Essays in Financial Economics

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This dissertation is composed of three stand-alone research projects in corporate governance, banking and empirical asset pricing.

In the first project, I use a sample of S&P 1500 firms to examine the role of outside directors with extended tenures in board-level governance, monitoring decisions, and advising outcomes. I find that firms with a higher proportion of directors with extended tenures have lower CEO pay, higher CEO turnover sensitivity following poor performance, and a smaller likelihood of intentionally misreporting earnings. These firms are less likely to make acquisitions, while the acquisitions that are made are of higher quality. My results show that regulatory efforts to impose term limits may, therefore, be misguided.

In the second project, I use a sample of large banks across 38 countries to examine how the concentration of the banking system impacts the choice of business activities and consequently the stability of banks. I show that banks in less concentrated banking systems have higher levels of non-traditional business activities with higher shareholder returns, but at a cost of increased systemic risk. In contrast, the non-traditional business activities in highly concentrated banking systems help reduce the volatility of profits and also the systemic risk of banks. Unlike previous research, I show that there is not always a one-to-one relationship between non-traditional business activities and systemic risk.

In the third project, I propose a novel measure of institutional attention based on readership statistics of news articles on Bloomberg terminals. I find that investors pay more attention to news stories for larger and low book-to-market firms. Contrary to previous studies, I do not find that institutional attention is reduced on Fridays. There is a sharp increase in abnormal turnover and absolute adjusted returns on days when institutional investors pay attention to news. The effects of institutional investor attention are much larger for smaller firms. Finally, while short term reversals are reduced on days after news is published, I provide some evidence that short term reversals do not occur on days after published news is read.

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Sidharth Sahgal

Feb 26, 2014

To my wife, Candice, and my son, Dylan

Abstract

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Contents

Chapter 1

Introduction

The crisis sparked by the collapse of the U.S. housing market in 2007 continues to reverberate through global markets as nations in America, Europe and Asia grapple with the vulnerabilities it exposed in the world financial system. With taxpayers forced to foot the bill for rescuing banks and stimulating fragile economies, fiscal deficits worldwide have surged. In the U.K., the National Audit Office estimated the peak costs of guarantees and cash payout for bailouts at 1.16 trillion pounds.[1] The Federal Reserve setup lending programs with total outflows of at least 7.7 trillion dollars through the crisis.[2] Still, sharp spikes in unemployment were unavoidable with losses in economic output in the U.S. alone estimated at 14 trillion dollars (Atkinson et al. (July 2013)). The high fiscal and social costs have led to political outrage and severe introspection among regulators and academics about the causes of the crisis and ways to prevent a recurrence.

The reform efforts have been global in scope. The Independent Commission on Banking (Vickers Commision) in the U.K. and the Liikanen Group in the European Union were setup to explore structural reform in the banking system. In the U.S., a comprehensive overhaul of banking regulations has been proposed in the Dodd-Frank Act. Besides these regional efforts, the Basel Committee has updated the recommended regulatory framework (Basel III) for banks around the world.

The reform process is based on the premise that the financial crisis was a failure of governance and regulation, issues which I explore in the first two chapters of this dissertation.

Problems with governance arise when managers engage in rent-seeking behavior to extract maximum personal benefit. This agency problem when ownership and control are separate is well known (Jensen and Meckling (1976)) and ex-

[1] http://www.nao.org.uk/report/the-treasurys-2010-11-accounts-the-financial-stability-interventions/

[2] http://www.bloomberg.com/news/2011-11-28/secret-fed-loans-undisclosed-to-congress-gave-banks-13-billion-in-income.html

acerbated in financial firms due to the presence of fixed-rate deposit insurance (Keeley (1990)) and too-big-to-fail subsidies. It is hoped that increased regulation will mitigate the moral hazard issues and reduce the chances of another crisis occurring.

In the first chapter of the dissertation, I examine one specific regulation that had already been implemented in certain countries and is being proposed in others. The regulation is related to implementing term limits for outside directors. The U.K. does not consider a director who has been on the board for longer than nine year to be independent, while Spain is considering implementing a 12 year term limit. These regulations are based on concerns that outside directors do not contribute to monitoring management once they have worked together with firm management for an extended period. Although this particular regulation isn't part of banking reform proposals, the agency concerns are the same. Even in the U.S., there has been an increasing clamor for such types of term limits to curb the entrenchment of management.[3] Motivated by these calls for regulation and the lack of empirical evidence on the issue, I examine whether the presence of directors with tenures of at least fifteen year exacerbates agency conflicts in a sample of approximately 1,500 U.S. firms.

The results in the first chapter show that directors do not become lax in their duties as their tenure increases. Experienced directors are more likely to attend board meetings and become members of board committees compared to more junior directors. These directors are also vigilant monitors. CEOs in firms with a higher proportion of experienced directors have lower levels of total compensation and are more likely to lose their jobs when the firms perform poorly. These firms are also less likely to make fraudulent earnings statements and the presence of experienced directors influences boards to make better-quality acquisitions. Overall,

[3]http://online.wsj.com/article/SB10001424127887323664204578607924055967366.html

I find that implementation of such term limits would likely be counterproductive and boards would lose a valuable source of expertise.

In the second chapter of the dissertation, I consider regulation related to limiting the non-banking activities of banks. Such regulation has been proposed by the Vickers Commision, the Liikanen review and the Dodd-Frank Act (through limiting proprietary trading). Previous research has mostly confirmed a positive relationship between the riskiness of a bank to the system as a whole and the level of non-traditional banking activities that it undertakes (De Jonghe (2010)). Using a sample of banks across 38 countries, I examine whether the relationship between non-traditional activities and bank systemic risk is homogenous. I find that in countries with low levels of banking concentration, such as the U.S and U.K, banks take on higher level of non-traditional activities. These activities are more profitable but also increase the bank's systemic risk. In countries with high levels of banking concentration, such as Canada and Australia, the positive relationship between non-traditional activities and systemic risk no longer holds. In fact, certain business activities can help reduce the systemic risk of banks. The chapter shows that one-size-fits-all regulation can be misguided.

In the final chapter of my dissertation, I depart from my examination of regulation to analyze a new database related to another important issue in finance: the dissemination and impact of news. Using a database of readership statistics for stories on Bloomberg terminals - one of the primary sources of market data and news for institutional investors - I examine the causes and consequences of institutional investors attention. Previous research has mostly used inexact proxies such as trading volume, extreme returns and the publication of news (Barber and Odean (2008); Gervais et al. (2001)), or focused on retail investors (Da et al. (2011)). There has been little analysis on causes or consequences of attention for institutional investors. I find that institutional investors pay more attention to

news stories for larger and low book-to-market firms, and that news wire coverage is a complement to analyst research. Contrary to previous studies, I do not find that institutional attention is reduced on Fridays. I also find that when institutional investors pay attention to news, there is a sharp increase in abnormal turnover and absolute adjusted returns. This effect is much more pronounced for smaller firms. I also find that short term reversals are significantly reduced after investors pay attention to news.

The dissertation is structured as three stand alone chapters and a conclusion. Each chapter is self contained and has its own detailed motivation, introduction, literature review and empirical analysis.

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Chapter 2

Should Outside Directors Have Term Limits? The Role of Experience in Corporate Governance

Abstract

Using a sample of S&P 1500 firms from 1998-2009, I examine the role of outside directors with extended tenures in board-level governance, monitoring decisions, and advising outcomes. I find a higher level of commitment among these directors as they are more likely to attend board meetings and also become members of the compensation and nomination committees. Firms with a higher proportion of directors with extended tenures have lower CEO pay, higher CEO turnover sensitivity following poor performance, and a smaller likelihood of intentionally misreporting earnings. These firms also restrict the expansion of resources under the CEO's control as they are less likely to make acquisitions, while the acquisitions that are made are of higher quality. Efforts to impose term limits may, therefore, be misguided.

2.1 Introduction

Shareholder advisory firms, regulators and companies increasingly view lengthy experience as a negative attribute for outside directors.[1][2] Outside directors with extended tenures – subsequently referred to as just experienced directors – are seen as ineffective in fulfilling the important roles of monitoring management and setting firm strategy. The Financial Reporting Council in the United Kingdom does not consider a director who has been on the board for longer than nine years to be an outside director.[3] The implication here is that directors become entrenched with management after an extended period and are, therefore, unable to monitor them adequately. In the U.S., The National Association of Corporate Directors (NACD), a well-regarded advisory organization which publishes best practice procedures in boardrooms, recommends tenure limits of 10 to 15 years when evaluation procedures are not in place (NACD (2005)). Similarly, Institutional Shareholder Services (ISS) recommends additional scrutiny for boards with average director tenure of greater than 15 years. Director term limits have also been seen as a way to bring fresh thinking and ideas onto the board and avoid stagnation in strategic decision making (Young (2011)). A survey by Heidrick & Struggles (2007), which polled 2,000 of the largest US firms, found that 22% of the 660 respondents had imposed term restrictions on directors, more than doubling from 9% in 2001, when the survey was previously conducted.

Despite concern that experienced directors exacerbate the manager-shareholder

[1] In a recent article in the Wall Street Journal, shareholder advocates state that corporate governance in the U.S. is improving but they conclude that one pending issue is low director turnover and lament the small number of firms with director term limits in the S&P 500. "Corporate Governance in U.S. Grows Up", Wall Street Journal. October 11, 2012. http://online.wsj.com/article/SB10000872396390444657804578050902543505648.html

[2] The SEC required General Electric to hold a vote on a shareholder proposal in its Annual General Meeting 2013.

[3] UK Corporate Governance Code (June 2010). Publicly listed companies on the London Stock Exchange are required to state how they have complied with this code.

agency problem (Jensen and Meckling (1976)), nearly 50% of the Standard & Poor's 1500 (S&P 1500) firms in my sample over the period 1998-2009 have an outside director who has been on the board for longer than 15 years. There are at least four reasons why having experienced directors on the board may actually be optimal for firms. First, given their long tenure, most experienced directors have worked with multiple CEOs, which should help them better assess the ability of the current CEO. Only 11% of directors with tenure longer than 15 years were hired during the current CEO's term. Second, over the course of their term, experienced directors will have built up a significant financial stake in the company, which aligns their interests with shareholders. A 1% change in underlying stock increases wealth by $15,733 for the median director with a tenure greater than 15 years, but only $5,088 for those with a shorter tenure. Third, just as a long successful tenure is seen as increasing the CEO's bargaining power (Hermalin and Weisbach (1998)), a longer tenure should also buttress the position of the director, helping him to balance the CEO's influence when it comes time to making decisions in the boardroom. Fourth, a lengthy tenure increases the director's association with the success or failure of the firm. Fama and Jensen (1983) posit that reputational benefits in the labor market are one of the primary motivations for directors. In order to maintain their reputation, directors will want to be associated with successful firms.

In this chapter, I first consider the propensity of experienced directors to attend board meetings and become members of committees, to address concerns that they are not active participants in board decision making. Next, I examine whether experienced directors contribute to agency problems by looking at the results of monitoring decisions such as CEO pay, CEO termination in the face of poor performance, and the misreporting of financial earnings. Finally, I examine whether a board with experienced directors can limit the resources under the

CEO's control by examining both the likelihood and quality of acquisitions. In order to isolate the contribution of experienced directors, I define an experienced director as one with at least 15 years of experience. I then use the proportion of these experienced directors on the board as the key explanatory variable in regressions where a firm outcome is the dependent variable. Using an aggregate measure, like the median or average, masks the distribution of tenure among directors. The choice of using a fixed number to define an experienced director is somewhat arbitrary, but crucial to the analysis, because it is hard to glean any insight on the heterogeneous effects of experienced directors without a concrete definition of "experienced". The longer the tenure, the more egregious the purported entrenchment, and hence I use 15 years as it is the maximum tenure from the range recommended by the NACD (2005).[4]

The efficacy of different forms of board structure has been studied extensively in the financial literature. However, despite widespread recommendations and even legislation on term limits, there is limited empirical evidence on how director tenure impacts board decision-making. One exception is a study by Vafeas (2003), which uses one year of data from 1994 and splits directors according to relative tenure within the firm. I eschew the approach of using relative tenure and instead use fixed tenure since even though a director may be the senior-most on the board, he may not have the lengthy experience that is crucial to increasing incentives and expertise. Another set of related studies (Landier et al. (2012); Coles et al. (2010); Core et al. (1999)) has considered whether directors who were hired after the current CEO began her term are co-opted by these CEOs. A longer tenure could be a proxy for the fact that the director was hired before the current CEO. However, the results in this chapter are not driven solely by the hiring effect. This is shown by controlling for the proportion of directors hired after the current CEO

[4]The results are quantitatively similar when tenure of 12 years is used.

was appointed and also by re-running the analysis in a subsample of firms where the CEO tenure is greater than that of the senior-most outside director.

The analysis consists of four main parts. First, I examine the determinants of a higher proportion of experienced directors on the board. When comparing across firms using industry fixed effects; smaller, older, more stable and successful firms with older and longer tenured CEOs who don't chair the board, are more likely to have experienced directors. However, when examining within-firm variation using firm fixed effects, many of these relationships change. A larger proportion of experienced directors is now positively related with firm size, which is intuitive, since firms have tended to increase in size over the sample period. CEO chairmanship of the board is no longer related to the proportion of experienced directors on the board. One interpretation of this discrepancy between results using industry and firm fixed effects is that when experienced directors are on the board, CEOs are not likely to relinquish their dual role as chair of the board; however, newly appointed CEOs are less likely to chair the board.

Second, I use director-level data to examine whether an experienced director's commitment to their role changes as tenure increases. I find that far from shirking responsibility, directors with tenure of more than 15 years are approximately 20% less likely to miss board meetings relative to their counterparts who have less than five years of experience. Even though participation in a monitoring committee requires extra effort in terms of time and responsibility, experienced directors are 8% more likely to be members of the nomination committee and 5.3% more likely to be members of the compensation committee. This membership could be attributed to experienced directors having deeper knowledge of the firm and its operations relative to newer directors, but it nevertheless signals a continued commitment to their role.

Third, I examine the role of experienced directors in three different firm mon-

itoring outcomes using panel regressions on firm-level data. Concerns regarding endogeneity and selection bias do not easily allow for causal inference from such regressions. To alleviate some of these concerns, I use firm and director fixed effects along with an extensive set of control variables in my analysis. When examining total CEO pay and controlling for its economic determinants as in Core, Holthausen, and Larcker (1999), my results show that an increase of one experienced director on the compensation committee, decreases the average pay of the CEO by about 2.6%. CEO turnover is also shown to be more sensitive to stock performance when there is a higher proportion of experienced directors. I also find that the presence of one additional experienced director on the board can reduce the probability of intentional misreporting by approximately 25% relative to firms where there are no experienced directors on the board.

Lastly, I determine if the presence of experienced directors affects strategic decisions in the firm. I find that firms with a higher proportion of experienced directors make fewer acquisitions, thereby limiting the empire building aspirations of the CEO and receive the corresponding excess pay (Roll (1986)). An examination of whether the quality of acquisitions made is higher, using announcement day abnormal stock returns as a proxy for quality shows that a higher proportion of experienced directors on the board is positively related to increased abnormal returns.

This chapter falls into the category of research which examines the impact of heterogeneity among directors on board decision-making. Initial studies on board structure focused on the number of outsiders on the board, that is directors who are not employees of the firm and are independent in terms of business relationships. But no clear link has been established between firm performance and the ratio of outside directors to insiders (Hermalin and Weisbach (2003)). Studies show CEO dismissal is more sensitive to performance in firms with a higher num-

ber of outside directors (e.g., Weisbach (1988); Kaplan and Minton (2012)), but independent boards have not been able to curtail excessive CEO pay. Guthrie and Sokolowsky (2012) show that the requirement to have all outside directors on the compensation committee actually increased CEO pay after the passage of the Sarbanes-Oxley Act (SOX). Given the lack of clear evidence on the benefits of outside directors, research has focused on their heterogeneity. Studies have looked at directors who are foreign (Masulis et al. (2012)), bankers (Guner et al. (2008)), female (Adams and Ferreira (2009)), venture capitalists (Baker and Gompers (2003)), CEOs in other firms (Fahlenbrach et al. (2010b)) and politically connected (Goldman et al. (2009)). Following these studies on director heterogeneity, this chapter uses extended tenure as a distinguishing attribute among outside directors.

This chapter makes four important contributions. First, I directly address the question of implementing director term limits, which have been suggested as a way to infuse fresh blood onto a board and avoid complacency. My results show that such a policy would be short-sighted as boards with experienced directors make a positive contribution to strategic and monitoring decisions. Second, I contribute to the growing literature on the effect that heterogeneity among outside directors has on CEO pay and turnover within firms. While previous studies have tried to measure the actual independence (relative to the officially declared independence) of board directors, their specific expertise and their networking benefits, there has been little research on tenure as a distinguishing attribute. Third, I contribute to the literature on how board structure affects the firm's acquisition strategy. Undertaking acquisitions expands the resources available to the CEO and, thus, potentially exacerbates agency problems. Boards with experienced directors may act as a countervailing force to the CEO and help mitigate such agency problems. In addition, I also find that firms with experienced directors make higher quality

acquisitions. Fourth, I contribute to the literature which considers the tradeoff between monitoring and advising. Previous theoretical and empirical research has shown that directors may not be able to accomplish both roles simultaneously because excessive monitoring can lead to a reduction in information shared by firm management. However, my results show that experienced directors, whose incentives are aligned with shareholders and who have a high level of firm expertise, may be an exception to this proposition.

2.2 Related literature and hypothesis development

2.2.1 Experienced directors and the agency problem

Separation of ownership and control can lead to agency problems where managers use their position to extract personal benefits (Jensen and Meckling (1976)). The board of directors plays an important role in monitoring management to mitigate such agency problems. There are two contrasting views on whether the board can fulfill its task of monitoring managers.

The first view has alternatively been called the "managerial power" or "board capture" hypothesis (Bebchuk and Fried (2003)). This hypothesis posits that a CEO can control directors on the board to reduce monitoring and interference with his strategic decisions. There are at least two channels through which he may gain control. First, the CEO can nominate new directors to the board who may be allies. Shivdasani and Yermack (1999) show that CEOs tend to choose more directors with relationships to the firm (gray directors) when they are involved in the nomination process. Core, Holthausen, and Larcker (1999) confirm that the presence of directors on the board who are hired by the CEO can lead to

monitoring problems like higher pay.

Second, the CEO may be able to influence directors who are currently serving on the board. If the directors are employees of the firm and depend on the CEO for career advancement and their pay, they may not stand up to the CEO in the boardroom. To mitigate such concerns, outside directors have been looked at as a way to monitor the CEO more effectively (Fama and Jensen (1983)). But, Guthrie and Sokolowsky (2012) show that boards with more independent directors on their compensation committees have a higher level of compensation for their CEOs. One possible explanation for this finding is that directors are not truly independent. Hwang and Kim (2009) show that outside directors with social connections to the CEO do not behave independently and pay their CEOs excessively. Apart from personal relationships impeding their responsibilities, outside directors may not want to rile up the CEO so that they can continue to secure easy re-nomination (Mace (1986); Lipton and Lorsch (1992)), reputational benefits (Fama and Jensen, 1983) and a good paycheck (Bebchuk and Fried (2003)). Directors may also structure the CEO's compensation to support rent extraction (Bebchuk et al. (2002)), which in turn can lead managers to misreport their earnings(Burns and Kedia (2006)) to boost the stock price.

Consistent with the managerial power hypothesis, experienced directors may be seen as contributing to the agency problem within a firm. They could be influenced by the CEO because of a relationship built over the years. Regulators and advocates for corporate governance, seem to agree with with view: Laws in the United Kingdom do not consider a director with tenure longer than nine years as independent and Spanish regulators have proposed a limit of 12 years for directors to be independent.

In contrast, the second view on the efficacy of boards states that directors are chosen and compensated to resolve agency problems within a firm, and they

maximize shareholder value by providing the right incentives for management. This is called the "optimal contracting" hypothesis (for e.g., Demsetz and Lehn (1985)). There are several examples in the literature that show board composition is structured to benefit the firm. For example, Coles, Daniel, and Naveen (2008) show that in cases where advising needs are greater, a larger number of insider directors is justified. In terms of monetary incentives, Perry (1999) and Ertugrul and Krishnan (2010) show that increasing incentive compensation for directors increases the likelihood of CEO turnover. Fich and Shivdasani (2005) also show that firms with stock option plans for their directors have higher firm valuations.

Experienced directors have usually dealt with multiple CEOs which will help them better assess the ability of the current CEO. Similar to the effect that a successful tenure has on the bargaining power of the CEO (Hermalin and Weisbach (1998)), one would also expect a long tenure to improve the bargaining position of the CEO. Additionally, an extended tenure at a firm usually means experienced directors have larger shareholdings than newer directors. These shareholdings and the expertise of experienced directors align the incentives of experienced directors with shareholders and make them more likely to make decisions which improve corporate governance.

In this chapter, I test whether the presence of experienced directors on the board provides evidence for the "managerial power" hypothesis or the "optimal contracting" hypothesis. These contrasting viewpoints, bring about my first hypothesis:

H1: Boards with a higher proportion of experienced directors mitigate the agency problem in firms which will lead to (i) lower unwarranted pay for the CEO, (ii) a higher likelihood of CEO departure following poor performance, (iii) firms being less likely to make an earnings restatement.

2.2.2 The balance between monitoring and advising

Besides monitoring management, directors serve as advisors, playing a key role in important strategic decisions (Adams et al. (2010)) such as acquisitions. Adams and Ferreira (2007) explore the conflict between the advising and monitoring of management which arises because outside directors are dependent on the CEO (Adams and Ferreira (2007)) or inside directors(Harris and Raviv (2008)) for firm-specific information. If outside directors monitor the CEO too closely, she may become unwilling to share information. Thus, it is sometimes considered optimal to have management-friendly boards.

Previous research has explored the effect of directors with expertise gained in another industry through their full-time jobs. One example is Guner, Malmendier, and Tate (2008), who find that boards with investment banking directors tend to make worse acquisitions. Experienced directors, however, develop expertise in the industry and firm on whose board they serve through their long tenure, which exposes them to the company's strategy, finances and competitive environment. The first best solution to the trade-off between monitoring and advising in Adams and Ferreira (2007) is the sharing of information by managers so that the boards can both monitor management effectively and give quality advice. An alternative may be the presence of experienced directors who have built firm-specific knowledge and may not be totally reliant on management for information. Their reduced dependence on management as a source of information, would allow these directors to fulfill their roles as both monitors and advisors.

Acquisitions can be a sign of management hubris and way to increase assets under control and consequently increase pay and perquisites (Roll (1986)). I examine whether directors can fulfill the two roles of monitoring and advising management simultaneously by examining whether the numbers of acquisitions are reduced and also whether the quality of acquisitions is improved.

This viewpoint about acquisitions brings about my second hypothesis:

H2: Boards with a higher proportion of experienced directors can offer benefits in terms of both monitoring and advising which will lead to (i) fewer acquisitions, (ii) better quality acquisitions

2.2.3 Director commitment

The NACD (2005) recommends the implementation of director term limits if proper evaluation procedures are not in place. They fear that directors will view their positions as "lifetime sinecures" and lose energy, enthusiasm and commitment. On the other hand, experienced directors have a lot at stake in the firm in terms of reputation and monetary incentives. Fama and Jensen (1983) posit that reputation in the labor marketplace is one of the primary motivations of directors. And Adams and Ferreira (2008) show that even small financial benefits like meeting fees can increase board attendance. Ertugrul and Krishnan (2010) show that equity ownership among directors can lead them to fire the CEO proactively in the case of poor performance. Experienced directors have both reputation and monetary incentives associated with the firm. Hence, they have the incentives to be vigilant monitors while board decisions are being made.

My third hypothesis tests whether experienced directors show commitment to the firm:

H3: Experienced directors are more likely to (i) attend board meetings and (ii) become members of a monitoring committee.

2.3 Empirical methodology

Any empirical study on board structure and board decision-making poses several technical concerns. Theoretical research has proposed that board structure is

determined endogenously due to firm and management characteristics (Hermalin and Weisbach (1998); Raheja (2005)). Linck, Netter, and Yang (2008) provide empirical evidence supporting these theories and show that boards are less independent when firms are smaller, have higher research and development (R&D) expenses, and have CEOs with greater influence. Failure to consider such endogeneity can invalidate inference in regressions examining board outcomes, where board structure is an explanatory variable. One of the primary causes of this endogeneity is the presence of unobserved time-invariant firm-specific factors, which could affect both board decisions and the proportion of experienced directors. To address this concern, wherever possible, I examine within-firm variations in monitoring outcomes using firm fixed effects. Results using industry fixed effects are also shown mainly to make the results comparable with previous studies. Endogeneity due to reverse causality is less of a concern since it seems unlikely that a monitoring or advising outcome such as CEO pay or quality of acquisition can affect the proportion of experienced directors on the board.

Another concern in the empirical analysis is selection bias, which may arise through two different channels. The first is through the selection decisions of directors, who may choose particular firms based on firm, CEO or board characteristics. I address this source of selection bias by controlling for firm level characteristics which have been shown to influence the composition of boards such as size, Tobin's q, R&D expenses and age; CEO level characteristics such as tenure, age, equity holdings, CEO-Chairman duality; and board level characteristics such as independence and size. The second channel of selection bias arises through the selection decision of firms, who may choose to hire and retain directors based on their ability and performance. I address this source of selection bias using director fixed effects, which allows for the isolation of individual director tenure as an explanatory variable when examining variation in firm outcomes. Another

more subtle reason for selection bias is the passage of the SOX Act, which put several firms out of compliance with regulations and required changes to board structure, giving rise to the possibility that firms chose more effective directors to remain on the board. I tackle this effect by using the proportion of directors hired before 2001 as an explanatory variable while examining all strategic and monitoring outcomes, as part of unattached robustness tests, and find that my results still hold.

I use OLS regressions whenever I use firm-fixed effects even if the dependent variable is binary or is restricted within a certain range. This is because using non-linear specifications with a large number of fixed effects gives rise to the incidental parameters problems, which can bias the coefficients and standard errors (Greene (2004); Arellano and Hahn (2007)). Furthermore, Angrist and Pischke (2009) (pg 103) point out that while non-linear models may provide a better fit, the marginal effects and t-statistics calculated using OLS are also sufficiently accurate. Robust standard errors which are clustered at the firm level are used for regressions which use industry and firm fixed effects. When using director fixed effects, the robust standard errors are clustered at the director level.

2.4 Data analysis

2.4.1 Data description

For detailed information on director attributes, I use the RiskMetrics (formerly IRCC) database, which provides data from 1996 to 2010. Only data after calendar year 1999 is included because there is incomplete information on committee membership and leadership before that year. The year variable is adjusted to denote the fiscal year rather the year of the Annual Meeting. This allows for the matching between the RiskMetrics data and the accounting data from Compus-

tat. The final sample includes data for fiscal years 1998 to 2009. There are a total of 173,598 director-year and 18,363 firm-year observations from the RiskMetrics database. CRSP is used for stock returns and Execucomp for information on CEO pay and attributes like age and tenure. I use the person denoted by Execucomp as the CEO (using the CEOANN flag). In the final sample, firms are only included when they have data listed in each of the RiskMetrics, Compustat, CRSP and Execucomp databases. There are a total of 15,922 firm-year observations, 142,319 director-year observations and 111,517 outside director-year observations after dropping observations without complete matching data in all the databases. An outside director is one who is marked as independent by RiskMetrics.

I make a few adjustments to the data to correct errors in the databases. Director tenure is set to missing if it is greater than 90 or less than 0. In addition, if a director's age is less than 21, it is set to be missing. Approximately 10% of observations do not include CEO age another 10% do not include CEO tenure in Execucomp. I manually set the CEO age and tenure values for these observations if publicly available. I also set director ownership to missing if the shares in the company are dual class.[5] The year the stock of a firm is listed is used as the firm age.[6]

[5]At the time of writing this chapter, RiskMetrics calculated the total individual director share holdings by adding together all stock held, even if they were from different classes. To address this shortcoming, I set the director ownership to missing if the shares in the company are dual class. Director ownership is not included as a control variable in the main section of results in order to avoid losing data points in the sample. All tests are repeated with director ownership as a control variable and the results are quantitatively similar.

[6]Shumway (2001) argues that listing age is the most appropriate method of measuring age because firms setup a corporate structure which meets exchange requirements and are fairly homogenous at that stage. However, many firms have a board of directors before they are listed on an exchange. In fact, I find that 73% of firms have CEO or directors who started their tenure before the listing date.To take this effect into account, I create a new variable for firm age, which calculates the start date of the firm as the earlier of the listing date or first employment date of the CEO or any director. In robustness testing, I find that the results are robust to this modified firm age as a control variable and also find that the results are consistent when including only the subset of firms with modified firm age greater than fifteen years.

2.4.2 Computing the proportion of experienced directors

The proportion of experienced directors on the board is the key explanatory variable in my analysis. When calculating the proportion of experienced directors, I use the ratio of experienced directors to the total number of outside directors. After the passage of the Sarbanes-Oxley Act in 2002, the task of monitoring management is performed mainly by outside directors as opposed to inside directors. The compensation, auditing and nominating committees are required to be staffed with outside directors and 50% of the board must be comprised of outside directors. Therefore I use the total number of outside directors in the denominator to compute the following variables which are used in the analysis.[7] The variable, PROP-G15, is calculated as the total number of outside directors with 15 or more years of tenure divided by the total number of outside directors. Compensation policy is mainly driven by the compensation committee, rather than the whole board. Therefore in order to isolate the effect of experienced directors on CEO compensation, I calculate PROP-CC-G15, which is the total number of outside directors with 15 or more years of tenure on the compensation committee divided by the total number of directors on the compensation committee. Similarly, I calculate the proportion of outside directors on the audit committee, PROP-AC-G15, using the ratio of outside directors with 15 or more years of tenure on the audit committee to the total number of directors on the audit committee. A control variable to distinguish the effect of experienced directors from that of directors hired during the term of the current CEO, PROP-CEOHIRE, is computed as the total number of outside directors with a tenure less than or equal to the current CEO, divided by the total number of outside directors.

[7]The results are quantitatively similar when using the total numbers of directors in the denominator.

2.4.3 Data summary

Table 1 contains a summary of the outside director data. Each observation is representative of one director-year and hence each director could be represented multiple times for different firms and years. The sample is divided into four groups to better understand how characteristics of directors evolve as tenure increases. The first group has tenure less than five years (L5), the second group has tenure between five and 15 years (B5-15), the third group (L15) includes all observations in the first two groups, and the fourth group (G15) has tenure greater than 15 years. While some attributes show the expected correlation, like the positive correlation between age and tenure, other attributes offer more interesting insight. Approximately 70% of directors in the L5 group were hired during the term of the current CEO, which decreases to 32% for directors in the B5-15 group and to only 11% for directors in the G15 group. This statistic weakens the claim that directors with extended tenure are entrenched with the current CEO of the firm. On the contrary, experienced directors have worked with multiple CEOs, giving them the opportunity to improve their monitoring skills.

There is also a sizable difference between equity ownership and consequently monetary incentives amongst directors as tenure progresses. Director ownership includes both stocks and options, which can be exercised within sixty days of the annual meeting. Ownership increases from 0.008% in the L5 group to 0.069% in the G15 group. Although the stakes are small in percentage terms, the dollar amounts are high. I calculate dollar sensitivity to a 1% change in the underlying stock price by multiplying the total number of shares and options by 1% of the fiscal year-end price. Directors in the group with tenure greater than 15 years have a sensitivity of \$15,773 to a 1% change in the stock price, while directors with less experience have approximately a third of the dollar sensitivity at \$5,088. A change of approximately 20% in the stock price can lead to a change in wealth

of $315,460 for the median experienced director which is a sizable effect.

In terms of board governance, poor attendance, an indicator variable, which is set to one if the directors does not attend 75% of board meetings, decreases from 1.92% in the L5 group to 1.41% in the G15 group. Membership in the compensation committee increases from 41% in the L5 group to approximately 53% in both, the B5-15 and G15 group. While a similar increase is seen in the nomination committee, there is actually a small decrease in likelihood of membership for G15 directors on the audit committee relative to L5 directors. This is probably due to the influence of Sarbanes-Oxley which mandated the presence of at least one director with financial expertise in the audit committee. This regulation led firms to bring new directors with financial expertise onto the board to meet this requirement.

Panel A in Table 2 shows firm-level data from Compustat, RiskMetrics, and CRSP used in the sample. The size of the firms on average is large at approximately $14.34 billion. Size and other firm-level characteristics are identical to other studies like Coles, Daniel, and Naveen (2008), Faleye, Hoitash, and Hoitash (2011) and Masulis and Mobbs (2011), which use the same database for their analysis. The median board has approximately nine members and 72.7% of the board is comprised of independent directors. About 3.6% of firms have busy boards (Fich and Shivdasani (2006)) and 45% of the outside directors have been hired during the term of the current CEO. Experienced directors are fairly prevalent on the boards of US-listed companies. While 48.4% of firms in the sample have at least one director who has tenure of more than 15 years, 63.7% have a director with tenure greater than 12 years and 78.1% of firms in the sample have a director with tenure of at least nine years. Panel B in Table 2 shows the composition of boards and committees according to the proportion of directors with specified tenures. On average, the proportion of outside directors with terms of 15, 12, and

nine years to the total number of outside directors is 0.13, 0.21 and 0.33.

