Impact of Economic Cycles on the Use of Performance Measures in Executive Compensation: An Empirical Examination

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Abstract

An extensive body of literature documents the central role played by management accountants in the development of performance measures. However, little research exists on the temporal evolution of performance measures in response to changes in the macroeconomic environment. This study examines the impact of economic cycles on the use of sales and income, two widely used performance measures, in executive compensation. We find that during normal periods income receives greater weight than sales in the Chief Executive Officer (CEO) compensation. When recession strikes firms reduce the weight on income but not on sales, resulting in an increase in relative weight on sales. Further investigations reveal that the cross-sectional variations in the weight on sales and income are conditioned by the life cycle stage of the firm. Growth and mature firms assign more weight to income during normal times and also reduce the weight on income most during recessionary period. In contrast, introductory firms increase weight on sales while decline firms leave weights on sales and income unchanged during recession. We also analyze the compensation of the Chief Sales Officer (CSO). Our results indicate that during normal periods both sales and income receive equal weight. However, during a recession the weight on sales rises significantly while the weight on income falls significantly. These findings indicate that the firms dynamically adjust the weights on sales and income in response to phases of economic cycles. To our knowledge, this is the first study to look at the impact of recession on the use of sales and income performance measures in executive compensation.

Keywords: Executive Compensation; Economic Cycles; Firm Life Cycle; Sales; Income.

1. Introduction

Management accountants have unique expertise and skills in identifying the way specific activities affect the overall performance of the organization (Datar and Rajan, 2018). An extensive body of literature documents the central role played by management accountants in the development of performance measures. However, little research exists on the temporal evolution of performance measures in response to changes in macroeconomic environment. Our study addresses this void in the literature by looking at how the weights placed on sales and income evolve over economic cycles – expansions and recessions.

Economic cycles have a significant impact on the survival and profitability of a firm. A properly designed compensation contract can serve as a strategic tool to steer the firm to survival and profitability through expansionary and recessionary stages of the economic cycle. It can accomplish this by rewarding activities, attributes, and work outcomes that support the organization's goals and strategic direction at any stage of the economic cycle (Howard & Dougherty, 2004).

Recession, which is a pervasive albeit transient shock to the external environment of the firm, is certainly beyond the control of managers. Some argue that relative performance evaluation (RPE) should be used to insulate the executive from the impact of such exogenous shocks.[1] Management accounting texts refer to this as controllability principle. This passive approach is a direct implication of the informativeness principle (Holmstrom, 1979; 1982) that treats exogenous shocks as mere statistical noise that need to be removed from performance measures to enhance their informativeness and to reduce the risk premium. We propose that the

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[1] The empirical support for RPE is weak, or at best, mixed (Antle and Smith, 1986; Gibbons and Murphy, 1990; Janakiraman et al., 1992; Aggarwal and Samwick, 1999; Garvey and Milbourn, 2003; Gong et al., 2011; Jayaraman et al., 2021).

firms may not necessarily view recession as a noise that needs to be eliminated. The reason is that if managers are held accountable for their goals in the face of such random and uncontrollable phenomena, they will actively respond to changes in macro environment by recalibrating their strategy (Merchant, 1987; Janakiraman, 1992). The board incentivizes managers to actively respond to recession by realigning compensation rather than passively filtering its effects as suggested by RPE. Our results indicate that the recession alters the stewardship value[2] of accounting measures in meaningful ways. During normal times, income receives a greater weight than sales in the CEO compensation function. However, during recessionary periods, the weight on income declines. Further evidence of dynamic adjustment is seen in the temporal distribution of relative weight on sales as measured by the weight on sales divided by the weight on income. We find that the relative weight on sales follows an inverted 'U' shaped pattern- lower preceding recession, higher during recession, and again lower during the post-recession recovery period.

