Seeking Alpha

Pay For Performance At S&P 1500 Companies

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Summary

- Relative TSR only explains 12% of the variation in ten year relative pay for S&P 1500 CEOs.
- Director focus on fair sharing (excess pay % of excess value = market pay % of expected value) would greatly improve alignment and incentive strength.
- The difference in annualized relative TSR between companies with excellent vs poor pay for performance is 7 percentage points.

In this paper, we present a methodology for measuring pay for performance and show how close S&P 1500 companies come to achieving perfect pay for performance. Our methodology plots relative pay against relative performance and calculates the trendline relationship to quantify incentive strength (slope), pay alignment (correlation) and the pay premium at industry average performance (intercept). Our our definition of "perfect" pay for performance is alignment (r-sq) of 100% with a zero pay premium at industry average performance. We focus on CEOs and measure alignment over ten year periods. We use a "mark to market" measure of pay that captures the alignment provided by vesting conditions and post-grant changes in the value of equity compensation.

OUR SIX KEY FINDINGS

Our first key finding is that CEO pay for performance at S&P 1500 companies is roughly 1/8 of the way to perfect pay for performance, i.e., relative performance explains only 12% of the variation in ten-year relative pay across the 1500 companies. Our second key

finding is that pay for performance could be dramatically improved by better director supervision of CEO pay. If directors were able to achieve CEO pay alignment (r-sq) at their own company of 50%+ and limit their own company's CEO pay premium to the current interquartile range, CEO pay at S&P 1500 companies would be roughly 3/4 of the way to perfect pay for performance, i.e., relative pay would explain 76% of the variation in ten-year relative performance across companies.

Some industries show more pay for performance than others. Two GICS industry groups - Household & Personal Products (3030) and Semi-conductors (4530) are a third of the way to perfect pay for performance, while five are less than 5% of the way.[1] Only 1/5 of all S&P 1500 companies achieve CEO pay alignment (r-sq) of 50%+ with an interquartile pay premium at industry average performance. Thus, our third key finding is that about a fifth of S&P 1500 companies have relatively well managed CEO pay. Unfortunately, investor Say on Pay voting shows little ability to discriminate between companies with high alignment and moderate pay levels on one hand and companies with low alignment and extreme pay levels on the other hand. Our fourth key finding is that the average SOP vote support of companies with relatively well managed CEO pay is only 1.2 percentage points greater than the average SOP support of companies with poorly managed CEO pay.

A fifth key finding is that directors have two readily available tools to improve pay for performance. The first tool is sharing analysis. Perfect alignment of relative pay with relative performance requires a fixed relationship between the CEO's excess pay share of excess value and the CEO's market pay share of expected value.[2] The CEO's market pay share of ex-ante expected value is easily calculated and should be a guideline for incentive plan sharing, but sharing concepts have largely disappeared from board deliberations and CD&A disclosure. The second, and more powerful, tool is "perfect" pay plans that lead automatically to perfect correlation of relative pay and relative performance. One perfect pay plan is the Dynamic CEO Compensation plan developed by finance professors Alex Edmans of London Business School and Xavier Gabaix of NYU

(published in the Journal of Finance).[3] A second perfect pay plan is the perfect performance share plan developed by Stephen O'Byrne of Shareholder Value Advisors (published in the Journal of Applied Corporate Finance).

A sixth key finding is that better pay is correlated with better performance. Higher alignment, higher pay leverage (up to 2.0) and lower positive pay premiums at industry average performance are all associated with higher ten year relative TSR. In a regression relating ten year relative TSR to contemporaneous alignment, leverage and pay premium, the annualized difference between a company with excellent pay for performance, i.e., alignment (r-sq) of 75%, leverage of 1.0 and a pay premium of 0%, and a company with poor pay for performance, i.e., alignment (r-sq) of 25%, leverage of 0.5 and a pay premium of +50%, is 7 percentage points.

HOW WE MEASURE PAY FOR PERFORMANCE

Our basic analysis plots relative pay on the vertical axis against relative TSR on the horizontal axis. When we measure ten year alignment using mark to market pay, the vertical axis is ln [cumulative actual pay / cumulative market pay], where ln denotes the natural logarithm, and the horizontal axis is ln [1 + cumulative relative TSR]. For an individual company, the analysis plots ten observations, i.e., cumulative relative pay and cumulative relative performance for year 1, for year 2, for year 3, etc. For a portfolio, industry or the entire S&P 1500, the analysis plots ten observations for each company, giving a total of 15,000 observations for the entire S&P 1500.

We use cumulative actual pay to measure relative pay because the basic objective of pay for performance is to align cumulative pay and cumulative investor return. Our measure of cumulative pay is the sum of cumulative compensation realized in cash, the estimated end of period value of unvested equity compensation, the estimated end of period value of unvested long-term cash awards and the change in pension value from the analysis base year.[4] We estimate the end of period value of unvested equity compensation using the

estimated vesting multiple and the end of period stock price.[5] We assume that restricted stock and performance shares vest and are realized in cash at the end of five years. We assume that stock options have an expected term of 6 years and are exercised at the end of the expected term. Our calculation of CEO mark to market pay over each ten year period is based on all CEO compensation awarded by the company even if the incumbent changes during the ten year period.[6] We calculate mark to market pay for each year using nominal dollars for each year, but adjust for inflation before calculating relative pay.

Our market rates represent average pay for position, industry and revenue size. We calculate market rates for each year using five years of historical data and the assumption that the sensitivity of top 5 pay to company revenue size is constant for each GICS industry.[7] Our market rate models make the assumption that a 1% change in revenue size increases pay by a constant percentage. We call the ratio of percentage change in pay to percentage change in revenue size "sales leverage". The median sales leverage of the 68 GICS industries in 0.44.[8] This implies that a 1% increase in revenue increases pay by 0.44%. We calculate relative pay using market pay for beginning revenue size to ensure that our pay for performance models don't disguise the pay sensitivity to relative TSR that is correlated with revenue growth. Since actual pay includes the future value of equity compensation, while market pay only reflects the grant date present value of equity compensation, we accrete market rates for the expected appreciation of equity compensation.[9]

We calculate relative TSR taking account of "industry beta". Industry beta measures the sensitivity of a company's stock returns to the industry return. We calculate industry betas using 10 years of monthly returns. The regression trendline is company TSR = monthly alpha + industry beta x industry TSR. We calculate a company's expected monthly return, given the industry return, as zero beta return + industry beta x (industry TSR - zero beta return) where the zero beta return is the market cap weighted average alpha of the companies in the industry, excluding the subject company. The calculation of the

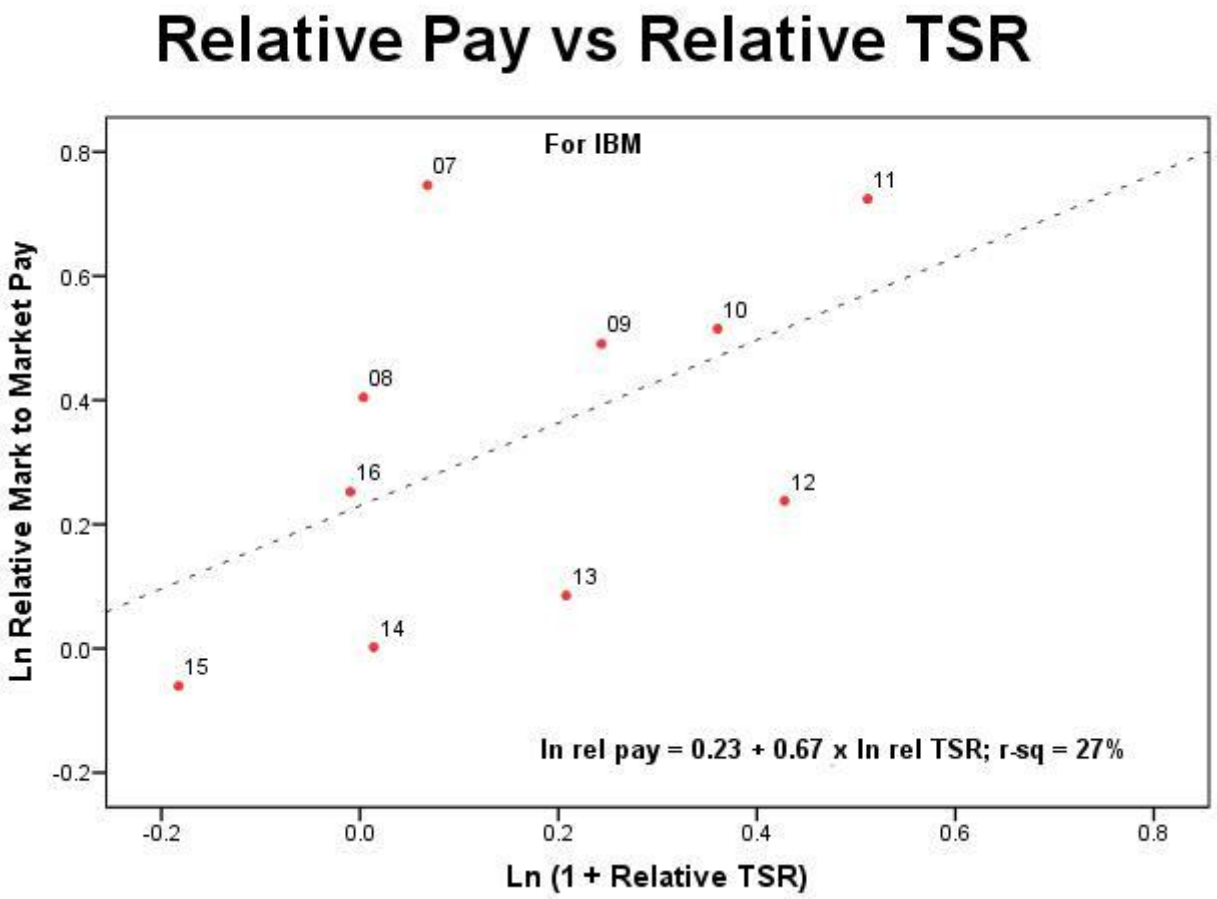
company's expected return parallels the Capital Asset Pricing Model (where expected return = risk-free rate + market beta x [market TSR - risk free rate]) with industry beta replacing market beta and zero beta return replacing the risk-free rate. The conventional calculation of relative TSR assumes a zero beta return of 0 and an industry beta of 1.0, i.e., a company's expected return is 0 + 1 x industry TSR, but the assumption of an industry beta of 1.0 is quite inaccurate for a third of S&P 1500 companies. The median industry beta of S&P 1500 companies is 0.8 and a third of S&P 1500 companies have industry betas that differ from 1.0 by 0.4 or more.