2.5 Results

In this section, I examine the impact of experienced directors on firm-level and board-level governance. The analysis is broken up into four sections. The first section considers the determinants of experienced directors on boards. The next section looks at board-level governance by examining whether experienced directors are likely to have poor attendance or participate in monitoring through a board committee. The third section considers whether experienced director exacerbate agency problems by looking at the monitoring outcomes such as CEO pay, CEO turnover and earnings restatements. The final section examines strategic outcomes, including, the propensity to make an acquisition and the quality of acquisitions that are made.

2.5.1 Determinants of experienced directors

This section analyzes the factors that drive the proportion of experienced directors to be higher in certain firms. Control variables used in this section are based on previous empirical and theoretical research. From a theoretical perspective, Raheja (2005) shows that firm characteristics like size and complexity of operations affects board structure. In addition, Hermalin and Weisbach (1998) show that board structure can also be determined by CEO influence. Hence I include the log of total assets (size), research and development expenses, CEO-chairman duality, CEO tenure, and age and equity ownership as control variables. Empirical studies such as Masulis and Mobbs (2011), Coles, Daniel, and Naveen (2008), and Adams and Ferreira (2009) have used measures of board structure, firm value and profitability as control variables when analyzing the determinants of board struc-

ture. Following these studies, I include board size, board independence, Tobin's q, ROA and standard deviation of ROA as control variables. Since director tenure of fifteen or greater years is being examined in this chapter, five year ROA, rather than one year ROA is used. In unattached test results, I find that profitability measured over or a longer time span of 10 years yields similar results. Firm age is likely to play an important role in determining the proportion of experienced directors since new firms will not have had the time to develop a higher proportion of experienced directors. Therefore, firm age is also used as a control variable.

Table 3 shows the results for regressions where the dependent variables are the proportion of outside experienced directors (PROP-G15, PROP-CC-G15, PROP-AC-G15). I examine the determinants of proportion of directors on the compensation committee and the audit committee in addition to the proportion of experienced directors on the entire board as they are used as key explanatory variables in future analysis. Regressions 1-3 using the Tobit procedure and include industry and year fixed effects where differences across firms, but within the same industry, are being examined. The truncation in the Tobit procedure is zero at the lower level and 1 at the upper level.[8] Regressions 4-6 use OLS and examine within-firm variation using firm and year fixed effects. While CEO-Chairman duality, CEO tenure and firm size show disparate effects in regressions involving industry fixed effects and firm fixed effects, firm age has the same effect in both types of regressions. In regression 1 with industry fixed effects, the coefficient for the CEO-chairman variable is negatively significant at the 1% level, however in regression 4, the coefficient for the CEO-chairman variable is not significant. This indicates that while a higher proportion of experienced directors occurs at firms where the CEO is does not chair the board, the change does not necessarily occur with a corresponding increase in the proportion of experienced directors within

[8]In unattached results, I repeat regressions 1-3 using OLS regressions and the results are quantitatively similar.

the firm. One possible interpretation of this result is that a newly appointed CEO may find it harder to chair the board when there are experienced directors on the board. The coefficient for CEO tenure is positively significant in regressions with industry fixed effects, indicating that relative to other firms, directors and CEO with longer tenures tend to co-exist. However, the coefficient for CEO tenure is not significant in regressions with firm fixed effects, indicating that a higher proportion of experienced directors is not correlated with an increase in the tenure of the CEO within the firm. This is an intuitive result given that almost 90% of experienced directors no longer work with the CEO who was present when they were hired.

In terms of firm characteristics, the coefficient for firm size is negatively significant at the 1% level, showing that relatively smaller firms are much more likely to have experienced directors. However, when firm fixed effects are used, the coefficient for firm size is positively significant showing that the proportion of experienced directors is increasing as a firm grows larger. Publicly listed firms (in the Compustat database) have grown in size over time and the positive relationship between firm size and the proportion of experienced directors is reflective of this fact. As expected, firm age is highly positively significant at the 1% level in regressions using both industry and firm fixed effects, where the proportion of experienced directors on the entire board is the dependent variable. Board membership in a successful firm can provide reputational benefits to directors (Fama and Jensen (1983)). The positive coefficient on five-year average ROA and negative coefficient on standard deviation of ROA (calculated using annual ROA over five years) show the desire of experienced directors to be at relatively more stable and profitable firms. However, the coefficient for both average ROA and the standard deviation of ROA are not significant in re regressions using firm fixed effects, showing that an increasing proportion of experienced directors is

not correlated with an improvement in ROA. The discrepancy between the results in industry and firm fixed effect regressions shows that an improvement in ROA could thus be driven by unobservable factors unrelated to the proportion of experienced directors.

Overall the results show that firms which are smaller and older, where the CEO is not the Chairman, and which have more stable and a higher level of accounting profitability are more likely to have experienced directors on the board. However, when firm fixed effects are taken into account it is not clear if experienced directors have a direct role in improving or reducing profitability.

2.5.2 Board level governance

In this section, I examine whether director commitment wanes as tenure increases by considering the likelihood of participation in a monitoring committee and attendance at board meetings.

2.5.2.1 Committee membership

Board committees are delegated important monitoring tasks such as setting CEO compensation, choosing and reviewing auditors, and nominating new directors. Participation in these committee means attending special meetings and spending more time on board duties. Faleye, Hoitash, and Hoitash (2011) show that participation by a majority of outside directors in two or more committees improves the quality of the board's monitoring. Given the extra commitment required for committee membership, I construe participation in a committee as a signal of engagement with the firm. There is little research on the individual director traits that influence committee membership. One exception is Adams and Ferreira (2009) who show that women are more likely to be members of one of the monitoring committees. Their results also show that directors with longer tenure

are more likely to be members of the compensation, nominating and corporate governance committees but less likely to be members of the audit committee. To gain further insight into this result on tenure, I use a sample with director-level observations and dummy variables for each of three following scenarios: if the tenure of the director is less than five (L5), between five and 15 (B5_15), and greater than 15 (G15).

Table 4 contains the results for OLS regressions where the dependent variable is membership in a committee and the independent variables under consideration are the three tenure variables mentioned previously. For the sake of brevity, regressions using industry fixed effects are not included. Observations are only included if a firm has at least one independent director on the monitoring committee under consideration. There are a total of 12 regressions examining membership in the audit, nominating or compensation committee. The dependent variable in regressions 1-3 indicates membership in either of the three committees, regressions 4-6 indicate membership in the compensation committee, regressions 7-9 indicate membership in the audit committee and regressions 10-12 indicate membership in the nomination committee.

The results show that tenure has a distinct impact on committee membership. L5 directors are less likely to become members of every committee, while B5_15 directors are more likely to become members of every committee. The result for G15 directors is mixed. While they are more likely to become members of the compensation committee and the nomination committee, they are less likely to become members of the audit committee. Overall, however, G15 directors are more likely to become members of a committee. The discrepancy between L5 and directors with longer tenure is a sensible result, given that L5 directors are new to the firm and less knowledgeable of its operations. One interesting caveat is that while new directors are approximately 12% less likely to be members of

the compensation and nominating committee, they are only 1.8% less likely to be members of the audit committee. Given the emphasis in SOX regulation on financial expertise for directors on the audit committee, this result could be due to new members with financial expertise being hired specifically to become members of the audit committee. This new hiring could also be the reason that, although G15 directors are more likely to become members of the compensation committee and the nomination committee, they are less likely to be members of the audit committee. The increased likelihood of membership in the nomination committee is about the same for both B5_15 directors and G15 directors, at approximately 8%. The 8% likelihood of membership in the compensation committee for B5_15 directors is more than the 5.1% likelihood of of G15 directors. Overall the results show that experienced directors play an active role in the corporate governance of the firm, especially through membership in the nomination and compensation committees.

2.5.2.2 Attendance

Attendance at board meetings is integral to the monitoring and advising duties of a director. Firms are required to report to the SEC whether directors attended less than 75% of meetings. In cases where the director has not attended 75% of meetings, an indicator variable called "Poor Attendance" is set to 1. In the sample of all independent directors, the mean of "poor attendance" is only 1.7% showing that missing meetings is relatively rare. In this section, I examine whether attendance at board meetings changes for directors with different tenures.

I include control variables for individual director attributes similar to the previous section on committee membership. Adams and Ferreira (2008) show directors are more likely to attend meetings when meeting fees are higher. Therefore, information on meeting fees and meetings from Execucomp are included as control

variables. There is no data on these two variables from the year 2007 onwards, so analysis is restricted to the years 1998-2006, leaving a total of 65,938 director-year observations.[9] Control variables for director age less than 65 and gender are also included to show that the tenure effect is distinct from these effects.

Table 5 includes the results for OLS regressions where the dependent variable is "poor attendance". All regressions include firm and year fixed effects. The coefficient for G15 directors in regression 1 is 0.4%. Given the mean of "Poor attendance" is 1.7%, G15 directors are 23.5% less likely to miss more than 75% of board meetings. This is in stark contrast to the coefficient for L5 directors in regression 3 that has approximately the same magnitude but with an opposite sign. Director age is also highly significant in these regressions, showing that directors younger than 65 years are more likely to miss board meetings. The results show that director commitment to attending board meetings does not wane as they get older and as their tenure increases.

2.5.3 Board monitoring

2.5.3.1 CEO compensation

CEO compensation has shown a sharp increase since the the 1970s (Frydman and Saks (2010)). There are two competing theories to explain this rise in executive pay. The first explanation is that executive pay is an optimal contracting solution to the agency problems faced by the firm. As the size and complexity of firms has increased, so has CEO compensation (Gabaix and Landier (2008); Tervio (2008)). The second explanation is that high CEO pay is a form of rent extraction by powerful CEOs and they are able to exert "managerial power" and influence on the board's decisions (Bebchuk and Fried (2003)). In fact, previous empirical

[9] As a robustness check, I perform my analysis using data for all years, without the meeting fees and number of meetings variables, and the results are quantitatively similar.

research shows that certain forms of board structure make boards susceptible to paying CEOs disproportionately. One example is Core, Holthausen, and Larcker (1999), who find that CEO pay is higher when the CEO and chairman share duties, the board has a larger number of independent directors, a larger proportion of directors are hired by the CEO, and board size is larger. In this section, I study whether the concern that experienced directors amplify agency problems is justified by examining the relationship between the proportion of experienced directors on the board and total CEO pay.

Data on CEO compensation is from Execucomp and is for the fiscal years 1998-2009. Total pay includes salary, bonus, equity and long-term incentive pay. There are a total of 15,922 firm-year observations with matching CRSP, Compustat, RiskMetrics and Execucomp data. Observations for the year 1998 are excluded, since compensation for the CEO is determined by the board from the previous year, and board structure data is only available from 1998. Execucomp changed its reporting of CEO option valuation in 2006 which does not allow for consistent within-firm and across-firm comparison of total compensation. To allow for an accurate comparison, I calculate CEO option compensation using a consistent methodology as described in detail in Appendix A. Compensation is also adjusted for inflation using the CPI deflator for the year 2003. The mean total annual compensation for the entire sample is $5.42 million, while the median is $2.83 million (in 2003 dollars). There is a large difference in mean and median, showing, as is widely known, that the distribution of compensation is skewed. Hence, log transformed compensation is used as the dependent variable. I use an approach similar to Core, Holthausen, and Larcker (1999) and Masulis et al. (2012), and control for the economic determinants of CEO pay using firm size, Tobin's q, market-adjusted stock returns for the previous year, stock volatility calculated

over five years, board structure and the CEO's equity ownership.[10] I also control for the mean director age on the board to ensure that a tenure effect and not an age effect is being captured in these regressions. Since remuneration decisions are made by the compensation committee, the ratio of experienced directors on the compensation committee to the total number of directors on the compensation committee is used as the key explanatory variable. The variable PROP-CC-G15 is used to denote the proportion of outside directors with tenures greater than 15 years on the compensation committee.

Table 6 shows the results of regressions where log transformed compensation is the dependent variable. In regression 1, firm and year fixed effects are used. In regression 1, the coefficient for PROP-CC-G15 is significant at the 5% level with a coefficient of -0.08. The average size of the compensation committee is three members and the addition of one experienced director will raise the proportion of experienced directors by 33%. The result in regression 1 means that a change from no director on the compensation committee to one director on the compensation committee will reduce CEO compensation by 2.6% or $145,411 which is an economically significant effect, specially given that we are examining within-firm variation. To distinguish the effect of experienced directors from those who are not hired during the term of the CEO, regression 2 includes the sub-sample of firm-year observations where CEO tenure is greater or equal to that all the outside directors. In this subsample all the directors will have potential to have been influenced by the CEO. The result is even stronger in this sub-sample as the coefficient for PROP-CC-G15 increases more than three-fold to -0.26 and is significant at the 10% level.

In regression 3, the OLS regressions use industry and year fixed effects and

[10]In unattached results, I also regress "excess" CEO compensation against the proportion of experienced directors find that the results still hold. Excess compensation is the residual from OLS regressions with the same economic determinants as in regression 1 in Table 4.

also control for the proportion of directors hired during the term of the CEO on the compensation committee. The coefficient for experienced directors is similar in magnitude and significance to regression 1 which used firm fixed effects. The coefficient for PROP-CEOHire is also significant and positive. These regressions have not controlled for the possibility of selection bias which may arise when firms retain "better" directors. If this was indeed the case, results showing that experienced directors help mitigate agency conflict would not be surprising. To address this concern of selection bias, regression 4 uses director fixed effects which allow the examination of within-director variation as tenure changes. One complication that arises when using director fixed effects is a change in the methodology of setting director identification numbers by Riskmetrics in the year 2003. To address this issue, I match directors within firm using name (first, middle and last) and director age to ensure that a consistent ID is used through the tenure of a director.[11] In addition to an indicator variable for tenure greater than fifteen years (G15), additional indicator variables for busyness (BUSY), age less than 65 (AGE_L65), a member of the compensation committee (CC), and hired after the CEO (CEO-Hire) are used as independent variables. The key explanatory variable in this regression is an interaction variable multiplying G15 and CC. This variable is significant at the 5% level with a coefficient of -0.045 showing that the presence of an experienced director on the compensation committee is correlated with lower pay for the CEO. When examining only the proportion of directors on the entire board as the key explanatory variable, rather than the compensation committee, the results do not hold using firm and director fixed effects, showing that presence on the compensation committee is essential for the experienced directors to have an influential effect on CEO compensation.

Overall the results show CEOs in firms that have experienced directors on

[11] See Coles et al. (2010) for an detailed description of the problem

their compensation committees are paid less than firms who do not have these directors.

2.5.3.2 CEO turnover

Boards are tasked with monitoring the leadership of a firm and affecting change in case of poor performance (Adams et al. (2010)). The literature shows that board characteristics play an important role in the decision to dismiss a CEO. The factors linked to a higher probability of CEO dismissal include: higher equity-based compensation and higher stock ownership for directors (Ertugrul and Krishnan (2010)), splitting CEO and chairman duties (Goyal and Park (2002)), a majority of outside directors serving on at least two of the three monitoring committees (Faleye et al. (2011)), smaller boards (Yermack (1996)), higher independence of the board (Weisbach (1988)) and the presence of female directors on the board (Adams and Ferreira (2009)). In this section, I examine whether boards with a higher proportion of experienced directors increase CEO turnover sensitivity to performance.

The dependent variable in this section is an indicator for CEO dismissals which takes the value 1 when the CEO is in his last year and 0 otherwise. The indicator variable also has the value 0 where the reason for CEO leaving has been marked as "Deceased" or "Retired" by Execucomp. The turnover sample ends in the year 2008. There are 1,620 dismissals in the sample of 14,486 firm-year observations, yielding an unconditional probability of 11.18%. The intentions of the board and the CEO are not always clear, making the process of identifying CEO dismissal extremely error-prone. Thus, similar to Jenter and Li (2009), and Adams and Ferreira (2009), all CEO dismissals are included in the sample. To identify the effect of experienced directors on CEO departures in case of poor performance, I include the interaction term between stock returns and the proportion of experienced di-

rectors as an independent variable. Stock returns are calculated as previous year firm stock returns minus the previous year return on the value weighted CRSP market index. Other than this additional interaction term, control variables are the same as in the previous section on compensation.

Results for the regressions on CEO turnover are in Table 7. In regression 1, with firm and year fixed effects, the interaction term between stock returns and PROP-G15 is negatively significant at the 5% level. This negative coefficient for the interaction term indicates that there is a higher likelihood of CEO turnover when the firm performs poorly and there are experienced directors on the board. There is also a positive coefficient for the interaction term between stock returns and PROP-CEOHire, showing that these directors who were hired after the CEO are less likely to dismiss a CEO when the firms perform poorly. In contrast to experienced directors, directors hired after the CEO exacerbate concerns about agency problems on the board. The two effects are distinct since the interaction terms using both sets of variables are significant. In order to further examine whether experience is just another way of looking at directors who were not hired before the CEO, I examine the subset of observations where the CEO has a longer tenure than any of the outside directors in regression 2. Within-firm variation in CEO turnover and a corresponding change in the proportion of experienced experienced directors is not possible given the sample length, hence I use industry and year fixed effects in regression 2. The coefficient of the interaction between PROP-G15 and stock return is similar in magnitude to the coefficient in regression 1, but the significance is slightly less than 10%. In regression 3, the regression includes all observations with industry and year fixed effects. The coefficient for the interaction variable is again significant at the 5% level.

Although the negative signs for the coefficients of CEO-chairman duality and CEO Ownership are in line with previous studies, one cannot comment on the

impact of these factors without considering interaction terms. In unattached results, I repeat the tests above with the addition of interaction terms between stock performance and both, the CEO Ownership, and CEO-chairman duality. The results still hold even with these additional variables. Overall, the results provide little evidence of the ability of the CEO to entrench himself in the face of poor performance if there are experienced directors on the board.

2.5.3.3 Earnings restatement

Although earnings manipulation can lead to large losses in reputation for firm management, financial incentives sometimes outweigh these concerns as managers seek to maximize performance-linked payouts or retain their jobs by manipulating accounting figures in financial statements. The audit committee is responsible for appointing and evaluating auditors and providing oversight on the integrity and compliance of company financial statements to reduce the likelihood of such earnings manipulation which can result in large shareholder losses. Previous research has shown that board independence and the presence of a financial expert can reduce (Agrawal and Chadha (2005);Klein (2002)); and the presence of foreign directors on the audit committee can increase (Masulis et al. (2012)) the probability of financial misreporting. In a similar vein, I examine the propensity of firms to misreport earnings when experienced directors are on the audit committee.

Data on accounting restatements is from the U.S. Government Accountability Office database, which released reports in 2003 and 2007 containing a list of financial statements which were incorrect on their release date. The reason for the inaccuracy could stem from either an error (unintentional reporting) or irregularities (intentional misreporting) and it is important to distinguish between the two effects (Hennes et al. (2008)). In addition, these reports released by the GAO list the date when the correction was made to the financial statements but

not do list the reporting period when the original infraction occurred. To address these two concerns in the data, I use modified versions of these reports obtained from Masulis et al. (2012) for the report released in 2007 (restatements from 2003 to 2006) and Burns and Kedia (2006) (restatements from 1997 to 2002) for the report released in 2003. [12] These modified reports include the misreported years and quarters and also use the Hennes et al. (2008) methodology to classify restatements as errors or irregularities.

I use the proportion of experienced directors on the audit committee (PROP-AC-G15) as the key independent variable. Table 8 contains the results for logistic regressions which use industry and year fixed effects. There is limited within-firm variation of earnings restatements, hence I do not use firm fixed effects in the analysis. The control variables are similar to those used in previous sections. The dependent variable in regression 1 is an indicator variable which takes the value 1 when a firm makes an earnings restatement and 0 otherwise. The coefficient for PROP-AC-G15 is not significant in this regression. In regression 2, the dependent variable is an indicator variable which takes the value 1 when the earnings restatement is classified an irregularity and the restatement is more likely to be due to a lapse in board monitoring. In contrast to the results on all earning restatements, the result in regression 2 shows that the coefficient for PROP-AC-G15 is -1.35 and is negatively significant at the 5% level. The marginal effect is -0.011 which means that adding one directors with tenure greater than 15 years on the audit committee, where none existed, will decrease the probability of an irregular earnings restatement by about -0.36% (0.33*-0.11). This is an economically significant effect as the unconditional probability of an irregular earnings restatement is just 1.5%. Thus the presence of an experienced director can reduce the occurrence by about 25%. Regressions 3 and 4 repeat the analysis from regressions 1 and

[12] I thank Natasha Burns, Simi Kedia, Ron Masulis, Cong Wang and Fei Xie for providing me with the modified earnings databases.

2 but use the subset of firms where the tenure of the CEO is greater than that of the outside directors. These regressions continue to show that the presence of experienced directors on the audit committee is less likely to be associated with intentional misreporting even in cases where the CEO and the experienced directors have had a chance to build a strong relationship over long tenures.

Overall the results provide strong support for the hypothesis that the presence of experienced directors on the board alleviates agency problems since these firms have lower propensity to misreport earnings intentionally.

2.5.4 Board advising

Besides monitoring management, directors serve as advisors, playing a key role in important strategic decisions like making and choosing acquisitions (Adams et al. (2010)). Previous research has explored the effect director expertise gained through their full-time jobs. One example is Guner, Malmendier, and Tate (2008), who find that boards with investment banking directors tend to make worse acquisitions. Experienced directors, however, develop expertise in the industry and firm on whose board they serve through their long tenure, which exposes them to the company's strategy, finances and competitive environment. Recent research has also explored the conflict between the advising and monitoring of management which arises because outside directors are dependent on the CEO (Adams and Ferreira (2007)) or inside directors (Harris and Raviv (2008)) for firm-specific information. If outside directors monitor the CEO too closely, she may become unwilling to share information. The first best solution to the trade-off between monitoring and advising in Adams and Ferreira (2007) is the sharing of information by managers so that the boards can both monitor management effectively and give quality advice. An alternative may be the presence of experienced directors who have built firm-specific knowledge and may not be totally reliant on manage-

ment for information. Their reduced dependence on management as a source of information, would allow these directors to fulfill their roles as both monitors and advisors.

In this section two aspects of this advisory role are examined. First is the decision to pursue acquisitions: Roll (1986) posits that takeovers are a sign of management hubris. I test the hypothesis that directors with long tenures may build relationships with the CEO and facilitate this hubris to retain their positions and ensure re-selection (Bebchuk and Fried (2003)). Second, I examine the hypothesis that experienced directors can provide advisory benefits to the firm by testing whether the presence of experienced directors on the board is associated with higher quality acquisitions.

2.5.4.1 Decision to pursue acquisition

The SDC database is used to obtain data on deals and the criteria in Masulis, Wang, and Xie (2007) is followed to identify acquisitions. Transactions, where the acquisition is completed and the acquirer controls less than 50% of the target's shares prior to the announcement and owns 100% of the target's shares after the transaction are included. Deals must be larger than $1 million and at least 1% of the acquirer's market value of equity, as measured on the eleventh trading day prior to the announcement date. In addition to these conditions, deals where the acquirer is making multiple deals on the same day (Faleye et al. (2011)) are excluded. After including only those observations which have information on director attributes in RiskMetrics, stock data from CRSP and accounting data from Compustat, the sample contains 3089 acquisitions.

In addition to the control variables from the previous sections, firm-level accounting variables like free cash flow and leverage, which have been used in the merger and acquisitions literature, are included. The dependent variable is an

indicator variable which is set to 1 when a firm decides to pursue one or more acquisitions within the fiscal year. In Table 9, regression 1 uses firm and year fixed effects. The coefficient for PROP-G15 is negatively significant at the 5% level with a coefficient of -0.06. Using an average board size of nine, an increase in one experienced directors will lead to 0.67% decrease in the probability of a merger. The unconditional probability of a merger is 18.37%, so it is a small but still meaningful impact. Regression 2 uses the subset of firms where the CEO tenure is greater than that of all outside directors and the coefficient for PROP-G15 is still significant at the 5% level and the magnitude of the coefficient is three times that of the coefficient of PROP-G15 in regression 1. This result shows that even when the CEO and experienced directors have served long tenures together, the likelihood that a firm will acquire another is lower than when experienced directors are on the board. In regression 3, industry and year fixed effects are used and the coefficient for PROP-G15 is negative but no longer significant at the 10% level. While this result shows that when comparing across firms, experienced directors on the board do not reduce the likelihood of an acquisitions, regressions using firm-fixed effect control for firm level unobservable factors and are more important from the point of the view of the firm. The importance of tenure can again be seen in regression 4, where director and year fixed effects are used. The coefficient for the PROP-G15 variable is significant at the 10% level showing again that the likelihood of acquisitions are lower even when examining within-director variation. Overall, even though the results are not strong when using industry fixed effects, the results using firm and director firm effects show that director term limits would rid the board of a counterbalance to the CEO in the board room.

2.5.4.2 Acquirer returns

This section examines whether experienced directors help firms make more profitable acquisitions, using a commonly employed event-study methodology that utilizes cumulative abnormal returns (CAR). Acquisitions are chosen under the same methodology as in the previous section. Firm-level accounting data and board structure data from the year before the acquisition is used. CAR for bidding firms is calculated as in Masulis, Wang, and Xie (2007). First, the market model is estimated using daily stock returns data from CRSP for the 200-day period from event day -210 to event day -11. Next, the cumulative abnormal returns are calculated over five days, two days before and two days after the announcement day. In this sample, the median CAR is 0.298 % and mean CAR is 0.21%.

In addition to the control variables from the previous sections, variables deemed important in previous studies on mergers and acquisitions are also included: deal size as in Moeller, Schlingemann, and Stulz (2004); percentage of payments made in cash as in Travlos (1987); different industry as in Morck, Shleifer, and Vishny (1990); private company as in Chang (1998); and takeover defenses as in Masulis, Wang, and Xie (2007). Relative value of the deal, which is also used a control variable, is calculated as per Masulis, Wang, and Xie (2007), where the deal value from the SDC database is divided by the bidding firm's market value of equity 11 days before the announcement date. RiskMetrics data on two other corporate governance mechanisms related to management entrenchment and the market for corporate control are also used. The first variable (staggered board) denotes whether a firm elects only a fraction of its directors to the board during annual elections. The second variable (GIM as in Gompers et al. (2003)), averages the incidence of 24 governance rules as a proxy for shareholder rights. The GIM index is only updated every other year so I assume the value does not change

unless it is updated in the database. Since data for many firm years is missing for the GIM index, the regressions which includes the GIM index is run separately in order to avoid losing observations.

Table 10 shows the results for OLS regressions where the dependent variable is the five-day CAR, multiplied by 100. Since this is an event study with small or no within-firm variation, I only use industry and year fixed effects for all regressions. The coefficient for PROP-G15 in regression 1 is significant at the 1% level with a magnitude of 2.11. This means that an increase of one experienced director on a board where none existed will increase CAR by 0.23%. In regression 2, GIM index is used as a control variable and in regression 3, the Staggered Board board variable is used as a control variable. The coefficient for PROP-G15 continues to remain significant at the 1% level in these regressions with a magnitude similar to that of regression 1. The results are robust to the cumulative abnormal return being calculated over three days. A regression examining the subsample of observations where the CEO tenure is greater than that of outside directors is not included in Table 10 since the sample size is greatly reduced, making inference unsuitable.

Contrary to Byrd and Hickman (1992) and similar to Masulis, Wang, and Xie (2007), the results show that the board's independence does not affect the quality of acquisitions. In terms of bidder characteristics, size is negatively related to acquisition returns (Moeller et al. (2004)). Free cash flow is not related to CAR, but this could be because the sample is not split into high and low Tobin's q firms as in Lang, Stulz, and Walkling (1991). In terms of deal characteristics, the results agree with previous studies. Bidders returns are positively linked to private deals (Chang (1998)), and the percentage of cash used (Travlos (1987)) and negatively linked to a difference in industry between the bidding and acquiring firms (Morck et al. (1990)). The results show that experienced directors can provide significant

advisory benefits to firms as their presence on the board can lead to significantly better quality acquisitions as measured by announcement day returns.

2.6 Conclusion

Advocates for improving corporate governance and regulators recommend term limits for outside directors. The premise is that new directors will infuse innovative ideas and energy into the boardroom and also be less likely to align with the CEO when the time comes to set compensation and consider leadership changes. A contrasting hypothesis in support of experienced directors stems from the fact that these directors have significant equity stakes in firms, have experience dealing with multiple CEOs and have had an opportunity to learn about the business and the industry. In this chapter, I study whether calls for term limits are justified by examining how the presence of experienced directors on boards affects firm policies.

Data from S&P 1500 companies over 12 years is used to examine monitoring and advising outcomes using the proportion of directors with a tenure greater than 15 years (an experienced director) as the key explanatory variable. Results in this chapter show that CEOs in firms with a larger number of experienced directors are likely to have lower compensation and are more likely to leave when the firm performs poorly. These firms are also less likely to make earnings restatements. Firms with a higher proportion of experienced directors are also less likely to make acquisitions and those that are made are more likely to be profitable. The results on both monitoring and advising outcomes suggest that experienced directors provide a balance of power in the boardroom.

This chapter also provides evidence on the trade-off between advising and monitoring of management. Previous research shows that excessive monitoring

of the CEO leads to the possibility that managers withhold information from the board, compromising advising quality. However, experienced directors may have developed firm-level expertise over their tenure and not be totally dependent on management for insight into firm operations. The results show that the presence of these directors on boards leads to both, better strategic and monitoring decision-making.

Overall, the results show that experienced directors make a valuable contribution to corporate governance within firms. Instead of term limits being rigorously mandated for every firm, evaluation procedures for directors should be encouraged. These procedures will help boards assess whether experienced directors continue to provide sound advice and monitor management effectively.

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APPENDIX A

Execucomp CEO Compensation

The Financial Accounting Standards Board (FASB) issued FAS 123 in Oct 1995 which encouraged firms to report their equity based compensation using a fair-value based method of accounting. The intention was to provide a more realistic valuation of the payment to executives compared to previous methods (APB 25) whereby stock option grants were often recognized without any compensation cost. FASB introduced FAS 123R at the end of 2004 which made the optional implementation of fair-value based accounting mandatory for all public firms. Subsequently, Execucomp changed its methodology for equity based compensation from the fiscal year 2006 onwards to incorporate FAS 123.[13]

Prior to the fiscal year 2006, Execucomp calculated stock option grants used it's own standardized Black-Scholes methodology. After the fiscal year 2006, Execucomp reported the value of the option grants as calculated by individual firms. Since firms may use their own internal models to value stock option grants, annual option compensation cannot be compared across firms after 2006. There will also be a difference in option valuation within firms before and after the fiscal year 2006. I follow Kini and Williams (2012) and Coles et al. (2010) and use the pre-2006 Execucomp methodology to calculate option awards for all years and all firms to ensure that compensation is comparable.

The pre-2006 Execucomp methodology used the following inputs:

- A grant date of July 1 is used for all options in a given fiscal year. To account for the fact that executives often exercise their options early, the time to maturity of the option was set to 70% of the actual time to maturity. This number was then rounded to the nearest whole number.

[13]Please refer to http://www.fasb.org/summary/stsum123r.shtml for details on FAS 123R and http://www.fasb.org/summary/stsum123.shtml# for details on FAS 123.

- The seven year risk free rate of a U.S. Treasury bond.
- The 60 month stock volatility is used. If there are fewer than 12 months are available, then the volatility of the S&P 1500 is used, otherwise if there are fewer than 60 months available, then those number of months are used. The data is winsorized at the 5 percentile and the 95 percentile.
- The average dividend yield over the previous three years is used. The data is winsorized at the 5 percentile and the 95 percentile.
- The company specified strike price and market price of the option were used.

In order to ensure that the correctly replicated Execucomp methodology I calculate the option valuation of all firms in all years before 2006 and get a correlation of 0.9973. I then calculate total compensation using the formula below:

Total Compensation = SALARY + BONUS + OTHANN + ALLOTHTOT + RSTKGRNT + option_awards_calculated_value + LTIP

The only change in my calculation from the Execucomp calculated total compensation *TDC1* is the calculation of the option awards. I find the correlation between total compensation measures is 0.996.

After the year 2006, I again calculate option values and leave all the other inputs the same. Prior to the year 2006, all inputs were available in the Execucomp table *Stock Option Grants - 1992 Format*. After 2006, the number of options granted and exercise price are used from the Execucomp table *Plan Based Awards*, while the exercise price is inferred from the Execucomp table *Outstanding Equity Awards* using exercise price and number of options in the grant.

Total Compensation = SALARY + BONUS + NONEQ_INCENT + OTHCOMP + STOCK_AWARDS_FV + option_awards_calculated_value + DEFER_RPT_AS_COMP_TOT

The correlation between my calculation of total compensation and TDC1 from Execucomp is unsurprisingly a bit lower at 96.6%.