Given that our focus is on sales and income and the Chief Sales Officer[3] (CSO) is mainly responsible for sales, we also investigate the impact of recession on CSO compensation. If the strategic emphasis on sales rises during recession and sales becomes a more congruent measure, it is most likely to manifest in the increased stewardship value of sales for the CSO. The results indicate that during normal times there is no significant difference between compensation weights on sales and income. This is in contrast to the CEO compensation where income receives significantly more weight than sales. During recessionary periods, the weight on sales increases significantly while the weight on income decreases significantly in the CSO

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[2] Stewardship value refers to the way a performance measure is used in the executive compensation contracts.
[3] Throughout this study, we use the term Chief Sales Officer (CSO) for top sales executives whose compensation data is available in Execucomp. The actual title of the officer may take different forms such as 'President, Sales', 'Vice President, Sales', 'Chief Sales Officer', and 'Executive Vice President, Sales'.

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compensation. The combined effect is a 465% increase in relative weight on sales during recession. For comparison, the increase in relative weight on sales for CEOs is about 82%. Because the CSO has the primary responsibility for sales and the CEO has a secondary responsibility as a top executive, this intra-firm adjustment of weight on sales aligns with the CSO's responsibility for sales. To our knowledge, this is the first study that looks at how CSO compensation responds to changes in macroeconomic conditions.

We also investigate the impact of life cycle on stewardship value of sales and income performance measures. According to the life cycle theory, a firm's evolution follows four distinct stages- introductory, growth, maturity, and decline. Prior research documents association between firm life cycle stage and compensation (Wang and Singh, 2014; DeAngelis and Grinstein, 2015; Drake and Martin, 2020; and Drake and Martin, 2021). When recession strikes, the cross-section of firms in the economy are in different stages of their life cycle. Since each life cycle stage represents a unique set of attributes and challenges (e.g., technology, customer demand, market structure, and competition), we expect that compensation committees will take into account the life cycle stage when tailoring the performance measures to incentivize managers to respond to recession. Consistent with this, we find that the redistribution of weights on sales and income during the recessionary periods is conditioned by the life cycle stage. Mature firms reduce the weight on income the most followed by growth firms. Declining firms do not make any significant changes in weights of either sales or income. This is in sharp contrast to normal periods when mature and growth firms give the most weight to income. In summary, our study highlights the influence of macroeconomic events such as recession as well as microeconomic factors such as life cycle stages in determining the stewardship value of performance measures.

The rest of the paper is organized as follows. The next section contains literature review and hypothesis development. Section 3 describes research design and sample selection procedure. Our findings and additional tests are presented in sections 4 and 5 respectively. Concluding remarks appear in the last section.

2. Literature Review and Hypothesis Development

Prior research on how recession affects executive compensation is sparse. Sun and Shin (2014) report that the board of directors grant a greater number of new options to CEOs when existing options go underwater due to recession. New option grants shield the CEO from the wealth effects of stock price decline caused by recession and restore incentives to create shareholder wealth. Casas-Arce et. al. (2020), using survey data of CFOs of small and mid-sized private companies, find that their target bonus decreased during recession and, at the same time, the likelihood of failure to meet earnings goals to earn bonus increased.

Matolcsy (2000) finds that the weight on income is positive and significant during steady economic growth years but insignificant during other years. Although we also focus on economic cycles, there are some important differences between our study and his study. First, he predicts a weak or zero relation between compensation and all performance measures while we predict a redistribution of weights on sales and income during recessionary periods. Second, his study is based on 100 large Australian firms during 1987-1995 period. Our study is based on a much larger sample of U.S. firms and covers a more recent period (1993-2018). During this period, U.S. economy suffered two recessions. Given international differences in compensation practices (Murphy, 1999) and changes in compensation practices over time (Frydman & Jenter, 2010), it is not clear whether Australian findings extend to the United States. Third, Matolcsy (2000) focuses only on CEO compensation while we examine compensation of both CEO and CSO.

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Finally, our study also investigates how recession impacts the relative weights on sales and income and how they are impacted by the life cycle stage of a firm.

2.1 Sales and Income Weights

The agency theory postulates that compensation contracts are designed to mitigate agency costs arising from divergent interests of utility-maximizing risk-averse managers and wealth-maximizing risk-neutral shareholders. Creation of value to enhance shareholder wealth requires managers to engage in many activities such as providing strategic direction and leadership, reducing costs, improving customer satisfaction, developing new products, training employees, forging alliances, and expanding market share. To provide incentives for such multi-dimensional effort, firms typically structure compensation contracts to reward multiple performance measures. For example, the popular balanced scorecard system (BSC)[4] advocated by Kaplan and Norton (1996) involves multiple financial and nonfinancial measures. The generic measures[5] under the financial metrics include income and sales.