AN EXAMPLE: PAY FOR PERFORMANCE AT IBM AND IN ITS INDUSTRY

Figure 1 shows our pay for performance analysis for IBM and figure 2 shows the same analysis for all companies in its GICS industry group, Software & Services (4510). The equation of the trendline for IBM in figure 1 is ln relative pay = 0.23 + 0.67 x ln relative TSR, while the equation of the trendline for the industry group in figure 2 is ln relative pay = 0.14 + 0.25 x ln relative TSR. The slope of the trendline is what we call "pay leverage". It gives the percentage change in relative pay associated with a 1% increase in relative shareholder wealth. IBM's pay leverage of 0.67 is almost three times as great as the industry average pay leverage of 0.25 and almost double the S&P 1500 average pay leverage of 0.34. The intercept is the trendline line value of ln relative pay at when ln relative TSR is zero. This is the ln pay premium at industry average performance. IBM's ln pay premium of 0.23 implies a percentage pay premium of +26%.[10] The industry ln pay premium of 0.14 implies a percentage pay premium of +15% at industry average performance.[11] A third value associated with the trendline is the correlation of ln relative pay and ln relative performance. We call this correlation "alignment". The squared correlation, what we call "alignment (r-sq)", is the percentage of the variation in ln relative pay explained by ln relative TSR. If ln relative pay and ln relative TSR are negatively

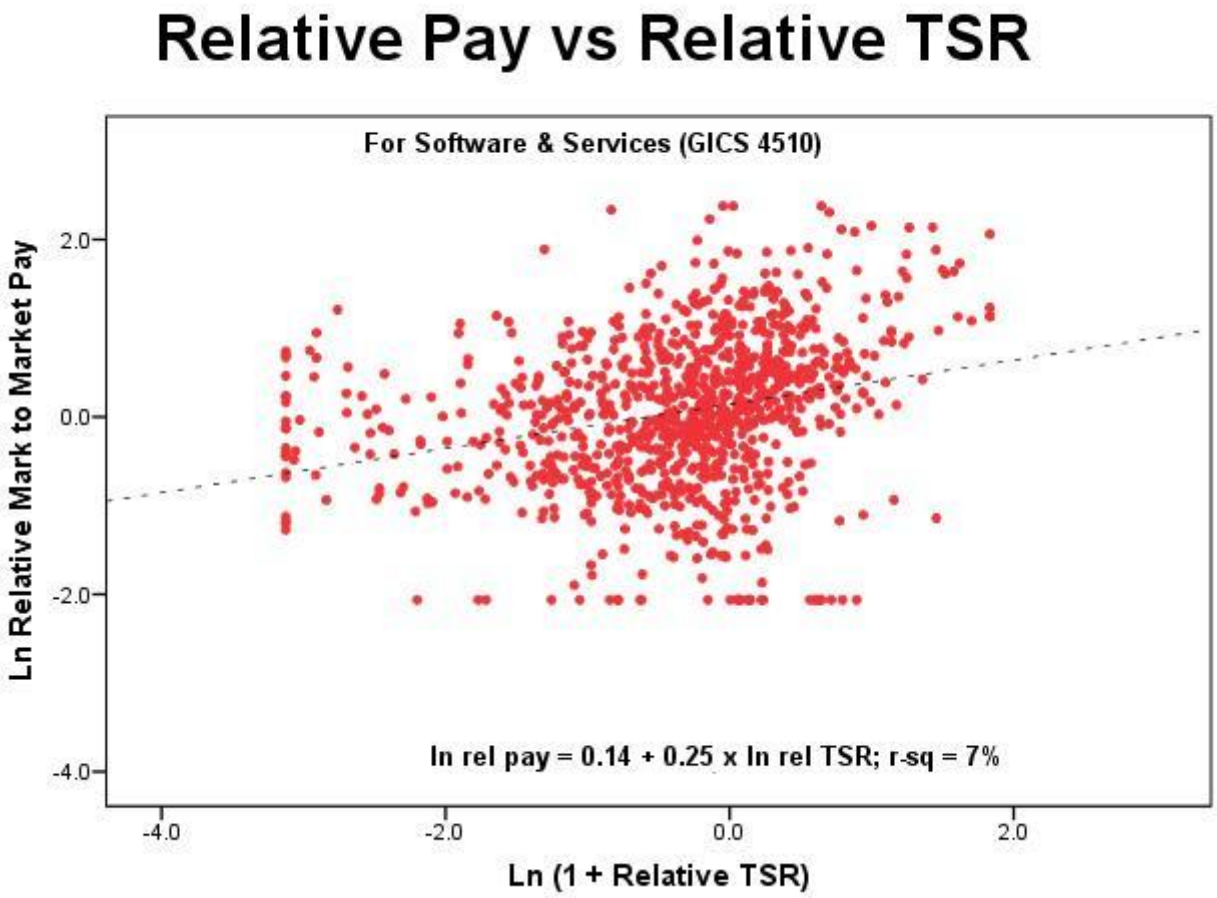
correlated, we consider alignment (r-sq) to be zero since we don't consider positive relative pay "explained" by negative relative performance. IBM's alignment (r-sq) of 27% is almost four times as great as the industry alignment of 7%.