APPENDIX B
Variable Description and Source

Director-level variables		
Poor Attendance	Indicator variable which is set to 1 when the directors does not attend at least 75% of board meetings	RiskMetrics
Former Employee	Indicator variable which is set to 1 when the director is a former employee	RiskMetrics
CEO-Hire	Indicator variable which is set to 1 if director is hired after the CEO	RiskMetrics
Number Boards	The number of boards of other firms the director sits on	RiskMetrics
Compensation committee membership	Indicator variable with 1 indicating membership of the committee	RiskMetrics
Director % Ownership	The total number of shares and options that can be exercised within 60 days of fiscal year end divided by shares outstanding.	RiskMetrics
Director Dollar Sensitivity	The sensitivity to 1% change in stock price is the sum of the total number of shares and options that can be exercised within 60 days of fiscal year end multiplied by 1% of fiscal year-end share price.	RiskMetrics
G15, B5_15, L5	Indicator variables which takes the value 1 when a director tenure is greater than or equal to 15 years, between 15 and five years, and less than five years respectively.	RiskMetrics
Age_L65	An indicator variable which takes the value 1 when director age is less than 65.	RiskMetrics
Female Director	Indicator which takes the value 1 when the director is a female.	RiskMetrics
Board-level variables		
PROP-OUTSIDE	The number of outside directors divided by the total number of directors	RiskMetrics
PROP-G15	The number of outside directors on the board with a tenure of 15 years divided by the total of outside directors.	RiskMetrics
PROP-G15-CC	The proportion of directors on the compensation committee with a tenure of 15 years divided by the total number of outside directors on the compensation committee.	RiskMetrics
PROP-G15-AC	the proportion of directors on the compensation committee with a a tenure of 15 years divided by the total number of outside directors on the audit committee.	
PROP-CEOHire	The proportion of outside directors hired after the CEO divided by the total number of outside directors.	RiskMetrics
PROP-CEOHire-CC	The proportion of outside directors hired after the CEO divided by the total number of outside directors.	RiskMetrics
PROP-CEOHire-AC	The proportion of outside directors hired after the CEO divided by the total number of outside directors.	RiskMetrics
Staggered board	An indicator variable set to 1 if election for all board members is not in the same year.	RiskMetrics
Busy Board	Indicator set to 1 if half or more of the outside directors are busy directors	RiskMetrics

CEO-level variables		
CEO Total Compensation	Log (Sum of salary, bonus, equity and long-term incentive pay)	Execucomp
CEO Age/Tenure	Age/Tenure of CEO	Execucomp
CEO-Chairman	Sum of salary, bonus, equity and long-term incentive pay	Execucomp
CEO % Ownership	The total number of shares and options that can be exercised within 60 days of fiscal year end divided by shares outstanding.	Execucomp
Firm-level variables		
Assets	Stated in inflation adjusted dollars. The inflation adjustment is made by using the CPI index and the year 2003 as the base year.	Compustat
Tobin's q	(Assets-Equity+Market equity)/Market equity	Compustat
R&D	Research and development expenses divided by assets/Total assets	Compustat
Pays Dividend	An indicator variable which is set to 1 for firms which pay a dividend.	Compustat
Leverage	Sum of short term debt and long term debt divided by assets	Compustat
Free cash flow	(Net cash flow from operation activities + Dividend paid)/Assets.	Compustat
RET	Previous year firm stock return minus the CRSP value weighted index.	Compustat
Return on assets	EBITDA divided by previous year end assets.	Compustat
Earned Equity	Retained equity divided by book equity.	Compustat
Asset Growth	Percentage growth in assets.	Compustat
The GIM index (Gompers, Ishii, and Metrick, 2003)	Variable averaging the incidence of 24 governance rules to proxy for shareholder rights.	RiskMetrics
CAR (Cumulative abnormal return)	Calculated over a three day period using the residuals of the market model. The parameters of the market model are estimated using data from event day -210 to event day -11	CRSP
Firm Age	Years since the stock was listed	CRSP
Standard deviation of ROA	Calculated over five years.	Compustat
StdDev (RET)	Standard deviation of stock returns calculated over give years using annual returns	CRSP

Table 1 Director Attributes by Tenure

This tables describes the mean value of 111,517 outside director-level observations. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO attributes from Execucomp. Variables are defined in the Appendix. Column (F) is the p-value for the non-parametric Mann-Whitney-Wilcoxon significance test for the difference between column (D) and column (E).

	(A)	**(B)**	**(C)**	**(D)** (includes (B)+(C))	**(E)**	**(F)** (D) vs. (E)
Variables	**All**	**Tenure<5**	**5<=Tenure<15**	**Tenure<15**	**Tenure>=15**	**Difference**
Count	111,517	45,535	50,815	96,350	15,167	
Attributes						
Age	61.210	57.957	62.286	60.241	67.359	0***
Tenure	7.521	2.148	8.459	5.476	20.506	0***
Female	13.446%	15.456%	13.350%	14.346%	7.734%	0***
Poor Attendance	1.697%	1.915%	1.588%	1.743%	1.411%	0.003***
Former Employee	0.326%	0.136%	0.301%	0.223%	0.982%	0***
Number Boards	0.975	0.973	1.026	1.001	0.810	0***
Hired by CEO	44.712%	70.328%	31.778%	49.997%	11.136%	0***
Committee Membership						
Compensation Committee	48.454%	41.449%	53.384%	47.744%	52.970%	0***
Audit Committee	50.159%	49.008%	51.599%	50.375%	48.790%	0***
Nomination Committee	42.792%	35.133%	47.356%	41.580%	50.491%	0***
Comp+Audit +Nomination	1.414	1.256	1.523	1.397	1.523	0***
Committee Leadership						
Compensation Committee	11.847%	6.145%	15.375%	11.013%	17.142%	0***
Audit committee	12.022%	8.492%	14.454%	11.637%	14.472%	0***
Equity Ownership						
%Ownership -mean	0.204%	0.146%	0.204%	0.177%	0.364%	0***
%Ownership -median	0.025%	0.008%	0.039%	0.020%	0.069%	0***
Dollar Sensitivity -mean	73,019	36,150	58,489	48,261	223,973	0***
Dollar Sensitivity -median	5,974	2,243	9,036	5,088	15,773	0***

TABLE 2 Firm-Level Summary

The table contains summat statistics for the sample of 15,922 firm-level observations for the period 1998-2009. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO attributes from Execucomp. Variables are defined in the Appendix.

Panel A: Firm Summary Statistics

	Mean	Median	Std Deviation
Board			
Number of Directors	9.405	9.000	2.707
% Outside Directors	0.697	0.727	0.167
Busy Board	0.036	0.000	0.185
% Hired after CEO	0.459	0.429	0.355
% Hired after CEO on Comp Committee	0.394	0.333	0.374
% Firms with 1 Outside Director with tenure>=15 yrs	0.484	0.000	0.500
% Firms with 1 Outside Director with tenure>=12 yrs	0.637	1.000	0.481
% Firms with 1 Outside Director with tenure>=9 yrs	0.781	1.000	0.414
Firm Characteristics			
Assets (millions)	14,341	1,818	78,708
Assets Inflation Adjusted (millions)	13,844	1,788	73,389
Log (Assets Inflation Adjusted)	7.669	7.489	1.672
Shareholders Equity (millions)	2,679	679	8,315
Market Equity (millions)	7,843	1,618	25,214
Tobin's q	2.019	1.470	2.172
Leverage	0.228	0.213	0.189
R&D Expenses	0.026	0.000	0.058
Pays Dividend	0.558	1.000	0.497
Free Cash Flow	0.100	0.090	0.076
Market to Book	1.457	0.923	2.242
Cash Holdings/Assets	0.196	0.068	1.223
Earned Equity	0.803	0.568	7.728
Asset growth	0.197	0.073	1.493
Firm Age	22.037	18.000	15.228
Firm Performance			
ROA	0.133	0.129	0.111
ROA-5 yr Avg	0.138	0.134	0.094
ROA-5 yr Std Deviation	0.039	0.026	0.049
RET	0.097	0.043	0.527
CEO			
CEO Tenure	7.415	5.000	7.497
CEO Age	55.550	56.000	7.381
CEO Total Compensation (thousands)	5,519	2,908	11,654
CEO Total Compensation Inflation Adjusted (thousands)	5,429	2,833	12,263
Log (CEO Total Compensation Inflation Adjusted)	7.947	7.950	1.202
CEO % Ownership	0.034	0.015	0.060
CEO Dollar Sensitivity (hundred thousands)	1,339	237	11,601
M&A			
GIM	9.181	9.000	2.672
Staggered Board	0.585	1.000	0.493
5 day CAR	0.210%	0.298%	7.423%
3 day CAR	0.051%	0.219%	6.310%

Panel B: Firm Summary by Tenure

	MEAN			
	PROP-G15	PROP-G12	PROP-G9	PROP-L5
All Outside Directors	0.132	0.214	0.332	0.588
Compensation Committee	0.136	0.222	0.347	0.605
Audit Committee	0.122	0.197	0.308	0.558
Nominating Committee	0.141	0.229	0.352	0.599

TABLE 3 Proportion of Experienced Directors

This table shows the relationship between the proportion of experienced directors and firm, CEO and board characteristics.The sample consists of 15922 firm-level observations for the period 1998-2009. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO attributes from Execucomp. The first three regressions use the Tobit procedure while the next three use OLS. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The t-statistics are in parenthesis. The numbers of observations may vary because of perfect predictability of the dependent variable.

	PROP-G15	**PROP-CC-G15**	**PROP-AC-G15**	**PROP-G15**	**PROP-CC-G15**	**PROP-AC-G15**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Board variables						
Board Size	0.106***	0.139***	0.086**	-0.012	0.017	0.021
	(4.14)	(3.21)	(2.13)	(-0.86)	(0.98)	(1.14)
PROP-OUTSIDE	-0.061	-0.053	-0.037	-0.070***	0.033	0.033
	(-1.57)	(-0.79)	(-0.60)	(-2.93)	(1.15)	(1.28)
CEO variables						
CEO-Chairman	-0.036***	-0.042**	-0.060***	-0.002	-0.006	-0.002
	(-3.80)	(-2.56)	(-3.77)	(-0.52)	(-1.02)	(-0.37)
CEO Age	1.741**	3.648**	3.567**	1.026*	0.716	1.556**
	(2.02)	(2.47)	(2.53)	(1.95)	(1.00)	(2.38)
CEO Tenure	7.304***	10.249***	11.057***	0.156	0.760	-0.161
	(7.72)	(6.41)	(7.53)	(0.29)	(1.03)	(-0.22)
CEO % Ownership	-0.016	0.027	0.004	0.024	-0.023	0.099*
	(-0.11)	(0.12)	(0.02)	(0.55)	(-0.43)	(1.89)
Firm variables						
Firm Size	-0.029***	-0.044***	-0.037***	0.020***	0.018*	0.022**
	(-5.94)	(-5.22)	(-4.73)	(2.98)	(1.88)	(2.53)
Firm Age	0.007***	0.011***	0.009***	0.003***	0.002	0.002*
	(13.41)	(11.68)	(11.16)	(3.81)	(1.52)	(1.74)
Tobin's q	0.001	-0.002	-0.011	-0.000	-0.001	-0.002
	(0.13)	(-0.30)	(-1.55)	(-0.25)	(-0.54)	(-1.11)
R&D	0.231	0.317	0.446**	0.125	0.164*	0.101
	(1.60)	(1.21)	(2.00)	(1.54)	(1.72)	(1.11)
Std deviation (ROA)	-0.635***	-1.088***	-0.733***	0.037	0.024	0.035
	(-4.44)	(-4.28)	(-3.34)	(0.60)	(0.30)	(0.47)
5 year avg ROA	0.155**	0.144	0.287**	-0.052	-0.093	-0.033
	(2.19)	(1.16)	(2.46)	(-0.97)	(-1.30)	(-0.50)
Observations	15034	14819	14953	15081	14865	14999
Adjusted R-squared				0.622	0.510	0.500
Pseudo R-squared	0.19	0.09	0.09			
Fixed Effects	Industry, Year	Industry, Year	Industry, Year	Firm, Year	Firm, Year	Firm, Year

TABLE 4 Committee Membership

This table includes logit regressions showing the relationship between participation in a committee and CEO, director and firm characteristics. The sample consists of 111,517 director-level observations for the period 1998-2009. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP and CEO attributes from Execucomp. The dependent variable in the first three regressions is an indicator variable which takes the value 1 when the director is a member of either the compensation, audit or nomination committee.The dependent variable in the next nine regressions are indicator variables which indicate membership in the committee specified by the heading. In addition, observations are not included for regressions 1-3, 4-6, 7-9, 10-12 if the firm does not have any committee, a compensation committee, an audit committee, or a nomination committee respectively. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The t-statistics are in parenthesis. The numbers of observations may vary because of perfect predictability of the dependent variable.

	Committee Member			**Comp Committee Member**			**Audit Committee Member**			**Nomination Committee Member**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
G15	0.028***			0.051***			-0.015***			0.088***		
	(9.94)			(10.46)			(-3.15)			(17.41)		
B5_15		0.065***			0.084***			0.022***			0.084***	
		(34.00)			(26.67)			(7.00)			(25.69)	
L5			-0.087***			-0.120***			-0.018***			-0.136***
			(-39.62)			(-35.74)			(-5.28)			(-39.82)
Director Controls												
Age_L65	-0.040***	-0.038***	-0.019***	-0.040***	-0.040***	-0.015***	0.002	0.007**	0.010***	-0.078***	-0.084***	-0.054***
	(-18.47)	(-18.12)	(-9.27)	(-11.45)	(-11.78)	(-4.26)	(0.63)	(2.15)	(2.85)	(-21.63)	(-24.06)	(-14.95)
Female Director	0.012***	0.010***	0.012***	-0.036***	-0.038***	-0.037***	-0.007	-0.007	-0.007	0.043***	0.040***	0.041***
	(4.18)	(3.63)	(4.00)	(-7.73)	(-8.27)	(-8.00)	(-1.54)	(-1.57)	(-1.49)	(9.25)	(8.59)	(8.78)
Busy Director	0.015***	0.012***	0.013***	0.043***	0.040***	0.040***	-0.032***	-0.033***	-0.033***	0.039***	0.035***	0.035***
	(4.93)	(4.18)	(4.32)	(8.49)	(7.88)	(7.97)	(-6.44)	(-6.54)	(-6.47)	(7.48)	(6.81)	(6.82)
Board Controls												
Board Size	-0.148***	-0.136***	-0.131***	-0.214***	-0.199***	-0.192***	-0.252***	-0.248***	-0.249***	-0.191***	-0.177***	-0.166***
	(-16.18)	(-14.98)	(-14.55)	(-15.32)	(-14.24)	(-13.76)	(-17.91)	(-17.61)	(-17.65)	(-12.39)	(-11.48)	(-10.88)
PROP-Outside	-0.126***	-0.121***	-0.113***	-0.233***	-0.227***	-0.216***	-0.298***	-0.295***	-0.294***	-0.078***	-0.076***	-0.063***
	(-9.45)	(-9.09)	(-8.53)	(-11.57)	(-11.29)	(-10.78)	(-14.73)	(-14.57)	(-14.53)	(-3.50)	(-3.43)	(-2.84)
CEO controls												
CEO-Chairman	-0.001	-0.002	-0.003	0.043***	0.041***	0.040***	-0.044***	-0.044***	-0.044***	0.056***	0.054***	0.052***
	(-0.15)	(-0.62)	(-0.76)	(6.56)	(6.22)	(6.10)	(-6.56)	(-6.66)	(-6.63)	(8.06)	(7.74)	(7.59)
CEO Age	0.766***	0.914***	0.900***	0.588	0.793*	0.778*	0.782*	0.816*	0.795*	0.648	0.850*	0.867*
	(2.65)	(3.18)	(3.14)	(1.26)	(1.71)	(1.68)	(1.68)	(1.75)	(1.71)	(1.30)	(1.72)	(1.76)
CEO Tenure	-0.085**	-0.077**	-0.075**	-0.035	-0.023	-0.020	0.030	0.033	0.032	-0.069	-0.051	-0.049
	(-2.18)	(-1.98)	(-1.97)	(-0.70)	(-0.46)	(-0.40)	(0.60)	(0.65)	(0.64)	(-1.17)	(-0.87)	(-0.84)
CEO % Ownership	-0.424	-0.722**	-0.835***	-0.083	-0.479	-0.650	0.367	0.262	0.280	0.381	-0.063	-0.275
	(-1.33)	(-2.28)	(-2.65)	(-0.17)	(-0.99)	(-1.35)	(0.76)	(0.54)	(0.58)	(0.72)	(-0.12)	(-0.52)
Firm controls												
Firm Size	0.011***	0.012***	0.011***	-0.003	-0.002	-0.004	0.004	0.004	0.004	-0.004	-0.003	-0.004
	(3.19)	(3.40)	(3.08)	(-0.55)	(-0.36)	(-0.64)	(0.76)	(0.73)	(0.68)	(-0.56)	(-0.41)	(-0.65)
Firm Age	0.006***	0.005***	0.005***	0.001	-0.000	-0.000	0.002***	0.002***	0.002***	0.004***	0.003***	0.003***
	(10.88)	(9.97)	(9.53)	(0.68)	(-0.05)	(-0.53)	(2.88)	(2.66)	(2.68)	(4.62)	(3.83)	(3.29)
Tobin's q	0.000	0.000	0.000	0.002	0.002	0.002	0.001	0.001	0.001	0.005*	0.005**	0.005**
	(0.07)	(0.25)	(0.30)	(1.37)	(1.51)	(1.57)	(1.01)	(1.05)	(1.04)	(1.92)	(2.08)	(2.14)
R&D	0.060	0.076	0.071	0.041	0.064	0.057	-0.080	-0.078	-0.081	-0.089	-0.073	-0.077
	(1.15)	(1.47)	(1.37)	(0.47)	(0.75)	(0.67)	(-0.93)	(-0.90)	(-0.93)	(-0.93)	(-0.77)	(-0.82)
Observations	104240	104240	104240	103680	103680	103680	104083	104083	104083	94855	94855	94855
Adjusted R-squared	0.088	0.097	0.103	0.074	0.079	0.084	0.063	0.063	0.063	0.106	0.110	0.118
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year

TABLE 5 Attendance Problems

This table shows the relationship between attendance problems and director, firm and CEO characteristics. The sample consists of 64,592 firm-level observations for the period 1998-2006. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO compensation and board meeting data from Execucomp. The dependent variable for all three OLS regressions is an indicator which takes the value 1 if the director has not attended 75% of board meetings. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The t-statistics are in parenthesis. The numbers of observations may vary because of perfect predictability of the dependent variable.

	Poor Attendance		
	(1)	(2)	(3)
G15	-0.004**		
	(-2.14)		
B5_15		-0.003**	
		(-2.21)	
L5			0.005***
			(3.63)
Director Controls			
Age_L65	0.003**	0.003***	0.002*
	(2.38)	(2.78)	(1.84)
Female Director	-0.003*	-0.003*	-0.003*
	(-1.76)	(-1.68)	(-1.74)
Busy Director	0.006***	0.006***	0.006***
	(3.15)	(3.22)	(3.23)
Board Controls			
Board Size	0.017***	0.016***	0.016***
	(3.41)	(3.29)	(3.19)
%Outside	0.030***	0.030***	0.029***
	(3.98)	(3.94)	(3.85)
CEO controls			
CEO-Chairman	0.008***	0.008***	0.008***
	(3.04)	(3.10)	(3.15)
CEO Age	-0.038	-0.045	-0.047
	(-0.21)	(-0.24)	(-0.25)
CEO Tenure	-0.014	-0.014	-0.014
	(-0.81)	(-0.83)	(-0.83)
CEO % Ownership	0.417**	0.427**	0.437**
	(2.17)	(2.22)	(2.27)
Firm Size	-0.006**	-0.006**	-0.006**
	(-2.56)	(-2.57)	(-2.57)
Firm Age	-0.004***	-0.004***	-0.004***
	(-7.47)	(-7.46)	(-7.45)
Tobin's q	-0.000	-0.000	-0.000
	(-0.71)	(-0.71)	(-0.73)
R&D	-0.008	-0.009	-0.009
	(-0.29)	(-0.31)	(-0.30)
Meeting controls			
Director Meeting Fee	-0.001	-0.001	-0.001
	(-1.16)	(-1.14)	(-1.17)
Number of meetings	0.355	0.358	0.357
	(1.50)	(1.51)	(1.50)
Observations	65938	65938	65938
Adjusted R-squared	0.037	0.037	0.037
Fixed Effects	Firm, Year	Firm, Year	Firm, Year

TABLE 6 CEO Compensation

This table includes OLS regressions showing the relationship between log of CEO compensation and director and firm characteristics.The sample consists of 13,648 firm-level observations for the period 1999-2009. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP and CEO compensation data from Execucomp. In regression 2, observations are only included if the CEO tenure is greater or equal to that of all outside directors. The dependent variable for all four OLS regressions is the log of CEO total compensation which is the sum of salary, bonus, equity and long-term incentive pay. All variables are defined in the Appendix ***,** and * indicate significance at the 1%, 5% and 10% level respectively. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The t-statistics are in parenthesis. The numbers of observations may vary because of perfect predictability of the dependent variable.

	Log (CEO Compensation)				
	(1)	**(2)**	**(3)**		**(4)**
PROP-G15-CC	-0.081**	-0.263*	-0.084**	G15 *CC	-0.045**
	(-2.01)	(-1.83)	(-2.40)		(-1.97)
Board controls				**Board controls**	
Board Size	0.072	0.161	0.090*	Board Size	0.081**
	(1.14)	(0.84)	(1.94)		(2.26)
PROP-Outside	0.109	0.621**	0.427***	%Outside	0.290***
	(1.18)	(2.13)	(6.67)		(5.96)
				Director controls	
Busy Board	-0.041	-0.134	0.019	Busy Director	0.010
	(-0.73)	(-0.86)	(0.31)		(0.66)
Mean Dir Age	0.001	0.008	0.000	Dir Age	-0.013**
	(0.18)	(0.75)	(0.10)		(-2.20)
PROP-CEOHire-CC	0.014		0.058**	CEO-Hire	0.005
	(0.41)		(2.16)		(0.29)
				G15	0.024
					(1.15)
				CC	-0.005
					(-0.40)
CEO controls				**CEO controls**	
CEO-Chairman	0.084***	-0.040	0.190***	CEO-Chairman	0.031*
	(3.59)	(-0.50)	(10.14)		(1.79)
CEO Age	-0.600	5.798	0.792	CEO Age	0.326
	(-0.20)	(0.34)	(0.58)		(0.25)
CEO Tenure	-3.180	-17.418	-6.026***	CEO Tenure	-1.407
	(-1.15)	(-1.18)	(-3.67)		(-0.96)
CEO % Ownership	-0.289	-0.398	-1.011***	CEO % Ownership	-0.404**
	(-1.03)	(-1.00)	(-4.58)		(-2.36)
Firm controls				**Firm controls**	
1 year RET	0.168***	0.188**	0.211***	1 year RET	0.165***
	(7.05)	(2.17)	(8.14)		(13.23)
StdDev (RET)	0.116***	-0.082	0.096***	StdDev (RET)	0.124***
	(3.40)	(-0.78)	(3.44)		(6.66)
Firm Size	0.229***	0.430***	0.315***	Firm Size	0.323***
	(7.17)	(4.88)	(72.26)		(40.15)
Firm Age	-0.003	-0.025*	-0.000	Firm Age	0.000
	(-0.74)	(-1.79)	(-0.84)		(0.23)
R&D	0.060	-1.565	1.481***	R&D	1.500***
	(0.16)	(-1.43)	(11.10)		(7.24)
Observations	13054	2140	13043		79924
Adjusted R-squared	0.643	0.637	0.393		0.604
Fixed Effects	Firm, year	Firm, year	Industry, year		Director, year

TABLE 7 CEO Turnover

This table includes regressions showing the relationship between CEO turnover and firm, CEO and board characteristics.The sample consists of 14,486 firm-level observations for the period 1998-2008. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO attributes from Execucomp. In regression 2, observations are only included if the CEO tenure is greater or equal to that of all outside directors. The dependent variable is an indicator which takes the value 1 if the CEO is in his last year, except in case of death and retirement. All variables are define in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The t-statistics are in parenthesis. The numbers of observations may vary because of perfect predictability of the dependent variable.

	CEO Turnover				
	(1)	(2)	(3)		(4)
PROP-G15* RET	-0.062**	-0.065	-0.079**	G15*RET	-0.021**
	(-2.02)	(-1.56)	(-2.38)		(-2.42)
PROP-CEOHire* RET	0.036**		0.016	CEOHire*RET	0.020***
	(2.24)		(0.94)		(3.52)
Board controls				**Board controls**	
Board Size	-0.013	0.048	0.012	Board Size	0.022*
	(-0.28)	(1.43)	(0.65)		(1.74)
PROP-Outside	-0.129***	0.089*	0.028	PROP-Outside	-0.148***
	(-3.63)	(1.82)	(1.30)		(-8.24)
				Director controls	
Busy Board	0.049**	0.060	0.044***	Busy Director	-0.006
	(2.35)	(1.23)	(2.71)		(-0.87)
Mean Dir Age	0.000	-0.004**	-0.004***	Dir Age	-0.002
	(0.13)	(-2.22)	(-5.06)		(-0.83)
PROP-CEOHire	0.200***	-0.089	0.084***	CEO-Hire	0.095***
	(8.73)	(-1.13)	(6.20)		(14.11)
PROP-G15	0.071**	0.037	-0.013	G15	0.014**
	(2.38)	(0.81)	(-0.70)		(1.98)
CEO controls				**CEO controls**	
CEO-Chairman	-0.270***	-0.286***	-0.158***	CEO-Chairman	
	(-15.92)	(-12.70)	(-15.30)		
CEO Age	16.073***	6.918***	10.091***	CEO Age	-0.076***
	(13.28)	(5.99)	(19.83)		(-10.04)
CEO Tenure	7.631***	-1.726	-0.843	CEO Tenure	14.736***
	(4.85)	(-1.54)	(-1.20)		(34.26)
CEO % Ownership	-0.227**	-0.080	-0.183***	CEO % Ownership	5.043***
	(-2.29)	(-0.91)	(-3.15)		(7.59)
Firm controls				**Firm controls**	-0.432***
RET	-0.032***	0.011	-0.022**	RET	(-7.09)
	(-3.37)	(0.73)	(-2.41)		
Firm Size	0.006	0.011	0.008***	Firm Size	-0.033***
	(0.51)	(1.53)	(2.74)		(-7.03)
R&D	0.111	0.071	0.065	R&D	-0.003
	(0.62)	(0.51)	(0.96)		(-1.40)
Tobin's q	0.000	0.003	-0.001	Tobin's q	0.279***
	(0.14)	(0.67)	(-0.55)		(4.42)
Firm Age	-0.005**	0.001	0.000	Firm Age	0.002
	(-2.51)	(0.59)	(1.55)		(0.91)
Observations	12486	2140	12486		0.001***
Adjusted R-squared	0.188	0.160	0.101		(3.02)
Fixed Effects	Firm, year	Industry, year	Industry, year		Director, year

TABLE 8 Financial Restatement

This table includes logit regressions showing the relationship between likelihood of a firm making an earnings restatement and director and firm characteristics over the period 1998-2006. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO attributes from from Execucomp. The dependent variable Restatement is an indicator which takes the value 1 if firm makes an earnings restatement. The dependent variable Irregularity is an indicator which takes the value 1 if firm intentionally misreports its earnings. Regressions 3 and 4 only use observations where CEO tenure is greater than that of all outside directors. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used.

	Restatement (1)	**Irregularity (2)**	**Restatement (3)**	**Irregularity (4)**
PROP-AC-G15	-0.199	-1.356**	-0.229	-3.260**
	(-0.61)	(-2.17)	(-0.36)	(-2.01)
Board controls				
Board Size	0.016	-0.196	-0.003	0.361
	(0.06)	(-0.46)	(-0.01)	(0.44)
PROP-Outside	-0.090	-0.969*	0.463	0.165
	(-0.25)	(-1.76)	(0.71)	(0.15)
Busy Board	-0.006	0.168	0.425	1.059
	(-0.02)	(0.49)	(0.84)	(1.53)
Mean Dir Age	0.001	-0.016	0.018	0.021
	(0.10)	(-0.68)	(0.88)	(0.41)
PROP-CEOHire-AC	0.063	0.052		
	(0.33)	(0.17)		
CEO controls				
CEO-Chairman	0.039	0.111	0.261	0.571
	(0.32)	(0.58)	(0.99)	(1.12)
CEO % Ownership	0.522	-5.148**	-0.295	-8.964*
	(0.54)	(-2.10)	(-0.22)	(-1.74)
CEO Age	-16.180*	-35.464**	-18.619	-59.525
	(-1.79)	(-2.25)	(-1.01)	(-1.15)
CEO Tenure	6.073	29.501	9.168	47.235
	(0.56)	(1.57)	(0.65)	(1.57)
Firm controls				
Firm Size	0.123**	0.296***	0.194*	0.169
	(2.45)	(4.24)	(1.90)	(0.75)
Firm Age	0.001	-0.000	-0.006	0.032*
	(0.13)	(-0.01)	(-0.55)	(1.79)
Tobin's q	-0.014	0.003	-0.017	-0.193
	(-0.27)	(0.05)	(-0.14)	(-0.60)
R&D	-0.491	-1.393	0.936	1.272
	(-0.42)	(-1.02)	(0.55)	(0.52)
Observations	10344	9157	1915	1251
Pseudo R-squared	0.053	0.098	0.113	0.161
Fixed Effects	Industry, year	Industry, year	Industry, year	Industry, year

TABLE 9 Acquisition Decision

This table showing the relationship between the likelihood of a firm making an acquisition and director and firm characteristics over the period 1999-2009. Data on merger and acquisition deals is from the SDC database. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO compensation data from Execucomp. In regression 2, observations are only included if the CEO tenure is greater or equal to that of all outside directors. The dependent variable is an indicator which takes the value 1 if the firm makes an acquisition that year. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The numbers of observations may vary because of perfect predictability of the dependent variable.

	Acquisition				
	(1)	**(2)**	**(3)**		**(4)**
PROP-G15	-0.062**	-0.182**	-0.021	G15	-0.011*
	(-2.02)	(-2.39)	(-1.08)		(-1.69)
Board controls				**Board controls**	
Board Size	0.079***	0.090	0.041**	Board Size	0.050***
	(2.62)	(0.97)	(2.53)		(4.52)
PROP-Outside	-0.041	0.026	-0.006	PROP-Outside	-0.019
	(-1.01)	(0.23)	(-0.24)		(-1.17)
				Director controls	
Busy Board	0.002	0.083	0.005	Busy Director	-0.007
	(0.09)	(1.04)	(0.26)		(-1.10)
Mean Dir Age	0.001	0.006	0.001	Dir Age	0.002
	(0.76)	(1.37)	(1.06)		(0.64)
PROP-CEOHire	-0.017		0.037***	CEO-Hire	0.002
	(-0.78)		(2.62)		(0.38)
CEO controls				**CEO controls**	
CEO-Chairman	0.001	0.042	0.010	CEO-Chairman	0.002
	(0.09)	(1.45)	(1.37)		(0.32)
CEO Age	1.133	-0.408	-1.710***	CEO Age	-0.996***
	(1.15)	(-0.07)	(-3.23)		(-2.87)
CEO Tenure	-2.006	-7.479	-1.051	CEO Tenure	-0.558
	(-1.57)	(-1.16)	(-1.49)		(-1.30)
CEO % Ownership	0.188*	-0.064	-0.131**	CEO % Ownership	0.123**
	(1.73)	(-0.35)	(-2.02)		(2.55)
Firm controls				**Firm controls**	
Firm Size	-0.059***	-0.024	0.013***	Firm Size	0.003
	(-4.32)	(-0.58)	(4.36)		(1.48)
Firm Age	-0.013***	-0.014**	-0.001***	Firm Age	-0.001***
	(-6.58)	(-2.14)	(-4.18)		(-3.24)
R&D	0.000	0.007	-0.004**	R&D	0.006***
	(0.12)	(0.59)	(-1.97)		(4.30)
Tobin's q	-0.421*	-0.380	-0.086	Tobin's q	0.157**
	(-1.83)	(-0.93)	(-0.97)		(2.45)
Merger controls				**Merger controls**	
Free Cash Flow	0.253***	0.055	0.067	Free Cash Flow	0.181***
	(3.47)	(0.28)	(1.37)		(6.33)
Leverage	-0.297***	-0.466***	-0.068***	Leverage	-0.170***
	(-6.95)	(-3.63)	(-3.31)		(-12.60)
Cash	-0.005	-0.004	-0.002	Cash	-0.002
	(-0.72)	(-0.16)	(-0.76)		(-1.19)
Observations	13654	2351	13654		82183
Adjusted R-squared	0.126	0.098	0.045		0.110
Fixed effects	Firm, year	Firm, year	Industry, year		Director, year

TABLE 10 Cumulative Abnormal Returns

This table includes regressions showing the relationship between cumulative abnormal returns and director and firm characteristics. The sample consists of 3089 firm-level observations for the period 1998-2009. Data on merger and acquisition deals is from the SDC database. Observations are included if they have director data from RiskMetrics, accounting data from Compustat, stock return data from CRSP, and CEO attributes from Execucomp. The dependent variable is the cumulative abnormal stock return for the acquiring firm two days before and two days after the acquisition has been announced. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis. Standard errors are robust and clustered by firm where industry and firm fixed effects are used and clustered by director when director fixed effects are used. The numbers of observations may vary because of perfect predictability of the dependent variable.

