,606 IAF employees. Other firm-, auditor-, and board-related data were collected from Compustat, Audit Analytics, and BoardEx, respectively, and merged with the IAF data. I drop firm-year observations where IAF size is equal to zero, representing firms from the sample which had no results from the search process. I next eliminate observations with missing audit committee, management, and firm characteristics, as well as missing audit fee data. I winsorize all continuous variable at the 1st and 99th percentiles. The final sample for analysis is 2,138 firm-year observations of 437 S&P 600 firms from 2010-2015.¹³

IAF Competency Measure

Following PCAOB AS 2605.09, I created a composite IAF competency measure that leverages prior research and includes additional dimensions of IAF competencies.¹⁴ I define experience as the average number of years of internal auditing experience at the target firm (*IAF_EXP_TENURE*), consistent with Prawitt et al. (2009) and Ege (2015). I measure the count of internal auditors who have previous Big 4 (*IAF_EXP_BIG4*) or

¹² I confirm a random sample of 50 self-designated CPAs per the LinkedIn profiles to the respective State Board of Accountancy with no identified issues. The random sample of 50 self-designated CPAs represents 5% of the identified CPAs in the sample.

¹³ This sample is larger than both Lin et al. (2011), of 214 firm-years from 2004-2006, and Ege (2015), of 1,398 firm-years from 2000-2009, suggesting LinkedIn provides more complete longitudinal data per firm for analysis.

¹⁴ Previous public accounting experience (Big 4 and/or Midtier) and CISA certification have not been previously examined in the literature. Further, this study differs from the literature in its measurement of education and size.

Midtier (*IAF_EXP_MIDTIER*) public accounting experience, as firms may aim to increase competency by hiring employees who have previous public accounting experience for their auditing knowledge.¹⁵ I define certification as the count of internal auditors who have CPA, CIA, CFE, or CISA designations (*IAF_CERT_CPA*, *IAF_CERT_CIA*, *IAF_CERT_CFE*, and *IAF_CERT_CISA*). Similar to Ege (2015), who newly incorporated the CFE certification, I also include the CISA certification, which is related to information systems auditing. In addition to risk assessment, internal controls testing, and compliance, internal auditors are also involved in auditing the information systems.

Previous research incorporates a measure of training, or the number of hours of training internal auditors complete during the year, to proxy for education. I leverage the degree-related data to proxy for ability (Lin et al. 2011). I define education as the count of internal auditors who have an accounting degree at the undergraduate or graduate level (*IAF_EDU_UGACC*, *IAF_EDU_MSA*).¹⁶ Previous research measures IAF investment as a separate component from competency based on a firm's annual IAF operating costs scaled by total assets or total sales (Prawitt et al. 2009; Lin et al. 2011; Ege 2015). Here, I define IAF investment as part of IAF competency, based on the number of IAF employees, scaled by firm size (*IAF_SIZE_SCALED*).

To calculate a composite measure, I first created ten indicators equal to one if each of the ten competency measures is greater than or equal to the median value by fiscal year,

¹⁵ Big 4 is defined as Deloitte, PwC, KPMG, EY, and AA. Midtier is defined as RSM, GT, BDO, and CBIZ.

¹⁶ Lin et al. (2011) measure education as the average number of undergraduate/graduate years. Due to varying factors such as full-time status or program length, I measure education based on degree type and major earned.

and zero otherwise.¹⁷ I summed the indicators into four distinct IAF competency components, i.e., internal audit and public accounting experience (*IAF_EXP*); professional certification (*IAF_CERT*); accounting education (*IAF_EDU*), and function size (*IAF_SIZE*). Next, I dichotomized each of the four competency components at the median, and set an indicator equal to one if the competency component is greater than or equal to the median; zero otherwise. Lastly, I summed the competency component indicators to create the overall IAF competency score, ranging from zero to four (*IAF_COMP*), with higher values representing higher IAF competency.

Multivariate Models

To test the relation between IAF competency and factors associated IAF competency, I specify the following OLS regression model:

$$\begin{aligned}
 IAF_COMP = & \beta_0 + \beta_1 ACPERCENT + \beta_2 ACMEET + \beta_3 AC EXPERT + \beta_4 CFO EXPERT + \\
 & \beta_5 BOARDINDEX + \beta_6 LN ASSETS + \beta_7 BM + \beta_8 LEV + \beta_9 INVREC + \\
 & \beta_{10} LN SEGMENTS + \beta_{11} CFO + \beta_{12} ROA + \beta_{13} BIG4 + \beta_{14} FOREIGN + \beta_{15} YearFE + \\
 & \beta_{16} IndustryFE + \mathcal{E}
 \end{aligned}
 \tag{1}$$

The dependent variables is the IAF competency measure previously described (*IAF_COMP*), a composite IAF competency score ranging from 0-4, with higher values indicating higher levels of IAF competency.

To test H1a- H1c, I measure three audit committee specific characteristics. First, I calculate the percentage of audit committee members as the number of audit committee members scaled by the total number of directors on the board (*ACPERCENT*). Second, I include the number of audit committee meetings held during the fiscal year (*ACMEET*).

¹⁷ This method is consistent with previous studies using the IIA GAIN Benchmarking Tool (e.g. Ege 2015) that dichotomize the competence components at the median and add measures for a composite score.

Third, I calculate the percentage of accounting experts on the audit committee as the number of designated financial experts on the audit committee divided by the total audit committee members (*ACEXPERT*). A positive and significant coefficient on β_3 would support H1c. To test H2, I measure two CFO specific characteristics. *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification and/or previous auditing experience, and zero otherwise (Li, Sun, and Ettredge 2010; Bedard, Hoitash, and Hoitash 2014). A positive and significant coefficient on β_4 would support H2.

I measure a board of director index based on three board of director characteristics in order to control for potential correlated omitted variables, or broader board characteristics that may impact the influence of audit committee and management characteristics on IAF competency. I consider board size, board independence, and average independent board member tenure, as these characteristics are found to be associated with higher corporate governance quality in the extant literature (Boone, Field, Karpoff, and Raheja 2008; Beasley 1996; Anderson, Mansi, and Reeb 2004). I dichotomized each of the three board characteristics at the median, and set an indicator equal to one if the characteristic is greater than or equal to the median; zero otherwise. I summed the board characteristic indicators to create the overall board index (*BOARDINDEX*), with higher values representing higher board quality.

The model further controls for firm characteristics that may influence dimensions of and overall IAF competency as used in prior research (Prawitt et al. 2009; Anderson et al. 2012; Ege 2015; Abbott et al. 2016). These variables include firm size (*LN_ASSETS*), book-to-market ratio (*BM*), leverage (*LEV*), asset efficiency (*INVREC*), number of segments (*LNSEGMENTS*), volatility (*CFO*), profitability (*ROA*), Big 4 auditor (*BIG4*),

and foreign operations (*FOREIGN*). See Table 1.1 for variable definitions. All continuous variables are winsorized at the 1st and 99th percentile. All models additionally control for 2-digit SIC industry and year fixed effects, and cluster standard errors at the firm level.

[INSERT TABLE 1.1 HERE]

V. RESULTS

Descriptive Statistics

Table 1.2 Panel A presents descriptive statistics for all IAF variables used to construct the IAF competency measure. Median IAF size (*IAF_SIZE_TOTAL*) for all firm-years is three employees, ranging from one to 23 individuals. Median IAF tenure is 5.3 years, ranging from zero to 32 years, with 31.5 (4.7) percent of IAF employees having previous Big 4 (Midtier) public accounting experience.¹⁸ Approximately 67 (14.5) percent of IAF employees have an undergraduate (graduate) degree in accounting. Lastly, 37.7, 20.7, 8.2, and 7.2 percent of IAF employees have their CPA, CIA, CFE, and CISA certifications, respectively.

Table 1.2 Panel B presents the means and standard deviations of the IAF competency components by Fama French 12 industry classification. Average IAF size ranges from approximately three to six individuals across industries. Each industry has approximately a quarter or more of IAF personnel with a Big 4 public accounting background as well as a CPA certification. Midtier experience is less common, with the energy and utility industries having between nine and ten percent of IAF personnel with

¹⁸ Lin et al. (2011) and Ege (2015) report a median experience of eight and six years, respectively, inclusive of years of internal and external auditing experience. I separate audit experience between years of internal auditing experience and propensity for previous Big 4/Midtier public accounting experience.

that level of experience. An undergraduate degree in accounting across industries is consistent, ranging from 61 to 74 percent, while manufacturing firms have the highest percentage of personnel with a master's degree in accounting (19 percent). 33.8 percent of consumer durables firms' employees have their CIA, while CFE (CISA) certification across industries ranges from 4.8-11.2 percent (3.1-10.8 percent).

[INSERT TABLE 1.2 HERE]

Table 1.2 Panel C presents the descriptive statistics of the model variables. The composite IAF competency score (*IAF_COMP*), aiming to enhance previous measures, ranges from zero to four with a mean (median) of 2.55 (3.0). Approximately one third of sample firms have IAF competency scores greater than the median (untabulated). Audit committee members comprise approximately half (45.0%) of the board of directors and have a median of eight meetings per year. Of those audit committee members, 49.1% are accounting experts. Approximately half of CFOs have auditing experience at a Big 6 firm and/or their CPA designation. The composite board index score (*BOARDINDEX*), ranges from zero to three with a mean (median) of 1.26 (1.0), suggesting that, on average, firms have moderate corporate governance quality on the board of directors.

Average firm size is \$1.1 billion with a median of five segments. About 20% of sample firms are leveraged, 86.1% engage a Big 4 public accounting firm, and 42.1% have foreign operations. The average book-to-market ratio is 0.542, the average inventory to receivables ratio is 0.277, the average standard deviation of operating cash flow scaled by total assets over the past 5 years is 0.047, and the average profitability is 4.3%. Table 1.2 Panel D presents the Pearson correlations. *IAF_COMP* is positively and significantly

correlated with *ACMEET*, *ACEXPRT*, *BOARDINDEX*, *LNASSETS*, *LEV*, *LNSEGMENTS*, and *BIG_4*. This score is negatively and significantly correlated with *ACPERCENT*, *BM*, and *CFO*.

Univariate Results

Table 1.3 presents a two-sample t-test based on the IAF competency score, characteristics, and antecedents comparing 2010 to 2015. Overall, *IAF_COMP* has changed marginally over the five-year horizon ($p < 0.10$). I further explore this result by evaluating each of the IAF competency components. *IAF_EXP*, *IAF_EDU*, and *IAF_SIZE_TOTAL* have increased significantly over the sample period ($p < 0.05$; $p < 0.01$; $p < 0.01$), signaling that IAF employees have more experience and accounting-related education in later years, and that functions are overall larger. On the other side, *IAF_CERT* has decreased significantly over the sample period ($p < 0.01$). This trend shows that there are less IAF employees with relevant professional certifications in later years. This incongruence in movement among all of the IAF components could account for the overall lack of movement in the *IAF_COMP* score between 2010 and 2015. That is, the construct is multifaceted, and considers many dimensions of IAF competency. One single employee can represent multiple dimensions of the competency score (e.g. an IAF employee that has previous Big 4 experience, their CPA, and an accounting education). I look to multivariate analysis to illuminate more findings about the research question.

[INSERT TABLE 1.3 HERE]

When considering the individual IAF components, IAF size and IAF tenure have increased significantly over this period, signaling that firms are investing more in building

a robust function and retaining competent employees. Similarly, IAF employees with graduate accounting degrees has significantly increased during this period, most likely due to the increased credit-hour requirement for the CPA examination (though CPA certification has not increased significantly over this period). CFOs with previous auditing and accounting experience have increased marginally over the sample period. Additionally, firms are bigger, more leveraged, more profitable, and less volatile in 2015 compared to 2010.

Multivariate Results

Table 1.4 Column 1 presents the main IAF competency regression for Equation (1). The model explains 21.6% of the variation in the IAF competency score. Additionally, the year fixed effects are significant ($p < 0.01$) in three of the five years relative to 2010, providing additional support that IAF competency is improving over time. With regard to the research question, certain dimensions of IAF competency are improving over time, such as IAF size and graduate degrees, and overall IAF competency appears to trend upward in multivariate analysis. As such, firms appear to at least somewhat recognize the importance of developing a competent and robust IAF based on the competency components. Overall, these results demonstrate limited support for the research question and warrant further investigation. That is, examining what characteristics of firms are associated with better IAF competency, and how IAF competency impacts items such as financial reporting quality enterprise risk management.

Results in Table 1.4 Column 1 do not reject the null hypothesis of H1a, suggesting that audit committee size does not significantly impact IAF competency. Columns 2

through 5 present the four discrete IAF competency components independently regressed on the same set of variables.¹⁹ *IAF_EDU* is the only component that is significantly associated with audit committee size, where a larger audit committee begets an IAF with a greater accounting educational background. Overall, however, this result is consistent with Anderson et al. (2012) who find that audit committee size is not associated with IAF size.

[INSERT TABLE 1.4 HERE]

Results in Table 1.4 also indicate that H1b is not supported. The total number of audit committee meetings has no significant association with IAF competency. There is only a marginal association of audit committee meetings increasing the level of IAF certification. This could be attributed to previous findings: audit committee meetings are more reactionary to issues rather than preemptive in nature when internal control issues arise (Carcello et al. 2006; Hoitash et al. 2009). Thus, more highly competent IAFs that are assuring internal control quality would not necessitate an increase in the number of audit committee meetings. Similarly, this result is consistent with Anderson et al. (2012), who find the number of general audit committee meetings has no significant influence on IAF size.

H1c is supported, as *ACEXPRT* is positive and significant ($p < 0.05$), indicating that a firm's IAF competency score increases by an average of 0.373 points when the percentage of accounting experts on the committee increases by 1%. Further, this result is support by two of four of the IAF competency components: *IAF_EXP* ($p < 0.10$) and *IAF_EDU* ($p < 0.01$). As the median audit committee size is three directors, with

¹⁹ Columns 1-4 are OLS regressions and Column 5 is a logistic regression; thus, the difference from Columns 1-4 to Column 5 in degrees of freedom is due to perfect prediction of industry fixed effects.

approximately half of those members designated as experts, an increase to the amount of experts on the committee could impact IAF competency meaningfully.

Previous research does not find significant association between IAF competency and audit committee expertise, likely due to limitations of model specification or sample composition as discussed in Section II. This result is new and meaningful to the literature, as IAF competency is found to be another corporate governance dimension enhanced by increased expertise on the audit committee. Accounting experts on the audit committee appear to be tuned into the importance of IAF's valuable role as a monitoring mechanism and are working to enhance IAF competency as a result. Audit committees with higher levels of accounting expertise appear to understand the importance of (1) retaining long-time IAF personnel who have quality background experience, (2) finding IAF personnel who have a relevant accounting education background, and (3) appropriately staffing the IAF with sufficient resources.

H2 is not supported. CFO background as an auditor or as a CPA does not appear to enhance IAF competency. In fact, the main model in Column 1 shows a negative association of CFO accounting expertise on overall IAF competency. This result is primarily driven by the *IAF_CERT* component in Column 3. Thus, when CFOs have accounting expertise, IAFs are less likely to have highly certified IAF personnel. This is an interesting result, as CFOs with public accounting experience or their CPA are presumably in tune with the importance of audit quality, based on career roles. Managers with accounting expertise may value or rely upon alternative resources to substantiate accounting and audit quality, such as with the accounting staff or external auditor.

Similarly, managers with accounting expertise may value their own accounting and auditing knowledge in order to monitor the financial reporting process.

With regard to other control variables, firms with greater board quality, larger firms, greater cash flow volatility, and those that engage with a Big 4 external auditor are associated with greater IAF competency. These results suggest that firms that care about corporate governance quality and monitoring (e.g. board quality; Big 4 auditors) and are more complex have incentives to develop competent IAFs in order to maintain effective monitoring and audit quality.

Additional Analysis

Principal Components Analysis. I additionally create a measure of IAF competency by using a principal component factor analysis in order to validate the measure used herein, following prior research (Ege 2015). I use each of the four IAF competency component scores (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) as inputs to the analysis. I identify one factor with an eigenvalue greater than 1, which collectively explains 50.6 percent of the underlying variance. This factor is positively associated with certification, education, and size, and not associated with experience (*IAF_PCA*). I re-estimate Equation (1) substituting *IAF_PCA* as the dependent variable. Table 1.5 presents the results of this analysis. Results of Equation (1) using PCA are consistent with main regression results in Table 1.4. IAF competency is associated with greater audit committee financial expertise, greater corporate governance quality, larger firms, and more leveraged firms. IAF competency is marginally, negatively associated with CFO accounting expertise, consistent with prior results, as well as the book to market ratio. Overall, these

results corroborate earlier findings and help validate the new IAF competency measurement.

[INSERT TABLE 1.5 HERE]

IAF v. No Identified IAF. Table 1.6 presents a two-sample t-test based on whether or not sample firms have an IAF versus no IAF identified based on the LinkedIn data collection to further corroborate the importance of differences in IAF competency. Here, *IAFINVEST* is equal to one if the firm year has an identified IAF size greater than zero; zero otherwise. As sample firms are public companies that require management certification of and audits over internal controls, it is likely that these firms engage with third-party IAF service providers to complete the necessary monitoring work versus having no IAF at all. Firms with identified IAFs have more audit committee meetings and have greater corporate governance quality as proxied by *BOARDINDEX*. These firms are larger, more leveraged, have greater asset efficiency, have more segments, are more profitable, more likely engage Big 4 auditors and have foreign operations. Firms with no identified IAF have bigger audit committees, which may be to compensate for the lesser internal firm knowledge internal audit consultants have. Similarly, firms with no IAF have greater book value and greater cash flow volatility.

[INSERT TABLE 1.6 HERE]

Interestingly, neither of the characteristics that were identified as influencing IAF competency in the main model (i.e. audit committee accounting expertise; CFO accounting expertise) are significant here. In fact, there may be a two-step process for developing IAF competency. First, there may be factors that influence the implementation of an internal

IAF via board, management, and firm characteristics. It appears that firms with greater corporate governance quality and more complex firms have greater demand for an in-house IAF. Second, once firms establish an IAF, characteristics, such as audit committee accounting expertise, play a role in influencing the specific level of IAF competency a firm has.

I further test the relation between internal IAF investment and firm-specific factors using a logistic regression model. Table 1.7 presents the results of this analysis. Both *ACMEET* and *BOARDINDEX* are positive and significant ($p < 0.05$), suggesting that firms with in-house IAFs have more audit committee meetings and have higher corporate governance quality compared to firms with no-identified in-house IAF. *LNASSETS* ($p < 0.05$), *INVREC* ($p < 0.10$), and *FOREIGN* ($p < 0.10$) are also positive and significant, suggesting that firms with in-house IAFs are larger, more efficient, and more complex. These results further corroborate the univariate findings that greater corporate governance quality and firm complexity create demand for firms to establish an in-house IAF. That is, reliance on a third-party for internal audit services is more common in weaker firms.

[INSERT TABLE 1.7 HERE]

VI. CONCLUSION

This study provides the first exploratory insight into the various audit committee and management factors that influence IAF competency by considering antecedents to IAF competency on a longitudinal basis. I find that the audit committee accounting expertise plays an active role in influencing higher IAF competency. Similarly, there is no consistent suggestive evidence that management exerts significant influence over IAF competence. I further find moderate support for IAF competency improving over time, signaling that

firms increasingly recognize the importance developing a competent IAF. As such, this study can help inform standard-setters and regulators about the characteristics of the audit committee that influence IAF competence in order to work toward ensuring quality standards for this corporate governance mechanism. This study additionally introduces LinkedIn data to the IAF literature stream, which allows for more objective sample composition, more current data collection, and longitudinal data analysis that is unavailable by the survey sources traditionally used in this literature.

There are several limitations to this study. First, as the use of LinkedIn resume data is nascent in archival research, the methodology behind data collection and analysis is still new. I aim to develop a robust methodology of data collection and validation throughout this study. I develop wide search parameters for the keyword searches and additionally read through each profile to ensure accuracy of data collection and coding. Additionally, I limit analysis to more recent years of data collection (2010-2015) to combat the risk that earlier years in the sample are not an accurate representation of the employees' credentials. I further validate a sample of IAF employees' CPA certifications, verifiable through the respective State Board of Accountancy's Web site in order to ensure accuracy of the LinkedIn resume. Second, it is possible that IAF competency and its antecedents are jointly determined. To that end, I include a corporate governance index as a control variable to capture corporate governance quality and additionally control for firm characteristics. Third, this study focuses on measurements related to competency as opposed to objectivity. While objectivity is a critical component for the IAF to maintain, it is not a directly observable trait that I can build into the IAF quality score like the competency dimensions.

Future research can utilize this IAF competency measure in order to reevaluate ex-post firm outcomes that have been previously examined in the literature with more limited measures (e.g. earnings management; material weakness disclosures). Additionally, this measure can be used to evaluate other audit and firm outcomes, such as how audit delays and going concern opinions are associated with IAF competency in order to gain a greater understanding of the relationship between the IAF and the external auditors. Similarly, future studies can assess the demand for IAF competency. Based on firm-specific risk profiles (e.g. firm complexity), future research can investigate the moderating effect of IAF competency on these firm characteristics.

TABLE 1.1 – Variable Definitions

IAF Competency Variables	
<i>IAF_EXP_TENURE</i>	Mean tenure of IAF employee at sample firm in years;
<i>IAF_EXP_BIG4</i>	Count of IAF employees who have previous working experience at a Big 4 accounting firm;
<i>IAF_EXP_MIDTIER</i>	Count of IAF employees who have previous working experience at a Midtier accounting firm
<i>IAF_EXP</i>	<i>IAF_EXP_TENURE</i> , <i>IAF_EXP_BIG4</i> , and <i>IAF_EXP_MIDTIER</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF experience component is greater than the median;
<i>IAF_CERT_CPA</i>	Count of IAF employees who have their CPA certification;
<i>IAF_CERT_CIA</i>	Count of IAF employees who have their CIA certification;
<i>IAF_CERT_CFE</i>	Count of IAF employees who have their CFE certification;
<i>IAF_CERT_CISA</i>	Count of IAF employees who have their CISA certification;
<i>IAF_CERT</i>	<i>IAF_CERT_CPA</i> , <i>IAF_CERT_CIA</i> , <i>IAF_CERT_CFE</i> , and <i>IAF_CERT_CISA</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF certification component is greater than the median;
<i>IAF_EDU_UGACC</i>	Count of IAF employees who have an undergraduate accounting degree;
<i>IAF_EDU_MSA</i>	Count of IAF employees who have a graduate accounting degree;
<i>IAF_EDU</i>	<i>IAF_EDU_UGACC</i> and <i>IAF_EDU_MSA</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF education component is greater than the median;
<i>IAF_SIZE_TOTAL</i>	Number of IAF employees;
<i>IAF_SIZE_SCALED</i>	Number of IAF employees scaled by the natural log of total assets at the end of year;
<i>IAF_SIZE</i>	<i>IAF_SIZE_TOTAL</i> is first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median;
<i>IAF_COMP</i>	Sum of <i>IAF_EXP</i> , <i>IAF_CERT</i> , <i>IAF_EDU</i> , and <i>IAF_SIZE</i> by year, ranging from zero to four;
<i>IAF_PCA</i>	A factor score derived from a principal component factor analysis of standardized measures of <i>IAF_EXP</i> , <i>IAF_CERT</i> , <i>IAF_EDU</i> , and <i>IAF_SIZE</i> ;
Variables of Interest	
<i>ACPERCENT</i>	Number of audit committee members scaled by the total number of directors on the board;
<i>ACMEET</i>	Number of audit committee meetings held during the fiscal year;
<i>ACEXPERT</i>	Percent of accounting experts on the audit committee;
<i>CFOEXPERT</i>	Indicator variable equal to one if the CFO has a CPA certification and/or previous auditing experience;
Firm Control Variables	
<i>BOARDINDEX</i>	Total board size, the percentage of board independence, and the mean value of independent director tenure are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are summed, ranging from zero to three;
<i>LNASSETS</i>	Natural log of total assets at the end of year;

<i>BM</i>	Book value of common equity divided by market value of common equity;
<i>LEVERAGE</i>	Long-term debt divided by total assets from end of year;
<i>INVREC</i>	Inventory and accounts receivable divided by total assets from end of year;
<i>LNSEGMENTS</i>	Natural log of the number of business and geographic segments;
<i>CFO</i>	Standard deviation of cash flow from operations over 5 years;
<i>ROA</i>	Net income divided by total assets;
<i>BIG4</i>	Indicator variable equal to one if the firm engages a Big 4 auditing firm;
<i>FOREIGN</i>	Indicator variable equal to one if the firm has foreign operations.

TABLE 1.2 – Descriptive Statistics

Panel A: IAF Competency Variables

	Mean	St. Dev.	Min.	25 th Pct.	Median	75 th Pct.	Max.
<i>IAF_SIZE_TOTAL</i>	3.820	3.087	1.000	2.000	3.000	5.000	23.000
<i>IAF_SIZE_SCALED</i>	0.532	0.394	0.112	0.250	0.418	0.715	2.628
<i>IAF_EXP_TENURE</i>	5.735	3.139	0.000	3.750	5.333	7.155	32.000
<i>IAF_EXP_BIG4</i>	0.315	0.335	0.000	0.000	0.250	0.500	1.000
<i>IAF_EXP_MIDTIER</i>	0.047	0.160	0.000	0.000	0.000	0.000	1.000
<i>IAF_EDU_UGACC</i>	0.669	0.337	0.000	0.500	0.727	1.000	1.000
<i>IAF_EDU_MSA</i>	0.145	0.248	0.000	0.000	0.000	0.250	1.000
<i>IAF_CERT_CPA</i>	0.377	0.351	0.000	0.000	0.333	0.600	1.000
<i>IAF_CERT_CIA</i>	0.207	0.290	0.000	0.000	0.000	0.333	1.000
<i>IAF_CERT_CFE</i>	0.082	0.187	0.000	0.000	0.000	0.000	1.000
<i>IAF_CERT_CISA</i>	0.072	0.167	0.000	0.000	0.000	0.000	1.000

N = 2,138. This panel provides descriptive statistics for the IAF competency characteristics. Variable definitions are provided in Table 1.1.

TABLE 1.2 (CONTINUED) – Descriptive Statistics

Panel B: IAF Competency Variables by Industry

	Consumer Non- Durables	Consumer Durables	Manu.	Energy	Chemicals	Business Equip.	Telecomm.	Utilities	Retail	Health	Other	Total
<i>IAF_SIZE_</i>	3.269	3.207	4.184	3.616	4.889	3.147	2.763	5.907	4.367	2.865	4.085	3.819
<i>TOTAL</i>	(2.398)	(2.046)	(3.139)	(2.604)	(3.418)	(2.473)	(1.618)	(4.482)	(3.516)	(2.029)	(3.542)	(3.087)
<i>IAF_SIZE_</i>	0.460	0.467	0.574	0.460	0.690	0.457	0.340	0.704	0.598	0.424	0.579	0.532
<i>SCALED</i>	(0.302)	(0.291)	(0.404)	(0.307)	(0.482)	(0.324)	(0.212)	(0.500)	(0.449)	(0.280)	(0.084)	(0.394)
<i>IAF_EXP_</i>	6.478	5.614	5.675	5.939	6.270	5.495	6.263	6.215	5.812	5.737	5.488	5.734
<i>TENURE</i>	(4.559)	(2.403)	(3.049)	(2.855)	(2.814)	(2.974)	(2.892)	(3.442)	(3.741)	(2.997)	(2.519)	(3.138)
<i>IAF_EXP_</i>	0.243	0.501	0.312	0.335	0.316	0.369	0.224	0.205	0.309	0.370	0.237	0.315
<i>BIG4</i>	(0.254)	(0.375)	(0.318)	(0.386)	(0.335)	(0.364)	(0.223)	(0.247)	(0.330)	(0.379)	(0.287)	(0.336)
<i>IAF_EXP_</i>	0.00675	0.0386	0.0686	0.0903	0.0217	0.0413	0.0219	0.0956	0.0479	0.0164	0.0467	0.0473
<i>MIDTIER</i>	(0.0319)	(0.142)	(0.193)	(0.238)	(0.0713)	(0.140)	(0.0963)	(0.178)	(0.178)	(0.0689)	(0.158)	(0.160)
<i>IAF_EDU_</i>	0.730	0.733	0.685	0.744	0.706	0.651	0.762	0.689	0.641	0.614	0.648	0.669
<i>UGACC</i>	(0.310)	(0.324)	(0.320)	(0.276)	(0.258)	(0.368)	(0.363)	(0.291)	(0.333)	(0.384)	(0.334)	(0.337)
<i>IAF_EDU_</i>	0.0731	0.0977	0.190	0.169	0.127	0.121	0.158	0.183	0.153	0.117	0.152	0.145
<i>MSA</i>	(0.139)	(0.201)	(0.291)	(0.226)	(0.232)	(0.241)	(0.176)	(0.211)	(0.273)	(0.241)	(0.229)	(0.248)
<i>IAF_CERT_</i>	0.242	0.384	0.404	0.464	0.446	0.305	0.365	0.591	0.368	0.367	0.405	0.377
<i>CPA</i>	(0.329)	(0.361)	(0.342)	(0.348)	(0.373)	(0.357)	(0.283)	(0.324)	(0.345)	(0.355)	(0.347)	(0.351)
<i>IAF_CERT_</i>	0.173	0.338	0.170	0.235	0.223	0.172	0.166	0.303	0.221	0.224	0.216	0.207
<i>CIA</i>	(0.264)	(0.323)	(0.247)	(0.272)	(0.273)	(0.281)	(0.276)	(0.367)	(0.315)	(0.309)	(0.289)	(0.290)
<i>IAF_CERT_</i>	0.0638	0.107	0.0655	0.0527	0.0480	0.100	0.0658	0.226	0.0609	0.0420	0.112	0.0815
<i>CFE</i>	(0.127)	(0.204)	(0.154)	(0.157)	(0.130)	(0.234)	(0.148)	(0.288)	(0.154)	(0.111)	(0.220)	(0.187)
<i>IAF_CERT_</i>	0.0312	0.108	0.0618	0.0363	0.0493	0.0943	0	0.0792	0.0708	0.0979	0.0730	0.0723
<i>CISA</i>	(0.0915)	(0.188)	(0.146)	(0.0906)	(0.104)	(0.201)	(0)	(0.123)	(0.161)	(0.212)	(0.175)	(0.167)
N	108	92	396	112	63	374	38	54	349	185	363	2,134

N = 2,134. This panel provides descriptive statistics for the IAF competency characteristics by Fama French 12 industry (standard deviation in parentheses). In the sample, I eliminate financial firms based on SIC code 6000-6999. Fama French 12 classification identified 4 firm-year observations (SIC codes 7000-7999) that as financial-related firms. I eliminate them in this presentation.

TABLE 1.2 (CONTINUED) – Descriptive Statistics

Panel C: Model Descriptives

	Mean	St. Dev.	Min.	25 th Pct.	Median	75 th Pct.	Max.
<i>IAF_COMP</i>	2.552	1.311	0.000	1.000	3.000	4.000	4.000
<i>ACPERCENT</i>	0.450	0.111	0.250	0.375	0.429	0.500	0.800
<i>ACMEET</i>	7.549	2.570	4.000	5.000	8.000	9.000	16.000
<i>ACEXPRT</i>	0.491	0.213	0.167	0.333	0.500	0.667	1.000
<i>CFOEXPRT</i>	0.485	0.500	0.000	0.000	0.000	1.000	1.000
<i>BOARDINDEX</i>	1.261	0.847	0.000	1.000	1.000	2.000	3.000
<i>LNASSETS</i>	6.983	0.949	4.660	6.349	6.972	7.651	9.038
<i>BM</i>	0.542	0.365	-0.746	0.324	0.489	0.715	1.909
<i>LEV</i>	0.193	0.170	0.000	0.017	0.176	0.310	0.687
<i>INVREC</i>	0.277	0.170	0.000	0.153	0.257	0.379	0.738
<i>LNSEGMENTS</i>	1.569	0.704	0.000	1.386	1.609	2.079	2.996
<i>CFO</i>	0.047	0.032	0.008	0.025	0.039	0.059	0.175
<i>ROA</i>	0.043	0.087	-0.412	0.020	0.050	0.082	0.245
<i>BIG4</i>	0.861	0.346	0.000	1.000	1.000	1.000	1.000
<i>FOREIGN</i>	0.421	0.494	0.000	0.000	0.000	1.000	1.000

N = 2,138. This panel provides descriptive statistics for Equation (1). Variable definitions are provided in Table 1.1.

