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YESTERDAY'S HEROES: COMPENSATION AND CREATIVE RISK-TAKING

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ABSTRACT

We investigate the link between compensation and risk-taking among finance firms during the period of 1992-2008. First, there are substantial cross-firm differences in residual pay (defined as total executive compensation controlling for firm size). Second, residual pay is correlated with price-based risk-taking measures including firm beta, return volatility, the sensitivity of firm stock price to the ABX subprime index, and tail cumulative return performance. Third, these risk-taking measures are correlated with short-term pay such as bonuses and options even controlling for longer-term incentives such as insider ownership stakes. Finally, compensation and risk-taking are not related to governance variables; but they do covary with ownership by institutional investors who tend to have short-termist preferences and the power to influence firms' management policies. These findings suggest that our residual pay measure is also potentially picking up firm-wide, high-powered incentives not captured by insider ownership. They also suggest that the correlation between residual pay and firm risk-taking is due to investors with heterogeneous short-termist preferences investing in different firms and incentivizing them to take different levels of risks.

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I. Introduction

Are Wall Street bonuses to blame for the most significant economic crisis since the Great Depression? Many including the Obama administration seem to think so. In his testimony (June 6, 2009) in front of Congress on the Treasury budget, Secretary Geithner argues, "I think that although many things caused this crisis, what happened to compensation and the incentives in *creative risk taking* did contribute in *some* institutions to the vulnerability that we saw in this financial crisis." (emphasis added).[1] To address this issue, the Obama administration is promoting reforms to tie pay to long-term performance and increase the say of shareholders in approving compensation and electing directors on compensation committees. Implicit in these reforms is the view that finance firms' short-termist incentives reflect mis-governance or entrenchment and a misalignment with shareholder interest.

This creative risk-taking is perhaps best epitomized by the now infamous "musical chairs" quote of Chuck Prince, then CEO of Citigroup, regarding their exposures to the subprime mortgage market. In his interview with the *Financial Times* back in July 2007, Chuck Prince, in referring to his company not backing away from risks at the beginning of the subprime crisis, remarked: "When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing." This quote is often attributed as market pressure (presumably being fired by impatient shareholders) forcing Citi's managers to take on such risks, whether or not they fully understood them. In other words, the short-termism emanated not so much from mis-governance or entrenchment as from demand on the part of investors themselves. This more nuanced perspective of a short-term stock market forcing management to be excessively myopic also has basis in theory (see Stein, 1989 and Stein, 2003 for a review of this large literature on the contrasting perspectives of the source of short-termism in markets).

In this paper, we motivate our empirical analysis around a few hypotheses drawn from this short-termism and risk-taking literature. The first is the familiar view of mis-governance and entrenchment. The second, due to Bolton, Scheinkman and Xiong (2006), draws a parallel between banks like Bear Stearns to dot-com stocks and growth options. In this "quant-bubble" story, over-confident and optimistic investors incentivize otherwise long-run value maximizing managers to make investments

[1] The view that short-termism contributed to the crisis is shared by other governments, particularly in the UK, where a parliamentary committee investigating the crisis "found that bonus-driven remuneration structures encouraged reckless and excessive risk-taking and that the design of bonus schemes was not aligned with the interests of shareholders and the long-term sustainability of the banks." (UK House of Commons, 2009)

and take risks in subprime derivatives built from financial engineering. The rationale is that the company can experience short-run earnings growth as a result and be quickly resold to even more optimistic investors. The third is the "cowboy culture" story in which Bear Stearns has risk-taking in its genes and shareholders who like such firms select to be their shareholders. While related, these three hypotheses yield somewhat different predictions, which we exploit below.

Using panel data on financial firm executive compensation and risk-taking from 1992-2008, we ask whether cross-sectional variation in firm compensation practices is related to heterogeneity in subsequent risk-taking. It is worth noting at the outset that our analysis is not causal and is designed to establish whether there is such an observed correlation and explore what factors might drive such a relationship by exploiting the different predictions yielded by the above hypotheses. Our measure of short-termism is the residual of total annual firm compensation (payouts to top executives) controlling for firm size and finance sub-industry classifications. Our measure differs from the more traditional measure of incentives---namely, insider ownership. Indeed, recent work (notably Fahlenbrach and Stulz, 2009) finds that insider ownership does not have much predictive power for risk-taking and that executives of finance firms tend to have high values of ownership stakes to begin with. But as we discuss below, our residual compensation measure better picks up implicit incentives not captured by insider ownership and as a result has more explanatory power for risk-taking.

Our empirical design is as follows. We split our sample into two periods—an early period defined as 1992 (when we start having executive compensation data) up to 2000, which marks the end of the dot-com era, and a late period from 2001-2008 which marks the beginning and end of the housing boom. We then take the first three years 1992-1994 to create a ranking of executive compensation among firms at the beginning of the early period. Specifically, we take the log of average executive compensation from 1992-1994 and regress this on the log of a firm's market capitalization in 1994, allowing for heterogeneity at the sub-industry level, to come up with a residual compensation ranking for each firm. We then take data from 1998-2000 to create a similar ranking for residual compensation before the late period.

Then, using data from 1995-2000 and 2001-2008, we calculate various risk-taking measures for the early and late periods, respectively. The first set consists of price-based measures including firm beta and return volatility. For the late period, we also compute the sensitivity of a firm's stock price to the ABX subprime index. The second set consists of accounting-based measures including the average holdings of mortgage-backed securities not backed by one of the government-sponsored entities (GSEs)

and book leverage. We also examine the cumulative return performance of our firms in each period with the idea of relating tail performance to compensation. Our baseline analysis is to regress these risk-taking measures on our lagged residual CEO compensation (from 1992-1994) measure along with other firm characteristics. Similarly, we calculate risk-taking measures for the period of 2001-2008 and regress these on our residual compensation measures constructed from 1998-2000.

We work with this stark set-up rather than panel estimation for a few reasons. The split in the sample periods is admittedly ad-hoc and indeed even in the late nineties, banks also faced turmoil related to the Asian, Mexican and Russian crises, though the magnitudes of their problems are dwarfed by the recent crisis. But as we will show, residual pay levels in our two cross-sections are highly correlated, so we are essentially capturing permanent effects. This set-up makes it clear that residual pay in our cross-sections is very similar and allows for a simple and conservative framework to measure our effects. Moreover, we will also work with a pooled panel set-up and cluster standard errors by firm in the robustness section and the results are similar. In addition, this set-up best captures cumulative returns over long horizons, which really gets at the idea behind the title of the paper. From 1995-2000, the market did very well and the risk-takers should have had good outlier performances, but during the period of 2001-2008, a poor time in market, the risk-takers should have had poor outlier performances.

We establish the following findings. First, there is substantial cross-sectional heterogeneity in the permanent component of residual executive compensation. The residual compensation measures obtained from this regression are highly correlated across the two sub-samples, and CEO turnover and stock price performance do not drive changes in the residual compensation measures across the two sub-periods. Firms with persistently high residual compensation include Bear Stearns, Lehman, Citicorp, Countrywide, and AIG. Low or moderate residual compensation firms include JP Morgan, Goldman Sachs, Wells Fargo, and Berkshire Hathaway. As such, we interpret heterogeneity of our residual compensation measure as being due to permanent cross-firm differences.

Second, we find that our residual compensation measure is strongly correlated in both sub-samples with our price-based measures of subsequent risk-taking. Firms with high executive compensation have a higher CAPM beta, higher return volatility, and ABX exposure. For instance, a one-standard deviation increase in residual compensation is associated with a 0.40-standard deviation increase in subsequent stock price exposure to price movements in the ABX. A price-based risk score, defined as the average of the normalized z-scores of CAPM beta, return volatility and ABX exposure, is even more strongly related to residual compensation than any of the measures individually, suggesting

there is a lot of measurement error in the risk measures to begin with. Moreover, firms with high residual compensation are more likely to be in the tails of performance, with extremely good performance in the early period when the market did well and extremely poor performance in the late period when the market did poorly.[2] This is consistent, for example, with a story where executives are highly-paid to take on not only more risk but also more tail risk and where the tail event was realized in the recent crisis. For example, a one-standard deviation increase in residual compensation in 1998-2000 is associated with 24% lower returns over the market in the 2001-2008 period. These results stand in contrast to more traditional book-based measures of risk-taking, which do less well. This is perhaps not surprising since many of the finance firms' exposures during the recent crisis were off balance sheet.

These findings suggest that there is substantial heterogeneity among financial firms in which high-compensation and high risk-taking go hand in hand. As a result, the aggressive firms that were yesterday's heroes when the stock market did well can easily be today's outcasts when fortunes reverse, very much to the point of what we have experienced in the last twenty or so years. The important thing to note here is that our price risk score measure is robust and statistically significant across all sub-industries. Our findings are also robust to a series of other checks.

We next examine the hypothesis of short-term compensation directly in two ways. First, we examine components of pay and find that both bonuses and equity/option compensation are especially correlated with risk-taking (while salary is markedly less informative)---strongly suggesting an important role of the short-term component of pay since option grants are typically viewed as a more tax-efficient way to pay bonuses (as we discuss below). Second, we regress the risk-taking of firms on compensation while controlling for insider ownership on the presumption that insider ownership is a proxy for long-term incentives. If indeed compensation is capturing long-term pay incentives (as opposed to short-term pay), then having insider ownership should mute our results and we should also expect insider ownership to predict risk-taking with the same sign as compensation. Instead, our baseline findings on compensation remain even after controlling for insider ownership.

We then ask whether our results are due to mis-governance or entrenchment as opposed to heterogeneity among investors who want to invest in high risk-taking firms and hence need to set compensation appropriately to induce such behavior. We find that standard governance measures such

[2] This tail performance measure is motivated by Coval, Jurek and Stafford (2009) who suggest that banks' CDO positions were akin to writing disaster insurance and hence standard risk metrics like market beta may be inadequate in capturing such sorts of tail risks.

as the Gompers, Ishii and Metrick (2003) and Bebchuk, Cohen and Ferrell (2009) measures of entrenchment, as well as board independence, are not correlated with our results (if anything, the worst governance score firms are associated with less risk-taking). So it appears that there is no evidence of mis-governance using these standard metrics for mis-alignment of interest between shareholders and management, at least in the cross-section. But this may simply be that these measures are not very good measures of governance in finance.

In contrast, we find that residual compensation and risk-taking are positively correlated with institutional ownership and stock turnover. The institutional ownership finding suggests that there is heterogeneity in investor preferences with institutional investors (perhaps because of shorter-horizons due to agency issues) wanting certain firms to take more risks and hence having to give them short-term incentives to do so. Indeed, both anecdotal and empirical evidence suggests that institutional investors are the ones with the power to pressure management (Froot, Perold and Stein, 1992; Graham, Harvey and Rajgopal, 2005; and Parrino, Sias and Starks, 2003). In this interpretation, the high-powered incentives picked up by our residual pay measure are simply the carrot needed to get the firm to take risks desired by institutional investors. Of course, one has to be a bit careful in interpretations here since if institutional investors are too short-termist and say always flip the shares of the company, they will not have any influence over management. But in practice, there is plentiful evidence that institutional investors care greatly about companies making quarterly earnings targets, presumably because the accompanying growth in share prices helps the institutional investors' portfolio performance.

The turnover finding makes the point of the importance of speculation as a driving motive for short-termist investors in mediating our results even more starkly. Turnover is an important proxy for speculative activity in financial markets (Hong and Stein, 2007). The fact that high turnover firms have both higher residual compensation and risk-taking is consistent with short-termist investors' speculative preferences for certain stocks. It turns out that firms with high institutional ownership tend to be high turnover firms and in a horse race between these two variables, institutional ownership has more explanatory power. Nonetheless, the two findings are broadly consistent with the speculative preferences of short-termist investors being important in understanding the relationship between compensation and risk-taking and hence support the quant-bubble hypothesis of Bolton, Scheinkman and Xiong (2006) and the cowboy culture alternative. In sum, these two sets of findings regarding the mediating role of short-termist incentives of shareholders support our earlier finding that short-term pay in the form of residual bonuses and options are especially correlated with risk-taking.

Finally, we attempt to distinguish between the quant-bubble and cowboy culture alternatives, which are very similar in spirit. The quant-bubble story predicts that Bear Stearns with high residual compensation is like a dot-com stock and hence should have high valuations as say measured by market-to-book. But it turns out that our residual compensation variable's explanatory power for risk-taking is unaffected by market-to-book as a control variable, which is inconsistent with the quant-bubble story. The only proviso is that standard metrics of like market-to-book are typically poor measures of finance firm valuations.

In sum, our findings suggest that investors with more short-termist preferences invest in firms with more short-term incentives and higher risk-taking. The presumption, given that institutional investors are sophisticated, is that the incentives provided were consistent with shareholder preferences. We have focused mostly in the narrative on short-term pay and while the bulk of the evidence is consistent with this story, there is an alternative take involving implicit incentives and efficiency wages. A high level of residual pay is like an efficiency wage where executives are paid more by short-term shareholders to take on more short-term risk with the underlying threat of firings. We have focused on total direct compensation, which is easier to measure than firing pressure, but it is likely that firing for failure to meet quarterly targets (while more difficult to measure) is a more powerful motivator.[3] These two types of high-powered incentives are likely to be correlated across firms and may explain why short-term pay predicts risk-taking even though very rich executives had such large stakes in their companies. In point, the competitive pressure that Chuck Prince suggests in his musical chairs quote is likely due to firing as much as bonuses.

Although not causal, this suggests that implicit incentives and efficiency wages are important for risk-taking in finance. Such issues are particularly important in finance where taxpayers bear a portion of the risk through bailouts. Our results suggest that reforms designed to strengthen the influence of shareholders in compensation decisions may exacerbate short-term risk-taking at the expense of taxpayers by encouraging risk-taking during speculative episodes.

[3] It is difficult to statistically predict CEO turnover based on performance. The R-squared from such regressions is typically around 10% - see Kaplan and Minton (2006). However, the evidence indicates that there is a turnover-performance relationship, and that this relationship has strengthened through time. Of course, the managers that are paid above norm would be the most sensitive to the threat of losing their jobs.

Our paper is organized as follows. We discuss the related literature in Section II and the data in Section III. We present the results in Section IV and conclude with some thoughts on future research in Section V.