	CAR (-2,2)		
	(1)	**(2)**	**(3)**
PROP-G15	2.112***	2.652***	2.050***
	(2.76)	(3.10)	(2.67)
Board controls			
Board Size	-0.426	0.201	-0.613
	(-0.67)	(0.28)	(-0.94)
PROP-Outside	-0.828	-0.737	-0.736
	(-0.88)	(-0.72)	(-0.77)
Busy Board	-0.550	-0.075	-0.549
	(-0.75)	(-0.10)	(-0.75)
Mean Dir Age	0.011	-0.020	0.011
	(0.33)	(-0.50)	(0.33)
PROP-CEOHire	0.021	0.075	0.122
	(0.03)	(0.11)	(0.20)
CEO controls			
CEO-Chairman	0.284	0.180	0.151
	(0.98)	(0.53)	(0.51)
CEO Age	4.902	21.435	-2.459
	(0.24)	(0.91)	(-0.12)
CEO Tenure	0.125	-18.094	2.157
	(0.00)	(-0.51)	(0.07)
CEO % Ownership	3.597*	4.894*	3.554*
	(1.72)	(1.72)	(1.68)
Firm controls			
Firm Size	-0.145	-0.233*	-0.127
	(-1.29)	(-1.87)	(-1.11)
Tobin's q	-0.078**	-0.086	-0.077**
	(-2.51)	(-0.75)	(-2.47)
R&D	-5.144*	-7.472*	-5.209*
	(-1.68)	(-1.85)	(-1.68)
Firm Age	9.821	13.123	13.107
	(1.00)	(1.14)	(1.33)
Merger controls			
Free Cash Flow	0.781	-0.083	0.903
	(0.34)	(-0.03)	(0.39)
Leverage	0.157	0.186	0.219
	(0.17)	(0.17)	(0.23)
Relative Size	-0.888*	-0.740	-0.943*
	(-1.80)	(-1.62)	(-1.86)
Diff Industries	-0.587**	-0.381	-0.540**
	(-2.28)	(-1.22)	(-2.08)
Private	2.117***	1.958***	2.098***
	(6.58)	(5.39)	(6.39)
% Cash	0.009***	0.009***	0.009***
	(3.24)	(2.82)	(3.25)
GINDEX		-0.038	
		(-0.70)	
Staggered Board			0.062
			(0.23)
Observations	3089	2230	3001
Adjusted R-squared	0.046	0.054	0.044
Fixed Effects	Industry, Year	Industry, Year	Industry, Year

Chapter 3

Market Structure, Banking Activity and Systemic Risk

Abstract

Using a sample of large banks across 38 countries this chapter examines how the concentration of the banking system impacts the choice of business activities and consequently the stability of banks. I show that banks in less concentrated banking systems have higher levels of non-traditional business activities with higher shareholder returns, but at a cost of increased systemic risk. In contrast, the non-traditional business activities in highly concentrated banking systems help reduce the volatility of profits and also the systemic risk of banks. Unlike previous research I show that there is not always a one-to-one relationship between non-traditional business activities and systemic risk.

3.1 Introduction

Over the last 15 years depository institutions have increased the share of non-traditional revenue in their total income. While the change in business models is a global phenomenon, it is more pronounced in countries such as the U.S., France and the U.K. In this chapter, I examine whether market structure can help explain the cross-country variation in non-traditional activities that banks choose to pursue. It is important to understand the motivation behind these choices because non-traditional banking activities have shouldered a large part of the blame for the 2007-2009 financial crisis, and now face the brunt of regulatory efforts.[1] Proposed regulation in the U.K. and the E.U. call for a split of retail banking operations from investment banking and trading. Such blanket regulations assume that non-traditional activities always increase the systemic risk of banks. Understanding the motivation for moving into new business activities and how these activities uniquely impact bank income allows us to develop a more nuanced view of the relationship between non-traditional activities and systemic risk.

I focus my attention on market structure because the presence of competitors can create a tournament-like environment where banks compete for customers, employees and investors. Theory has shown that an inter-firm tournament can induce managers to take on more risk, especially tail risk, as they can move to competitor firms before the risk materializes (Acharya et al. (2012c)). Stock based incentives, which are common in countries such as the U.S. and U.K., also encourage risk taking as shareholders reward managers when equity price gains outpace

[1] In response to the large costs suffered by taxpayers in the UK, an independent commission on banking (Vickers Commission) has recommended "ring-fencing" domestic retail operations from global wholesale and investment banking operations. Similarly, the European Union appointed Liikanen review and the Dodd-Frank Act in the U.S. have proposed regulations which limit trading and proprietary activities by banks. If these recommendations and proposals are passed into law, it would be reminiscent of the 1933 Glass-Steagall Act of the U.S. which limited the business activities of depositary institutions.

advances for other firms in the industry (Ozdenoren and Yuan (2012)).[2] The presence of deposit insurance (Merton (1977)) and rescue guarantees only exacerbate this effect in financial institutions because managers are often protected from downside risk. Erosion of franchise value with increased competition makes it more likely that banks will make lower quality loans to increase profits, thereby raising the likelihood of failure (Hellmann et al. (2000)). This propensity of banks to increase risk taking in the face of competition became evident among banks in the U.S. after the deregulation in the 1980s (Keeley (1990)).

There is both theoretical and empirical research which contradicts the view that competition makes banks riskier (for example: Boyd and De Nicolo (2005)), but I do not directly address this debate. Instead, I consider the effect of market structure (which I define as concentration), on one specific business choice made by banks, i.e., the choice to incorporate a higher level of non-traditional activities (which I define as the proportion of non-interest income in total income) in their business model. Even though non-traditional income has become an increasingly large part of banking revenue, there is little research on its link to the competitive landscape in which banks operate. I seek to address this gap by looking not only at how the level of non-traditional income earned by banks varies with the levels of concentration in their domestic markets, but also how these businesses impact bank profitability. While regulators look to restrict banking activities, executives at large banks such as Bank of America and J.P. Morgan have defended their business models as crucial to diversifying revenue flow.[3] The first objective in this chapter is therefore to try and understand whether non-traditional income simply helps executives to outperform their competitors in tournaments or whether it is used chiefly to minimize the riskiness of their revenue flows.

[2]Laeven and Levine (2009) and Barry, Lepetit, and Tarazi (2011) show that ownership structure can also exacerbate risk taking by banks.

[3]"Bank Breakups: Not So Fast" The Wall Street Journal, July 29, 2012.

The second objective of the chapter is to examine the relationship between non-traditional income and systemic risk. Previous empirical research has mostly shown that a larger proportion of non-traditional income is correlated with higher levels of systemic risk (De Jonghe (2010); Brunnermeier et al. (2011)). The results using individual bank risk are however, mixed. Demirguc-Kunt and Huizinga, 2010 and Stiroh, 2004 finds a positive relationship between bank risk and non-traditional income in a global and U.S. sample respectively. Pennathur et al. (2012) find that public sector banks in India reduce their risk significantly from fee based income, while Lepetit et al. (2008) find a similar negative relationship between trading income for small European banks. These studies either examine banks within a single country, or they use a pooled sample of global banks on the assumption that the relationship between risk and business activity is homogenous in all countries. My approach differs in that I consider the possibility that the relationship between bank risk and non-traditional income varies with the level of banking concentration in the country. The case for revenue diversification follows from the usual portfolio diversification argument (Markowitz (1952)). However, when banks are in a competitive environment, the potential for moral hazard is exacerbated and the risk-sharing goal of diversification may be transformed, consequently shifting risk onto the aggregate financial system.

To test the two objectives, I use a sample of 191 listed large banks with market capitalization larger than five billion dollars across 38 countries over the time period from 1996 to 2010. Large banks are chosen for two reasons. First, systemic risk generally arises through larger financial institutions.[4] Second, larger banks are more likely to diversify their income streams (Demirguc-Kunt and Huizinga (2010)). Large banks have the ability to enter new businesses because they have

[4]The Dodd-Frank bill gives regulators extra power over systemically important institutions with at least 50 billion dollars in assets. Similarly, Basel III has specified that approximately 30 of the largest financial institutions, which are deemed systemically risky will require higher capital levels.

easier access to capital, technology and infrastructure. Additionally, I only choose depositary institutions since other financial institutions such as investment banks, almost by definition, get most of their revenue from non-traditional income.

There are two key measures in my study. The proxy for systemic risk is based on the expected capital shortfall of a financial institution during a crisis (Acharya et al. (2010); Acharya et al. (2012a)).[5] The tail distribution of bank stock returns, MES, is highly predictive of this capital shortfall and is used in my analysis. The proxy for concentration is the asset Herfindahl-Hirschman Index (HHI). In order to better understand whether the relationship between systemic risk and non-traditional income varies with concentration, I split the sample into two subsamples. The first includes countries whose concentration is higher than the median annual concentration (LowConc) such as the U.S., U.K. and France, and the second subsample includes countries with a concentration below the median level of annual concentration (HighConc) such as Australia, Canada and Sweden. The characteristics of non-traditional income are then examined in each of these subsamples.

There are four key findings in the empirical analysis. First, I find that the level of non-traditional income is higher in banks in low concentration banking systems. The difference between the median level of concentration is about 10% in the two subsamples. In multivariate panel regressions, I find that the concentration variable is highly significant in explaining the higher levels of non-traditional income. My results are robust to bank-level and country-level fixed effects.[6] While unob-

[5]I compare the performance of different measure of bank weakness (tail-beta (De Jonghe (2010)), z-score and MES (Acharya, Pedersen, Philippon, and Richardson (2010))) in predicting bank weakness during the 1996 Asian and 2007-2009 financial crisis, and find that MES is the most suitable measure. I did not use another commonly used measure for systemic risk, CoVar(Adrian and Brunnermeier (2009)), as the requisite data for computing the measure is not available for the international sample in this chapter.

[6]The result holds even when I control for the level of banking regulations (Barth et al. (2008)) intended to curb non-traditional banking activities. The lack of significance on the regulation variable may be emblematic of the size of banks in my sample. Several of these banks have a large global presence, allowing them to possibly circumvent regulations in their home country.

servable factors are one source of endogeneity, another channel for endogeneity could be banks acquiring financial firms engaged in non-lending activities, which would increase both bank size and the concentration of the banking system. This reverse causality, however, works against my results, rather than being a driver of my results.

Second, I find that it is the competition amongst banks to obtain higher shareholder returns driving higher levels of non-traditional income in LowConc banks. When examining the relationship between return on equity (ROE) and non-traditional income, I find that the coefficient for ROE in the LowConc subsample is two and half times the coefficient for the HighConc subsample. The coefficient for the return on assets (ROA), in contrast, is fairly similar in the two subsamples. When comparing the effect of non-traditional income on reduction of profit volatility, I find that in the HighConc subsample some types of non-traditional income can reduce the volatility of ROA, while non-traditional income unequivocally increases the volatility of ROA for banks in LowConc countries. Unreported results using a small sub-sample of banks show that equity makes up a larger proportion of CEO compensation in LowConc countries. These equity incentives, in turn, are correlated with a higher level of non-traditional income in banks. Total compensation is not correlated with higher levels of non-traditional income.[7]

Third, I find that the relationship between non-traditional income and systemic risk is not homogenous in concentration. Similar to Brunnermeier et al. (2011) and De Jonghe (2010), in the full sample, I find that non-traditional income is significantly and positively associated with systemic risk, proxied by MES.

Another possibility is that the regulatory flag is too coarse to capture all the different types of non-traditional income.

[7]Compensation data is available to us for only major LowConc countries such as the U.S., U.K and France. Few data observations are available for banks in HighConc countries such as India and China. Hence, I have not included my results on CEO compensation in this chapter.

However, when I add an interaction variable between non-traditional income and concentration, I find that this variable is also highly negatively significant. Breaking the sample down into two subsamples, I find that in the LowConc subsample, a one standard-deviation increase of 2% in non-traditional income is correlated with a 20% increase in MES. In contrast, the coefficient is negative in the HighConc subsample and is not significant. Regressions using bank fixed effects show an even more interesting result – non-traditional income actually reduces systemic risk for HighConc banks while it has no effect on systemic risk in LowConc banks.

My fourth finding shows that the contrasting results in the two subsamples are driven by the type of non-traditional income, not solely by the levels of non-traditional income earned by banks. To investigate the difference between type and levels of non-traditional income I consider three components of non-traditional income, i.e., fee, trading, and unclassified (non-fee and non-trading) income. Although the levels of fee income are similar in the two subsamples, I find that while there is a positive relationship between systemic risk and fee income in LowConc banks, the relationship is reversed for HighConc banks. Similarly, trading income is correlated with lower levels of systemic risk in the HighConc banks. Unclassified income is higher in LowConc banks and is positively related to systemic risk, showing that the level of this component of non-traditional income could be relevant in explaining systemic risk in LowConc banks.

Finally, I employ several tests to show the robustness of my results. First, I address the weaknesses of my concentration measure which assumes that all bank assets are located domestically. I create a new bank-level concentration measure which takes the location of bank subsidiaries into account. I find that the relationship between non-traditional income and systemic risk continues to vary with levels of concentration. Second, given the notorious difficulty in measuring systemic risk, I re-examine my results using the two most commonly used measures

of risk, i.e., the z-score and the volatility of stock returns. The contrasting effects of non-traditional income on systemic risk continue to hold. Finally, I validate the MES measure of systemic risk over the Asian currency crisis and the 2007-2009 financial crisis. I find that MES is a significant predictor of equity losses in banks during these crises, justifying its use as an indicator of systemic risk.

This chapter makes four important contributions. First, I show that the effect of non-traditional income on systemic risk is complex. Specifically, I show that non-traditional income can have a legitimate place in reducing the systemic risk of a bank, as long as the focus of non-traditional income is to reduce the volatility of income rather than solely to increase shareholders returns. My result is in contrast to previous research which has mostly concluded that non-traditional income increases bank fragility. One example is Demirguc-Kunt and Huizinga (2010) who use a global sample to show that non-traditional income increases the individual risk (z-score) and return on assets (ROA) of banks, but provides diversification advantages at only very low levels. Similarly, Stiroh (2004) and Brunnermeier, Dong, and Palia (2011) use a U.S. sample and De Jonghe (2010) uses an European sample to show a positive relationship between alternative risk measures and non-traditional income.

Second, I contribute to the literature on bank concentration. There is a large body of empirical literature examining whether there is a positive relationship between bank concentration and stability (competition-fragility) or a negative one (competition-stability).[8] There is little research, however, on how concentration impacts the business model of banks. I show that banks move towards high ROE business activities when faced with increasing competition. This builds on the literature which shows that banks increase their risk-taking in competitive banking systems. Keeley (1990) shows that increased competition between banks

[8]See Boyd and De Nicolo (2005) for an excellent overview.

in the U.S. in the late 1960s and 1970s may have led to increased risk taking and a surge in failure in the 1980s. Beck, Demirguc-Kunt, and Levine (2006) show that banking crises are less likely in economies with more concentrated banking systems. Finally, Berger, Klapper, and Turk-Ariss (2009) show that banks with lower levels of market power have a higher level of risk exposure.

Third, my study applies and validates the market-based measure of systemic risk, MES, which is calculated using a year of historical stock returns. Other papers which have looked at banking stability (Demirguc-Kunt and Huizinga (2010); Berger et al. (2009)) have been based on the z-score, calculated over several years with only one calculation for the entire sample. De Jonghe (2010) uses an alternative tail risk measure called tail-beta which uses six years of data. The recent crisis has shown that financial innovation can create and transmit distress at a rapid pace. A measure of banking weakness which can quickly reflect stresses in the market can be very useful for regulators and reflect the current risks in the system. I also show that MES is a better predictor of future bank instability by comparing its performance against z-score and tail-β in predicting stock losses during both the 2007-2009 financial crisis and the Asian financial crisis.

Fourth, to the best of my knowledge, I are the first to examine the determinants of systemic risk in a global context. Beltratti and Stulz (2012) examine the determinants of cross sectional variation in the stock returns of large banks during the 2007-2009 financial crisis, but do not explicitly examine systemic risk. De Jonghe (2010) examines the determinants of systemic risk in a European sample, while Brunnermeier, Dong, and Palia (2011) use a U.S. sample. My sample includes banks located in over 38 countries. In order to ensure my results are not driven by banks in countries with less developed banking systems, I repeat my analysis for banks located only in developed countries, and find that the results still hold.

In Section 1, I introduce the literature and develop my hypothesis. In Section 2, I describe the key variables in my study. In Section 3, I describe the data. In Section 4, I examine the results. Section 5 describes the robustness tests and section 6 concludes.

3.2 Related literature and hypothesis development

One of the fundamental reasons for the existence of financial intermediaries is that they reduce information asymmetry between borrowers and lenders (Bhattacharya and Thakor (1993)). When banks fail en masse, the ability of the financial system to assimilate such information is lost and financial intermediation is hampered (Bernanke (1983); Ivashina and Scharfstein (2010)). Such a loss in lending ability can be costly for the rest of economy resulting in reduced output, increasing unemployment, crashing real estate prices and increases in government debt (Reinhart and Rogoff (2008)). There is a vast body of banking literature which seeks to understand the causes of banking crises and how to prevent them in the future. The goal of this chapter is to contribute to this literature by understanding whether business choices made by banks in environments with varying levels of competition impact their contribution to the stability of the banking system as a whole. In this section, I develop the necessary hypothesis as a prelude to my empirical analysis.

3.2.1 Concentration and non-traditional income

The presence of fixed-rate deposit insurance (Keeley (1990)), too-big-too fail subsidies and limited liability corporate structures give bank managers incentives to increase risk taking to extract maximum personal benefits. Besides regulation of

banks through setting of capital and interest rate levels (Hellmann et al. (2000); Martinez-Miera and Repullo (2010)), letting banks earn monopoly rents has been suggested as a way of making banks behave more conservatively. The idea is that banks will want to preserve their charter value and avoid bankruptcy. In support of the view that competition increases bank fragility, the "competition-fragility" hypothesis, Keeley (1990) shows that increased competition between banks in the U.S. in late 1960s and 1970s may have led to increased risk taking and a surge in failure in the 1980s. Beck, Demirguc-Kunt, and Levine (2006) show that banking crises are less likely in economies with more concentrated banking systems, using the actual occurrence of a crisis to measure a banking system's stability. Berger, Klapper, and Turk-Ariss (2009) use a different concentration measure called the Lerner index as a proxy for competition in a global sample of 30 developed countries and find that banks with a higher degree of market power are less risky, although they do bear more loan portfolio risk.

On the other hand, Boyd and De Nicolo (2005) demonstrate a channel by which competition could, in fact, decrease the riskiness of the loan portfolios held by banks. They focus on the lowering of interest rates by banks in a competitive loan market and show that lower rates could lead to a higher chance of a payoff by borrowers, which in turn could increase the stability of banks. However, a recent extension of the model (Martinez-Miera and Repullo (2010)) shows that when the more realistic case of imperfect correlation between loan defaults is considered, the amount of interest earned by banks is also lowered in a competitive banking systems. This can leave banks with lower amounts of capital to cover loan losses and can increase their chance of failure, and leave the effect of competition on banks ambiguous. In support of the "competition-stability" hypothesis, Jayaratne and Strahan (1998) overturn the results in Keeley (1990) using a larger sample and show that loan losses decreased after competition increased in the U.S. A

study by Boyd, De Nicolo, and Jalal (2006) on both U.S. and international banks finds that a bank's probability of failure (z-score) is positively and significantly related to concentration.

Until recently, the literature has used riskier loans, higher leverage, or higher deposit rates as the channels through which banks increase their riskiness when they face competition (Keeley (1990); Hellmann et al. (2000)). However, in a theoretical setting, Thakor (2012) shows that banks can also increase financial innovation in their business when they face competition in their core lending markets. In his model, financial innovation is proxied by loans which do not have risk-default data on them, while loans which are similar to those offered by competitors are called standard loans. These innovative products are financed through short-term loans and are analogous to non-traditional business which banks around the world have been pursuing. In Europe, the Second Banking directive of 1989 allowed banks to diversify into insurance and other non-lending activities. Even though the Glass-Steagall Act of 1933 severely curtailed the business activities of banks in the U.S., repeated exemptions to the law in the 1980's and 1990's culminated in the Gramm-Leach-Biley Act in 1999 which allowed banks to pursue a wide range of activities including insurance underwriting. The case for such bank diversification has usually been along two lines. First, banks can obtain more information about customers when they provide non-lending services (Degryse and Van Cayseele (2000)). This information can be used to improve both screening and monitoring and help reduce the information asymmetry inherent in lending relationships (Boot (2000); Bhattacharya and Thakor (1993)). The second justification for bank diversification follows from the traditional portfolio diversification argument (Markowitz (1952)). The procyclical nature of lending has been well documented. Investment banking activities such as market making in securities and transactional services such as cash management can arguably

help banks reduce the volatility of loan income which is dependent on the business cycle.

In this paper, I use non-traditional income as a proxy for financial innovation and directly test the theoretical prediction in Thakor (2012) that banks in competitive banking environments have higher levels of innovation and that banks pursue these businesses because they earn higher profits. The above discussion brings about my first hypothesis:

Hypothesis 1: When banks are located in competitive banking systems they employ higher levels of non-traditional income activity as a way of earning higher shareholder returns rather than reducing volatility of profits.

3.2.2 Non-traditional income, concentration and systemic risk

In the previous section, I looked at whether concentration affects the levels of non-traditional income and whether it has positive effects on the profitability of the bank. Besides offering potential benefits, bank diversification can be a source of individual bank instability. On the asset side, some nontraditional activities allow banks to hold relatively low amounts of capital. The necessity of capital regulations in banks to mitigate moral hazard and increase bank stability has been well established in the literature (Rochet (1992)). Nontraditional business activities may thus offer a channel to circumvent capital regulations and allow increased risk taking by bank managers exacerbating agency issues (Jensen and Meckling (1976)). Another channel for bank instability through nontraditional business activities exists on the funding side of the balance sheet. The 2007-2009 financial crisis showed that the short term funding of securitized assets held by trading subsidiaries of banks makes them susceptible to modern-day bank runs

(Gorton and Metrick (2012)).[9] Recent empirical research examining the impact of non-traditional income on individual bank's risk has not shown that it can yield diversification advantages. DeYoung and Roland (2001) and Stiroh (2004) show that banks in the U.S. with a larger proportion of non-traditional income have higher earnings volatility. The results are consistent in an international sample, as Demirguc-Kunt and Huizinga (2010) finds that risk adjusted profits are reduced with higher levels of non-traditional income.

While recognizing that this relationship for individual banks is important, the impact of diversification on the financial system is also important because of the negative externalities associated with bank failure. Ibragimov, Jaffee, and Walden (2011) show that systemic risk can arise when the return distribution of the assets used for diversification have heavy tails and are correlated. Wagner (2010) shows that the effect is mechanical, for as banks diversify, their portfolios will begin to overlap and look increasingly similar. A fall in the value of these similar portfolios can lead to joint failures. These papers point to the fact that while non-traditional income may help reduce individual bank risk, it can increase the chance of systemic crisis where many banks fail. Similarly, Thakor (2012) shows that bank diversification in the form of financial innovation can lead to financial crisis when these activities are correlated.

Previous empirical evidence seems to confirm the theoretical predictions that non-traditional income can increase the systemic risk of banks (De Jonghe (2010); Brunnermeier et al. (2011)). The limited liability structure and favorable treatment of banks by regulators already give banks a risk-shifting incentive. Thus the risk-sharing goal of diversification may instead be transformed to a risk-shifting incentive when banks are faced with competitive pressures. However, in the case where banks have franchise value, banks may be wary of overly risk investments

[9]On the other hand, forcing banks to alter their mix of assets can negatively affect capital (Distinguin, Roulet, and Tarazi (2013)).

even though they may offer high returns. Facing less competitor pressure in their core lending markets and thereby less shareholder pressure to improve returns, banks may choose safer non-traditional income which meets the goals of diversification and reduces systemic risk.

The above discussion is related to my next hypothesis:

Hypothesis 2: Non-traditional income reduces systemic risk in highly concentrated banking systems, but risk shifting incentives take over in competitive banking systems, leading to a positive relationship between non-traditional income and systemic risk in low concentration banking systems.

3.3 Empirical methodology

Testing my hypothesis requires empirical measurement of concentration, systemic risk and non-traditional income. In this section, I explain the choice of my proxies in the context of previous literature.

3.3.1 Measurement of systemic risk contributions

While regulators and academics differ on the exact definition, systemic risk is generally perceived as the risk of a systemic crisis which weakens the intermediation capacity of the financial sector.[10] The weakness in any single financial institution would not be considered a systemic crisis, unless there was risk of contagion to other institutions. Therefore, firm specific risk measures such as volatility and z-score (Stiroh (2004); Demirguc-Kunt and Huizinga (2010)) which have been used previously as measures of bank stability are inappropriate to measure systemic risk. After the financial crisis in 2007-2009, several measures of systemic risk which are conditional on the entire financial system being in distress have been

[10]De Brandt and Hartmann (2000) offers an excellent survey of the literature on systemic risk.

proposed. As I are interested in examining bank level behavior, I do not explicitly consider measures of the entire financial system being in stress. My goal is to predict the relative weakness of a bank in the midst of a systemic crisis. This is done by using the methodology developed in Acharya et al. (2010), who propose measuring systemic risk as the capital shortfall of a financial institution when the banking system as a whole is under-capitalized, and they call this the systemic expected shortfall (SES).

$$SES^i \equiv E[za^i - w_1^i | W_1 < zA] \tag{3.1}$$

In this equation, w^i and a^i are the bank's equity and assets, z is the target capital ratio, W is the aggregate equity of the banking sector and A is the aggregate assets of the banking sector. In the model, systemic events occur when$W_1 < zA$, i.e., the banking sector is below its targeted capital levels. Since extreme events occur infrequently, Acharya et al. (2010) appeal to extreme value theory and propose measuring the expected capital shortfall in a firm using information from moderately bad days. The expected equity loss in a crisis is thus defined as

$$MES^i_{5\%} \equiv -E\left[\frac{w_1^i}{w_o^i} - 1 | I_{5\%}\right] \tag{3.2}$$

where $I_{5\%}$ indicates that the market is in its lowest 5% return quintile. The relationship between MES and SES is given by,

$$\frac{SES^i}{w_0^i} = \frac{za^i - w_0^i}{w_0^i} + kMES^i_{5\%} + \Delta^i \tag{3.3}$$

The first part of the right hand side of the equation denotes excess leverage, the second scales up the daily loss in equity to a loss during a crisis, and the third relates to excess costs of distress. MES is directly proportional to SES and Acharya et al. (2010) show that it is a good predictor of equity losses in the

financial crisis and is therefore used as a proxy for SES. Based on these results, I use MES as an indicator of the systemic risk contribution of a bank.

In this chapter, I compute MES as the average return of the stock (R^i) when the market (R^m) return is in its lowest 5% return quantile over one year of data.

$$MES^i_{5\%} = -100 * \frac{\sum R^i_t I_{\{t \in D\}}}{\sum I_{\{t \in D\}}} \tag{3.4}$$

where I is an indicator variable which takes the value 1 the market is in its 5% return quantile$D = \{R^m_t$in 5% quantile$\}$ and 0 otherwise. A higher level of MES implies a higher contribution of systemic risk to weakness in the banking system. I use U.S. dollar returns for both the market and the individual stock. A broad local market index is used as proxy for R^m. MES is calculated for each fiscal year from July of the previous year until June of the following year.

In using information from the tail of stock returns, MES is similar to a measure called tail-beta (De Jonghe (2010)), which estimates the probability of a sharp decline in a bank's stock price conditional on a crash in the banking index. I do not describe the details, but note that the methodology is based on using a modified Hill (1975) estimator to calculate the tail index and a semi-parametric estimation of the probability. This technique, however, uses six years of data. Given the rapid changes that are possible in bank business models, I prefer to use a measure which can be calculated using a shorter time frame.[11] Huang, Zhou, and Zhu (2009) estimate credit losses in the midst of a crisis using credit default swaps (CDS) and time-varying correlations. Given the international nature of my sample, I prefer to use stock returns over CDS returns, which are not widely available for foreign institutions. Another key measure proposed by Adrian and Brunnermeier (2009) measures the contribution of a bank to systemic risk as the

[11] I examined the performance of a version of tail-beta calculated using only year of data in predicting equity losses during the recent financial crisis and found that tail-β was not significant. I thank Olivier De Jonghe for supplying a sample data set for the computation of tail-beta.

difference between the VaR of the financial system and the VaR of the financial system, conditional on a bank being in distress.[12] Computing this measure of systemic risk, $CoVar$, however, requires data on real estate indexes and other market data which is not readily available for an international sample. Finally, Lehar (2005) uses the Merton (1977) methodology of measuring default risk, but this measure does not consider aggregate weakness in the banking system, hence I prefer not to use it.

3.3.2 Concentration

When examining the impact of competition on stability, theory models often use the number of identically sized banks as an indicator of banking competition. But given the difference in sizes of banks and total banking assets between countries, this variable is not suited for a cross-country study. Instead I prefer to use the country-level Herfindahl-Hirschman Index (HHI) using the total assets on a bank's balance sheet. HHI has been used in several banking studies.[13] Some recent, related examples include Boyd, De Nicolo, and Jalal (2006) and Berger, Klapper, and Turk-Ariss (2009) who use deposit and loan HHIs to examine the relationship between concentration and stability. Acharya, Hasan, and Saunders (2006) use loan HHI to measure the exposure of a bank to loans in a particular industry. The focus of this chapter is bank business models which are not related to traditional banking of loan-making and deposit-taking. Hence, I prefer to use HHI calculated using total assets. HHI is calculated using the share of individual bank assets in the total assets of all private and publicly listed banks available in my database (Bankscope) for each country. The total banking assets in a country are calculated as the sum of assets in all public and private bank holding companies, commercial

[12] VaR is defined as the maximum dollar loss of an institution within a q% confidence interval.

[13] Berger et al. (2004) give a detailed literature review with several U.S. based studies which have used HHI as a measure of concentration.

banks, cooperative banks and savings banks in Bankscope. HHI is calculated as the sum of the proportion of each banks assets in total domestic bank assets squared.

Berger et al. (2004) point out that concentration measures such as asset HHI are not always a measure of competition because of differences in large and small bank behavior. In addition, banks may be catering to niche loan markets which could decrease the competition they face, even though they are located in a banking system with low levels of concentration. My sample however is focused on extremely large banks which focus on a wide range of loan markets, alleviating some of these concerns. Berger, Klapper, and Turk-Ariss (2009) use another measure of competition called the Lerner index which aims to measure market power by examining the marginal cost of bank revenues. This is used as an indicator of market power. While the Lerner index is suitable for measuring market power for firms with homogenous business models and similar cost structures, it is not suitable to compare one bank which may have 90% of revenue from loans against another which may only earn 40% of revenue through loans. Other studies on concentration such as Beck, Demirguc-Kunt, and Levine (2006) use the market share of the top 3 banks in the banking system. This measure is highly correlated with asset HHI and my results are robust to using this measure as well.

There is another concern about using asset HHI measure as a measure of concentration. Many of the largest banks have global business operations and my measure of HHI assumes that assets are located domestically. To overcome this limitation, I also create a new bank-level HHI which takes into account the location of the global subsidiaries of banks. I only have data for the year 2010 on the ownership linkages between banks and their foreign subsidiaries. Hence, this bank-level measure is used only as a robustness test and is described in more detail in that section.

In order to examine the effect of non-traditional income in countries with different banking concentrations I break the sample into two groups: low concentration (LowConc) and high concentration (HighConc). To get a similar number of banks in each group, I calculate the annual median HHI of all banks rather than calculating the median HHI by country. Banks which are below the median HHI are put in the LowConc subsample while banks which are above the median HHI are put in the HighConc subsample.

3.3.3 Non-traditional income

Using a framework similar to previous empirical research, I measure non-traditional income as the share of non-interest income in total operating income. Total operating income is defined as the sum of gross interest income and non-interest income. Stiroh (2006) and Demirguc-Kunt and Huizinga (2010) define non-traditional income as the share of non-interest income/(net interest income + non-interest income), while Brunnermeier, Dong, and Palia (2011) defines non-traditional income as the non-interest income/net interest income. Net interest income includes costs associated with funding lending and other assets, without taking into account the costs for non-interest income which are typically administrative (trader and investment banker salaries). I prefer to use gross interest income, so that I can isolate revenue from lending. My results are robust to using the alternative measures, net interest income + non-interest income, or only non-interest income in the denominator.

I also split non-traditional income into its components, which are: trading income, fee income and unclassified income. In Bankscope, trading income includes "income from marking to market of derivatives, on currency related transactions, interest-rate instruments, equities and other trading assets, including insurance-related trading income". I also combine income from re-evaluation of

AFS (Available for Sale) securities in trading income. Fee income includes all fees and commissions which are not related to loans. Unclassified income includes all income which is not a part of fee and trading income.

3.3.4 Control Variables

3.3.4.1 Regulation

The World Bank Database for regulation by Barth, Caprio, and Levine (2008) (June 2008 version) is based on questionnaires sent to financial supervisory authorities in each country. I use the section on Activities Restrictions to verify whether country-specific regulation is the primary driver behind higher levels of non-traditional income within a bank. There are four questions in Activities Restrictions that relate to the regulation of securities activities, real estate activities, insurance activities and non-financial activities. The four possible answers are "Unrestricted", "Permitted", "Restricted" and "Prohibited", which I denote with a numeric value of 1-4 with increasing levels being increasingly restrictive. A new variable called REGN, which is a summation of the answers to all four questions, is used in the analysis.