Figure 1



Source: Shareholder Value Advisors

Figure 2

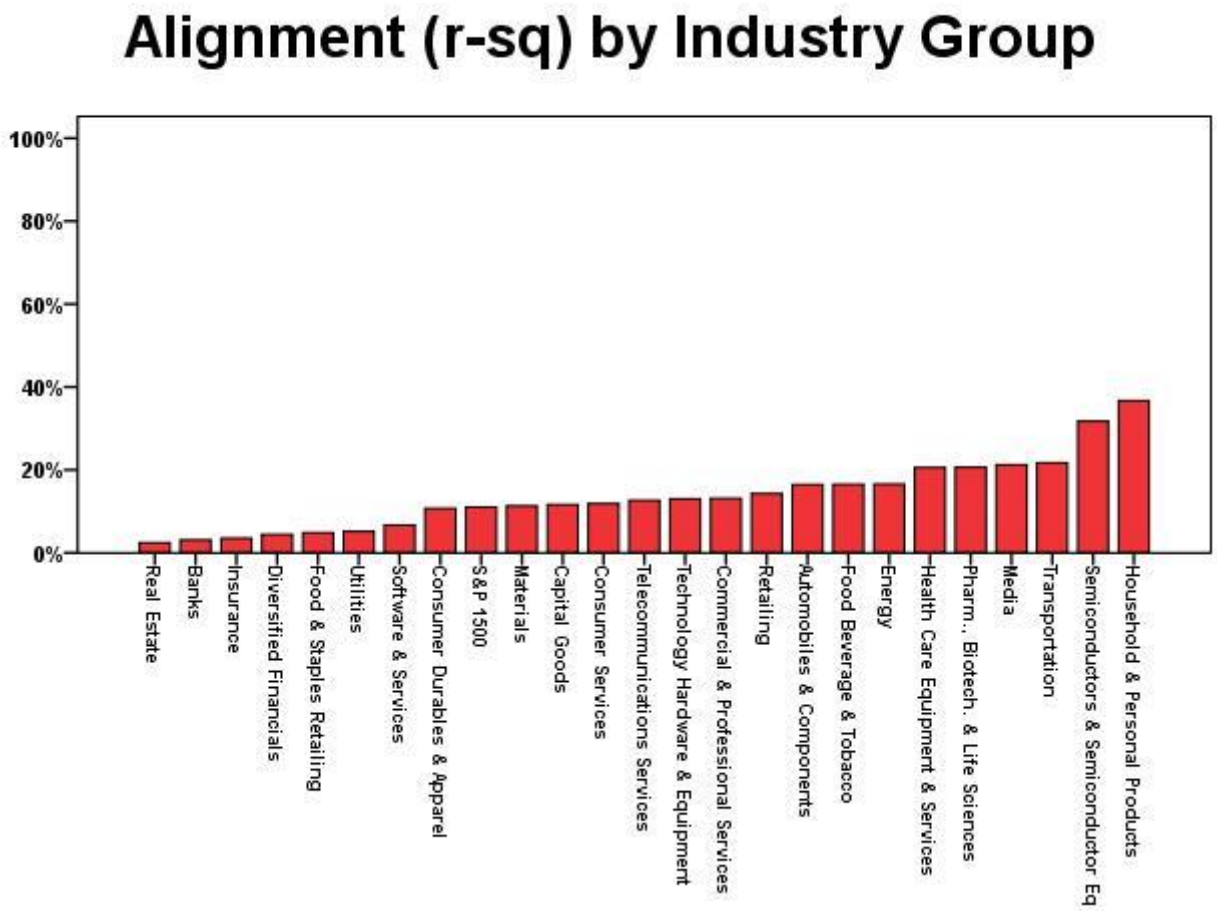


Source: Shareholder Value Advisors

PAY FOR PERFORMANCE IN THE GICS INDUSTRY GROUPS AND THE S&P 1500

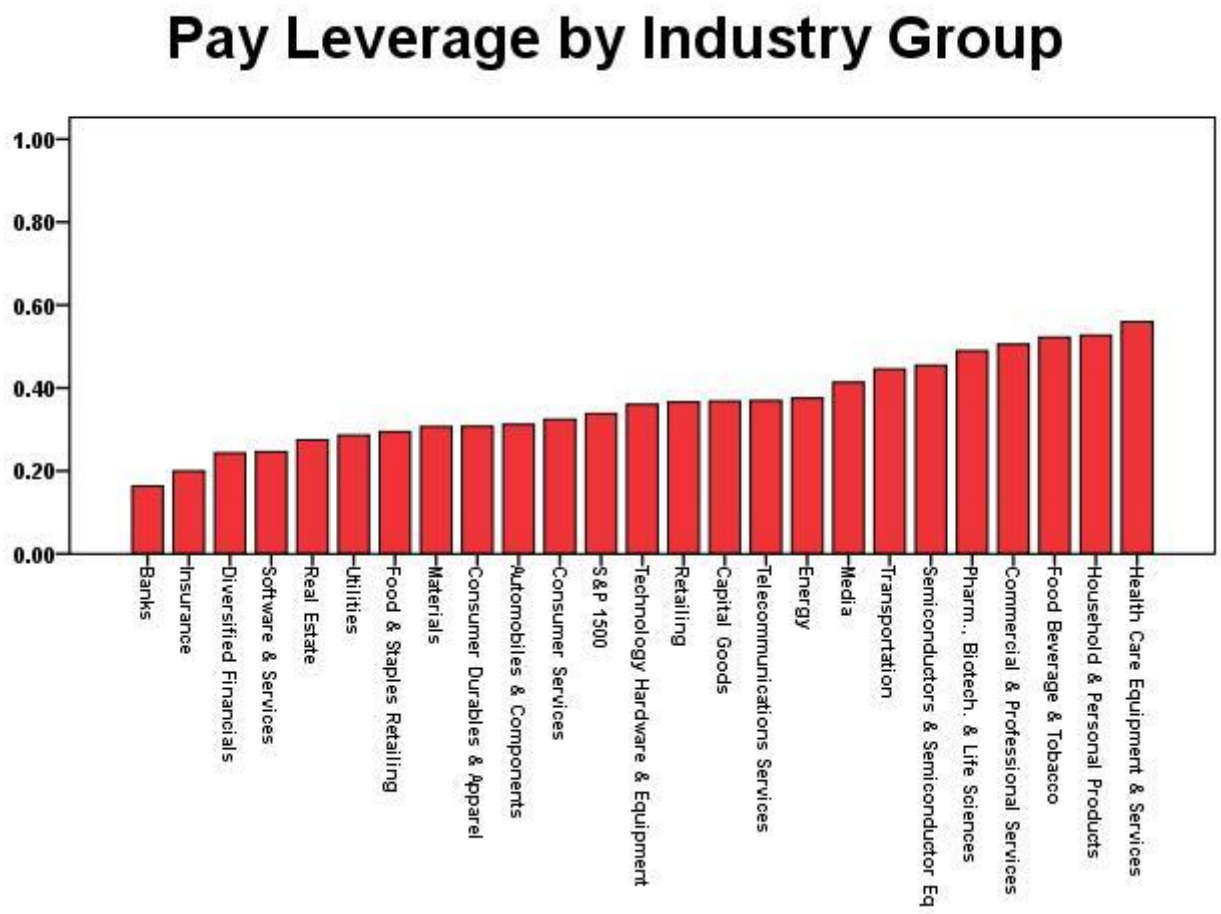
Figures 3 and 4 show alignment (r-sq) and pay leverage by industry group. Six industry groups have alignment (r-sq) over 20%, while 5 have alignment (r-sq) below 5%. Four industry groups have pay leverage greater than 0.5, while 2 have pay leverage below 0.2. In general, the industry groups with higher pay leverage tend to have higher pay alignment.[12]

Figure 3



Source: Shareholder Value Advisors

Figure 4



Source: Shareholder Value Advisors

For the S&P 1500 as a whole, alignment (r-sq) is only 11%, but this alignment calculation assumes constant pay leverage, 0.34, for all S&P 1500 companies. We can see from Figure 4 that industry group pay leverage ranges from less than half of that leverage to more than 165% of that leverage. These differences in pay leverage can make S&P 1500 alignment appear lower than average industry group alignment. We can adjust for differences in industry group pay leverage by changing the horizontal axis in the pay for performance scatterplot to pay leverage x ln (1 + relative TSR). Adjusting for differences in

industry group pay leverage increases S&P 1500 alignment, but quite modestly so, raising alignment (r-sq) from 11% to only 12%. In theory, we should get even higher S&P 1500 alignment when adjust for differences in individual company pay leverage, but, in fact, alignment (r-sq) falls from 11% to 10%. The surprising decline in alignment is due to the fact that almost 20% of individual company pay leverages are negative.[13] The alignment (r-sq) of 12% adjusting for differences in industry group pay leverage is the basis for our conclusion that CEO pay for performance at S&P 1500 companies is roughly 1/8 of the way to perfect pay for performance.