Since profits are an important determinant of shareholder wealth, many prior studies relating to executive compensation use income-based performance measures such as net income, Return on Investment (ROI), or Return on Equity (ROE). The underlying assumption is that firms are profit-maximizing entities. However, it may be suboptimal for a firm to pursue income without reference to the macroeconomic environment, product demand, or market structure. Early economic literature suggests that both income and sales are important. For example, Baumol (1958) shows that oligopolistic firms seek to maximize sales subject to a minimum profit constraint. Similarly, Ross (1987) shows that, under a set of fairly general conditions,

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[4] The balanced score card system (BSC) retains traditional financial metrics as the ultimate outcome measures for company success but supplements them with metrics from three additional perspectives – customer, internal process, and learning and growth.
[5] Generic measures are those that show up in most organizations' balanced scorecards.

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optimal agency contracts place positive weights on both income and sales as long as both measures are contractible. Since both of these measures are readily available and observable, they satisfy the contractibility requirement.

The real-world evidence also suggests that firms use both income and sales as performance measures. Comparative figures for income and sales appear prominently in quarterly earnings announcements. During conference calls, management guidance includes forecasts of sales and income for the next fiscal year. Interestingly, a survey of 212 US corporations by Towers Watson (2010) indicates revenue as the single most common annual financial performance measure for bonus awards. The two next most common performance measures are cash flow and operating income. Despite the prevalence of sales as a performance measure, very few academic studies include sales as a performance measure. The few exceptions that do provide corroborating evidence on the use of sales as a performance measure. Kim and Yang's (2010) analysis of proxy statements of S&P companies during 2006-09 period indicates that 80% of companies use multiple performance measures. Among the quantitative measures, the most frequently used measures are- EPS, revenue, and operating income. DeAngelis and Grinstein (2015) report that among S&P firms, 87% use income measures and 39% use sales measures. The weight assigned to income-based (sales-based) measures for performance-based award is 56% (12%). Both in terms of frequency of use and weights assigned to them, income and sales are the top two performance measures. Jaiswall and Raman (2019), using a sample of 859 Indian firms over 2002-2015 period, report that both Return on Assets (ROA) and sales growth are positively and significantly associated with the CEO pay.

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Both survey and empirical evidence presented above suggest that income and sales are two widely used performance measures.[6] However, we know little about how much weight is assigned to them in determining executive compensation. According to theoretical agency literature, the optimal weight on a performance measure is a positive function of three attributes-sensitivity, precision, and congruence (Banker and Datar, 1989; Feltham and Xie, 1994). Sensitivity measures the extent to which the expected value of a performance measure changes with the effort or actions undertaken by the manager. Precision is lack of noise. Congruence is the relation between the marginal impact of managerial effort on performance measure (overall compensation) and firm value. Datar et al. (2001) show that optimal weights on performance measures involve a trade-off between congruity and risk imposed by the intensity of the performance measure where intensity is the product of sensitivity and precision.

However, sensitivity, precision, and congruence are theoretical constructs and cannot be observed or measured directly. We circumvent this problem by using recession as a natural laboratory experiment. Given that recession represents a serious jolt to the external environment of the firm, we expect that this shift in the external environment and the resulting firm response will alter the intensity and congruity of sales and income performance measures leading to a redistribution of weights on these performance measures. We hypothesize that this recession-driven redistribution will result in a decrease in weight on earnings. One reason we expect this to occur is earnings persistence. Theoretically, persistent earnings have higher sensitivity and congruence. It takes greater effort on the part of manager to bring about a persistent increase in

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[6] While we realize that firms use other performance measures, we restrict our analysis to sales and income since these are two of the most commonly used measures.

earnings than a transitory increase in earnings.[7] Prior studies (Baber et al., 1998; Arya and

Nagar, 2021) have documented that compensation is positively related to earnings persistence.