II. Related Literature

The literature on compensation, governance and risk-taking has, up until very recently, paid very little attention to the financial sector. There are some exceptions. For instance, Laeven and Levine (2008) document that risk taking among banks is higher in those with large and diversified blockholders. Mehran and Rosenberg (2008) argue that stock option grants lead CEOs to take less borrowing and higher capital ratios but to undertake riskier investments.

The crisis has spurred research contemporary with ours into this previously under-researched area. Adams (2009) focuses on comparing governance at financial firms prominent in the crisis with non-financials and concludes that, although there are substantial differences in average governance between the two groups, governance is not an obvious culprit for the crisis. Erkens, Hung and Matos (2009) look at international evidence on governance, CEO turnover and risk-taking for the 2006-2008 crisis period and find that stronger governance mechanisms are associated with more CEO turnover but also more losses and bonuses are associated with ex post shareholder losses and higher book leverage. Keys, Mukherjee, Seru and Vig (2009) look at CEO and risk-manager compensation and find that firms with higher risk-manager compensation originated lower-quality loans. Fahlenbrach and Stulz (2009) find that insider ownership does not have much explanatory power for which finance firms did badly in terms of returns during the crisis.

Our contribution is to come up with our residual pay measure that can pick up other important incentives better than the traditional measure of insider ownership. First, top executives, even if they have high ownership stakes, face other high-powered incentives related to market pressure from short-termist investors to out-perform rivals. The above quote from Chuck Prince and the recent firing of John Mack of Morgan Stanley after the collapse of Lehman (both of whom were well-incentivized and both facing pressure from impatient shareholders) are consistent with this perspective. In other words, implicit incentives related to firing also matter greatly. Second, many rank-and-file employees that matter for risk-taking (such as risk managers or proprietary traders) do not typically have high ownership stakes and hence our measure might better pick up the incentives of these employees. We would ideally like compensation data for a wide range of employees at each firm, but ExecuComp (our data source for compensation) typically only provides data for the top five executives. Nonetheless,

higher annual payouts at the top level might pick up a firm culture for high-powered incentives, whether they are bonuses or higher sensitivity of firing to short-term performance. As such, we view our residual pay measure as being a sensible proxy of both firm-wide explicit and implicit short-termist incentives.

Relative to this literature, we contribute a number of new findings. First, we are the first to focus on price-based risk-taking measures rather than standard book leverage measures. Indeed, we find that our price-based measures show up much more significantly in our regressions than do book leverage. Second, we focus on risk-taking over long periods and establish that the relationship between risk-taking and compensation is a persistent practice over a long time period. In particular, we not only find that aggressive firms who did well in the 1990's and were "yesterday's heroes" were the largest risk-takers and are today's outcasts in the crisis, but we also find that these firms tend to be the high compensation firms, and that the compensation practices at these firms tend to be persistently high even after excluding the CEO. Here it is important to emphasize that just focusing on the crisis period would be inadequate to nail down a fixed effects hypothesis or the tail return risk measure. Our results thus contribute to the growing idea that risk-taking may be related to a firm-fixed effect such as firm culture that is picked up by our compensation measure. Third, we find that both bonuses and options/equity compensation drive risk-taking in contrast to insider ownership (which we find has limited explanatory power similar to Fahlenbrach and Stulz, 2009). In other words, it appears that it is the shorter-term incentives in the organization that matters. Fourth, we further expand the link between short-term compensation and risk-taking by studying whether short-termism among investors is an alternative explanation to mis-governance and finding that the evidence favors a clientele effect among investors.

These findings contribute to the broader literature on governance and executive compensation by focusing on financial firms, where these issues are now recognized as especially important due to the systemic risk the sector poses to the economy, and by offering empirical evidence that speculative activity influences compensation and short-term risk-taking. A large literature already focuses on whether value and risk-taking are related to shareholder rights and managerial rent-extraction (Bebchuk, Fried and Walker, 2002; Bebchuk, Cohen and Ferrell, 2009; Gompers, Ishii and Metrick, 2003; and Yermack, 1996, among many). Additionally, we also contribute to the literature on compensation and performance (e.g., Edmans, Gabaix, and Landier, 2009; Kaplan, 2008) and particular components of compensation such as bonuses contribute to short-termism (e.g., Bergstresser and Philippon, 2006; Healy, 1985; Burns and Kedia, 2006; and Murphy, 1999).

III. Data and Definitions

A. Classifying Financial Firms

We start with the CRSP Monthly Stock File, 1992-2008. We limit our analysis to financial firms, which we divide into three groups. We first construct a group of primary dealers by hand-matching a historical list from the Federal Reserve Bank of New York with PERMCOs from our CRSP file. When a primary dealer is a subsidiary of a larger bank holding company in CRSP, we group the bank holding company with the primary dealers.

We then use SIC codes obtained from a current list of SIC classifications on the OSHA website to classify firms into a second group of banks, lenders, and bank-holding companies which do not have primary dealer subsidiaries. This group comprises firms from SIC 60 commercial banks, SIC 61 non-deposit lenders, and SIC 6712 bank holding companies. Our third and last group of financial firms are insurers from SIC 6331 (fire, marine and casualty insurance) and SIC 6351 (surety insurance). This group of insurers contains firms such as AIG and monoline insurers such as MBIA.

Our data on SIC codes comes from CRSP. However, a number of the SIC codes obtained from CRSP do not exactly match the SIC classification, particularly for bank holding companies. For example, Countrywide (PERMCO 796) and AMBAC Financial (PERMCO 29052) have SIC 6711 and 6719, respectively. We worry that we might have omitted some financial firms. Hence, we supplement this list by hand collecting additional financial firms from the more expansive three-digit SIC codes of 670 and 671 and then looking at company description via 10-K statements on EDGAR. Similarly, we conduct a similar check for three-digit SIC codes 633 and 635. Finally, we hand check all the firms on our list to make sure we have not included any non-financials. We also exclude Fannie Mae, Freddie Mac, and Sallie Mae from our analysis.

We then link the CRSP monthly returns of these financial firms to their accounting data using the CRSP-COMPUSTAT Quarterly file. Then we link this merged database with ExecuComp database to retrieve their executive compensation data. Our baseline sample of financial firms has to have data from all three of these databases.[4]

B. Variables

[4] For comparability with Fahlenbrach and Stulz (2009), we replicate our sample construction procedure to pick out firms at the end of 2006. Our procedure picks out 95 out of 98 of their firms and includes several financial firms they have excluded.

The construction of our variables is as follows. We compute our residual compensation measure as follows. We first average total compensation (including bonus, salary, equity and option grants, and other direct annual compensation) across the top five most highly paid executives at each firm. We aggregate across all forms of direct compensation because it is a less noisy measure of short-term pay practices than looking at particular components. Indeed, some authors such as Michael Jensen argue that option grants are just a cost-efficient way to pay bonuses and a large literature (Murphy, 2000; Hall and Murphy, 2003) convincingly shows that both bonus and option grants motivate short-termist behavior. Then we regress (cross-sectionally) total compensation on two control variables. The first is firm size since it is well known that the best personnel work for the biggest firms (Gabaix and Landier, 2008; Murphy, 1999). The second is heterogeneity in sub-industry classifications among financial firms (which we break into three categories: primary dealers, banks, lenders and bank-holding companies, and insurance companies) since primary dealers and banks may have different compensation practices than insurance companies.[5]

Our baseline measure of executive compensation is total direct compensation TDC1 from ExecuComp (Salary + Bonus + Value of Option Grants + Other Annual Compensation + Restricted Stock Grants + Long-term Incentive Payouts + All Other Compensation), averaged across the top five executives at the firm. Specifically, we measure top 5 executive compensation as the average compensation of the top 5 most highly paid executives (by TDC1), always including the CEO and CFO when available.[6] We exclude pay in years associated with IPOs since pay during those periods often involve one-time startup stock grants that are less relevant for our hypotheses. For firm variables that overlap between CRSP and COMPUSTAT, we take the CRSP value. We compute Market Capitalization in a year as shares outstanding (SHROUT) times price (PRC) on December 31 of that year. The market-to-book ratio is Market Capitalization divided by book equity (stockholders equity plus deferred taxes and investment tax credits, less the book value of preferred stock, from COMPUSTAT).

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[5] Murphy (1999) documents that there is substantial heterogeneity in how pay scales with size across non-financial industries. We view our three groups as a rough split among firms that engage in investment banking and intensive trading activity, other banks that operate more as commercial banks and lenders, and, finally, financial insurers.

[6] We employ this procedure because firms occasionally report the compensation of more than five people. Occasionally, firms report compensation of fewer than five people as well. Because firms who report less than five executives may not be strictly comparable to firms who report compensation of the top five (the vast majority of the sample), we also re-do our analysis using top 5 compensation only when five executives report compensation. Results are very similar.

We compute six measures of risk-taking and stock-price performance: 1) the beta of the firm's stock, 2) the firm's stock return volatility, 3) the correlation of a firm's daily stock returns with returns to the ABX AAA index (ABX Exposure), 4) the cumulative return to the firm's stock, 5) a firm's balance sheet holdings of non-agency mortgage backed securities (MBS Exposure), and 6) book leverage. We follow Adrian and Shin (2009) who analyze the leverage characteristics of investment banks by computing leverage as the ratio of book assets (ATQ) to book equity (SEQQ).

We compute a firm's Market Beta and Return Volatility for a given period (1995-2000 in the early period or 2001-2008 in the late period) using the CRSP Daily Returns File, and take our market return to be the CRSP Value-Weighted Index return (including dividends). Our data on the risk-free return comes from Ken French's website. In computing betas and volatility, we require at least one year's worth of observations (252 trading days) in that period. We compute each firm's cumulative compounded return in a given period and subtract it from the cumulative compounded return of the market to obtain each firm's Cumulative Excess Return for that period. We follow Shumway (1997) in our treatment of delisting returns.

We use the on-the-run ABX daily price index obtained from Barclays Capital Live[7] to compute a firm's ABX Exposure. Following Longstaff (2010), we compute the ABX return as the log of the time-t price divided by the time t-1 price, where we ignore the coupon rates of each tranche (i.e. like Longstaff, we are assuming a coupon yield of zero). We compute a firm's exposure to the AAA tranche by regressing returns obtained from the CRSP Daily Returns File on returns to the ABX AAA and returns to the market (defined as the CRSP Value-Weighted Index return, including dividends) for each firm from 2006 (when the ABX was created) through the end of 2008. We take the coefficient on ABX returns as the firm's exposure to the ABX. Importantly, we also compute an average price-based risk score measure that is an equal-weighted average of the standardized z-scores of market beta, return volatility and, in the late period, the firm's exposure to ABX. As we will show below, the risk measures are noisy and hence averaging them provides a cleaner measure of firm risk-taking. This price-based risk score is our main dependent variable of interest.[8]

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[7] Barclays Capital Live, formerly known as Lehman Live, is available at http://live.barcap.com/ . The ABX indices are compiled and maintained by MarkIt, at http://www.markit.com/ . Longstaff (2010) provides a discussion of the index.

[8] Our price-based risk score is motivated by a principal components analysis of Market Beta, Return Volatility and Exposure to ABX. The first principal component explains over 70% of the variation in the three measures and has loadings very close to an equal-weighted average.

We obtain data on exposure to mortgage-backed securities (MBS) from the consolidated financial statements of bank holding companies (Form FR Y-9C), available electronically from the Federal Reserve Bank of Chicago. We define MBS exposure as total holdings of mortgage-backed securities not issued or guaranteed by government-sponsored entities (FNMA, GNMA and FHLMC), divided by total balance sheet size (BHCK2170). We include both pass-through securities (BHCK1710+BHCK1713) and non-pass-through securities (BHCK1734+BHCK1736) such as collateralized mortgage obligations (CMOs) and real-estate mortgage investment conduits (REMICs), and include holdings on the trading-side of the balance sheet (BHCK3536 on Schedule HC-D) as well as the securities balance sheet (aforementioned variables, on Schedule HC-B). We focus on non-GSE guaranteed mortgage-backed securities in order to focus attention on the riskiest securities such as subprime. We also create an analogous book based risk score measure that is the average of the standardized z-scores of Exposure to MBS and Book Leverage.

Our baseline computations relate total compensation to risk-taking. In extended results, we will also utilize insider ownership, which we measure as the number of shares plus the delta-weighted number of options owned by the top five executives divided by shares outstanding, as a noisy proxy for long-term compensation.[9] We compute the delta-weights on the options using the Core and Guay (1999) methodology.[10]

We also relate these measures of risk-taking and stock price performance to measures of governance. We obtain from RiskMetrics data on corporate governance including the G index (Gompers, Ishii and Metrick, 2003), percentage of directors that are outsiders (classified as "Independent" by RiskMetrics), and the board size. Since the RiskMetrics data on directors goes back to 1997, we have data on board size and independence only for our late period. We obtain data on the Entrenchment Index (Bebchuk, Cohen and Ferrell, 2009) from Lucian Bebchuk's website. For our measure of speculative activity, we use monthly stock turnover data from CRSP and compute the average 36-month stock turnover (VOL*100 / SHROUT*1000) for each period.

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[9] Here we follow papers such as Jensen and Murphy (1990) and Himmelberg, Hubbard and Palia (1999) in using effective percentage ownership as a measure of incentives. In results not reported, we use the market value of insider equity as our measure of insider ownership (Baker and Hall, 2004; Hall and Liebman, 1998) and find a positive relationship between the value of equity holdings and risk-taking. However, this finding is driven by the well-known fact that market value of equity scales increasingly with size: the positive relationship disappears after including a control for market capitalization. Edmans, Gabaix and Landier (2009) suggest scaling the dollar stake measure by total compensation to obtain a size-neutral proxy for how incentives appropriately scale with size. Our results on residual pay are robust to using any of these three measures.

[10] Following Bergstresser and Phillipon (2006), we also run our results assuming a delta of 1 and 0.75 across all options and find qualitatively identical results.

We obtain data on institutional ownership from the Thomson Reuters S34 database, which captures 13F filings by financial institutions electronically. We match 8-digit CUSIPs in Thomson to PERMNOs in CRSP, noting that the CUSIPs in Thomson are provided for the filing date (not the reporting date). For each PERMNO, we divide the shares held by each financial institution (SHARES) by the shares outstanding (as reported by Thomson in SHROUT1 before 1999 and SHROUT2 after 1999) and sum up over each stock. We take care to ensure that holdings and shares outstanding both reflect stock splits when necessary.[11] We censor the percentage of shares held by institutions at 1 for a few observations.