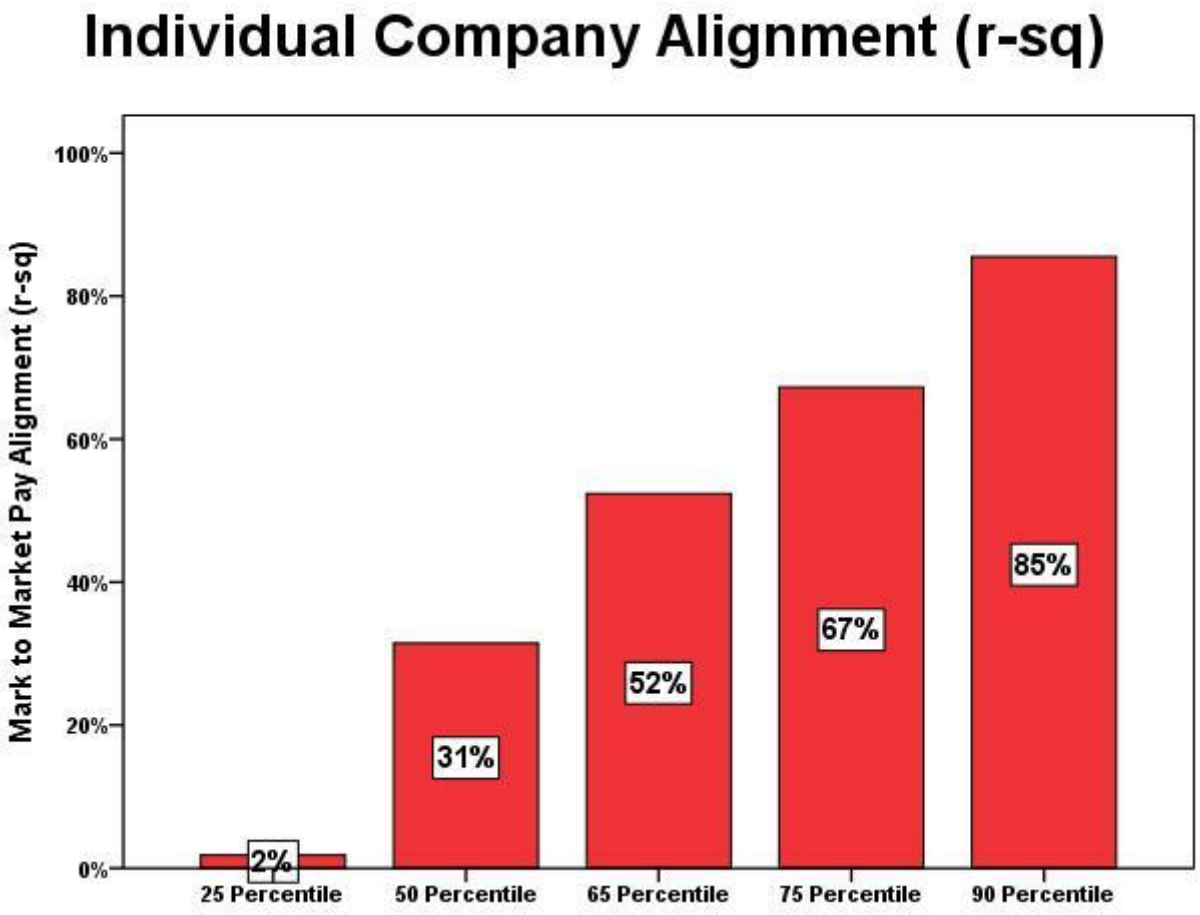
We calculate relative pay using market rates based on company revenue size at the start of the ten-year period to ensure we recognize as pay for performance the pay sensitivity to relative TSR that is correlated with revenue growth. When market rates are calculated based on current revenue size, market rate growth explains 7% of the variation in relative TSR, and hence, disguises some pay sensitivity to performance. For the S&P 1500, using market rates based on current revenue size reduces alignment (r-sq) from 11.0% to 9.6%.

THE IMPACT OF IMPROVING INDIVIDUAL COMPANY ALIGNMENT AND LIMITING PAY PREMIUMS

To identify the primary causes of low alignment, we need to look beyond differences in pay leverage. One important cause of low alignment *across* S&P 1500 companies is low alignment *within* S&P 1500 companies. Figure 5 shows the distribution of individual company pay alignment (r-sq) for S&P 1500 companies. Relative performance explains less than half the variation in relative pay for 65% of S&P 1500 companies. When we drop these companies from the scatterplot of relative pay vs relative TSR x pay leverage, we find that S&P 1500 alignment (r-sq) increases from 11% to 25%. A second cause of low alignment *across* S&P 1500 companies is extreme pay levels *within* S&P 1500 companies. Figure 6 shows the distribution of individual pay premiums at industry average performance for S&P 1500 companies. A quarter of the companies pay more than 58%

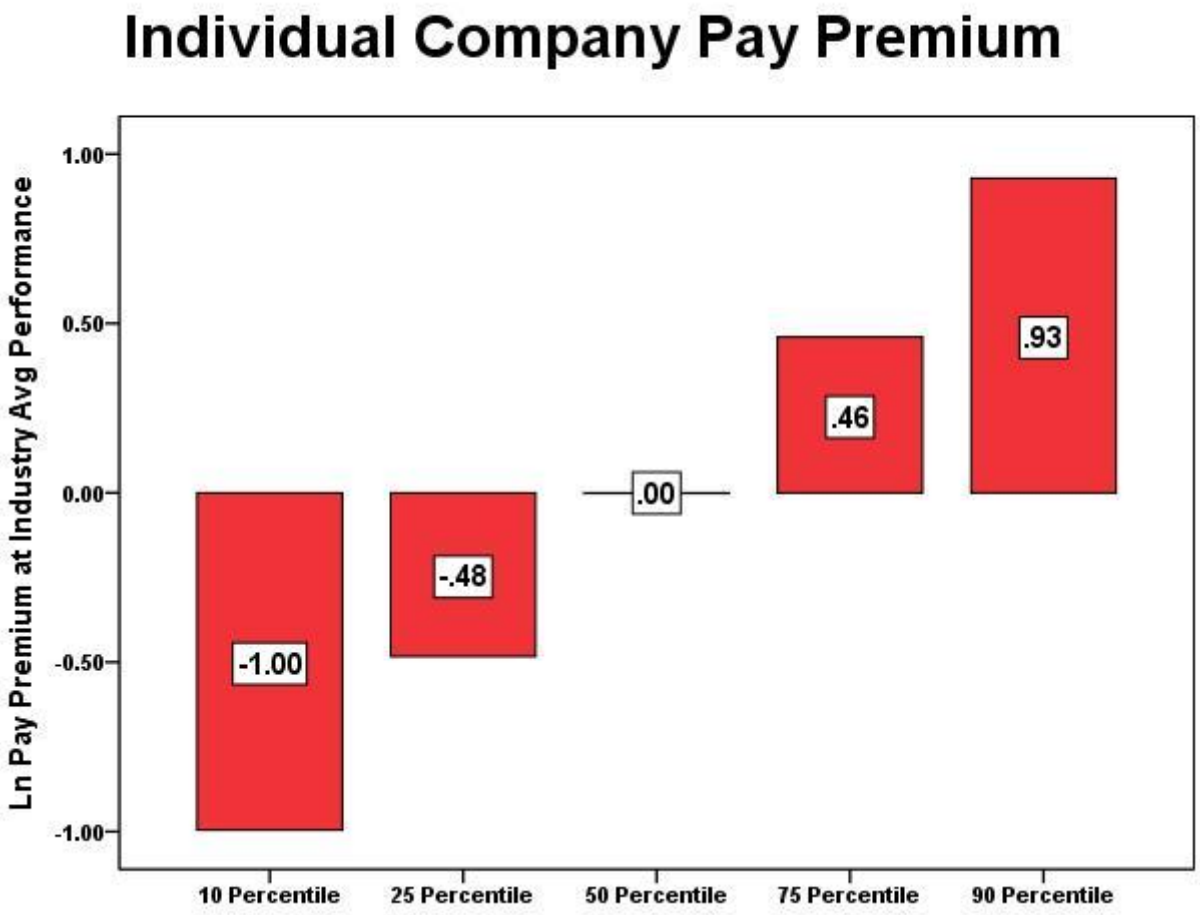
above market at industry average performance and another quarter pay more than 38% below market at industry average performance[14]. When we drop these companies from the scatterplot of relative pay vs relative TSR x pay leverage, as well as the companies with individual company alignment (r-sq) less than 50%, we find that S&P 1500 alignment (r-sq) increases from 11% to 76%. Our selections for alignment (r-sq) of 50%+ and interquartile pay premiums reduce our company sample to 292 companies.[15]