TABLE 1.2 (CONTINUED) – Descriptive Statistics

Panel D: Pearson Correlation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) <i>IAF_COMP</i>	1														
(2)	-0.08***	1													
<i>ACPERCENT</i>															
(3)	0.08***	-0.09***	1												
<i>ACMEET</i>															
(4)	0.08***	-0.24***	0.05**	1											
<i>ACEXPERT</i>															
(5)	-0.03	0.06***	-0.03	0.04*	1										
<i>CFOXPERT</i>															
(6)	0.19***	-0.20***	0.03	0.04**	-0.03	1									
<i>BOARDINDEX</i>															
(7)	0.37***	-0.15***	0.10***	0.02	-0.04*	0.26***	1								
<i>LNASSETS</i>															
(8)	-0.04*	0.06***	0.04*	-0.08***	-0.03	-0.02	0.04**	1							
<i>BM</i>															
(9)	0.19***	-0.11***	0.01	0.07***	-0.03	0.08***	0.48***	-0.08***	1						
<i>LEV</i>															
(10)	0.02	0.09***	0.01	0.01	0.10***	0.01	-0.08***	0.09***	-0.12***	1					
<i>INVREC</i>															
(11)	0.07***	-0.02	0.07***	0.06***	-0.01	0.10***	0.06***	0.07***	0.00	0.17***	1				
<i>LNSEGMENTS</i>															
(12)	-0.05**	0.09***	-0.05**	-0.00	-0.03	-0.15***	-0.31***	0.03	-0.17***	0.11***	-0.04*	1			
<i>CFO</i>															
(13)	0.02	0.01	-0.05**	-0.02	0.04*	0.03	-0.03	-0.28***	-0.26***	0.03	-0.02	-0.05**	1		
<i>ROA</i>															
(14)	0.20***	-0.08***	0.14***	0.03	-0.05**	0.17***	0.24***	-0.02	0.12***	-0.04*	0.04*	-0.05**	-0.01	1	
<i>BIG4</i>															
(15)	0.01	0.05**	0.03	0.02	0.06***	-0.04*	0.04*	0.03	-0.07***	0.16***	0.37***	-0.05**	-0.02	-0.02	1
<i>FOREIGN</i>															

Variable definitions are in Table 1.1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

TABLE 1.3 – T-test of IAF Competency Score, Competency Measures, and Antecedents

	t- statistic	p-value	2010 (N)	2010 (Mean)	2015 (N)	2015 (Mean)
IAF Competency Score:						
<i>IAF_COMP</i>	1.699	0.090	326	2.589	369	2.420
IAF Competency Components:						
<i>IAF_EXP</i>	-2.344	0.019**	326	2.040	369	2.163
<i>IAF_CERT</i>	8.436	0.000***	326	3.620	369	3.190
<i>IAF_EDU</i>	-3.968	0.000***	326	1.503	369	1.650
<i>IAF_SIZE_SCALED</i>	-5.510	0.000***	326	0.437	369	0.603
IAF Characteristics:						
<i>IAF_EXP_TENURE</i>	-5.571	0.000***	326	5.065	369	6.477
<i>IAF_EXP_BIG4</i>	-1.491	0.136	326	0.300	369	0.339
<i>IAF_EXP_MIDTIER</i>	-1.530	0.126	326	0.032	369	0.049
<i>IAF_EDU_UGACC</i>	-1.415	0.158	326	0.654	369	0.691
<i>IAF_EDU_MSA</i>	-1.966	0.050**	326	0.122	369	0.159
<i>IAF_CERT_CPA</i>	0.129	0.897	326	0.379	369	0.375
<i>IAF_CERT_CIA</i>	-0.036	0.971	326	0.208	369	0.208
<i>IAF_CERT_CFE</i>	-1.081	0.280	326	0.074	369	0.090
<i>IAF_CERT_CISA</i>	0.481	0.631	326	0.071	369	0.065
IAF Antecedents:						
<i>ACPERCENT</i>	-1.479	0.140	326	0.443	369	0.455
<i>ACMEET</i>	1.573	0.116	326	7.785	369	7.474
<i>ACEXPRT</i>	-0.274	0.784	326	0.486	369	0.490
<i>CFOEXPERT</i>	1.672	0.095*	326	0.497	369	0.434
<i>BOARDINDEX</i>	0.001	0.999	326	1.233	369	1.233
<i>LNASSETS</i>	-4.546	0.000***	326	6.796	369	7.118
<i>BM</i>	0.598	0.550	326	0.566	369	0.549
<i>LEV</i>	-6.327	0.000***	326	0.159	369	0.241
<i>INVREC</i>	0.773	0.440	326	0.280	369	0.270
<i>LNSEGMENTS</i>	0.348	0.728	326	1.598	369	1.580
<i>CFO</i>	4.968	0.000***	326	0.053	369	0.041
<i>ROA</i>	4.446	0.000***	326	0.052	369	0.019
<i>BIG4</i>	0.943	0.346	326	0.868	369	0.843
<i>FOREIGN</i>	-0.182	0.856	326	0.429	369	0.436
Observations	695					

Variable definitions are in Appendix Table 1.1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

TABLE 1.4 – Antecedents of IAF Competency

	(1)	(2)	(3)	(4)	(5)
	<i>IAF_COMP</i>	<i>IAF_EXP</i>	<i>IAF_CERT</i>	<i>IAF_EDU</i>	<i>IAF_SIZE</i>
<i>ACPERCENT</i>	0.246 (0.54)	0.124 (0.53)	-0.055 (-0.28)	0.363** (2.15)	-0.036 (-0.04)
<i>ACMEET</i>	0.019 (1.13)	0.003 (0.36)	0.013* (1.52)	-0.003 (-0.52)	-0.023 (-0.78)
<i>ACFINEXPERT</i>	0.373** (1.90)	0.175* (1.47)	-0.002 (-0.02)	0.208*** (2.68)	-0.592* (-1.60)
<i>CFOEXPERT</i>	-0.127* (-1.44)	-0.048 (-0.93)	-0.103** (-2.49)	-0.029 (-0.83)	-0.090 (-0.52)
<i>BOARDINDEX</i>	0.127*** (2.50)	0.068** (2.20)	0.036 (1.50)	0.063*** (3.18)	-0.058 (-0.63)
<i>LNASSETS</i>	0.505*** (8.25)	0.202*** (5.34)	0.115*** (3.73)	0.137*** (6.05)	-0.468*** (-4.12)
<i>BM</i>	-0.259** (-2.23)	-0.042 (-0.64)	-0.173*** (-3.03)	-0.102** (-2.38)	0.135 (0.64)
<i>LEV</i>	0.183 (0.58)	-0.123 (-0.65)	0.198 (1.36)	0.096 (0.82)	-0.123 (-0.20)
<i>INVREC</i>	0.618 (1.56)	0.439** (2.06)	0.433** (2.28)	0.018 (0.12)	-0.561 (-0.80)
<i>LNSEGMENTS</i>	0.117 (1.50)	0.018 (0.39)	0.040 (1.09)	0.024 (0.86)	-0.318** (-2.36)
<i>CFO</i>	2.804** (2.01)	0.588 (0.74)	0.408 (0.59)	0.952* (1.77)	-5.130** (-2.00)
<i>ROA</i>	0.056 (0.13)	-0.031 (-0.14)	-0.134 (-0.67)	0.084 (0.56)	-0.805 (-1.05)
<i>BIG4</i>	0.326** (2.20)	0.102 (1.44)	0.163** (2.21)	0.045 (0.81)	-0.663*** (-2.73)
<i>FOREIGN</i>	0.068 (0.68)	0.093 (1.57)	-0.015 (-0.29)	0.014 (0.35)	-0.331* (-1.80)
Constant	-0.055 (-0.10)	1.304*** (4.09)	3.275*** (12.98)	0.678*** (3.27)	3.344*** (3.21)
Industry & Year Effects?	Yes	Yes	Yes	Yes	Yes
Observations	2,138	2,138	2,138	2,138	2,112
Adjusted R ²	0.216	0.113	0.222	0.150	NA
Pseudo R ²	NA	NA	NA	NA	0.096

This table reports results from regressions of AC, management, and firm characteristics on IAF competency. Column 1 presents Equation (1). The dependent variable is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. The dependent variables in Columns 2-5 represent each of those four competency components discretely regressed on the same set of AC, management, and firm characteristics. Columns 1-4 are OLS regressions and Column 5 is a logistic regression; thus, the difference from Columns 1-4 to Column 5 in degrees of freedom is due to perfect prediction of industry fixed effects. The variables of interest are *ACPERCENT*, *ACMEET*, *ACFINEXPERT*, and *CFOEXPERT*. *ACPERCENT* is the number of audit committee members scaled by the total number of directors on the board, *ACMEET* is the number of audit committee meetings held during the fiscal year, and *ACEXPERT* is the percentage of financial experts on the audit committee. *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification and/or previous auditing experience, and zero otherwise. *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets

to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, and *ROA* is the ratio of net income to total assets. *Big4* and *FOREIGN* are indicator variables for a Big 4 external auditor and foreign operations. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 1.5 – Antecedents of IAF Competency using PCA

	(1) <i>IAF_PCA</i>	t-statistic
<i>ACPERCENT</i>	0.310	(0.70)
<i>ACMEET</i>	0.016	(0.96)
<i>ACEXPERT</i>	0.331**	(1.74)
<i>CFOEXPERT</i>	-0.145*	(-1.65)
<i>BOARDINDEX</i>	0.124***	(2.56)
<i>LNASSETS</i>	0.430***	(7.17)
<i>BM</i>	-0.317***	(-2.80)
<i>LEVERAGE</i>	0.289	(0.93)
<i>INVREC</i>	0.536	(1.41)
<i>LNSEGMENTS</i>	0.110	(1.48)
<i>CFO</i>	2.475*	(1.77)
<i>ROA</i>	0.069	(0.17)
<i>BIG4</i>	0.316**	(2.22)
<i>FOREIGN</i>	0.065	(0.62)
Constant	3.614***	(6.69)
Industry & Year Effects?	Yes	
Observations	2,138	
Adjusted R^2	0.215	

This table reports results from an OLS regression of IAF investment on firm characteristics. The dependent variable in Column 1 is *IAF_PCA*, which is a factor score composed of the certification, education, and size component scores (*IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*). *ACPERCENT* is the number of audit committee members scaled by the total number of directors on the board, *ACMEET* is the number of audit committee meetings held during the fiscal year, and *ACEXPERT* is the percentage of accounting experts on the audit committee. *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification and/or previous auditing experience, and zero otherwise. *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, and *ROA* is the ratio of net income to total assets. *Big4* and *FOREIGN* are indicator variables for a Big 4 external auditor and foreign operations. Regression includes year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test.

TABLE 1.6 – T-test of IAF versus No Identified IAF

	t-statistic	p-value	No IAF (N)	No IAF (Mean)	Has IAF (N)	Has IAF (Mean)
<i>ACPERCENT</i>	6.815	0.000***	809	0.483	2,138	0.450
<i>ACMEET</i>	-6.904	0.000***	809	6.818	2,138	7.540
<i>ACEXPERT</i>	0.450	0.653	809	0.494	2,138	0.490
<i>CFOEXPERT</i>	-0.302	0.763	809	0.471	2,138	0.476
<i>BOARDINDEX</i>	-9.047	0.000***	809	1.283	2,138	1.575
<i>LNASSETS</i>	-18.476	0.000***	809	6.234	2,138	6.973
<i>BM</i>	6.275	0.000***	809	3.217	2,138	2.561
<i>LEVERAGE</i>	-6.856	0.000***	809	0.143	2,138	0.194
<i>INVREC</i>	-3.821	0.000***	809	0.253	2,138	0.277
<i>LNSEGMENTS</i>	-5.841	0.000***	809	1.242	2,138	1.518
<i>CFO</i>	5.058	0.000***	809	0.055	2,138	0.047
<i>ROA</i>	-1.661	0.097*	809	0.033	2,138	0.041
<i>BIG4</i>	-5.895	0.000***	809	0.773	2,138	0.862
<i>FOREIGN</i>	-4.154	0.000***	809	0.337	2,138	0.421
Observations	2,947					

This table reports results from a t-test of Equation (1) independent and control variables between firms with an identified IAF and firms with no identified IAF, based on the LinkedIn data collection. The original LinkedIn sample of 600 firms, consisting of 2,947 firm years, is split by *IAFINVEST*, which is equal to one for firms with an identified IAF size greater than zero, and zero otherwise. *ACPERCENT* is the number of audit committee members scaled by the total number of directors on the board, *ACMEET* is the number of audit committee meetings held during the fiscal year, and *ACEXPERT* is the percentage of accounting experts on the audit committee. *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification and/or previous auditing experience, and zero otherwise. *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, and *ROA* is the ratio of net income to total assets. *Big4* and *FOREIGN* are indicator variables for a Big 4 external auditor and foreign operations. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 1.7 – Antecedents of In-House IAF Investment

	(1) <i>IAFINVEST</i>	t-statistic
<i>ACPERCENT</i>	-0.754	(-0.88)
<i>ACMEET</i>	0.097**	(2.50)
<i>ACEXPERT</i>	-0.559	(-1.24)
<i>CFOEXPERT</i>	-0.139	(-0.78)
<i>BOARDINDEX</i>	0.255**	(2.26)
<i>LNASSETS</i>	1.064***	(7.63)
<i>BM</i>	-0.036	(-0.16)
<i>LEVERAGE</i>	-0.254	(-0.37)
<i>INVREC</i>	1.410*	(1.75)
<i>LNSEGMENTS</i>	-0.297	(-0.87)
<i>CFO</i>	2.838	(1.09)
<i>ROA</i>	-0.216	(-0.29)
<i>BIG4</i>	-0.307	(-1.23)
<i>FOREIGN</i>	0.365*	(1.72)
Constant	-5.808***	(-4.41)
Industry & Year Effects?	Yes	
Observations	2,947	
Pseudo R^2	0.193	

This table reports results from a logistic regression of IAF investment on firm characteristics. The dependent variable in Column 1 is *IAFINVEST*, which is equal to one for firms with an identified IAF size greater than zero, and zero otherwise. *ACPERCENT* is the number of audit committee members scaled by the total number of directors on the board, *ACMEET* is the number of audit committee meetings held during the fiscal year, and *ACACCTEXPERT* is the percentage of accounting experts on the audit committee. *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification and/or previous auditing experience, and zero otherwise. *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, and *ROA* is the ratio of net income to total assets. *Big4* and *FOREIGN* are indicator variables for a Big 4 external auditor and foreign operations. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test.

CHAPTER TWO

Internal Audit Competency and Financial Reporting Quality

I. INTRODUCTION

Internal audit functions (IAFs) are critical for financial reporting quality as they are tasked to identify, remediate, monitor, and communicate internal control and financial reporting issues as part of the broader corporate governance system (IIA 2017; Lin, Pizzini, Vargus, and Bardhan 2011; Ege 2015). The Institute of Internal Auditors (IIA), PCAOB, and SEC professional standards specifically acknowledge the importance of IAF personnel competencies as they relate to evaluating financial reporting quality, both internally and alongside the external auditor (SEC 2003a; PCAOBa 2016; PCAOBb 2016; IIA 2017; Lin et al. 2011).²⁰

While prior literature finds that higher quality IAFs are associated with a lower likelihood of management misconduct, less earnings management, and lower audit fees (DeFond and Zhang 2014; Prawitt, Smith, and Wood 2009; Abbott, Daugherty, Parker, and Peters 2016; Prawitt, Sharp, and Wood 2012; Ege 2015), data constraints have limited investigations into the IAF and whether firms respond to financial reporting issues by changing the IAF. In this study, I utilize a new measure of IAF competency, based on longitudinal resume data from LinkedIn, and test if IAF competency (1) is associated with the propensity for material weakness and restatements²¹ and (2) changes after material

²⁰ Anecdotally, internal audit departments have uncovered some of the largest corporate frauds in modern history. For example, Cynthia Cooper and her internal audit team at WorldCom, relentlessly pursued suspicion of wrongdoing, uncovering a \$3.8 billion in fraud (Pulliam and Solomon 2002).

²¹ Specifically, I evaluate misstatements of previously reported earnings.

weakness and restatement disclosures. I then examine whether firms' reactions depend on the baseline competency of the IAF, or on characteristics of the audit committee and CFO.

Despite the focus the IIA and PCAOB standards place on IAF competency as it relates to financial reporting quality, there is a surprising lack of direct regulation over the IAF. This lack of structure is conspicuous considering the regulatory requirements imposed on boards of directors, audit committees, and external auditors (Ege 2015). Further, there is a lack of available data about the IAF, especially about how IAFs change over time. As a result, limited studies have directly addressed the change in IAF competency after the revelation of financial reporting issues. Ege (2015) finds that firms with management misconduct increase IAF competency in the post-misconduct year, suggesting that firms improve competency in reaction to an egregious failure. While firms react to a highly salient and relatively rare event such as management fraud, it is unclear whether and under what circumstances firms will improve IAF competency in response to less egregious and more frequent events, such as material weakness or restatement disclosures.

It is possible that firms do not react to material weakness or restatement disclosures by changing IAF competency, as they may choose not to react at all, or decide to only change characteristics of other monitoring mechanisms. For example, Goh (2009) finds that audit committee supervisory expertise, audit committee size, board independence, and a new CFO are associated with remediating material weaknesses in a timely manner. Similarly, audit committee members and CFOs are more likely to be replaced after an income-decreasing restatement (Srinivasan 2005; Hennes, Leone, and Miller 2008; Agrawal and Cooper 2017). Ettredge, Heintz, Li, and Scholz (2011) find that firms receiving adverse internal control opinions are likely to dismiss their external auditor, while

Hennes, Leone, and Miller (2014) find that external auditor turnover is higher after more severe restatements. Therefore, firms have incentives to address financial reporting issues at the external auditor, management, or board level as these groups are highly monitored by regulatory bodies and changes to them can act as a highly visible signal that the firm is addressing failures. Thus, it may make sense for firms to focus resources on increasing monitoring at this level compared to the IAF (Johnstone, Li, and Rupley 2011).

Nevertheless, material weakness and restatement disclosures are financial reporting outcome “shocks” that threaten organizational legitimacy as these events impact public perception of financial reporting reliability (Hammersley, Myers and Zhou 2012; Feldmann, Read, and Abdolmohammadi 2009). Further, these disclosures are associated with significant costs such as higher audit fees (Hoitash, Hoitash, and Bedard 2008), negative stock price reaction (Hammersley, Myers, and Shakespeare 2008; Palmrose, Richardson, and Scholz 2004), higher executive and audit committee turnover (Leone and Liu 2010; Srinivasan 2005), and lower CFO compensation (Hoitash, Hoitash, and Johnstone 2012). As the IAF is responsible for preventing these reporting failures, changing IAF competency may be an effective means to improve monitoring.

I conduct the tests using hand-collected resume data from LinkedIn (p. 20-23). LinkedIn data allows us to expand beyond the traditional survey-based sources in the IAF literature by providing individual-level longitudinal information across public company firms in a contemporary setting. Growing accounting research using LinkedIn validate that accounting/finance professionals’ use of LinkedIn (Barrios 2019; Jiang, Wang, and Wang 2018; Fracassi, Petry, and Tate 2016). The LinkedIn data collection yielded a sample of

2,138 firm-years representing 437 unique firms of the S&P 600 index²² from 2010 through 2015.²³ This data represent firm-level competency characteristics of the IAF, including professional experience and certification, educational background, and overall function size. I utilize the composite IAF competency score from Chapter One that includes competency dimensions related to internal audit-related tenure, public accounting background, accounting-related designations (Certified Public Accountant (CPA), Certified Internal Auditor (CIA), Certified Information Systems Auditor (CISA), or Certified Fraud Examiner (CFE)) undergraduate and/or graduate degrees in accounting, and number of IAF personnel.

Multivariate baseline tests show a negative association between the measure of IAF competency and both material weakness disclosures and restatements, and thus help validate the measure.²⁴ These results also add to prior research that finds weak association between IAF competency and material weakness disclosure and does not document an association with restatements, perhaps due to sample composition and measurement. In primary analysis, I examine changes in IAF quality as a response to the disclosure of a material weakness (restatement). Results show a positive association between a material

²² S&P 600 firms are particularly suitable for examining responses to FRQ events for several reasons. First, it is not practical to manually collect employee data for very large firms. Second, these firms are required to have an internal control audit under SOX Section 404b as of 2004 (PCAOB 2016a).

²³ The decision to restrict main analysis to 2010-2015 is threefold. First, MW and restatement disclosures are not as prevalent as they were during the early stages of SOX implementation, suggesting their occurrence today creates more of a financial reporting outcome “shock”. Only 17.6 (14.9) percent of sample firms in this study had a MW (restatement) disclosure from 2010-2015, compared to 21.0 (70.6) percent of sample firms from 2004-2006 (2001-2005) (Lin et al. 2011). Second, LinkedIn did not start achieving rapid growth until 2007-2010 (Byers 2013). Lastly, due to the potential for varying degrees of existence or completeness of profiles, earlier years of career information may not be as reliable as more contemporary resume data (Case, Gardiner, Rutner, and Dyer 2012).

²⁴ This study evaluates restatements in two ways. I examine the period of misstatement for the baseline level analysis and the date of restatement disclosure for the change analyses following reporting event disclosures.

weakness (restatement) disclosure and subsequent improvements in IAF competency, after controlling for other possible determinants of IAF competency and material weakness (restatement) disclosure. These associations are not found at a two- or three-year horizon, suggesting that firms immediately improve IAF competency in light of financial reporting failures. Further, I find that the improvement in IAF competency following material weakness disclosure is greater among firms with lower baseline IAF competency, but that there is no similar effect for restatements. I suggest that as restatement disclosures are relatively more severe compared to material weakness disclosures, restating firms work to improve IAF competency regardless of baseline competency levels.

Next, I perform a battery of robustness tests. First, I assess the sensitivity of results with the use of the individual IAF competency components and find generally consistent, albeit weaker, associations. I surmise that as IAFs can be stronger along some dimensions and weaker along others, it is more precise to use a multidimensional IAF competency measure rather than rely on the individual components. To further validate that the composite measure is not driven by a single component, I construct competency measures based on all combinations of three-component competency scores and observe consistent results. I additionally find that results remain consistent to using principal component analysis (PCA) to construct the competency score. To address a potential concern of self-selection to instate an in-house IAF function, I use a Heckman selection model and continue to observe similar results. Finally, as a falsification test, I find that changes in IAF competency are not associated with accruals, a less observable earnings quality metric that does not capture a distinct financial reporting event.

Further, I examine whether changes in IAF competency vary with characteristics of internal monitors already in place. To achieve this, I manually collect and analyze audit committee charters to assess their commitment towards the IAF. I conjecture that the audit committee's commitment towards the IAF can be measured based on the extent audit committees discuss the IAF in their charter. I find that following both material weakness and restatement disclosures, IAF competency increases only when audit committee commitment to the IAF is high. I further examine whether accounting expertise of the audit committee and the CFO moderates the increase in IAF competency. It is possible that experts will recognize the value of the IAF and be more willing to invest in its quality. In contrast, audit committees and CFOs with lesser accounting expertise may invest in stronger IAFs to overcome their knowledge shortcomings. Consistent with the latter, IAF competency increases only when audit committee accounting expertise is lower and when the CFO lacks accounting expertise following both disclosures.

This study contributes to the IAF literature in several ways. First, I utilize a new IAF competency measure developed from manually collected data from LinkedIn. Using LinkedIn allows us to start with an objective public company sample that I can collect individual-level, contemporary data for and easily match to other publicly available data sources. This is not afforded by previous IAF data sources. Second, I complement Lin et al. (2011) and Ege (2015) by demonstrating that higher IAF competency is associated with lower likelihood of material weaknesses and restatements, which helps to validate the composite measure and demonstrate the value-add of a competent IAF to financial reporting quality. Main results show that IAF competencies change after a material weakness and restatement disclosure. These findings are interesting because a priori it is

not clear that firms will change their IAF in response to a less severe financial reporting failure. Further, they suggest that despite the lack of regulatory oversight over the IAF, firms are nonetheless focused on its improvement.

Finally, I find variation in firms' reaction to material weakness and restatement disclosure that is dependent on firm attributes. Specifically, firms with higher audit committee commitment toward the IAF, lower audit committee accounting expertise, and no CFO accounting expertise are more likely to increase IAF competency after a financial reporting failure. These analyses suggest that these results are most likely not attributed to some spurious correlations between financial reporting quality and the IAF, as I would not have expected to find systematic variation in IAF changes that depend on firm characteristics. While I find that, even without regulation, firms recognize the importance of the IAF by improving IAF competency in reaction to ineffective monitoring, I suggest that regulation may still be necessary as not all firms are equally likely to increase IAF competency. For example, regulation requiring public companies to maintain an in-house IAF and to disclose function-level competency would allow for closer regulatory monitoring of competency characteristics and greater stakeholder salience to the function as it relates to financial reporting.²⁵

The rest of the paper is organized as follows. Section II reviews background information and literature about the IAF. Section III describes the hypotheses and Section

²⁵ Part III Item 10 of 10-k filings typically list and describe the directors, executive officers, and corporate governance of public companies. Regulatory disclosure over the IAF could include a detailed description of the CAE or summary statistics of IAF competency characteristics.

IV describes the data, sample, and models. Section V discusses results and I conclude in Section VI.

II. BACKGROUND & LITERATURE REVIEW

IAF's Role and Related Standards

The IAF is recognized as an important component of corporate governance that monitors operations by providing risk-based and objective assurance (Carcello, Eulerich, Masli, and Wood 2018; IIA 2017). The IAF conducts risk assessments, provides assurance over internal controls and financial reporting, and maintains compliance, all while reporting to the audit committee, interacting with management, and working alongside the external auditor (IIA 2003). Based on the IAF's "position" within the firm, the function has a unique ability to gather organizational information as direct insiders who are not bound by access to systems and personnel or by the requirements of generally accepted auditing standards (Sprakman 1997).

Professional standards echo the importance of IAF competency. The IIA's Attribute Standards 1130 and 1210 require the IAF to maintain independence and objectivity in performing their work as well as possess professional proficiency, knowledge, and skills in executing their responsibilities (IIA 2017). Competency and due professional care are necessary for internal auditors to evaluate and respond to fraud risk, significant risks of material misstatement, and governance, risk management, and control processes (IIA 2017). Trotman and Duncan's (2018) interview study confirm the importance of technical skills and experience as input attributes to their internal audit quality framework. Further, external auditing standards address the necessity of assessing IAF competency before relying on their work (PCAOB AS 2201.16-19; PCAOB AS

2605.09-11).²⁶ Competency measures that the auditor should document about IAF personnel include: education level, professional experience, and professional certification (PCAOB 2016b).

The IAF's risk assessment and internal controls testing signals its responsibility in maintaining financial reporting quality. However, despite SOX regulation, there are no SEC requirements that mandate IAF quality compared to the significant overhaul of firm governance rules (Ege 2015). Regulatory oversight is limited to New York Stock Exchange (NYSE) listed firms, which are required to have an IAF.²⁷ Thus, many publicly traded firms are not required to have an in-house IAF. Yet, anecdotally, deficiencies attributed to Toshiba's and Wells Fargo's IAFs contributed to the perpetration of fraudulent activity (The Japan News 2015; WSJ 2016). In contrast, WorldCom's IAF uncovered fraudulent activity that may have persisted otherwise (Pulliam and Solomon 2002). Despite the lack of regulatory oversight over the IAF, it appears that IAF competence plays an important role for firms seeking to increase monitoring effectiveness of their reporting process.

III. HYPOTHESIS DEVELOPMENT

Internal Audit Competency and Financial Reporting Quality

The IAF literature typically examines the relation between IAF quality and financial reporting quality and finds that higher quality IAFs are significantly related to lower earnings management behavior, through lower abnormal accruals and a lower

²⁶ Prior research has evaluated external audit fees in relation to the IAF. Prawitt et al. (2012) find direct assistance with (as opposed to reliance on) external auditing tasks lowers the unexpected audit fee, while Chen, Chung, Peters, and Wynn (2017) find that when IAF compensation is based on firm performance, audit fees are higher.

²⁷ Pursuant to the NYSE Listed Company Manual Section 303A.07 (NYSE 2018).

propensity to meet or beat analyst expectations (Prawitt et al. 2009; Abbott et al. 2016).²⁸ Lin et al. (2011) examine the association between IAF quality and the probability to disclose a material weakness and find limited evidence of an inverse association only for the education component of competency.²⁹ Similarly, Ege (2015) finds a negative association between IAF competency and management misconduct. The association between IAF competency and restatement has not been studied in the literature.³⁰ Following the general findings that IAF competency is associated with better financial reporting quality, I predict that greater IAF competency will be negatively associated with the propensity for material weakness or restatement. I propose the following baseline hypothesis to validate the competency measure:

H1: The propensity for material weakness or restatement is negatively associated with IAF competency.

Changes in Internal Audit Competency following Financial Reporting Failures

While prior research and professional standards demonstrate the importance of IAF competency to the financial reporting process, it is unclear whether firms will react to the disclosure of a material weakness or restatement by actively changing IAF competency. Since the IAF is not under regulatory scrutiny, firms may choose to change the composition of other functions that monitor financial reporting. For example, firms can increase the

²⁸ IAF quality in the literature is typically a measure composed of competency attributes (e.g. experience, certification, education, training hours), objectivity measures (e.g. management training ground status; independent reporting channel to the audit committee), and IAF investment (e.g. size), usually based on the IIA GAIN Benchmarking Tool. Herein, I focus only on IAF competency measures (Prawitt et al. 2009, Lin et al. 2011, Messier et al. 2011, Prawitt et al. 2011, Ege 2015, and Pizzini, Lin, and Ziegenfuss 2015).

²⁹ Lin et al. (2011) do not utilize a composite IAF measure which may explain their weaker results.

³⁰ Lin et al. (2011) and Pizzini et al. (2015) are the only IAF studies that consider restatement as a control variable.

quality of their audit committee, hire a CFO with accounting expertise, or hire a new external auditor, as these parties are heavily regulated (Goh 2009; Johnstone et al. 2011; Ettredge et al. 2011; Srinivasan 2005; Agrawal and Cooper 2017; Hennes et al. 2014). Further, changes to the audit committee, management, and external auditor are externally visible to shareholders, who may be concerned with the disclosure. Firms that wish to appease shareholders may choose to respond by making changes to these visible parties.

In addition, since no study has examined whether firms change their IAF in response to a less severe signal of financial reporting failure, it is possible that material weakness or restatement disclosures are not salient enough to warrant a change to the IAF. In contrast, financial fraud, which is a relatively rare but highly salient event, can lead to substantial changes. Indeed, Ege (2015) provides evidence that firms react to this egregious financial reporting failure by improving IAF competency. Nevertheless, while less severe than fraud, material weakness or restatement disclosures also have adverse consequences. For example, material weakness disclosure results in higher audit fees, negative market reactions, and lower CFO compensation (Hoitash et al. 2008; Hammersley et al. 2008; Hoitash et al. 2012). Similarly, restatement disclosure leads to higher executive turnover, audit committee turnover, and external audit fees, as well as a negative market reaction (Leone and Liu 2010; Srinivasan 2005; Hoitash et al. 2008; Palmrose et al. 2004). Therefore, firms have personal incentives to avoid further financial reporting mishaps, which may lead them to enhance IAF competency. I formulate this prediction in the following hypothesis:

H2: IAF competency will increase following the disclosure of a MW or restatement.

Audit Committee and CFO Characteristics and Changes in Internal Audit Competency

Since the audit committee and the CFO have the most influence over IAF composition, I develop hypotheses that examine whether changes to the IAF vary based on audit committee commitment to the IAF, audit committee accounting expertise, and CFO accounting expertise.

Audit Committee Commitment. The audit committee represents a subset of the board of directors that is directly responsible for providing oversight over financial reporting, internal control, audit, and compliance processes (SEC 2003a). The audit committee is responsible for overseeing employment decisions related to the IAF and providing a direct reporting line to the function, and thus can influence IAF competency (SEC 2003a; PCAOB 2016b). Therefore, I first examine the commitment of the audit committee toward monitoring the IAF.