During expansionary period, economic growth opportunities are high, and firms are easily able

to find and invest in new projects. The aggregate demand is also rising. Both lead to greater

persistence in earnings. During recession, the opposite holds true. The growth opportunities are

scarce and aggregate demand falls resulting in lower sales volume. Due to the stickiness of costs,

income declines even further resulting in a decrease in earnings persistence. Several empirical

studies have documented a decline in earnings persistence during recession. Tomy (2012), using

data from two cyclical industries (manufacturing and consumer durables), finds that earnings are

most persistent during an expansion, least persistent during a recession, and have intermediate

levels of persistence during moderate growth periods.[8] Johnson (1999), using a sample of 53,324

quarterly earnings announcements over 1970-1987 period, finds that both earnings persistence

and earning response coefficient (ERC) are higher during expansionary period and lower during

recessionary period. Economic downturns also reduce the sensitivity of income which often

declines despite best managerial efforts. A decline in persistence and sensitivity caused by

recessionary conditions will lead to a decrease in weight on earnings. Thus, our first hypothesis

predicts a lower weight on earnings during the recessionary phase of economic cycle[9] -

H1: *During recessionary periods, the weight on income in the CEO compensation function*

decreases.

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[7] For example, a persistent increase may require penetration of new markets or reengineering processes to reduce costs while transitory increases can be obtained by sale and leaseback of office building or selective sale of marketable securities that have increased in value.

[8] We also find that earnings persistence declines significantly during recession for our sample firms.

[9] Matolcsy (2000) provides another reason for decline in weight on income during recession. He argues that financial targets such as income can be set lower than the previous year during economic downturns. In such cases, managers can receive bonus and pay raise even when changes in income are non-positive. This can result in a flat or even negative relation between change in income and change in compensation.

While firms may pursue profit maximization during normal times due to product and capital market pressures, arresting sales decline becomes a strategic imperative in recessionary periods. In a depressed demand environment, it also takes great effort to accomplish it. Thus, the congruence of sales rises. Recall that congruence is the relation between the marginal impact of managerial effort on performance measure and firm value. There is another reason why compensation committees may want to increase the weight on sales. Sales are comparatively less susceptible to manipulation (subject only to revenue recognition standard) than income (subject to myriads of accrual-based and real earnings management tools). Income is also a frequent target of manipulation for bonus awards and adherence to income-based debt covenants. During recessionary period, firms are often forced to take cost-cutting measures such as laying off employees and reducing discretionary expenses. Increased weight on sales dissuades them from reducing costs (for example, reducing marketing and sales promotion) that adversely impact sales. We expect that firms will respond to the increased congruence of sales and decreased precision of income by placing a greater weight on sales. This leads to our second hypothesis:

H2: *During recessionary periods, the weight on sales in the CEO compensation function increases.*

The above predictions embed a joint premise that compensation committees- (a) recognize the recession-induced changes in the contract relevant properties of sales and income, and (b) react in a timely fashion to adjust the performance measures. As a practical matter, this premise may not hold for a few reasons. First, it is difficult for compensation committees to discern changes in the contract relevant attributes of performance measures. Second, inefficient contracts may persist if compensation committees have a natural tendency to conform to pay practices of other firms. As Bebchuk and Fried (2009, p. 75) state, "*Following the herd requires*

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less explanation, less justification, and less confidence in one's own judgment than does carving out a new path…. The evolution of compensation arrangements is slowed down or made "sticky" by compensation committees' preference for adhering to conventions and their reluctance to deviate substantially from established pay practices." Third, Kahneman and Tversky (1982) point out that the regret associated with failure to act is often less intense than the regret associated with the failure of an action. In the case of compensation committees, the anticipation of regret is likely to favor status quo of keeping the same compensation contract over innovative behavior of altering weights on performance measures. Given the heightened risk and uncertainty present in a recessionary environment, the probability of a bad outcome from changing the contract is salient, especially when there are no guideposts about the optimal magnitude of alteration in weights of performance measures. Other factors such as managerial power and poor governance may also hinder timely adjustments in the performance measures particularly if the adjustments are not executive friendly.