Figure 5



Source: Shareholder Value Advisors

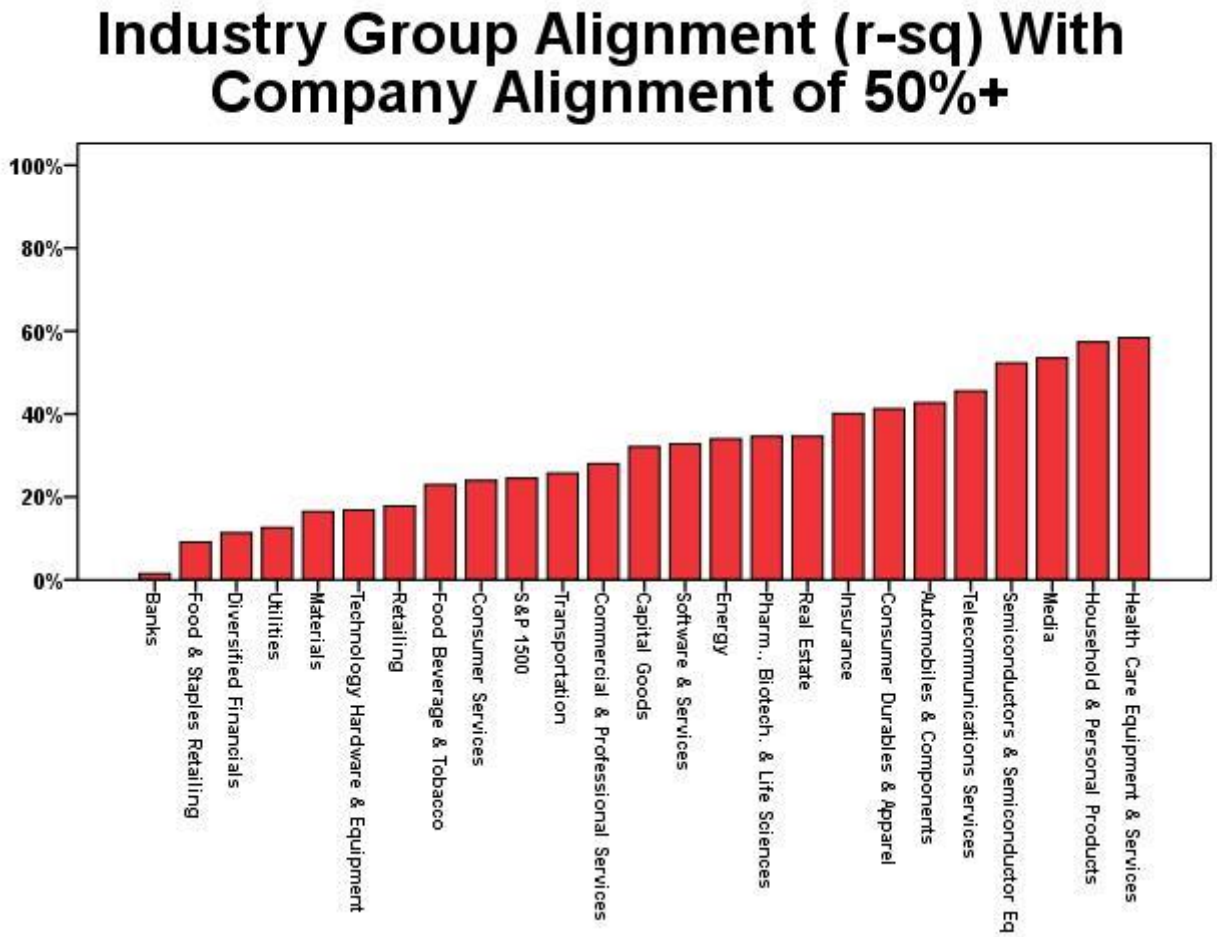
Figure 6



Source: Shareholder Value Advisors

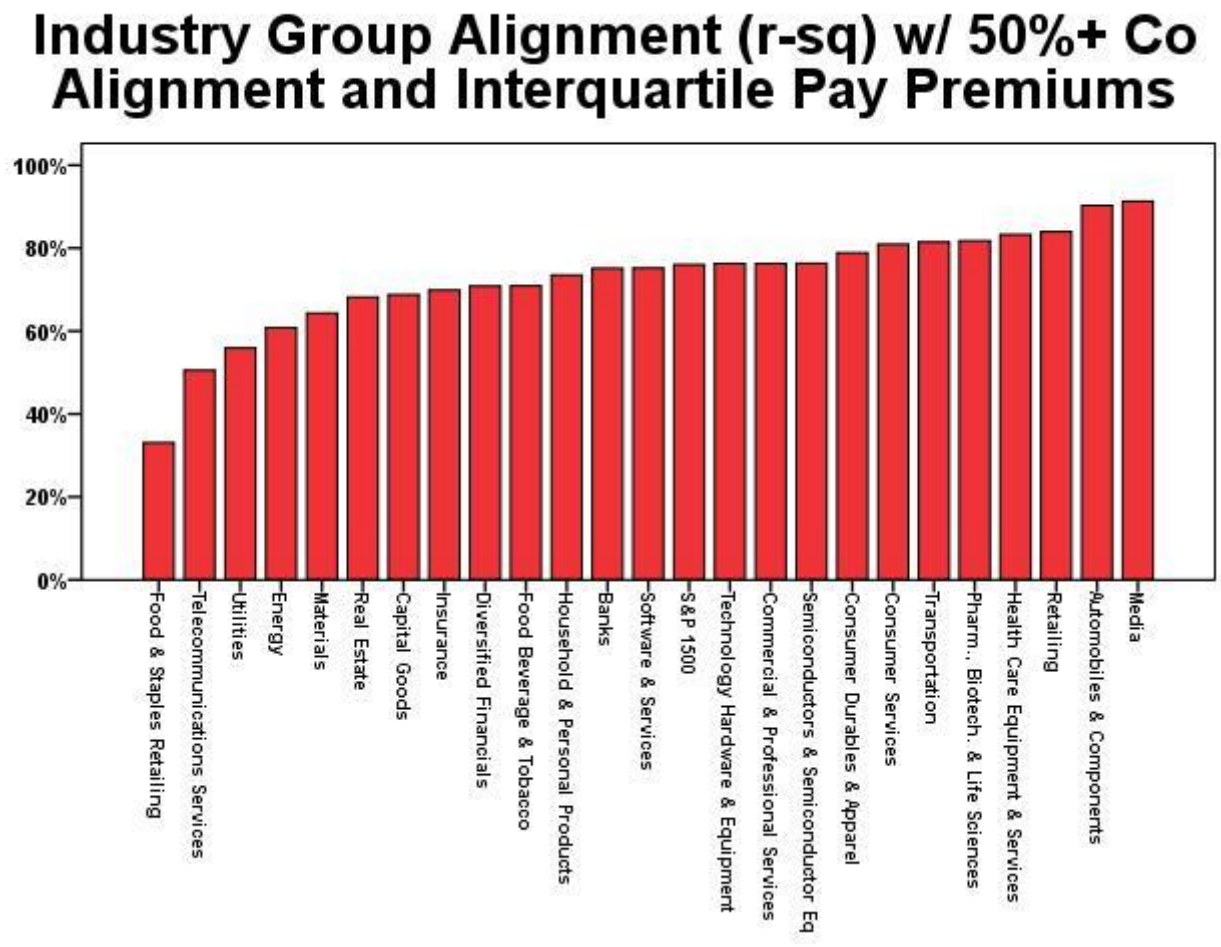
Figures 7 and 8 show alignment (r-sq) across industry groups after dropping companies with low individual company alignment and after dropping companies with low alignment and pay outside the interquartile range.

Figure 7



Source: Shareholder Value Advisors

Figure 8



Source: Shareholder Value Advisors

The relative contributions of closer alignment and better cost control depend on whether we select well aligned companies before or after selecting companies with interquartile pay premiums. We have chosen to consider alignment first because there is an extensive literature arguing that it's just alignment, not pay level, that matters.[16] For the S&P 1500 as a whole, the contribution of alignment is greater if we consider it second, although the contribution of alignment is still much smaller than the contribution of cost control. As we showed above, limiting the S&P 1500 sample to companies with individual company

alignment (r-sq) of 50%+ increases cross company alignment (r-sq) from 12% to 25% and further limiting the sample to companies with interquartile pay premiums increases cross company alignment (r-sq) to 76%. If we first limit the sample to companies with interquartile pay premiums, cross company alignment (r-sq) increases from 12% to 54% and further limiting the sample to companies with individual company alignment (r-sq) of 50%+ increases cross company alignment (r-sq) to 76%. This says that individual company alignment provides 13 of the 54 percentage point increase in cross company alignment (r-sq) when we consider alignment first, but 22 of the 54 percentage point increase when we consider it second. Considering alignment second increases its relative contribution from 24% to 41%, but, in the both cases, the contribution of alignment is less than the contribution of controlling pay level.