Due to lack of data availability, prior research namely uses surveys to understand the working relationship between audit committee members and IAF personnel (Raghunandan, Read, and Rama 2001; Carcello, Hermanson, and Raghunandan 2005; Eulerich, Velte, and Theis 2015). Innovatively, Carcello, Hermanson, and Neal (2002) examine publicly available audit committee charters and document the propensity of eight IAF-related voluntary disclosures within the charter of 150 listed firms, finding variation in how firms disclose monitoring activities over the IAF.³¹ While larger, NYSE-listed, and

³¹ Carcello et al. (2002) report the propensity of audit committee reviews of IAF personnel decisions, assessments of IAF independence, private meetings with the IAF, unrestricted access to the IAF, reviews of IAF scope, procedures/plans, and results, and coordination of effort between the IAF and external audit function.

banking firms are associated with greater voluntary IAF-related disclosure, the authors do not examine whether greater IAF-related disclosures in the charter results in higher monitoring accountability over the IAF. Burke, Hoitash, and Hoitash (2019) address this question in a different context and find that sustainability board committees that explicitly claim responsibility over specific dimensions of corporate social responsibilities in their charters perform better along these dimensions. Taken together, voluntary disclosure of IAF activities in the audit committee charter may signal greater audit committee commitment towards the IAF, resulting in greater improvement to IAF competency after a reporting event. I formulate this prediction in the following hypothesis:

H3a: Following a material weakness or restatement disclosure, IAF competency increases to a greater extent in firms with higher audit committee commitment to the IAF.

Audit Committee Accounting Expertise. Regulation requires the audit committee to have at least one financial expert, defined as having either a direct financial background, such as auditors and CFOs, or an indirect financial background, such as CEOs who have a supervisory role over the financial reporting process (SEC 2003b). Extensive literature has shown that the former category, defined as accounting expert, is mainly effective in improving financial reporting quality (e.g., Hoitash, Hoitash, and Bedard 2009). This literature finds higher audit committee accounting expertise is associated with a lower likelihood of material weakness and restatement disclosure, less earnings management, and importantly has demonstrated that audit committee accounting expertise typically demands higher audit quality (Hoitash and Hoitash 2009; Zhang, Zhou and Zhou 2007; Krishnan 2005; Abbott, Parker, and Peters 2004). Thus, if firms with higher audit committee

accounting expertise experience a FRQ failure, those committees will likely be willing to invest in the IAF to a greater extent and improve its competency.

On the other hand, firms with lower audit committee accounting expertise that experience a reporting failure may have incentive to compensate for their lack of requisite accounting knowledge by surrounding themselves with high quality monitors at the IAF-level. The external auditing literature finds that audit teams frequently rely on the expertise of specialists as part of the engagement in order to improve audit quality (Cannon and Bedard 2017; Griffith, Hammersley, and Kadous 2015; Hux 2017). For example, Griffith et al. (2015) find that insufficient auditor valuation knowledge around complex fair value measurements prompts the use of valuation specialists, while Canon and Bedard (2017) find the use of valuation specialists for fair value estimation increases problem identification. Similarly, Dhaliwal, Naiker, and Navissi (2010) find that the addition of accounting experts to an audit committee that possesses supervisory experts (e.g. finance experts) improves accruals quality due to the complementary skill sets of accounting knowledge and business acumen. Audit committees with less accounting expertise may therefore recognize a need for IAF competency to improve in order to bolster monitoring after a material weakness or restatement disclosure. I formulate this prediction in the following null hypothesis.

H3b: Following a material weakness or restatement disclosure, IAF competency increases are moderated by the level of audit committee accounting expertise.

CFO Accounting Expertise. Public company CFOs are directly responsible for the financial reporting process. Per SOX regulation, the CFO must certify the financial statements and the effectiveness of internal controls. Research finds that CFOs are held accountable for financial reporting mishaps. CFOs are more likely to leave their firms or suffer a bonus compensation decrease following a material weakness disclosure (Johnstone et al. 2011; Hoitash et al. 2012). CFO turnover is also higher following a restatement disclosure (Leone and Liu 2010). Together, these findings suggest that CFOs have personal incentives to avoid reporting issues.

CFOs with accounting expertise are associated with a lower likelihood to disclose material weaknesses and restatements (Li et al. 2010; Aier, Comprix, Gunlock, and Lee 2005; Hoitash, Hoitash, and Kurt 2016). Firms focused on monitoring are more likely to recruit CFOs with an accounting background, and these CFOs are likely to focus on their financial reporting role as their performance evaluation is most likely tied to financial reporting quality. Therefore, CFOs with accounting backgrounds may be willing to invest more in IAF competency following a reporting event. In contrast, CFOs with no accounting expertise are more likely to experience financial restatements (e.g., Aier et al. 2005), and may suffer personal costs as a result of poor reporting. CFOs with no accounting expertise, similar to audit committees with lower accounting expertise, may recognize that they are not as able to monitor the financial reporting process, and therefore are likely to strengthen their supporting cast by increasing IAF competency. I formulate these contrasting predictions in the following null hypothesis.

H3c: Following a material weakness or restatement disclosure, IAF competency increases are moderated by the level of CFO accounting expertise.

IV. RESEARCH DESIGN

Sample

I started with an S&P 600 index dataset (a merge of Compustat and Audit Analytics), containing 6,320 firm-year observations of 982 firms from 2010-2015 (p. 20-23).³² I eliminated missing audit-related observations and excluded financial firms (SIC code 6000-6999), yielding a final sample of 3,616 firm-year observations of 600 firms from 2010-2015. I focus on the sample period 2010-2015 as material weakness and restatement disclosures are not as prevalent in a current setting compared to the early implementation years of SOX regulation. For example, Lin et al (2011) find that 21 (70.6) percent of sample firms disclosed at least one material weakness (restatement) from 2004-2006 (2001-2005).³³ I find that 17.2 (14.9) percent of sample firms disclosed at least one material weakness (restatement) from 2010-2015, a six-year period.³⁴

I then hand-collected IAF personnel data for the 600 sample firms from LinkedIn, yielding 19,544 individual-year observations for 2,606 IAF employees. Please refer to Chapter One for detailed discussion about the data collection protocol. After aggregating the IAF personnel data at the firm level, I merged the data with the S&P 600 index data, as well as with additional data from SeekINF, BoardEx, and hand-collected audit committee charters. I dropped firm-year observations where IAF size is equal to zero and eliminated observations with missing audit committee, management, auditor, and firm characteristics.

³² The S&P 600 index represents small-cap US equity market firms valuing from US \$0.4-1.8 billion (S&P 2016).

³³ Previous GAIN research largely focuses on the pre- and early-SOX periods (2000-2005).

³⁴ I also focus on the sample period 2010-2015 as LinkedIn did not start achieving rapid growth through 2010, creating a risk that IAF personnel who were near retirement or newly retired never created a profile in pre-2010 years.

I winsorized all continuous variable at the 1st and 99th percentiles. The final sample is 2,138 firm-year observations of 437 S&P 600 firms from 2010-2015.

Data

I hand-collected individual IAF employee data from LinkedIn, specifically for competencies related to past and current employment history, educational background, and professional certifications (PCAOB 2016a; p. 20-23).³⁵ I find LinkedIn to be a viable source for this data as business professionals are likely to utilize this professional networking platform and previous IAF-related research is limited by the lack of publicly available information about IAF employees (p. 17-20). I collected audit committee and management data from BoardEx for each sample firm.

IAF Competency Measure

Per Chapter One, I utilize a composite IAF competency measure considering prior research and PCAOB AS 2605.09. There are four overarching dimensions of IAF competency: experience, certification, education, and size. Experience is comprised of three variables: (1) the average number of years of internal auditing experience at the target firm (*IAF_EXP_TENURE*),³⁶ (2) the count of internal auditors who have previous Big 4 public accounting experience (*IAF_EXP_BIG4*), and (3) the count of internal auditors who have previous Midtier (*IAF_EXP_MIDTIER*) public accounting experience.³⁷ Certification

³⁵ Per the IIA's Attribute Standard 1210, IAF personnel need to possess professional proficiency, knowledge, and skills in executing their responsibilities (IIA 2017). Similarly, PCAOB Auditing Standards (AS) 2210 & 2605 address competency measures that the external auditor should document about IAF personnel, including education level, professional experience, and professional certification (PCAOB 2016a; PCAOB 2016b).

³⁶ This measurement is consistent with Prawitt et al. (2009) and Ege (2015).

³⁷ Big 4 firms are defined as Deloitte, PwC, KPMG, EY, and Arthur Anderson. Midtier firms are defined as RSM, GT, BDO, and CBIZ.

represents four variables: the count of internal auditors who have CPA, CIA, CFE, or CISA designations (*IAF_CERT_CPA*, *IAF_CERT_CIA*, *IAF_CERT_CFE*, and *IAF_CERT_CISA*). Education encompasses two variables including the count of internal auditors who have an accounting degree at the undergraduate or graduate level (*IAF_EDU_UGACC*, *IAF_EDU_MSA*).³⁸ Lastly, size proxies for IAF investment and is based on the number of IAF employees, scaled by firm size (*IAF_SIZE_SCALED*).

Each characteristic is assigned an indicator variable equal to one if the competency measure is greater than or equal to the median value by fiscal year, and zero otherwise, which are subsequently summed into the four distinct IAF competency components described above, i.e., experience (*IAF_EXP*), certification (*IAF_CERT*), education (*IAF_EDU*), and size (*IAF_SIZE_SCALED*). Each component is dichotomized at the median and indicator variables are created equal to one if the competency component is greater than or equal to the median; zero otherwise. The four competency component indicators are summed for the composite measure, ranging from zero to four (*IAF_COMP*), with higher values representing higher IAF competency. As robustness for the baseline analysis, I also calculated an industry-year competency score by dichotomizing each of the ten competency measures at the median by fiscal year and two-digit SIC industry code and then following the remainder of the above procedure (*IAF_COMP_IND*).

Multivariate Models

To test the relation between the propensity of material weakness (restatement) and IAF competence (H1), I specify the following logistic regression models:

³⁸ Degree-related data proxies for ability (Lin et al. 2011).

$$\begin{aligned}
MW = & \beta_0 + \beta_1 IAF_COMP_IND + \beta_2 RESTATE + \beta_3 LNASSETS + \beta_4 BM + \beta_5 LEV \\
& + \beta_6 INVREC + \beta_7 LNSEGMENTS + \beta_8 CFO + \beta_9 LNAUDFEE + \beta_{10} ROA + \\
& \beta_{11} BOARDINDEX + \beta_{12} FOREIGN + \beta_{13} BIG4 + \beta_{14} AUDCHG + \beta_{15} LASTYRCFO \\
& + \beta_{16} IndustryFE + \beta_{17} YearFE + \mathcal{E}
\end{aligned} \quad (1)$$

$$\begin{aligned}
RESTATE = & \beta_0 + \beta_1 IAF_COMP_IND + \beta_2 MW + \beta_3 LNASSETS + \beta_4 BM + \\
& \beta_5 SALES GROWTH + \beta_6 LEV + \beta_7 LNSEGMENTS + \beta_8 LNAUDFEE + \beta_9 ROA + \\
& \beta_{10} BOARDINDEX + \beta_{11} FOREIGN + \beta_{12} BIG4 + \beta_{13} AUDCHG + \beta_{14} LASTYRCFO \\
& + \beta_{15} ACQ + \beta_{16} LIT + \beta_{17} IndustryFE + \beta_{18} YearFE + \mathcal{E}
\end{aligned} \quad (2)$$

The dependent variable *MW* in Equation (1) captures whether the target firm disclosed a material weakness under SOX Section 302 and/or Section 404 in year *t*. The dependent variable *RESTATE* in Equation (2) captures whether the target firm restated its financial statements for year *t*. The variables of interest in both equations (*IAF_COMP*; *IAF_COMP_IND*) capture the level of IAF competence. A positive and significant coefficient on β_1 would support H1. Following previous literature (e.g. Ge and McVay 2005; Ashbaugh-Skaife, Collins, Kinney, and LaFond 2009; Hoitash et al. 2009; Ogneva, Raghunandan, and Subramanyam 2007), I control for the following determinants of material weakness disclosure in Equation (1): firm size (*LNASSETS*), book-to-market ratio (*BM*), leverage (*LEV*), asset efficiency (*INVREC*), number of segments (*LNSEGMENTS*), volatility (*CFO*), audit fees (*LNAUDFEE*), profitability (*ROA*), foreign operations (*FOREIGN*), Big 4 auditor (*BIG4*), and auditor change (*AUDCHG*).

To control for determinants of restatements, and following previous literature (e.g. Gal-Or et al. 2018), Equation (2) includes *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *FOREIGN*, *BIG4*, sales growth (*SALES GROWTH*), merger and acquisition (M&A) activity (*ACQ*), and litigious industries (*LIT*). In both equations, I control for the reporting environment. I create an index representative of board size, board

independence, and board tenure (*BOARDINDEX*) and consider whether the firm-year is the last year of the CFO's tenure (*LASTYRCFO*). See Table 2.1 for detailed variable descriptions.

[INSERT TABLE 2.1 HERE]

To test the relation between material weakness and restatement disclosure and a subsequent change in IAF competency (H2), I specify the following OLS regression models:

$$\begin{aligned} \Delta IAF_COMP = & \beta_0 + \beta_1 LAGMW + \beta_2 LAGIAFBASE + \beta_3 \Delta LNASSETS + \beta_4 \Delta BM + \\ & \beta_5 \Delta LEV + \beta_6 \Delta INVREC + \beta_7 \Delta LNSEGMENTS + \beta_8 \Delta CFO + \beta_9 \Delta LNAUDFEE + \\ & \beta_{10} \Delta ROA + \beta_{11} \Delta BOARDINDEX + \beta_{12} FOREIGN + \beta_{13} BIG4 + \beta_{14} AUDCHG + \\ & \beta_{15} NEWCFO + \beta_{15} IndustryFE + \beta_{16} YearFE + \mathcal{E} \end{aligned} \quad (3)$$

$$\begin{aligned} \Delta IAF_COMP = & \beta_0 + \beta_1 LAGRESTDISC + \beta_2 LAGIAFBASE + \beta_3 \Delta LNASSETS + \\ & \beta_4 \Delta BM + \beta_5 \Delta SALES GROWTH + \beta_6 \Delta LEV + \beta_7 \Delta LNSEGMENTS + \beta_8 \Delta LNAUDFEE \\ & + \beta_9 \Delta ROA + \beta_{10} \Delta BOARDINDEX + \beta_{11} FOREIGN + \beta_{12} BIG4 + \beta_{13} AUDCHG + \\ & \beta_{14} NEWCFO + \beta_{15} ACQ + \beta_{16} LIT + \beta_{17} IndustryFE + \beta_{18} YearFE + \mathcal{E} \end{aligned} \quad (4)$$

The dependent variable for both equations is the change in IAF competency (*ΔIAF_COMP*), with higher values indicating greater change in IAF competency. I utilize a change model to not only observe the effect of a financial reporting event on IAF competency, but also to isolate the potential endogenous effects of IAF competency influencing financial reporting events. The variable of interest in Equation (3), *LAGMW*, captures whether the target firm disclosed a material weakness under SOX Section 302 and/or Section 404 in year *t-1*. The variable of interest in Equation (4), *LAGRESTDISC*, captures whether the target firm disclosed a restatement in year *t-1*. I employ lagged variables of interest in order to test for reverse causality to provide evidence that the

historical MW or restatement disclosure is what is driving the change to IAF competency. A positive and significant coefficient on β_1 in each equation would support H2.

To test H3, I consider high/low audit committee commitment towards the IAF (H3a), high/low audit committee accounting expertise (H3b), and high/low CFO expertise (H3c). To capture audit committee commitment toward the IAF, I manually collected the most recent audit committee charter from each sample firm's Web site. For H3a, I partition the sample by audit committee commitment and code *ACCOMMIT* equal to one if the number of times "internal audit" is mentioned in the audit committee charter is greater than the sample median, and zero otherwise. H3b partitions the sample by audit committee accounting expertise, where *ACEXP* is equal to one for firms wherein the percentage of accounting experts on the audit committee is greater than the median, and zero otherwise.³⁹ H3c partitions the sample by CFO expertise. *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification or previous auditing experience, and zero otherwise (Li, Sun, and Ettredge 2010; Bedard, Hoitash, and Hoitash 2014).

In addition to the common control variables (measured as the year-over-year change), Equations (3) and (4) also control for the lagged, baseline value of IAF competency. *LAGIAFBASE* is equal to negative one if *IAF_COMP* is in the top quartile for the previous firm-year, and zero otherwise.⁴⁰ All models additionally control for 2-digit SIC industry and year fixed effects (Prawitt et al. 2009; Anderson, Christ, Johnstone, and Rittenberg 2012; Ege 2015; Abbott et al. 2016). I cluster standard errors at the firm level.

V. RESULTS

³⁹ Consistent with the generally accepted definition of accounting financial expertise, an audit committee member is considered to be an accounting financial expert if they has direct experience in either financial statement preparation or auditing (Cohen, Hoitash, Krishnamoorthy, and Wright 2014).

⁴⁰ For ease of interpretation, *LAGIAFBASE* is inversely coded.

Descriptive Statistics

Table 2.2 presents the descriptive statistics of the model variables. The main IAF competency measure (*IAF_COMP*) ranges from zero to four with a mean (median) of 2.55 (3.0). The additional IAF competency measure (*IAF_COMP_IND*) ranges from zero to four with a mean (median) of 2.65 (3.0). The propensity of material weakness (restatement) disclosure in the sample is approximately 6 (3.6) percent. Misstatements occur for 7.1 percent of firm-years observations. Average total assets are \$1.1 billion, consistent with the sample covering S&P 600 index firms. The remaining descriptive are listed in the table and are consistent with the S&P 600 sample.

[INSERT TABLE 2.2 HERE]

Table 2.3 presents Pearson correlations of common variables among the logistic and OLS regression models. As predicted, *IAF_COMP* is significantly, negatively correlated with *MW*, *RESTATE*, and *RESTDISC*. *IAF_COMP* is positively correlated with firm size, leverage, segments, audit fees, board quality, and engaging with a Big 4 auditor, suggesting that more complex firms have better IAF competency. *IAF_COMP* is negatively correlated with the book-to-market ratio and external auditor changes, suggesting that firms with uncertain operation are less likely to invest in IAF competency.

[INSERT TABLE 2.3 HERE]

Multivariate Analysis

Effect of IAF Competency on Financial Reporting Events

Table 2.4 Panel A tests H1 using Equation (1). Both measures of IAF competency are inversely associated to the propensity of material weakness in Columns 1 and 3. These results are economically meaningful, as the average marginal effects are significant in Columns 2 and 4. Per Column 2, a firm with IAF competency one standard deviation above the mean is approximately 2.0 percent less likely to report a material weakness compared to firms with average competency, or a 33.3 percent decrease relative to the unconditional probability of material weakness of 5.9 percent.⁴¹ This result expands Lin et al.'s (2011) finding that documents a negative association between material weakness and IAF education only. Consistent with prior literature, material weakness is positively associated with restatement, cash flow volatility, audit fees, and auditor changes, and negatively associated with firm size, book-to-market, complexity, and performance.

[INSERT TABLE 2.4 HERE]

Table 2.4 Panel B tests H1 using Equation (2).⁴² Both measures of IAF competency are negatively associated with restatements in Columns 1 and 3, and the average marginal effects are significant in Columns 2 and 4. Per Column 2, a one standard deviation increase in IAF competency above the mean is associated with a 2.2 percent decline in the likelihood of a misstatement, representing a 31.3 percent decline relative to the 7.1 percent unconditional probability of misstatement in the sample. This result has not been previously reported in the literature. Consistent with prior research, restatement is

⁴¹ Following Ege (2015), I calculate the marginal effect of the change in likelihood of material weakness (restatement) by multiplying the coefficient on *IAF_COMP* in Panel A (Panel B) Column 2 by the standard deviation of *IAF_COMP*.

⁴² The degrees of freedom difference from Panel A to Panel B is due to perfect prediction of industry fixed effects.

positively associated with material weakness, book-to-market, and firm complexity, and negatively associated with M&A activity.⁴³

Collectively, the results for H1 suggest that IAF competency plays a meaningful role in mitigating financial reporting failures.^{44,45,46} Interestingly, the marginal effects analysis for both models yield similar findings to Ege (2015), who finds that firms with IAF quality one standard deviation above the mean are 2.3 percent less likely to have management misconduct. These complementary results extend Ege's (2015) findings and suggest that the development of high IAF competency works to deter financial reporting issues across varying levels of egregiousness.

Effect of Financial Reporting Events on Changes to IAF Competency

Table 2.5 Panel A presents the test of H2 using Equation (3). Consistent with H2, *LAGMW* in Column 1 is positive and significant, suggesting that firms improve IAF competence in the year following a material weakness disclosure. Economic significance shows that a firm, on average, increases IAF competency by 6.5 percent after disclosing a

⁴³ I acknowledge the test of IAF competence on restatement occurrence does not yield significance across many control measures in the model. I remove *RESTATE* in Equation (1) and *MW* in Equation (2) in order to address concerns of collinearity between the events. Untabulated results are robust to the test of H1.

⁴⁴ I refit Equations (1) and (2) as ordinal logistic regressions to calculate the effect of changing IAF competency on an ordinal scale and find that results are robust to the logistic regression models discussed herein.

⁴⁵ To address concerns that I am losing rich data by dichotomizing continuous variables to measure *IAF_COMP*, I alternatively standardize all ten measures of IAF competence in order to observe all characteristics on the same scale, average the standardized scores per IAF competence dimension, and sum together to create a new composite score. I estimate Equations (1) and (2) using this new measure and find consistent results supporting H1.

⁴⁶ I likewise consider the effect of correlated omitted variables related to audit committee commitment, audit committee size, audit committee and CFO expertise, and auditor changes to the models. Adding these measures as control variables to Equation (1) do not change the inferences or yield significant control results. The result is robust in Equation (2) along with a negative and significant result for CFO expertise, suggesting that higher CFO expertise leads to lower restatement propensity.

material weakness.⁴⁷ Despite the lack of regulatory oversight over the IAF, firms choose to respond to a material weakness disclosure by improving this internal monitoring mechanism, suggesting that firms recognize the IAF can help mitigate control deficiencies. Interestingly, this significant association is not found at a two or three year horizon (untabulated), signaling that firms take immediate action to improve IAF competency following a material weakness disclosure. In Column 2, I interact *LAGMW* with *LAGIAFBASE*. Firms with lower baseline competency further recognize the need to improve their IAF, and on average, improve competency by 19.7 percent after disclosing a material weakness.

Table 2.5 Panel B presents the test of H2 using Equation (4). *LAGRESTDISC* in Column 1 is positive and significant, supporting H2. Firms increase IAF competency by an average of 7.9 percent following a restatement disclosure. Again, this significant association is not found at a two or three year horizon (untabulated), suggesting promptness in addressing failures. Column 2 interacts *LAGRESTDISC* with *LAGIAFBASE*. There is no interaction effect for restatement, potentially due to the relative severity of restatement versus material weakness disclosure. That is, restatements are a clear indication of financial reporting failure that has widespread implications over financial reporting quality, compared to material weakness disclosures which can be limited to more isolated internal control issues. The lack of result may suggest that following a restatement, most firms increase IAF competency regardless of baseline competency.⁴⁸

⁴⁷ To approximate the economic effect of an IAF competency change for firms on average, the coefficient on *LAGMW* is divided by the mean *IAF_COMP*. This procedure is followed for *LAGRESTDISC* and for interactions.

⁴⁸ Again, I consider the effect of correlated omitted variables related to audit committee commitment, audit committee size, audit committee and CFO expertise, and auditor changes to the models. The test of H2

[INSERT TABLE 2.5 HERE]

To provide additional understanding of the restatement interaction results, I test the effect of material weakness disclosure persistence on changes to IAF competency. Material weakness persistence over consecutive years should prompt firms to take stronger action to increase IAF competency compared to a one-time disclosure, as persistence signals a failure to remediate the problem. Material weakness persistence may spur negative reputational effects due to concerns about financial reporting reliability (Hammersley et al. 2012). Bedard, Hoitash, Hoitash, and Westermann (2012) find that failure to remediate a material weakness is associated with increased abnormal accruals. Persistence should signal to firms the need for remediation in order to avoid costs associated with lingering reporting problems.

I predict that material weakness disclosure persistence over a two-year period for firms is positively associated with a subsequent change in IAF competence. I also predict that there will be no interaction effect, echoing the restatement results, as material weakness disclosure persistence is a relatively severe failure where all firms, on average, will work to improve IAF competence. To test this association, I substitute the variable of interest in Equation (3) with the indicator *LAGMWPERSIST*, which equals one if a material weakness disclosure in year *t-2* is not remedied in year *t-1* or zero otherwise. I further interact *LAGMWPERSIST* and *LAGIAFBASE*. Table 2.5 Panel C provides results of this analysis. Consistent with the predictions, the coefficient on *MWPERSIST* in Columns 1 and 2 is positive and significant, suggesting that material weakness persistence prompts

holds by adding these variables as controls to Equations (3) and (4); further, these variables are not significant in the models.

firms to increase IAF competency by 13.9 percent on average. However, Column 2 finds no interaction effect, suggesting that material weakness persistence is a financial reporting event that prompts change to IAF competency regardless of the base competency level.

Audit Committee and CFO Characteristics and Changes in Internal Audit Competency

Audit Committee Commitment. Table 2.6 presents results for H3a for audit committee commitment (*ACCOMMIT*), proxied by IAF disclosures in the audit committee charter. Panel A (Panel B) shows that *LAGMW* (*LAGRESTDISC*) is positive and significant only among firms with higher audit committee commitment (Column 2). Firms improve IAF competency by 17.3 (13.2) percent, on average, following a material weakness (restatement) disclosure.⁴⁹ Together, these results suggest that firms with higher audit committee commitment toward IAF monitoring are more dedicated to improving the IAF in light of a failure.

[INSERT TABLE 2.6 HERE]

Audit Committee and CFO Accounting Expertise. Table 2.7 provides results for testing H3b and H3c, partitioning the sample by *ACEXPERT* and *CFOEXPERT*. Table 2.7 Panel A provides results for material weakness disclosure. *LAGMW* is positive and significant, only among firms with lower audit committee accounting expertise (Column 1), suggesting an improvement of IAF competency of 15.8 percent, on average, following a material weakness disclosure. Consistently, *LAGMW* is positive and significant, only among firms with no CFO accounting expertise (Column 3), representing an average

⁴⁹ The results remain consistent when only considering the firm-year in which the audit committee charter was collected. Further, results are consistent in backfilling the IAF disclosures to sample firm-years before the audit committee charter date.

increase of 12.0 percent in IAF competency following a material weakness disclosure. This evidence is consistent with the CFO's direct responsibility for the financial reporting process. Firms with lower audit committee accounting expertise and no CFO accounting expertise work to improve IAF competency in recognition of the limitations of their monitoring abilities. In both cases, improving IAF competency will help to mediate the knowledge gap that exists at the audit committee and CFO levels in order to move forward.

Table 2.7 Panel B provides results for restatement disclosure. *LAGRESTDISC* in Columns 1 and 3 are both positive and significant, consistent with both H3b and H3c. Following a restatement disclosure, firms are likely to improve IAF competency when they have lower audit committee or no CFO accounting expertise by 11.7 and 9.4 percent, respectively. These results echo earlier findings, and overall demonstrate that audit committee and management personnel who lack substantive accounting knowledge seek to improve IAF competence in order to bolster lower-level monitoring and to prevent future reporting issues.

[INSERT TABLE 2.7 HERE]

Additional Analysis and Robustness

Multidimensional Components Analysis. I develop a composite measure of IAF competency not only to align with prior literature, but also to recognize that while firms can have strong IAF competency along some dimensions, they can be weaker along others. Past research suggests that focusing discretely on one competency component may disregard employees' combination of competencies across various dimensions (Hoang, Abeysekera, and Ma 2018). To investigate, I first re-estimate Equations (1)-(4) using each

of the four IAF competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) instead of the composite IAF competency score. Table 2.8 presents these results. Panel A re-estimates the level analyses, showing that the education and size components have an inverse relationship with the financial reporting event. Panels B and C re-estimate the change analyses. Material weakness disclosure prompts changes to certification, education, and size when baseline IAF competency is low.⁵⁰ Restatement disclosure prompts change to certification. Overall, results are weaker compared to the main test results, which suggests that leveraging a composite measure may better underscore the multidimensionality of the IAF competency construct. To further examine whether any one component is driving the results of the main hypothesis tests, I recalculate *IAF_COMP* four times with each new measure excluding one of the four competency components.⁵¹

[INSERT TABLE 2.8 HERE]

Table 2.9 presents results of re-estimating Equations (1)-(4) using the combination of measures that rely on three components. I find that results across both analysis types for both outcome measures are robust, thus demonstrating that the combination of the four competency components, rather than any single, is important and work in tandem to create a more reliable measure of IAF competency.

[INSERT TABLE 2.9 HERE]

⁵⁰ As the R^2 for Columns 1 and 2 are negative, I do not interpret these results as the model is not consistently reliable compared to the other components in Columns 3-8. I reserve the same judgment for Panel D as well.

⁵¹ The four three-component variables are as follows: *IAF_COMP_EXPCERTEDU* excludes *IAF_SIZE*; *IAF_COMP_EXPCERTSIZE* excludes *IAF_EDU*, *IAF_COMP_EXPEDUSIZE* excludes *IAF_CERT*, and *IAF_COMP_CERTEDUSIZE* excludes *IAF_EXP*.

Principal Components Analysis. Similar to Ege (2015), I create a measure of IAF competency by using a principal component factor analysis. I use the IAF competency component scores (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*), and identify one factor with eigenvalue greater than 1, which collectively explains 50.6 percent of the underlying variance. This factor is positively associated with certification, education, and size, and not associated with experience. Untabulated results of Equation (3) and (4) are consistent with Table 2.4 Panel A and B as well as Table 2.9 Panel C and D results for material weakness and restatement disclosure: IAF competency improves after a material weakness disclosure, and additionally improves when baseline IAF is lower (both $p < 0.05$), while IAF competency improves after a restatement disclosure, regardless of the baseline level of IAF competency ($p < 0.10$). These results corroborate earlier findings and help validate the measurement of IAF competency.

Falsification Test. To ensure that the association between a reporting event and subsequent changes in IAF competence is specific to the IAF's delineated responsibility toward monitoring financial reporting quality, I re-estimate Equation (3), substituting the variable of interest with $\Delta DACC$, which is the change in absolute value of performance-adjusted discretionary accruals (Kothari, Leone, and Wasley 2005). While previous studies find that higher IAF quality deters earnings management behavior via abnormal accruals, there is no expectation that higher levels of discretionary accrual activity, which is not directly observable by stakeholders, will prompt firms to change IAF competence composition compared to publicly visible events, such as material weakness and restatement disclosures (Prawitt et al. 2012; Abbott et al. 2016; Gal-Or et al. 2018). I partition the sample by the highest quartile of performance-adjusted discretionary accruals

to most closely elicit an accruals “event” (*DACC_QRT*). Table 2.10 presents the results of this analysis. Column 1 presents the model for discretionary accruals in the lower three quartiles and Column 2 presents the model for discretionary accruals in the top quartile. In both estimations, changes in the level of discretionary accruals are not associated with a subsequent change in IAF competence, demonstrating that changes to IAF competence are aligned with the IAF’s responsibility of oversight over financial reporting quality.

[INSERT TABLE 2.10 HERE]

Endogeneity Concerns. Estimating associations between IAF competency and financial reporting events may suffer from correlated omitted variables that influence both the likelihood to invest in the IAF and financial reporting quality. To combat this potential concern, the main models utilize a change analysis and examine how a financial reporting event influence changes to IAF competency. Further, to control for reverse causality, the main models also utilize lagged independent variables. I also consider selection bias to assuage concerns that results are not biased by unobservable factors that influence the choice to have an in-house IAF. I perform a Heckman two-step selection model for the main test analysis of H2 using Equations (3) and (4). As not all public firms are required to have an IAF, the first stage estimates the decision to instate an in-house IAF function. I expect that larger, riskier, complex, and those with higher audit production cost are more likely to instate an in-house IAF.⁵² Untabulated results indicate that the Inverse Mills Ratio is significant, suggesting there is a selection issue. Nevertheless, in the second-stage

⁵² I proxy firm size (*LNASSETS*), leverage (*LEVERAGE*), sales growth (*SALESGROWTH*), cash flow volatility (*CFO*), litigious industries (*LIT*), asset efficiency (*INVREC*), segments (*LNSEGMENTS*), foreign operations (*FOREIGN*), audit fees (*LNAUDFEE*), and Big 4 auditor (*BIG4*) for these firm characteristics, respectively.

estimation the main variables of interest *LAGMW* and *LAGRESTATE* continue to exhibit consistent results ($p < 0.05$ for both).⁵³

VI. CONCLUSION

In this study, I use longitudinal resume data from LinkedIn about IAF employees in order to test for the association between material weakness and restatement disclosures and a subsequent change in IAF competency. Despite the IAF's critical role in monitoring financial reporting there is a lack of regulatory standards around IAF competence. As a result, it is not clear whether firms will make changes to the IAF in response to a financial reporting failure. Similarly, data constraints have limited research in investigating how the IAF changes over multiple reporting periods. I find that both material weakness and restatements are inversely associated with a composite measure of IAF competence and that material weakness and restatement disclosures are positively associated with subsequent improvements to the IAF. Firms with a lower baseline IAF competence are more likely to improve in the case of material weakness disclosure. These results suggest that firms are responding to the failure by directly addressing IAF competence, thus recognizing IAF's key monitoring role as well as working to mitigate further financial reporting issues.