Lastly, we winsorize all variables except for our compensation variables and Market Capitalization at their 1% and 99% values. We do not winsorize the G Index, E Index, board size or the percentage of directors that are outsiders, since these are based on well-behaved count-data.

IV. Results

Our goal is to relate differences in risk-taking across finance firms to cross-sectional heterogeneity in their compensation. To this end, we split our sample into two periods—an early period defined as 1992 (when we start having reasonable executive compensation data) up to 2000, which marks the end of the dot-com era and a late from 2001-2008 which marks the beginning and end of the housing boom. We then take 1992-1994 (1998-2000) to create a ranking of executive compensation among firms at the beginning of the early period.[12] As we mentioned earlier, in our comparison of firm compensation practices, it is important to control for two things. The first is firm size since it is well known that better personnel work for bigger firms (Gabaix and Landier, 2008; Murphy, 1999). The second is heterogeneity in sub-industry classifications among financial firms (described above). In other words, we work with a residual compensation measure in which we take the residual from a cross-sectional regression of compensation on firm size and sub-industry classifications.

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[11] We always divide shares held by the Thomson-provided value of shares outstanding rather than the CRSP value of shares outstanding to avoid mis-computing institutional ownership due to misalignments between when Thomson and CRSP report splits. When Thomson reports multiple filings, we always take the first filing, which corrects for the fact that shares outstanding may have changed by a later filing. There is one instance where Thomson's value of shares outstanding (SHROUT2) does not make any sense, for Independence Community Bank (PERMNO 85876) in 1998Q3. Here we replace that value with the CRSP value of shares outstanding.

[12] If a firm reports compensation for less than the full three years inside the ranking window, we take the average of the available data. Note that we are averaging (over time) top 5 executive compensation, which is itself an average. We employ this procedure because there is noise in ExecuComp. For example, if a CEO serves less than a full year, pay will be smaller for that year. Additionally, ExecuComp sometimes fails to report data on all top five executives as reported in their proxy statement, and taking the three-year average smoothes this.

Ideally, we would like to control for heterogeneity by allowing both slopes and intercepts to vary across sub-industries. Unfortunately, the limited number of primary dealers per year does not allow us to form reliable estimates of the slope and intercept within that group.[13] Instead, we take the log of average executive compensation in 1992-1994 (1998-2000 for the crisis-period) and regress it on the log of firms' market capitalization in 1994 (2000 for the crisis-period), allowing intercepts to vary by sub-industry and allowing the insurers group to have a slope distinct from banks and primary dealers.[14] This specification allows for heterogeneity in the levels of pay across sub-industries and for an insurer-specific slope (where we have enough observations to form a reliable estimate).

With these residual pay estimates in hand, we track the risk-taking of these firms from 1995-2000 and 2001-2008, respectively. Specifically, using data from 1995-2000, we calculate various risk-taking measures including firm beta, return volatility, average holdings of non-GSE backed mortgage-backed securities, and average book leverage. We also form a price-based risk score based on equal-weighted z-scores of firm beta and return volatility and a book-based risk score based on holdings of non-GSE backed mortgage-backed securities and book leverage. We then regress these risk-taking measures on our lagged residual CEO compensation (from 1992-1994) measure along with other firm characteristics. We also regress the cumulative return performance of each firm on lagged residual compensation to look at which firms have extreme performance. Similarly, we calculate risk-taking measures and return outcomes for the period of 2001-2008 and regress these on our residual compensation measures constructed from 1998-2000. During the late period, we can also compute the sensitivity of a firm's stock price to the ABX subprime index and include this in the price-based risk score.

Our final data set comprises two cross-sections: the first containing data on pay of 153 firms (15 primary dealers, 113 banks, 25 insurers) in 1992-1994 and their risk-taking activity in 1995-2000, and the second containing data on pay of 152 firms (11 primary dealers, 106 banks, 35 insurers) in 1998-2000 and their risk-taking in 2001-2008, with 79 firms reporting in both periods.

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[13] In particular, the estimate of the slope of compensation and market capitalization fluctuates depending on the year in which the regression is run due to changes in the composition of the primary dealer group. Consistent with this, running a regression that allows for slopes and intercepts to vary across all sub-industries yields a large standard error on the slope for primary dealers.

[14] We have also regressed the average compensation on not just 1994 log market capitalization but the average of the market capitalizations from 1992-1994 and obtain similar results.

Table 1 and Table 1 (cont) report summary statistics for log compensation, risk-taking measures and various firm characteristics for our two periods. The figures are similar to those reported in other studies. A couple of comments are helpful here. Since compensation and market capitalization do not scale linearly, we find it convenient to work with log compensation and log market capitalization. For convenience, we report here the raw compensation figures. The mean (median) executive compensation in 1992-1994 was $1.39M ($762K) with a standard deviation of $1.77M. In the 1998-2000 sample, the mean (median) executive compensation was $3.72M ($1.63M) with a standard deviation of $6.31M. Mean (median) firm market capitalization was $2.79B ($1.18B) with a standard deviation of $4.27B in 1994, and was $13.0B ($3.03B) with a standard deviation of $31.0B in 2000. Our sample encompasses a broad-cross-section of finance. It includes the top investment banks, commercial banks, and insurers in both the early and late periods (Bear Stearns, Citigroup/Travelers, AIG, etc.), as well as smaller firms.

A. Heterogeneity in Compensation Practices

We first document that there is substantial cross-sectional heterogeneity in executive compensation controlling for firm size and finance sub-industry classifications. The formal regression results are presented in Panel A of Table 2. The first column shows the results for the early period and the second shows the results for the late period. Notice in the early period that the coefficient in front of Log Market Capitalization is positive (0.47) and very statistically significant. The coefficient in front of the insurer specific slope is -0.31 and also significant, indicating that insurer pay increases less quickly with firm size then for primary dealers and banks. The average level of pay also differs somewhat across these three groups, with primary dealers having the highest pay on average. The relationship is economically significant with an R-square above 0.6. The results for the late period in the second column are qualitatively similar.[15]

Figure 1 plots the observations along with the fitted values from the regressions in Panel A of Table 2. Each panel plots the log of average total compensation among executives in each ranking period against log market capitalization, and highlights the relationship for our three groups. For example, Panel A plots, for the early period, the log of executive compensation during 1992-1994 against market capitalization at the end of 1994, with three lines representing the linear fit of size to

[15] In all specifications reported in this paper, heteroskedasticity is an *a priori* major concern since we suspect substantial heterogeneity among banks, insurers, and primary dealers. We use HC3 standard errors which are robust to heteroskedasticity but have much better small-sample properties than the usual Huber-White sandwich estimator, as documented in MacKinnon and White (1985) and Long and Ervin (2000).

compensation for our three sub-industries. A quick eyeball of the figure suggests that there is indeed a strong linear relationship between log total compensation and log market capitalization, with primary dealers having a higher-than-average level of pay relative to banks and insurers and insurers having a lower pay-size slope compared to primary dealers and banks. Panel B of Figure 2 plots the results for the late period. Notice that the two figures are fairly similar. This is not a coincidence as the residual pays from these two periods are quite correlated, as we show below.

Panel B of Table 2 gives summary statistics for log compensation and log market capitalization by sub-industry and period. Together with the regression results from Panel A of Table 2, we can calculate the economic significance of the findings. For example, a one-standard deviation increase in log market capitalization is associated with a 0.76-standard deviation increase in total compensation in the early period among banks and bank holding companies. (A one-standard deviation increase in log market capitalization in the early period for banks is associated with a 1.0850 [1 SD] x 0.4712 [slope] = 0.5112 increase in log pay, which is 0.5112 / 0.6725 = 0.76-standard deviations of log pay for banks.) Given our small sample size and the fact that we have statistical significance, it is not surprising that the implied economic significance from our regression in Panel A of Table 2 is quite large. More interestingly, the residual compensation measures obtained from this regression are highly correlated across the two sub-samples, as shown in Panel C. The correlation between residual compensation in the two periods is 0.69 with a p-value of zero.

Table 3 lists quintile rankings of residual executive compensation (ranked within each sub-industry) for firms prominent in the financial crisis. High residual compensation firms include Bear Stearns, Citigroup, Countrywide, and AIG, and they tend to be high residual compensation firms even as far back as the 1992-1994 ranking period. We emphasize this point because we believe this suggests our residual compensation measure is a noisy proxy for firm-specific compensation practices.

To analyze this point further, we examine whether CEO turnover and stock price performance drive changes in the residual compensation measures. The idea is that if these variables do not drive changes in residual compensation then it is suggestive of something more fundamental about the culture or technology of the firm. Panel A of Table 4 presents the results of an exercise where we regress quintile rankings of residual compensation in the late period on quintile rankings of residual compensation in the early period, cumulative returns in between the two periods (1995-1997), and whether there was any CEO turnover in between the two periods. The first column shows that the 1992-1994 quintile ranking is significant at the 1% level and explains 24.8% of the variance of 1998-2000

quintile rankings. The second column shows that introducing returns and CEO turnover between the two periods leads to an R-squared of 26.4%. Both coefficients are statistically insignificant. Good past price performance leads a firm to have slightly higher residual compensation in the late period and CEO turnover leads to lower residual compensation, but the bulk of explanatory power for what a firm's residual compensation ranking is in the late period is provided by the ranking in the early period. Since the theoretical directional effect of CEO turnover on rankings is unclear, in the third column, we regress the absolute value of changes in rankings on an indicator for whether there was any CEO turnover in 1995-1997, and find a statistically insignificant coefficient of 0.08. We repeat this exercise to analyze whether movements in and out of the highest quintile and lowest quintile are driven by returns and turnover in Panel B and find no significant relationship.

Panel C repeats this exercise for raw residual compensation (not quintile rankings) and finds that the coefficient on early period compensation is 0.84; returns and CEO turnover are both statistically insignificant and provide almost no additional R-squared. We conclude that CEO turnover and stock price performance have weak explanatory power for changes in rankings and that the bulk of explanatory power is provided by past rankings. The economic significance of stock price performance and CEO turnover in the interim are negligible. We note finally that a Breusch-Pagan-Godfrey test of serial correlation in the residual compensation between the two periods rejects the null hypothesis of no serial correlation with a p-value of zero.[16] As such, we interpret our residual compensation measure as being largely a firm fixed-effect and that there is a substantial cross-sectional variation in this residual compensation measure.

Finally, because we are concerned that sample attrition between our early and late ranking periods may be driving our results, we examine whether there are systematic differences between the 73 firms who are not present in both 1992-1994 and 1998-2000 samples and the 79 that are present in both. First, we examine whether persistence among firms that are present in 1992-1994 and 1995-1997 but not in 1998-2000 (there are 33 such firms) is different than persistence for firms that survive through 2000.[17] We regress 1995-1997 residual compensation as the dependent variable on 1992-1994 residual compensation and include an interaction with an indicator for whether a firm subsequently drops out. We find no statistical evidence that persistence for dropouts is different than persistence for survivors: in

[16] This holds regardless of whether standard-errors are clustered at the firm level or if standard errors robust to small-sample bias such as the HC3 standard error are used.
[17] The remaining 40 firms in the 1998-2000 sample first appear in ExecuComp after 1994.

fact, the point estimate on 1992-1994 residual compensation is even higher for the 33 firms who subsequently drop out than for those that survive, although the difference is not statistically significant. Second, we look at CRSP delisting codes for these firms that do not survive and find that mergers account for many of the firms that drop out. Since targets are typically smaller firms, we examine whether there is a size bias in our results by dropping the bottom 25% of firms by market capitalization in both the 1992-1994 and 1998-2000 samples and repeating our analysis. We find that our estimates of persistence are if anything higher and our results on risk-taking below are virtually unchanged. We conclude that attrition between the two samples is not driving our persistence results.

B. Compensation and Risk-Taking

We now analyze the relationship between our residual compensation measure and risk-taking and find that residual compensation and subsequent risk-taking are strongly correlated in both sub-samples. We start with our price-based measures. Our first set of findings is that firms with high executive compensation have a higher CAPM beta, higher return volatility and higher ABX exposure.

Figure 2 demonstrate the results of predictive regressions where we compute beta, volatility and ABX exposure and regress this on residual compensation in 1992-1994 (1998-2000). The formal regressions are in Table 5, Panel A. We start our discussion with market beta (see Figure 2(a)-(b)). A one-standard deviation increase in residual pay in the late period is associated with a 0.1317 increase in beta (0.6428 [1 SD of residual pay] x 0.2049 [slope] = 0.1317), which is 0.40-standard deviations (0.1317/0.3312 [1 SD of beta] = 0.40). For the early period, this number is 0.32 standard deviations. Both estimates are economically and statistically significant.

We next consider return volatility (see Figure 2(c)-(d)). Here, a one-standard deviation increase in residual pay in the late period is associated with an 8.23% increase in annualized volatility (0.6428 [1 SD of residual pay] x 0.1280 [slope] = 0.0823), which is 0.32-standard deviations (0.0823 / 0.2550 [1 SD of volatility] = 0.32). In the early period, this association is 0.36-standard deviations. Again, both estimates are economically and statistically significant.

Since a portion of financial firms' exposure to the subprime market operated through off-balance sheet vehicles, we next consider our ABX exposure measure, which is market-based and should more sharply capture the large risks that banks took than balance-sheet measures (see Figure 2(e)). Off-loading risky assets into structured investment vehicles (SIVs), which finance the purchase of these assets using short-term paper, did not off-load the risk from the sponsoring firms themselves.

Sponsoring firms often retained risk by granting "liquidity backstops" or credit lines to these vehicles, to be drawn in case these SIV's could not continue to finance themselves in the market. This is exactly what happened, bringing enormous losses to the sponsoring firms (Brunnermeier, 2009).