CEO PAY LEVELS MATTER BECAUSE CEO PAY PREMIUMS AFFECT AVERAGE EMPLOYEE PAY

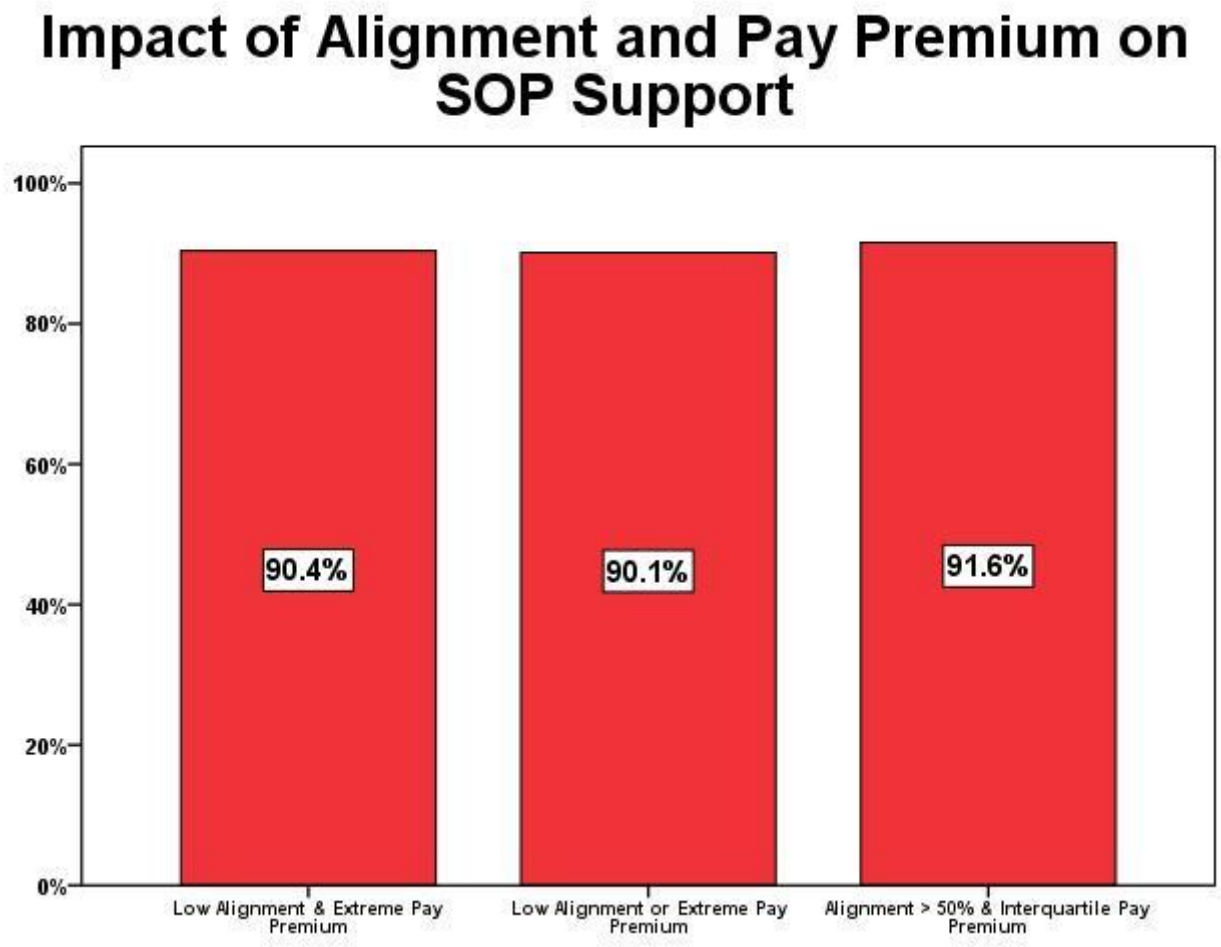
The classic argument for ignoring CEO pay level is that even a 100% pay premium is a trivial cost relative to shareholder value and, hence, a small price to pay for the prospect of higher shareholder return. But this argument assumes that CEO pay premiums have no impact on average employee pay premiums. A regression of average employee ln pay premium at industry average performance on CEO ln pay premium at industry average performance shows that a 10% CEO pay premium is associated with a 1.0% average employee pay premium. In five industry groups, a 10% CEO pay premium raises the average employee pay premium by more than 2.0%.[17] For the S&P 1500 as a whole, and for most industry groups, the impact of a positive CEO pay premium is much greater than the impact of a negative CEO pay premium, i.e., high CEO pay raises average employee pay much more than low CEO pay reduces average employee pay. For example, for the S&P 1500 as a whole, a +10% CEO pay premium at industry average performance is associated with a +1.0% average employee pay premium, while a -10% CEO pay "premium" is only associated with a -0.2% average employee pay "premium".

The true impact of the CEO pay premium may be larger than these estimates. Our data on average employee compensation is largely estimated because most companies don't report total employee compensation. If we restrict the sample to companies with known, not estimated, average employee compensation, we find that the impact of a 10% CEO pay premium in the S&P 1500 as a whole is twice as large, i.e., a 2.0% average employee pay premium.

SOP VOTING IS NOT VERY DISCRIMINATING

Figure 9 shows SOP vote support for three groups of companies: companies with low alignment and extreme pay levels, companies with low alignment or extreme pay levels (but not both) and companies with alignment (r-sq) of 50%+ and interquartile pay. The graph shows that SOP voting makes no meaningful distinction between these three groups of companies.

Figure 9



Source: Shareholder Value Advisors

CONSISTENT SHARING IS THE FOUNDATION OF PAY FOR PERFORMANCE

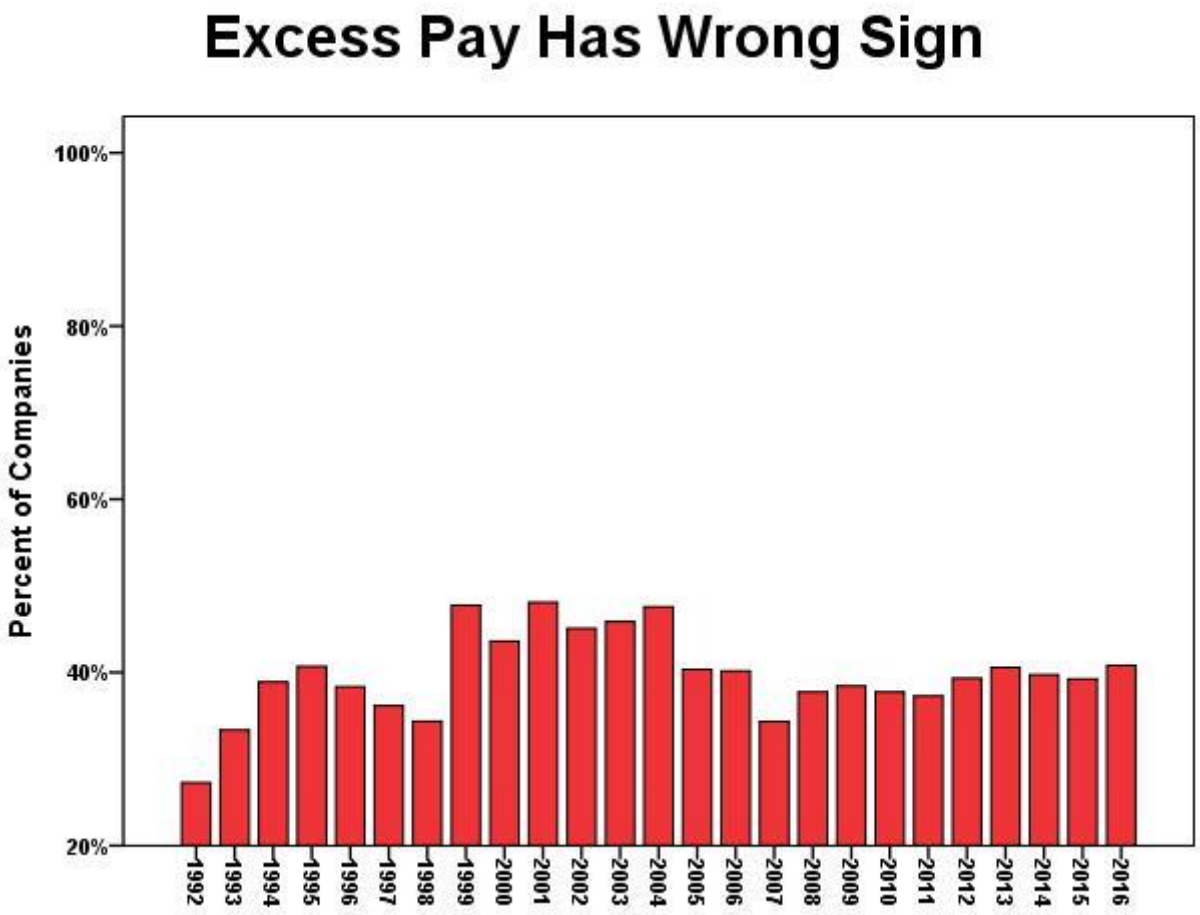
Perfect pay for performance requires consistent sharing in expected and "excess" value. Our definition of perfect pay for performance is a perfect correlation of relative pay and relative performance with a zero pay premium at industry average performance. For simplicity, we'll assume that pay leverage is 1.0, so the relationship between relative pay

and relative TSR is ln relative pay = 0 + 1 x ln (1 + relative TSR), or relative pay = 1 + relative TSR. In this simple case, we'll see that perfect pay for performance requires equal sharing in expected and excess value.[18]

If we define excess pay as [actual pay - market pay], we can express relative pay, which is actual pay / market pay, as [(market pay + excess pay) / market pay] or as 1 + [excess pay / market pay]. From this, we can see that perfect pay for performance requires excess pay / market pay = relative TSR. If we define excess shareholder wealth as [actual shareholder wealth - expected shareholder wealth], we can express relative TSR, which is [(1 + TSR) / (1 + industry TSR)] - 1, as [excess shareholder wealth / expected shareholder wealth]. Thus, perfect pay for performance requires excess pay / market pay = excess shareholder wealth / expected shareholder wealth, or excess pay / excess shareholder wealth = market pay / expected shareholder wealth. In other words, excess value sharing = expected value sharing.[19]