I find that firms with higher audit committee commitment toward the IAF, lower audit committee accounting expertise, and lower CFO accounting expertise are more likely to increase IAF competence after a material weakness or restatement disclosure. Taken together, it appears that firms are recognizing the need to enhance IAF competence in light of reporting failures, specifically for those firms that have greater incentive for IAF to assist

⁵³ Results consistent across MLE, MLE with robust clustered standard errors, and two-step estimations.

with higher level monitoring. These results suggest that regulators can consider ways to monitor and require high quality IAF competence in order to mitigate future reporting issues.

There are several limitations to this study. First, as the sample is limited to S&P 600 index firms, which was used to capture variation in financial, audit, and corporate governance risk, results may not be generalizable to all public companies. As larger public firms may not experience financial reporting failures as frequently, they may not face the need to address IAF competence in the same manner as smaller firms. Second, the use of LinkedIn resume data may lead to incomplete or inaccurate data collection. I restricted data analysis in the main tests to more recent years and I verified observable profile information to authoritative sources in order to reduce the possibility of completeness and accuracy issues in the dataset (Case et al. 2012; Thibodeau et al. 2017). Finally, compared to previous studies, LinkedIn data does not allow us to observe any information regarding IAF objectivity, which is an important pillar in conjunction with IAF competence to overall IAF quality. Nevertheless, using LinkedIn as a new data source to study specific functions within the firm, such as the IAF, provide advantageous properties over other existing data sources. Future studies can use a similar method to study other context specific departments within the firm.

TABLE 2.1 – Variable Definitions

IAF Competency Variables	
<i>IAF_EXP_TENURE</i>	Mean tenure of IAF employee at sample firm in years;
<i>IAF_EXP_BIG4</i>	Count of IAF employees who have previous working experience at a Big 4 accounting firm;
<i>IAF_EXP_MIDTIER</i>	Count of IAF employees who have previous working experience at a Midtier accounting firm
<i>IAF_EXP</i>	<i>IAF_EXP_TENURE</i> , <i>IAF_EXP_BIG4</i> , and <i>IAF_EXP_MIDTIER</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF experience component is greater than the median;
<i>IAF_CERT_CPA</i>	Count of IAF employees who have their CPA certification;
<i>IAF_CERT_CIA</i>	Count of IAF employees who have their CIA certification;
<i>IAF_CERT_CFE</i>	Count of IAF employees who have their CFE certification;
<i>IAF_CERT_CISA</i>	Count of IAF employees who have their CISA certification;
<i>IAF_CERT</i>	<i>IAF_CERT_CPA</i> , <i>IAF_CERT_CIA</i> , <i>IAF_CERT_CFE</i> , and <i>IAF_CERT_CISA</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF certification component is greater than the median;
<i>IAF_EDU_UGACC</i>	Count of IAF employees who have an undergraduate accounting degree;
<i>IAF_EDU_MSA</i>	Count of IAF employees who have a graduate accounting degree;
<i>IAF_EDU</i>	<i>IAF_EDU_UGACC</i> and <i>IAF_EDU_MSA</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF education component is greater than the median;
<i>IAF_SIZE_TOTAL</i>	Number of IAF employees;
<i>IAF_SIZE_SCALED</i>	Number of IAF employees scaled by the natural log of total assets at the end of year;
<i>IAF_SIZE</i>	<i>IAF_SIZE_TOTAL</i> is first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median;
<i>IAF_COMP</i>	Sum of <i>IAF_EXP</i> , <i>IAF_CERT</i> , <i>IAF_EDU</i> , and <i>IAF_SIZE</i> by year, ranging from zero to four;
<i>IAF_COMP_IND</i>	Sum of <i>IAF_EXP</i> , <i>IAF_CERT</i> , <i>IAF_EDU</i> , and <i>IAF_SIZE</i> by industry-year, ranging from zero to four;
<i>IAFBASE</i>	Indicator variable equal to -1 if <i>IAF_COMP</i> is in the top quartile, and equal to zero if <i>IAF_COMP</i> is in the lower three quartiles;
Variables of Interest	
<i>MW</i>	Indicator variable equal to one if there is a MW disclosure under SOX Sections 302 and/or 404 in the current year;
<i>MWPERSIST</i>	Indicator variable equal to one if there is a MW disclosure under SOX Section 302 and/or 404 in the previous year and in the current year;
<i>RESTATE</i>	Indicator variable equal to one if there is a restatement of earnings during the reporting period;
<i>RESTDISC</i>	Indicator variable equal to one if there is a disclosure of restatement of earnings in the current year;
<i>DACC</i>	Absolute value of performance-adjusted discretionary accruals;

DACC_QRT Indicator variable equal to one for firms with *DACC* in the highest quartile, and zero for firms with *DACC* in the lower three quartiles.

Monitoring Variables

ACCOMMIT Indicator variable equal to one if the number of IAF-related disclosures in the AC charter is greater than the median;

ACEXPRT Indicator variable equal to one if the count of AC accounting experts is greater than the median;

CFOEXPRT Indicator variable equal to one if the CFO has a CPA certification and/or previous auditing experience;

Firm Control Variables

LNASSETS Natural log of total assets at the end of year;

BM Book value of common equity divided by market value of common equity;

SALESGROWTH Percent of sales growth from the prior year;

LEVERAGE Long-term debt divided by total assets from end of year;

INVREC Inventory and accounts receivable divided by total assets from end of year;

LNSEGMENTS Natural log of the number of business and geographic segments;

CFO Standard deviation of cash flow from operations over 5 years;

LNAUDFEE Natural log of the audit fee;

ROA Net income divided by total assets;

BOARDINDEX Total board size, the percentage of board independence, and the mean value of independent director tenure are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are summed, ranging from zero to three;

FOREIGN Indicator variable equal to one if the firm has foreign operations;

BIG4 Indicator variable equal to one if the firm engages a Big 4 auditing firm;

AUDCHG Indicator variable equal to one if the firm has changed its external auditor in the current year;

LASTYRCFO Indicator variable equal to one if the CFO is in their last year of tenure with the firm;

NEWCFO Indicator variable equal to one if the CFO is in their first year of tenure with the firm;

ACQ Indicator variable equal to one if the firm had M&A activity in the current year;

LIT Indicator variable equal to one if the firm is in a litigious industry.

TABLE 2.2 – Descriptive Statistics

	Mean	St. Dev.	Min.	25 th Pct.	Median	75 th Pct.	Max.
<i>IAF_COMP</i>	2.552	1.311	0.000	1.000	3.000	4.000	4.000
<i>IAF_COMP_IND</i>	2.650	1.252	0.000	2.000	3.000	4.000	4.000
<i>MW</i>	0.059	0.235	0.000	0.000	0.000	0.000	1.000
<i>RESTATE</i>	0.071	0.258	0.000	0.000	0.000	0.000	1.000
<i>RESTDISC</i>	0.036	0.187	0.000	0.000	0.000	0.000	1.000
<i>IAFBASE</i>	-0.335	0.472	-1.000	-1.000	0.000	0.000	0.000
<i>LNASSETS</i>	6.983	0.948	4.660	6.350	6.974	7.651	9.038
<i>BM</i>	0.541	0.365	-0.746	0.321	0.489	0.712	1.909
<i>SALESGROWTH</i>	0.089	0.195	-0.432	-0.006	0.067	0.158	0.933
<i>LEV</i>	0.192	0.170	0.000	0.017	0.174	0.310	0.687
<i>LNSEGMENTS</i>	1.575	0.701	0.000	1.386	1.609	2.079	2.996
<i>CFO</i>	0.047	0.032	0.008	0.025	0.039	0.060	0.175
<i>LNAUDFEE</i>	14.162	0.631	12.740	13.730	14.166	14.574	15.635
<i>ROA</i>	0.044	0.087	-0.412	0.020	0.051	0.083	0.245
<i>BOARDINDEX</i>	1.288	0.840	0.000	1.000	1.000	2.000	3.000
<i>FOREIGN</i>	0.421	0.494	0.000	0.000	0.000	1.000	1.000
<i>BIG4</i>	0.877	0.328	0.000	1.000	1.000	1.000	1.000
<i>AUDCHG</i>	0.043	0.204	0.000	0.000	0.000	0.000	1.000
<i>LASTYRCFO</i>	0.291	0.454	0.000	0.000	0.000	1.000	1.000
<i>NEWCFO</i>	0.352	0.478	0.000	0.000	0.000	1.000	1.000
<i>ACQ</i>	0.213	0.410	0.000	0.000	0.000	0.000	1.000
<i>LIT</i>	0.223	0.416	0.000	0.000	0.000	0.000	1.000

This panel provides descriptive statistics for the models (N = 2,099). Variable definitions are provided in Table 2.1.

TABLE 2.3 – Pearson Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)
(1) <i>IAF_COMP</i>	1					
(2) <i>IAF_COMP_IND</i>	0.76***	1				
(3) <i>MW</i>	-0.10***	-0.09***	1			
(4) <i>RESTATE</i>	-0.04**	-0.05**	0.21***	1		
(5) <i>RESTDISC</i>	-0.04**	-0.05**	0.32***	0.22***	1	
(6) <i>IAFBASE</i>	-0.77***	-0.61***	0.08***	0.04**	0.05**	1

Variable definitions are in Table 2.1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

TABLE 2.4 – Effect of IAF Competency on FRQ Events

Panel A: Propensity of Material Weakness	Predicted Sign	(1) <i>MW</i>	(2) Ave. Marginal Effects	(3) <i>MW</i>	(4) Ave. Marginal Effects
<i>IAF_COMP</i>	–	-0.305*** (-3.08)	-0.015*** (-3.16)		
<i>IAF_COMP_IND</i>	–			-0.270*** (-3.07)	-0.012*** (-2.84)
<i>RESTATE</i>	+	2.102*** (6.19)	0.105*** (6.22)	2.143*** (6.22)	0.108*** (6.21)
<i>LNASSETS</i>	+	-0.847*** (-3.50)	-0.043*** (-3.39)	-0.912*** (-3.76)	-0.045*** (-3.56)
<i>BM</i>	–	-0.590* (-1.75)	-0.030* (-1.73)	-0.539 (-1.61)	-0.027 (-1.61)
<i>LEV</i>	+	0.808 (0.85)	0.041 (0.84)	0.758 (0.80)	0.037 (0.76)
<i>INVREC</i>	–	-0.245 (-0.24)	-0.012 (-0.24)	-0.389 (-0.38)	-0.019 (-0.38)
<i>LNSEGMENTS</i>	–	-0.307* (-1.77)	-0.015* (-1.77)	-0.327* (-1.86)	-0.017* (-1.86)
<i>CFO</i>	+	12.833*** (3.20)	0.644*** (3.14)	12.598*** (3.13)	0.624*** (3.03)
<i>LNAUDFEE</i>	–	1.241*** (3.82)	0.062*** (3.74)	1.225*** (3.70)	0.061*** (3.60)
<i>ROA</i>	–	-3.463*** (-3.19)	-0.174*** (-3.14)	-3.489*** (-3.18)	-0.175*** (-3.16)
<i>BOARDINDEX</i>	–	-0.128 (-0.71)	-0.006 (-0.71)	-0.133 (-0.76)	-0.007 (-0.81)
<i>FOREIGN</i>	+	-0.095 (-0.30)	-0.004 (-0.30)	-0.066 (-0.21)	-0.004 (-0.24)
<i>BIG4</i>	–	0.061 (0.14)	-0.003 (0.14)	0.060 (0.14)	0.002 (0.10)
<i>AUDCHG</i>	+	1.366*** (4.18)	0.069*** (4.23)	1.357*** (4.10)	0.068*** (4.13)
<i>LASTYRCFO</i>	+	-0.004 (-0.02)	-0.000 (-0.02)	-0.003 (-0.01)	-0.000 (-0.01)
Constant		-14.564*** (-4.19)		-14.010*** (-3.95)	
Industry and Year Effects		Yes	Yes	Yes	Yes
Observations		1,866	1,866	1,866	1,866
Pseudo <i>R</i> ²		0.244	N/A	0.240	N/A

TABLE 2.4 (CONTINUED) – Effect of IAF Competency on FRQ Events

Panel B: Propensity of Restatement	Predicted Sign	(1) <i>RESTATE</i>	(2) Ave. Marginal Effects	(3) <i>RESTATE</i>	(4) Ave. Marginal Effects
<i>IAF_COMP</i>	–	-0.236** (-2.29)	-0.017** (-2.28)		
<i>IAF_COMP_IND</i>	–			-0.159* (-1.56)	-0.011* (-1.56)
<i>MW</i>	+	1.977*** (6.31)	0.139*** (5.87)	2.010*** (6.32)	0.142*** (5.86)
<i>LNASSETS</i>	+	-0.230 (-0.73)	-0.016 (-0.74)	-0.249 (-0.80)	-0.018 (-0.85)
<i>BM</i>	–	0.992** (2.38)	0.070** (2.49)	1.001** (2.42)	0.071** (2.53)
<i>SALESGROWTH</i>	–	-0.196 (-0.39)	-0.014 (-0.39)	-0.176 (-0.35)	-0.012 (-0.32)
<i>LEV</i>	+	0.831 (0.62)	0.058 (0.62)	0.783 (0.59)	0.055 (0.60)
<i>LNSEGMENTS</i>	–	0.518* (1.81)	0.036* (1.80)	0.514* (1.79)	0.036* (1.81)
<i>LNAUDFEE</i>	–	0.422 (0.93)	0.030 (0.62)	0.370 (0.81)	0.026 (0.87)
<i>ROA</i>	–	1.264 (0.72)	0.090 (0.74)	1.282 (0.72)	0.090 (0.74)
<i>BOARDINDEX</i>	–	-0.070 (-0.39)	-0.005 (-0.39)	-0.085 (-0.48)	-0.006 (-0.52)
<i>FOREIGN</i>	+	-0.102 (-0.33)	-0.007 (-0.33)	-0.080 (-0.26)	-0.006 (-0.29)
<i>BIG4</i>	–	0.446 (0.78)	0.031 (0.78)	0.434 (0.75)	0.031 (0.79)
<i>AUDCHG</i>	+	0.264 (0.61)	0.019 (0.61)	0.253 (0.59)	0.018 (0.55)
<i>LASTYRCFO</i>	+	0.286 (1.14)	0.020 (1.13)	0.292 (1.17)	0.021 (1.17)
<i>ACQUISITION</i>	+	-0.466* (-1.67)	-0.033* (-1.68)	-0.472* (-1.68)	-0.033* (-1.70)
<i>LIT</i>	–	0.139 (0.20)	0.010 (0.20)	0.144 (0.21)	0.010 (0.21)
Constant		-6.156 (-1.21)		-5.470 (-1.07)	
Industry and Year Effects		Yes	Yes	Yes	Yes
Observations		1,694	1,694	1,694	1,694
Pseudo <i>R</i> ²		0.157	NA	0.153	NA

This table reports results from logistic regressions of IAF competency and the propensity of FRQ events. Panel A presents Equation (1). The dependent variable is *MW*, which equals one for firms that disclose a MW and zero otherwise. The variable of interest in Column 1 is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. The variable of interest in Column 3 is *IAF_COMP_IND*, which is a composite score of IAF competency based on the median scores across the four competency components by industry-year, and can range from zero to four. *RESTATE* equals one for firms that have a restatement during the fiscal period; zero otherwise. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts

receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, *LNAUDFEE* is the natural log of audit fees, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *FOREIGN* is an indicator variable for foreign operations. *Big4*, *AUDCHG*, and *LASTYRCFO* are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. Columns 2 and 4 report the average marginal effects of the models in Columns 1 and 3, respectively. Panel B presents Equation (2). The dependent variable is *RESTATE*, described earlier. The variables of interest in Column 1 and 2 are the same as in Panel A. Control variables include: *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *BOARDINDEX*, *FOREIGN*, *BIG4*, *AUDCHG*, and *LASTYRCFO*. Additional control variables in Equation (2) include: *SALESGROWTH*, the percentage of sales growth from the prior year, *ACQUISITION*, an indicator variable for merger and acquisition activity during the fiscal year, and *LIT*, an indicator variable for firms in litigious industries. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 2.5 – Effect of FRQ Events on Changes to IAF Competency

Panel A: Material Weakness				
Disclosure	(1)		(2)	
	<i>ΔIAF COMP</i>	t-statistic	<i>ΔIAF COMP</i>	t-statistic
<i>LAGMW</i>	0.167*	(1.69)	0.268**	(2.42)
<i>LAGIAFBASE</i>	0.465***	(11.59)	0.448***	(11.02)
<i>LAGMW*LAGIAFBASE</i>			0.503***	(2.61)
<i>ΔLNASSETS</i>	0.156	(1.12)	0.150	(1.08)
<i>ΔBM</i>	0.030	(0.27)	0.029	(0.26)
<i>ΔLEV</i>	-0.409	(-1.42)	-0.408	(-1.42)
<i>ΔINVREC</i>	0.313	(0.67)	0.287	(0.61)
<i>ΔLNSEGMENTS</i>	0.125*	(1.71)	0.123*	(1.69)
<i>ΔCFO</i>	0.254	(0.23)	0.209	(0.19)
<i>ΔLNAUDFEE</i>	-0.004	(-0.04)	0.018	(0.15)
<i>ΔROA</i>	-0.067	(-0.18)	-0.077	(-0.20)
<i>ΔBOARDINDEX</i>	-0.057*	(-1.87)	-0.057*	(-1.86)
<i>FOREIGN</i>	0.058	(1.35)	0.057	(1.34)
<i>BIG4</i>	0.145**	(2.50)	0.144**	(2.49)
<i>AUDCHG</i>	-0.045	(-0.32)	-0.052	(-0.38)
<i>NEWCFO</i>	0.081**	(2.16)	0.081**	(2.18)
Constant	0.012	(0.19)	0.014	(0.23)
Industry and Year Effects	Yes		Yes	
Observations	1,612		1,612	
Adjusted R ²	0.071		0.073	
Panel B: Restatement Disclosure				
	(1)		(2)	
	<i>ΔIAF COMP</i>	t-statistic	<i>ΔIAF COMP</i>	t-statistic
<i>LAGRESTDISC</i>	0.201**	(2.17)	0.243**	(2.21)
<i>LAGIAFBASE</i>	0.467***	(11.65)	0.462***	(11.35)
<i>LAGRESTDISC*LAGIAFBASE</i>			0.207	(1.08)
<i>ΔLNASSETS</i>	0.102	(0.73)	0.102	(0.74)
<i>ΔBM</i>	0.027	(0.24)	0.028	(0.25)
<i>ΔSALESGROWTH</i>	0.091	(0.93)	0.087	(0.90)
<i>ΔLEV</i>	-0.423	(-1.51)	-0.423	(-1.52)
<i>ΔLNSEGMENTS</i>	0.127*	(1.75)	0.125*	(1.71)
<i>ΔLNAUDFEE</i>	0.011	(0.09)	0.012	(0.10)
<i>ΔROA</i>	-0.105	(-0.28)	-0.107	(-0.28)
<i>ΔBOARDINDEX</i>	-0.056*	(-1.84)	-0.055*	(-1.80)
<i>FOREIGN</i>	0.055	(1.28)	0.055	(1.29)
<i>BIG4</i>	0.144**	(2.44)	0.145**	(2.45)
<i>AUDCHG</i>	-0.038	(-0.28)	-0.038	(-0.28)
<i>NEWCFO</i>	0.083**	(2.19)	0.083**	(2.21)
<i>ACQ</i>	0.002	(0.04)	0.001	(0.01)
<i>LIT</i>	0.032	(0.37)	0.034	(0.39)
Constant	0.484***	(6.62)	0.479***	(6.49)
Industry and Year Effects	Yes		Yes	
Observations	1,612		1,612	
Adjusted R ²	0.071		0.070	

TABLE 2.5 (CONTINUED) – Effect of FRQ Events on Changes to IAF Competency

Panel C: Material Weakness Persistence	(1)		(2)	
	ΔIAF_COMP	t-statistic	ΔIAF_COMP	t-statistic
<i>LAGMWPERSIST</i>	0.356**	(1.99)	0.426**	(2.13)
<i>LAGIAFBASE</i>	0.468***	(11.71)	0.464***	(11.49)
<i>LAGMWPERSIST*LAGIAFBASE</i>			0.426	(1.47)
Constant	0.016	(0.25)	0.479***	(6.70)
Controls	Yes		Yes	
Industry and Year Effects	Yes		Yes	
Observations	1,612		1,612	
Adjusted R^2	0.072		0.072	

This table reports results from OLS regressions of FRQ events and subsequent change to IAF competency. Panel A Column 1 presents Equation (3). The dependent variable is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. The variable of interest is *LAGMW*, which equals one for firms that disclosed a MW in the previous fiscal year, and zero otherwise. *LAGIAFBASE* is equal to -1 if *IAF_COMP* is in the top quartile for the previous firm-year, and zero if *IAF_COMP* is in the lower three quartiles for the previous firm-year. Column 2 presents results of the main model with an interaction between previous MW disclosure and baseline IAF competency. All continuous control variables are measured as the year-over-year change in value. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, *LNAUDFEE* is the natural log of audit fees, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *FOREIGN* is an indicator variable for foreign operations. *Big4*, *AUDCHG*, and *NEWCFO* are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. Panel B Column 1 presents Equation (4). The dependent variable is *IAF_COMP* and the variable of interest is *LAGRESTDISC*, which equals one for firms that disclosed a restatement in the previous fiscal year, and zero otherwise. Column 2 presents results of the main model with an interaction between previous restatement disclosure and baseline IAF competency. Control variables include: *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *BOARDINDEX*, *FOREIGN*, *BIG4*, *AUDCHG*, and *NEWCFO*. Additional control variables in Equation (4) include: *SALESGROWTH*, the percentage of sales growth from the prior year, *ACQUISITION*, an indicator variable for merger and acquisition activity during the fiscal year, and *LIT*, an indicator variable for firms in litigious industries. Panel C Column 1 presents Equation (3), substituting the variable of interest with *LAGMWPERSIST*, which equals one for firms that disclosed a MW in the previous fiscal year and in the current fiscal year, and zero otherwise. Column 2 presents results of the main model with an interaction between previous MW persistence and baseline IAF competency. Control variables are the same as listed previously for Equation (3). Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction for variables *LAGMW*, *LAGRESTDISC*, and *LAGMWPERSIST*; two-tailed test otherwise.

TABLE 2.6 – Moderating Effect of Audit Committee Commitment on Changes to IAF Competency

Panel A: Material Weakness Disclosure	(1)		(2)	
	ΔIAF_COMP (<i>ACCOMMIT=0</i>)	t-statistic	ΔIAF_COMP (<i>ACCOMMIT=1</i>)	t-statistic
<i>LAGMW</i>	-0.031	(-0.23)	0.441***	(3.36)
<i>LAGIAFBASE</i>	0.535***	(8.15)	0.438***	(8.40)
$\Delta LNASSETS$	0.388*	(1.83)	0.047	(0.25)
ΔBM	0.063	(0.37)	0.034	(0.24)
ΔLEV	-1.206**	(-2.49)	0.069	(0.19)
$\Delta INVREC$	-0.677	(-0.95)	0.916	(1.41)
$\Delta LNSEGMENTS$	0.040	(0.34)	0.181*	(1.93)
ΔCFO	2.092	(1.09)	-1.129	(-0.81)
$\Delta LNAUDFEE$	-0.044	(-0.29)	0.032	(0.20)
ΔROA	-0.549	(-0.81)	0.321	(0.76)
$\Delta BOARDINDEX$	-0.110**	(-2.27)	-0.025	(-0.64)
<i>FOREIGN</i>	-0.044	(-0.63)	0.152**	(2.45)
<i>BIG4</i>	0.102	(1.30)	0.318***	(3.27)
<i>AUDCHG</i>	0.260	(0.87)	-0.155	(-1.05)
<i>NEWCFO</i>	0.058	(1.00)	0.087*	(1.68)
Constant	-0.224	(-0.92)	-0.026	(-0.35)
Industry and Year Effects	Yes		Yes	
Observations	704		908	
Adjusted R ²	0.069		0.073	
Panel B: Restatement Disclosure	(1)		(2)	
	ΔIAF_COMP (<i>ACCOMMIT=0</i>)	t-statistic	ΔIAF_COMP (<i>ACCOMMIT=1</i>)	t-statistic
<i>LAGRESTDISC</i>	0.142	(1.49)	0.337**	(2.39)
<i>LAGIAFBASE</i>	0.529***	(8.03)	0.448***	(8.47)
$\Delta LNASSETS$	0.402*	(1.92)	-0.040	(-0.20)
ΔBM	0.043	(0.25)	0.020	(0.14)
$\Delta SALES GROWTH$	-0.027	(-0.18)	0.147	(1.10)
ΔLEV	-1.091**	(-2.34)	-0.056	(-0.15)
$\Delta LNSEGMENTS$	0.051	(0.41)	0.175*	(1.93)
$\Delta LNAUDFEE$	-0.010	(-0.06)	0.059	(0.37)
ΔROA	-0.460	(-0.68)	0.127	(0.28)
$\Delta BOARDINDEX$	-0.108**	(-2.22)	-0.026	(-0.66)
<i>FOREIGN</i>	-0.033	(-0.48)	0.143**	(2.29)
<i>BIG4</i>	0.094	(1.19)	0.291***	(2.90)
<i>AUDCHG</i>	0.250	(0.83)	-0.142	(-0.98)
<i>NEWCFO</i>	0.058	(0.98)	0.095*	(1.81)
<i>ACQUISITION</i>	0.007	(0.08)	-0.016	(-0.28)
<i>LIT</i>	0.155	(1.19)	-0.092	(-0.83)
Constant	0.288	(1.21)	0.410***	(4.64)
Industry and Year Effects	Yes		Yes	
Observations	704		908	
Adjusted R ²	0.068		0.065	

This table reports results from OLS regressions of FRQ events and subsequent change to IAF competency considering moderating effects of AC charter commitment. Panel A presents Equation (3). The dependent variable is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. The variable of interest is *LAGMW*, which equals one for firms that disclosed a

MW in the previous fiscal year, and zero otherwise. *LAGIAFBASE* is equal to -1 if *IAF_COMP* is in the top quartile for the previous firm-year, and zero if *IAF_COMP* is in the lower three quartiles for the previous firm-year. Column 1 presents results of the model for firms with a lower level of AC charter commitment and Column 2 presents results of the model for firms with a higher level of AC charter commitment (*ACCOMMIT*). *ACCOMMIT* is equal to one for firms with AC charter mentions of the IAF greater than the median, and zero otherwise. All continuous control variables are measured as the year-over-year change in value. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, *LNAUDFEE* is the natural log of audit fees, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *FOREIGN* is an indicator variable for foreign operations. *Big4*, *AUDCHG*, and *NEWCFO* are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. Panel B presents Equation (4). The dependent variable is *IAF_COMP* and the variable of interest is *LAGRESTDISC*, which equals one for firms that disclosed a restatement in the previous fiscal year, and zero otherwise. Column 1 (2) presents lower (higher) levels of *ACCOMMIT*. Control variables include: *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *BOARDINDEX*, *FOREIGN*, *BIG4*, *AUDCHG*, and *NEWCFO*. Additional control variables in Equation (4) include: *SALESGROWTH*, the percentage of sales growth from the prior year, *ACQUISITION*, an indicator variable for merger and acquisition activity during the fiscal year, and *LIT*, an indicator variable for firms in litigious industries. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction for variables *LAGMW* and *LAGRESTDISC*; two-tailed test otherwise.

TABLE 2.7 – Moderating Effect of Internal Monitors on Changes to IAF Competency

Panel A: Material Weakness Disclosure	(1) <i>ΔIAF COMP</i> (<i>ACEXPERT=0</i>)	(2) <i>ΔIAF COMP</i> (<i>ACEXPERT=1</i>)	(3) <i>ΔIAF COMP</i> (<i>CFOEXPERT=0</i>)	(4) <i>ΔIAF COMP</i> (<i>CFOEXPERT=1</i>)
<i>LAGMW</i>	0.404*** (2.75)	-0.018 (-0.13)	0.305* (1.96)	0.006 (0.04)
<i>LAGIAFBASE</i>	0.377*** (6.10)	0.550*** (10.11)	0.414*** (7.17)	0.533*** (8.33)
<i>ΔLNASSETS</i>	0.134 (0.63)	0.164 (0.82)	0.265 (1.40)	0.059 (0.26)
<i>ΔBM</i>	0.205 (1.12)	-0.078 (-0.53)	-0.034 (-0.19)	0.106 (0.86)
<i>ΔLEV</i>	-0.830* (-1.82)	-0.127 (-0.32)	-0.481 (-1.34)	-0.332 (-0.66)
<i>ΔINVREC</i>	0.035 (0.05)	0.564 (0.88)	0.289 (0.40)	0.289 (0.47)
<i>ΔLNSEGMENTS</i>	0.161 (1.64)	0.123 (1.06)	0.122 (0.95)	0.145 (1.58)
<i>ΔCFO</i>	-0.010 (-0.01)	0.382 (0.22)	0.171 (0.11)	0.475 (0.29)
<i>ΔLNAUDFEE</i>	0.167 (0.83)	-0.176 (-1.19)	0.055 (0.34)	-0.117 (-0.75)
<i>ΔROA</i>	0.000 (0.00)	-0.035 (-0.07)	-0.196 (-0.39)	0.072 (0.16)
<i>ΔBOARDINDEX</i>	-0.122** (-2.43)	-0.007 (-0.17)	-0.051 (-1.19)	-0.054 (-1.22)
<i>FOREIGN</i>	-0.019 (-0.30)	0.123* (1.95)	-0.010 (-0.16)	0.106 (1.59)
<i>BIG4</i>	0.029 (0.37)	0.251*** (2.95)	0.188** (2.03)	0.176** (2.23)
<i>AUDCHG</i>	0.024 (0.12)	-0.132 (-0.70)	0.091 (0.45)	-0.133 (-0.71)
<i>NEWCFO</i>	0.086 (1.51)	0.099* (1.83)	0.049 (0.93)	0.142* (1.96)
Constant	-0.147 (-0.83)	-0.024 (-0.26)	-0.225 (-1.34)	0.044 (0.53)
Industry and Year Effects	Yes	Yes	Yes	Yes
Observations	737	875	836	776
Adjusted R ²	0.055	0.087	0.065	0.059

TABLE 2.7 (CONTINUED) – Moderating Effect of Internal Monitors on Changes to IAF Competency

Panel B – Restatement Disclosure	(1) <i>ΔIAF_COMP</i> (<i>ACEXPERT=0</i>)	(2) <i>ΔIAF_COMP</i> (<i>ACEXPERT=1</i>)	(3) <i>ΔIAF_COMP</i> (<i>CFOEXPERT=0</i>)	(4) <i>ΔIAF_COMP</i> (<i>CFOEXPERT=1</i>)
<i>LAGRESTDISC</i>	0.298* (1.83)	0.165 (1.46)	0.240* (1.92)	0.169 (1.12)
<i>LAGIAFBASE</i>	0.391*** (6.31)	0.540*** (9.99)	0.417*** (7.15)	0.530*** (8.31)
<i>ΔLNASSETS</i>	0.149 (0.70)	0.024 (0.13)	0.177 (0.96)	0.036 (0.16)
<i>ΔBM</i>	0.161 (0.90)	-0.051 (-0.35)	-0.018 (-0.10)	0.096 (0.78)
<i>ΔSALESGROWTH</i>	-0.113 (-0.79)	0.346** (2.27)	0.167 (1.29)	0.010 (0.07)
<i>ΔLEV</i>	-0.715* (-1.84)	-0.194 (-0.48)	-0.503 (-1.41)	-0.352 (-0.77)
<i>ΔLNSEGMENTS</i>	0.149 (1.50)	0.107 (0.92)	0.122 (0.98)	0.156 (1.63)
<i>ΔLNAUDFEE</i>	0.194 (0.97)	-0.148 (-0.98)	0.078 (0.48)	-0.095 (-0.59)
<i>ΔROA</i>	0.098 (0.19)	-0.170 (-0.32)	-0.256 (-0.52)	0.094 (0.20)
<i>ΔBOARDINDEX</i>	-0.130*** (-2.63)	-0.004 (-0.09)	-0.052 (-1.19)	-0.053 (-1.20)
<i>FOREIGN</i>	-0.007 (-0.10)	0.118* (1.89)	-0.016 (-0.26)	0.107 (1.60)
<i>BIG4</i>	0.025 (0.31)	0.243*** (2.77)	0.174* (1.89)	0.180** (2.21)
<i>AUDCHG</i>	0.036 (0.18)	-0.112 (-0.60)	0.115 (0.58)	-0.135 (-0.74)
<i>NEWCFO</i>	0.100* (1.80)	0.101* (1.83)	0.052 (0.98)	0.142* (1.96)
<i>ACQUISITION</i>	0.009 (0.11)	-0.016 (-0.25)	0.023 (0.32)	-0.033 (-0.47)
<i>LIT</i>	-0.034 (-0.20)	0.066 (0.58)	-0.095 (-0.95)	0.131 (0.92)
Constant	0.214 (1.17)	0.552*** (5.39)	0.202 (1.24)	0.575*** (5.64)
Industry and Year Effects	Yes	Yes	Yes	Yes
Observations	737	875	836	776
Adjusted <i>R</i> ²	0.048	0.093	0.064	0.065

This table reports results from OLS regressions of FRQ events and subsequent change to IAF competency considering moderating effects of internal monitoring mechanisms. Panel A presents Equation (3). The dependent variable is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. The variable of interest is *LAGMW*, which equals one for firms that disclose a MW in the previous fiscal year, and zero otherwise. *LAGIAFBASE* is equal to -1 if *IAF_COMP* is in the top quartile for the previous firm-year, and zero if *IAF_COMP* is in the lower three quartiles for the previous firm-year. Column 1 presents results of the model for firms with a lower level of AC accounting expertise and Column 2 presents results of the model for firms with a higher level of AC accounting expertise (*ACEXPERT*). *ACEXPERT* is equal to one for firms with AC accounting expertise

greater than the median, and zero otherwise. Column 3 presents results of the model for firms with a lower level of CFO accounting expertise and Column 4 presents results of the model for firms with a higher level of CFO accounting expertise (*CFOEXPERT*). *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification and/or previous auditing experience, and zero otherwise. All continuous control variables are measured as the year-over-year change in value. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, *LNAUDFEE* is the natural log of audit fees, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *FOREIGN* is an indicator variable for foreign operations. *Big4*, *AUDCHG*, and *NEWCFO* are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. Panel B presents Equation (4). The dependent variable is *IAF_COMP* and the variable of interest is *LAGRESTDISC*, which equals one for firms that disclose a restatement in the previous fiscal year, and zero otherwise. Column 1 (2) presents lower (higher) levels of *ACEXPERT*, and Column 3 (4) presents lower (higher) levels of *CFOEXPERT*. Control variables include: *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *BOARDINDEX*, *FOREIGN*, *BIG4*, *AUDCHG*, and *NEWCFO*. Additional control variables in Equation (4) include: *SALESGROWTH*, the percentage of sales growth from the prior year, *ACQUISITION*, an indicator variable for merger and acquisition activity during the fiscal year, and *LIT*, an indicator variable for firms in litigious industries. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test.