3.3.4.2 Interest Rate Spread

If the interest rate spread earned by banks is low, banks could be expected to increase their non-traditional income regardless of competition in the banking sector. Therefore, I use the interest rate spread earned by banks as a control variable when examining the determinants of non-traditional income. Interest rate spread is calculated as:

$$\text{Interest Rate Spread} = \frac{\text{Interest Income}}{\text{Average Earnings Assets}} - \frac{\text{Interest Expense}}{\text{Average Liabilities}}$$

This ratio helps us judge the profitability of the bank's core business. This is an imprecise proxy because it may include the effect of securities other than those related to retail banking. But although I do have a detailed breakup of interest income from loans and interest expense on deposits, the data only exists from the year 2007 onwards. Hence I do not use it in my analysis.

3.3.4.3 Bank-level factors

There are four key balance sheet variables variables used as control variables as they may affect the cross sectional variation in systemic risk as perceived by the stock market. First, I use nondeposit funding to represent funding constraints. Funding that is not sourced through customer deposits is considered more volatile and hence, similar to Demirguc-Kunt and Huizinga (2010), I use the proportion of nondeposit funding in short term funding as a control variable. Second, I control for the level of bank capitalization by constructing an Equity variable which is measured as the ratio of total equity to bank assets. Third, I use the year-over-year growth in assets to distinguish between faster growing banks which could be considered more systemically risky. Fourth, I use the amount of outstanding loans as an additional control for the size of banks by using the ratio of loans to assets.

3.3.4.4 Macroeconomic variables

There are three key country-level variables which are used as control variables as banks in countries with differing levels of economic development and growth may need different business models to cater to more complex customer needs. First, I measure the level of economic development as the ratio of GDP to population. Second, I measure country-level growth as the year-over-year growth in GDP. Third, a change in price levels may alter the repayment ability of borrowers and hence I use the year-over-year change in the consumer price index as an Inflation

variable.

3.4 Data

3.4.1 Sample

Bankscope provides bank-specific accounting data for a global sample in a uniform format. Hence I use this database to construct non-traditional income and other accounting measures for all the years that data is available, i.e., 1996-2010. The measure for systemic risk used in this chapter, MES, uses stock returns. Hence, I only use banks which have stock return data for at least one year. Datastream is the database used for stock returns. Firms with the two digit SIC code of 60 and also the four digit SIC code of 6712 (bank holding companies) are defined as banks. Investment banking firms are excluded from this sample because their primary business is generating non-traditional income rather than loan income. In Demirguc-Kunt and Huizinga (2010), investment banks have between 75% to 80% of non-traditional income as a proportion of interest income. Even though investment banks such as Goldman Sachs and Morgan Stanley became bank holding companies in the year 2008, I exclude them from my sample, because the changed designation only covers three years in a twelve year sample. Given the losses suffered by these banks and their high level of non-traditional income, including them would presumably lend more support to my results.

Similar to the criteria in Acharya et al. (2010), I select banks with a market value of at least five billion U.S. dollars in Datastream at any point between 1996 and 2010. Using such large banks also ensures that the stocks of these banks are highly liquid, which is important for an accurate measurement of tail risk. The World Bank Database is used for national accounts data. Taiwan and Chile are excluded because they have incomplete national account data. The final sample

has a total of 191 banks from 38 countries. My results are robust to performing the analysis on a subsample of banks exclusively from developed markets. Since banks may start or fail at any point during the sample period, or Bankscope may start including previously excluded banks, I have an unbalanced panel data set. All data is winsorized at the 95% level to prevent outliers from influencing results. All numbers which are not ratios are in (inflation adjusted) constant 2000 U.S. Dollars.

3.4.2 Summary

Table 1 shows a summary of the data split by levels of concentration. The median size of banks in the LowConc subsample at 79 billion dollars is larger than banks in the HighConc subsample at 50 billion dollars. But the mean size of banks in the HighConc subsample is higher indicating that there are a few large banks in this subsample. The median proportion of non-traditional income is 22% in the LowConc subsample which is higher than the median of 20% in the high concentration subsample. The Mann-Whitney-Wilcoxon test indicates a significant difference with a p-value of less than 1% between the distributions of non-traditional income in each of the subsamples. The univariate tests thus confirm that banks in HighConc have lower levels of non-traditional income. While the levels of fee income and trading income are not significantly different in the two subsamples, there is a significant difference in the levels of unclassified income. ROA is higher in LowConc countries, while ROE is lower. This difference could stem from the fact that LowConc banks earn higher levels of non-traditional income, which normally use fewer assets on the balance sheet. The volatility of both ROA and ROE is higher in the LowConc subsample, showing that the revenue streams are riskier in those countries.

Figure 1 shows how the level of non-traditional income evolves over the time

period for each of the two samples. non-traditional income increases from 1996-2004 in banks located in both the LowConc and HighConc subsample. However, the increase is much more dramatic in the LowConc subsample. The banks in both type of banking environments also suffer a steep decline in non-traditional income in the year before and after the financial crisis started. This overall increase in non-traditional income in LowConc banks is similar to the increase of non-traditional income in American banks (Brunnermeier et al. (2011)) seen over a similar time frame. Demirguc-Kunt and Huizinga (2010) do not see such a dramatic increase in non-traditional income for commercial banks. The reason for the difference could be that Demirguc-Kunt and Huizinga (2010) uses a sample of banks which includes smaller banks which may not have seen a significant change in their business models.

To get more detail on countries that are in my sample I look at a snapshot of the median values of data for each country in the year 2006 prior to the 2007-2009 financial crisis in Table 2. The U.S. has 23 banks in the sample which meet the selection criteria, whereas many other countries have only one or two banks. The U.S. is the least concentrated country in the sample with an HHI of only 0.02 since it has thousands of banks, most of which are small in size and not publicly listed. Notably, countries with banking systems in deep distress during the recent financial crisis such as the U.S., U.K., Germany and France are in the LowConc subsample. There are fewer countries in the LowConc subsample because the U.S. has a large number of banks. Switzerland is the least concentrated country in the sample, largely because it has two extremely large listed banks, UBS and Credit Suisse Group. The median size of these Swiss banks is 1.2 trillion U.S. dollars.[14]

[14]Some of the difference in size could also arise from difference in accounting for derivatives. While U.S. GAAP allows for netting of derivative positions, IFRS used by European banks does not allow the same level of netting making them seem larger compared to U.S. banks. My empirical analysis uses both country-level and firm-level fixed effects which allows us to address this discrepancy.

Banks in Australia and Canada, which were considered safer and performed better during the global financial crisis are in the HighConc subsample.

3.5 Empirical results

3.5.1 Bank concentration and non-traditional income

3.5.1.1 Levels of non-traditional income

I first examine if levels of non-traditional income are different when banks are located in countries with different levels of banking concentration. The model is of the form:

$$NoninterestIncome_{bt} = \alpha + \gamma_1 B_{bt} + \gamma_2 C_{ct} + \epsilon_{bt} \tag{3.5}$$

B_{bt} are bank-specific control variables, which include characteristics like asset size, equity levels, the interest rate spread earned by banks, and asset growth. C_{ct} are country-specific variables to control for per-capita GDP, GDP growth and inflation. In addition I also include the country-level regulation variable, REGN, as a control variable.

Table 3 shows the results of OLS regressions using the model specified above. The first two regressions include bank-level variables and the concentration of the banking system in the country. In regression 1, country fixed effects are used. The coefficient for concentration is negatively significant at the 1% level showing that the level of non-traditional income is higher in countries with low levels of concentration. Similar to the results in Demirguc-Kunt and Huizinga (2010), the coefficients for the assets and equity variables are positively significant. In regression 2, where bank fixed effects are used, the coefficient for concentration is still negatively significant at the 1% level. However, the coefficient for assets is now negatively significant at the 5% level. This result is intuitive given that I

are now looking at within-bank variation. An increase of non-traditional income within a bank implies a decreasing emphasis on increasing the size of the balance sheet through loans.

In regression 3, the variable for the regulation of diversification activities, REGN, and macro-economic variables for per-capita GDP, GDP growth and inflation are included. This regression uses country fixed effects. The coefficient for concentration is still significant at the 5% level. The coefficient for the regulation flag is not significant. There are at least possible three reasons for this effect. First, banks could be finding ways to circumvent regulation. Second, the large banks in my sample may be engaged in regulatory arbitrage in cross-country environments where they have more freedom to choose business activities. Third, the regulation flag may not be granular enough to capture all non-traditional income activities. Although the lack of significance on the regulation flag may also be due to the choice of my sample, or simply a deficiency in the measurement of the regulation variable, the evidence still points to the fact that competition abets an increase in non-traditional income.

In regression 4, which uses bank fixed effects, the regulation flag is removed since regulation is only calculated once for each country and there is no variation of that variable for banks within a country. The coefficient for concentration is still negatively significant at the 1% level. The regression with country-level macroeconomic variables also shows that banks in countries with higher GDP growth have higher non-traditional income which may be the result of customers needing increasingly sophisticated services from banks. Overall, the results clearly show that banks in less concentrated environments have higher levels of non-traditional income, although the motivation for their choice is still not clear. I explore this further in the next section.

3.5.1.2 Profitability of non-traditional income

In this section, I examine whether there are differences in profitability of non-traditional income activities chosen in countries with different levels of concentration. The model is of the form:

$$Profitability_{bt} = \alpha + \gamma_1 B_{bt} + \gamma_2 C_{ct} + \epsilon_{bt} \tag{3.6}$$

B_{bt} are bank-specific control variables, which include characteristics like non-traditional income, asset size, loans, nonperforming loans and non deposit funding. C_{ct} are country-specific variables to control for per-capita GDP , GDP growth and inflation. All regressions use robust standard errors.

Return on equity (ROE) and return on assets (ROA) are both used as proxies for profitability and calculated annually. The first regression uses ROE as a dependent variable for the LowConc subsample. The coefficient for non-traditional income is positively significant at the 1% level. The coefficient for the non-traditional income variable is 0.187 which means that for an increase in one standard deviation of non-traditional income, there is an increase in ROE of 0.0006, where the standard deviation of ROE is 0.036. Stiroh (2004) does not find a similar positive relationship, when examining the impact of non-traditional income on ROE for American banks. The discrepancy in results could be due to the fact that the sample in Stiroh (2004) includes smaller banks, and is from 1984-2001 before banks in the U.S, U.K, France and other Low Conc countries started highly profitable trading activities in securitized credit products.

The second regression uses ROA as a dependent variable for the LowConc subsample. In this case, the result is similar to Demirguc-Kunt and Huizinga (2010), where I find a highly significant positive relationship between ROA and non-traditional income. The last two regressions are for the HighConc subsam-

ple. In regression 3, where ROE is the dependent variable, the coefficient for non-traditional income is positive, but is not significant at the 10% level. The magnitude of the coefficient is about 2.5 times less than the magnitude of the coefficient for non-traditional income in the LowConc subsample. This result is in contrast to the relatively similar coefficient for non-traditional income in regressions where ROA is the dependent variable. The difference in the magnitude of the coefficient for ROE shows that banks in LowConc countries are choosing non-traditional income activities that appeal to shareholders.

3.5.1.3 Volatility of profits and non-traditional income

In this section, I examine whether there are differences in profitability of non-traditional income activities chosen in countries with different levels of concentration. The model is of the form:

$$Vol(Profitability)_b = \alpha + \gamma_1 B_b + \gamma_2 C_c + \epsilon_b \tag{3.7}$$

B_b are bank-specific control variables, which include characteristics like non-traditional income, components of non-traditional income, asset size, loans, non-performing equity levels, and nondeposit funding. C_c are country-specific variables to control for per-capita GDP, GDP growth and inflation. All regressions use country fixed effects with robust standard errors.

The dependent variable, the standard deviation of ROA (SD ROA), is calculated over the entire sample period from 1996-2010. All the independent variables are averages calculated over the same time period. In Table 5, the first four regressions include the LowConc subsample. In regression 1, the coefficient for SD ROA is highly positively significant at the 1% level. In regression 2 and regression 4, it can be seen that this effect is driven mainly by the unclassified and the fee income components of non-traditional income. The result is similar to Stiroh

(2004) who finds a similar relationship between standard deviation of ROE and non-traditional income in U.S. banks.

The last four regressions are for banks located in the HighConc subsample. While the coefficient for non-traditional income is negative, it is not significant. The unclassified income component of non-traditional income is however, highly significant at the 5% level. This is in sharp contrast to the result for unclassified income in the LowConc subsample. While there is a strong positive relationship between non-traditional income and increased volatility of ROA in the LowConc subsample, banks in the HighConc subsample do not display the same relationship. Instead, there is evidence that certain components like unclassified income are correlated with lower volatility of ROA. In unattached results, regressions using volatility of ROE as the dependent variable, show similar contrasts in the two subsamples.

These results on volatility and levels of ROA and ROE indicate that executives in banks in LowConc countries have focused on improving their shareholder returns, rather than reducing volatility of revenue.

3.5.2 Systemic risk, bank concentration and non-traditional income

3.5.2.1 Systemic risk and concentration

This section examines whether non-traditional income and the concentration of the banking system where the bank is located has an impact on the systemic risk contributions of individual banks . The model that I estimate is:

$$MES_{bt} = \alpha + \beta_1 NoninterestIncome_{bt} + \beta_2 Concentration_{ct} + \gamma_1 B_{bt} + \gamma_2 C_{ct} + \epsilon_{bct} \tag{3.8}$$

MES is calculated for each time period t and each bank b. B_{bt} are bank-specific control variables, which include characteristics like asset size, equity levels, non-deposit funding and loan book size. In addition, I include ROA as a profitability measure, to examine if less profitable banks are regarded by investors are more systemically risky. I also include asset growth to examine if fast-growing firms are linked to higher levels of systemic risk. C_{ct} are country-specific variables to control for per-capita GDP, GDP growth and inflation. The reason for including these variables is that faster developing countries or those with higher levels of economic wealth may have different requirements from their financial institutions. Inflation is also included as a control variable, as slow or negative levels of inflation may increase the real value of debt, reducing payment rates, asset quality and subsequently capital ratio of banks.

Table 6 shows the results of the OLS regression analysis. Robust standard errors are used in all regressions. Regression 1 and 2 include bank-level variables, country-level variables including concentration, and country fixed effects. The coefficient for concentration is positively significant at the 1% level indicating that MES is higher when concentration is higher. Previous research has not examined the role of concentration in systemic risk of individual banks, but this result is similar to Boyd, De Nicolo, and Jalal (2006) who find that bank in less concentrated economies are more individually risky. The coefficients for assets and non-traditional income are both significant at the 1% level indicating that larger and more diversified banks have higher levels of MES. The result is similar to De Jonghe (2010) and Brunnermeier, Dong, and Palia (2011) who show that non-traditional income is correlated with a higher level of systemic risk. Less profitable banks, banks in countries with a higher per-capita GDP and lower inflation also have higher levels of MES. The coefficient for inflation is negatively significant at the 5% level, which could be indicative of the fact that an increase

in the real (vs. nominal) burden on payers of debt increases MES.

Regression 2 is similar to regression 1, but I also include an interaction term between non-traditional income and concentration to examine whether the relationship between non-traditional income and concentration is homogenous in different countries. The coefficient for this interaction variable is significant at the 1% level indicating that a higher level of non-traditional income is correlated with a higher level of MES in countries with lower banking concentration. This relationship is explored in more detail in the next two sections.

Regression 3 and regression 4 are similar to the previous two regressions but also include bank fixed effects. The coefficient for concentration is still significant at the 5% level, indicating that concentration is positively related to non-traditional income even when considering only within-bank variation of MES. The coefficient for non-traditional income is now negatively significant at the 10% level, showing that, when I consider only a within-bank increase in non-traditional income, it is correlated with a decrease in MES. This result is in contrast to the results in regressions 1 and regression 2, which showed that banks with higher levels of non-traditional income relative to each other were more systemically risky. In regression 4, again with bank fixed effects, I include the interaction between concentration and non-traditional income. Similar to regression 3, the result indicates that non-traditional income is not related to an increase in MES, no matter the concentration level of the banking system.

The results show that banks in countries with higher levels of concentration have higher levels of systemic risk whether I use country or bank fixed effects. The results on non-traditional income are however mixed. First they show that the relationship between MES and non-traditional income is not homogenous. Second, the results show that within-firm increase of non-traditional income is not correlated with higher levels of MES. I explore this relationship between non-

traditional income and MES further in the next section.

3.5.2.2 Systemic risk and non-traditional income in LowConc and HighConc

In this section, I are interested in exploring the result from the previous section further, where the interaction term between non-traditional income and concentration is negative. I examine this heterogeneity in the relationship between MES and non-traditional income by splitting the sample into two subsamples, a HighConc subsample and a LowConc subsample. The regression setup for each of the subsamples is similar to equation 6, but I no longer include the concentration variable.

The results for this section are in Table 7. Regressions 1 and 2 uses the LowConc subsample, which consists of observations whose concentration is below the annual median level of concentration. Countries with competitive banking systems like the U.S., U.K., Germany and France fall into the LowConc category. In regression 1, which uses country fixed effects, non-traditional income is significant at the 1% level. The result is not only statistically significant, but also economically significant. A one standard deviation increase of 2% is correlated with a 20% increase in MES. This is a stronger relationship than in Brunnermeier, Dong, and Palia (2011), where one standard deviation increase in non-traditional income cause a between 11.6% increase in SES. The difference may arise because my sample has much larger banks, which typically pose greater systemic risk. The coefficient for the loans variable is also negatively significant at the 5% level, which essentially follows from the result on non-traditional income, as banks with higher levels of non-traditional income have fewer loans on their books. While the coefficient for inflation is not significant in LowConc countries, the results for other coefficients are similar to those seen in the previous section.

In regression 2, which uses bank fixed effects, non-traditional income is no longer significant. This result shows that a within-bank increase in non-traditional income is not related to an increase in MES. One possible reason could be because banks already have high levels of non-traditional income in LowConc countries and the marginal impact of an increase is small. On the other hand, the new non-traditional income activities being incrementally chosen by the banks may not be perceived as being systemically risky by the market.

Regressions 3-4 consist of observations where the concentration is above the median level of concentration (HighConc). In regression 3, which uses country fixed effects, although the sign for the coefficient of non-traditional income is negative, it is not significant. This result is in stark contrast to the LowConc subsample, where higher levels of non-traditional income are highly correlated to MES. Similar to the LowConc subsample, larger banks are more likely to have higher levels of MES, although the coefficient in the HighConc subsample is almost twice in magnitude. The coefficient for inflation is highly negatively significant in the HighConc subsample, which shows that lower levels of inflation are an issue for banks in the HighConc subsample.

In regression 4, which uses bank fixed effects, non-traditional income is negatively significant at the 1% level. This result shows that increasing levels of non-traditional income can be correlated with a lower level of systemic risk. Banking executives have long argued about the benefits of diversifying into activities that are not considered to be at the core of their business. This result offers some evidence in support of this view for banks located in HighConc countries. While univariate tests in Table 1 show that banks in HighConc countries have lower levels of non-traditional income, it seems unlikely the 10% difference in levels of non-traditional income itself is itself enough to explain the drastic difference in effects on systemic risk. In the next section, I will further explore the nature of

non-traditional income in the two subsamples.

3.5.2.3 Systemic risk and components of non-traditional income

In this section, I split non-traditional income into its components and examine their relationship with MES. The regression setup is similar to the previous section, except that I examine the three components of non-traditional income: trading income, fee income and unclassified income. The summary in Table 1 shows that while the difference between total non-traditional income in the LowConc and HighConc subsample is highly significant, the difference between levels of trading income and fee income are not. The difference between levels of non-traditional income arises from the difference in levels of unclassified income.

The results for the regressions analysis are in Table 8. The OLS regressions 1-6 are for the LowConc subsample. Regressions 1-3 use country fixed effects and show that a larger fee income and a larger unclassified income are associated with larger MES. The coefficient for trading income is not significant showing that higher levels of trading income are not associated with higher levels of MES. In previous research, like Demirguc-Kunt and Huizinga (2010) and Brunnermeier, Dong, and Palia (2011), trading income has been highly correlated with higher risk. The lack of a relationship in my results could be due to a couple of reasons. First, unlike Demirguc-Kunt and Huizinga (2010) who also include investment banks in their sample, I only include depositary institutions. Second, unlike Brunnermeier, Dong, and Palia (2011) who only consider U.S. financial institutions using data reported to the Federal Reserve, my sample includes financial institutions in many different countries where trading income may be of a different nature. Similar to the previous section, when I use bank fixed effects, I find there is no relationship between MES and non-traditional income.

The next six regressions are for the HighConc subsample. Regressions 7-9

use country fixed effects and show that both fee income and trading income are negatively correlated with MES. The venturing of banks into trading of debt products has been often blamed as a primary reason for the recent financial crisis. This has led to calls for separating the investment banking and trading divisions of banks from their depositary divisions. My results show that trading income can sometimes have beneficial benefits in reducing systemic risk. This is not solely due to the levels of trading income which are about the same in the two subsamples. Trading income could originate from different sources. Some banks have large market making desks primarily helping clients hedge their interest rate, currency and commodity price exposure. While other banks have larger proprietary trading desks and can also gain income through hedge fund and private equity investments. My data does not provide a break-up of trading income, but the evidence points to the fact that trading income can sometimes have positive benefits and should not be outright dismissed as a source of revenue diversification for banks.

MES for banks is negatively correlated with fee income at the 10% level for the regression using country fixed effects which again point to differences in type of fee income in the two competitive environments as the levels of fee income are about the same in Table 1. With unclassified income, the story is a bit different as the levels of unclassified income are significantly higher in the LowConc subsample, so the differences could arise from both type and levels of unclassified income. The results in regressions 10-12 using firm fixed effects are very similar to the results with bank fixed effects. Overall, the results provide evidence on the possibility of differences in both type and level of non-traditional income which can lead to contrasting effects on systemic risk.

3.6 Robustness Tests

In this section, I examine alternative measures of concentration, risk, and also the relative performance of different measures of systemic risk.

3.6.1 alternative Measures of Concentration

Large banks do business internationally. The previously used measure of concentration assumes that all bank assets are based in the home country. Even though most banks have the largest proportion of their assets in their home country, I create an alternative bank-level measure of concentration which considers the location of assets, to ensure the robustness of my results. Bankscope provides data on banking subsidiaries which are incorporated in foreign countries, and specifies the ultimate owner of these subsidiaries. I use this linkage to create a proxy for international presence of banks and create a new measure of concentration called weighted Herfindahl-Hirschman index ($wHHI$).

The weighted Herfindahl-Hirschman index, HHI_{it}, is calculated for year t for every bank i in my sample.

$$wHHI_{it} = \sum_{c=1}^{n} \alpha_{ct}^{i} HHI_{ct}$$

α_{ct}^{i} is the proportion of assets for bank i in n countries . HHH_{ct} is the country-level HHI which is calculated as the weighted sum of local bank assets,

$$HHI_{ct} = \sum_{k=1}^{m} s_k^2$$

Here, the proportion of local bank assets, s, is calculated for each of the m banks in a country. All public and private bank holding companies, commercial

banks, cooperative banks, savings banks, investment banks and securities firms make up the m firms in Bankscope.

There are, however, a few limitations with the data. First, the subsidiary linkage is based on the status of ownership for the last year in the sample, i.e., 2010. The new measure of concentration, weighted concentration, assumes the subsidiary linkage stays constant throughout the sample. Second, asset size of subsidiaries may not give a perfect indication of the geographical distribution of bank activities. For example, several European banks have large subsidiaries in their home countries and also in London. While the London subsidiary may have a large asset base, it could conceivably be a placeholder for activities in other European countries. And lastly, the cross-holdings of subsidiaries within a country are not known. Therefore only the assets of largest subsidiary of a bank in a foreign country are used. There is also little information on subsidiaries before the year 2000, so I only calculate the concentration measure from the year 2001 onwards. In addition to the weighted HHI, I calculate the proportion of assets of the largest three banks by asset size in total country bank assets. This measure of concentration is called the "Top 3 Assets" and also used in the regression analysis.

Table 9 shows results for OLS regressions where MES is the dependent variable and the two new measures of concentration are the independent variables. The same control variables, as those in Table 4, are used in this analysis. Country fixed effects are used in all regressions. Regression 1 and 3 show that both weighted concentration and top 3 assets are positively significant at the 1% level. This result shows that MES is higher for banks which are in more concentrated banking environments. Regressions 2 and 4 include an interaction term between non-traditional income and concentration. The coefficient for the interaction term is negatively significant at the 5% level in regression 2 and negatively significant at the 1% level in regression 4. These results again show that non-traditional income

is more systemically risky in low concentration countries.

3.6.2 Alternative measures of risk

In Table 10, I examine whether the positive relationship between risk and concentration holds when using alternative measures of bank risk. The first two regressions in panel A use volatility of the stock returns as the dependent variable. Volatility is calculated annually using daily returns and has been used frequently as a robustness test to measure riskiness of a bank (for example: Laeven and Levine (2009)). In panel A, regression 1 uses the LowConc subsample. The coefficient for non-traditional income is highly significant at the 1% level. This positive relationship between total risk of the stock and non-traditional income is similar to Demirguc-Kunt and Huizinga (2010). When I examine the HighConc subsample in regression 2, however, the coefficient for non-traditional income is not significant. The contrasting result with the LowConc subsample, continues to show that non-traditional income contributes to the riskiness of a bank in the LowConc subsample, but does not have the same effect in the HighConc subsample.

In panel B, I use a commonly used measure of bank riskiness, the z-score as the dependent variable. Z-score is measured as:

$$Z\text{-}score = \frac{Avg(ROA) + Avg(Equity/Assets)}{StdDev(ROA)}$$

Each of the components of the z-score is computed over the entire sample period. A higher value for z-score indicates lower risk as the bank has higher levels of profitability and equity with less variability in profitability. In regression 1 for the LowConc subsample, the coefficient for non-traditional income is negatively significant at the 5% level. In regression 2, however, the coefficient for non-traditional income is not significant. The contrasting effects of non-traditional

income are again evident in this test.

3.6.3 Performance of risk measures during financial crises

This section examines if cross sectional variation in equity returns during the 2007-2009 financial crisis and the Asian financial crisis can be explained by systemic risk measures calculated before each of the crises. I compare MES to tail-beta and z-score to determine which of the these risk measures can predict equity losses in the financial crisis. I calculate tail-beta as in De Jonghe (2010), where it equals the probability of a sharp decline in a bank's stock price conditional on a crash in the banking index. I do not describe the details, but note that the methodology is based on using a modified Hill (1975) estimator to calculate the tail index and a semi-parametric estimation of the probability. One caveat with my calculation is that I use only one year of equity returns to calculate tail-beta, whereas De Jonghe (2010) uses six years of equity returns. The reason for choosing a shorter time period is to provide both equity based measures with the same amount of information. In addition to these two equity based measures, I also use z-score in my analysis, which is calculated over the previous three years of data. For the 2007-2009 financial crisis, the evaluation period is from July 2007 to December 2008 and one year of equity returns before this period are used to calculate MES and tail-beta. For the Asian financial crisis, the evaluation period is from June 1997 to December 1997, and one year of equity returns before this period are used to calculate MES and tail-beta. Table 11 presents the results for my historical tests. The coefficient for MES is negatively significant in both financial crises. Both tail-beta and z-score are not significant in the regressions. These results give us the confidence to use MES as a measure of systemic risk in my tests.

3.7 Conclusion

In the aftermath of the 2007-2009 financial crisis, bank regulators have been tasked with studying and proposing new regulations to make the banking system more robust, and to prevent a repetition of the bailouts that were orchestrated by central banks and treasury departments. One major focus of these new regulations is the diversification of banks into non-traditional income generating activities. In fact, legislators in the UK may pass a law "ring-fencing" retail banking from investment banking if they follow the recommendations of the Independent Commission of Banking. Similarly, the European Union appointed Liikanen review and the Dodd-Frank Act in the U.S. have proposed regulations which limit trading and proprietary activities by banks. The importance of this issue from a regulatory perspective directly motivates my empirical analysis.

I use a sample of 191 large international banks over the years 1996-2010 to show that regulation limiting non-traditional income may not necessarily reduce the systemic risk of banks in all countries. My analysis distinguishes between countries based on the concentration of their banking systems. In order to measure concentration I use the asset Herfindahl-Hirschman Index for all the private and public banks in a country. The tail risk of a stock is used as a proxy for the systemic risk of an individual bank. I find that countries with a low concentration banking system (such as the U.S., Germany, and the U.K.) have higher levels of non-traditional income. As banks face higher levels of competition, they pursue activities with higher shareholder returns. Non-traditional income in these economies does not help reduce the volatility of profitability, but is actually correlated with higher levels of systemic risk.

In contrast, non-traditional income in high concentration countries (such as Australia and Canada) can help reduce systemic risk. Non-traditional income in

these countries has lower levels of shareholder returns and reduces the volatility of profitability. I also carry out a series of robustness tests. The results hold even when a new measure of bank-level concentration which takes into account the geographic dispersion of bank assets is used. The contrasting effects of non-traditional income on risk are also seen when I use alternative measure of risk such as the z-score and the volatility of stock returns.

Previous literature has shown that non-traditional income increases bank fragility and does not provide diversification benefits. My main contribution to the literature is twofold. First, I show that the relationship between bank diversification and systemic risk is not homogenous. Second, I show that concentration has an impact on levels and types of non-traditional income activities chosen by banks. Overall, the results show that regulation curbing levels of non-traditional income may not necessarily make banks safer in high concentration countries. In fact, it may actually increase their systemic risk. On the other hand, in low concentration banking systems, regulators should be wary of some of the non-traditional income activities which have high shareholder returns but do not provide risk reduction.

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APPENDIX
Variable Description

Variable	Description	Source
Assets	Log (total assets) in year 2000 dollars	Bankscope
Asset growth	Annual percentage change in Assets	Bankscope
Non-traditional income	Non-interest income/Total operating income	Bankscope
Trading income	Trading income/Total operating income	Bankscope
Fee Income	Fee income/Total operating income	Bankscope
Unclassified income	(Non-interest income-Net fees-Trading income)/Total operating income	Bankscope
Nondeposit funding	Non-deposit funding/Total short term funding	Bankscope
Equity	Total Equity/Assets	
Loans	Loans/Total assets	Bankscope
NPL	Non performing loans/Gross loans	Bankscope
Interest rate spread	(Interest income/Average earnings assets)-Interest expense/Average liabilities	Bankscope
Market leverage	(Assets-Equity+Market equity)/Market equity	Bankscope
ROA	Operating profit before taxes/Total assets	Bankscope
ROE	Operating profit before taxes/Total equity	Bankscope
MES	The average return of a stock when the market is in its lowest 5%	Datastream
Vol	Annualized volatility of daily returns	Datastream
Tail-beta	Probability of a sharp decline in a bank's stock price conditional on a crash in the banking index	Datastream
Z-score	$\frac{ROA+Equity/Assets}{SD(ROA)}$	Bankscope
Concentration	Herfindahl-Hirschman index calculated using total assets	Bankscope
Weighted concentration	Herfindahl-Hirschman index calculated using total domestic assets of a bank	Bankscope
Top 3 concentration	Assets of three largest banks in country/Assets of all banks	Bankscope
GDP per cap	GDP in year 2000 dollars divided by population	World Bank
GDP growth	Annual percentage change in GDP	World Bank
Inflation	Annual percentage change in consumer price index	World Bank
REGN	Summation of survey answer to restrictions on securities activities, real estate activities, insurance activities and non-financial activities	Barth, Caprio, and Levine (2008)

Figure 1

Differences in non-traditional income

This graph shows median levels of non-traditional income from 1996-2010. Concentration is calculated as the Herfindahl-Hirschman Index (HHI) of all private and public bank assets listed in Bankscope. The Low Concentration group includes banks which were in countries with levels of asset HHI below the median asset HHI for each year. The High Concentration group includes banks not in the Low Concentration group. Non-traditional income is calculated as non-interest income divided by total operating income. The values on the graph are the median non-traditional income values for each year within each group.

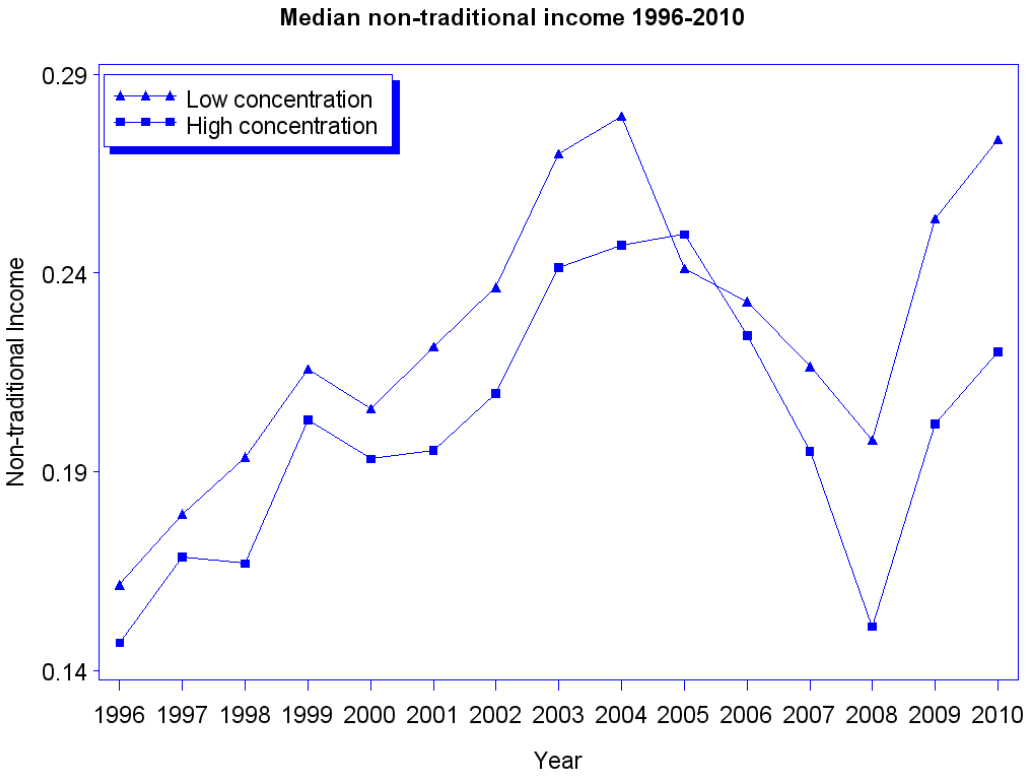

Table 1 Data Summary by Concentration

The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. All variables are measured annually, except for z-score which is calculated using data from all years in the sample. All variable are defined in the Appendix. Difference is the p-value for the non-parametric Mann-Whitney-Wilcoxon significance test for the difference between the low concentration and the high concentration sub-group.