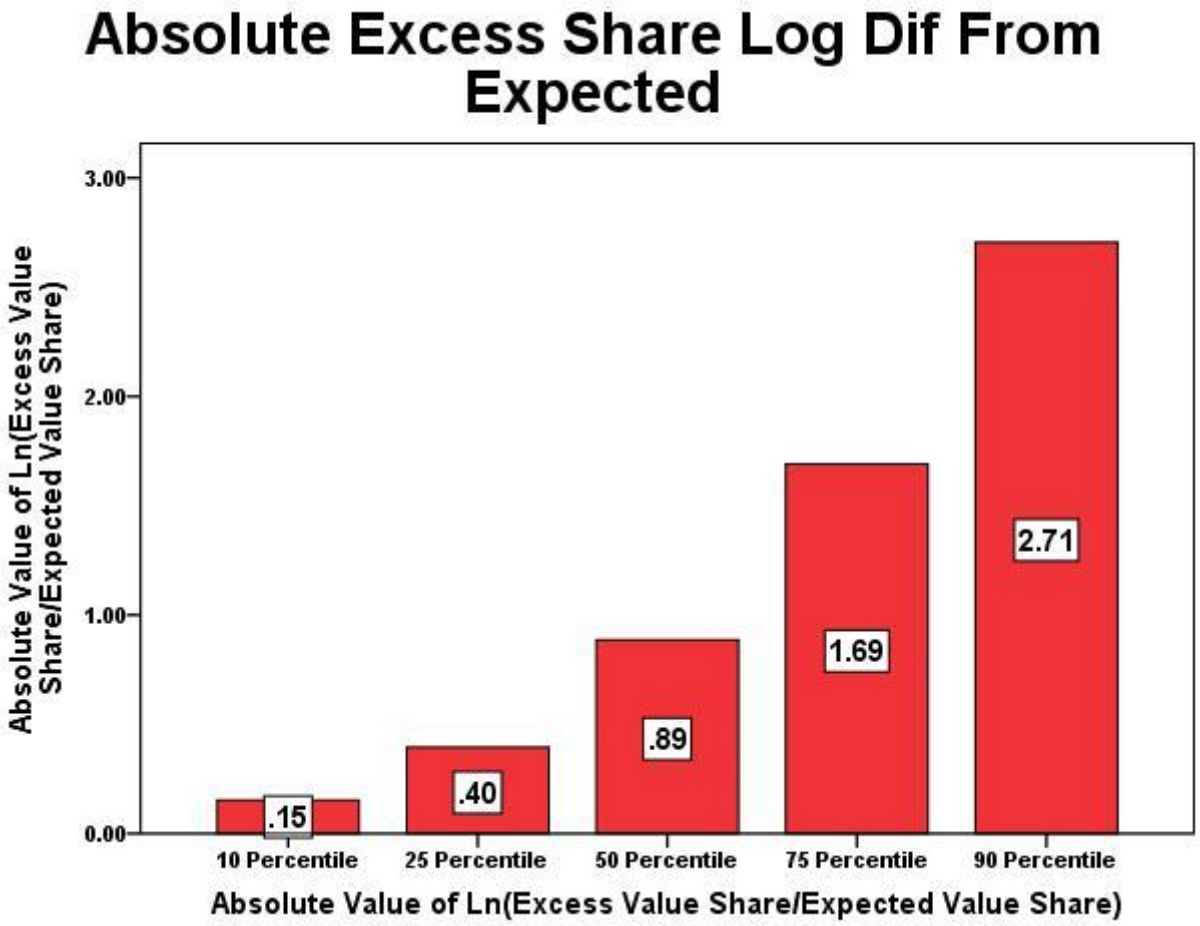
Given the weak relationship between relative pay and relative TSR among S&P 1500 companies, it's not surprising that we see little evidence of consistent sharing. About 40% of the time, as Figure 10 shows, excess pay and excess shareholder wealth have opposite signs, so there is no meaningful sharing concept. Figure 11 shows, for the cases where excess pay and excess shareholder wealth have the same sign, a measure of the difference between excess and expected value sharing, the absolute value of ln(excess value share / expected value share). At the 10th percentile, the value is 0.15 which means that the larger share is 16% bigger than the smaller share.[20] The company years at or below this 10th percentile are the 10% of company years with the most consistent sharing excluding company years where excess pay and excess shareholder wealth have opposite signs. Since company years with the wrong sign are close to half of all company years, our best 10% for sharing consistency excluding wrong sign companies is pretty close to the best 5% of all companies.

Figure 10



Source: Shareholder Value Advisors

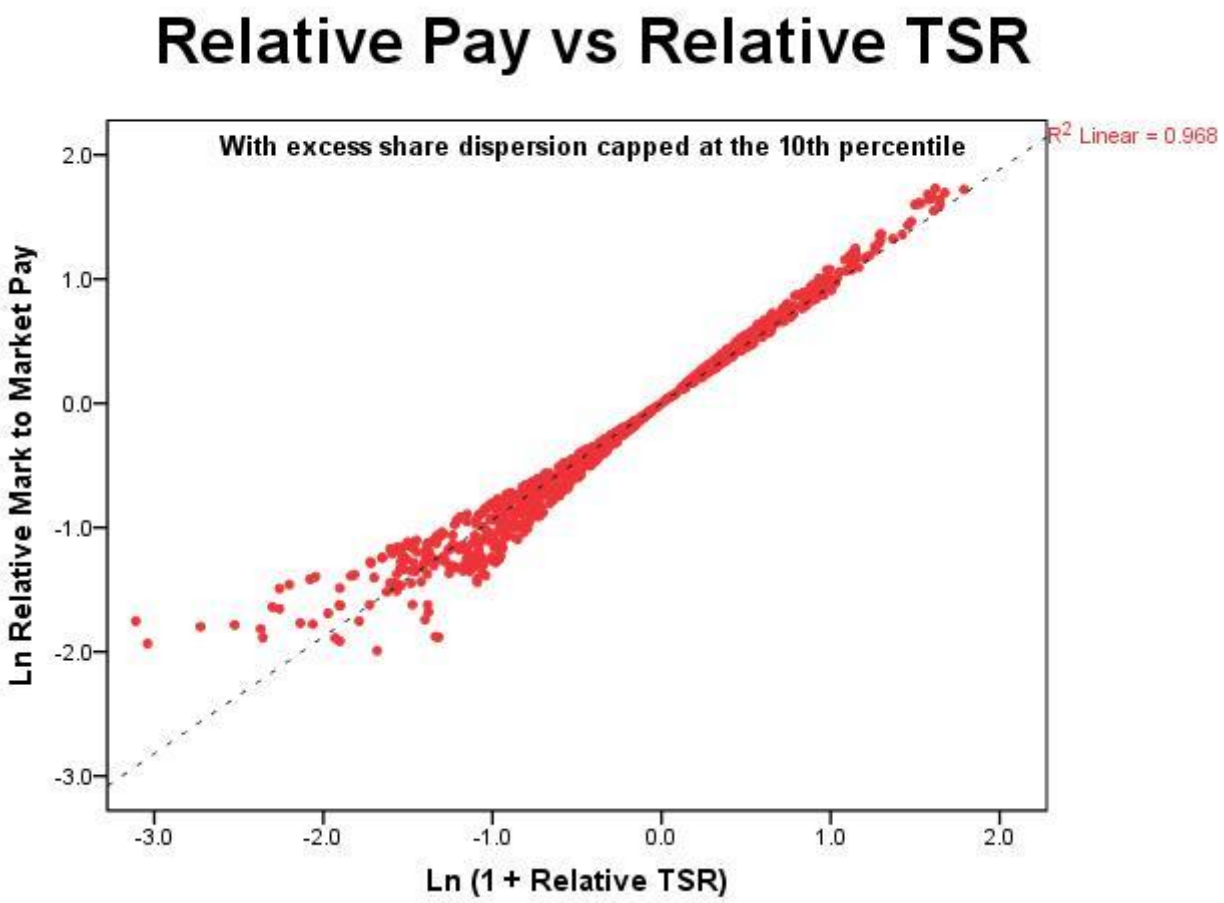
Figure 11



Source: Shareholder Value Advisors

Figure 12 shows the scatterplot of relative pay vs relative performance for this best 5% of company years for sharing consistency. Alignment (r-sq) is 97% which is pretty close to perfect pay for performance. This empirical result confirms our derivation above, i.e., alignment of relative pay and relative performance implies consistent sharing in excess and expected value, and vice versa.

Figure 12



Source: Shareholder Value Advisors

Sharing is rarely mentioned in CD&As, but focus on sharing may be the easiest way for directors to improve executive pay. Directors can easily compute ex-ante expected value sharing. It's market pay for the CEO divided by ex-ante expected shareholder wealth, i.e., beginning shareholder wealth x (1 + cost of equity). Incentive plans should be designed to give the CEO this share of excess shareholder wealth and non-performance pay should be treated as a draw against fair pay for performance, i.e., cumulative market pay plus this share of cumulative excess shareholder wealth.

THE PERFECT PAY PLANS GIVE DIRECTORS MORE DETAILED GUIDANCE

The perfect pay plans developed by O'Byrne and Edmans & Gabaix give directors more detailed guidance on how to achieve consistent sharing[21]. O'Byrne's perfect performance share plan provides for annual grants of performance shares, but departs from conventional pay practices in three ways. First, the target compensation used to determine the number of grant shares is not market compensation, but market compensation adjusted for trailing relative performance. With target pay leverage of 1.0, target compensation is market compensation x (1 + relative TSR). Second, the vesting multiple is designed to take out the industry component of the stock return, not to leverage some measure of operating performance. The vesting multiple is equal to 1/(1 + industry TSR). Third, non-performance pay and all other cash paid out prior to retirement is treated as a draw against the ultimate value of the performance shares.