TABLE 2.8 – IAF Competency Components Analysis

Panel A: Propensity of Material Weakness and Restatement	(1) <i>MW</i>	(2) <i>MW</i>	(3) <i>MW</i>	(4) <i>MW</i>	(5) <i>RESTATE</i>	(6) <i>RESTATE</i>	(7) <i>RESTATE</i>	(8) <i>RESTATE</i>
<i>IAF_EXP</i>	-0.274* (-1.32)				-0.208 (-0.91)			
<i>IAF_CERT</i>		-0.218 (-1.12)				0.001 (0.00)		
<i>IAF_EDU</i>			-0.673*** (-2.49)				-0.464** (-1.83)	
<i>IAF_SIZE</i>				0.674*** (2.76)				-0.622** (-2.27)
Constant	-12.983*** (-3.81)	-12.472*** (-3.57)	-13.065*** (-3.78)	-14.806*** (-4.35)	-4.616 (-0.90)	-4.547 (-0.89)	-5.155 (-1.02)	-6.683 (-1.35)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,866	1,866	1,866	1,866	1,694	1,694	1,694	1,694
Pseudo <i>R</i> ²	0.234	0.233	0.240	0.240	0.151	0.149	0.154	0.159
Panel B: Material Weakness Disclosure	(1) <i>ΔIAF_EXP</i>	(2) <i>ΔIAF_EXP</i>	(3) <i>ΔIAF_CERT</i>	(4) <i>ΔIAF_CERT</i>	(5) <i>ΔIAF_EDU</i>	(6) <i>ΔIAF_EDU</i>	(7) <i>ΔIAF_SIZE</i>	(8) <i>ΔIAF_SIZE</i>
<i>LAGMW</i>	-0.003 (-0.05)	0.069 (1.19)	0.030 (0.70)	0.049 (1.05)	0.097** (1.99)	0.124** (2.20)	-0.045 (0.99)	-0.064 (-1.30)
<i>LAGIAFBASE</i>	0.037* (1.66)	0.024 (1.08)	0.016 (0.87)	0.013 (0.68)	0.157*** (8.89)	0.151*** (8.62)	-0.102*** (-5.80)	-0.010*** (5.63)
<i>LAGMW*</i>		0.377*** (2.71)		0.131* (1.33)		0.148** (1.72)		-0.091 (-0.72)
<i>LAGIAFBASE</i>								
Constant	0.094* (2.53)	0.068* (1.87)	0.291*** (11.42)	0.291*** (11.42)	0.012 (0.43)	0.013 (0.45)	-0.249*** (-7.33)	-0.249*** (-7.33)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,612	1,612	1,612	1,612	1,612	1,612	1,612	1,612
Adjusted <i>R</i> ²	-0.016	-0.012	0.228	0.230	0.023	0.026	0.001	-0.001

TABLE 2.8 (CONTINUED – IAF Competency Components Analysis

Panel C: Restatement Disclosure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>ΔIAF_EXP</i>	<i>ΔIAF_EXP</i>	<i>ΔIAF_CERT</i>	<i>ΔIAF_CERT</i>	<i>ΔIAF_EDU</i>	<i>ΔIAF_EDU</i>	<i>ΔIAF_SIZE</i>	<i>ΔIAF_SIZE</i>
<i>LAGRESTDISC</i>	0.049 (0.92)	0.067 (1.06)	0.100*** (2.44)	0.102** (2.04)	0.017 (0.34)	0.020 (0.35)	-0.101 (-1.52)	0.054 (0.98)
<i>LAGIAFBASE</i>	0.035 (1.62)	0.033 (1.48)	0.015 (0.83)	0.016 (0.83)	0.162*** (9.07)	0.160*** (8.90)	-0.101*** (-5.85)	-0.099*** (-5.64)
<i>LAGRESTDISC*</i>		0.093 (0.59)		0.026 (0.36)		0.041 (0.43)		-0.083 (-1.00)
Constant	0.095** (2.50)	0.100** (2.37)	0.292*** (10.25)	0.305*** (9.64)	0.139*** (4.54)	0.164*** (4.88)	0.379*** (11.76)	0.381*** (11.11)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and Year Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,612	1,612	1,612	1,612	1,612	1,612	1,612	1,612
Adjusted R ²	-0.015	-0.015	0.232	0.232	0.020	0.022	0.001	0.001

This table reports results from logistic regressions of IAF competency and the propensity of financial reporting events as well as OLS regressions of financial reporting events and subsequent changes to IAF competency. Panel A presents Equation (1). The dependent variable is *MW*, which equals one for firms that disclose a material weakness and zero otherwise. The variable of interest in Columns 1-4 are the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*). *RESTATE* equals one for firms that have a restatement during the fiscal period; zero otherwise. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, *LNAUDFEE* is the natural log of audit fees, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *FOREIGN* is an indicator variable for foreign operations. *Big4*, *AUDCHG*, and *LASTYRCFO* are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. Panel B presents Equation (2). The dependent variable is *RESTATE*, described earlier. The variables of interest in Columns 1-4 are the same as in Panel A. Control variables include: *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *BOARDINDEX*, *FOREIGN*, *BIG4*, *AUDCHG*, and *LASTYRCFO*. Additional control variables in Equation (2) include: *SALESGROWTH*, the percentage of sales growth from the prior year, *ACQUISITION*, an indicator variable for merger and acquisition activity during the fiscal year, and *LIT*, an indicator variable for firms in litigious industries. Panel C presents Equation (3). The dependent variables in Columns 1-8 are the change in the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*). The variable of interest is *LAGMW*, which equals one for firms that disclosed a material weakness in the previous fiscal year, and zero otherwise. *LAGIAFBASE* is equal to -1 if *IAF_COMP* is in the top quartile for the previous firm-year, and zero if *IAF_COMP* is in the lower three quartiles for the previous firm-year. Columns 2, 4, 6, and 8 present results of the main model with an interaction between

previous material weakness disclosure and baseline IAF component competency. All continuous control variables are measured as the year-over-year change in value, and are consistent with the control variables in Panel A, with the exception of *NEWCFO* replacing *LASTYRCFO*, an indicator variable for a change to the CFO in the current year. Panel D presents Equation (4). The dependent variables in Columns 1-8 are the change in the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) and the variable of interest is *LAGRESTDISC*, which equals one for firms that disclosed a restatement in the previous fiscal year, and zero otherwise. Columns 2, 4, 6, 8 present results of the main model with an interaction between previous restatement disclosure and baseline IAF competency. Control variables are consistent with Panel B, with the exception of *NEWCFO* replacing *LASTYRCFO*. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 2.9 – Three-Component IAF Competency Components Analysis

Panel A: Propensity of Material Weakness	(1)	(2)	(3)	(4)
	<i>MW</i>	<i>MW</i>	<i>MW</i>	<i>MW</i>
<i>IAF_COMP_EXPCERTEDU</i>	-0.402*** (-3.08)			
<i>IAF_COMP_EXPCERTSIZE</i>		-0.363*** (-2.66)		
<i>IAF_COMP_EXPEDUSIZE</i>			-0.392*** (-3.26)	
<i>IAF_COMP_CERTEDUSIZE</i>				-0.293** (-2.56)
Constant	-14.266*** (-4.05)	-14.339*** (-4.11)	-14.584*** (-4.35)	-14.200*** (-4.03)
Controls	Yes	Yes	Yes	Yes
Industry and Year Effects	Yes	Yes	Yes	Yes
Observations	1,866	1,866	1,866	1,866
Pseudo <i>R</i> ²	0.244	0.242	0.245	0.240
Panel B: Propensity of Restatement	(1)	(2)	(3)	(4)
	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>	<i>RESTATE</i>
<i>IAF_COMP_EXPCERTEDU</i>	-0.247** (-1.80)			
<i>IAF_COMP_EXPCERTSIZE</i>		-0.294** (-2.15)		
<i>IAF_COMP_EXPEDUSIZE</i>			-0.321*** (-2.35)	
<i>IAF_COMP_CERTEDUSIZE</i>				-0.238** (-2.21)
Constant	-5.580 (-1.07)	-5.863 (-1.14)	-6.299 (-1.27)	-6.050 (-1.17)
Controls	Yes	Yes	Yes	Yes
Industry and Year Effects	Yes	Yes	Yes	Yes
Observations	1,694	1,694	1,694	1,694
Pseudo <i>R</i> ²	0.154	0.156	0.160	0.156

TABLE 2.9 (CONTINUED) – Three-Component IAF Competency Components Analysis

Panel C: MW Disclosure	(1)	(2)	(3)	(4)
	$\frac{\Delta IAF_COMP_}{EXPCERTEDU}$	$\frac{\Delta IAF_COMP_}{EXPCERTSIZE}$	$\frac{\Delta IAF_COMP_}{EXPEDUSIZE}$	$\frac{\Delta IAF_COMP_}{CERTEDUSIZE}$
<i>LAGMW</i>	0.150** (2.00)	0.109* (1.53)	0.202** (2.14)	0.203** (2.01)
<i>LAGIAFBASE_ EXPCERTEDU</i>	0.354*** (9.58)			
<i>LAGIAFBASE_ EXPCERTSIZE</i>		0.330*** (7.36)		
<i>LAGIAFBASE_ EXPEDUSIZE</i>			0.508*** (6.75)	
<i>LAGIAFBASE_ CERTEDUSIZE</i>				0.385*** (6.66)
Constant	0.393*** (8.01)	0.013 (0.26)	-0.153*** (-2.64)	-0.038 (-0.63)
Controls	Yes	Yes	Yes	Yes
Industry and Year Effects	Yes	Yes	Yes	Yes
Observations	1,612	1,612	1,612	1,612
Adjusted R ²	0.072	0.040	0.031	0.025
Panel D: Restatement Disclosure	(1)	(2)	(3)	(4)
	$\frac{\Delta IAF_COMP_}{EXPCERTEDU}$	$\frac{\Delta IAF_COMP_}{EXPCERTSIZE}$	$\frac{\Delta IAF_COMP_}{EXPEDUSIZE}$	$\frac{\Delta IAF_COMP_}{CERTEDUSIZE}$
<i>LAGRESTDISC</i>	0.181** (2.50)	0.210*** (3.02)	0.189** (2.27)	0.155* (1.69)
<i>LAGIAFBASE_ EXPCERTEDU</i>	0.358*** (9.63)			
<i>LAGIAFBASE_ EXPCERTSIZE</i>		0.328*** (7.36)		
<i>LAGIAFBASE_ EXPEDUSIZE</i>			0.518*** (6.85)	
<i>LAGIAFBASE_ CERTEDUSIZE</i>				0.392*** (6.82)
Constant	0.400*** (8.00)	0.026 (0.50)	-0.157*** (-2.70)	-0.039 (-0.63)
Controls?	Yes	Yes	Yes	Yes
Industry and Year Effects?	Yes	Yes	Yes	Yes
Observations	1,612	1,612	1,612	1,612
Adjusted R ²	0.072	0.044	0.029	0.023

This table reports results from logistic regressions of IAF competency and the propensity of financial reporting events as well as OLS regressions of financial reporting events and subsequent changes to IAF competency. Panel A presents Equation (1). The dependent variable is *MW*, which equals one for firms that disclose a material weakness and zero otherwise. The variable of interest in Columns 1-4 are the four three-

competency components (*IAF_EXPCERTEDU*, *IAF_EXPCERTSIZE*, *IAF_EXPEDUSIZE*, and *IAF_CERTEDUSIZE*). *RESTATE* equals one for firms that have a restatement during the fiscal period; zero otherwise. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *CFO* is the standard deviation of operating cash flow over a five year period, *LNAUDFEE* is the natural log of audit fees, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *FOREIGN* is an indicator variable for foreign operations. *Big4*, *AUDCHG*, and *LASTYRCFO* are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. Panel B presents Equation (2). The dependent variable is *RESTATE*, described earlier. The variables of interest in Columns 1-4 are the same as in Panel A. Control variables include: *LNASSETS*, *BM*, *LEV*, *LNSEGMENTS*, *LNAUDFEE*, *ROA*, *BOARDINDEX*, *FOREIGN*, *BIG4*, *AUDCHG*, and *LASTYRCFO*. Additional control variables in Equation (2) include: *SALESGROWTH*, the percentage of sales growth from the prior year, *ACQUISITION*, an indicator variable for merger and acquisition activity during the fiscal year, and *LIT*, an indicator variable for firms in litigious industries. Panel C presents Equation (3). The dependent variables in Columns 1-4 are the change in the four competency components (*IAF_EXPCERTEDU*, *IAF_EXPCERTSIZE*, *IAF_EXPEDUSIZE*, and *IAF_CERTEDUSIZE*). The variable of interest is *LAGMW*, which equals one for firms that disclosed a material weakness in the previous fiscal year, and zero otherwise. *LAGIAFBASE_** is equal to -1 if the associated three-competency component is in the top quartile for the previous firm-year, and zero if the associated three-competency component is in the lower three quartiles for the previous firm-year. All continuous control variables are measured as the year-over-year change in value, and are consistent with the control variables in Panel A, with the exception of *NEWCFO* replacing *LASTYRCFO*, an indicator variable for a change to the CFO in the current year. Panel D presents Equation (4). The dependent variables in Columns 1-8 are the change in the four competency components (*IAF_EXPCERTEDU*, *IAF_EXPCERTSIZE*, *IAF_EXPEDUSIZE*, and *IAF_CERTEDUSIZE*) and the variable of interest is *LAGRESTDISC*, which equals one for firms that disclosed a restatement in the previous fiscal year, and zero otherwise. Control variables are consistent with Panel B, with the exception of *NEWCFO* replacing *LASTYRCFO*. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 2.10 – Effect of Discretionary Accruals on Changes to IAF Competency

	(1)	t-statistic	(2)	t-statistic
	ΔIAF_COMP ($DACC_QRT=0$)		ΔIAF_COMP ($DACC_QRT=1$)	
$\Delta DACC$	-0.754	(-1.30)	-0.156	(-0.32)
$LAGIAFBASE$	0.473***	(10.20)	0.416***	(4.12)
$\Delta LNASSETS$	-0.013	(-0.08)	0.381	(1.39)
ΔMB	0.014	(0.11)	0.101	(0.41)
$\Delta SALESGROWTH$	0.115	(0.84)	0.034	(0.19)
ΔLEV	-0.384	(-1.02)	-0.650	(-1.18)
$\Delta INVREC$	0.166	(0.27)	-0.177	(-0.21)
$\Delta LNSEGMENTS$	0.183**	(2.06)	0.217	(0.97)
ΔCFO	0.585	(0.38)	-1.371	(-0.57)
$\Delta LNAUDFEE$	-0.087	(-0.72)	-0.041	(-0.18)
ΔROA	0.458	(1.03)	-0.773	(-1.37)
$\Delta BOARDINDEX$	-0.045	(-1.22)	-0.080	(-1.11)
$FOREIGN$	0.048	(0.89)	0.071	(0.71)
$BIG4$	0.162***	(2.67)	0.088	(0.76)
$AUDCHG$	-0.102	(-0.61)	0.213	(0.50)
$NEWCFO$	0.040	(0.89)	0.230***	(2.68)
$ACQUISITION$	0.001	(0.02)	0.046	(0.41)
LIT	-0.030	(-0.36)	0.082	(0.38)
Constant	0.168	(1.60)	0.168	(0.56)
Observations	1,132		372	
Adjusted R^2	0.065		0.013	

This table reports results from OLS regressions of changes to performance-adjusted discretionary accruals and changes to IAF competency. The dependent variable is IAF_COMP , which is a composite score of IAF competency based on the median scores across the four competency components (IAF_EXP , IAF_CERT , IAF_EDU , and IAF_SIZE) by year, and can range from zero to four. The variable of interest is $DACC$, which represents the absolute value of performance-adjusted discretionary accruals. $LAGIAFBASE$ is equal to -1 if IAF_COMP is in the top quartile for the previous firm-year, and zero if IAF_COMP is in the lower three quartiles for the previous firm-year. Column 1 presents results of the model for firms with a lower level of discretionary accruals and Column 2 presents results of the model for firms with a higher level of discretionary accruals ($DACC_QRT$). $DACC_QRT$ is equal to one for firms with the absolute value of performance-adjusted discretionary accruals in the highest quartile, and zero for firms with discretionary accruals in the lower three quartiles. All continuous control variables are measured as the year-over-year change in value. $LNASSETS$ is the natural log of total assets, MB is the ratio of the market value of common equity to the book value of common equity, $SALESGROWTH$, the percentage of sales growth from the prior year, LEV is the ratio of total liabilities to assets, $INVREC$ is the ratio of inventory and accounts receivable assets to total assets, $LNSEGMENTS$ is the natural log of operating and geographic segments, CFO is the standard deviation of operating cash flow over a five year period, ROA is the ratio of net income to total assets, and $BOARDINDEX$ is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. $FOREIGN$ is an indicator variable for foreign operations. $Big4$, $AUDCHG$, and $NEWCFO$ are indicator variables for a Big 4 external auditor, a change to the external auditor in the current year, and a change to the CFO in the current year. $ACQUISITION$, an indicator variable for merger and acquisition activity during the fiscal year. Regressions include year and two-digit SIC code industry fixed effects. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test.

CHAPTER THREE

The Relationship between Internal Audit Competency and Enterprise Risk Management

I. INTRODUCTION

Enterprise risk management (ERM) helps organizations by providing a structured, consistent, and coordinated approach to risk management. The Committee of Sponsoring Organizations (COSO) ERM framework and the Institute of Internal Auditors (IIA) identify the internal audit function (IAF) as an important monitoring function that performs assurance and consulting activities in order to evaluate the effectiveness of risk management processes and recommend improvements directly to the audit committee and management (COSO 2004a; IIA 2009; IIA 2013). The IAF, therefore, plays a greater role than providing assurance over financial reporting by evaluating risk exposures across strategic, operational, financial, and compliance settings (PwC 2009; IIA 2017). Yet, the IAF literature has not explored whether IAF competency is associated with two ERM outcomes: ERM quality and ERM oversight disclosure.⁵⁴ In this study, I use a newly developed measure of IAF competency using LinkedIn data to examine the association between IAF competency and ERM quality.⁵⁵ I further test whether various levels of board

⁵⁴ Gates, Nicolas, and Walker (2012) find that greater ERM oversight by leadership increases ERM information and communication within the firm. In this study, I proxy ERM oversight disclosure for explicit discussion of “enterprise risk management” or “ERM” in the proxy statement and audit committee charter. Discussion of ERM in these filings are specific to oversight activities of the board and audit committee, compared to broader discussions of risk management topics such as compensation and interest rate risk.

⁵⁵ IAF competency refers to an array of employee attributes including professional experience, education, and certification, as well as firm-level function size (Prawitt, Smith, and Wood. 2009, Lin, Pizzini, Vargus, and Bardhan 2011, Messier, Reynolds, Simon, and Wood 2011, Prawitt, Sharp, and Wood 2011, Ege 2015, and Pizzini, Lin, and Ziegenfuss 2015). These observable characteristics in total measure the IAF’s knowledge and skills required to perform job responsibilities; IAF competency has been found to deter management misconduct (Ege 2015).

ERM oversight affect this association. Additionally, I investigate the association between IAF competency and firms' propensity to disclose ERM oversight practices.

It is important to examine the relationship between IAF competency and ERM quality and oversight disclosure due to recent focus on ERM practices. After the 2008 financial crisis, firms have placed greater emphasis on improving risk processes and implementing or enhancing quality ERM programs (Deloitte 2015; Carcello et al. 2018). Further, recent rulings from the Securities and Exchange Commission (SEC) and Congress (e.g. SEC Rule 33-9089; Dodd-Frank Act) seek to enhance public company disclosure of risk oversight. Firms, therefore, have a greater responsibility than ever before to develop and maintain effective ERM, which is associated with improved earnings, accounting performance, and firm performance (Beasley, Pagach, and Warr 2008b; Baxter, Bedard, Hoitash, and Yezegel 2013; Gordon, Loeb, and Tseng 2009; Hoyt and Liebenberg 2011).⁵⁶ The IAF plays a direct role in ERM effectiveness by evaluating and assuring key risks, and therefore a more competent IAF will provide higher quality information and feedback to management. However, the COSO ERM framework identifies specific activities that are solely management's responsibility (Bailey, Collins, and Abbott 2018).⁵⁷ Therefore, the IAF may not have enough reach within the ERM framework to make a meaningful difference in ERM outcomes, regardless of IAF competency level.

It is possible that IAF competency does not play a role in ERM quality. As the IAF was initially established to address financial reporting risks, internal auditors may not as

⁵⁶ Baxter et al. (2013) find that firms that disclose audit committee risk oversight and firms with a risk committee have higher Standard & Poor's (S&P) ERM quality for a sample of banking and insurance industry firms.

⁵⁷ Management-specific risk activities in the COSO ERM framework are event identification and risk response.

aptly be able to contribute meaningfully to broader areas of risk management (e.g. strategic risks). This may limit the function's ability to impact ERM quality and oversight as IAF personnel may not have appropriate competencies (Carcello et al. 2018). Similarly, while the IAF is responsible for many overlapping responsibilities between the COSO internal control and ERM frameworks, the COSO ERM framework identifies event identification and risk response as management's responsibility, suggesting that management may primarily effect a firm's level of ERM quality (Bailey, Collins, and Abbott 2018). Thus, the IAF may not have enough reach throughout the ERM framework to make a meaningful difference in ERM quality, despite having appropriate competency.

Conversely, IAF competency may play a role in ERM quality. ERM's iterative risk identification process and monitoring of risks specifically enable firms to identify ineffective controls, thus improving overall internal control quality and aiding external auditors in their assessment of audit risk (Bailey et al. 2018; Cohen, Krishnamoorthy, and Wright 2017). The IAF is ultimately responsible in the ERM framework for assuring that management and other functions are effective in managing risk as a "third line of defense" through its assurance and consulting activities (IIA 2013). Additionally, prior literature finds that Chief Audit Executive tenure, as well as management and board members asking for greater IAF involvement with ERM, increases IAF's level of involvement in ERM-related evaluation (Beasley, Clune, and Hermanson 2008a). Similarly, management perceptions of business risk, specifically financial and operating risk, decrease when the IAF audits a particular business unit, and perceptions of future audited unit performance increases (Carcello, Eulerich, Masli, and Wood 2018). That is, support exists for IAF's

direct involvement in ERM evaluation as board and management members identify that the IAF plays a value-add role.

It is also an empirical question as to whether IAF competency is associated with the propensity and extent of ERM oversight disclosure. While disclosure of company risks is required in firm filings, explicit disclosure of ERM-specific oversight is not required, suggesting variation in ERM oversight disclosures, specifically within the proxy statement and audit committee charter (SEC 2010; NYSE 2003). Past research finds that voluntary board-level and audit committee-level disclosures are associated with greater resources that support monitoring processes, such as underlying control structures, greater independent director effort, and larger firms (Mahmoudian, Nazari, and Herremans 2012; Laksmana 2008; Cheng and Courtenay 2006; Lim, Matolcsy, and Chow 2007; Carcello, Hermanson, and Neal 2002). These disclosures are driven by the confidence in the monitoring process as opposed to the level of performance of the related disclosure item.

The IAF's direct role in the ERM process of evaluating and assuring key risks may directly impact the volume and quality of information communicated to the board, who are ultimately responsible for ERM oversight. These IAF activities may not only enable the board to effectively monitor ERM processes, but also may increase the comfort of board members with the quality of the ERM program, increasing their willingness to voluntarily report on their responsibilities for ERM risk oversight. It may align, therefore, that a more competent IAF will provide better underlying evidence of ERM activities, which will lead to the board or audit committee disclosing risk oversight responsibilities in the proxy statement or audit committee charter, regardless of the level of ERM quality.

Due to data constraints, past research does not address whether IAF competency is associated with ERM quality and risk oversight. In this study, I use a measure of IAF competency to test whether IAF competency is associated with an objective measure of ERM quality. I further test whether the level of board oversight over ERM practice (i.e. board-level, audit committee-level, or risk committee-level) moderates the relationship between IAF competency and ERM quality. I next test whether IAF competency is associated with firms' propensity and extent of ERM oversight disclosure in both proxy statements and audit committee charters. I test the predictions on a sample of 2,138 firm-years representing 437 unique firms of the S&P 600 index⁵⁸ from 2010 through 2015.⁵⁹ I use hand-collected LinkedIn data to uniquely measure competency characteristics of individual IAF employees, i.e. professional experience and certification, educational background, function size, in order to construct a composite IAF competency score on a firm-year basis. This composite IAF competency score is the primary test variable as it captures a comprehensive understanding of firm-level IAF competency. I combine this data with SeekINF data to identify disclosures of ERM oversight in proxy statements, with hand-collected audit committee charters to identify audit committee charter disclosures of ERM oversight, with BoardEx to identify risk committee details, and with Compustat and Audit Analytics for necessary ERM quality characteristics and control variables.

⁵⁸ S&P 600 firms are particularly suitable for examining associations with ERM oversight as these firms are “typically known for less liquidity and potentially less financial stability”, indicating that this index holds more distinctive risk and, as such, may be subject to greater variation of ERM oversight (S&P 2016).

⁵⁹ The decision to restrict my main analysis to 2010-2015 is primarily due to relevant risk oversight rules (e.g. SEC Rule 33-9089; Dodd-Frank Act) that directly regulate the disclosure of ERM oversight and the establishment of risk committees were not enacted until 2010. Additionally, there are concerns about LinkedIn usage and degrees of completeness of profiles for years preceding 2010 (Byers 2013; Case, Gardiner, Rutner, and Dyer 2012).

I first examine whether there is an association between IAF competency and ERM quality. I find a positive association between the measure of IAF competency and an objective index of ERM quality developed by Gordon et al. (2009), suggesting that IAF has enough influence in its work surrounding ERM evaluation to positively impact firm ERM performance. This result extends the abundant IAF and financial reporting quality literature and adds to the ERM literature by examining IAF competency as it relates to ERM outcomes. I further examine whether the association between IAF competency and ERM quality differs by level of audit committee or CFO accounting expertise. Consistent with literature that identifies lower expert individuals surrounding themselves with experts, I find that the relationship between IAF competency and ERM quality is significant when audit committee accounting expertise is low or there is no CFO accounting expertise.

I next examine whether there is an association between IAF competency and ERM oversight disclosure, proxied by disclosure of ERM oversight in the proxy statement and audit committee charter. I find that IAF competency is positively associated with the propensity to disclose ERM-specific oversight responsibilities in both the proxy statement and audit committee charter. I additionally find that IAF competency is positively associated with the extent of ERM oversight disclosure in both the proxy statement and audit committee charter. These tests control for ERM quality, and suggest that firms base the decision to disclose on IAF's contributions to ERM oversight versus the level of ERM quality. These results are also new to the IAF and ERM literatures, and suggest a unique value IAF competency provides for disclosure.

I further test for whether the association between IAF competency and ERM quality is affected by the concentration of board-level ERM oversight. I find the relationship

between IAF competency and ERM quality strongest when the audit committee has the primary responsibility for ERM oversight, as proxied by disclosure of ERM oversight in the audit committee charter. I find a weaker relationship between IAF competency and ERM quality when the board has the primary responsibility for ERM oversight, as proxied by disclosure of ERM oversight in the proxy statement. I find no relationship between IAF competency and ERM oversight when there is a standalone risk committee, which could be due to low power in the sample or the mutual exclusivity of the risk committee's and the IAF's role within the firm. Interestingly, I do not find an association between IAF competency and ERM quality for firms that do not disclose ERM risk oversight, suggesting that while ERM quality does not determine the propensity of ERM oversight disclosure, the comfort in disclosing about risk oversight suggests stronger overall ERM quality.

Next, I perform robustness tests and additional analyses. I re-estimate all main tests using propensity score matching, and find consistent results across all models. These models provide comfort for the potential for endogeneity impacting the relationship between IAF competency and ERM quality and oversight disclosure. I additionally re-estimate the association between IAF competency and ERM quality by considering the effect of institutional ownership, an external monitoring mechanism. I find that IAF competency is positively associated with ERM quality when the extent of institutional ownership is high, suggesting that greater external pressure may be associated with an effort to utilize IAF information and communication to increase ERM quality. This result provides comfort that the relationship in the main analysis is not spurious.

This study extends research that examines the IAF's role in financial reporting quality by examining the IAF's wider role in the ERM process. I contribute to both the IAF

and ERM literatures by finding that (1) higher IAF competency leads to greater ERM quality, (2) higher IAF competency leads to a greater propensity for and greater extent of firms' disclosure of ERM oversight in the proxy statement and audit committee charter, and (3) higher IAF competency leads to greater ERM quality when the audit committee is primarily responsible for ERM oversight as proxied by ERM disclosure in the audit committee charter. ERM is critical for managing risk, and prior research has not evaluated the IAF's role as a lower-level monitor that feeds important ERM-related information to management and the board. These results, therefore, demonstrate the value a competent IAF has in enhancing overall risk monitoring and providing risk-based disclosure for external stakeholders. Management and boards that are focused on their monitoring capabilities should be interested in these results, as bolstering ERM-related monitoring at the IAF level can increase their own ability to effectively monitor ERM.

Findings herein are also relevant to external auditors who are required to evaluate client control risk as well as internal audit competency. Understanding the value a more competent lends to overall ERM quality can contribute to overall audit efficiency and effectiveness. Further, findings of this study can contribute to the open debate of whether the IAF should be a regulated monitoring body, as regulatory oversight is scant and movement on this issue has slowed in recent years (Ege 2015; Carcello et al. 2018). Findings can contribute to investors' knowledge about corporate governance quality due to a higher likelihood of firm disclosure over board risk oversight based on higher IAF competency. Lastly, findings contribute to the nascent, but growing, literature using LinkedIn as a data source to gather information about accounting personnel (Barrios 2018; Lee, Nagy, and Zimmerman 2018).

The rest of the paper is organized as follows. Section II reviews background information and literature about ERM and the IAF. Section III proposes hypotheses, Section IV describes the proposed methodology, Section V discusses results, and Section VI concludes.