Indeed, high residual compensation in 1998-2000 predicts high exposure to subprime in 2006-2008 with a p-value of 0.012 on the slope of residual compensation. In economic terms, a one standard deviation increase in residual compensation leads to a 0.40-standard deviation increase in ABX exposure (0.6428 [1 SD of residual pay] x 0.1541 [slope] / 0.2483 [1 SD of ABX exposure] = 0.40). The figure also reveals that firms prominent in the crisis and most exposed to subprime, such as Bear Stearns (BSC), Lehman Brothers (LEH) and AIG (AIG), were high residual compensation firms in 1998-2000. Compensation also picks out a number of other firms who had high exposure to subprime – Hartford Financial (HIG), an insurer who received $3.4 billion in TARP money, is a high compensation firm, as is Fremont General (FMT).[18]

We also consider an average price risk score measure which puts equal weight on the standardized versions of market beta, return volatility and (when available) ABX exposure (see Figure (f)-(g)). Here, we actually find that our results are even stronger when we use this average price risk measure. Notice that the t-statistics are higher in each case and the economic significances are at least as high as when we consider the risk measures separately. For example, a 1-SD increase in residual comp is associated with a 0.49-SD increase in the price-based risk score in the late period (0.6428 [1 SD of residual pay] x 0.6477 [slope] / 0.8467 [1 SD of the risk score]); the analogous number for the early period is 0.41-SDs. This suggests that our individual risk measures, even though they are individually significant, are nonetheless noisy and that this combined measure is a cleaner way to measure firm risk taking.[19] We will focus on this measure in the remaining paper.

We next consider how the cumulative returns of these firms are related to their compensation practices. The idea is that high residual compensation firms are more likely to be in the tails of performance, with extreme good performance pre-crisis when the market did well and extreme poor performance during the crisis period when the market did poorly. The results are presented in Figure (h)-(i) with the corresponding regressions in Panel B of Table 5. The results on cumulative returns are

[18] Fremont General was a relatively small California bank that nevertheless managed to originate a significant volume of subprime mortgages nationally and did not stop doing so until faced with a likely cease and desist order from the FDIC in 2007. Afterwards, Fremont General became embroiled in lawsuits alleging predatory lending.

[19] In particular, our results are not being driven by only the ABX, which is only available in 2006-2008. If we use a price-based risk-score based on only beta and return volatility we find remarkably similar results.

striking – residual compensation strongly predicts cross-sectional differences in subsequent cumulative performance. For example, for the crisis period, a one-standard deviation increase in residual compensation predicts a 24% decrease in returns (0.6428 [1 SD of residual pay] x -0.3722 [slope] = -0.24), which is a 0.28-standard deviation decrease in returns in the cross-section (0.24/0.8423 [1 SD of cumulative returns] = 0.28). In contrast, in the early period, a one-standard deviation increase in residual compensation predicts a 54% *increase* in returns (0.4898 [1 SD of residual pay] x 1.1002 [slope] = 0.58), or a 0.28-standard deviation increase (0.54/1.946 [1 SD of cumulative returns] = 0.28).

Given the persistence of residual compensation, the results show that aggressive firms that were yesterday's heroes when the stock market did well can easily be today's outcasts when fortunes reverse. Bear Stearns (BSC), Citigroup/Travelers (C/TRV), and AIG (AIG) are prime examples. In other words, there is substantial heterogeneity in financial firms in which high compensation, high risk-taking and tail performance go hand in hand. In particular, it is important to note that this link between compensation and risk-taking (as measured by beta, volatility, ABX exposure and returns) persists in both periods, even before the crisis. This suggests that the persistent effect picked up by our residual compensation measure is consistently linked to risk-taking over time.

We continue with our risk-taking analysis in Figure 2 (cont) where we also look at balance-sheet based measures by examining holdings of non-GSE-backed MBS (as a percentage of balance sheet size) and book leverage and their relationship with residual compensation. Figure 2 (cont) (j)-(k) and Table 5 Panel C report that holdings of non-GSE backed MBS are associated with residual compensation. As mentioned before, these mortgage-backed securities included substantial pools of risky mortgages such as subprime and Alt-A. High residual compensation in 1998-2000 predicts higher holdings of non-GSE MBS in 2001-2008 (though it not statistically significant). The results imply that a one-standard deviation increase in residual compensation is associated with a 0.15-standard deviation increase in risky MBS holdings (0.6428 [1 SD of residual pay] x 0.0079 [slope] / 0.0344 [1 SD of MBS exposure] = 0.15). In the early period, we find less than half of that relation. Since the non-GSE backed MBS market did not become substantially risky until the early 2000's, when the growth in subprime lending led to a boom in the non-GSE MBS market (Keys et al., 2009; Chomsisengphet and Pennington-Cross, 2006), we actually view this non-result in the early period as consistent with our hypothesis.

Table 5 (l)-(m) of Figure 2 (cont) and show the results for book leverage. In both periods, we find a positive but statistically insignificant relationship. As mentioned, we are not surprised that only the price based measures come in significantly since the book based measure are likely to miss most of

what is interesting when it comes to creative risk taking. As such, we will only consider price based risk measures in the remaining portion of this paper.

In Table 6, we repeat our analysis relating risk-taking in 1995-2000 (2001-2008) to residual compensation in 1992-1994 (1998-2000), where we successively drop different groups of financial firms in our analysis to see how our results vary across different sub-industries. We focus on the price risk measure since this is our least noisy measure of risk taking. First, we exclude the primary dealers from our analysis and find consistent results across all our measures of risk-taking. Second, because we are also concerned that the results may be driven by the insurance companies, we repeat the analysis dropping insurers. Again, the results are similar. Finally, we run our results using only banks and bank holding companies, excluding both insurers and the primary dealers. Although statistical significance is a bit more limited for individual risk-taking measures (not surprising given that we are losing 25-30% of our sample), our findings are still economically and statistically significant for the price-based risk-taking measure, which aggregates information from the Market Beta, Return Volatility, and Exposure to ABX. So our results are not just due to primary dealers, though the results are stronger when primary dealers are included. This is not surprising, since these firms have more discretion to take risks (e.g., Bear Stearns and Citigroup). Moreover, in results not reported, the correlation between risk taking measures and residual compensation is primarily a compositional effect in that changes in the risk-taking measures are uncorrelated with changes in the residual compensation measure. This drives home again the point that we are dealing with permanent cross-firm differences.

C. Robustness Checks

In Table 7, we perform a series of additional robustness checks of the above findings. First, we re-do our analysis by calculating residual compensation using book asset values rather than market value on the idea that asset values are more exogenous than firm size and that book asset values will reflect both debt plus equity. This is reported in the first row. We report only the coefficient in front of residual compensation both for the early and late period for each of the risk-taking measures, which are given by the columns. The results are very similar to the ones before.

One may worry that residual compensation is simply a proxy for book leverage. Our results indicating a low correlation between residual compensation and book leverage suggest this is not the case, but we present more formal analysis in the second row of Table 7. Controlling for size and book leverage does not significantly affect our results. To further examine this hypothesis, in results not reported, we also include leverage on the right-hand side when computing residual compensation in the

first-stage and find that including leverage only marginally improves the fit between compensation and size and does not affect our risk-taking results. In sum, our price-based risk-taking measures are not driven by differences in book leverage.

Third, we exclude the CEO's pay when computing our residual compensation measure and find nearly identical results.[20] Even after excluding the CEO, a one-standard deviation increase in residual compensation is associated with a 0.48-standard deviation increase in average price risk score exposure when using non-CEO compensation (0.6321 [1 SD of non-CEO residual pay] x 0.6372 [slope] / 0.8467 [1 SD of price-based risk] = 0.48). While ideally we would have data on compensation of other employees at financial firms (e.g., traders), whether our result would flip if we had such data on non-executive employees depends on whether the relative ranking order of average pay would change substantially if we measured pay of employees lower down rather than executives. It seems a reasonable conjecture that Bear Stearns, for example, would be in the highest quintile of payers relative to its peers even when measuring non-executive pay. Either way, the persistence in residual compensation and the positive association between non-CEO executive compensation and risk-taking suggest that residual compensation is more indicative of an overall firm effect such as culture.

Fourth, we do the same exercises for manufacturing industries as an out-of-sample check since the theory of short-termism and risk-taking should apply to non-financial industries as well. However, one might expect these effects to be stronger for finance firms where risk is a much bigger deal, except for our book-based risk score (which for manufacturing is simply book leverage). We find elements of this from the results reported in the fourth row, where relationship between residual compensation and our book-based risk-measure is statistically significant for manufacturing. Moreover, the economic significance of the price-based risk score is much lower for manufacturing compared to finance, at 0.09-SDs per 1-SD of residual compensation in the early period and 0.19-SDs in the late period (the comparable numbers for finance are 0.41 and 0.49-SDs, respectively). In particular, residual compensation has no statistical or economic explanatory power for ABX exposure among manufacturing firms, which is also a good check that our ABX exposure results are not spurious.

Fifth, we run a pooled regression version of our analysis. More specifically, rather than just running two cross-sectional regressions, an early period and a late period, we do the following exercise.

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[20] For these results, we focus only on the subsample of firms which identify a CEO through the CEOANN variable in ExecuComp (a few firms do not identify a CEO). We take the average compensation of the remaining executives (up to four) as our measure of non-CEO executive compensation.

For each year in 1995-2008, we calculate our individual risk measures (Beta, Return Volatility, Exposure to ABX, Exposure to MBS, Book Leverage) at an annual frequency and use this to construct an annual price-based risk score and book-based risk score. We include the Exposure to ABX only in 2007 and 2008 when computing the price-based-risk score. We then run a pooled regression of each year's risk-taking measure on lagged residual pay, which we calculate using the previous three years worth of compensation data. The results are both statistically significant, with much larger economic magnitudes for the price-based score compared to the book-based score. One standard deviation of residual compensation is associated with 0.33-SDs of our price-based risk score in the following year (0.6240 [1 SD of residual compensation in the pooled sample] * 0.4625 [slope] / 0.8736 [1 SD of price-based risk-score]), while the relationship is only 0.18-SDs using the book-based risk score (0.6240 [1 SD of residual compensation in the pooled sample] * 0.2078 [slope] / 0.7353 [1 SD of book-based risk-score]). The bulk of the analysis tells us that our results are not an artifact of how we cut the sub-periods in our analysis.

D. Is it Short-Termism?

We investigate whether our residual pay measure is related to short-termist incentives in two ways. First, in Table 8, we look at the different components of pay and find that both bonuses and equity compensation are correlated with risk-taking, consistent with earlier empirical literature which finds that bonuses and equity compensation motivate short-term behavior.[21] Although statistical significance in this exercise is more limited, and thus we use caution in interpreting our results, we find that, consistent with concerns about bonuses and risk-taking, a one-standard deviation increase in (residual) bonuses in 1998-2000 is associated with 0.21-SD increase in the price-based risk score (0.9369 [1-SD of residual bonus] x 0.1858 [slope] / 0.8467 [1-SD of price-based risk]), corroborating anecdotal evidence that short-termist bonus schemes are related to risk-taking.

In Table 9, we examine the hypothesis of short-term compensation explicitly by regressing risk-taking of firms on compensation while controlling for insider ownership on the presumption that insider ownership is a proxy for long-term incentives. If indeed compensation is capturing long-term pay incentives (as opposed to short-term pay as we suspect), then having insider ownership should mute our results and we should also expect insider ownership to predict risk-taking with the same sign as

[21] For these results which focus on components of pay, we always use the same list of top 5 executives as we used in constructing our baseline residual compensation measure.

compensation. We measure insider ownership by the average percentage of shares held by the top 5 five executives in 1992-1994 and 1998-2000 in the early and late periods, respectively.

Our baseline findings on compensation remain even after controlling for insider ownership. Our point estimates on the association between residual compensation and our average price risk score are remarkably similar, and the statistical and economic significance are also of similar magnitudes. We find some evidence that insider ownership tends to mitigate risk-taking. Importantly, higher insider ownership was qualitatively associated with higher returns in both periods, reinforcing the view that compensation provided short-term incentives while insider ownership provided long-term incentives. Although the effect is not statistically significant, in economic terms, a one-standard deviation increase in 1998-2000 insider ownership is associated with a 0.20-standard deviation increase in buy-and-hold returns in 2001-2008 ([0.0778 [1 SD of insider ownership] x 2.1423 [slope] / 0.8423 [1 SD of cumulative returns] = 0.20), or 16.7-percentage points. Because we are concerned about how insider ownership scales with firm size, we introduce an additional control for market capitalization and find effects of similar statistical significance and economic magnitude (not reported). Another concern is that the percentage of shares held does not appropriately capture explicit pay-for-performance incentives (Hall and Liebman, 1998). Alternatively, we measure insider ownership using the dollar stake (as in Fahlenbrach as Stulz, 2009) and we find no significant effect from ownership when including a size control. Importantly, residual compensation predicts risk-taking regardless of which insider ownership measure we use. This additional evidence indicates that our risk-taking results are being driven by short-termism.

E. Is it Mis-Governance?

In Table 10, we ask whether our results are due to mis-governance or entrenchment. We relate our average price risk score measure with various measures of governance on the right-hand side. The measures of governance that we examine are measures of entrenchment (Gompers, Ishii and Metrick, 2003; and Bebchuk, Cohen and Ferrell, 2009), board independence (the percentage of outside directors on the board), and board size (Yermack, 1996). We consistently find that none of these standard measures of governance predict risk-taking, nor are they associated with our measure of residual compensation. Specifically, entrenchment measures do not predict risk-taking, nor, surprisingly,

cumulative returns in either period.[22] The exception is that the E Index is negatively correlated with price-based risk-taking in the early period. The negative correlation suggests that managers who were more entrenched (i.e., managed firms with weaker shareholder rights) are associated with less risk-taking.

Thus, weaker shareholder rights are not associated with high residual compensation or subsequent risk-taking in either the early or late periods. Our results on board composition and board size reinforce this non-correlation result – neither is statistically correlated with residual compensation or risk. The economic significance of board composition is also not significant: a one-standard deviation (16-percent) increase in the percentage of outsiders on a board (the mean is 64% in the late period) is actually associated with a 0.11-standard deviation increase in price risk exposure (0.1604 [1 SD of percentage outsiders] x 0.5816 [slope] / 0.8467 [1 SD of price-based risk] = 0.11). Overall, we consistently find that the percentage of outsiders on the board does not predict subsequent risk-taking, or even returns, during the late period when the crisis occurs.[23]

F. Is It Heterogeneous Investor Preferences?

Finally, we explore the idea derived from our quant-bubble and cowboy culture hypotheses, that risk-taking and executive compensation may be related to heterogeneous shareholder preferences. We consider two measures of shareholder preferences. The first is institutional ownership. Institutional investors such as mutual funds are thought to have shorter-horizons due to agency problems. The idea then is that these institutional investors want certain firms to take more risks and hence give them short-term incentives to do so. The second is stock turnover. Turnover is an important proxy for speculative activity in financial markets (Hong and Stein, 2007). Stocks with higher turnover can be thought of as being traded by short-termist investors who are perhaps all too happy to let management incentivize themselves to take risks.