The differences between the perfect performance share plan and conventional pay practices help us understand why the alignment of relative pay and relative performance in S&P 1500 companies is so low. First, managers are not entitled to market compensation regardless of past performance. The concept of competitive pay regardless of past performance is replaced by the concept of competitive pay for average performance. Second, managers are not paid for industry performance. Some conventional equity plans, such as stock options and restricted stock grants, tie vesting solely to service, so managers receive 100% of any stock appreciation due to industry performance. Other equity plans, such as performance share plans, tie vesting to relative performance, but typically vest the entire stock value as long as the vesting threshold is satisfied. This means that acceptable relative performance entitles the manager to the industry component of the stock return. Third, all cash realized prior to retirement is treated as a draw against the ultimate value of the performance shares. Conventional equity plan design requires vesting periods before equity grants can be cashed out, but doesn't ask whether the value of undistributed equity is sufficient to warrant the cash

payout, i.e., is the undistributed equity value large enough to re-coup any decline in the value of cashed out shares and maintain the target relationship between cumulative pay and cumulative performance?

HIGHER ALIGNMENT IS ASSOCIATED WITH BETTER FIRM PERFORMANCE

A regression of 10 year relative TSR for S&P 1500 companies on the three components of pay for performance explains 14% of the variation in ln(1 + 10 year relative TSR). The regression shows that higher leverage (up to 2.0), higher alignment and lower positive pay premiums are all associated with higher relative TSR. The difference in annualized relative TSR between a company with excellent pay for performance, i.e., alignment (r-sq) of 75%, leverage of 1.0 and a pay premium of 0%, and a company with poor pay for performance, i.e., alignment (r-sq) of 25%, leverage of 0.5 and a pay premium of +50%, is 7 percentage points.[22]

Our pay for performance analysis makes the implicit assumption that employees should receive competitive pay in the labor market when shareholders earn competitive returns in the capital markets. It's a partnership model that implies that negative pay premiums for industry average performance are bad. The regression is not fully consistent with the partnership model because it shows that negative pay premiums have a positive effect on relative TSR although the effect is not statistically significant.

CONCLUSION

This paper shows that CEO pay for performance at S&P 1500 companies is roughly 1/8 of the way to perfect pay for performance, but could be dramatically improved if corporate directors did a reasonably good job of overseeing CEO pay. If directors could achieve CEO pay alignment (r-sq) of 50% at their own company and limit their own company's

CEO pay premium at industry average performance to the current interquartile range, CEO pay for performance at S&P 1500 companies would jump up to 3/4 of perfect pay for performance.

Only a fifth of S&P 1500 companies have reasonably well managed CEO pay, i.e., alignment (r-sq) of 50%+ with an interquartile pay premium at industry average performance. Despite the prevalence of low alignment and extreme pay levels, SOP vote support is high and insensitive to differences in alignment and pay level. Support for companies with alignment (r-sq) of 50%+ and interquartile pay premiums at industry average performance is only 1.2 percentage points higher, on average, than support for companies with low alignment and extreme pay levels. Investors need to provide much more discriminating SOP voting if they hope to prod directors into better oversight of CEO pay.

Directors have readily available tools to improve pay for performance, but have failed to use them. One tool is sharing analysis. Perfect alignment, with pay leverage of 1.0, requires that the CEO's excess pay share of excess value be equal to his or her market pay share of expected value, but sharing analysis is largely absent from CD&As. A second tool is perfect pay plans such as the Dynamic CEO Compensation Plan developed by finance professors Alex Edmans and Xavier Gabaix and the perfect performance share plan developed by Stephen O'Byrne, but the perfect pay plans are rarely mentioned in boardroom discussion.

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[1] The five, in descending order of pay for performance, are Food & Staples Retailing (3010), Diversified Financials (4020), Insurance (4030), Banks (4010) and Real Estate (6010).

[2] Excess pay, as we explain in more detail below, is [actual pay - market pay] and the excess pay share of excess value is excess pay / dollar excess return.

[3] This plan was a runner-up for the Harvard Business Review/McKinsey Management Innovation of the Year Award in 2012 and the paper was named the best paper of 2009 by the Financial Research Association.

[4] Cumulative pay only includes the value of equity and long-term cash grants awarded during the analysis period. The realized values of grants made prior to the first year of the analysis period are not included.

[5] We estimate vesting multiples using a standardized vesting schedule and using relative TSR as a proxy for the specific performance measures used by each company. Our standardized vesting schedule assumes 0% vesting for performance below the 25th percentile, 50% vesting for 25th percentile performance, 100% vesting for 50th percentile performance and 200% vesting (or the company's maximum vesting percentage, if less) for 75th percentile performance. We use linear interpolation to determine vesting between 50% and 100% and between 100% and 200%,

[6] For each year, we use the compensation of the individual identified as the CEO in the proxy filing. We use the our assumptions about vesting and realization without regard to individual incumbent tenure.

[7] Ln market pay = industry mean ln pay + sales sensitivity x [ln revenue - mean ln revenue]. Mean ln pay and mean ln revenue are calculated for each GICS industry using five years of historical data for the position (i.e., CEO, CFO) or pay rank (i.e., #2 exec, #3 exec, etc.). Sales sensitivity for each GICS industry is calculated from a regression of ln pay on ln revenue using the aggregate pay of all top 5 executives for all history years. In this regression, pay and revenue are inflation adjusted and ln pay and ln revenue are measured as differences from annual means, i.e., the pay variable is ln pay - mean ln pay for the industry and year and the revenue variable is ln revenue - mean ln revenue for the industry and year.

[8] GICS industry sales leverage ranges from 0.20 to 0.63. The 10th percentile is 0.33 and the 90th percentile is 0.57.

[9] The accretion factor is based on the average difference between cumulative mark to market pay and cumulative market pay across all industry groups. For ten year analyses, the accretion factor is 12.7%.

[10] 26% = exp(0.23) - 1.

[11] An industry can have a non-zero pay premium at industry average performance because the mean relative return of all the S&P 1500 companies in the industry can be non-zero. For example, the mean value of ln(1 + relative TSR) for the 974 company-periods in the Software & Services regression is -0.37. Relative TSR is measured against a market cap weighted industry return (excluding the subject company) and adjusted for industry beta, so the mean individual company relative return is often non-zero.

[12] Pay leverage explains 64% of the variation in pay alignment (r-sq) across the 24 GICS industry groups.

[13] If we exclude companies with negative pay leverage, S&P alignment (r-sq) is 13.8% and increases to 14.9% when we adjust for differences in individual company pay leverage by making the independent variable company pay leverage x ln (1 + relative TSR).

[14] 0.46 is the 75th percentile ln pay premium, while -0.48 is the 25th percentile ln pay premium. 58% = exp(0.46) - 1 and -38% = exp(-0.48) - 1.

[15] The 292 companies represent 18.9% of our total company sample of 1,548 companies. Our sample is more than 1,500 because we use the Execucomp database, which includes companies that have been in the S&P 1500 at various points in time. Our

sample is Execucomp companies with ten consecutive years of complete data. We use the latest available ten-year period for each company. The latest available ten-year period ends in 2016 for 70% of the sample and in the 2015 for another 14% of the sample.

[16] The most famous piece in this literature is Jensen and Murphy's 1990 Harvard Business Review article, "CEO Incentives - It's Not How Much You Pay, but How" (May-June) (available here).

[17] The industry groups, in descending order of pay impact, are Pharmaceuticals (3520), Media (2540), Diversified Financials (4020), Telecommunication Services (5020) and Insurance (4030).

[18] More generally, perfect pay for performance with pay leverage of β requires that excess value share = expected value shareβ.

[19] Technically, these are ratios, not shares because excess shareholder wealth is net of excess pay and expected shareholder wealth is net of market pay.

[20] 16% = exp(0.15) - 1.

[21] The perfect pay plans are explained in more detail in Edmans, Alex, Xavier Gabaix, Tomasz Sadzik and Yuliy Sannikov, "Dynamic CEO Compensation", *Journal of Finance* (October 2012) and O'Byrne, Stephen F., "Three Versions of Perfect Pay for Performance (or The Rebirth of Partnership Concepts in Executive Pay)", *Journal of Applied Corporate Finance* (Winter 2014). A conceptually similar perfect pay plan for investment managers is found in Raymond, Donald, "Paying (Only) for Skill (Alpha)", *CFA Institute Conference Proceedings Quarterly* (June 2008) (available here).

[22] The regression does not include any additional variables such as the Fama-French factors.

Disclosure: I/we have no positions in any stocks mentioned, and no plans to initiate any positions within the next 72 hours.

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