II. BACKGROUND & LITERATURE REVIEW

IAF's Role in Enterprise Risk Management

The IAF plays an important role in ERM as a risk-based, objective assurance provider (Carcello et al. 2018; IIA 2017). The COSO ERM framework identifies the IAF as a function that can directly assist both the audit committee and management by “examining, evaluating, reporting, and recommending improvements on the adequacy and effectiveness of management’s risk management processes” (COSO 2004a; COSO 2004b). Indeed, the Institute of Internal Auditors (IIA) echoes the broad COSO definition above through its Attribute Standard 2120.⁶⁰ That is, the IAF can aid the achievement of the firm’s strategic objectives by evaluating risk exposures and determining appropriate responses based on management’s risk appetite (IIA 2017).

The IIA further delineates two types of activities the IAF can perform with regard to ERM: assurance and consulting (IIA 2009). Assurance activities are primarily concerned with reviewing the management of key risks, evaluating the reporting of key risks, and providing assurance of risk evaluation and processes. Consulting IAF activities can include coaching management in responding to risks, coordinating ERM activities, and maintaining the ERM framework (Gramling and Myers 2006; IIA 2009). As such, the IAF

⁶⁰ IIA Attribute Standard 2120 – Risk Management states: “the internal audit activity must evaluate the effectiveness of and contribute to the improvement of risk management processes” (IIA 2017).

can provide value to an organization's ERM by expanding its assurance practices beyond the traditional financial and compliance roles to focusing on strategic, operational, and information technology risks that represent a firm's evolving risk profile (PwC 2009).

Research has provided support for the IAF's role in ERM. Beasley et al. (2008a) find that greater Chief Audit Executive (CAE) tenure increases IAF involvement in ERM work, suggesting that seniority at the IAF level influences the IAF's role in assessing and reporting on ERM. Similarly, greater IAF activity in ERM-related processes is higher when there is a request for great IAF involvement in ERM from either the CFO or audit committee.⁶¹ PwC's (2009) State of the Internal Audit Profession Study further find that effective communication between the IAF and the board/management is critical for successful leveraging of the IAF in the assessment of ERM. Collectively, these results suggest that board- and management-level support for and relationship with the IAF can increase the IAF's success in ERM-related evaluation. However, it is important to consider the mechanism through which the IAF can and should be involved in ERM. The IIA heeds that management should be wholly responsible for setting the risk appetite, imposing the risk management processes, and making risk responses (IIA 2009).⁶² As such, management needs to make patently clear of the boundaries surrounding what areas of ERM evaluation are and are not appropriate for the IAF to be involved in.

Enterprise Risk Management Literature

⁶¹ In an earlier study, Beasley et al. (2005) find that explicit calls from the CEO and CFO for internal audit involvement in ERM implementation are positively associated with the extent of ERM deployment.

⁶² For example, de Zwaan, Stewart, and Subramaniam (2009) experimentally find that internal auditors are less willing to report a breakdown in risk procedures to the audit committee when their involvement in ERM is high, suggesting a negative impact on objectivity when they are performing risk activities specifically tasked to management.

The updated 2017 COSO ERM framework focuses on the evolution of ERM in the current risk environment. That is, as ERM has matured over the past two decades, ERM has shifted from an implementation phase to a more mature, application stage, where both management and the board need to consider risks as they relate to strategy and performance (COSO 2017). ERM is one of management's fundamental responsibilities toward determining risk, implementing risk processes, and managing risk outcomes. Management reports on the risk management framework on behalf of the board, who, along with the audit committee, is responsible for overseeing the ERM process (IIA 2009; Gramling and Myers 2006). The ERM literature focuses primarily on determinants of ERM implementation and its effect on firm performance and audit fees.

Prior research that examines ERM implementation traditionally focuses on the appointment of a Chief Risk Officer (CRO) as a signal of implementation (e.g. Leibenberg and Hoyt 2003; Pagach and Warr 2011; Beasley et al. 2005; Desender and Lafuente 2013; Hines, Masli, Mauldin, and Peters 2015). CRO appointments are associated with larger and more leveraged firms, greater institutional ownership, greater board independence, and higher audit fees (Leibenberg and Hoyt 2003; Pagach and Warr 2011; Beasley, Clune, and Hermanson 2005; Hines et al. 2015).⁶³ Collectively, these studies examine firms beyond

⁶³ Additionally, the literature shows that some management and board-level characteristics impact ERM implementation. CEO and CFO support for ERM, greater board independence along with a lack of CEO duality, and the influence of a risk manager and/or board of directors lead to ERM implementation (Beasley et al. 2005; Desender 2007; Kleffner, Lee, and McGannon 2003). Together, larger firms with greater monitoring quality and support for ERM at the board and management level determine ERM implementation.

the banking industry that are required to appoint a CRO, suggesting that firm characteristics determine said appointment.⁶⁴

Additional ERM studies address ERM beyond the implementation stage by estimating more comprehensive measures of ERM quality. Higher ERM quality, for banking and insurance firms per S&P, is associated with improved accounting performance, stronger responses to earnings surprises, and reduced audit fees, audit delay, and likelihood of late filing (i.e. Baxter et al. 2013; McShane, Nair, and Rustambekov 2011; Bailey et al. 2018). Similarly, Gordon et al. (2009) develop an ERM quality index and find a positive relation between ERM performance and firm performance, contingent on environmental uncertainty, industry competition, firm complexity, firm size, and board monitoring.

Overall, there is some support in the literature that point to ERM implementation or ERM quality as a mechanism for firms to improve stock returns, accounting performance, and firm performance by committing to risk oversight. However, no archival study has investigated whether lower-level monitors contribute to ERM quality or oversight. This study considers the effect of IAF competency on ERM quality and ERM oversight disclosure.

III. HYPOTHESIS DEVELOPMENT

IAF Competency and ERM Quality

⁶⁴ The Dodd Frank Act of 2010 requires publicly-traded banking institutions with total assets greater than \$10 billion to have a board-level risk committee and with total assets greater than \$50 billion to have a CRO (U.S. House of Representatives 2010).

Prior IAF research finds that higher quality IAFs are significantly related to lower earnings management behavior, lower material weakness disclosure, and lower propensity of management misconduct (Prawitt et al. 2009; Abbott, Daugherty, Parker, and Peters 2016; Lin et al. 2011; Ege 2015). Similarly, Chapters One and Two find that more competent IAFs are associated with greater audit committee financial expertise, lower material weakness disclosure, and lower restatement disclosure. Further, Chapter Two finds that IAF competency increases in light of material weakness and restatement disclosures. These results collectively show the value of the IAF as a governance mechanism as it relates to financial reporting quality (DeFond and Zhang 2014).

Yet, the IAF's role is greater than providing assurance just over financial reporting. The IAF is responsible for risk management across strategic, operational, reporting, and compliance objectives as a "third line of defense" (IIA 2013). Indeed, many of the COSO ERM components overlap with the internal controls over financial reporting (ICFR) components, suggesting that the transference of skillsets for IAF employees between testing of specific controls and providing broad-based risk management evaluations is not an obstacle.⁶⁵ The IAF can provide assurance that the first two lines of defense (i.e. operational management and risk management/compliance functions) are effective in managing risk (ECIIA/FERMA 2011; IIA 2013; Carcello et al. 2018).⁶⁶ Similarly, the IAF's role in risk management prompted the since-rescinded NASDAQ proposal requiring

⁶⁵ Per COSO, the ERM and ICFR components that overlap are (1) environment, (2) risk assessment, (3) control activities, (4) information and communication, and (5) monitoring.

⁶⁶ Per the IIA's Three Lines of Defense Model (IIA 2013), the first line of defense, operational management, own and manage risk through the direct use of management controls and internal control measures. The second line of defense, risk management and compliance functions, build and monitor the first line of defense through functions related to financial control, security, risk management, quality, inspection, and compliance.

all listed companies to maintain an IAF (SEC 2013; Protiviti 2013; Carcello et al. 2018). Carcello et al. (2018) find that management perceptions of overall business risk are reduced when the IAF audits a business unit (compared to a non-audited business unit), specifically for both financial and operating risk. Their findings further support the value-added nature of IAF in an ERM capacity as management perceives greater performance of the audited business unit ex-post.

Thus, the IAF plays a role in ERM, but it is unanswered in the literature whether IAF competency is associated with ERM quality. On one hand, IAF competency may not play a significant role in determining better ERM in an organization for a few reasons. While there is substantial overlap between the COSO ERM and ICFR components, Bailey et al. (2018) notes that the ICFR framework does not include activities related to event identification and risk response. As these are typically management activities, the IAF may not take part in these areas or may take part in them in a limited manner (e.g. just for financial reporting), and thus IAF competency would not impact ERM. Cohen et al. (2017) find that while audit committee members and CFOs perceive they play a significant role with respect to ERM, external auditors perceive they play a weaker role concerning ERM objectives outside of financial reporting risks. Similarly, as the IAF was initially developed to address financial reporting risks, internal auditors too may have a lesser role in the broader areas of risk management, such as with strategic risks (Carcello et al. 2018). Thus, higher IAF competence may not in fact improve overall ERM.

On the other hand, Bailey et al. (2018, 26) state that “ERM’s iterative risk identification process aids in the coordination between operating personnel and external auditors in key control identification”. They argue that ERM’s risk documentation and

monitoring of potential risk events enable external auditors to more aptly assess inherent and control risk, and thus, to be better prepared for the engagement. Inherent in the risk identification, documentation and monitoring process is a critical need for firm personnel to understand controls. In an interview study, Cohen et al. (2017) find that ERM monitoring allows the firm to identify ineffective controls and improve overall internal control. As the IAF plays a direct role in risk identification, documentation, and monitoring via assurance and consulting activities, higher IAF competence may increase the quality of risk information within the firm, which can help improve ERM quality.

Based on the standing literature, I expect that more competent IAFs will better assess strategic, operational, reporting, and compliance risk management processes, thus ultimately strengthening ERM. I formulate this prediction in the following directional hypothesis:

H1: IAF competency is positively associated with ERM quality.

IAF Competency and ERM Oversight Disclosure

I next discuss ERM-related disclosures in proxy statement filings and audit committee charters as a signal for ERM oversight commitment. Formally defined board risk responsibilities strengthen board risk oversight by expressly determining board accountability over its oversight activities (Tonello 2007; Deloitte 2014; Ittner and Keusch 2015). As such, I seek to establish an understanding of whether IAF competency strengthens firm-level confidence in the decision to voluntarily disclose ERM oversight practices.

Proxy Statements

The SEC enacted Rule 33-9089 as of 2010 in order to enhance public company proxy statement disclosures with more information around risk management and risk oversight (SEC 2010). Specifically, this amendment aims to provide stakeholders with greater information about “the board’s role in risk oversight and... disclosure about [a company’s compensation] policies and practices as they relate to risk management” (SEC 2010, 5). Disclosures of “risk management” in the proxy statement include broad discussion of topics related, but not limited, to compensation specific risk, interest rate specific risk, management’s qualifications over risk management, and ERM oversight.

In this study, I specifically focus on disclosures surrounding the board’s role in ERM oversight for a few reasons. First, COSO emphasizes the board’s oversight over ERM by recommending four practices focused on ERM’s contribution to company objectives (COSO 2009).⁶⁷ Gates et al. (2012) find that greater ERM-specific oversight by audit and risk management executives leads to increased risk-related information and communication, which increases perceived ERM performance. Second, Bailey et al. (2018) note that the SEC disclosure-based initiative differs from ICFR regulation as ICFR requires management and external auditor certification while ERM implementation is not mandatory. As such, there should be variability in proxy statements with explicit mentions of ERM.

⁶⁷ COSO’s recommended practices include: (1) discuss risk management philosophy and risk appetite, (2) understand risk management practices, (3) review portfolio risks in relation to risk appetite, and (4) be apprised of the most significant risks and risk responses.

To highlight the distinction between disclosures of “risk management” and of “ERM”, consider Cracker Barrel Old Country Store Inc.’s 2015 proxy statement. One discussion of risk management includes consideration of executive compensation:

“Compensation Risk Analysis: The Compensation Committee is responsible for overseeing our incentive compensation arrangements, for aligning such arrangement with sound **risk management** and long-term growth...”

This compares to the discussion of enterprise risk management:

“Board Oversight of Risk Management: ...Our Board of Directors also conducts an annual review, led by the Audit Committee, of the conclusions and recommendations generated by management’s **enterprise risk management** process. This process involves a cross-functional group of our senior management that, on a continual basis, identifies current and future potential risks facing us and ensures that actions are taken to manage and mitigate those potential risks.”

As such, I find it appropriate in this study to limit disclosures to specific discussion of ERM.

Prior research finds that boards with greater independent oversight of management and boards with greater time and resources dedicated to board oversight provide greater voluntary disclosure of executive compensation practices in the proxy statement, suggesting that disclosures are outcomes of board decisions rather than the assumed effect on management decisions (Laksmana 2008). Similarly, more independent boards have been found to have greater voluntary disclosure and disclosure of strategic information (Cheng and Courtenay 2006; Lim et al. 2007). Interestingly, board members seek to reduce disclosure risk by utilizing voluntary disclosure in reporting. Mahmoudian et al. (2012) find that strategic and operational controls provide the board greater confidence to voluntarily disclose non-financial (e.g. environmental, social, and governance issues) despite the level of non-financial performance. That is, boards with the underlying

mechanisms to support quality information for monitoring purposes may feel more comfortable in voluntarily disclosing information, regardless of the level of performance of the related disclosure.

Taken together, the underlying control activities and communication of ERM-related activities from lower-level monitors, such as the IAF, may not only enhance the board's ability to effectively monitor ERM processes through available resources and information, but also may provide the board greater confidence in its decision to disclose voluntarily about their ERM oversight responsibilities. A more competent IAF should provide better underlying information and communication regarding ERM activities to enhance board-level ERM monitoring. This in turn may lead a board to disclose about its oversight in the proxy statement, despite the level of ERM quality. As such, I expect firms with higher IAF competency to disclose ERM risk oversight in the proxy statement. I formulate this prediction in the following directional hypothesis:

H2a: IAF competency is positively associated with the propensity to disclose and extent of disclosure of ERM oversight in the proxy statement.

Audit Committee Charter

The audit committee charter is another source of disclosure information that can illustrate ERM oversight responsibilities by demonstrating audit committee commitment toward ERM oversight. With regard to financial reporting, the audit committee is responsible for monitoring internal control, audit, and compliance processes, as well as overseeing IAF employment decisions and providing a direct IAF-audit committee reporting line (SEC 2003a; PCAOB 2016a). Beyond financial reporting, Beasley, Branson,

and Hancock (2010) find that the audit committee is most frequently charged with risk oversight in a survey study. Indeed, the New York Stock Exchange (NYSE) Corporate Governance Rules require registrant audit committees to discuss risk assessment and risk management policies in their charter (NYSE 2003; Beasley et al. 2005).^{68,69,70}

Baxter et al. (2013) find that firms that disclose assigned audit committee oversight of financial responsibility have higher ERM quality in their sample of financial firms. That is, greater disclosure around risk assessment and risk management policies can signal greater audit committee commitment toward ERM oversight responsibilities. In that vein, previous literature has explored committee commitment toward oversight through charter disclosure. Burke, Hoitash, and Hoitash (2017) find that firms with sustainability board committee charters that explicitly claim responsibility over corporate social responsibilities perform better along those dimensions. Similarly, Chapter Two finds that firms with audit committee charters that have greater voluntary disclosure over the IAF are more likely to increase IAF competency after both material weakness and restatement disclosures.

Yet, similar to the proxy statement discussion, voluntary disclosure of audit committee activities has not been found to be uniform in all firms, suggesting variation in how firms determine disclosure regarding audit committee oversight in the charter

⁶⁸ Per Ittner and Keusch (2015) Footnote #3: “Even if the Board sets up a separate risk committee, the audit committee charter of NYSE-listed firms must still address the committee’s duty to discuss policies with respect to risk assessment and risk management.”

⁶⁹ Additionally, the NYSE requires all registrants to have an IAF in order to “provide management and the audit committee ongoing assessments of the company’s risk management process and system of internal control” (NYSE 2003, 13).

⁷⁰ Similar to earlier discussion of the proxy statement, the audit committee charter disclosure rule is inclusive of all risk management related items. As such, I expect variability in firms disclosing explicitly about ERM-related items, and restrict analysis to this specific set of disclosures.

(Carcello et al. 2002).⁷¹ As such, audit committee risk oversight disclosure may not be dependent on firm performance and may be determined more by the level of confidence instilled in the risk oversight process. As audit committees are directly responsible for both IAF and ERM oversight simultaneously, and the IAF provides the audit committee with information and communication about ERM processes, the audit committee may feel more compelled to disclose about its ERM risk oversight responsibilities due to the comfort in the established communication loop.⁷²

A more competent IAF should enable the audit committee to better monitor ERM-related risk by providing cohesive information and communication about internal control and risk processes. The audit committee may then choose to provide ERM disclosures in the audit committee charter regardless of ERM quality. As such, I expect firms with higher IAF competency to disclose ERM risk oversight in the audit committee charter. I formulate this prediction in the following directional hypothesis:

H2b: IAF competency is positively associated with propensity to disclose and extent of disclosure of ERM oversight in the audit committee charter.

IAF Competency, ERM Quality, and Level of Board Oversight

⁷¹ Carcello et al. (2002) find that depository firms, larger firms, and NYSE firms are more likely to voluntarily disclose about audit committee oversight activities in the audit committee charter.

⁷² Additionally, other voluntary disclosures in the audit committee charter may prompt audit committees to disclose about their ERM oversight responsibilities. Gramling and Myers (2006) discuss the importance of safeguards around the IAF undertaking legitimate consulting activities (beyond assurance activities). The authors suggest that a preventative measure to ensure the delineation of responsibility between the IAF and management is to document IAF's ERM responsibilities in the audit committee charter. This in turn, may prompt a greater likelihood and extent of disclosure of the overall committee's ERM oversight responsibilities.

Provided that IAF competency is positively associated with ERM quality, this association may be influenced by which function within the board of directors takes the premier responsibility for ERM oversight when ERM oversight is disclosed. Firms may signal overall board responsibility for ERM risk oversight via the proxy statement. Firms may also signal audit committee-specific responsibility for ERM risk oversight via the audit committee charter. Additionally, firms may institute a standalone risk committee which takes explicit responsibility toward managing ERM risk oversight. I discuss each of these three levels of ERM oversight herein.

Full board oversight. Board-level risk oversight, as indicated by ERM disclosure in the proxy statement, signals that the board as a whole takes responsibility for ERM monitoring. Per COSO's ERM framework, the board as whole should be involved in the risk management discussion of philosophy, practices, and responses (COSO 2009). That is, by virtue of "more hands on deck" at the board level being specifically invested in ERM oversight, board-level ERM risk oversight should enhance ERM quality. Board-level ERM risk oversight depends on the quality of information provided by lower-level monitors, such as the IAF. As such, board-level risk oversight may increase ERM quality, especially when IAF competency is higher.

Audit committee oversight. Audit committee risk oversight, as indicated by ERM disclosure in the audit committee charter, explicitly signals that the audit committee takes responsibility for ERM oversight.⁷³ By disclosing monitoring responsibilities toward risk

⁷³ At times, firms choose to disclose the audit committee charter within the proxy statement. Disclosures of the audit committee within the proxy statement were removed from the sample of proxy statement disclosures to create a distinct sample between proxy and audit committee charter disclosures of ERM risk oversight.

oversight in its charter, the audit committee signals its commitment and takes on risk oversight with such activities as discussing risk assessment and risk management policies. As the audit committee already has the responsibility for monitoring internal control through oversight of the IAF, audit committee-level ERM risk oversight can provide greater insight to monitoring both risk and internal control processes simultaneously. That is, the audit committee will be focused on evaluating risk from an enterprise level that will help inform understanding of the internal controls aimed to mitigate risk. Additionally, as the audit committee is responsible for IAF oversight, the audit committee will have ease of communication and access to information necessary to monitor both functions. The audit committee's dual focus on both ERM and internal control should thus work to enhance ERM quality. As such, audit committee-level risk oversight may increase ERM quality, especially when IAF competency is higher.

Risk committee oversight. The Dodd Frank Act of 2010 established risk committee requirements for publicly-traded financial institutions in light of the 2008 global financial crisis (U.S. House of Representatives 2010). Risk committees are explicitly responsible for ERM oversight, and as such, firms beyond the financial industry have established risk committees in order to address increasing ERM demands.⁷⁴ Risk committees can provide a centralized, dedicated resource to evaluate risk management, to unburden the work level of other committees with regard to ERM monitoring, and to streamline communication to the overall board, thus strengthening board risk oversight

⁷⁴ As the sample does not include financial institutions, many of which are required to have a risk committee per the Dodd-Frank Act of 2010, I expect there to be variability in the firms that choose to have a risk committee (U.S. House of Representatives 2010). Establishing a risk committee, therefore, is a specific decision that firms choose to make given the availability of resources and the needs of the ERM.

(Hines et al. 2015; Ittner and Keusch 2015). Further, risk committees can act a publicly visible signal to stakeholders that firms are taking risk management and corporate governance seriously (Ittner and Keusch 2015). Baxter et al. (2013) find that firms with a risk committee have higher ERM quality ratings for their sample of financial firms. In the external auditing literature, Hines et al. (2015) find that while risk committees are associated with higher audit fees, the composition of the risk committee (i.e. higher risk committee independence; higher audit committee overlap) is associated with lower audit fees. Interestingly, Bailey et al. (2018) do not find an association between risk committees and audit fees, but find that audit delay decreases for firms with a risk committee. That is, risk committees provide benefits of maintaining ERM quality as well as increasing audit efficiency.

Establishing a risk committee for non-financial firms is a specific decision that firms choose to make given the availability of resources and the needs of the ERM. Risk committee-level ERM oversight, therefore, signals that the standalone committee takes responsibility for ERM oversight. As monitoring and managing risk is the committee's main function, the risk committee will have a tight focus around ERM, compared to the board or audit committee, where ERM oversight is one of many prescribed responsibilities. Since this sub-committee is a dedicated resource toward risk oversight, ERM quality should be enhanced in the presence of a risk committee. If firms are choosing to invest in ERM oversight via a risk committee, firms are likely to invest in monitoring at various levels, including the IAF. As such, risk committee-level risk oversight may increase ERM quality, especially when IAF competency is higher.

I formulate this overall prediction in the following directional hypothesis:

H3: The association between IAF competency and ERM quality is positively influenced by the board component most responsible for risk oversight (board; audit committee; risk committee).

IV. RESEARCH DESIGN

Sample

The sample selection starts with an S&P 600 index dataset consisting of 3,616 firm-year observations of 600 firms from 2010-2015 (p. 20-23). I then hand-collected IAF personnel data for the sample firms from LinkedIn, totaling 19,544 individual-year observations for 2,606 IAF employees. Please refer to Chapter One for detailed discussion about the data collection protocol. I merged the IAF and S&P 600 data with additional data from Compustat, Audit Analytics, SeekINF, BoardEx, and hand-collected audit committee charters. I eliminated observations with missing IAF size, and missing audit committee, management, auditor, and firm characteristics. I winsorized all continuous variable at the 1st and 99th percentiles. The final sample is 2,138 firm-year observations of 437 S&P 600 firms from 2010-2015.

Data

I hand-collected individual IAF employee data from LinkedIn related to employment history, higher education, and professional certifications (PCAOB 2016a; p. 20-23). Previous IAF-related research is limited by the lack of publicly available information about IAF employees, so I find LinkedIn to be a valid source of data for this study (p. 17-20). I collected proxy disclosure data from SeekINF for the sample firms. I searched for the phrase “enterprise risk management” and “ERM” within the SEC Form DEF 14A Proxy Statement option from 2010-2015. I hand-collected audit committee

charters from each sample firm's Web site.⁷⁵ I collected risk committee data from BoardEx's Board and Committee Details dataset for each sample firm.

Independent Variable: IAF Competency Measure

I utilize the composite IAF competency measure created in Chapter One and used for financial reporting quality analysis in Chapter Two. The ten competency characteristics are IAF tenure (*IAF_EXP_TENURE*), previous Big 4 experience (*IAF_EXP_BIG4*), previous Midtier experience (*IAF_EXP_MIDTIER*), CPA certification (*IAF_CERT_CPA*), CIA certification (*IAF_CERT_CIA*), CFE certification (*IAF_CERT_CFE*), CISA certification (*IAF_CERT_CISA*), undergraduate accounting education (*IAF_EDU_UGACC*), graduate accounting education (*IAF_EDU_MSA*), and the number of IAF employees scaled by firm size (*IAF_SIZE_SCALED*).

Each characteristic receives an indicator variable equal to one if the competency measure is greater than or equal to the median value by fiscal year, and zero otherwise. These indicators are summed into the four overarching components of IAF competency, experience (*IAF_EXP*), certification (*IAF_CERT*), education (*IAF_EDU*), and size (*IAF_SIZE*), and again dichotomized at the median. Each component is assigned an indicator variable equal to one if the component measure is greater than or equal to the median value, and zero otherwise. These component indicators are summed to total the composite IAF competency measure (*IAF_COMP*), ranging from zero to four, with higher values representing higher IAF competency.

⁷⁵ Audit committee charters are not regularly updated each year for each firm. As such, I use the most recent version I could obtain online as of 2016.

Dependent Variables

ERM Quality

For H1 and H3, I measure ERM quality based on the Gordon et al. (2009) ERM index that aims to measure firm ERM performance in an objective manner. Gordon et al. (2009) use the COSO ERM framework objectives of strategy, operations, reporting, and compliance to conceptually ground their index. The authors identify two relevant measures per COSO objective that suggest the achievement of the objective based on firm performance. Thus, the goal of the index is to measure ERM effectiveness, or quality, based on a firm's ability to successfully achieve the COSO ERM objectives.

The strategy objective focuses on whether a firm can develop a competitive advantage relative to industry firms. The authors identify two industry-level measures that focus specifically on firm performance and systematic risk. The first measure, *STRAT1*, is equal to the number of standard deviations a firm's sales deviate from industry sales, and captures whether firms are outperforming their average peers. The second measure, *STRAT2*, measures whether there has been a reduction in systematic risk (proxied by the firm's beta) relative to other firms in the same industry, and captures whether the use of ERM successfully diversifies firm risk. The operations objective focuses on firm productivity. The authors identify two measures that focus on operating efficiency, suggesting that better efficiency lowers the overall risk of firm failure. *OPS1* is calculated as the asset turnover ratio, and captures the level of asset input for a given level of output. *OPS2* is the ratio of total sales to the number of employees, and captures the level of employee efficiency relative to performance.

The reporting objective focuses on reporting reliability as it impacts firm performance. The authors identify two measures that focus on financial reporting quality to capture whether poor reporting increases firm risk, which negatively impacts firm performance. *REPORT1* is equal to sum of the disclosure of (1) a material weakness, (2) an unclean audit opinion, and (3) a restatement, and captures commonly used measures of financial reporting failures. *REPORT2* measures abnormal accruals using the Jones (1991) accruals estimation model, and captures the level of a firm's abnormal accruals relative to industry peers. Lastly, the compliance objective addresses a firm's level of compliance with applicable laws and regulations. The authors identify two measures that suggest adherence auditing standards and regulation compliance. *COMP1* measures increased compliance with greater audit fees as the ratio between audit fees and firm size and captures auditor compliance with generally accepted auditing standards. *COMP2* measures settlement outcomes as it relates to firm size as the ratio between settlement net gains/losses and firm size, and captures settlement outcomes relative to compliance with regulation.

The authors standardize each measure among the sample firms, and sum the eight standardized measures to compose the overall ERM index (*ERMI*). Please refer to Appendix A for greater detail into the calculation of each of these measures.⁷⁶

⁷⁶ Gordon et al. (2009) identify 112 firms from 2005 that disclose the use ERM in 10-K/10-Q filings and fit further criteria for their models in order to measure performance based on the COSO ERM framework objectives. Main results suggest that higher performing ERM firms are associated with better firm performance (proxied by one-year excess stock market returns). The authors use a propensity score matched sample in order to validate the ERM index. The authors match the sample firms to 112 non-ERM identifying firms to combat the risk of ERM self-selection as well as to support the theory that firms using ERM should have a higher ERM index value than non-ERM firms. Correcting for self-selection, the authors find that the main test results hold. The authors further use alternative cutoffs and timing for excess returns to support their results.

Enterprise Risk Management Disclosures

For H2a, I measure disclosure of ERM oversight in the proxy statement. I create an indicator variable *PROXYERMDISC* equal to one if the sample firm discusses “enterprise risk management” and/or “ERM” in a proxy statement per firm-year, and zero otherwise. For H2b, I measure disclosure of ERM oversight in the audit committee charter. I create an indicator variable *ACCHARTERMDISC* equal to one if the sample firm discusses “enterprise risk management” and/or “ERM” in the audit committee charter, and zero otherwise. I also measure the extent of ERM oversight disclosure in the proxy statement and audit committee charter. I create two count variables, *PROXYERMDISCCOUNT* and *ACERMDISCCOUNT*, which are equal to the number of times “enterprise risk management” and/or “ERM” is discussed in the proxy statement and audit committee charter respectively.

Multivariate Models

To test the relation between the IAF competency and ERM quality for H1, and the moderating effect of board-level, audit committee-level, and risk committee-level ERM oversight disclosure on the relationship between IAF competency and ERM quality for H3, I specify the following OLS regression model:

$$\begin{aligned} ERMI = & \beta_0 + \beta_1 IAF_COMP + \beta_2 LNASSETS + \beta_3 BM + \beta_4 LEV + \beta_5 INVREC + \\ & \beta_6 LNSEGMENTS + \beta_7 SALES GROWTH + \beta_8 ROA + \beta_9 MW + \beta_{10} LIT + \beta_{11} ACQ + \\ & \beta_{12} FOREIGN + \beta_{13} NEWCFO + \beta_{14} BIG4 + \beta_{15} AUDCHG + \beta_{16} BOARDINDEX + \\ & \beta_{19} IndustryFE + \beta_{20} YearFE + \mathcal{E} \end{aligned} \quad (1)$$

The dependent variable *ERMI* in Equation (1) is a composite measure from Gordon et al. (2009) that measures various components of the COSO framework based on firm

performance. Please refer to Appendix A for a detailed explanation of how this composite measure is calculated. The variable of interest for Equation (1), *IAF_COMP*, captures the level of IAF competence. A positive and significant coefficient on β_1 would support H1. To test for H3, I split the sample of firms based on the level of ERM oversight. *BOARDRESP* is equal to one when the firm discloses ERM oversight in the proxy statement, and zero when the firm does not disclose ERM oversight in the audit committee charter or does not have a risk committee in place. *ACRESP* is equal to one when the firm discloses ERM oversight in the audit committee charter, and zero when the firm does not disclose ERM oversight in the proxy statement or does not have a risk committee. Within the BoardEx committee detail data, I searched for the term “risk” in the committee name variable in order to distinguish which committees are designated as risk committees per firm-year. I create an indicator variable *RISKCOMM* equal to one if the sample firm has a designated risk committee in the firm year, and zero otherwise. *RISKCOMMRESP* is equal to one when the firm has an established risk committee, and equal to zero when the firm does not disclose ERM oversight in either the proxy statement or the audit committee charter. A significant coefficient on β_1 would support H1 and H3.

To test the relation between the propensity of and extent of disclosure of ERM oversight in proxy statements (audit committee charters) and IAF competence for H2a (H2b), I specify the following logistic regression models:

$$\begin{aligned}
 \text{PROXYERMDISC [PROXYERMDISCCOUNT]} = & \beta_0 + \beta_1 \text{IAF_COMP} + \beta_2 \text{LNASSETS} + \\
 & \beta_3 \text{BM} + \beta_4 \text{LEV} + \beta_5 \text{INVREC} + \beta_6 \text{LNSEGMENTS} + \beta_7 \text{SALESGROWTH} + \beta_8 \text{ROA} + \\
 & \beta_9 \text{MW} + \beta_{10} \text{LIT} + \beta_{11} \text{ACQ} + \beta_{12} \text{FOREIGN} + \beta_{13} \text{NEWCFO} + \beta_{14} \text{BIG4} + \beta_{15} \text{AUDCHG} \\
 & + \beta_{16} \text{RISKCOMM} + \beta_{17} \text{BOARDINDEX} + \beta_{18} \text{ERMI} + \beta_{19} \text{IndustryFE} + \beta_{20} \text{YearFE} + \mathcal{E}(2)
 \end{aligned}$$

$$\begin{aligned}
ACCHARTERMDISC \ [ACCHARTERMDISCCOUNT] = & \beta_0 + \beta_1 IAF_COMP + \\
& \beta_2 LNASSETS + \beta_3 BM + \beta_4 LEV + \beta_5 INVREC + \beta_6 LNSEGMENTS + \\
& \beta_7 SALES GROWTH + \beta_8 ROA + \beta_9 MW + \beta_{10} LIT + \beta_{11} ACQ + \beta_{12} FOREIGN + \\
& \beta_{13} NEWCFO + \beta_{14} BIG4 + \beta_{15} AUDCHG + \beta_{16} RISKCOMM + \beta_{17} BOARDINDEX + \\
& \beta_{18} ERMI + \beta_{19} IndustryFE + \beta_{20} YearFE + \mathcal{E}
\end{aligned} \tag{3}$$

The dependent variable *PROXYERMDISC* in Equation (2) captures whether the target firm discusses ERM in a proxy statement in year *t*. The alternative measure *PROXYERMDISCCOUNT* measures the extent of ERM discussion in the proxy statement in year *t*. The dependent variable *ACCHARTERMDISC* in Equation (3) captures whether the target firm discusses ERM in the audit committee charter in year *t*. *ACCHARTERMDISCCOUNT* measures the extent of ERM discussion in the audit committee charter in year *t*. The variable of interest in both equations, *IAF_COMP*, captures the level of IAF competence. A positive and significant coefficient on β_1 for both equations would support H2a and H2b.