Table 11 Panel A presents the formal regression results relating residual compensation, our price-based risk score, and return outcomes to institutional ownership and share turnover. We start with the institutional ownership results. Note that there is significant variation in average institutional

[22] One concern may be that the entrenchment measures may not relate linearly to risk-taking. We repeat our analysis by analyzing risk-taking among "Democracy" firms (firms with G Index less than or equal to 5) and "Dictatorship" firms (firms with G Index greater than or equal to 14) and also find no relationship with risk-taking.

[23] We do, however, acknowledge that there is endogeneity in board composition (Hermalin and Weisbach 1998), and that factors other than board independence such as financial expertise may be important.

ownership. Institutional ownership (averaged over the 12 quarters of 1992-1994 within firms and then across firms) averaged 46% with a standard deviation of 17%; the corresponding numbers in 1998-2000 are a mean of 46% and standard deviation of 18%. The interquartile ranges were 25% and 26% in the early and late periods, respectively. Institutional ownership is linked to residual compensation at the 1% level in the late period. In economic terms, a one-standard deviation increase in institutional ownership is associated with a 0.29-standard deviation increase in residual compensation (0.1802 [1 SD of institutional ownership] x 1.0353 [slope] / 0.6428 [1 SD of residual pay] = 0.29). This relationship is even stronger in the early period, where the economic relationship is 0.35-standard deviations in residual compensation for one standard deviation in institutional ownership (0.1684 [1 SD of institutional ownership] x 1.0153 [slope] / 0.4898 [1 SD of residual pay] = 0.35). Institutional ownership and price-based risk-taking scores also positively covary, with one standard deviation in institutional ownership accounting for 0.19-standard deviations of price-based risk-taking in the late period. In terms of returns, one standard deviation of institutional ownership is associated with 11% lower returns in the late period.

We next turn to share turnover results. We compute the average monthly stock turnover in the 36 months of 1992-1994 (1998-2000) and then relate this to residual compensation and subsequent risk-taking in 1995-2000 (2001-2008). From the summary statistics for our measure of speculative activity in Table 1 (cont), there is significant heterogeneity in share turnover – the mean monthly share turnover among stocks in the 1998-2000 period was 8% with a standard deviation of 4%, ranging from 2% (the minimum) to 23% (the maximum). Even in the early period, before the height of the dot-com bubble, the standard deviation of monthly turnover was 4%, with a maximum of 19%. Residual compensation and risk-taking are statistically and economically significantly related to stock turnover. In particular, a one-standard deviation increase in average monthly stock turnover is associated with a 0.30-standard deviation increase in residual compensation in the late period (0.0417 [1 SD of stock turnover] x 4.6843 [slope] / 0.6428 [1 SD of residual pay] = 0.30), an effect that is significant at the 5% level. There is also positive link between share turnover and risk-taking. For instance, high share turnover in 1998-2000 predicts a high price-based risk score 2001-2008, with one standard deviation of share turnover being associated with 0.42-standard deviations of price-based risk. Because we are concerned that we may be introducing a scale effect in using share turnover (which is a ratio of volume over shares outstanding) as a proxy for speculative activity, we add a control for market capitalization and find remarkably similar results (not reported for brevity). For example, even after controlling for size, a one-standard deviation increase in share turnover in the late period is associated with a 0.38-standard deviation increase in the

price-based risk score, and is significant at the 5% level. We repeat this exercise in controlling for size in our institutional ownership regressions and also find similar results.

In results not reported here, when we run a horse race between institutional ownership and stock turnover, institutional ownership emerges as the more significant variable, though both variables retain the right sign. The only issue is that these two variables are highly correlated and so we might worry a bit about multi-collinearity in interpreting such a multiple regression. In sum, broadly, the findings in Panel A support the implication from the quant-bubble and cowboy culture story that heterogeneous investor preferences for risk-taking play a key role in the observed correlation between residual compensation and risk-taking.

These two hypotheses are similar in spirit but do differ in their predictions in subtle ways. For instance, the quant-bubble story has an implication that high residual compensation firms ought to also be high valuation firms similar to dot-com stocks. In Table 11 Panel B, we ask if it fact that high residual compensation firms are like the growth firms of finance. One way to examine this hypothesis is to see whether our compensation/risk-taking correlation is just due to growth options, proxied by a firm's market/book ratio. Under this hypothesis, market/book should be positively correlated with subsequent risk-taking. Here we present results where we include in our regressions of risk-taking and compensation a firm's market/book and market capitalization at the end of each ranking period. Importantly, our results for residual compensation still hold. In contrast, for our average price risk measure, a firm's market/book has limited explanatory power in comparison. The proviso in this analysis is that market-to-book is typically a poor measure of finance firm valuations.

Broadly, the evidence supports a story where short-term investors incentivize management using short-term incentives to take large bets on risky propositions. This alternative does not necessarily imply that managers were fully aware of their risks. If shareholders in certain firms want their managers to take risks they will offer appropriate contracts. Managers will also select themselves into these firms. Ceteris paribus, these firms will end up with managers that have more tolerance for risks or that do not fully perceive risks. As an example, one might think that Joseph Casano (of AIG FP) or Stanley O'Neal were ideal managers for stockholders that wanted their firms to take a lot of risk.

We also stress that we do not view this hypothesis as incompatible with the hypothesis that entrenchment is a significant problem that led to the crisis, but in light of the non-correlation between shareholder rights and both risk-taking and price performance, at a minimum our results suggests that further research should explore investor preferences as an alternative hypothesis to failures of

governance. Indeed, the following quote by Michael Lewis (2004) nicely sums up the viewpoint derived from these findings:

> *"The investor cares about short-term gains in stock prices a lot more than he does about the long-term viability of the company. Indeed, he does not seem to notice that the two goals often conflict. ... The investor, of course, likes to think of himself as a force for honesty and transparency, but he has proved, in recent years, that he prefers a lucrative lie to an expensive truth. And he's very good at letting corporate management know it."*

V. Conclusion

It is worth restating again the lack of causal statements in this analysis. What this analysis points to is that there is important heterogeneity across firms in risk-taking (i.e. Bear Stearns, Lehman and Citigroup have been previously skating on the edge and have come close to failing before the most recent events) and importantly, this is very correlated with persistent compensation practices that emphasize short-term pay in the form of bonuses and options. While not causal, our analysis suggests a beginning in terms of being able to quantify these issues and making perhaps more nuanced statements regarding the relationship between short-term pay and risk-taking.

Our analysis further points to the role of heterogeneous shareholder preferences for short-termism and risk-taking as an important determinant in the behavior of the firms. That is, our findings indicate that heterogeneity of firm compensation and risk-taking behavior are not related to entrenchment per se but sorting of investors with like preferences into these firms. Although our analysis cannot point to whether the shareholders gave management or the firm the right level of short-term incentives, they do point to the importance of short-term incentives or related efficiency wages in bringing about higher levels of risk-taking. To the extent that risk-taking is difficult to measure ex-ante, restrictions on pay may play a role in mitigating potential taxpayer losses from too-big-to-fail firms.

Our paper also suggests that deeper research into the nature of implicit incentives, peer effects, and organizational structure might bear fruit as far as understanding risk-taking by finance firms. More specifically, we have focused on cross-firm differences in risk-taking but one implication of our analysis is the vital role of competition among finance firms and the extent to which competition led to excessive risk-taking. Further work along these lines is likely to yield considerable insights.

References

Adams, R. (2009): "Governance and the Financial Crisis," SSRN Paper 1398583.

Adrian, Tobias, and H. S. Shin (2009): "Liquidity and Leverage," Federal Reserve Bank of New York Staff Reports, January 2009.

Baker, G. P., and B. J. Hall (2004): "CEO Incentives and Firm Size," Journal of Labor Economics, 22(4), 767-798.

Bebchuk, L., A. Cohen, and A. Ferrell (2009): "What Matters in Corporate Governance?," Forthcoming RFS 2009.

Bebchuk, L. A., J. M. Fried, and D. I. Walker (2002): "Managerial Power and Rent Extraction in the Design of Executive Compensation," University of Chicago Law Review, 69(3), 751-846.

Bergstresser, D., and T. Philippon (2006): "CEO Incentives and Earnings Management," Journal of Financial Economics, 80(3), 511-529.

Bolton, P., J. Scheinkman, and W. Xiong (2006): "Executive Compensation and Short-Termist Behaviour in Speculative Markets," Review of Economic Studies, 73(3), 577-610.

Burns, N., and S. Kedia (2006): "The Impact of Performance-Based Compensation on Misreporting," Journal of Financial Economics, 79(1), 35-67.

Brunnermeier, M. (2009): "Deciphering the Liquidity and Credit Crunch: 2007-2008," Journal of Economic Perspectives, 23(1), 77-100.

Chomsisengphet, S., and A. Pennington-Cross (2006): "The Evolution of the Subprime Mortgage Market," Federal Reserve Bank of St. Louis Review, 88(1), 31-56.

Core, J., and W. Guay (1999): "The Use of Equity Grants to Manage Optimal Equity Incentive Levels," Journal of Accounting and Economics, 28(2), 151-184.

Coval, J., J. Jurek, and E. Stafford (2009): "The Economics of Structured Finance," Journal of Economic Perspectives, 23(1), 3-25.

Edmans, A., X. Gabaix and A. Landier (2009): "A Multiplicative Model of CEO Incentives in Market Equilibrium," Review of Financial Studies, 22(12), 4881-4917.

Erkens, D., M. Hung, and P. Matos (2009): "Corporate Governance in the Recent Financial Crisis: Evidence from Financial Institutions Worldwide," SSRN Paper 1397685.

Fahlenbrach, Rudiger and Rene Stulz (2009): "Bank CEO Incentives and the Credit Crisis," Ohio State Working Paper.

Froot, K., A. Perold and J. Stein (1992): "Shareholder Trading Practices and Corporate Investment Horizons," Journal of Applied Corporate Finance, 5, 42-58.

Gabaix, X., and A. Landier (2008): "Why Has CEO Pay Increased So Much?," Quarterly Journal of Economics, 123(1), 49-100.

Gompers, P., J. Ishii, and A. Metrick (2003): "Corporate Governance and Equity Prices," Quarterly Journal of Economics, 116(1), 107-155.

Graham, J. R., C. R. Harvey, and S. Rajgopal (2005): "The Economic Implications of Corporate Financial Reporting," Journal of Accounting and Economics, 40(1), 3-73.

Hall, B. J., and J. B. Liebman (1998): "Are CEOs Really Paid Like Bureaucrats?," Quarterly Journal of Economics, 63(3), 653-691.

Hall, B. J., and K. J. Murphy (2003): "The Trouble with Stock Options," Journal of Economic Perspectives, 17(3), 49-70.

Healy, P. M. (1985): "The Effect of Bonus Schemes on Accounting Decisions,""Journal of Accounting and Economics, 7, 85-107.

Hermalin, B., and M. Weisbach (1998): "Endogenously Chosen Boards of Directors and Their Monitoring of the CEO," American Economic Review, 88(1), 96-118.

Himmelberg, C. P., R. G. Hubbard, and D. Palia (1999): "Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance," Journal of Financial Economics, 53(3), 353-384.

Hong, Harrison and Jeremy C. Stein (2007): "Disagreement and the Stock Market," (with Harrison Hong), Journal of Economic Perspectives, 21, pp. 109-128.

Jensen, M. C., and K. J. Murphy (1990): "Performance Pay and Top-Management Incentives," Journal of Political Economy, 98(2), 225-264.

Kaplan, S.N. (2008): "Are US CEOs Overpaid?," The Academy of Management Perspectives, 22(2), 5-20.

Kaplan, S. N., and B. A. Minton (2006): "How Has CEO Turnover Changed? Increasingly Performance Sensitive Boards and Increasingly Uneasy CEOs," Working Paper.

Keys, B. J., T. Mukherjee, A. Seru, and V. Vig (2009): "Financial Regulation and Securitization: Evidence from Subprime Loans," Forthcoming Journal of Monetary Economics.

Laeven, L., and R. Levine (2008): "Corporate Governance, Regulation, and Bank Risk Taking," Journal of Financial Economics, forthcoming.

Lewis, Michael (2004): "The Irresponsible Investor," New York Times Magazine, June 6 2004, Online at http://www.nytimes.com/2004/06/06/magazine/the-irresponsible-investor.html.

Long, J. S., and L. H. Ervin (2000): "Using Heteroskedasticity-Consistent Standard Errors in the Linear Regression Model," The American Statistician, 54(3), 217-224.

Longstaff, F. A. (2010): "The Subprime Credit Crisis and Contagion in Financial Markets," Journal of Financial Economics, Forthcoming.

MacKinnon, J. G., and H. White (1985): "Some Heteroskedasticity-Consistent Covariance Matrix Estimators with Improved Finite Sample Properties," Journal of Econometrics, 29(3), 305-325.

Mehran, H. and J. Rosenberg (2007): "The Effect of CEO Stock Options on Bank Investment Choice, Borrowing, and Capital," Working paper, Federal Reserve Bank of New York.

Murphy, K. J. (1999): "Executive Compensation," in Handbook of Labor Economics, vol. 3, pp. 2485-2563. Elsevier.

-------- (2000): "Performance Standards in Incentive Contracts," Journal of Accounting and Economics, 30(3), 245-278.

Parrino, R., R. W. Sias, and L. T. Starks (2003): "Voting With Their Feet: Institutional Ownership Changes Around Forced CEO Turnover," Journal of Financial Economics, 68(1), 3-46.

Shumway, T. (1997): "The Delisting Bias in CRSP Data," Journal of Finance, 52(1), 327-340.

Stein, Jeremy C. (1989): "Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior," Quarterly Journal of Economics, 104, 655-669.

Stein, Jeremy C. (2003): "Agency, Information and Corporate Investment," in Handbook of the Economics of Finance, edited by George Constantinides, Milt Harris and René Stulz, pp. 111-165. Elsevier.