	LOW CONC			HIGH CONC			
VARIABLE	**MEDIAN**	**MEAN**	**STD**	**MEDIAN**	**MEAN**	**STD**	**Difference**
Bank-level							
Assets (Billions)	79,071	75,519	17,160	50,183	81,423	54,783	0.000
Log assets	11.278	11.205	0.250	10.823	11.140	0.565	0.012
Asset growth	0.092	0.092	0.041	0.096	0.103	0.046	0.518
Non-traditional income	0.221	0.225	0.035	0.202	0.201	0.033	0.000
Fee income	0.135	0.125	0.029	0.125	0.121	0.032	0.424
Trading income	0.006	0.009	0.006	0.005	0.007	0.008	0.075
Unclassified income	0.049	0.050	0.013	0.022	0.025	0.009	0.000
Nondeposit funding	0.190	0.185	0.038	0.213	0.218	0.040	0.008
Equity	0.073	0.076	0.006	0.062	0.061	0.005	0.000
Loans	0.603	0.598	0.036	0.581	0.569	0.039	0.079
NPL	0.019	0.019	0.004	0.022	0.023	0.005	0.008
Interest rate spread	2.875	2.930	0.248	2.210	2.287	0.271	0.000
Market leverage	0.072	0.076	0.018	0.101	0.096	0.017	0.001
ROA	0.014	0.014	0.003	0.012	0.012	0.002	0.029
ROE	0.197	0.193	0.036	0.197	0.203	0.026	0.001
MES	2.559	2.957	1.574	2.730	3.137	1.309	0.006
VOL	0.319	0.348	0.133	0.323	0.327	0.101	0.023
Tail-beta	0.134	0.132	0.062	0.220	0.189	0.071	0.000
Z-score	20.302	24.739	16.553	18.675	25.737	20.479	0.000
Country-level							
Concentration	0.046	0.044	0.029	0.143	0.147	0.012	0.000
Weighted concentration	0.049	0.051	0.023	0.135	0.133	0.006	0.000
Top3 concentration	0.301	0.252	0.113	0.561	0.564	0.026	0.000
GDP per cap (Millions)	0.308	0.298	0.049	0.163	0.169	0.031	0.000
GDP growth	0.034	0.029	0.020	0.037	0.033	0.016	0.000
Inflation	0.027	0.025	0.009	0.023	0.024	0.008	0.367
Number of Observations	1071	1071	1071	994	994	994	

TABLE 2 Year 2006 Summary

The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. All variable are defined in the Appendix. The LowConc subsample contains observations where the concentration is below the median level of annual concentration.

MARKET	Num	Assets	Conc.	Conc. group	Noninterest income	Fee income	Trading income	Unclassified income	Nondeposit funding	Market leverage	Interest spread	MES
United States	23	85,990	0.020	LOW	0.268	0.141	0.009	0.131	0.092	0.054	2.810	1.396
Japan	9	150,634	0.052	LOW	0.327	0.218	0.015	0.045	0.171	0.124	1.250	2.590
Malaysia	2	45,047	0.062	LOW	0.225	0.113	0.028	0.047	0.197	0.046	3.420	2.494
France	4	1,247,240	0.067	LOW	0.285	0.108	0.084	0.015	0.479	0.183	0.510	1.823
United Kingdom	5	992,345	0.069	LOW	0.286	0.125	0.077	0.026	0.151	0.111	0.900	1.785
Brazil	5	85,704	0.069	LOW	0.182	0.218	0.000	-0.008	0.419	0.053	6.680	3.276
Austria	2	133,630	0.077	LOW	0.289	0.173	0.033	0.075	0.304	0.070	3.075	2.352
Germany	5	252,367	0.081	LOW	0.197	0.122	0.028	0.014	0.506	0.218	0.510	1.653
Indonesia	4	16,393	0.084	LOW	0.105	0.069	0.008	0.027	0.029	0.040	5.710	3.215
South Korea	5	106,657	0.092	LOW	0.229	0.053	0.015	0.059	0.172	0.117	2.700	2.545
Mexico	2	12,988	0.092	LOW	0.148	0.153	0.014	0.000	0.045	0.032	3.595	2.642
Poland	2	24,907	0.094	LOW	0.375	0.251	0.007	0.100	0.061	0.032	4.050	3.418
India	6	25,326	0.096	LOW	0.194	0.110	0.017	0.051	0.090	0.061	3.370	3.614
Turkey	9	33,520	0.100	LOW	0.155	0.099	0.003	0.047	0.214	0.042	3.680	4.773
Thailand	3	24,446	0.102	HIGH	0.229	0.122	0.000	0.026	0.057	0.066	3.680	4.736
Russian Federation	2	62,425	0.118	HIGH	0.161	0.113	0.037	0.010	0.073	0.032	5.975	3.448
South Africa	4	66,233	0.121	HIGH	0.339	0.173	0.053	0.027	0.078	0.065	2.430	4.134
Spain	5	118,513	0.123	HIGH	0.220	0.165	0.015	0.021	0.379	0.074	1.610	2.010
Morocco	1	18,439	0.131	HIGH	0.294	0.141	0.000	0.153	0.078	0.040	3.340	3.176
Italy	7	131,518	0.132	HIGH	0.234	0.182	0.033	0.000	0.265	0.086	2.185	1.492
Canada	6	265,906	0.138	HIGH	0.345	0.191	0.000	0.130	0.264	0.083	1.520	1.022
Portugal	1	66,529	0.139	HIGH	0.222	0.166	-0.008	0.050	0.406	0.073	1.570	1.074
Saudi Arabia	6	19,798	0.140	HIGH	0.278	0.210	0.027	0.020	0.050	0.032	3.655	1.045
China	5	188,093	0.142	HIGH	0.063	0.056	0.003	0.007	0.083	0.057	2.550	4.597
Greece	1	86,139	0.151	HIGH	0.220	0.122	0.004	0.043	0.105	0.043	3.530	2.845
Belgium	2	501,817	0.158	HIGH	0.181	0.085	0.021	0.036	0.454	0.147	0.745	1.920
Hungary	1	31,638	0.162	HIGH	0.213	0.163	0.000	0.019	0.135	0.032	6.680	3.723
Czech Republic	1	24,472	0.170	HIGH	0.281	0.243	0.000	0.003	0.029	0.047	3.000	1.668
Australia	6	202,611	0.171	HIGH	0.178	0.083	0.011	0.038	0.303	0.060	1.880	1.810
Ireland	1	167,713	0.180	HIGH	0.158	0.105	0.004	0.016	0.346	0.100	1.350	2.714
Israel	2	57,783	0.187	HIGH	0.379	0.237	0.051	0.061	0.037	0.109	2.510	2.965
Hong Kong	3	73,511	0.196	HIGH	0.154	0.097	0.034	0.017	0.128	0.047	1.940	2.198
Singapore	3	89,848	0.218	HIGH	0.175	0.118	0.024	0.023	0.140	0.056	1.950	2.204
Colombia	2	18,190	0.222	HIGH	0.271	0.231	0.010	0.022	0.120	0.058	6.570	3.000
Denmark	1	413,314	0.244	HIGH	0.098	0.060	0.057	0.044	0.445	0.163	0.540	1.662
Peru	1	9,012	0.244	HIGH	0.321	0.228	0.000	0.085	0.189	0.033	6.190	1.494
Sweden	4	231,731	0.244	HIGH	0.235	0.153	0.040	0.013	0.336	0.122	0.875	2.535
Switzerland	2	1,260,782	0.244	HIGH	0.340	0.211	0.084	0.012	0.438	0.132	0.690	1.972

TABLE 3 Non-traditional income and concentration

This table shows the relationship between non-traditional income and concentration. The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. The dependent variable, non-traditional income is total non-interest income divided by total operating income. Regressions 1 and 3 use country fixed effects. Regressions 2 and 4 use bank fixed effects. All variable are defined in the appendix. Robust standard errors are used in all the OLS regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	NiIncome (1)	**NiIncome (2)**	**NiIncome (3)**	**NiIncome (4)**
Concentration	-0.324***	-0.251***	-0.319***	-0.224***
	(-4.21)	(-3.88)	(-3.72)	(-3.24)
Assets	0.024***	-0.022***	0.025***	-0.014**
	(9.27)	(-4.00)	(8.88)	(-2.46)
Equity	0.616***	0.483***	0.653***	0.648***
	(4.34)	(4.80)	(4.17)	(6.25)
Interest rate spread	-0.018***	-0.020***	-0.018***	-0.020***
	(-6.10)	(-9.34)	(-5.52)	(-9.05)
Asset growth	0.049***	0.078***	0.037*	0.072***
	(2.62)	(6.37)	(1.88)	(5.87)
GDP growth			0.302**	0.280***
			(2.34)	(3.30)
GDP per cap			-0.000	0.000
			(-0.56)	(0.59)
Inflation			-0.118	-0.063
			(-0.84)	(-0.65)
REGN			0.015*	
			(1.77)	
Observations	1965	1965	1845	1959
Adjusted R-squared	0.369	0.745	0.371	0.747
Country Fixed Effect	yes	no	yes	no
Bank Fixed Effect	no	yes	no	yes
Year Fixed Effect	yes	yes	yes	yes

TABLE 4 Non-traditional income and profitability

This table shows the relationship between profitability of the bank and concentration. The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. The LowConc subsample contains observations where the concentration is below the median level of annual concentration. The dependent variables are annual ROE and ROA. All variable are defined in the Appendix. Robust standard errors are used in all the OLS regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	LOW CONC		HIGH CONC	
	ROE	**ROA**	**ROE**	**ROA**
	(1)	(2)	(3)	(4)
Non-traditional income	0.187***	0.016***	0.071	0.012***
	(6.21)	(6.36)	(1.62)	(3.64)
Assets	0.002	-0.001***	0.007*	0.000
	(0.74)	(-4.75)	(1.73)	(0.11)
Loans	0.066***	0.007***	0.009	0.006**
	(3.09)	(3.68)	(0.30)	(2.16)
NPL	-1.443***	-0.066***	-1.179***	-0.091***
	(-5.93)	(-3.20)	(-4.79)	(-4.13)
Nondeposit funding	-0.027	-0.005**	-0.012	-0.002
	(-1.03)	(-2.39)	(-0.36)	(-0.66)
GDP per cap	-0.000***	-0.000***	-0.000*	-0.000***
	(-4.49)	(-2.85)	(-1.81)	(-4.15)
GDP growth	0.005**	0.000	0.008***	0.001***
	(2.34)	(1.44)	(6.37)	(5.49)
Inflation	0.002	0.000	0.002**	0.000**
	(0.74)	(0.06)	(2.37)	(2.08)
Observations	948	948	865	865
Adjusted R-squared	0.395	0.615	0.383	0.563
Country Fixed Effect	yes	yes	yes	yes
Year Fixed Effect	yes	yes	yes	yes

TABLE 5 Standard deviation of ROA

This table shows the relationship between standard deviation of ROA (SD ROA) and the components of non-traditional income. The sample consists of 191 bank-level observations from the period 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. All regressions use country fixed effects. The dependent variable, SD ROA, is calculated once for every bank over the entire time period. All dependent variables are average values calculated over the entire time period. All variable are defined in the Appendix. Robust standard errors are used in all the OLS regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	Low Conc				**High Conc**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
	SD ROA	**SD ROA**	**SD ROA**	**SD ROA**	**SD ROA**	**SD ROA**	**SD ROA**	**SD ROA**
Non-traditional income	0.010***				-0.002			
	(3.46)				(-0.46)			
Fee income		0.008*				0.002		
		(1.89)				(0.31)		
Trading income			-0.001				-0.012	
			(-0.03)				(-0.49)	
Unclassified income				0.016***				-0.011**
				(3.27)				(-2.35)
Assets	0.000	0.000	0.000	0.000	-0.001***	-0.001**	-0.001**	-0.001***
	(0.37)	(0.50)	(0.79)	(0.84)	(-2.87)	(-2.60)	(-2.57)	(-3.01)
Loans	0.006***	0.004*	0.003	0.003	-0.001	-0.001	-0.002	-0.002
	(3.30)	(1.74)	(1.12)	(1.40)	(-0.46)	(-0.35)	(-0.51)	(-1.02)
NPL	0.032	0.032	0.033	0.026	0.052**	0.050**	0.050**	0.044**
	(1.33)	(1.37)	(1.25)	(1.05)	(2.65)	(2.57)	(2.52)	(2.18)
Nondeposit funding	-0.000	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.002
	(-0.17)	(-0.44)	(-0.66)	(-0.39)	(-0.43)	(-0.40)	(-0.39)	(-0.80)
GDP per cap	0.007*	0.010**	0.009**	0.003	0.002	0.002	0.002	0.002
	(1.68)	(2.38)	(2.20)	(0.79)	(0.63)	(0.55)	(0.62)	(0.55)
GDP growth	-0.060***	-0.037	-0.047*	-0.078***	-0.029	-0.023	-0.027*	-0.034**
	(-2.65)	(-1.41)	(-1.97)	(-3.53)	(-1.37)	(-1.14)	(-1.73)	(-2.06)
Inflation	0.103***	0.097***	0.094***	0.090***	0.043**	0.041**	0.044**	0.046**
	(5.45)	(4.48)	(4.32)	(4.53)	(2.28)	(2.20)	(2.25)	(2.54)
Observations	112	112	112	112	73	73	73	73
Adjusted R-squared	0.295	0.238	0.206	0.293	0.471	0.468	0.471	0.498

TABLE 6 MES and concentration

This table shows the relationship between MES and concentration. The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. MES is the dependent variable for all regressions. The first two regressions use country fixed effects, while the last two regressions use bank fixed effects. MES is calculated as the average return of the stock on the worst 5 percentile returns days for the market. All variables are defined in the Appendix. Robust standard errors are used in all regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	(1) **MES**	**(2)** **MES**	**(3)** **MES**	**(4)** **MES**
Concentration	4.977***	7.445***	4.530**	5.374**
	(2.93)	(3.89)	(2.52)	(2.37)
Assets	0.261***	0.240***	0.156	0.153
	(7.49)	(6.70)	(1.21)	(1.18)
Non-traditional income*Concentration		-14.038***		-4.659
		(-3.37)		(-0.73)
Non-traditional income	1.014***	2.155***	-1.078*	-0.546
	(3.24)	(5.04)	(-1.87)	(-0.62)
Equity	3.400**	3.452**	1.633	1.456
	(1.97)	(2.00)	(0.58)	(0.52)
Nondeposit Funding	0.163	0.163	0.595	0.587
	(0.54)	(0.54)	(1.30)	(1.28)
Loans	-0.322	-0.271	0.014	0.013
	(-1.17)	(-0.98)	(0.03)	(0.03)
ROA	-25.182***	-25.660***	-32.932***	-32.846***
	(-4.78)	(-4.89)	(-5.01)	(-5.00)
Asset growth	-0.329	-0.279	-0.364	-0.366
	(-1.39)	(-1.17)	(-1.42)	(-1.43)
GDP per cap	11.888***	11.542***	12.021***	11.883***
	(3.70)	(3.63)	(3.60)	(3.54)
GDP growth	-1.666	-1.174	-1.311	-1.225
	(-0.82)	(-0.57)	(-0.63)	(-0.59)
Inflation	-5.572**	-5.591**	-6.574**	-6.576**
	(-2.19)	(-2.20)	(-2.52)	(-2.52)
Observations	1837	1837	1837	1837
Adjusted R-squared	0.670	0.672	0.693	0.693
Country Fixed Effect	yes	yes	no	no
Bank Fixed Effect	no	no	yes	yes
Year Fixed Effect	yes	yes	yes	yes

TABLE 7 MES split sample

This table shows the relationship between MES and concentration. The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. All regressions use OLS and MES is the dependent variable. Regressions 1 and 3 use country fixed effects, while regressions 2 and 4 use bank fixed effects. The LowConc subsample contains observations where the concentration is below the median level of annual concentration. Robust standard errors are used in all regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	LOW CONC		**HIGH CONC**	
	(1)	**(2)**	**(3)**	**(4)**
	MES	**MES**	**MES**	**MES**
Non-traditional income	2.153***	0.563	-0.767	-2.396***
	(5.58)	(0.73)	(-1.40)	(-2.89)
Assets	0.175***	-0.194	0.355***	0.566**
	(4.46)	(-1.17)	(4.89)	(2.47)
Equity	3.234*	-4.904	1.073	1.616
	(1.78)	(-1.43)	(0.35)	(0.37)
Nondeposit funding	-0.205	-0.056	0.254	0.552
	(-0.54)	(-0.08)	(0.54)	(0.80)
Loans	-0.781**	-0.540	0.782	0.745
	(-2.56)	(-0.98)	(1.64)	(1.21)
ROA	-36.567***	-57.474***	-11.638	-5.432
	(-5.99)	(-7.40)	(-1.48)	(-0.58)
Asset growth	-0.499*	-0.693**	0.245	0.194
	(-1.79)	(-2.27)	(0.62)	(0.46)
GDP per cap	17.551**	22.957***	7.400**	7.517**
	(2.26)	(3.02)	(2.06)	(2.01)
GDP growth	-0.512	0.512	-3.740	-3.498
	(-0.11)	(0.10)	(-1.61)	(-1.47)
Inflation	3.340	-0.940	-7.277**	-7.914**
	(0.68)	(-0.20)	(-2.27)	(-2.41)
Observations	958	958	879	879
Adjusted R-squared	0.745	0.780	0.662	0.673
Country Fixed Effect	Yes	No	Yes	No
Bank Fixed Effect	No	Yes	No	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes

TABLE 8 MES and non-traditional income components

This table shows the relationship between MES and concentration. The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. All regressions use OLS and MES is the dependent variable. Regressions 1-3 and 7-9 use country fixed effects, while regressions 4-6 and 10-12 use bank fixed effects. The LowConc subsample contains observations where the concentration is below the median level of annual concentration. All variables are defined in the Appendix. ***,**,* indicates significance at the 1%, 5% and 10% level.

	LOW CONC						HIGH CONC					
	Country Fixed			Bank Fixed			Country Fixed			Bank Fixed		
	(1) MES	(2) MES	(3) MES	(4) MES	(5) MES	(6) MES	(7) MES	(8) MES	(9) MES	(10) MES	(11) MES	(12) MES
Fee income	1.829***			0.332			-1.200*			-1.643**		
	(3.41)			(0.23)			(-1.79)			(-2.11)		
Trading income		-0.394			-0.119			-4.135**			-5.850**	
		(-0.21)			(-0.06)			(-2.06)			(-2.46)	
Unclassified income			1.341**			1.206			0.496			1.058
			(2.38)			(1.39)			(0.66)			(1.19)
Assets	0.222***	0.245***	0.217***	-0.184	-0.187	-0.192	0.357***	0.367***	0.366***	0.527**	0.653***	0.623***
	(5.94)	(6.50)	(5.65)	(-1.09)	(-1.12)	(-1.15)	(4.96)	(5.14)	(5.09)	(2.23)	(2.88)	(2.73)
Equity	4.302**	3.384*	2.819	-4.840	-4.782	-4.960	0.409	0.281	0.287	0.652	0.045	0.608
	(2.31)	(1.85)	(1.52)	(-1.40)	(-1.40)	(-1.45)	(0.13)	(0.09)	(0.09)	(0.15)	(0.01)	(0.14)
Nondeposit funding	-0.346	-0.302	-0.199	-0.085	-0.078	-0.069	0.188	0.189	0.271	0.571	0.508	0.669
	(-0.91)	(-0.77)	(-0.50)	(-0.12)	(-0.11)	(-0.10)	(0.40)	(0.41)	(0.58)	(0.85)	(0.75)	(0.99)
Loans	-1.173***	-1.430***	-1.388***	-0.575	-0.572	-0.568	0.857*	0.853*	0.943**	0.837	0.880	0.890
	(-4.15)	(-4.39)	(-5.05)	(-1.02)	(-1.02)	(-1.02)	(1.82)	(1.81)	(2.02)	(1.35)	(1.43)	(1.44)
ROA	-32.053***	-29.655***	-30.142***	-56.951***	-56.723***	-56.529***	-11.530	-12.562	-12.378	-9.131	-9.461	-9.899
	(-5.10)	(-4.79)	(-4.92)	(-7.42)	(-7.36)	(-7.45)	(-1.50)	(-1.62)	(-1.60)	(-1.01)	(-1.05)	(-1.10)
Asset growth	-0.587**	-0.622**	-0.574**	-0.679**	-0.674**	-0.681**	0.181	0.221	0.175	0.042	0.037	-0.020
	(-2.09)	(-2.21)	(-2.03)	(-2.20)	(-2.23)	(-2.24)	(0.47)	(0.57)	(0.45)	(0.10)	(0.09)	(-0.05)
GDP per cap	19.188**	19.828**	19.094**	23.387***	23.293***	22.135***	6.980*	7.554**	7.615**	6.754*	7.795**	7.559**
	(2.43)	(2.51)	(2.44)	(3.06)	(3.05)	(2.90)	(1.92)	(2.11)	(2.12)	(1.75)	(2.07)	(1.99)
GDP growth	0.166	0.127	-0.438	0.626	0.601	0.261	-3.904*	-3.642	-4.100*	-3.987*	-3.535	-4.173*
	(0.04)	(0.03)	(-0.09)	(0.13)	(0.12)	(0.05)	(-1.69)	(-1.55)	(-1.76)	(-1.67)	(-1.45)	(-1.74)
Inflation	2.046	0.950	1.558	-1.218	-1.361	-0.798	-7.083**	-7.155**	-7.378**	-7.923**	-8.057**	-8.231**
	(0.41)	(0.19)	(0.32)	(-0.26)	(-0.29)	(-0.17)	(-2.20)	(-2.24)	(-2.31)	(-2.39)	(-2.47)	(-2.50)
Observations	958	958	958	958	958	958	879	879	879	879	879	879
Adjusted R-squared	0.739	0.736	0.737	0.780	0.780	0.780	0.663	0.663	0.662	0.670	0.671	0.668
Country Fixed Effects	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	No	No
Bank Fixed Effects	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 9 alternative measures for concentration

This table shows the relationship between MES and alternative measures of concentration. The sample consists of 2065 bank-level observations from the years 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. MES is the dependent variable for OLS regressions, which all use country fixed effects. Weighted concentration is calculated as the bank-level Herfindahl-Hirschman Index of the banking sector which includes all private and public banks listed in Bankscope and takes into account the geographical location of the assets. All variables are defined in the Appendix. Robust standard errors are used in all regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	(1) **MES**	**(2)** **MES**	**(3)** **MES**	**(4)** **MES**
Weighted concentration	4.699***	7.245***		
	(3.02)	(3.76)		
Weighted concentration*Non-traditional income		-11.824**		
		(-2.32)		
Top 3 concentration			2.975***	3.734***
			(4.80)	(5.57)
Top 3 concentration*Non-traditional income				-4.259***
				(-3.41)
Non-traditional income	1.129***	2.099***	1.044***	2.586***
	(3.23)	(4.14)	(3.44)	(5.14)
Nondeposit funding	-0.305	-0.288	0.170	0.163
	(-0.92)	(-0.88)	(0.58)	(0.56)
Assets	0.188***	0.175***	0.225***	0.206***
	(4.89)	(4.47)	(7.11)	(6.30)
Loans	-0.591*	-0.566*	-0.282	-0.226
	(-1.89)	(-1.80)	(-1.06)	(-0.85)
ROA	-34.041***	-34.022***	-23.106***	-23.469***
	(-6.77)	(-6.78)	(-4.91)	(-5.01)
Asset growth	-0.530*	-0.493*	-0.335	-0.273
	(-1.88)	(-1.73)	(-1.47)	(-1.18)
GDP growth	-3.439*	-3.255	-3.571*	-3.153*
	(-1.70)	(-1.61)	(-1.90)	(-1.67)
GDP per cap	-0.000	-0.000	0.000**	0.000**
	(-0.36)	(-0.41)	(2.32)	(2.30)
Observations	1439	1439	1973	1973
Adjusted R-squared	0.690	0.691	0.658	0.659
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

TABLE 10 Alternative measures for risk

This table shows the relationship between MES and alternative measures of concentration. In panel A, the sample consists of 2065 bank-level observations for the period 1996-2010. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. The dependent variable, the annual volatility of stock returns is calculated using daily returns. In panel B, the sample consists of 191 bank-level observations for the period 1996-2010. The dependent variable, the z-score is calculated as (average(ROA)+equity/assets)/SD(ROA) where each of the numbers is calculated over the entire time period. All independent variables in Panel A are calculated annually, while in Panel B all independent variables represent the mean value over the entire time period. The LowConc subsample contains observations where the concentration is below the median level of annual concentration. All variables are defined in the Appendix. Robust standard errors are used in all regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

PANEL A

	LowConc	HighConc
	(1)	**(2)**
	Vol	**Vol**
Non-traditional income	0.172***	0.009
	(5.25)	(0.20)
Assets	-0.000	0.006
	(-0.07)	(1.03)
Equity	0.026	0.114
	(0.18)	(0.48)
Nondeposit funding	0.044	0.053
	(1.52)	(1.37)
Loans	-0.011	0.086**
	(-0.45)	(2.21)
ROA	-3.182***	-2.343***
	(-6.47)	(-3.82)
Asset growth	-0.046*	0.013
	(-1.89)	(0.42)
GDP per cap	1.105**	0.183
	(2.24)	(0.70)
GDP growth	-0.582*	-0.417**
	(-1.84)	(-2.26)
Inflation	0.247	-0.200
	(0.71)	(-0.87)
Observations	958	879
Adjusted R-squared	0.741	0.681
Country Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

PANEL B

	LowConc	HighConc
	(1)	**(2)**
	Z-score	**Z-score**
Non-traditional income	-52.713**	14.262
	(-2.41)	(0.69)
Assets	-4.833***	4.903*
	(-3.00)	(1.97)
Loans	-28.025**	6.614
	(-2.22)	(0.52)
NPL	104.507	-204.612*
	(0.45)	(-1.69)
Nondeposit funding	-11.266	-14.856
	(-0.55)	(-0.81)
GDP per cap	27.746	-40.376
	(1.09)	(-1.47)
GDP growth	551.374***	305.056**
	(3.07)	(2.25)
Inflation	-221.473**	-136.029
	(-2.05)	(-1.65)
Observations	110	72
Adjusted R-squared	0.202	0.364
Country Fixed Effects	Yes	Yes

TABLE 11 Performance of Risk measures

This table shows the relationship between stock performance during financial crises and risk measures. The first three regressions use the stock losses during the sub-prime financial crisis for which the period between July 2007 to Dec 2008 is used. The last two regressions use the stock losses during the Asian financial crisis for which the period between June 1997 to Dec 1997 is used. Observations are included if they have bank data from Bankscope, stock return data from DataStream and national accounts data from the World Bank Database. All variables are defined in the Appendix. Robust standard errors are used in all regressions. ***,**,* indicates significance at the 1%, 5% and 10% level.

	2007-2009 FINANCIAL CRISIS				**ASIAN FINANCIAL**	
	(1)	**(2)**	**(3)**		**(1)**	**(2)**
	Stock Losses	**Stock Losses**	**Stock Losses**		**Stock Losses**	**Stock Losses**
MES	-3.028**			MES	-10.580**	
	(-2.43)				(-2.07)	
Z-score		0.001		Tail-beta		0.067
		(1.44)				(0.35)
Tail-beta			-0.004	Assets	-0.030	-0.061*
			(-0.06)		(-0.82)	(-1.66)
Assets	-0.075***	-0.087***	-0.072***	Market leverage	0.006	0.007
	(-3.87)	(-4.37)	(-3.99)		(0.89)	(1.01)
Market leverage	-0.006	-0.004	-0.006			
	(-1.26)	(-0.80)	(-1.14)			
Observations	159	148	159	Observations	92	92
Adjusted R-squared	0.216	0.220	0.192	Adjusted R-squared	0.101	0.055

Chapter 4

Institutional Investor Attention: Causes and Consequences

Abstract

In this chapter I use a novel measure of institutional attention based on readership statistics of news articles on Bloomberg terminals. I find that investors pay more attention to news stories for larger and low book-to-market firms, and that news wire coverage is a complement to analyst research. Contrary to previous research, I do not find that institutional attention is reduced on Fridays. Compared to days when published news is not read, there is an average increase in abnormal turnover of 13% on days when news is read. This increase is driven mainly by unexpected news on merger and acquisitions. Similarly, there is an increase of 65 bps for absolute adjusted returns on days when news is read compared to when it is not read. This increase is driven by earnings, merger and acquisition news and also other unexpected news. The effects of institutional investor attention are much larger for smaller firms. Finally, while short term reversals are reduced on days after news is published, I provide some evidence that short term reversals do not occur on days after published news is read.

4.1 Introduction

Institutional investors are faced with a daily barrage of information.[1]They must decide whether to allocation attention to analyst reports, press releases from firms, newswires, or newspapers. Even though keeping track of a portfolio of stocks is a full-time job, institutional investors cannot reasonably be expected to absorb all the available information since attention is a scarce cognitive resource (Kahneman (1973)). The financial literature has mostly conflated the publication of information with readership and there has been little opportunity to challenge this premise because measuring readership is empirically difficult.[2] In this chapter, I utilize a new and unique database which includes readership statistics of news stories published on Bloomberg terminals, to understand whether publication and readership have distinct implications.

Bloomberg terminals, which provide market news, data, are a ubiquitous presence at asset management firms and investment banks around the world.[3] I use the term institutional investor to describe terminal users because the significant recurring expense of each terminal connection means very few retail investors have access to Bloomberg. Firms are likely to provide the terminal only to employees who need live access to market data and news, and are involved in trading and investment decisions. There are more than 5,000 stories, mostly related to finance, published every day by the more than 2,300 journalists across 147 news bureaus. This coverage ensures that we have a comprehensive news data set covering most public firms. Specifically, the Bloomberg news database consists of over 52 million observations over Jan 2011-May 2013 and provides data on whether at least

[1]I use the term institutional investors to refer to both asset management companies (buy side) and financial intermediaries who provide services to these companies (sell side).

[2]Examples include Tetlock (2010) and Tetlock (2011) among several others.

[3]There are approximately 350,000 terminals around the world. At the time of writing this chapter, the cost to the institution is approximately $2000/user per month.

1,000 or 5,000 users have selected a news story on the terminal. Since selection requires conscious effort and signals intention to read the story, I believe that the readership is a good measure of institutional investor attention.

The goal of this chapter are twofold. First, I seek to shed some light on the determinants of investor attention. Previous studies have used variables such as trading volume, extreme returns, price limits and media mentions (Barber and Odean (2008); Gervais et al. (2001); Seasholes and Wu (2007)) as a proxy for investor attention. Other papers have used measures such as advertising spend to gauge familiarity with a company (Grullon et al. (2004)). Da et al. (2011) point out that stock returns and volume could be driven by factors unrelated to attention and the inclusion of a firm doesn't guarantee readership. Thus, they use web searches on Google as a direct measure of retail investor attention. There are few comparable measures of direct institutional investor attention. However, it is important to understand the behavior of institutional investors as they control a large amount of funds and have been responsible for sharp increases in trading volume (Chordia et al. (2011)). I, therefore, examine the characteristics of news which make it more likely to be read by institutional investors.

The second goal is to understand the influence of institutional investor attention on stock returns and volume. The impact of attention on these variables is not immediately obvious. Traditional asset pricing theory have assumed the immediate incorporation of information, implying investors are always paying attention. The shortcomings of this approach have been well documented.[4] Theoretically, Peng and Xiong (2006) show that limitations in investor attention can lead to investors processing more market and sector-wide information than firm-specific information. Empirically, Hirshleifer et al. (2009) and DellaVigna and Pollet (2009) show that there are smaller stock price reactions on days when there are

[4]Huberman and Regev (2001) and Tetlock (2011) show that investors even tend to react to news several day after it was released.

a higher number of earnings announcements and when earnings news is released on Fridays. The authors take this to be a sign of underreaction due to limited investor attention. My data set, however, allows me to improve on this methodology and actually measure the direct impact of investor attention to news on stock returns and volume.