Following previous literature that focuses on disclosure of risk in public filings (e.g. Lawrence, Minutti-Meza, and Vyas 2018; Moon and Swanquist 2018), ERM measurement (e.g. Gordon et al. 2009), and determinants of risk committee presence (e.g. Ittner and Keusch 2015), I control for the following determinants of ERM quality and risk disclosure: firm size (*LNASSETS*), book-to-market ratio (*BM*), leverage (*LEV*), asset efficiency (*INVREC*), number of segments (*LNSEGMENTS*), sales growth (*SALES GROWTH*), profitability (*ROA*), internal control quality (*MW*), litigious industries (*LIT*), merger and acquisition activity (*ACQ*), foreign operations (*FOREIGN*), new CFO in the current year (*NEWCFO*), Big 4 auditor (*BIG4*), and auditor changes (*AUDCHG*). I additionally create an index representative of board size, board independence, and board tenure (*BOARDINDEX*). For Equations (2) and (3), I consider whether there is a risk committee

present at the firm (*RISKCOMM*). I further control for ERM quality (*ERMI*). See Table 3.1 for detailed variable descriptions. All models control for 2-digit SIC industry and year fixed effects. I cluster standard errors at the firm level.

[INSERT TABLE 3.1 HERE]

V. RESULTS

Descriptive Statistics

Table 3.2 presents the descriptive statistics of the model variables. The main IAF competency measure (*IAF_COMP*) ranges from zero to four with a mean (median) of 2.47 (3.0). The propensity of proxy statement (AC charter) ERM disclosure in the sample is 26.8 (12.2) percent. The extent of proxy statement (AC charter) ERM disclosure in the sample is 1.29 (0.17) times per filing. Average ERM quality is -0.001, consistent with Gordon et al. (2009). Board, audit committee, and risk committee responsibility is 84.8, 11.9, and 3.1 percent, respectively. Average total assets are \$1.1 billion, consistent with the sample covering S&P 600 index firms. The remaining descriptive are listed in the table and are consistent with the S&P 600 sample.

[INSERT TABLE 3.2 HERE]

Table 3.3 presents Pearson correlations for the IAF competency measure and the main variables of interest related to ERM quality and disclosure. As predicted, *IAF_COMP* is significantly, positively correlated with *PROXYERMDISC*, *ACCHARTERMDISC*, and *ERMI*. *IAF_COMP* is also significantly, positively associated with *ACCHARTERMDISCCOUNT*, the extent of AC charter ERM oversight disclosure. *IAF_COMP* is negatively associated with *BOARDRESP*, while positively associated with

ACRESP and *RISKCOMMRESP*. With regard to control variables (untabulated), *IAF_COMP* is positively correlated with firm size, leverage, segments, engaging with a Big 4 auditor, risk committee presence, and the board index, suggesting that more complex firms have better IAF competency. *IAF_COMP* is negatively correlated with the book-to-market ratio, material weaknesses, litigious firms, M&A activity, and auditor changes, suggesting that firms with uncertain operations are less likely to invest in IAF competency.

[INSERT TABLE 3.3 HERE]

Multivariate Analysis

Effect of IAF Competency on ERM Quality

Table 3.4 Column 1 presents the test of H1 using Equation (1). *IAF_COMP* in Column 1 is positive and significant, indicating that ERM quality increases with IAF competency.⁷⁷ Testing for marginal effects (untabulated), I find that a firm with IAF competency one standard deviation above the mean has ERM quality approximately 9.6 percent higher than firms with average competency.⁷⁸ Similar to how IAF competency improves financial reporting quality (e.g. Prawitt et al. 2009), this new, archival result to the literature demonstrates that the IAF provides value in assessing risk management. That is, as the IAF directly identifies, documents, and monitors risk through its assurance and consulting activities, higher IAF competency enhances overall ERM quality. This result

⁷⁷ I consider endogeneity where firms with better IAF are more likely to have higher ERM quality. I re-estimate Equation (1) by lagging the main variable of interest, *IAF_COMP*, in order to test for reverse causality. I find consistent results ($p < 0.01$). I also consider whether ERM quality is determined by the propensity to disclose ERM oversight practices in the proxy statement or audit committee charter. I re-estimate Equation (1) to include *PROXYERMDISC* and *ACCHARTERMDISC*, and find that *IAF_COMP* is still positive and significant and neither disclosure control is significant.

⁷⁸ Following Ege (2015), I calculate the marginal effect of ERM quality by multiplying the marginal coefficient on *IAF_COMP* by the standard deviation of *IAF_COMP*.

signals another benefit, beyond traditional financial reporting, for firms to invest in IAF competency. While management is ultimately responsible for event identification, risk response, and overall ERM, a more competent IAF, on average, is able to provide higher quality information and communication about risk management that aids ERM quality. ERM quality is also positively associated with firm size and the inventory and receivables turnover ratio. ERM quality is negatively associated with the book to market ratio, leverage, return on assets, material weakness disclosure, litigation risk, and auditor changes.⁷⁹

[INSERT TABLE 3.4 HERE]

I further investigate whether audit committee accounting expertise and CFO accounting expertise influence the relationship between IAF competency and ERM quality. Prior literature finds that audit committee accounting expertise⁸⁰ improves financial reporting quality through a lower likelihood of material weakness and restatement disclosure, less earnings management, and importantly has demonstrated that audit committee accounting expertise typically demands higher audit quality (Hoitash and Hoitash 2009; Zhang, Zhou and Zhou 2007; Krishnan 2005; Abbott, Parker, and Peters 2004). Similarly, prior literature finds that CFO accounting expertise is associated with a

⁷⁹ I consider whether the association between IAF competency and ERM quality is due to operating risk, or the inherent risk that a firm may fail to perform. I re-estimate Equation (1) and include the following additional control variables related to firm volatility. *CFO* is the standard deviation of cash flow from operations over 5 years, *SALESVOL* is the standard deviation of sales over 5 years, and *STDRET* is the standard deviation of returns over 12 months. Untabulated results find that IAF competency is still significantly associated with ERM quality, controlling for firm volatility characteristics. *CFO* and *SALESVOL* are inversely related to *ERMI*.

⁸⁰ Audit committees are required to have at least one designated financial expert (SEC 2003b). One type of financial expertise, commonly referred to as accounting expertise, is defined as an audit committee member who has a direct financial background in roles such as an auditor or CFO (Hoitash, Hoitash, and Bedard 2009).

lower likelihood to disclose material weaknesses and restatements (Li, Sun, and Ettredge 2010; Aier, Comprix, Gunlock, and Lee 2005; Hoitash, Hoitash, and Kurt 2016).⁸¹ To extend those literatures to an ERM context, accounting expertise at the audit committee or CFO level may have an impact on ERM quality as these professionals are trained to take a risk-based approach to evaluating processes. On the one hand, firms with greater audit committee or CFO accounting expertise may be more capable in evaluating risk and more likely to utilize a competent IAF as a resource to make risk-related determinations.

On the other hand, firms with lesser accounting expertise at the audit committee or CFO level may need to rely more significantly on the competency of lower-level monitors, such as the IAF, in order to make risk-based decisions. Prior literature finds that accounting professionals rely on specialist skill sets in order to complement their own understanding of complex processes (e.g. Cannon and Bedard 2017; Griffith, Hammersley and Kadous 2015; Hux 2017). Similarly, Chapter Two finds that firms with lower audit committee or no CFO accounting expertise improve IAF competency after a financial reporting failure in order to buoy their reliance on lower-level monitors to remediate financial reporting issues. That is, audit committees and CFOs with lesser accounting expertise may recognize they are less able to personally monitor ERM, and are therefore more likely to rely on a more competent IAF to provide higher quality information and communication about risk management to increase ERM quality.

⁸¹ CFOs are notably held accountable for financial reporting failures. CFO turnover increases following material weakness and restatement disclosures, and CFO bonus compensation decreases following material weakness disclosures (Johnstone, Li, and Rupley 2011; Hoitash et al.2012; Leone and Liu 2010).

Table 3.4 Columns 2 through 5 presents the results of this analysis. Columns 2 and 3 partition the sample by *ACEXP*ERT for firms with percentage of accounting experts below and above the median. Similarly, Columns 4 shows the sample of firms when *CFOEXP*ERT equals zero, and Column 5 shows when *CFOEXP*ERT is equal to one (Li et al. 2010; Bedard, Hoitash, and Hoitash 2014). Similar to Chapter Two, *IAF_COMP* is positive and significant when audit committee accounting expertise is low or when there is no CFO accounting expertise. While IAF competency on average works to improve ERM quality, these results suggest that IAF competency has a meaningful impact on improving ERM quality when ERM monitors are limited in their abilities to effectively oversee ERM-specific risks on their own. Control variable results are similar across these cross-sectional models to the main test in Column (1).

Effect of IAF Competency on Disclosure Events

Table 3.5 Panel A tests H2a and H2b using Equations (2) and (3). IAF competency is positively associated with the propensity for ERM disclosures in proxy statements and in AC charters in Columns 1 and 3, respectively. These results are new to the literature and document a positive association between the level of IAF competency and the likelihood of ERM oversight disclosure.⁸² These results are also economically meaningful, as the average marginal effects are significant in Columns 2 and 4. A firm with IAF competency

⁸² I additionally test H2a and H2b with dependent variables that measure the disclosure of “risk management” in both the proxy statement and AC charter. I find that the level of IAF competency is not associated with the propensity of disclosure of “risk management” in either setting. The lack of results is not a priori surprising, as disclosures of “risk management” may incorporate more broad-based topics beyond “enterprise risk management”, such as discussions of compensation specific risk, interest-rate specific risk, or biographical descriptions of executives’ professional backgrounds. These disclosures are not core to the discussion of a comprehensive risk management system that I aim to test for. As such, I find it appropriate in this study to limit the measures to discussion of specifically “enterprise risk management”.

one standard deviation above the mean is approximately 2.1 percent more likely to disclose ERM oversight in the proxy statement compared to firms with average competency. This represents a 7.7 percent increase relative to the unconditional probability of proxy statement disclosure of 26.8 percent.⁸³ Similarly, a firm with IAF competency one standard deviation about the mean is approximately 1.5 percent more likely to disclose ERM oversight in the audit committee charter compared to firms with average competency. This represents a 12.4 percent increase relative to the unconditional probability of audit committee charter disclosure of 12.2 percent.⁸⁴ Proxy statement ERM disclosure is positively associated with inventory and receivables turnover, material weakness disclosure, engaging a Big 4 auditor, auditor changes, and the board index, and negatively associated with foreign operations and the first year of a new CFO. Audit committee charter ERM disclosure is positively associated with firm size, engaging with a Big 4, auditor, and the board index, and negatively associated with leverage, segments, and sales growth.

[INSERT TABLE 3.5 HERE]

Table 3.5 Panel B re-estimates Equations (2) and (3) as OLS regressions with the continuous dependent variables *PROXYERMDISCCOUNT* and *ACERMDISCCOUNT*, respectively. Consistent with the main test of H2a and H2b, IAF competency is positively

⁸³ Following Ege (2015), I calculate the marginal effect of the change in likelihood of proxy statement (AC charter) disclosure by multiplying the coefficient on *IAF_COMP* in Column 2 by the standard deviation of *IAF_COMP*.

⁸⁴ I re-estimate Equations (2) and (3) to include the controls *CFO*, *SALESVOL*, and *STDRET*, in order to consider whether operating risk characteristics are influencing firm decisions to disclose about ERM oversight. Untabulated results find that IAF competency is still significantly associated with the propensity for ERM disclosure in both the proxy statement and audit committee charter. None of the three added variables is significant in the analysis.

associated with the extent of ERM disclosure in both the proxy statement and AC charter.⁸⁵ The extent of proxy statement ERM disclosure is positively associated with inventory and receivables turnover, engaging a Big 4 auditor, auditor changes, and the board index, and negatively associated with foreign operations and the first year of a new CFO. The extent of AC charter ERM disclosure is positively associated with firm size, inventory and receivables turnover, engaging a Big 4 auditor, and the board index, and negatively associated with leverage and segment. These results complement earlier findings and suggest that firms with greater IAF competency are not only more likely to disclose about oversight in these filings, but also increase the extent of disclosure about oversight as well.⁸⁶

I note that control variable *ERMI*, the dependent variable from the test of H1, is not significant in this analysis for any model. This suggests, consistent with prior research, that the board's decision to disclose about oversight, on average, is concerned with the confidence in the IAF's ability to provide quality information regarding ERM processes rather than the level of ERM quality that exists at the firm. However, to ascertain whether firms with higher IAF competency are simply more likely to disclose about ERM oversight, I partition the sample by ERM quality. Table 3.5 Panels C and D re-estimate Equations (2) and (3) for the propensity of disclosure and for the extent of disclosure by splitting the

⁸⁵ Results are consistent for both models using firm fixed effects. I additionally re-estimate these models for the extent of disclosure of "risk management", similar to the main test. The level of IAF competency is not associated with the extent of disclosure of "risk management" in either the proxy statement or AC charter.

⁸⁶ I re-estimate Equations (2) and (3) by employing a one-year lagged value of IAF competency in order to test for reverse causality. I find consistent results (untabulated) to the main test analysis, for both the disclosure of ERM and the extent of ERM disclosure in the proxy statement and AC charter. There is a significant positive association between the prior level of IAF competency and the propensity for and extent of firms to disclose ERM oversight in both the proxy statement ($p < 0.05$) and audit committee charter ($p < 0.10$). Results hold when lagging IAF competency at two-year horizon. I further restrict main test analysis to only firms that employ a Big 4 external auditor and find consistent results (untabulated).

sample by *ERMI_MED*. *ERMI_MED* is equal to one for firms with ERM quality above the median, and zero for firms with ERM quality below the median.

Interestingly, columns 1 and 3 of Panels C and D find that IAF competency is associated with the propensity and extent of disclosure in both the proxy statement and audit committee charter when ERM quality is low. This effect is not found in Columns 2 and 4 when ERM quality is high, for either disclosure type. These results highlight the value of the IAF's underlying information and communication quality in the board's decision to disclose ERM oversight. That is, better lower-level monitoring enables boards to feel more confident in their ERM monitoring, and thus more comfortable in disclosing ERM oversight activities, even in light of poor ERM performance.

Collectively, results for H2a and H2b suggest that IAF competency plays a meaningful role in determining the likelihood and extent of ERM oversight disclosure in the proxy statement and audit committee charter. Competent IAFs help to enhance ERM oversight by providing greater information and communication to firm leaders, who in turn are comfortable disclosing information about board-level ERM oversight practices.

Effect of IAF Competency on ERM Quality based on Board-Level Oversight

Table 3.6 presents the tests of H3 using Equation (1). Column 1 tests for the subsample of firms with board-level risk oversight (*BOARDRESP=1*), Column 2 tests for the subsample of firms with audit committee-level risk oversight (*ACRESP=1*), Column 3 tests for the subsample of firms with risk committee-level risk oversight (*RISKCOMMRESP=1*), and Column 4 tests for the subsample of firms with no proxy statement or audit committee charter disclosure or risk committee presence. In Column 1,

IAF competency is marginally associated with ERM quality when the board is primarily responsible for risk oversight, as disclosed by the proxy statement. ERM quality is positively associated with firm size and inventory and receivables turnover, and negatively associated with book to market, leverage, return on assets, material weakness disclosure, and auditor changes, when the board takes primary responsibility of ERM oversight. Column 2 finds that IAF competency is positively associated with ERM quality when the audit committee is primarily responsible for risk oversight, as disclosed by the audit committee charter. ERM quality is positively associated with the inventory and receivables turnover, sales growth, and foreign operations, and negatively associated with material weakness disclosure when the audit committee is primarily responsible for ERM oversight.

[INSERT TABLE 3.6 HERE]

In Column 3, I do not find an association between IAF competency and ERM quality when there is a risk committee present. ERM quality is positively associated with the inventory and receivables turnover, return on assets, and auditor change, and negatively associated with segments, material weakness disclosure, foreign operations, and the board index when the risk committee takes primary responsibility of ERM oversight. This result could be due to the low propensity for sample firms to maintain a standalone risk committee (e.g. low power).⁸⁷ This result could also be due to the discrete role the risk committee plays in ERM risk oversight. On one hand, firms could be investing in a risk committee at the expense of investing in increasing IAF competency. On the other hand, risk committees as a centralized resource to evaluate risk management may not interact with the IAF as

⁸⁷ I re-fit Equation (1) for Column (3) by eliminating industry and year fixed effects, to consider potential effects of perfect prediction. Results remain consistent, and inferences do not change.

regularly or as rigorously as the audit committee or the total board, despite IAF competency, thus limiting the impact of IAF competency on ERM quality. Overall, these results are intuitive, as the audit committee is primarily responsible for monitoring both internal controls and risk, as well as for oversight of the IAF. The audit committee's synergy of oversight enhances ERM monitoring, which takes advantage of an increased information exchange between a competent IAF and the audit committee, in order to increase ERM quality. Based on the test of H2, while ERM quality does not determine whether or how much boards choose to disclose about ERM risk oversight, the concentration of risk oversight in conjunction with the level of IAF competency helps to impact ERM quality.

As a specification test, I test whether IAF competency is associated with ERM quality when there is no signal of ERM risk oversight via oversight disclosure or presence of a risk committee. This test is designed to capture sample firms that do not explicitly signal where the predominant ERM risk oversight responsibility lies within the firm. Column 4 presents these results and finds that there is no association between IAF competency and ERM quality when ERM risk oversight is not clearly, externally specified by the firm.

Additional Analysis and Robustness

Propensity-Score Matching. Estimating associations between IAF competency and enterprise risk management outcomes may suffer from correlated omitted variables that influence both the likelihood to invest in the IAF and in ERM. To combat the potential concern that ERM quality or ERM oversight disclosure influences the level of IAF

competency, I re-estimate Equations (1) through (3) using propensity score matching. I first create an indicator variable *IAF_COMP_MED*, equal to one if *IAF_COMP* is greater than or equal to the median, and zero otherwise. The design produces a sample that has treatment and control observations that have similar predicted probabilities of having higher IAF competency. To construct the propensity score matching sample, I obtain the predicted probabilities from the first-stage model (untabulated) using the following variables based on the determinants of higher IAF competency and determinants of higher financial reporting quality when IAF competency is higher: *LNTA*, *BM*, *LEV*, *INVREC*, *MW*, *LIT*, *ACQ*, *FOREIGN*, *BIG4*, and *BOARDINDEX* (Chapters One and Two). I perform a one-to-one match with replacement, within a caliper range of one percent.⁸⁸ Table 6 Panels A and B confirm that the covariate means for the matched pairs are balanced across treatment and comparison groups.⁸⁹ Table 3.7 Panel C presents the second-stage regression results of this procedure using the propensity score. Column (1) presents Equation (1) for *ERMI* and finds that *IAF_COMP* is positive and significant at the $p < 0.05$ level. Columns 2 and 3 present Equation (2) and find that *IAF_COMP* is significantly related to *PROXYDISC* and *PROXYCOUNT* at the $p < 0.05$ level. Columns 4 and 5 present Equation (3) and find that *IAF_COMP* is significantly related to *ACCHARTERMDISC* and *ACCHARTERM COUNT* at the $p < 0.10$ level. Overall, the matched sample results are

⁸⁸ Matching with replacement and a caliper weight of 0.01 are used in this analysis in order to increase the quality of matching between the treatment and control groups and to reduce bias in the sample.

⁸⁹ In Table 6 Panel A, after matching the sample for the ERM quality analysis, and in Table 6 Panel B, after matching the sample for the ERM disclosure analyses, the mean bias is reduced to a less than five percent level. Further, the difference in propensity score between *IAF_COMP_MED* firms is not significantly different for each sample group ($p = 0.946$ and $p = 0.579$, respectively). There are no significant differences between paired firms along any dimension, with the exception of *RISKCOMM*, a control variable for the ERM disclosure analyses, suggesting the propensity score matching procedure was reasonably successful in ensuring covariate balance.

consistent with the results presented in Tables 3 and 4 and provide support that main test analyses are not suffering from a correlated omitted variable problem.

[INSERT TABLE 3.7 HERE]

ERM Quality Cross-Sectional Test. I perform a further cross-sectional test for Equation (1) in order to address endogeneity concerns that the relationship between IAF competency and ERM quality is spurious. External monitors, such as institutional owners, can improve ERM by placing pressure on firms to decrease information asymmetry while increasing the costs of risk management failures. I examine whether the association between IAF competency and ERM quality varies with institutional ownership. Past research finds that Institutional ownership acts as an external monitoring mechanism that is associated with lower earnings management, and higher conservatism and investment efficiency (Yu 2008; Ramalingegowda and Yu 2012; Cheng, Dhaliwal, and Zhang 2013). I therefore expect that firms with higher institutional ownership will be associated with ERM quality. I obtain institutional ownership data from Thomson-Reuters and set *INSTOWN* equal to one for firms with the number of institutional owners greater than the sample median, and zero otherwise.

Table 3.8 presents the results of this analysis. Columns 1 and 2 partition the sample by *INSTOWN*. *IAF_COMP* is positive and significant when institutional ownership is high. While IAF competency on average works to improve ERM quality, these results suggest that external monitoring does impact the relationship between IAF competency and ERM quality. Institutional owners' monitoring primarily stems from analysis of financial reports. As the ERM quality measure is derived from objective performance metrics from regular financial filings (refer to Appendix A), it would follow that an increased amount of external

monitoring over ERM-related measures in the financial statements would prompt firms to focus on improving performance.

[INSERT TABLE 3.8 HERE]

VI. CONCLUSION

In sum, this study investigates (1) IAF competency's association with ERM quality, (2) IAF competency as an antecedent to ERM oversight disclosure in firm proxy statements and audit committee charters, (3) the moderating effect of the level of board risk oversight on the association between IAF competency and ERM quality. I first find that firms with higher IAF competency are positively associated with higher ERM quality, as the IAF plays a direct role in risk assessment processes that help to strengthen ERM. I next find that firms with higher IAF competency are positively associated with the likelihood of ERM oversight disclosure in the proxy statement and audit committee charter, suggesting board member confidence in IAF's contribution to risk assessment processes. I additionally find that firms with higher IAF competency are more likely to have greater disclosure of ERM oversight within the proxy statement and audit committee charter. Further, I find a relationship between IAF competency and ERM quality based on the type of board-level ERM oversight. Audit-committee level risk oversight contributes to the relationship between IAF competency and ERM oversight disclosure. I perform a number of tests to combat for endogeneity concerns, including propensity score matching and considering whether institutional ownership plays a role in increasing ERM quality.

Findings of this study can contribute to both research and practice. This is the first study to use archival data to understand the associations between IAF competency and ERM-related outcomes. Here, I utilize LinkedIn to develop a composite measure of IAF

competency across large publicly-traded firms in order to understand more about accounting employees that are not as readily observable in other data sources, such as IAF personnel. More practically, focus on risk management has increased over the last decade due to the 2008 financial crisis, and therefore it is important to understand the IAF's role in facilitating ERM oversight. Results can inform management and board members who are seeking to enhance their monitoring capabilities over ERM. Investing in IAF competency can aid firm leaders to more effectively monitor ERM. Results can inform external auditors that are faced with evaluating control risk and are concerned with audit effectiveness. Higher IAF competency suggests that external auditors can feel more comfortable relying on IAF work related to ERM areas, which can enhance external audit effectiveness over risk assessment. Results can inform regulators about the importance of IAF competency on ERM processes as they determine whether it is necessary to regulate the competency of the function. Lastly, results can potentially inform investors about corporate governance quality based on disclosure information. As firms with higher competency are more likely to disclose information related to board risk oversight, investors will have more information regarding corporate governance quality.

Table 3.1 – Variable Definitions

IAF Competency Variables	
<i>IAF_EXP_TENURE</i>	Mean tenure of IAF employee at sample firm in years;
<i>IAF_EXP_BIG4</i>	Count of IAF employees who have previous working experience at a Big 4 accounting firm;
<i>IAF_EXP_MIDTIER</i>	Count of IAF employees who have previous working experience at a Midtier accounting firm
<i>IAF_EXP</i>	<i>IAF_EXP_TENURE</i> , <i>IAF_EXP_BIG4</i> , and <i>IAF_EXP_MIDTIER</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF experience component is greater than the median;
<i>IAF_CERT_CPA</i>	Count of IAF employees who have their CPA certification;
<i>IAF_CERT_CIA</i>	Count of IAF employees who have their CIA certification;
<i>IAF_CERT_CFE</i>	Count of IAF employees who have their CFE certification;
<i>IAF_CERT_CISA</i>	Count of IAF employees who have their CISA certification;
<i>IAF_CERT</i>	<i>IAF_CERT_CPA</i> , <i>IAF_CERT_CIA</i> , <i>IAF_CERT_CFE</i> , and <i>IAF_CERT_CISA</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF certification component is greater than the median;
<i>IAF_EDU_UGACC</i>	Count of IAF employees who have an undergraduate accounting degree;
<i>IAF_EDU_MSA</i>	Count of IAF employees who have a graduate accounting degree;
<i>IAF_EDU</i>	<i>IAF_EDU_UGACC</i> and <i>IAF_EDU_MSA</i> are first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are totaled, and then dichotomized again at the median, equal to one if the total IAF education component is greater than the median;
<i>IAF_SIZE_TOTAL</i>	Number of IAF employees;
<i>IAF_SIZE_SCALED</i>	Number of IAF employees scaled by the natural log of total assets at the end of year;
<i>IAF_SIZE</i>	<i>IAF_SIZE_SCALED</i> is first dichotomized at the median by fiscal year, equal to one if the value is greater than or equal to the median;
<i>IAF_COMP</i>	Sum of <i>IAF_EXP</i> , <i>IAF_CERT</i> , <i>IAF_EDU</i> , and <i>IAF_SIZE</i> by year, ranging from zero to four;
Variables of Interest	
<i>PROXYERMDISC</i>	Indicator variable equal to one if there is an “enterprise risk management” and/or “ERM” disclosure in a proxy statement in the current year;
<i>ACCHARTERMDISC</i>	Indicator variable equal to one if there is an “enterprise risk management” and/or “ERM” disclosure in the audit committee charter in the current year;
<i>PROXYERMDISCCOUNT</i>	Count of “enterprise risk management” and/or “ERM” disclosure in the proxy statement in the current year;
<i>ACCHARTERMDISCCOUNT</i>	Count of “enterprise risk management” and/or “ERM” disclosure in the audit committee charter in the current year;
<i>ERMI</i>	Index sum of the following standardized variables: <i>STRAT1</i> , <i>STRAT2</i> , <i>OPS1</i> , <i>OPS2</i> , <i>REPORT1</i> , <i>REPORT2</i> , <i>COMP1</i> , and <i>COMP2</i> ;

<i>ERMI_MED</i>	Indicator variable equal to one if the level of ERM quality is greater than the median;
<i>STRAT1</i>	Firm-year sales less the average industry firm-year sales divided by the standard deviation of firm-year sales of all firms in the same industry;
<i>STRAT2</i>	The change in the firm's beta from <i>t</i> to <i>t-1</i> less the average industry beta divided by the standard deviation of beta for all firms in the same industry;
<i>OPS1</i>	Sales divided by total assets;
<i>OPS2</i>	Sales divided by total number of employees;
<i>REPORT1</i>	Sum of indicators of disclosure of any of the following events: (1) material weakness, (2) an unclean audit opinion, and (3) restatement. This measure is inversely coded, and ranges from -3 to 0;
<i>REPORT2</i>	Absolute value of normal accruals divided by the absolute value of the sum of normal accruals and abnormal accruals;
<i>COMP1</i>	Audit fees divided by total assets;
<i>COMP2</i>	Settlement net gain (loss) divided by total assets;
<i>BOARDRESP</i>	Indicator variable equal to one if the firm discloses ERM oversight in the proxy statement, but not in the audit committee charter or does not have a standalone risk committee;
<i>ACRESP</i>	Indicator variable equal to one if the firm discloses ERM oversight in the audit committee charter, but not in the proxy statement or does not have a standalone risk committee;
<i>RISKCOMM</i>	Indicator variable equal to one if there is a board-level risk committee;
<i>RISKCOMMRESP</i>	Indicator variable equal to one if the firm has a standalone risk committee, but does not disclose ERM oversight in either the proxy statement or audit committee charter;

Firm Control and Other Variables

<i>LNASSETS</i>	Natural log of total assets at the end of year;
<i>BM</i>	Book value of common equity divided by market value of common equity;
<i>LEV</i>	Long-term debt divided by total assets from end of year;
<i>INVREC</i>	Inventory and accounts receivable divided by total assets from end of year;
<i>LNSEGMENTS</i>	Natural log of the number of business and geographic segments;
<i>SALESGROWTH</i>	Percent of sales growth from the prior year;
<i>ROA</i>	Net income divided by total assets;
<i>MW</i>	Indicator variable equal to one if there is a MW disclosure under SOX Sections 302 and/or 404 in the current year;
<i>LIT</i>	Indicator variable equal to one if the firm is in a litigious industry;
<i>ACQ</i>	Indicator variable equal to one if the firm had M&A activity in the current year;
<i>FOREIGN</i>	Indicator variable equal to one if the firm has foreign operations;
<i>NEWCFO</i>	Indicator variable equal to one if the CFO is in their first year of tenure with the firm;
<i>BIG4</i>	Indicator variable equal to one if the firm engages a Big 4 auditing firm;
<i>AUDCHG</i>	Indicator variable equal to one if the firm has changed its external auditor in the current year;
<i>BOARDINDEX</i>	Total board size, the percentage of board independence, and the mean value of independent director tenure are first dichotomized

ACEXP

CFOEXP

INSTOWN

at the median by fiscal year, equal to one if the value is greater than or equal to the median; zero otherwise. Those indicator values are summed, ranging from zero to three;

Indicator variable equal to one if the percentage of accounting experts on the audit committee is greater than the median;

Indicator variable equal to one if the CFO has a CPA certification or auditing experience;

Indicator variable equal to one if the firm has a number of institutional owners greater than the median.