2.2 Impact of Firm Life Cycle

So far, we have assumed that the impact of recession is cross-sectionally invariant. However, at the onset of recession, firms in the economy are in different stages of evolution-introductory, growth, maturity, and decline (Wang and Singh, 2014). Since each stage presents a unique set of attributes and challenges (e.g., technology, customer demand, market structure, and competition), we expect that the performance measures will be tailored to motivate the CEO to adapt firm strategy to meet the unique challenges of its life cycle stage. Prior literature provides some evidence of changes in compensation contracts with the evolution of a firm. DeAngelis and Grinstein (2015) find that sales are used by firms with larger growth opportunities and accounting returns are used more heavily by more mature firms with fewer growth opportunities.

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Similarly, Drake and Martin (2021) find that mature firms give more weight on earnings compared to growth and decline firms. However, they do not find any difference in weight on earnings between growth and decline firms. While both of these studies examine the impact of life cycle stage on the weight on earnings, we investigate how firm's response to recession is mediated by the life cycle stage. Below, we first describe how life cycle affects the stewardship value of sales and income and then discuss the differential impact of recession on firms in different life cycle stages.

Introductory firms make significant investments to commercialize their innovation and to develop potential markets. They have a small sales volume and little, if any, income and neither of these measures reflect managerial efforts. Therefore, we expect both measures to receive low weights in compensation.

Growth firms are more concerned with market share and sales growth than profits, making sales a more congruent measure. Their managers incur capital expenditure to build productive capacity, expand product offerings, and devise marketing strategies to enter new markets. The success of these efforts is reflected in sales, making it a more informative measure. With rising sales, earnings also increase and become more persistent. We expect weights on both sales and income to rise during the growth period.

When a firm transitions to maturity, earnings rise rapidly as the investments made in prior stage growth opportunities bear fruit and economies of scale are realized. Since growth opportunities are scarce at this stage, mature firms sustain profitability by seeking operational efficiencies and cost reductions making income a more congruent measure. As income fully reflects the impact of these measures, it also becomes highly informative of managerial efforts.

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Earnings persistence is also at peak driven by stable demand and competitive advantages. Therefore, we expect mature firms to place the most weight on earnings.

Declining firms suffer from loss of market share and falling profits. Their CEOs are tasked with reviving the firm by cutting costs, laying off employees, overhauling existing product lines, exiting unprofitable markets, and rebuilding competitive advantage. These turnaround efforts are not immediately reflected in sales and income, which may be still trending down. Therefore, we expect a diminished reliance on sales and income in the compensation function for declining firms.

To summarize, introductory firms place low weights on both sales and income, as they are yet to reflect the impact of managerial actions. The weights on sales and income rise during growth and maturity stages as their informativeness, congruence, and persistence increases. Finally, we expect a diminution in weights on both sales and income for declining firms as turnaround efforts come into focus.

As discussed in the previous section, a firm's unconditional strategic response to recession is to increase weight on sales and to reduce weight on income. The above discussion indicates that the informativeness and congruence of sales and income vary across life cycle stages. Therefore, the response to recession at the firm level is likely to be asymmetric, conditional on the strategic significance of sales and income dictated by its life cycle stage. We expect that the introductory and decline firms will make only a small upward (downward) adjustment in the weight on sales (income) since they have low weights on both sales and income prior to recession. Conversely, the growth and mature firms will make a large upward (downward) adjustment in weight on sales (income) since they have high weights on both sales and income prior to recession.

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It is possible that introductory and decline firms do not make any adjustments because they are already giving low weights to sales and income. Likewise, it is also possible that growth and mature firms do not reduce weight on income because income is of vital importance to them, or they do not increase weight on sales because they have enough resources to outlast recession and can afford to take a temporary hit in sales.

Given that the agency theory is not developed enough to determine the precise magnitude of redistribution of weights, we only hypothesize that the redistribution of weights on sales and income is influenced by the life cycle stage of the firm. This leads to the following hypothesis-

H3: *During recessionary periods, the redistribution of weights on sales and income in the CEO compensation function is conditioned by the life cycle stage of a firm.*

2.3 Chief Sales Officer (CSO) Compensation

Sales involves all the steps needed to get individual customers to buy the product. It is said that marketing creates the 'pull' to get the customer ready to buy the product and sales creates the 'push' to 'close the deal' by performing the vital steps of completing the sale and generating revenue. Marketing and sales activities and processes, such as advertising (McAlister et al., 2007), promotion (Pauwels et al., 2004), and brand equity (Madden et al., 2006) are central to creating and enhancing firm value (Srivastava et al., 1998; Srinivasan and Hanssens, 2009).