I conjecture that given time constraints, investors choose to allocate attention to news which is more informative. The impact that this informativeness can have on stock returns and volume follows from theoretical model in Tetlock (2010). In his model, there are two investor groups; one consisting of informed traders, who have persistent liquidity shocks, and the second consisting of uninformed traders. The second group is only willing to provide liquidity to the first when they are informed by news. It follows that the more informative the news, the higher the propensity of uninformed traders to trade. Thus, a higher higher level of information within news can lead to larger stock price reactions and increased trading volume. If uninformed investors are risk-averse, they may not immediately trade and incorporate new information which can lead to persistence in returns after the news day. Based on this argument, my hypothesis is that greater attention is correlated with increases in returns, trading volume and momentum, which can reduce the well-known short term reversal effect.

To address the two goals, I use a sample of 2,625 Compustat firms listed on the NASDAQ and NYSE exchanges and merge them with news from the Bloomberg database. Besides containing story headlines and text, the database also contains information on whether at least 1,000 or 5,000 users have read a news story, along with a time-stamp. If one or more news stories attributed to a firm reaches these thresholds within a period of 24 hours, I set a daily indicator readership variable to 1. In addition, I create a measure of abnormal attention which is an indicator variable set to 1 if readership is higher than the average readership over

the previous five days. These readership variables are the key variables in my analysis.

The analysis is broken up into three parts. First, I analyze the determinants of news coverage and news readership. I find that extremely large firms with higher analyst coverage, higher book-to-market ratios, and higher volatility and absolute prices increases in the previous week are more likely to have news published about them. The result showing that analyst coverage is a complement to news coverage is in contrast with Fang and Peress (2009) who found newspaper coverage is a substitute for analyst coverage. My result is intuitive since newswires and analysts both cater to a similar set of investors. I also find that news is far less likely to get published on Mondays and Fridays.

I next analyze the determinants of readership. To address the selection bias that results from the fact that only published news can be read, I use the Heckman (1979) two step selection procedure. My results show that news wires have a bias to publish stories on very large companies, but readers don't share that bias to the same extent. However, firms with low book-to-market ratios, so-called glamour firms, are more likely to attract readership. Finally, I find that readership doesn't decrease on Fridays, contrary to previous research (DellaVigna and Pollet (2009)).

In the second part of the analysis, I analyze the relationship between stock returns and turnover, and investor attention using weighted Fama and MacBeth (1973) style regressions. To do this, I compare days on which published news goes unread with days where readership is high. The dependent variables here are a measure of daily abnormal turnover and the absolute adjusted stock return. The results show that both these dependent variables show a sharp increase on days when investors pay more attention to news. The average increase in abnormal turnover for the entire sample is 13%, while the average increase in the absolute adjusted stock return is 65 bps. The effect is exacerbated for smaller

firms, especially those in the lowest quintile. I also examine whether attention to a particular type of news is driving the results using Bloomberg's subject-based categorizations. The stories fall into earnings, mergers and acquisitions, analyst, macro, and governance categories. If a story does not fall into any of these categories, I put it into the no-type category. Similar to Chae (2005), I further classify earnings news as expected news, and the remaining categories as unexpected news. Trading volume increases the most when stories on unexpected mergers and acquisitions are read. The increases in returns are, however, largest for the unexpected news category of no-type, which indicates the need for further classification. Overall, the result are consistent with the hypothesis that increase attention to news is correlated with increased returns and trading volume.

In the last part of the analysis, I examine if attention affects short term reversals. I estimate weighted Fama and MacBeth (1973) regressions where the dependent variable is adjusted stock return from days $t+2$ to $t+5$ and the main independent variables are the adjusted stock return on day t and an interaction term between this return variable and an attention variable on day t. I find that there is a sizable reversal defects of 10.7% in my sample. On days when news is published, however, there is a positive effect (drift) in returns reducing reversals by 2.1%. This reduction is mainly driven by analyst and earnings news. However, on days when investors pay abnormal attention to news, the adjusted stock return on day t is much smaller and no longer significant. The coefficient of the interaction variable also increases to 3.5%. The reversal effect is largest for no-type news. Overall the result shows that reversals are reduced or eliminated on days after investors pay attention to news.

The chapter makes contributions to three different literatures. First, as this is the first study to use a direct measure of institutional investor attention, it adds to the attention literature. I show that investors pay attention to larger,

glamour firms and that attention is not reduced on Fridays. I also show that institutional investor attention is correlated with significant increases in stock returns and trading volume. Second, I contribute to the literature on trading volume and show that when news is more informative, as measured by attention levels, it is correlated with an increase in trading volume. I also show that this effect is more pronounced in smaller firms. Previous research has only shown that retail investor attention is linked with an increase in trading volume. Lastly, I contribute to the literature on short-term reversals and show that there is little or no short term reversal after days when investors pay attention to the news.

The rest of the chapter continues as follows. Section 2 consists of a literature review. Section 3 describes the data. Section 4 describes the empirical results and Section 5 concludes.

4.2 Literature review

The analysis in this chapter is related to two different streams of literature. The first stream deals with the relationship between attention and the financial markets. This literature attempts to understand how investors process information, the limits to investor attention, and the impact of attention on the stock markets. The second stream is the literature on news and release of information. There are two parts to this literature. One implicitly assumes that investors incorporate new information and analyze the impact of this new information. The second part does not assume that news is incorporated immediately and uses the delay in incorporation to explain several asset pricing anomalies.

4.2.1 Investor Attention

Attention is a scare cognitive resource and requires effort (Kahneman (1973)). Investors cannot pay attention to all stock-related information given the overwhelming amount of information in the market place. However, standard theoretical asset pricing models have traditionally assumes the immediate incorporation of public information into stock prices. One of the first papers to recognize the constraints to processing information using the rational agent framework is Merton (1987), who suggested that investors actively follow a few stocks and buy and sell those stocks. These investors would thus require a premium to invest in stocks which they do not follow. In contrast to the rational agent framework, behavioral models attempt to show the limitations of investor attention. Peng and Xiong (2006) show that limited investor attention leads them to process more market and sector-wide information than firm-specific information. Hirshleifer and Teoh (2003) employ a different approach and show that even the presentation of informationally equivalent data in different formats can lead to varied stock price reactions, long-run abnormal returns and corporate decisions.

The empirical literature on attention often relies on behavioral explanations. For example, the empirical results in Barber and Odean (2008) show that individual investors are net buyers of attention-grabbing stocks where attention is measured using stocks in the news, stocks experiencing high abnormal trading volume, and stocks with extreme one-day returns. Such a result would not arise in the rational agent framework where investors choose to follow a few stocks regardless of attention grabbing events. Several other papers have examined the effects of attention grabbing events on investor behavior. Gervais et al. (2001) find stock returns are high after stock experience abnormally high trading volume as that is when investors start paying attention to the stock. Grullon et al. (2004) shows that firms with overall visibility, as measured by its advertising expendi-

tures, have a larger number of individual and institutional investors and the stock is more liquid. Seasholes and Wu (2007) show that stocks hitting price limits attracts investor attention which leads to increases in trading volume and increase in prices but subsequent mean reversion.

This empirical literature has used various proxies for investor attention. In contrast to using proxies, using internet searches on Google as a direct measure of retail investor attention, Da, Engelberg, and Gao (2011) shows that an increase in Google's Search Volume Index predicts higher stock prices in the next 2 weeks and an eventual price reversal within the year. Retail investor attention also contributes to the large first-day return and long-run under-performance of IPO stocks. These results provide some evidence on the effects of retail investor attention. However, there has not been similar research on the impact of institutional investor attention. My chapter seeks to fill this gap in the literature.

4.2.2 News and the stock market

The theoretical literature in finance assumes that the release of news should cause investors to update their beliefs about the stock price. However, the link between the release of news and the reasons for trading are not so clear. If all investors had the same levels of information about a stock , the same valuation models, and the same level of risk aversion, prices would change without any trading. There have been two strands of literature which seek to explain the relationship between the arrival of information and an increase in trading. The first strand follows from rational models, where trading occurs between privately informed traders, uninformed traders and liquidity traders. This literature commonly assumes that since prices should change when new information is made available, the reason for trading is due to the information asymmetry among traders before the information was released (Kim and Verrecchia (1991b)). The informed

traders with superior private information in Wang (1994) also suffer a liquidity or endowment shock. Uninformed traders who are risk averse, are willing to trade with these traders because they are informed both by the change in prices and the arrival of news. Based upon this intuition, Tetlock (2010) proposes that stock trading volume and the regression coefficient of post-news returns on news event returns increases in the informativeness in news. In the second strand of research to explain trading volume, Harris and Raviv (1993) eschew the approach of using informed and uninformed trades and posit that trading volume arises from differences in opinion. They assume traders have the same common beliefs and receive common information but differ in the way they interpret this information. They show that absolute price changes and volume are positively correlated, consecutive price changes exhibit negative serial correlation and volume is positively autocorrelated.

Another stream of theoretical literature seeks to explain the persistence and reversal of returns after the initial release of news. These papers generally use the idea that investors underreact or overreact to information the day it was released. Daniel et al. (1998) show that investor over-confidence in strength of private signals can lead to overreaction when there is no release of news. The subsequent release of news can lead to underreaction, because investors are slow to update their beliefs. Barberis et al. (1998) develop a model of investor sentiment where investors display the biases such as representativeness and conservatism leading to underreaction. Hong and Stein (1999) create a model of underreaction, overreaction and momentum trading. They have two types of traders newswatchers and momentum traders, both of whom are boundedly rational and cannot process all available information. Underreaction rises since newswatchers cannot observe information about past prices and this cause information to diffuse slowly. Finally, DellaVigna and Pollet (2009) shows that there is an underreaction to earnings

news announcements on Fridays.

Empirically, there has a been vast amount of research showing that the release of news can have strong effects on both stock returns and trading volume. For the sake of brevity, I mention only the more recent literature. In terms of trading volume, Chae (2005) shows that cumulative trading volume decrease inversely to information asymmetry prior to scheduled earnings announcement, while the opposite relation holds for volume after the announcement. However, trading volume increases before unscheduled announcement such as M&A announcements and bond rating change announcements, and shows little relation to proxies for information asymmetry. Tetlock (2007) shows that pessimism in daily Wall Street Journal column predicts downward pressure on market prices followed by a reversion to fundamentals and unusually high or low pessimism. Tetlock, Saar-Tsechansky, and Macskassy (2008) find that measuring tone using a simple quantitative measure of language can predict individual firms accounting earnings and stock returns. Tetlock (2010) shows that public news increases the willingness of investors without private information to trade and accommodate a persistent liquidity shock. The aforementioned literature assumes that investors read news when it is released. I do not make this assumption and examine whether there is difference in stock market reaction when news is read versus when it not.

Research has also shown that the total stock prices reaction to news may not be immediate. There has been persistence in returns after firms issue both IPO's and share repurchases (Loughran and Ritter (1995); Ikenberry et al. (1995)), earnings news (Chan et al. (1996);Bernard and Thomas (1989)), stock splits (Desai and Jain (1997)), and bond rating changes (Dichev and Piotroski (2001)). The explanation for such persistence in returns has often been based on behavioral explanations like limited attention (Hirshleifer et al. (2009); DellaVigna and Pollet (2009)) and the disposition effect (Grinblatt and Han (2005); Frazzini (2006)). In

this chapter, I examine whether there is persistence or reversal in returns when investors are paying attention to news.

4.3 Data

4.3.1 News data

Bloomberg stores the initial publication of a news story and subsequent modifications to it as individual messages. Each message contains a news headline, time-stamp, several data fields, and story text. One of these data fields indicates whether the story is being initially *published* or is a subsequent *modification*. A typical story has one *published* and multiple *modification* messages as story attributes are frequently modified. Another field contains metadata classifications of the story by *topic*, *company* and *person*. The *company* field contains the Bloomberg firm level ticker, along with a relevance score out of 100. I use this ticker to attribute stories to a firm, but only do so when the relevance score for the firm level ticker is greater than 90, as these stories are most likely to be closely related to the firm. The *topic* field has over 90,000 possible values. These include geographical classification, industry classification, sector classification and so forth.[5] Such tagging ensures that users can filter relevant news. Another use for the *topic* field is information on when readership thresholds are passed. A *modification* message is sent for a news story when the threshold of 1,000 readers is reached and the *topic* field then contains a value of *Read.* When a threshold of 5,000 readers is reached, the topic field will contain a value of *MostRead*. I use the time-stamp of the *published* message to determine the initial time of publish and

[5]News items stream through on a terminal and users can click on any of the news items to read the news article. Alternatively and more typically, users interested in a certain topic create custom windows where news on those *topics* are displayed. So for example, a portfolio manager interested in the oil sector can stream all stories tagged with the OIL *topic* to a custom window.

the time-stamp of the first *modification* message where the *topic* field contains the value *Read* or *MostRead* to determine when the readership threshold was reached. I only classify a news story as *Read* or *MostRead* when the readership threshold is reached within 24 hours. The cutoff of 24 hours is used because this chapter examines the impact of news readership on stock returns and volume on a daily frequency.

While Bloomberg has been publishing news on its terminals for several years, the readership thresholds in the *topic* field have only been implemented after Jan 25, 2011. Hence our sample starts on Jan 26, 2011 and goes up to May 8, 2013. There are total of over 52 million messages in the Bloomberg news database between those days, out of which eight million are *published* messages for stories in English. The rest of the messages are either published messages for stories in other languages or *modification* messages. The publication and readership variables I create are measured on a daily frequency. Several news stories like earnings news are frequently released outside of trading hours making a daily frequency appropriate if the impact of all new stories, and not just those which are released intra-day, are to be analyzed. The daily frequency has also been used in recent papers on news such as Tetlock (2010). A story is attributed to trading day t if it is published between 4 p.m. on the previous trading day *t-1* and 4 p.m. on the trading day t. I use Compustat to determine valid trading days and avoid weekends and holidays.

I use a firm-level indicator variable for the publication and readership variables rather than counting the number of stories released every day. This is because, similar to other newswire services such as Reuters, Bloomberg often breaks up a news release into separate messages where the headlines highlight the key components of a news release. Doing so provides quick and easy visibility for traders. Counting each of these messages can make it seem like there are multiple news

stories in a day, when the multiple messages are in fact part of the same story. In order to avoid overstating the number of published news articles, I create an indicator variable, $newsPub_{it}$, to indicate whether one or more news stories is published about firm i on trading day t.

I also create indicator variables, $newsRead_{it}$ and $newsMostRead_{it}$, to indicate whether one or more news stories for firm i on day t have reached a threshold level of 1,000 or 5,000 readers respectively. Since every new story that passes the 5,000 user threshold will also have been passed the 1,000 user threshold, I set $newsRead_{it}$ to a value of zero if the story reaches the 5,000 user threshold in order to cleanly distinguish the effects of the different levels of readership. I also create an indicator variable,$newsNotRead_{it}$, to indicate when a story is published ($newsPub_{it} = 1$), but no readership thresholds are reached ($newsRead_{it}$=0, $newsMostRead_{it}$=0). The variable $newsPub_{it}$ is a measure of the supply of news while the variables $newsRead_{it}$, $newsMostRead_{it}$, and $newsNotRead_{it}$ are measures for the demand for news and unique features of this data.

Although this database is the first to provide readership statistics of any sort, the methodology of using absolute numbers as readership thresholds is not ideal for firms of different sizes. Large firms routinely hit the threshold of 1,000 readers on an almost daily basis. Apple for example has stories published on it every single day through the sample and hits the 1,000 readership threshold on 99% of days.[6] To address such a problem, I create another readership variable called $newsAbnAtt_{it}$ which measures whether a firm has an abnormal level of attention. The variable is calculated as follows:

$$newsAbnAtt_{it} = I\left\{weightedReadership_{it} > \sum_{j=t-5}^{j=t-1} \frac{weightedReadership_{ij}}{5}\right\}$$

[6]For AAPL stock:$newsRead_{it}$=52% and $newsMostRead_{it}$ =47%

$$weightedReadership_{it} = 5 * \#MostRead_{it} + \#Read_{it}$$

This variable is set to 1 if the weighted readership is greater than the average weighted readership over the last five days. The weighted readership is calculated as number of $MostRead$ stories ($\#MostRead_{it}$) multiplied by 5 plus the number of $Read$ ($\#Read_{it}$) stories that are not $MostRead$ on day t. The reason for using weighted readership based on the number of news stories in addition to using the readership indicator variables,$newsRead_{it}$ and $newsMostRead_{it}$, is that it incorporates additional readership information. Using a coarse indicator variable ignores the potential to distinguish a heavy readership day from a low readership day, specially for large firms which have high levels of readership on a regular basis. Another reason for using $newsAbnAtt_{it}$ is that it can take into account the fact that sometimes a firm may have may have five $Read$ stories, but $newsMostRead_{it}$ will not be set to 1 even though more than 5,000 users have read a story related to the firm. I also create an indicator variable, $newsNoAbnAtt_{it}$, to indicate when one or more stories is published, ($newsPub_{it} = 1$), but there is no abnormal attention ($newsAbnAtt_{it}$ =0).

The *topic* field in each Bloomberg news message also contains information on the category of the story. I create indicator variables for five major categories of news; earnings news ($newsEarnings_{it}$), analyst rating news ($newsAnalyst_{it}$), merger and acquisition news ($newsMNA_{it}$), macro news ($newsMacro_{it}$) and governance news ($newsGov_{it}$). The governance category includes news on corporate governance, executive pay and lawsuits. The macro category includes stories on political risk and macro risk related to the firm. These categories are not mutually exclusive, so a story could belong to two categories such as $newsEarnings_{it}$ and $newsMNA_{it}$. If a story does not fall into any of the five major categories, then I

classify it as no type ($newsNoType_{it}$).

4.3.2 Stock returns, volume and other data

Compustat is used for stock returns and accounting data. I follow standard steps to avoid highly illiquid and extremely small firms. I only include all firms with common shares traded on the NYSE/AMEX/NASDAQ stock exchanges with a stock price of at least one dollar throughout the sample. Compustat does not directly calculate a total return, hence daily returns are calculated after taking into account the total return factor (TRFD) and the adjustment factor (AJEXDI). I calculate $size_{it}$ as the market capitalization at the end of June and calculate book-to-market (bm_{it}) ratio using the book value of equity at the end of the last fiscal year as in Fama and French (1992). I then calculate a three factor adjusted return, $adjRet_{it}$, by matching each stock to one of the six size/book-to-market portfolios from Kenneth French's web site.[7] I also create a measure of past returns, which is the absolute value of the cumulative returns over days $t-5$ to $t-1$, $prevAbsAdjRet_{i,t}$. The standard deviation of $AdjRet_{it}$ over days $t-5$ through to day $t-1$ is used as the idiosyncratic volatility (vol_{it}). I use stock turnover as a measure of daily trading volume because it takes into account the outstanding free float of the stock. Since turnover data is skewed, I use logarithmic turnover, as is common in the literature (Chae (2005), Tetlock (2010)). To measure abnormal turnover, I subtract the turnover on day t from the average of the past 60 days (Campbell et al. (1993)).

$$abnTurnover_{it} = \text{Log}\left(\frac{TradingVolume_{it}}{SharesOutstanding_{it}}\right) - \frac{1}{60}\sum_{i=t-60}^{i=t-1} Log\left(\frac{TradingVolume_{it}}{SharesOutstanding_{iti}}\right)$$

I only include observations when the stock has positive trading volume on all

[7] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data library.html

60 days from $t-60$ to $t-1$. I also include only those firms which have at least one year of data. I calculate liquidity ($illiq_{i,t}$) of the stock as the average value of $10^6 * abs(adjRet_{it})/volume_{it}$ from day $t-5$ to day $t-1$ (Amihud (2002)). I merge this stock return, turnover and accounting data with Bloomberg data by ticker. If a firm has multiple issues, the ticker of the issue which matches the one used by Bloomberg is used. If Bloomberg also has multiple tickers for the same firm, then the one with more stories published against it is used. The filters reduces the sample size to 2,625 firms. In this sample only 11 firms do not have any news published over the entire sample period. This coverage of more than 99% is higher than the 68% coverage in Tetlock (2010), most likely because my sample is newer and news coverage has become more widespread and frequent.

I use I/B/E/S summary files with monthly updates to collect analyst coverage data. I only use the forecasts for the upcoming quarter to compute, $numAnalysts_{it}$ as $log(1 + NumberOfAnalysts)$, and $analystDispersion_{it}$ as $log(1 + stdDevEstimate/meanEstimate)$. The fraction of institutional ownership, $instOwnership_{it}$, is obtained on quarterly frequency from the Thomson Reuters Institutional Holdings (13F) database.

4.3.3 Summary statistics

Table 1 shows average levels of Bloomberg news publication and readership data. Panel A includes all observations on a firm-day level. There are a total of 1.43 million observations in the sample and at least one firm-level story is published on 13.7% of days. Stocks with larger market capitalization are more likely to be owned by institutional investors and hence more likely to have news coverage in Bloomberg. To understand the difference in publication and readership statistics between smaller and larger firms, I break up the sample into quintiles based on daily market capitalization. The publication rate varies from 32.5% for the largest

quintile to 5.4% for the smallest quintile showing that size can make a large impact on the likelihood of publication. The column $newsRead_{it}$ shows that at least one firm-level story is read by at least 1,000 users on 4.1% of days. This changes from 13.8% for the largest quintile to 0.03% for the smallest quintile. The number of stories that are read by at least 5,000 readers, $newsMostRead_{it}$ is small as the average for all observations is just 0.04% and 1.7% for the largest quintile. The $newsAbnAttention_{it}$ column has very similar numbers to $newsRead_{it}$, except for the largest firms, which is because a viewership of 1,000 users is fairly routine for large firms.

To get clarity on the category of news that gets published, the averages in Panel B are based on only those observations where $newsPub_{it} = 1$, i.e., at least one story is published. While earnings news ($newsEarnings_{it}$) make up a higher proportion of published news for small firms at 34.9%, they only make up 20.1% of the stories that are published for large firms. For most of the other categories of news, the proportion of published news increases for larger firms. For example, while analyst news ($newsAnalyst_{it}$) makes up 10.3% of stories for the smallest quintile, they make up almost 22.4% of the stories for the largest quintile. This result is intuitive since larger firms have higher levels of analyst coverage. Similarly, 8.1% of all stories are merger and acquisition stories ($newsMNA_{it}$) for the smallest quintile, while 17.8% of all stories are merger and acquisition stories for the largest quintile. The proportion of news on governance ($newsGovernance_{it}$) does not increase with size. While 31.9% of news for the largest quintile is related to governance, the proportion is in a narrow range of 11.8% to 15.4% for firms in the first four quintiles. The result shows that larger firms are much more likely to get news coverage for corporate governance. News which could not be classified makes up a fairly large proportion of approximately 40% perhaps suggesting the need for further classification.

To understand which news stories attract higher levels of readership, the averages in Panel C are based on only those observations where $newsAbnAtt_{it} = 1$, i.e., the days when the firm has a higher level of readership than the average readership over the previous five days. At least one news story with a readership of 1,000 is the driver for abnormal attention on 96.3% of days for the smallest quintile of firms, while it is the driver of abnormal attention for 87.0% for the largest firms. At least one news story with a readership of 5,000 readers is the driver for abnormal attention on 3.7% of days for the smallest quintile, while it is the driver of abnormal attention on 13.0% of days for the largest quintile. This result shows that the $newsAbnAtt_{it}$ variable is successful in distinguishing between attention towards smaller and larger firms using an absolute level of readership. Next, I compare the categories of stories which attract abnormal levels of attention. Somewhat surprisingly, corporate governance new stories attract the highest level of attention. This is especially surprising for firms which are not in the largest quintile, because although governance news constitutes about 11.8%-15.4% of news that is published, it makes up between 22.8% and 30.9% of news that attracts abnormal attention. Attention is fairly evenly attracted by firms of all quintile for other categories of news stories relative to the proportion of news that is published, except for earnings news. Even though earnings news constitutes a smaller proportion of news stories for the largest quintile relative to the smallest quintile, it attracts a higher level of attention for the largest quintile of firms.

4.4 Empirical results

The empirical results consist of three parts. In the first part, I examine what firm and news characteristics drive attention towards particular news stories. In

the second part, the effect of abnormal attention on stock returns and trading volume are examined. In the last part, I examine how attention affects short term reversals in stock returns.

4.4.1 Determinants of institutional investor attention

In this section, I examine the determinants of daily publication and readership of news stories. The control variables are similar to those used in Fang and Peress (2009) who examine the annual determinants of media coverage in mass media outlets such as newspapers. I control for size of the firm since larger firms have more shareholders, more analyst coverage and are generally more visible. In addition to controlling for size, I also control for size-squared to determine if there is a non-linear effect and extremely large firms attract disproportionate amounts of news attention. A high book-to-market ratio is often used as a proxy for 'value' firms, and a low book-to-market ratio is used a proxy for 'glamour' firms. I control for the book-to-market ratio to see if the news readership behavior is different for value vs. glamour firms. Research analysts are a major provider of information on stocks for institutional investors and so I include a variable for the number of analysts to determine if news publication/readership is a complement or substitute to analyst coverage. To determine whether heterogeneity in opinions is crucial in driving more coverage and more readership, I include a variable for analyst dispersion (Diether et al. (2002)). I also control for stock returns and volatility over the previous week as market activity has been shown to attract retail investor attention (Barber and Odean (2008)). The proportion of stock held by institutional investors in previous quarter is also included as a control variable.[8]

I also include indicator variables for day-of-the-week and the category of the

[8]In unattached results, I include Fama-French 48 industry fixed effects, but find that including them does not change the results

story. The reason for including day-of-the-week variable is that firms often time the release of unfavorable news such as weak earnings news and dividend reductions on Friday (Penman (1987); Damodaran (1989)). DellaVigna and Pollet (2009) also show that the post-earnings-announcement-drift is stronger on Fridays because there is smaller market reaction to earning news on Friday. The authors interpret this as a sign that investors pay less attention to a release of news on Fridays. A variable to indicate the category of news is included as certain categories of expected news releases such as earnings, have been shown to have different effects from unexpected news releases like acquisition announcements and bond rating changes (Chae (2005)).

The dependent variable in regression 1 in Table 2 is $newsPub_{it}$, an indicator variable which takes the value 1 when one or more stories is published on day t for firm i. The regression uses the probit model and the standard errors are clustered by firm. The size-squared variable is highly positively significant at the 1% level showing that extremely large firms are more likely to be written about and confirming that there is a non-linear relationship between firm size and news coverage. Somewhat surprisingly, the coefficient for bm_{it} is highly positive significant showing that value firms, i.e., firms with high book to market ratios, are more likely to have higher news coverage. The coefficient for analyst coverage is highly significant at the 1% level showing that analyst coverage is a complement to news coverage. The coefficients for both stock activity variables, $vol_{i,t}$ and $prevAbsAdjRet_{i,t}$, are highly positively significant at the 1% level showing that stock with high absolute returns and high volatility are more likely to attract news coverage. Fang and Peress (2009) show that individual ownership is positively related with higher coverage in in daily national newspapers like the New York Times and USA Today. One might expect the opposite relationship in Bloomberg news data since it is primarily used by institutional investors, but I find there is

no relationship. The regression also shows that far fewer stories are published on a Friday and Mondays as the coefficients are highly negatively significant at the 1% level. I do not include variables indicating the category of the news story in this regression because a positive value for a news category is perfectly correlated with a positive value for the $newsPub_{it}$ variable.

In regressions 2-4, I examine the determinants of readership. The econometric issue with examining readership is that only those stories that are published can get read. To address this selection bias, I use the Heckman (1979) two step selection procedure. The procedure first estimates a probit regression using the selection variable as the dependent variable and then uses the transformed probability of the selection variable in the second stage. In this case, the selection variable is $newsPub_{it}$ and the first stage yields similar results to regression 1. The results of the second stage are shown in regressions 2-4. This procedure ensures that the determinants of readership are being examined conditional on news being published. In regression 2, the dependent variable, $newsRead_{it}$, takes a value of 1 when one or more stories are read by at least 1,000 users, but less than 5,000 users for firm i on day t. After controlling for selection bias, the relationship between the $newsRead_{it}$ and size still shows that larger firms attract more attention, but the result is not skewed towards larger firms. The coefficient for book-to-market however changes sign, and confirms the intuition that glamour firms attract more attention, even though more articles are published for high book-to-value firms. The coefficient for the number of analysts forecasting quarterly earnings is still highly significant, which shows that firms with are popular with institutional investors and consequently likely to have more analyst coverage, are more likely to have attract attention to news. The regression result also shows that the coefficient for Friday is close to zero and not significant. Contrary to previous research (DellaVigna and Pollet (2009)), which uses proxies to show

that investors pay less attention on Friday, the result shows that investors are not less likely to pay attention to news on Fridays. News on mergers and acquisitions attracts the most level of attention, while other categories of classified news attracts about the same level of attention. The news which do not fall into one of the major news categories, i.e., the unclassified category, attracts the least amount of attention.

In regression 3, the dependent variable, $newsMostRead_{it}$, takes a value of 1 when one or more stories are read by at least 5,000 users for firm i on day t. The results for this regression are different from regression 2 where the $newsRead_{it}$ variable was the dependent variable. Instead the results in regression 3 are similar to the result in regression 1, where $newsPub_{it}$ is the dependent variable. One possible explanation of such similarity is that only extremely large firms can reach the 5,000 user threshold and the results are being driven by these extremely large firms. This is apparent from the results in the summary table where firms in the first four quintiles have close to zero-percent averages for the $newsMostRead_{it}$ variable. Given that this result does not seem to be representative of a large sample, I use the results from $newsRead_{it}$ regressions in my discussion. In regression 4, the dependent variable, $newsAbnAtt_{it}$ captures an abnormal level of attention to firm-level news. For smaller firms, this measure is analogous to $newsRead_{it}$ since smaller firms have fewer people reading about them and also have less frequent news coverage. But for larger firms, $newsAbnAtt_{it}$ should more accurately capture attention since large firms are frequently read about on almost daily basis. The relationship between size, book-to-market, Friday, the category of news, and abnormal attention is similar to the relationship between these variables and $newsRead_{it}$. However, the coefficient for stock activity variables are in the opposite direction. This means that these firms were probably not in the news over the last five days since they did not have abnormal levels of stock activity. This result

is reasonable given that abnormal attention measure is based on higher levels of attention than the average over the last five days.

4.4.2 Institutional investor attention and stock volume and returns

In this section, I examine the impact of attention to news on abnormal turnover and absolute adjusted returns. The impact of news on stock returns and volume has been well documented in the literature.[9] However, due to lack of data there is little evidence on how news readership alters these variables. To distinguish between these two effects, i.e., publication and readership, I primarily use $newsNoAbnAtt_{it}$ and $newsAbnAtt_{it}$ as the explanatory variables.

4.4.2.1 Univariate tests

Table 3 contains the average value of daily abnormal turnover and absolute adjusted returns for different readership categories and different size quintiles. Panel A shows the mean values of abnormal turnover. Abnormal turnover is the difference between the logarithmic turnover on day t and its average over days$t-60$ to $t-i$ for company i. The first column shows that abnormal turnover is negative and close to zero when there is no news. There is a large jump in turnover when news is released. When the news is not read, the average increase of approximately 25% which is seen in the ($newsNotRead$) column, is driven primarily by smaller firms as the largest quintile of firms only has a 4% increase in abnormal turnover when news is not read. There are at least two explanations for the distinct effects of readership across the size of firms. First, even a few readers can have a big trading impact for a small firm because of relatively small market capitalization. Second, larger companies have lower levels of information asymmetry, higher levels of news

[9]See Chae (2005) for a detailed literature review

and analyst coverage, and higher levels of regular readership. Thus, news that is not read is probably an indicator that the news is not very informative and hence we see only a small increase in turnover.

As the readership level increases, there is a corresponding increase in abnormal turnover. While a readership of 1,000 readers increases the average level of turnover to approximately 31%, the increase is 111% for the smallest quintile and 15% for the largest quintile. The increase is even greater for a readership of 5,000 readers. The average increase in turnover is 35% for all firms, while the increase is 128% for the smallest quintile and 25% for the largest firms, which is a significant effect. The abnormal turnover when there is an abnormal level of attention to news is similar to the abnormal turnover when firms have a readership of 1,000 users for smaller firms. For larger firms, who need readership greater than a readership of 1,000 users to cross into the abnormal threshold, the effect of abnormal attention on turnover is much larger than the effect of readership by 1,000 users.

Panel B shows the mean values of absolute adjusted returns. Absolute adjusted return is the absolute value of the adjusted return ($adjRet_{it}$) as previously defined. A similar pattern is seen in the absolute adjusted returns as was seen in abnormal turnover. There is an increase in absolute adjusted return as readership increases and the increase is specially pronounced for smaller firms. Considering the column which examines the average return when news attracts abnormal attention, there is an increase in the return of 5.7% for the smallest quintile of firms, while the increase for the largest quintile is 0.57%. This result shows the significant effect that abnormal attention can have on returns.