TABLE 3.2 – Descriptive Statistics

	N	Mean	St. Dev.	Min.	25 th Pct.	Med.	75 th Pct.	Max.
<i>IAF_COMP</i>	2,138	2.552	1.311	0.000	1.000	3.000	4.000	4.000
<i>PROXYERMDISC</i>	2,138	0.268	0.443	0.000	0.000	0.000	1.000	1.000
<i>PROXYERMDISCCOUNT</i>	2,138	1.292	1.231	0.000	0.000	1.000	2.000	11.000
<i>ACCHARTERMDISC</i>	2,138	0.122	0.327	0.000	0.000	0.000	0.000	1.000
<i>ACCHARTERMDISCCOUNT</i>	2,138	0.171	0.540	0.000	0.000	0.000	0.000	5.000
<i>BOARDRESP</i>	894	0.848	0.360	0.000	1.000	1.000	1.000	1.000
<i>ACRESP</i>	894	0.119	0.324	0.000	0.000	0.000	0.000	1.000
<i>RISKCOMMRESP</i>	894	0.033	0.173	0.000	0.000	0.000	0.000	1.000
<i>ERMI</i>	1,953	-0.001	2.699	-8.665	-1.126	-0.094	1.035	34.729
<i>LNTA</i>	2,138	6.983	0.949	4.660	6.349	6.972	7.651	9.038
<i>BM</i>	2,138	0.542	0.365	-0.746	0.324	0.489	0.715	1.909
<i>LEV</i>	2,138	0.193	0.170	0.000	0.017	0.176	0.310	0.687
<i>INVREC</i>	2,138	0.277	0.170	0.000	0.153	0.257	0.379	0.738
<i>LNSEGMENTS</i>	2,138	1.569	0.704	0.000	1.386	1.609	2.079	2.996
<i>SALESGROWTH</i>	2,138	0.088	0.194	-0.432	-0.007	0.067	0.158	0.933
<i>ROA</i>	2,138	0.043	0.087	-0.412	0.020	0.050	0.082	0.245
<i>MW</i>	2,138	0.059	0.236	0.000	0.000	0.000	0.000	1.000
<i>LIT</i>	2,138	0.225	0.418	0.000	0.000	0.000	0.000	1.000
<i>ACQ</i>	2,138	0.215	0.411	0.000	0.000	0.000	0.000	1.000
<i>FOREIGN</i>	2,138	0.421	0.494	0.000	0.000	0.000	1.000	1.000
<i>NEWFCO</i>	2,138	0.354	0.478	0.000	0.000	0.000	1.000	1.000
<i>BIG4</i>	2,138	0.861	0.346	0.000	1.000	1.000	1.000	1.000
<i>AUDCHG</i>	2,138	0.043	0.204	0.000	0.000	0.000	0.000	1.000
<i>RISKCOMM</i>	2,138	0.033	0.179	0.000	0.000	0.000	0.000	1.000
<i>BOARDINDEX</i>	2,138	1.288	0.840	0.000	1.000	1.000	2.000	3.000

This panel provides descriptive statistics for the models. Variable definitions are provided in Table 3.1.

Table 3.3 – Pearson Correlation Table

	(1) <i>IAF_ COMP</i>	(2) <i>PROXY ERM DISC</i>	(3) <i>PROXY ERM DISC COUNT</i>	(4) <i>ACCHART ERM DISC</i>	(5) <i>ACCHART ERM DISC COUNT</i>	(6) <i>BOARD RESP</i>	(7) <i>AC RESP</i>	(8) <i>RISK COMM RESP</i>	(9) <i>ERMI</i>
(1) <i>IAF_COMP</i>	1								
(2) <i>PROXYERMDISC</i>	0.11***	1							
(3) <i>PROXYERMDISCCOUNT</i>	0.01	0.10***	1						
(4) <i>ACCHARTERMDISC</i>	0.08***	0.24***	-0.02	1					
(5) <i>ACCHARTERMDISCCOUNT</i>	0.07***	0.22***	-0.01	0.85***	1				
(6) <i>BOARDRESP</i>	-0.11***	-0.23***	-0.06***	-0.75***	-0.88***	1			
(7) <i>ACRESP</i>	0.07***	0.22***	-0.05**	0.84***	0.99***	-0.87***	1		
(8) <i>RISKCOMMRESP</i>	0.09***	0.06***	0.16***	-0.06***	-0.07***	-0.42***	-0.07***	1	
(9) <i>ERMI</i>	0.06***	0.07***	0.01	0.07***	0.05**	-0.08***	0.04*	0.07***	1

Variable definitions are in Table 3.1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

TABLE 3.4 – Effect of IAF Competency on ERM Quality

	Pred. Sign	(1) <i>ERMI</i>	(2) <i>ERMI</i> (<i>ACEXP</i> <i>ERT</i> =0)	(3) <i>ERMI</i> (<i>ACEXP</i> <i>ERT</i> =1)	(4) <i>ERMI</i> (<i>CFOEXP</i> <i>ERT</i> =0)	(5) <i>ERMI</i> (<i>CFOEXP</i> <i>ERT</i> =1)
<i>IAF_COMP</i>	+	0.121** (2.14)	0.197** (2.54)	0.048 (0.70)	0.124* (1.66)	0.052 (0.64)
<i>LNTA</i>	+	0.649*** (2.80)	0.105 (0.61)	1.070*** (2.86)	0.546*** (2.65)	0.803* (1.80)
<i>BM</i>	+	-1.212*** (-3.88)	-0.733* (-1.90)	-1.355*** (-3.26)	-1.275*** (-4.71)	-1.275* (-1.96)
<i>LEV</i>	+	-3.018** (-2.51)	-1.739** (-2.08)	-3.619* (-1.91)	-2.336** (-2.54)	-3.694* (-1.72)
<i>INVREC</i>	-	6.556*** (6.42)	6.627*** (5.78)	6.212*** (4.26)	6.493*** (5.80)	6.777*** (4.10)
<i>LNSEGMENTS</i>	-	-0.098 (-0.71)	-0.102 (-0.49)	-0.034 (-0.18)	-0.311** (-2.47)	0.228 (0.73)
<i>SALESGROWTH</i>	-	0.220 (0.40)	0.051 (0.14)	0.619 (0.60)	-0.205 (-0.59)	0.890 (0.89)
<i>ROA</i>	+	-2.885* (-1.84)	-3.114 (-1.49)	-1.357 (-0.70)	-1.707 (-1.27)	-4.471 (-1.64)
<i>MW</i>	-	-2.885*** (-9.44)	-2.506*** (-5.10)	-3.026*** (-9.23)	-3.332*** (-9.34)	-2.357*** (-4.83)
<i>LIT</i>	-	-0.335 (-1.41)	-0.233 (-0.59)	-0.392 (-1.39)	0.175 (0.52)	-0.960*** (-2.98)
<i>ACQ</i>	+	-0.107 (-0.75)	-0.188 (-1.05)	-0.115 (-0.64)	-0.299* (-1.79)	-0.023 (-0.12)
<i>FOREIGN</i>	-	0.002 (0.01)	-0.252 (-0.96)	0.087 (0.27)	-0.286 (-1.20)	0.146 (0.44)
<i>NEWCF</i>	-	-0.077 (-0.42)	-0.012 (-0.07)	-0.258 (-0.84)	0.020 (0.11)	0.008 (0.04)
<i>BIG4</i>	+	0.230 (1.04)	0.350 (1.07)	0.316 (1.58)	0.551** (1.99)	0.095 (0.35)
<i>AUDCHG</i>	-	-0.422** (-2.06)	-0.373 (-1.20)	-0.410* (-1.68)	-0.391 (-1.46)	-0.444 (-1.36)
<i>BOARDINDEX</i>	+	-0.053 (-0.39)	0.162 (1.44)	-0.127 (-0.67)	0.023 (0.23)	-0.016 (-0.09)
Constant		-4.814*** (-2.80)	-2.296 (-1.61)	-7.496*** (-2.72)	-4.178** (-2.59)	-6.370* (-1.94)
Industry & Year Effects		Yes	Yes	Yes	Yes	Yes
Observations		1,953	913	1,040	1,012	941
Adjusted R ²		0.270	0.283	0.308	0.348	0.261

This table reports results from OLS regressions of IAF competency and ERM quality for Equation (1). The dependent variable is *ERMI*, which is a composite index from Gordon et al. (2009) that sums the standardized variables of *STRAT1*, *STRAT2*, *OPSI*, *OPS2*, *REPORT1*, *REPORT2*, *COMP1*, and *COMP2*, described in Appendix A. The variable of interest is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. Column 1 presents results of the main regression model. Column 2 presents results of the model for firms with a lower level of audit committee accounting expertise, and Column 3 presents results of the model for firms with a higher level of audit committee accounting expertise (*ACEXP*). *ACEXP* is equal to one for firms wherein the percentage of accounting experts on the audit committee is greater than the median, and zero otherwise. Column 4 presents the results of the model for firms with no CFO accounting expertise, and Column 5 presents results

of the model for firms with CFO accounting expertise (*CFOEXPERT*). *CFOEXPERT* is equal to one for firms with CFOs who have their CPA certification or previous auditing experience, and zero otherwise. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *SALESGROWTH* is the percent change in sales from the prior year, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *MW* is an indicator variable for material weakness disclosure, *FOREIGN* is an indicator variable for foreign operations, *LIT* is an indicator variable for firms in litigious industries, and *ACQ* is an indicator variable for merger and acquisition activity during the fiscal year. *NEWCFO*, *BIG4*, and *AUDCHG* are indicator variables for a new CFO in the current year, Big 4 external auditor, and a change to the external auditor in the current year. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 3.5 – Effect of IAF Competency on ERM Oversight Disclosures

Panel A: Propensity of ERM Disclosure	Pred. Sign	(1) <i>PROXYERM</i> <i>DISC</i>	(2) Ave. Marginal Effects	(3) <i>ACCHARTERM</i> <i>DISC</i>	(4) Ave. Marginal Effects
<i>IAF_COMP</i>	+	0.148** (1.66)	0.026** (1.68)	0.176* (1.59)	0.019* (1.59)
<i>LNTA</i>	+	0.178 (1.07)	0.032 (1.15)	0.446 (1.49)	0.049* (1.57)
<i>BM</i>	+	0.246 (0.93)	0.040 (0.88)	0.378 (0.98)	0.039 (0.95)
<i>LEV</i>	+	-0.633 (-0.83)	-0.110 (-0.85)	-1.786 (-1.49)	-0.191* (-1.52)
<i>INVREC</i>	-	1.403 (1.44)	0.244* (1.48)	1.487 (1.11)	0.160 (1.14)
<i>LNSEGMENTS</i>	-	-0.038 (-0.21)	-0.006 (-0.20)	-0.421 (-1.52)	-0.044* (-1.55)
<i>SALESGROWTH</i>	-	-0.299 (-0.90)	-0.056 (-0.99)	-0.609 (-1.31)	-0.069* (-1.38)
<i>ROA</i>	+	0.738 (0.71)	0.132 (0.75)	-1.041 (-0.66)	-0.106 (-0.63)
<i>MW</i>	-	0.475 (1.39)	0.080* (1.37)	-0.299 (-0.63)	-0.032 (-0.63)
<i>LIT</i>	-	0.448 (0.93)	0.074 (0.90)	0.473 (0.71)	0.049 (0.70)
<i>ACQ</i>	+	-0.085 (-0.48)	-0.014 (-0.48)	-0.045 (-0.18)	-0.005 (-0.18)
<i>FOREIGN</i>	-	-0.597** (-2.31)	-0.103*** (-2.41)	-0.289 (-0.72)	-0.025 (-0.74)
<i>NEWCF0</i>	-	-0.530*** (-2.84)	-0.091*** (-2.89)	-0.231 (-0.97)	-0.025 (-0.98)
<i>BIG4</i>	+	1.600** (2.44)	0.274*** (2.55)	0.608 (1.34)	0.065* (1.35)
<i>AUDCHG</i>	-	0.461 (1.55)	0.078* (1.54)	0.329 (1.06)	0.034 (1.03)
<i>RISKCOMM</i>	+	0.116 (0.18)	0.021 (0.19)	-0.629 (-0.54)	-0.066 (-0.54)
<i>BOARDINDEX</i>	+	0.349*** (2.75)	0.055*** (2.59)	0.266 (1.43)	0.024* (1.23)
<i>ERMI</i>	+	0.024 (0.50)	0.004 (0.47)	0.003 (0.06)	0.000 (0.05)
Constant		-5.312*** (-3.19)		-5.266** (-2.11)	
Industry & Year Effects		Yes	Yes	Yes	Yes
Observations		1,913	1,913	1,699	1,699
Pseudo <i>R</i> ²		0.136	N/A	0.129	N/A

TABLE 3.5 (CONTINUED) – Effect of IAF Competency on ERM Oversight Disclosures

Panel B: Extent of ERM Disclosure	Pred. Sign	(1) <i>PROXYERM DISCCOUNT</i>	t-statistic	(2) <i>ACCHARTERM DISCCOUNT</i>	t-statistic
<i>IAF_COMP</i>	+	0.025*	(1.75)	0.025	(1.61)
<i>LNTA</i>	+	0.033	(1.18)	0.068*	(1.82)
<i>BM</i>	+	0.040	(0.87)	0.045	(0.69)
<i>LEV</i>	+	-0.128	(-1.01)	-0.299*	(-1.67)
<i>INVREC</i>	-	0.227	(1.43)	0.486*	(1.70)
<i>LNSEGMENTS</i>	-	-0.007	(-0.24)	-0.076	(-1.33)
<i>SALESGROWTH</i>	-	-0.033	(-0.60)	-0.054	(-0.90)
<i>ROA</i>	+	0.093	(0.56)	-0.079	(-0.40)
<i>MW</i>	-	0.080	(1.26)	-0.064	(-1.03)
<i>LIT</i>	-	0.061	(0.71)	0.064	(0.67)
<i>ACQ</i>	+	-0.014	(-0.45)	-0.007	(-0.18)
<i>FOREIGN</i>	-	-0.097**	(-2.27)	-0.064	(-0.93)
<i>NEWCF0</i>	-	-0.088***	(-2.84)	-0.003	(-0.05)
<i>BIG4</i>	+	0.160***	(3.05)	0.077*	(1.76)
<i>AUDCHG</i>	-	0.063	(1.41)	0.011	(0.25)
<i>RISKCOMM</i>	+	0.048	(0.35)	-0.065	(-0.38)
<i>BOARDINDEX</i>	+	0.058***	(2.66)	0.036	(1.31)
<i>ERMI</i>	+	0.005	(0.56)	-0.002	(-0.27)
Constant		-0.349	(-1.47)	-0.397	(-1.21)
Industry and Year Effects		Yes		Yes	
Observations		1,953		1,953	
Adjusted R ²		0.120		0.080	

Panel C: Propensity of ERM Disclosure Based on ERM Quality	(1) <i>PROXYERM DISC (ERMI MED=0)</i>	(2) <i>PROXYERM DISC (ERMI MED=1)</i>	(3) <i>ACCHARTERM DISC (ERMI MED=0)</i>	(4) <i>ACCHARTERM DISC (ERMI MED=1)</i>
<i>IAF_COMP</i>	0.275*** (2.49)	0.054 (0.47)	0.250** (1.71)	0.158 (1.05)
Constant	-6.745*** (-3.45)	-4.913*** (-2.65)	-6.785** (-2.44)	-4.754* (-1.78)
Industry & Year Effects	Yes	Yes	Yes	Yes
Observations	956	1081	762	907
Pseudo R ²	0.179	0.187	0.169	0.179

TABLE 3.5 (CONTINUED) – Effect of IAF Competency on ERM Oversight Disclosures

Panel D: Extent of ERM Disclosure Based on ERM Quality	(1) <i>PROXYERM DISCCOUNT</i> (<i>ERMI MED=0</i>)	(2) <i>PROXYERM DISCCOUNT</i> (<i>ERMI MED=1</i>)	(3) <i>ACCHARTER DISCCOUNT</i> (<i>ERMI MED=0</i>)	(4) <i>ACCHARTERM DISCCOUNT</i> (<i>ERMI MED=1</i>)
<i>IAF_COMP</i>	0.043*** (2.59)	0.006 (0.34)	0.028** (1.77)	0.019 (0.76)
Constant	-0.447* (-1.80)	-0.439** (-1.98)	-0.268 (-1.13)	-0.662* (-1.82)
Industry & Year Effects	Yes	Yes	Yes	Yes
Observations	978	1121	978	1121
Adjusted <i>R</i> ²	0.141	0.158	0.093	0.093

This table reports results from regressions of IAF competency and the propensity and extent of ERM oversight disclosures in the proxy statement and audit committee charter. Panel A presents the logistic regressions of Equations (2) and (3). The dependent variable in Column (1) is *PROXYERM DISC*, which equals one for firms that disclose ERM oversight in the proxy statement, and zero otherwise. The dependent variable in Column (3) is *ACCHARTERM DISC*, which equals one for firms that disclose ERM oversight in the audit committee charter, and zero otherwise. The variable of interest in Columns (1) and (3) is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *SALESGROWTH* is the percent change in sales from the prior year, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *MW* is an indicator variable for material weakness disclosure, *FOREIGN* is an indicator variable for foreign operations, *LIT* is an indicator variable for firms in litigious industries, and *ACQ* is an indicator variable for merger and acquisition activity during the fiscal year. *NEWCFO*, *BIG4*, *AUDCHG*, and *RISKCOMM* are indicator variables for a new CFO in the current year, Big 4 external auditor, a change to the external auditor in the current year, and risk committee presence in the current year. Columns 2 and 4 report the average marginal effects of the models in Columns 1 and 3, respectively. Panel B presents Equations (1) and (2) using OLS regression for different dependent measures. The dependent variable in Column (1) is *PROXYERM DISCCOUNT*, which measures the extent of ERM oversight disclosure in the proxy statement. The dependent variable in Column (2) is *ACCHARTERM DISCCOUNT*, which measures the extent of ERM oversight disclosure in the AC charter. Panels C re-estimates Equations (1) and (2) from Panel A by splitting the sample by *ERMI_MED*, which equals one for firms that have ERM quality above the median, and zero otherwise. Panel D re-estimates Equations (1) and (2) from Panel B by splitting the sample by *ERMI_MED*. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 3.6 – Effect of IAF Competency on ERM Quality Based on Board-Level Oversight

	Pred. Sign	(1) <i>ERMI</i> (<i>BOARD</i> <i>RESP=1</i>)	(2) <i>ERMI</i> (<i>AC</i> <i>RESP=1</i>)	(3) <i>ERMI</i> (<i>RISKCOMM</i> <i>RESP=1</i>)	(4) <i>ERMI</i> (<i>NO</i> <i>DISCLOSURE</i>)
<i>IAF_COMP</i>	+	0.428* (1.60)	0.324** (2.25)	-0.166 (-1.11)	0.063 (1.09)
<i>LNTA</i>	+	1.899** (2.01)	-0.294 (-0.96)	-0.013 (-0.02)	0.436** (2.12)
<i>BM</i>	+	-1.834** (-2.29)	0.220 (0.41)	-1.130 (-0.58)	-1.141*** (-3.81)
<i>LEV</i>	+	-6.431* (-1.84)	-1.366 (-0.96)	-0.806 (-0.21)	-2.408*** (-2.68)
<i>INVREC</i>	-	7.647** (2.21)	9.601*** (5.19)	5.746*** (3.45)	5.710*** (5.72)
<i>LNSEGMENTS</i>	-	0.126 (0.22)	-0.258 (-0.96)	-1.813** (-1.84)	-0.084 (-0.52)
<i>SALESGROWTH</i>	-	1.263 (0.82)	1.206 (1.43)	-0.637 (-0.37)	-0.324 (-1.12)
<i>ROA</i>	+	-6.819** (-1.99)	0.069 (0.04)	15.547*** (3.17)	-3.090** (-1.92)
<i>MW</i>	-	-3.384*** (-5.98)	-2.819*** (-3.04)	-2.847*** (-3.00)	-2.812*** (-7.08)
<i>LIT</i>	-	-0.597 (-0.79)	-1.008 (-1.05)	-0.223 (-0.36)	-0.138 (-0.51)
<i>ACQ</i>	+	0.206 (0.40)	0.108 (0.35)	-0.182 (-0.36)	-0.194* (-1.40)
<i>FOREIGN</i>	-	1.331 (1.27)	0.754* (1.90)	-1.092** (-1.98)	-0.108 (-0.49)
<i>NEWFCFO</i>	-	0.028 (0.10)	0.348 (1.34)	-0.101 (-0.16)	0.045 (0.27)
<i>BIG4</i>	+	-0.107 (-0.07)	0.270 (0.44)	0.000 (.)	0.295* (1.32)
<i>AUDCHG</i>	-	-1.077 (-1.53)	-0.796 (-1.20)	1.541*** (3.74)	-0.334* (-1.31)
<i>BOARDINDEX</i>	+	-0.665 (-1.16)	-0.005 (-0.02)	-0.656** (-1.99)	0.048 (0.52)
Constant		-14.496* (-1.68)	0.414 (0.24)	2.936 (0.68)	-3.266** (-2.03)
Industry & Year Effects		Yes	Yes	Yes	Yes
Observations		377	231	59	1,281
Pseudo <i>R</i> ²		0.426	0.498	0.764	0.297

This table reports results from OLS regressions of IAF competency and ERM quality for Equation (1). The dependent variable is *ERMI*, which is a composite index from Gordon et al. (2009) that sums the standardized variables of *STRAT1*, *STRAT2*, *OPSI*, *OPS2*, *REPORT1*, *REPORT2*, *COMPI*, and *COMP2*, described in Appendix A. The variable of interest is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *SALESGROWTH* is the percent change in sales from the prior year, *ROA* is the ratio of net income to total assets, and

BOARDINDEX is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *MW* is an indicator variable for material weakness disclosure, *FOREIGN* is an indicator variable for foreign operations, *LIT* is an indicator variable for firms in litigious industries, and *ACQ* is an indicator variable for merger and acquisition activity during the fiscal year. *NEWCFO*, *BIG4*, and *AUDCHG* are indicator variables for a new CFO in the current year, Big 4 external auditor, and a change to the external auditor in the current year. Columns (1) through (4) restrict the analysis to four groups of interest. Column (1) restricts the sample to where *BOARDRESP=1*, or where the board of directors has the primary responsibility for ERM oversight. Column (2) restricts the sample to where *ACRESP=1*, or where the audit committee has primary responsibility for ERM oversight. Column (3) restricts the sample to where *RISKCOMMRESP=1*, or where the risk committee has primary responsibility for ERM oversight. Column (4) restricts the sample to firms that do not disclose ERM oversight in the proxy statement or audit committee charter, or that do not have a standalone risk committee. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 3.7 – Propensity Score Matched Samples of ERM Quality and Disclosure Analyses

Panel A: Covariate Balance for ERM Quality Analysis	(1) Treated	(2) Control	t-statistic	p-value
<i>LNTA</i>	7.321	7.361	-0.63	0.529
<i>BM</i>	0.488	0.496	-0.28	0.780
<i>LEV</i>	0.244	0.255	-0.84	0.403
<i>INVREC</i>	0.258	0.255	0.27	0.788
<i>LNSEGMENTS</i>	1.623	1.597	0.56	0.578
<i>SALESGROWTH</i>	0.049	0.051	-0.16	0.870
<i>ROA</i>	0.035	0.030	0.78	0.438
<i>MW</i>	0.052	0.054	-0.16	0.876
<i>LIT</i>	0.228	0.220	0.25	0.800
<i>ACQ</i>	0.203	0.213	-0.35	0.729
<i>FOREIGN</i>	0.441	0.411	0.85	0.394
<i>NEWFCFO</i>	0.443	0.417	0.75	0.456
<i>BIG4</i>	0.896	0.900	-0.17	0.862
<i>AUDCHG</i>	0.040	0.033	0.47	0.640
<i>BOARDINDEX</i>	1.391	1.373	0.30	0.761
Observations	410	410		

Panel B: Covariate Balance for ERM Disclosure Analysis	(1) Treated	(2) Control	t-statistic	p-value
<i>LNTA</i>	7.332	7.333	-0.03	0.980
<i>BM</i>	0.518	0.531	-0.61	0.540
<i>LEV</i>	0.228	0.220	0.91	0.364
<i>INVREC</i>	0.287	0.290	-0.36	0.720
<i>LNSEGMENTS</i>	1.627	1.652	-0.71	0.476
<i>SALESGROWTH</i>	0.086	0.087	-0.08	0.939
<i>ROA</i>	0.044	0.044	0.02	0.981
<i>MW</i>	0.034	0.033	0.12	0.096
<i>LIT</i>	0.180	0.180	-0.01	0.993
<i>ACQ</i>	0.194	0.186	0.40	0.689
<i>FOREIGN</i>	0.420	0.420	-0.01	0.991
<i>NEWFCFO</i>	0.370	0.369	0.05	0.959
<i>BIG4</i>	0.946	0.945	0.07	0.941
<i>AUDCHG</i>	0.026	0.026	-0.05	0.958
<i>BOARDINDEX</i>	1.383	1.410	-0.60	0.550
<i>RISKCOMM</i>	0.061	0.037	2.14	0.033**
<i>ERMI</i>	0.493	0.277	1.25	0.210
Observations	710	710		

TABLE 3.7 (CONTINUED) – Propensity Score Matched Samples of ERM Quality and Disclosure Analyses

Panel C: Second Stage Regression	(1) <i>ERMI</i>	(2) <i>PROXY DISC</i>	(3) <i>PROXY COUNT</i>	(4) <i>ACCHARTERM DISC</i>	(5) <i>ACCHARTERM COUNT</i>
<i>IAF_COMP</i>	0.539* (1.85)	0.391** (1.81)	0.066** (1.75)	0.427* (1.33)	0.057* (1.35)
<i>LNTA</i>	1.278*** (3.60)	0.281 (1.24)	0.049 (1.22)	1.514*** (4.23)	0.176*** (3.29)
<i>BM</i>	-1.551*** (-2.90)	0.066 (0.20)	0.013 (0.22)	0.294 (0.69)	0.038 (0.43)
<i>LEV</i>	-3.620** (-1.97)	-1.456 (-1.52)	-0.260 (-1.58)	-3.954*** (-2.65)	-0.554*** (-2.66)
<i>INVREC</i>	7.393*** (4.41)	0.978 (0.73)	0.172 (0.78)	4.045** (2.29)	0.905** (2.28)
<i>LNSEGMENTS</i>	0.020 (0.09)	0.154 (0.73)	0.022 (0.58)	-0.420 (-1.35)	-0.054 (-0.82)
<i>SALESGROWTH</i>	0.750 (0.64)	-0.145 (-0.31)	-0.010 (-0.13)	-0.626 (-1.18)	-0.049 (-0.56)
<i>ROA</i>	-0.998 (-0.43)	-0.864 (-0.63)	-0.174 (-0.68)	-1.160 (-0.68)	-0.025 (-0.12)
<i>MW</i>	-2.661*** (-4.71)	0.499 (0.99)	0.077 (0.78)	-1.300* (-1.93)	-0.179*** (-2.63)
<i>LIT</i>	0.000 (0.00)	-0.565 (-1.06)	-0.098 (-1.00)	0.999 (1.15)	0.104 (0.79)
<i>ACQ</i>	-0.481* (-1.67)	-0.148 (-0.67)	-0.025 (-0.63)	0.353 (1.10)	0.021 (0.45)
<i>FOREIGN</i>	0.072 (0.25)	-0.660** (-2.18)	-0.108** (-2.03)	-0.457 (-1.00)	-0.097 (-1.05)
<i>NEWCF0</i>	0.073 (0.28)	-0.404* (-1.68)	-0.071 (-1.64)	-0.022 (-0.08)	0.043 (0.70)
<i>BIG4</i>	0.193 (0.65)	-0.114 (-0.16)	0.000 (0.00)	-0.952 (-0.87)	-0.042 (-0.30)
<i>AUDCHG</i>	-0.992** (-2.00)	0.325 (0.34)	0.035 (0.29)	0.540 (1.06)	0.020 (0.32)
<i>BOARDINDEX</i>	-0.222 (-0.97)	0.775 (1.49)	0.137 (1.34)	0.771* (1.66)	0.035 (0.39)
<i>RISKCOMM</i>		0.535*** (3.25)	0.091*** (3.14)	0.169 (0.75)	0.035 (1.01)
<i>ERMI</i>		0.017 (0.29)	0.003 (0.24)	-0.035 (-0.62)	-0.009 (-0.93)
Constant	-9.828*** (-3.72)	-4.450** (-2.21)	-0.277 (-0.78)	-12.976*** (-4.30)	-1.124** (-2.36)
Industry & Year Effects	Yes	Yes	Yes	Yes	Yes
Observations	829	1,185	1,209	1,044	1,209
Adjusted R ²	0.302		0.161		0.119
Pseudo R ²		0.163		0.231	

This table reports results from regressions of IAF competency and ERM quality and the propensity and extent of ERM oversight disclosures in the proxy statement and audit committee charter using propensity score matching for Equations (1) through (3). The dependent variable in Column (1) is *ERMI*, which is a composite index from Gordon et al. (2009) that sums the standardized variables of *STRATI*, *STRAT2*, *OPSI*,

OPS2, *REPORT1*, *REPORT2*, *COMP1*, and *COMP2*, described in Appendix A. The dependent variable in Column (2) is *PROXYERMDISC*, which equals one for firms that disclose ERM oversight in the proxy statement, and zero otherwise. The dependent variable in Column (3) is *PROXYERMDISCCOUNT*, which measures the extent of ERM oversight disclosure in the proxy statement. The dependent variable in Column (4) is *ACCHARTERMDISC*, which equals one for firms that disclose ERM oversight in the audit committee charter, and zero otherwise. The dependent variable in Column (5) is *ACCHARTERMDISCCOUNT*, which measures the extent of ERM oversight disclosure in the AC charter. The variable of interest is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *SALESGROWTH* is the percent change in sales from the prior year, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *MW* is an indicator variable for material weakness disclosure, *FOREIGN* is an indicator variable for foreign operations, *LIT* is an indicator variable for firms in litigious industries, and *ACQ* is an indicator variable for merger and acquisition activity during the fiscal year. *NEWCFO*, *BIG4*, *AUDCHG*, and *RISKCOMM* are indicator variables for a new CFO in the current year, Big 4 external auditor, a change to the external auditor in the current year, and risk committee presence in the current year. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

TABLE 3.8 – Effect of IAF Competency on ERM Quality Based on Institutional Ownership

	(1) <i>ERMI</i> (<i>INSTOWN</i> =0)	t-statistic	(2) <i>ERMI</i> (<i>INSTOWN</i> =1)	t-statistic
<i>IAF_COMP</i>	0.085	(0.71)	0.219**	(2.31)
<i>LNTA</i>	0.138	(0.79)	1.421***	(2.72)
<i>BM</i>	-1.008***	(-3.92)	-1.524**	(-2.29)
<i>LEV</i>	-0.879	(-1.51)	-4.336*	(-1.66)
<i>INVREC</i>	6.542***	(6.05)	7.452***	(3.95)
<i>LNSEGMENTS</i>	-0.314**	(-2.15)	0.095	(0.31)
<i>SALESGROWTH</i>	-0.236	(-0.63)	1.092	(1.13)
<i>ROA</i>	-2.136*	(-1.65)	-0.129	(-0.06)
<i>MW</i>	-3.133***	(-12.39)	-3.122***	(-4.19)
<i>LIT</i>	-0.248	(-0.96)	-0.320	(-0.80)
<i>ACQ</i>	-0.199	(-1.29)	-0.149	(-0.68)
<i>FOREIGN</i>	-0.071	(-0.35)	-0.224	(-0.61)
<i>NEWCFO</i>	0.007	(0.05)	-0.204	(-0.48)
<i>BIG4</i>	0.494**	(2.09)	0.204	(0.58)
<i>AUDCHG</i>	-0.203	(-0.73)	-0.477	(-1.32)
<i>RISKCOMM</i>	0.081	(0.86)	-0.232	(-0.71)
<i>BOARDINDEX</i>	0.556	(0.59)	-0.250	(-0.81)
Constant	-0.359	(-1.51)	-0.404	(-1.23)
Industry and Year Effects	Yes		Yes	
Observations	800		821	
Adjusted <i>R</i> ²	0.424		0.272	

This table reports results from OLS regressions of IAF competency and ERM quality for Equation (1). The dependent variable is *ERMI*, which is a composite index from Gordon et al. (2009) that sums the standardized variables of *STRAT1*, *STRAT2*, *OPS1*, *OPS2*, *REPORT1*, *REPORT2*, *COMP1*, and *COMP2*, described in Appendix A. The variable of interest is *IAF_COMP*, which is a composite score of IAF competency based on the median scores across the four competency components (*IAF_EXP*, *IAF_CERT*, *IAF_EDU*, and *IAF_SIZE*) by year, and can range from zero to four. Column 1 presents results of the model for firms with a lower level of institutional ownership, and Column 2 presents results of the model for firms with a higher level of institutional ownership (*INSTOWN*). *INSTOWN* is equal to one for firms with a number of institutional owners greater than the median, and zero otherwise. *LNASSETS* is the natural log of total assets, *BM* is the ratio of the book value of common equity to the market value of common equity, *LEV* is the ratio of total liabilities to assets, *INVREC* is the ratio of inventory and accounts receivable assets to total assets, *LNSEGMENTS* is the natural log of operating and geographic segments, *SALESGROWTH* is the percent change in sales from the prior year, *ROA* is the ratio of net income to total assets, and *BOARDINDEX* is a composite index measure of three board characteristics (i.e. size, independence, average independent board member tenure), and can range from zero to three. *MW* is an indicator variable for material weakness disclosure, *FOREIGN* is an indicator variable for foreign operations, *LIT* is an indicator variable for firms in litigious industries, and *ACQ* is an indicator variable for merger and acquisition activity during the fiscal year. *NEWCFO*, *BIG4*, and *AUDCHG* are indicator variables for a new CFO in the current year, Big 4 external auditor, and a change to the external auditor in the current year. Regressions include year and two-digit SIC code industry fixed effects and cluster standard errors by firm. Numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test where the coefficient sign is consistent with the predicted direction.

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