UK House of Commons, Treasury Committee (2009): "Banking Crisis: Reforming Corporate Governance and Pay in the City." Ninth report of the session 2008-2009. http://www.publications.parliament.uk/pa/cm200809/cmselect/cmtreasy/519/519.pdf

Yermack, D. (1996): "Higher Market Valuation of Companies with a Small Board of Directors," Journal of Financial Economics, 40(2), 185-2

Table 1: Summary Statistics

We report summary statistics for our measures of executive compensation, residual compensation, market capitalization, and risk-taking measures in two cross-sections, the "early" and "late" periods. Panel A reports summary statistics for average executive compensation in 1992-1994 as well as summary statistics of measures of subsequent risk-taking for those firms. Panel B reports summary statistics for the late period, where we compute residual compensation in 1998-2000 and risk-taking in 2001-2008. To obtain residual executive compensation, we take residuals from a regression of log executive compensation on log market capitalization in the two periods, as described in Table 2.

Period	Variable	Mean	SD	Skew.	Min.	Max.	Median	IQR	Obs.
Panel A:	**Early Period**								
1992-1994	Log Executive Compensation	6.8458	0.8007	0.8138	5.3425	9.5278	6.6358	1.1858	153
1992-1994	Residual Executive Compensation	0.0000	0.4898	0.5309	-1.8252	1.8203	-0.0450	0.5330	153
1994	Log Market Capitalization	14.0522	1.2487	0.3242	11.7479	17.2487	13.9770	2.1286	153
1994	Market/Book	1.3531	0.5096	1.6648	0.4848	3.7748	1.2649	0.5136	150
1995-2000	Market Beta	0.8769	0.3337	0.4010	0.2467	1.7046	0.8396	0.4403	144
1995-2000	Daily Return Volatility	0.3121	0.0676	1.2175	0.1886	0.6039	0.3036	0.0803	144
1995-2000	Price-Based Risk Measure	0.0000	0.8416	0.4721	-1.8580	2.5273	-0.0379	1.1032	144
1995-2000	Cumulative Excess Return	0.9679	1.9455	1.2705	-2.4495	7.3019	0.5071	1.8655	153
1995-2000	Non-GSE MBS Exposure	0.0107	0.0172	3.0096	0.0000	0.1081	0.0027	0.0155	87
1995-2000	Average Book Leverage	11.9104	5.5474	1.1885	1.9636	35.6819	12.1684	4.7500	150
1995-2000	Book-Based Risk Measure	0.0000	0.7487	1.8509	-1.3260	3.4975	-0.1202	0.7187	87
Panel B:	**Late Period**								
1998-2000	Log Executive Compensation	7.5482	1.0677	0.6363	5.5075	10.9156	7.3945	1.4058	152
1998-2000	Residual Executive Compensation	0.0000	0.6428	0.3802	-2.4599	2.4425	-0.0554	0.7314	152
2000	Log Market Capitalization	14.9982	1.7319	-0.2049	8.4239	19.2508	14.9240	2.3085	152
2000	Market/Book	2.4321	1.3729	1.3553	0.0849	7.7388	2.0995	1.3413	148
2001-2008	Market Beta	1.1225	0.3312	0.5532	0.4071	2.0293	1.0777	0.4304	137
2001-2008	Daily Return Volatility	0.4520	0.2550	2.4797	0.2131	1.5201	0.3710	0.1626	137
2006-2008	ABX Exposure	0.0538	0.2483	1.1701	-0.6950	1.0746	0.0186	0.2012	105
2001-2008	Price-Based Risk Measure	0.0000	0.8467	1.5762	-1.2877	3.6500	-0.2227	0.8880	105
2001-2008	Cumulative Excess Return	0.2062	0.8423	0.9627	-1.2520	3.1201	0.0864	1.0546	151
2001-2008	Non-GSE MBS Exposure	0.0227	0.0344	2.8727	0.0000	0.2111	0.0104	0.0243	80
2001-2008	Average Book Leverage	10.9642	5.0982	1.0049	1.8274	30.0476	10.9519	5.0491	145
2001-2008	Book-Based Risk Measure	0.0000	0.7564	1.9344	-1.6514	3.9772	-0.1507	0.8684	79

Table 1: Summary Statistics (Continued)

We report summary statistics for our measures of insider ownership, governance, and stock turnover in our two cross-sections, the "early" and "late" periods. Panel A reports summary statistics for the early cross-section (1992-1994). Panel B reports summary statistics for the late cross-section, where insider ownership, governance and turnover are computed in 1998-2000.

Period	Variable	Mean	SD	Skew.	Min.	Max.	Median	IQR	Obs.
Panel A:	**Early Period**								
1992-1994	Insider Ownership	0.0366	0.0535	4.1138	0.0000	0.4592	0.0168	0.0372	147
1992-1994	G Index	9.8983	2.7250	-0.1980	3.0000	16.0000	10.0000	4.0000	118
1992-1994	E Index	2.5882	1.3798	-0.2379	0.0000	5.0000	2.6667	2.0000	85
1992-1994	Average Monthly Stock Turnover	0.0651	0.0387	1.1454	0.0092	0.1881	0.0563	0.0460	153
1992-1994	Average Institutional Ownership	0.4647	0.1684	-0.1401	0.1087	0.7858	0.4899	0.2515	153
Panel B:	**Late Period**								
1998-2000	Insider Ownership	0.0515	0.0778	3.4634	0.0017	0.5345	0.0223	0.0389	150
1998-2000	G Index	9.4074	2.9378	-0.1137	2.0000	15.6667	9.8333	4.6667	126
1998-2000	E Index	2.5468	1.5092	0.0595	0.0000	6.0000	2.3333	2.6667	114
2000	% Outside Directors	0.6408	0.1604	-0.4651	0.1667	0.9231	0.6641	0.2451	128
2000	Board Size	13.1354	4.3714	0.4138	6.0000	25.0000	13.0000	6.6667	128
1998-2000	Average Monthly Stock Turnover	0.0774	0.0417	1.3981	0.0176	0.2285	0.0705	0.0428	152
1998-2000	Average Institutional Ownership	0.4558	0.1802	0.3477	0.1482	0.8730	0.4530	0.2588	152

Table 2: Residual Executive Compensation

Panel A reports OLS estimates of a regression where log executive compensation is the dependent variable and log market capitalization is the independent variable. We run these regressions in two periods, the "early period" (1992-1994) and "late period" (1998-2000), where we allow for primary dealer, banks/lenders/BHC, and insurer fixed effects, and for an insurer-specific slope. We compute executive compensation by averaging the total compensation of the top five executives for each firm-year and then averaging this over the three years within each window. We measure market capitalization on December 31 in the last year of each period. Panel B reports means and standard deviations for executive compensation by each sub-industry. Panel C reports the correlation between residual executive compensation from the early period and the late period. HC3-robust standard errors are reported below each coefficient. Robust standard errors are reported. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

Panel A: Executive Compensation and Firm Size

Log Executive Compensation	**Early Period 1992-1994**	**Late Period 1998-2000**
Log Market Capitalization	0.4712***	0.4730***
	[0.0444]	[0.0766]
Log Market Capitalization (Insurers)	-0.3104**	-0.3167**
	[0.1432]	[0.1437]
Primary Dealers	0.6632**	1.0335***
	[0.2687]	[0.3255]
Insurers	4.2608**	4.7601**
	[1.9125]	[2.1195]
Constant	0.1737	0.3602
	[0.6150]	[1.1681]
Observations	153	152
R-squared	0.6259	0.6376

Panel B: Means and Standard Deviations by Industry

		Early Period 1992-1994		**Late Period 1998-2000**	
		Executive Compensation	Log Market Capitalization.	Executive Compensation	Log Market Capitalization.
Primary Dealers	Mean	8.1251	15.4660	9.6240	17.3993
	SD	0.9153	0.9803	0.9989	1.1481
	N	15	15	11	11
Banks, Lenders and BHCS	Mean	6.7105	13.8713	7.3719	14.8231
	SD	0.6725	1.0850	0.9261	1.4913
	N	113	113	106	106
Insurers	Mean	6.6895	14.0214	7.4297	14.7738
	SD	0.5719	1.5542	0.7846	2.0130
	N	25	25	35	35

Panel C: Correlation of Residual Executive Compensation

Residual Executive Compensation	**1992-1994**
1998-2000	0.6898***
	N=79

Table 3: Firms Ranked by Residual Compensation

We track the within-industry quintile ranking (5=highest, 1=lowest) of residual executive compensation of firms who played prominent roles in the financial crisis. We find firms in the "late period" (1998-2000) and track what their ranking was in the early period (1992-1994). Names and tickers correspond to names and tickers that applied in the late period (1998-2000); we note changes in names and tickers when applicable. Residual compensation is computed by regressing executive compensation on market capitalization in each period (results reported in Table 2) and taking the residual.

Panel A: Primary Dealers

Company	Late Period (1998-2000)	Early Period (1992-1994)
Bank of America (BAC) -Previously Nations Bank (NB)	2	NB: 3 BAC: 1
Bear Stearns (BSC)	5	5
Chase Manhattan (CMB) -Previously Chemical Banking (CHL) -Subsequently acquires JP Morgan (JPM)	4	CHL: 2 CMB: 1
Citigroup, Inc. (C) -Previously Travelers, Inc. (TRV)	4	5
Goldman Sachs Group, Inc. (GS)	3	.
JP Morgan & Co. (JPM)	1	4
Lehman Brothers (LEH)	5	.
Merrill Lynch & Co. (MER)	2	4
Morgan Stanley Dean Witter & Co. (MWD) -Previously Morgan Stanley Group (MS) -Subsequently changes ticker back to MS	3	4
Total # of Firms	11	15

Panel B: Banks, Lenders, and Bank Holding Companies

Company	Late Period (1998-2000)	Early Period (1992-1994)
Countrywide Credit (CCR) -Later Countrywide Financial Corp. (CFC)	5	5
Wells Fargo & Co. (WFC) -Previously Norwest Corp. (NOB)	3	NOB: 5 WFC: 3
Wachovia Corp. (WB)	4	1
Washington Mutual, Inc. (WM)	2	3
Total # of Firms	106	113

Panel C: Insurers

Company	Late Period (1998-2000)	Early Period (1992-1994)
American International Group, Inc.	5	5
AMBAC Financial, Inc.	3	.
Berkshire Hathaway, Inc.	1	1
MBIA, Inc.	5	.
Total # of Firms	35	25

Table 4: Residual Executive Compensation, CEO Turnover, and Past Returns

The first two columns of Panel A report results from an OLS regression where the dependent variable is a firm's within-industry quintile ranking of residual compensation in 1998-2000 and the independent variables are the firm's ranking in 1992-1994, returns in 1995-1997 and an indicator for CEO turnover in 1995-1997. The third column reports results from a regression where the dependent variable is the absolute changes in the rankings between the early and late periods, and where the independent variables are the ranking in 1992-1994 and an indicator for CEO turnover during 1995-1997. Panel B analyzes attrition from the top and bottom quintiles. It reports results from a regression where the dependent variable is the absolute change in ranking between the early and late periods, and the independent variables are returns and an indicator variable for CEO turnover between the two periods. The first column restricts attention to firms who were ranked in the highest quintile in 1992-1994 and the second column restricts attention to firms who were in the bottom quintile. Panel C repeats the exercise in Panel A using raw residual compensation as the dependent variable. HC3 robust standard errors are reported in brackets below each coefficient except for Panel B, where we use the homoskedastic OLS standard error to avoid extreme small-sample bias. For all standard errors and hypothesis tests, we apply a degree-of-freedom adjustment to account for sampling error in estimating residual executive compensation. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

Panel A: Within-Industry Quintile Rankings (N=79)

	Ranking (1998-2000)	Ranking (1998-2000)	Abs(Diff.) (Late-Early)
Ranking. (1992-1994)	0.5087***	0.4805***	-0.0764
	[0.1006]	[0.1129]	[0.0948]
Returns (1995-1997)		0.1995	
		[0.2411]	
CEO Turnover (1995-1997)		-0.2654	0.0849
		[0.4180]	[0.2755]
Constant	1.5306***	1.4228***	1.2689***
	[0.3380]	[0.3863]	[0.3246]
R-Squared	0.2480	0.2638	0.0149

Panel B: Attrition from Highest and Lowest Quintiles (N= 15 and 14)

Abs(Change in Ranking)	Firms in Highest Pay Quintile, 1992-1994	Firms in Lowest Pay Quintile, 1992-1994
Returns (1995-1997)	-0.0273	0.034
	[0.1807]	[0.2251]
CEO Turnover (1995-1997)	(omitted – all	0.4318
	equal to 0)	[0.5409]
Constant	0.439	0.5459
	[0.3107]	[0.3188]
R-Squared	0.0028	0.0960

Panel C: Raw Residual Executive Compensation (N=79)

	Resid. Comp. (1998-2000)	Resid. Comp. (1998-2000)	Abs(Diff.) (Late-Early)
Residual Comp. (1992-1994)	0.8374***	0.8373***	0.0231
	[0.1417]	[0.1548]	[0.0629]
Returns (1995-1997)		-0.0093	
		[0.0884]	
CEO Turnover (1995-1997)		-0.038	-0.0442
		[0.1361]	[0.0732]
Constant	0.0071	0.0243	0.3804***
	[0.0547]	[0.1307]	[0.0367]
R-Squared	0.4758	0.4765	0.0062

Table 5: Residual Executive Compensation and Risk-Taking

We report results from OLS regressions where the dependent variables are our risk-taking measures and the independent variable is residual executive compensation. The first column reports results where we run these regressions for our early cross-section, and the second column reports results for our late cross-section. In the early cross-section, residual compensation is computed in 1992-1994 and our risk-taking measures are computed in 1995m1-2000m12. For the late cross-section, residual compensation is computed in 1998-2000 and our risk-taking measures are computed in 2001m1-2008m12, with the exception of Exposure to ABX, which is computed from 19Jan06-31Dec08. Panel A contains regressions for our price-based risk measures. The CRSP VW Beta is the beta of firm returns with returns to the CRSP value-weighted market return (including dividends), computed from daily data. Return volatility is the volatility of daily returns over the risk-free rate annualized to one trading year (252 days). Exposure to ABX is the coefficient from a regression of returns over the risk-free rate on returns to the ABX AAA tranche, controlling for the excess market return, computed using daily return data. The price-based risk-score is an equal-weighted average of the z-scores of the above three measures. Panel B contains regressions for return outcomes. Cumulative excess returns are the buy-and-hold returns in excess of the market over that period. Panel C contains regressions for our book-based risk measures. Exposure to MBS is defined as total holdings of mortgage-backed securities not issued or guaranteed by government-sponsored entities divided by total balance sheet size. Book leverage is total book assets divided by the book value of stockholder's equity. The book-based risk-score is an equal-weighted average of the z-scores of the above two measures. HC3 robust standard errors are reported in brackets and R-squareds are reported in parentheses. For all standard errors and hypothesis tests, we apply a degree-of-freedom adjustment to account for sampling error in estimating residual executive compensation. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