4.4.2.2 Multivariate tests

In this section, I estimate regressions where the dependent variables are the abnormal turnover and absolute adjusted return.

$$abnTurnover_{it} = Intercept + \beta_1 * [AttType]_{it} + \beta_2 * X_{it} \tag{4.1}$$

$$absAdjRet_{it} = Intercept + \beta_1 * [AttType]_{it} + \beta_2 * X_{it} \tag{4.2}$$

The regressions are estimated for every day in the sample and then the average of the coefficients is taken over the sample time period in the spirit of Fama and MacBeth (1973). However, rather than taking the simple average of the coefficients, I weight the coefficients by the inverse of their daily variance as this makes the estimation more efficient (Ferson and Harvey (1999)). To address concerns regarding auto-correlation, I use the Newey and West (1987) correction for 5 lags. This approach is similar to Tetlock (2010). In the regressions, $[AttType]_{it}$ refers to an indicator variable which can either be $newsAbnAtt_{it}$ or $newsNoAbnAtt_{it}$ depending on the regression. I compare $newsAbnAtt_{it}$ against $newsNoAbnAtt_{it}$ to distinguish the effect of attention to news against the effect of no attention to news. I use this notation to simplify the presentation of data in the regression results. The main coefficient of interest, β_1, indicates the change in abnormal turnover or absolute adjusted returns when investors give a higher level of attention to a firm. Instead of using the absolute levels of readership, I use the abnormal levels of attention as the main independent variable in this section. The reason for doing so is that abnormal attention more accurately captures irregular attention for larger companies. However, the results using $newsRead_{it}$ as an independent variable are fairly similar. The results using $newsMostRead_{it}$ are not reliable because there are very few instances when small firms have readership of 5000 users.

The control variables in the vector, X_{it}, are firm-level variables based on previous literature on the determinants of trading volume, especially in the context

of news (Chordia et al. (2007); Tetlock (2011)). I include a variable for the cumulative absolute adjusted return over the previous five days, $prevAbsAdjRet_{it}$, because portfolio re-balancing by liquidity traders may be driven by past returns (Hong and Stein (1999); Hirshleifer et al. (2006)). Idiosyncratic volatility, vol_{it}, is included because it has been shown to be an important driver of stock returns (Ang et al. (2006)). The liquidity of a stock may play a role in the incorporation of information (Tetlock (2010)) and hence it is included. I also control for market capitalization as size has often been used as a proxy for asymmetric information (Chae (2005)).

Table 4 shows the results for regressions where the abnormal turnover is the dependent variable. In regressions 1 and 2, the main independent variable, $AttType_{it}$ is $newsNoAbnAtt_{it}$. In regression 1, the coefficient for $newsNoAbnAtt_{it}$ is 0.20 and is significant at the 1% level, showing that even when users don't pay abnormal attention to news stories, the publication of news can lead to an increase of 20% in abnormal turnover on average for all stocks. In regressions 3 and 4, the main independent variable, $AttType_{it}$ is $newsAbnAtt_{it}$. In regression 3, the coefficient for $newsNoAbnAtt_{it}$ is 0.33 and is significant at the 1% level. This result shows that attention can lead lead to an increase of almost 13% in abnormal turnover relative to when news is not read. Several of the control variables such as illiquidity, volatility and return over the previous are highly significant in explaining abnormal turnover, but the results from the univariate tests carry through to the multivariate tests.

In regressions 2 and 4, I include indicator variables specifying the category of the news story to determine if specific categories are driving the increase in abnormal turnover. In addition, I include interaction variables between the category of news and the level of attention. To estimate the impact of news when users do not give it attention, I add the coefficient for the indicator variable, for example,

$newsAnalyst_{it}$ and the interaction variable, $newsAnalyst_{it} * newsNoAbnAtt_{it}$. Similarly, to determine the impact of news when users give it attention, I add the coefficient for the indicator variable, for example, $newsAnalyst_{it}$ and the interaction variable, $newsAnalyst_{it} * newsAbnAtt_{it}$. Continuing with the example of analyst news, the total coefficient for analyst news is 0.253 (0.301-0.048=0.253) when the story received attention, whereas the coefficient is 0.308 when the news did not receive attention, showing that attention to analyst news increases abnormal turnover by approximately 5%. Similar analysis shows that there is an increase of approximately 0% for earnings news, 2% for governance news, 14.2% for merger and acquisition news, 2.5% for macro news and 13% for news which is not categorized. The result shows that increased attention to earning news is not related with an increase in abnormal turnover. There are a few possible explanations for this result. Users on a Bloomberg terminal can view the important components of the earnings result in the headlines and may not click on the headline. Another possibility is that since earnings news is widely disseminated in the media, users may get earnings news from another source. The big increase in abnormal turnover seems to come from merger and acquisition, analyst and unclassified news. These categories could possibly be considered as unexpected news. Attention to such unexpected news could be an indicator of informativeness of the news and hence the result is fairly intuitive. The result also agrees with previous literature which have documented similar results in the context of publication of news (Chae (2005)).

Table 5 shows the results for regressions where absolute abnormal returns are the dependent variables in all regressions. The results are very similar to the regressions on abnormal turnover. In regressions 1 and 3, which include control variables, but not include the story category, attention increases absolute return by 90 bps. This result shows the large impact that news attention has on stock

returns. When the story category is included, an increase in attention only has a strong impact on certain news categories. The increase is 80 bps for unclassified news while it is 70 bps for analyst and merger and acquisition news, while is 40 bps for earnings news and there is almost no change for macro and governance news. The result again shows that attention to unexpected news is driving a steep increase in returns. However, there is also a significant increase for returns when earnings news is released. This provides evidence for the hypothesis that in the case of earnings news events, institutional investor attention is not the main driver behind volume, however institutional investor attention does seem to affect returns.

4.4.3 Institutional investor attention and stock reversals

In this section, I examine the effect of abnormal attention on short term reversals in stock returns. I look at reversal over a one week period as that horizon has been used in many previous studies (Jegadeesh (1990), Tetlock (2011)). I estimate regressions where the dependent variable is the adjusted return from day $t+2$ to day $t+5$. I skip day $t+1$ to avoid bid-ask bounce. [10]

$$\begin{aligned} adjRet_{i,t+2,t+5} &= Intercept + \beta_1 * adjRet_{i,t} + \beta_2 * adjRet_{i,t} * [AttType]_{i,t} \\ &\quad + \beta_3 * [AttType]_{i,t} + \beta_4 * X \end{aligned} \tag{4.3}$$

The estimation approach is similar to the previous regressions involving abnormal turnover and absolute adjusted returns, i.e., I estimate coefficients using weighted average of a daily cross-sectional regression in the spirit of Fama and MacBeth (1973). I include a variable for the return on day t as an independent

[10] In unattached results I find that using $t+1$ to $t+5$ gives similar results

variable, $adjRet_{it}$, since the coefficient for this variable is the primary indicator of whether there is auto-correlation and reversal in returns. Since I am interested in examining whether attention to news can impact short term reversals, I include an interaction term, $adjRet_{it} * [AttType]_{it}$, which is the main independent variable in the regression. The control variables are again similar to the regressions involving abnormal turnover and absolute adjusted returns. In addition, I control for abnormal turnover since it has been shown to predict future returns (Gervais et al. (2001)). Previous research has also shown that reversals are more pronounced in stocks for smaller companies, hence I include an interaction term $adjRet_{it} * [AttType]_{it}$ to control for the size effect (Conrad et al. (1994)).

The results examining short term reversals are in Table 6. Regressions 1-2 examine the case where news is published but it does not receive attention, i.e., $[AttType_{it}]$ is equal to $newsNoAbnAtt_{it}$. Regressions 3-4 examine the case where news is published and it receives attention, i.e., $[AttType_{it}]$ is equal to $newsAbnAtt_{it}$. In regression 1, the coefficient for $adjRet_t$ is -10.7% which means that on average the future return $adjRet_{t+2,t+5}$ is -10.4% of the day t return, $adjRet_t$. The coefficient is significant at the 5% level and provides some evidence that there is short term reversal in returns. The interaction variable between attention and adjusted returns is positive and significant at the 1% level, indicating that the reversal is reduced by 2.1% of the return on $adjRet_t$ when news is published but does not receive abnormal attention. In regression 3, the coefficient for $adjRet_t$ is -7.5% but it is not significant. The coefficient for the interaction term is positive and has a magnitude of 3.6% indicating a higher reduction in reversal than when news does not attract attention. The lack of significance on the $adjRet_t$ variable and the reduction are indicative of the fact that there is evidence of little or no reversal when news attracts attention.

In regressions 2 and 4, instead of using one variable for all categories of news,

I use separate indicator variables for the category of news, in order to ascertain if particular type of news reduce short term reversal. I include interaction terms between the category of news, $[AttType]_t$ and $adjRet_t$. In addition, I include indicator variables for the type of news, and interaction terms between $[AttType]_t$ and the news type, although both these set of variables have little effect on the result. In regression 2 where the $[AttType]_t$ is equal to $newsNoAbnAtt_{it}$, the reduction in reversal comes mainly from analyst and earnings news. In regression 4 where the $[AttType]_t$ is equal to $newsAbnAtt_{it}$, the reduction in reversal comes mainly from unclassified news, although the coefficient for merger and acquisition news is -2.9% , which has a t-statistic of -1.64. The coefficient for unclassified news at -6.5% is greater than the coefficient for any other type of news. Similar to the result on adjusted returns, this result shows that attention to unexpected news can lead to an increase in not only turnover and returns but also a persistence/reduction in short term reversal.

4.5 Conclusion

Bloomberg terminals are one of the primary source of information for traders and investment analysts working in large financial firms. In this chapter, I create a direct measure of institutional investor attention by using a database with readership statistics of news stories from these terminals. I use daily firm-level readership indicator variables to examine the determinants of institutional investor attention and also its effects on stock returns and trading volume.

Consistent with the hypothesis that investor attention measures the informativeness of news, I find that there is a sharp increase in abnormal trading volume and absolute adjusted stock returns on days when investors pay attention to news. This result is specially strong for smaller firms. Unexpected news such

as merger and acquisition news and no-type news are the primary drivers behind the increase in trading volume and returns. I also find the short term reversal is sharply reduced when investors pay attention to news.

There is significant scope for additional research using the Bloomberg readership database. One potential project entails examining the effect of institutional investor on longer term momentum anomalies. Another potential project is delving further into the determinants of attention and addressing questions such as: Do negative news attract a higher level of attention? Is institutional investor attention towards firms reduced on days when there is important macroeconomic news or when there are significant political events? I plan to address these questions in future research.

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APPENDIX A

Bloomberg news data format

- storyID: unique ID for each story.
- storyAction: Defines pass of the story. ADD_1STPASS is just headline and coding and is not used. ADD_STORY contains the full story and classification. UPDATE_ATTRIBUTE is an updates to existing stories.
- storyWireCode: Defines the Bloomberg source. Possible values are the main English-based Bloomberg bureau, investor teleconference, Bloomberg TV, regional Bloomberg bureau.
- storyLanguage: Possible values are English, Japanese, Chinese_Simp, Chines_Trad, German, Korean, Russian, Spanish and Portuguese.
- storyVersionType: Either ORIGINAL (first instance in a story group) or UPDATE(subsequent stories in a story group)
- storyGroupIdentifier: When similar stories are grouped together. All updates to a story (for market data updates/corrections) will have a new storyId but the same storyGroupIdentifier.
- storyMetadataType: Possible values are COMPANY/PERSON/TOPIC.
- storyMetadataValue: A text array with strings contain the corresponding value of metadata.
- storyMetadataRelevance: "Aboutness" code score [1-100] for the given classification tags.

APPENDIX B
Variable Description

Variable	Description	Source
$newsPub_{it}$	The variable takes a value of 1 when one or more news story is published.	Bloomberg
$newsRead_{it}$	The variable takes a value of 1 when one or more news story is read by at least 1,000 users but less than 5,00 users	Bloomberg
$newsMostRead_{it}$	The variable takes a value of 1 when one or more news story is read by at least 5,000 users.	Bloomberg
$newsNotRead_{it}$	The variable takes a value of 1 when one or more news story is published but none of the stories are not read by at least 1000 users.	Bloomberg
$newsAbnAtt_{it}$	The takes a value of 1 when the weighted readership score on day t is greater than the average weighted readership score calculated from days $t-1$ to day $t-5$. The weighted readership score is calculate as 5 times the number of stories read by at least 5,000 users + number of stories read by more than 1,000 users but less than 5,000 users.	Bloomberg
$newsNoAbnAtt_{it}$	The variable takes a value of 1 when one or more news story is published by the the $newsAbnAtt_{it}$ variable is equal to zero.	Bloomberg
$newsAnalyst_{it}$, $newsEarnings_{it}$, $newsGov_{it}$,$newsMNA_{it}$, $newsMacro_{it}$, $newsNoType_{it}$	The indicator variables take the value of 1 when news on analysts, earnings, governance, mergers and acquisitions, macroeconomic and news not belonging to any of these categories is published respectively.	
$size_{it}$	Calculated as the market capitalization at the end of June for the upcoming year as in Fama and French (1992)	Compustat
bm_{it}	Calculated using the book value of equity at the end of the last fiscal year in the prior calendar year divided by the market value of equity at the end of December of the prior year as in Fama and French (1992).	Compustat
$adjRet_{it}$	Stock return minus 1 of 6 size-B/M matched portfolios from Kenneth French Website	Compustat
$analystDispersion_{it}$	The variable is the log (1+(std deviation/mean)) of the analyst estimates of quarterly earnings for the upcoming quarter.	Compustat
$numAnalysts_{it}$	The variable is the log (1+(count)) of the analyst estimates of quarterly earnings for the upcoming quarter.	Compustat
vol_{it}	is the volatility of Fama-French three factor model adjusted returns over day $t-5$ to day $t-1$.	Compustat
$prevAdjRet_{it}$	The variable is the cumulative Fama-French three factor model adjusted returns over day $t-5$ to day t-1.	Compustat
$instOwnership_{it}$	The variable is the percentage of stock owned by institutional investors.	Compustat

TABLE 1 Publication and Readership by Size

This table shows the mean of daily publication and readership statistics at the firm level on the Bloomberg terminal. The sample includes 2,625 firms and goes from Jan 2011 to May 2013. The row *All* includes all observations. The rows labeled *Size n* consists of observations in the n^{th} quintile. The quintiles are calculated daily using the logarithm of the market capitalization as the size variable.

Panel A : All observations

	Num Obs	$newsPub_{it}$	$newsRead_{it}$	$newsMostRead_{it}$	$newsNotRead_{it}$	$newsNoAbnAtt_{it}$	$newsAbnAtt_{it}$
All	1,430,078	0.137	0.041	0.004	0.092	0.101	0.036
Size 1	286,246	0.054	0.003	0.000	0.051	0.051	0.003
Size 2	286,033	0.071	0.008	0.000	0.062	0.062	0.008
Size 3	285,997	0.097	0.018	0.001	0.077	0.078	0.018
Size 4	286,033	0.139	0.035	0.002	0.102	0.105	0.034
Size 5	285,769	0.325	0.138	0.017	0.169	0.207	0.117

Panel B : $newsPub_{it} = 1$

		$newsRead_{it}$	$newsMostRead_{it}$	$newsAbnAtt_{it}$	$newsNoType_{it}$	$newsEarnings_{it}$	$newsMNA_{it}$	$newsAnalyst_{it}$	$newsMacro_{it}$	$newsGov_{it}$
All	196,006	0.296	0.030	0.262	0.379	0.230	0.144	0.214	0.144	0.224
Size 1	15,526	0.061	0.002	0.061	0.402	0.349	0.081	0.103	0.038	0.129
Size 2	20,260	0.116	0.003	0.115	0.391	0.298	0.102	0.181	0.057	0.118
Size 3	27,624	0.189	0.010	0.187	0.383	0.247	0.116	0.229	0.072	0.135
Size 4	39,828	0.253	0.013	0.240	0.406	0.206	0.132	0.239	0.093	0.154
Size 5	92,768	0.425	0.054	0.360	0.361	0.201	0.178	0.224	0.223	0.319

Panel C :$newsAbnAtt_{it} = 1$

		$newsRead_{it}$	$newsMostRead_{it}$	$newsNoType_{it}$	$newsEarnings_{it}$	$newsMNA_{it}$	$newsAnalyst_{it}$	$newsMacro_{it}$	$newsGov_{it}$
All	51,030	0.899	0.101	0.240	0.284	0.245	0.293	0.271	0.368
Size 1	938	0.963	0.037	0.257	0.212	0.242	0.275	0.151	0.309
Size 2	2,305	0.974	0.026	0.262	0.237	0.223	0.329	0.179	0.228
Size 3	5,126	0.947	0.053	0.262	0.238	0.221	0.309	0.182	0.246
Size 4	9,517	0.948	0.052	0.274	0.264	0.225	0.299	0.186	0.259
Size 5	33,144	0.870	0.130	0.224	0.302	0.257	0.287	0.320	0.430

TABLE 2 Determinants of readership (Firm Characteristics)

This table examines the determinants of daily readership of firm-level Bloomberg news stories. The sample includes 2,625 firms and goes from Jan 2011 to May 2013. The dependent variables are indicator variables signifying publications and readership of news articles. All variables are defined in the Appendix. Regression 1 is a probit regression where the standard errors are clustered by firm. Regression 2-4 show the results of the second stage of a two stage Heckman selection model, where the results of the first stage are shown in Regression 1. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis.

	(1) $newsPub_{it}$	(2) $newsRead_{it}$	(3) $newsMostRead_{it}$	(4) $newsAbnAttention_{it}$
$size_{it}$	-1.517***	0.167***	-0.359***	0.955***
	(-12.06)	(6.56)	(-22.43)	(24.89)
$size_{it}$*$size_{it}$	0.042***	-0.004***	0.010***	-0.026***
	(14.00)	(-4.92)	(22.71)	(-23.55)
bm_{it}	0.334***	-0.039***	0.118***	-0.256***
	(8.63)	(-4.02)	(20.61)	(-18.56)
$analystDispersion_{it}$	0.054**	0.006	0.021***	-0.041***
	(2.33)	(1.17)	(7.78)	(-6.20)
$numAnalysts_{it}$	0.117***	0.038***	0.040***	-0.035***
	(6.97)	(9.39)	(16.69)	(-5.98)
$vol_{i,t-1,t-5}$	5.363***	1.147***	1.825***	-3.100***
	(21.68)	(6.95)	(18.42)	(-13.03)
$prevAdjRet_{i,t-1,t-5}$	0.879***	0.024	0.297***	-0.568***
	(12.96)	(0.55)	(11.30)	(-9.01)
$instOwnership_{it}$	-0.009	-0.010*	-0.010***	0.011
	(-0.30)	(-1.87)	(-3.45)	(1.51)
$monday$	-0.102***	0.021***	-0.030***	0.066***
	(-15.88)	(4.89)	(-11.75)	(10.72)
$tuesday$	-0.018***	0.017***	-0.005**	0.024***
	(-3.02)	(5.04)	(-2.28)	(4.94)
$thursday$	0.013**	-0.006*	-0.000	-0.014***
	(2.00)	(-1.76)	(-0.10)	(-3.03)
$friday$	-0.116***	-0.001	-0.037***	0.048***
	(-17.00)	(-0.25)	(-13.65)	(7.46)
$newsEarnings_{it}$		0.134***	0.057***	0.122***
		(45.59)	(41.38)	(36.64)
$newsMNA_{it}$		0.210***	0.071***	0.170***
		(63.77)	(44.52)	(44.58)
$newsAnalyst_{it}$		0.130***	0.050***	0.125***
		(43.36)	(34.53)	(36.37)
$newsGov_{it}$		0.140***	0.058***	0.102***
		(56.83)	(46.94)	(34.07)
$newsMacro_{it}$		0.116***	0.030***	0.110***
		(46.49)	(23.57)	(35.81)
$newsNoType_{it}$		0.035***	0.055***	0.036***
		(10.75)	(34.89)	(9.55)
mills lambda		-0.244***	0.369***	-0.887***
		(-7.40)	(19.06)	(-19.06)
Observations	1025891	1025891	1025891	1025891

TABLE 3 Volume and Absolute Return Summary Table

This table shows the mean of daily abnormal turnover and absolute adjusted return at the firm level on the Bloomberg terminal. The sample includes 2,625 firms and goes from Jan 2011 to May 2013. Abnormal turnover is the difference between log turnover on day i and average of log turnover over days$t-1$ to $t-60$ for company i. Absolute adjusted return is the absolute value of the difference in stock return on day i and a matched portfolio from one of six B/M portfolios. The row *All* includes all observations. The rows labeled *Size n* consists of observations in the n^{th} quintile. The quintiles are calculated daily using the logarithm of the market capitalization as the size variable.

Panel A: Abnormal Turnover

	No News	News Published ($newsPub_{it}=1$)				
	$newsPub_{it}=0$	$newsNotRead_{it}=1$	$newsRead_{it}=1$	$newsMostRead_{it}=1$	$newsAbnAtt_{it}=0$	$newsAbnAtt_{it}=1$
ALL	-0.0376	0.2240	0.2891	0.3520	0.2120	0.3413
Size 1	-0.0443	0.4584	1.1083	1.2848	0.4592	1.1135
Size 2	-0.0236	0.3894	0.8174	1.1874	0.3911	0.8211
Size 3	-0.0322	0.3370	0.5945	0.8143	0.3391	0.6092
Size 4	-0.0391	0.2245	0.4660	0.9304	0.2284	0.4975
Size 5	-0.0529	0.0404	0.1525	0.2503	0.0410	0.2000

Panel B: Adjusted Returns

	No News	News Published ($newsPub_{it}=1$)				
	$newsPub_{it}=0$	$newsNotRead_{it}=1$	$newsRead_{it}=1$	$newsMostRead_{it}=1$	$newsAbnAtt_{it}=0$	$newsAbnAtt_{it}=1$
ALL	0.0130‘	0.0188	0.0220	0.0243	0.0182	0.0247
Size 1	0.0180	0.0350	0.0916	0.0620	0.0350	0.0921
Size 2	0.0143	0.0290	0.0585	0.0892	0.0290	0.0605
Size 3	0.0121	0.0234	0.0410	0.0635	0.0235	0.0432
Size 4	0.0102	0.0163	0.0299	0.0568	0.0164	0.0322
Size 5	0.0088	0.0099	0.0139	0.0180	0.0100	0.0157

TABLE 4 Impact of attention on abnormal turnover (Firm Characteristics)

This table examines the determinants of daily readership of firm-level Bloomberg news stories. The sample includes 2,625 firms and goes from Jan 2011 to May 2013. The dependent variable in all regressions is the abnormal turnover which is the difference between log turnover on day i and average of log turnover over days$t-1$ to $t-60$ for company i. All models use weighted Fama and MacBeth (1973) regression. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis.

	$AttType = newsNoAbnAtt_{it}$		$AttType = newsAbnAtt_{it}$	
	(1)	(2)	(3)	(4)
	$AbnTurnover_{it}$	$AbnTurnover_{it}$	$AbnTurnover_{it}$	$AbnTurnover_{it}$
[AttType]	0.200***		0.330***	
	(25.34)		(32.31)	
$illiq_{i,t-1,t-5}$	-0.557***	-0.574***	-0.563***	-0.570***
	(-27.21)	(-28.37)	(-27.75)	(-28.30)
$mktCap_{i,t-1}$	-0.005*	-0.013***	-0.007***	-0.013***
	(-1.95)	(-5.15)	(-2.89)	(-5.15)
$prevAdjRet_{i,t-1,t-5}$	2.277***	2.262***	2.264***	2.249***
	(28.08)	(28.46)	(28.10)	(28.52)
$vol_{i,t-1,t-5}$	2.309***	2.104***	2.267***	2.087***
	(17.40)	(16.65)	(17.13)	(16.57)
$newsAnalyst_{it}$		0.301***		0.260***
		(29.86)		(35.54)
$newsEarnings_{it}$		0.461***		0.534***
		(27.62)		(37.94)
$newsGov_{it}$		0.008		0.001
		(1.25)		(0.21)
$newsMNA_{it}$		0.203***		0.066***
		(16.70)		(10.16)
$newsMacro_{it}$		0.028***		-0.003
		(5.86)		(-0.75)
$newsNoType_{it}$		0.209***		0.096***
		(20.27)		(30.83)
$newsAnalyst_{it}$*[AttType]		-0.048***		0.048***
		(-4.27)		(4.27)
$newsEarnings_{it}$*[AttType]		0.038***		-0.038***
		(2.90)		(-2.89)
$newsGov_{it}$*[AttType]		-0.009		0.009
		(-1.35)		(1.30)
$newsMNA_{it}$*[AttType]		-0.139***		0.140***
		(-12.66)		(12.71)
$newsMacro_{it}$*[AttType]		-0.031***		0.031***
		(-5.18)		(5.18)
$newsNoType_{it}$*[AttType]		-0.121***		0.121***
		(-13.68)		(13.72)
Intercept	-0.014	0.142***	0.043	0.144***
	(-0.29)	(2.82)	(0.86)	(2.86)
Num Obs	1395682	1395682	1386106	1386106
ADJRSQ	0.089***	0.122***	0.088***	0.122***
	(39.76)	(35.85)	(47.70)	(35.73)

TABLE 5 Impact of attention on absolute abnormal returns

This table examines the determinants of daily readership of firm-level Bloomberg news stories. The sample includes 2,625 firms and goes from Jan 2011 to May 2013. The dependent variable in all regressions is the absolute adjusted return which is the absolute value of the difference in stock return on day i and a matched portfolio from one of six B/M portfolios. All models use weighted Fama and MacBeth (1973) regression. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis.

	attType=No Attention		attType=Abnormal Attention	
	(1)	(2)	(3)	(4)
	$AbsAdjRet_{it}$	$AbsAdjRet_{it}$	$AbsAdjRet_{it}$	$AbsAdjRet_{it}$
[AttType]	0.005***		0.014***	
	(21.12)		(36.75)	
$illiq_{i,t-1,t-5}$	0.007***	0.006***	0.007***	0.006***
	(23.93)	(21.09)	(21.65)	(21.01)
$mktCap_{i,t-1}$	-0.001***	-0.002***	-0.001***	-0.002***
	(-45.23)	(-51.63)	(-48.13)	(-50.34)
$prevAbsAdjRet_{i,t-1,t-5}$	0.030***	0.029***	0.029***	0.029***
	(23.68)	(24.01)	(23.29)	(23.63)
$vol_{i,t-1,t-5}$	0.171***	0.162***	0.168***	0.161***
	(39.58)	(39.05)	(38.91)	(38.82)
$newsAnalyst_{it}$		0.014***		0.007***
		(29.20)		(32.06)
$newsEarnings_{it}$		0.018***		0.018***
		(22.91)		(28.67)
$newsGov_{it}$		0.001***		0.001***
		(2.98)		(5.38)
$newsMNA_{it}$		0.007***		0.000
		(12.70)		(0.51)
$newsMacro_{it}$		0.001***		0.000
		(3.22)		(1.52)
$newsNoType_{it}$		0.009***		0.003***
		(23.22)		(31.37)
$newsAnalyst_{it}$*[AttType]		-0.007***		0.007***
		(-13.79)		(13.81)
$newsEarnings_{it}$*[AttType]		-0.002**		0.002**
		(-2.32)		(2.34)
$newsGov_{it}$*[AttType]		-0.000		0.000
		(-0.07)		(0.08)
$newsMNA_{it}$*[AttType]		-0.007***		0.007***
		(-12.51)		(12.56)
$newsMacro_{it}$*[AttType]		-0.001**		0.001**
		(-2.25)		(2.25)
$newsNoType_{it}$*[AttType]		-0.007***		0.007***
		(-17.60)		(17.65)
Intercept	0.036***	0.042***	0.040***	0.042***
	(51.22)	(56.08)	(53.48)	(55.53)
Num Obs	1395913	1395913	1386334	1386334
ADJRSQ	0.097***	0.159***	0.109***	0.160***
	(53.94)	(70.11)	(53.56)	(69.88)

TABLE 6 Impact of attention on short term reversals

This table examines the determinants of daily readership of firm-level Bloomberg news stories. The sample includes 2625 firms and goes from Jan 2011 to May 2013. The dependent variable in all regressions is the cumulative adjust return from day days$t+2$ to $t+60$. All models use weighted Fama and MacBeth (1973) regression. All variables are defined in the Appendix. ***,** and * indicate significance at the 1%, 5% and 10% level respectively. The t-statistics are in parenthesis.

	$AttType = newsNoAbnAtt_{it}$		$AttType = newsAbnAtt_{it}$	
	(1)	(2)	(3)	(4)
	$AdjRet_{i,t+2,t+5}$	$AdjRet_{i,t+2,t+5}$	$AdjRet_{i,t+2,t+5}$	$AdjRet_{i,t+2,t+5}$
$AdjRet_{i,t}$	-0.107**	-0.105**	-0.075	-0.077
	(-2.05)	(-2.01)	(-1.30)	(-1.28)
[AttType]	-0.000		-0.001*	
	(-0.65)		(-1.83)	
[AttType]*$AdjRet_{i,t}$	0.021***		0.036***	
	(2.99)		(4.10)	
$mktCap_{i,t-1}$*$AdjRet_{i,t}$	0.004	0.004	0.002	0.002
	(1.50)	(1.47)	(0.76)	(0.79)
$illiq_{i,t-1,t-5}$	0.000	0.000	0.001	0.001
	(0.20)	(0.23)	(0.32)	(0.33)
$mktCap_{i,t-1}$	-0.000*	-0.000	-0.000	-0.000
	(-1.83)	(-1.58)	(-1.55)	(-1.57)
$prevAbsAdjRet_{i,t-1,t-5}$	0.005	0.005	0.005	0.005
	(1.58)	(1.55)	(1.52)	(1.48)
$vol_{i,t-1,t-5}$	-0.012	-0.012	-0.013	-0.013
	(-0.94)	(-0.90)	(-0.97)	(-0.97)
$AbnTurnover_{it}$	0.001***	0.001***	0.001***	0.001***
	(5.61)	(5.48)	(5.56)	(5.50)
$newsAnalyst_{it}$*[AttType]*$AdjRet_{i,t}$		0.029**		0.007
		(2.47)		(0.38)
$newsEarnings_{it}$*[AttType]*$AdjRet_{i,t}$		0.019**		0.013
		(2.27)		(0.80)
$newsGov_{it}$*[AttType]*$AdjRet_{i,t}$		0.016		0.004
		(0.99)		(0.29)
$newsMNA_{it}$*[AttType]*$AdjRet_{i,t}$		0.001		0.029
		(0.06)		(1.29)
$newsMacro_{it}$*[AttType]*$AdjRet_{i,t}$		-0.004		0.028
		(-0.35)		(1.64)
$newsNoType_{it}$*[AttType]*$AdjRet_{i,t}$		0.007		0.065***
		(0.52)		(2.77)
$newsAnalyst_{it}$		-0.000		-0.000
		(-0.32)		(-0.45)
$newsEarnings_{it}$		-0.000		-0.001**
		(-0.95)		(-1.98)
$newsGov_{it}$		-0.000		-0.000
		(-0.71)		(-0.16)
$newsMNA_{it}$		0.000		0.000
		(0.24)		(0.86)
$newsMacro_{it}$		0.000		0.000
		(0.06)		(0.30)
$newsNoType_{it}$		-0.002***		0.000
		(-3.40)		(0.09)
$newsAnalyst_{it}$*[AttType]		0.000		0.000
		(0.22)		(0.41)
$newsEarnings_{it}$*[AttType]		-0.000		0.000
		(-0.74)		(0.94)
$newsGov_{it}$*[AttType]		0.000		-0.000
		(0.66)		(-1.17)
$newsMNA_{it}$*[AttType]		-0.000		-0.000
		(-0.06)		(-0.85)
$newsMacro_{it}$*[AttType]		0.000		-0.000
		(0.41)		(-0.08)
$indNoType$*[AttType]		0.001***		-0.001***
		(3.02)		(-2.60)
Intercept	0.004*	0.003	0.003	0.003
	(1.85)	(1.64)	(1.58)	(1.63)
Num Obs	1394723	1394723	1385148	1385148
ADJRSQ	0.018***	0.019***	0.018***	0.020***
	(15.09)	(16.15)	(14.89)	(15.92)

Chapter 5

Conclusion

This dissertation is a detailed exploration of issues in corporate governance, banking and empirical asset pricing.

The first chapter investigates whether director term limits are the optimal solution to concerns that directors with extended tenures exacerbate agency conflicts. I examine the contribution of experienced directors to several firm outcomes like CEO compensation, CEO turnover, propensity to fraudulently report earnings and propensity to acquire another company. Results indicate that experienced directors actually help improve firm outcomes even after controlling for endogeneity and selection bias issues. The chapter makes an important contribution to the literature on corporate governance, which till now lacked evidence on the effect of long tenured directors on board decision-making.

In the second chapter, I use a sample of global banks to examine whether the relationship between non-traditional activities and systemic risk is homogenous in countries with different market structures. My results show that banks in countries with a lower level of concentration have higher levels of non-traditional business activities and increased systemic risk. However, banks in countries with a higher level of concentration can reduce their systemic risk with certain non-traditional banking activities. The chapter shows that contrary to previous findings, there is not a one-to-one relationship between non-traditional activities and systemic risk.

The third chapter is the first to study the determinants and effects of institutional investor attention. Using readership statistics for news articles on Bloomberg terminals, my results show that institutional investors are more likely to pay attention to larger firms and those with lower book-to-market ratios. I find that there is a sharp increase in abnormal turnover and absolute adjusted stock returns when institutional investors pay attention to news. This effect is especially strong for smaller firms. The chapter fills an important gap in the literature

since there have been very few efforts to directly gauge the effects of institutional investor attention.