OLS Coefficient on Residual Executive Compensation

Panel A: Price-Based Risk Measures

LHS	Early Period	Late Period
CRSP VW Beta	0.2205***	0.2049***
	[0.0573]	[0.0505]
	N=144	N=137
	(0.1054)	(0.1507)
Return Volatility	0.0503***	0.1280***
	[0.0107]	[0.0483]
	N=144	N=137
	(0.1337)	(0.0992)
Exposure to ABX		0.1541**
		[0.0603]
		N=105
		(0.1303)
Price-Based Risk-Score	0.7025***	0.6477***
	[0.1385]	[0.1425]
	N=144	N=105
	(0.1682)	(0.1980)

Panel B: Outcomes

	Early Period	Late Period
Cumulative Excess Returns	1.1002**	-0.3722***
	[0.4618]	[0.1052]
	N=153	N=151
	(0.0767)	(0.0809)

Panel C: Book-Sheet-Based Risk Measures

LHS	Early Period	Late Period
Exposure to MBS	0.0026	0.0079
	[0.0030]	[0.0059]
	N=87	N=80
	(0.0034)	(0.0143)
Book Leverage	1.4337	1.4289
	[1.6173]	[1.0969]
	N=150	N=145
	(0.0163)	(0.0331)
Book-Based Risk-Score	0.3818	0.1558
	[0.3070]	[0.1740]
	N=87	N=79
	(0.0392)	(0.0116)

Table 6: Results Broken Down By Finance Sub-Industries

We regress our price-based risk-score on residual compensation for various sub-industries. The dependent variables are our price-based risk-score and cumulative excess returns defined in Table 5, and the independent variable is residual executive compensation, defined in Table 2. We report results from six separate regressions: the early and early and late period cross-sections for each of the three groupings. The first row within each risk-taking measure reports results excluding the primary dealers from the sample, and the second row excludes the insurers. The third row within each risk-taking measure only includes banks and bank-holding companies, which are not primary dealers in the sample. The two columns represent the results of running these exercises in the early and late period cross-sections separately. HC3 robust standard errors are reported in brackets below each coefficient. For all standard errors and hypothesis tests, we apply a degree-of-freedom adjustment to account for sampling error in estimating residual executive compensation. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

OLS Coefficient on Residual Executive Compensation

LHS	Grouping	Early Period	Late Period
Price-Based Risk-Score	Excluding Primary Dealers	0.7462***	0.5400***
		[0.1428]	[0.1130]
	Excluding Insurers	0.8220***	0.6760***
		[0.1522]	[0.2293]
	Banks/BHCs Only	0.9445***	0.4312***
		[0.1389]	[0.1489]
Cumulative Excess Returns	Excluding Primary Dealers	0.9742**	-0.3718***
		[0.4864]	[0.1046]
	Excluding Insurers	1.2361**	-0.2575**
		[0.5383]	[0.1128]
	Banks/BHCs Only	1.1383*	-0.2418**
		[0.5964]	[0.1117]

Table 7: Robustness Checks

We regress our risk-taking measures on residual compensation under various robustness assumptions. Each row is a different robustness exercise and each column reports the results from an OLS regression with a different risk-taking measure as the dependent variable and residual compensation as the independent variable. In the first row, we use residual compensation computed from book asset values instead of market capitalization as the independent variable. The second row adds controls for leverage and market capitalization as independent variables in addition to residual compensation. The third row uses residual non-CEO executive compensation as the independent variable, obtained by regressing non-CEO executive compensation (top 5 excluding CEO) on market capitalization in each period and taking the residual. The fourth row repeats our exercise by using a sample of manufacturing firms (two-digit SIC 20-39) where we compute residual compensation along two-digit SIC codes. For manufacturing, the book-based risk score is simply the z-score for leverage, since holdings of MBS do not apply for these firms. In the fifth row, we check whether our results are sensitive to the cutoff period by first calculating each risk-taking measure (except for long-horizon returns) using only one year's worth of daily data. Then we run a pooled regression of each year's risk-taking measure on lagged residual compensation. Prior to 2006, we omit Exposure to ABX when computing the price-based risk score since it is not available. HC3 robust standard errors are reported in brackets under each coefficient except for the last row, where we cluster standard errors by firm. For all standard errors and hypothesis tests, we apply a degree-of-freedom adjustment to account for sampling error in estimating residual executive compensation. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

Robustness Exercise		Price-Based Risk Score	Cumulative Excess Return
Using book asset values when computing residual compensation	Early Period	0.6891***	0.8849**
		[0.1096]	[0.4168]
	Late Period	0.4455***	-0.3613***
		[0.1046]	[0.1121]
Controlling for book leverage and size in risk-taking regressions	Early Period	0.6408***	1.0093**
		[0.1328]	[0.4677]
	Late Period	0.4605***	-0.3576***
		[0.1376]	[0.1045]
Using only non-CEO executive compensation	Early Period	0.6802***	1.2073**
		[0.1412]	[0.4717]
	Late Period	0.6372***	-0.3758***
		[0.1495]	[0.1016]
Analysis on manufacturing industries	Early Period	0.1671**	0.4434**
		[0.0708]	[0.2069]
	Late Period	0.2340***	-0.0611
		[0.0552]	[0.1192]
Pooled Regression (1995-2008)		0.4625***	
		[0.0545]	

Table 8: Measuring Short-Termism with Bonuses

We report results from OLS regressions where the dependent variables are our risk-taking measures, defined in Table 5. For each risk-taking measure, we run a single regression where the independent variables are residual bonus, salary, and non-cash compensation. The first column reports results where we run these regressions for our early cross-section, and the second column reports results for our late cross-section. We compute residual bonus, salary, and non-compensation similar to how we compute residual compensation. For example, we measure bonus payouts by computing average bonus payouts to the top 5 executives for each firm-year and then average this over the three years within each window (1992-1994 for the early period, 1998-2000 for the late period). We then regress this on log market capitalization at the end of each period and take the residual. In all regressions, we include an indicator for whether or not a firm paid a bonus that year (coefficient not reported). HC3 robust standard errors are reported in brackets below each coefficient. For each regression, we apply a degree of freedom adjustment to correct for sampling error. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

OLS Coefficients

LHS	RHS	Early Period	Late Period
Price-Based Risk-Score	Residual Bonus	0.2549*	0.1858**
		[0.1367]	[0.0718]
	Residual Salary	-0.1742	-0.3549
		[0.2498]	[0.2595]
	Residual Non-Cash	0.3123***	0.3708***
		[0.1163]	[0.0954]
Cumulative Excess Returns	Residual Bonus	0.3982	-0.2659***
		[0.2652]	[0.0774]
	Residual Salary	0.0106	0.3952
		[0.6476]	[0.2800]
	Residual Non-Cash	0.4400*	-0.1372
		[0.2378]	[0.1100]

Table 9: Measuring Short-Termism by Controlling for Insider Ownership Stakes

We run OLS regressions of our risk-taking measures on residual compensation (defined in Table 2), controlling for insider ownership. The dependent variables are defined in Table 5. We measure insider ownership as the average percentage of shares plus delta-weighted options owned by the top 5 executives during each period. Delta-weights are computed using the Core and Guay (1999) methodology. Each column represents the results of these regressions separately for our early and late cross-sections. Coefficients are reported with HC3 robust standard errors in brackets. For the specification with residual compensation as the dependent variable, we apply a degree of freedom adjustment to account for sampling error. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

Risk-Taking Regressions Controlling for Insider Ownership

LHS	RHS	Early Period	Late Period
Price-Based Risk Score	Residual Comp.	0.7332***	0.6452***
		[0.1543]	[0.1518]
	Insider Ownership	-0.1264	-0.3042
		[1.8372]	[0.9727]
Cumulative Excess Returns	Residual Comp.	1.2215**	-0.3918***
		[0.4738]	[0.1222]
	Insider Ownership	1.9175	2.1423
		[3.1397]	[1.4485]

Table 10: Residual Compensation and Governance

In this table, we run OLS regressions of our risk-taking measures and residual compensation on governance measures. For each dependent variable, we report four rows of results corresponding to separate regressions using four different governance measures as independent variables. G-Index is the Gompers-Ishii-Metrick (2003) measure of managerial entrenchment. E-Index is the Bebchuk, Cohen and Ferrell (2008) measure of entrenchment. % Outside Directors is the percentage of outside directors who have no significant connection with the firm (classified as "Independent" by RiskMetrics). Board Size is the total number of directors in the firm. Each column represents the results of these regressions separately for our early and late cross-sections. Coefficients are reported with HC3 robust standard errors in brackets. For the specification with residual compensation as the dependent variable, we apply a degree of freedom adjustment to account for sampling error. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

Governance Regressions

LHS	Governance	Early Period	Late Period
Residual Compensation	G-Index	-0.0008 [0.0191]	0.0122 [0.0202]
	E-Index	-0.0499 [0.0541]	-0.0006 [0.0483]
	% Outside Directors		0.0031 [0.4512]
	Board Size		-0.0238 [0.0149]
Price-Based Risk Score	G-Index	-0.0090 [0.0335]	0.0039 [0.0342]
	E-Index	-0.1490** [0.0593]	-0.0596 [0.0627]
	% Outside Directors		0.5816 [0.6258]
	Board Size		-0.0171 [0.0220]
Cumulative Excess Returns	G-Index	-0.0136 [0.0710]	0.0025 [0.0324]
	E-Index	-0.0524 [0.1441]	0.0512 [0.0515]
	% Outside Directors		-0.3710 [0.3911]
	Board Size		0.0167 [0.0160]

Table 11: Compensation and Risk-Taking: Mediating Roles of Institutional Ownership and Stock Turnover

In Panel A, we regress our risk-taking measures and residual compensation on institutional ownership and stock turnover. The dependent variables are our risk-taking measures (defined in Table 5) and residual compensation (defined in Table 2). The independent variable in the first two columns is institutional ownership, where the first column is a regression for the early period and the second column for the late period. The independent variable in the third and fourth column is stock turnover in the early and late period, respectively. Institutional ownership is defined as the total shares held by institutions reporting in 13F statements divided by the number of shares outstanding averaged over the 12 quarters in 1992-1994 for the early period and 1998-2000 for the late period. Stock turnover is defined as the monthly volume divided by shares outstanding averaged over the 36 months in the early and late periods. In Panel B we run our risk-taking regressions where the dependent variable are our risk measures and outcomes and the independent variables are residual compensation with controls for market capitalization and market/book. HC3-robust standard errors are reported in brackets below each coefficient and R-squareds are reported in parentheses. For the specification with residual executive compensation as a dependent variable, we apply a degrees-of-freedom adjustment to account for sampling error. * denotes significant at 10%, ** denotes significant at 5%, and *** denotes significant at 1% level.

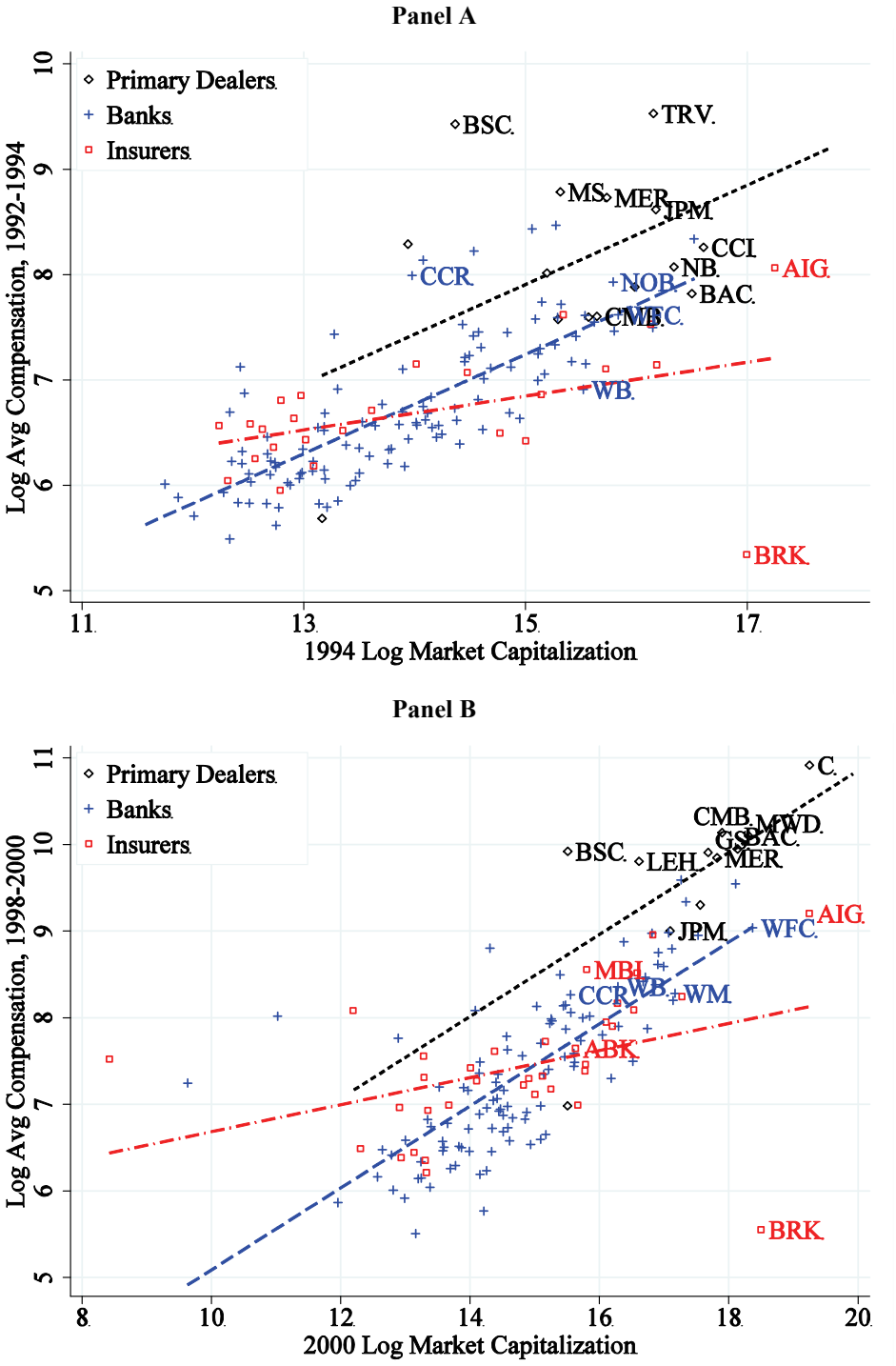
Panel A: Institutional Ownership and Stock Turnover

	Institutional Ownership		Stock Turnover	
LHS	**Early Period**	**Late Period**	**Early Period**	**Late Period**
Residual Executive Compensation	1.0153***	1.0353***	2.2346**	4.6843**
	[0.2531]	[0.2722]	[1.1026]	[1.7976]
	N=153	N=152	N=153	N=152
	(0.1219)	(0.0842)	(0.0312)	(0.0922)
Price-Based Risk Score	1.7654***	0.9075**	3.8004*	8.4264**
	[0.3707]	[0.3799]	[1.9764]	[3.2328]
	N=144	N=105	N=144	N=105
	(0.1283)	(0.0416)	(0.0314)	(0.1600)
Cumulative Excess Returns	2.7324***	-0.6353*	1.3348	-3.6020***
	[0.9606]	[0.3468]	[3.0793]	[1.2847]
	N=153	N=151	N=153	N=151
	(0.0559)	(0.0186)	(0.0007)	(0.0311)

Panel B: Risk-Taking and Market-Book

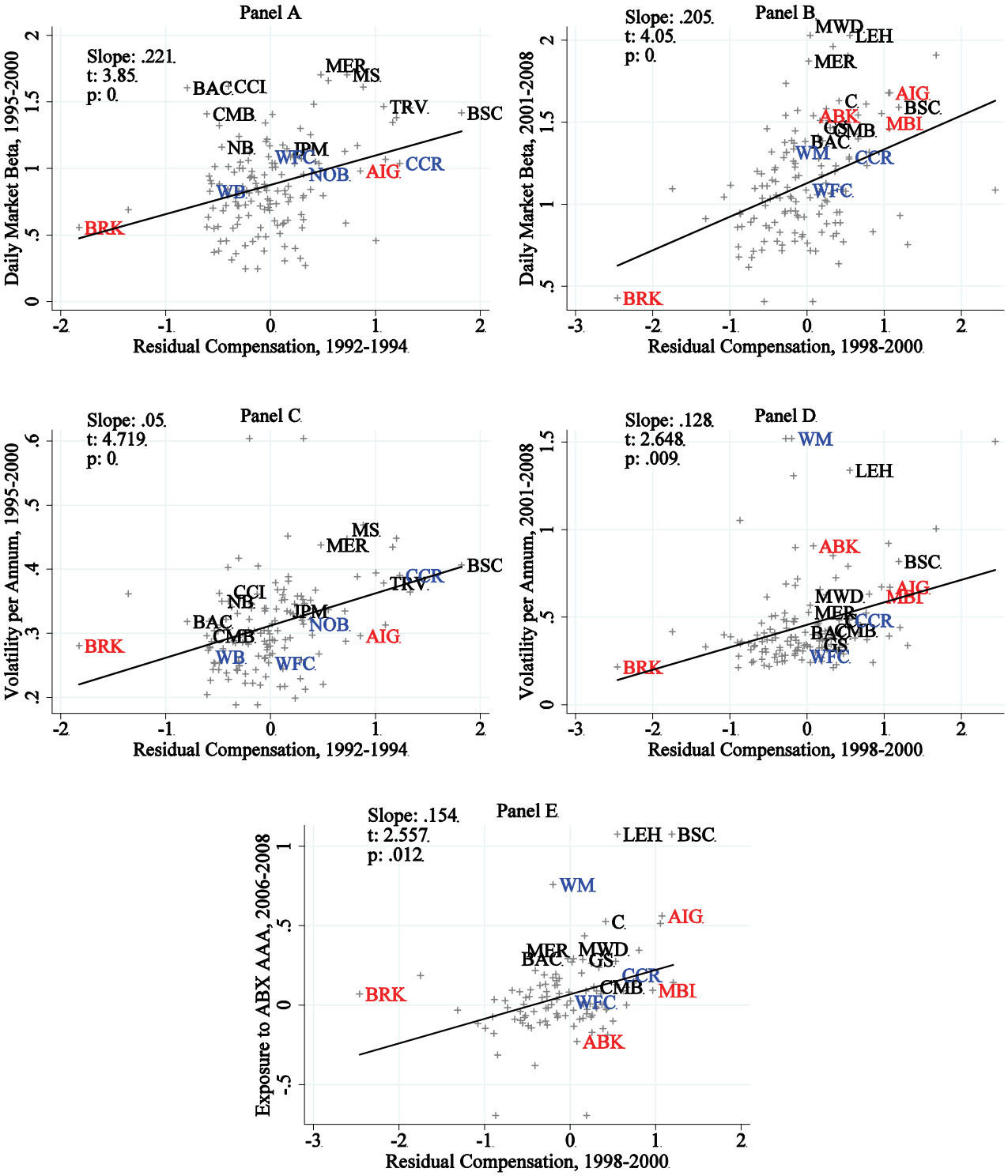
LHS	RHS	Early Period	Late Period
Price-Based Risk Score	Residual Compensation	0.7003***	0.5725***
		[0.1380]	[0.1622]
	Log Market Capitalization	0.2677***	0.1576***
		[0.0589]	[0.0523]
	Market/Book	-0.0851	-0.0782
		[0.1491]	[0.0501]
	N	144	105
	R-Squared	0.321	0.2737
Cumulative Excess Returns	Residual Compensation	1.1108**	-0.3562***
		[0.4624]	[0.1091]
	Log Market Capitalization	0.3752***	-0.0811*
		[0.1278]	[0.0420]
	Market/Book	-0.0696	-0.0701
		[0.4004]	[0.0428]
	N	150	148
	R-Squared	0.132	0.1348

Figure 1: Log Average Executive Compensation and Market Capitalization



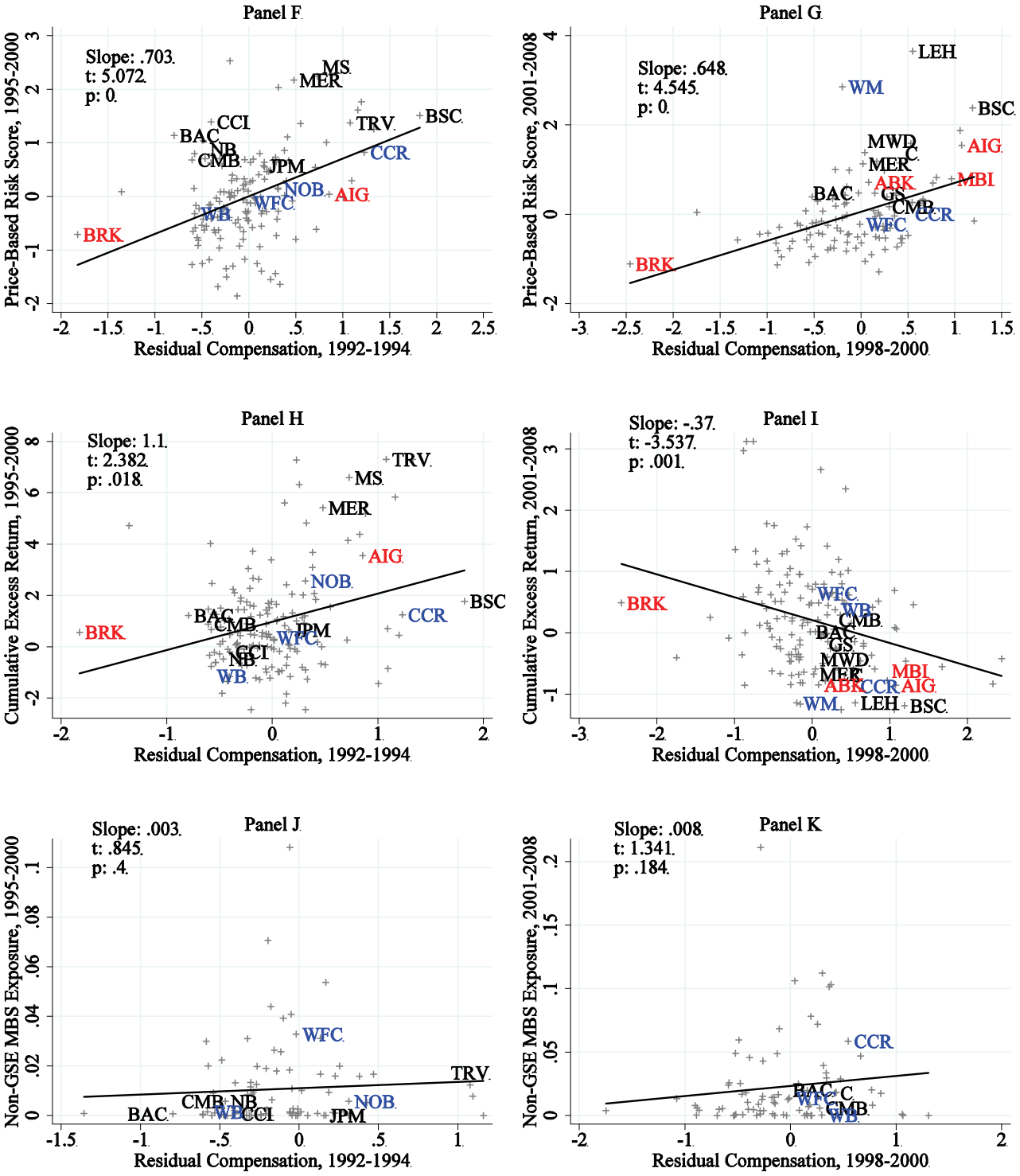
The figure plots the log of average executive compensation on the vertical axis against log market capitalization on the horizontal axis, and overlays a linear fit. Panel A plots this relationship for the early period (1992-1994) and Panel B plots this relationship for the late period (1998-2000). Slopes and intercepts are calculated using a model where all three groups (primary dealers, banks, insurers) have their own intercepts and insurers have a distinct slope from banks and primary dealers. Tickers significant to the crisis are labeled.

Figure 2: Residual Executive Compensation and Risk-Taking



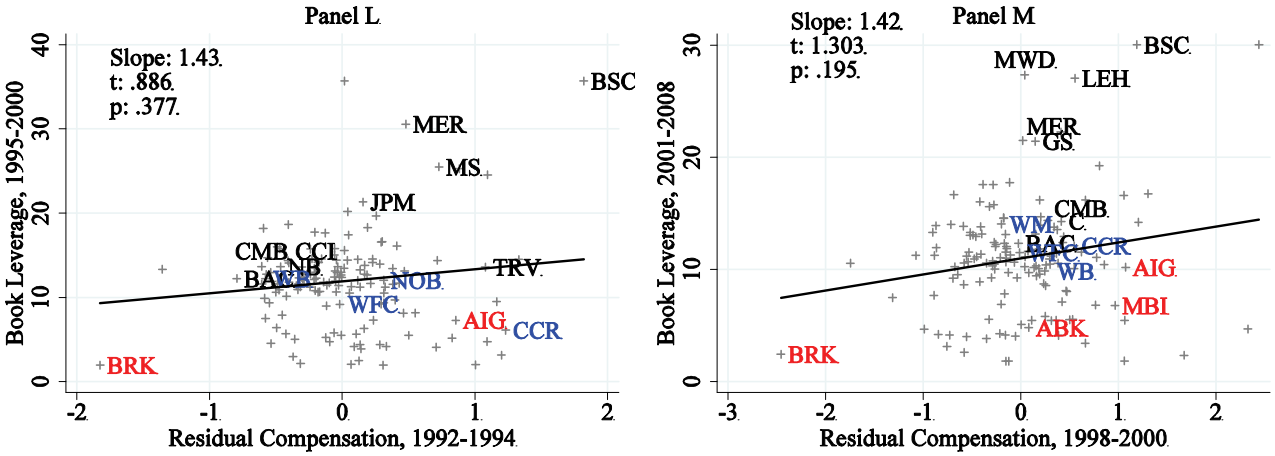
We plot our measures of risk-taking on the vertical axis of each panel against residual compensation on the horizontal axis for both the early and late cross-sections. Panels A and B plot the relationship of a firm's stock return beta with residual executive compensation. Panels C and D plot the relationship for daily return volatility (annualized using 252 trading days), and Panel E plots ABX Exposure and residual compensation. A linear fit is overlaid and we report the slopes, t-statistics, p-values, and R-squares associated with each fit. The t-statistics are calculated using HC3-robust standard errors with a degrees-of-freedom adjustment to account for sampling error in estimating residual executive compensation. Tickers significant to the crisis are labeled.

Figure 2 (Continued): Residual Executive Compensation and Risk-Taking



We plot our measures of risk-taking on the vertical axis of each panel against residual compensation on the horizontal axis for both the early and late cross-sections. Panels F and G plot a price-based risk-score based on beta, volatility, and ABX exposure against residual compensation. Panels H and I plot a firm's cumulative excess return over the market in each period. Panels J and K plot the relationship for average non-GSE MBS holdings as a percentage of total balance sheet size for both periods. A linear fit is overlaid and we report the slopes, t-statistics, p-values, and R-squares associated with each fit. The t-statistics are calculated using HC3-robust standard errors with a degrees-of-freedom adjustment to account for sampling error in estimating residual executive compensation. Tickers significant to the crisis are labeled.

Figure 2 (Continued): Residual Executive Compensation and Risk-Taking



We plot our measures of risk-taking on the vertical axis of each panel against residual compensation on the horizontal axis for both the early and late cross-sections. Panels L and M plot book leverage against residual compensation.