We focus on the Chief Sales Officer (CSO) compensation for several reasons. First, the CSO formulates sales strategy, provides operational leadership to the entire sales force, and is responsible for achieving sales goals. The CSO coordinates sales management activities across business units to deliver value to customers (Nath and Bharadwaj, 2020), allocates budgets across sales territories (Malshe and Sohi, 2009), and provides valuable insights and intelligence on customers, intermediaries, and competitors to the top management team (Kotler et al., 2006).

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Second, since sales is crucial for survival in recessionary periods and the CSO is directly responsible for sales, both the probability and magnitude of redistribution of weight from income to sales is likely to be the highest in the CSO compensation function. This provides a more powerful test of our hypotheses. Third, it enables us to compare the compensation weights of CSO and non-CSO groups yielding potentially rich insights into how compensation committees adjust intra-firm executive compensation in response to recessionary conditions.

At this point, one might ask why income should be given any weight at all for the CSO, who is mainly responsible for sales. The reason the CSO is likely to be evaluated on income is that otherwise sales targets can be met by focusing on low margin products, cutting prices to boost sales, or excessive spending on marketing, advertising, and sales commission. All of these actions boost sales but hurt income.

Similar to the CEO, we expect compensation committees to place greater weight on sales and smaller weight on income in setting the CSO compensation. However, given the fact that the CSO is mainly responsible for sales, we expect these changes to be more pronounced compared to other executives. Specifically, we test the following hypotheses-

H4: *During recessionary periods, the weight on income in the CSO compensation function decreases.*

H5: *During recessionary periods, the weight on sales in the CSO compensation function increases.*

Despite the vital role played by the CSO, the vast majority of accounting research studies focus on CEO compensation. The implicit assumption is that only the CEO actions have first-order effects on firm value. Though a few accounting studies (for example, Balsam et. al., 2012; Caglio et. al., 2018; Hui & Matsunaga, 2015) investigate the Chief Financial Officer (CFO)

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compensation, none of them look at the CSO compensation. Our study fills this void in the literature by investigating how sales and income influence the CSO compensation.

3. Research Design and Sample Selection

As stated in the previous section, we restrict our analysis to the CEO and CSO compensation as these two top executives bear most responsibility for income and sales respectively. Rather than using total compensation which combines all elements of compensation, we focus on two components of compensation- salary and bonus. The rationale for not using total compensation is that current theories of compensation are not rich enough to specify which components of compensation will be influenced by a specific performance measure. However, in practice, elements of compensation are structured to respond differentially to various performance measures and combining them into total compensation is likely to considerably attenuate the relation existing between an individual component of compensation and the performance measure.[10] An informal analysis of compensation committee reports, prior literature research, and empirical surveys all confirm that while salary raises are discretionary, bonus awards are often based on sales and income (Gaver & Gaver, 1998; Baber et al., 1998; Sloan, 1993; Huang et al., 2015). While we recognize that other components of compensation may also be restructured during recessionary periods, it is not clear if sales and income have any material role in their determination. For example, stock options and restricted stocks are often awarded to executives. However, their value is primarily a function of stock price and volatility which is affected by a myriad of factors and not so much by sales and income. Moreover, since stock returns already reflect the value-relevant attributes of earnings, the inclusion of equity-based compensation is likely to introduce noise in the dependent variable.

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[10] This is corroborated by Baber et al. (1996) who report that while earnings are significantly related to cash salary and bonus, the relation between earnings and total compensation is tenuous at best.

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We regress compensation on performance measures to obtain their ex-post weights. Ex-post weights are determined at the end of the period when actual performance data becomes available. The advantage of this approach is that it enables compensation committees to take into account unforeseen events like recession and exercise discretion in managerial performance evaluation.[11] Specifically, we estimate the following model to test our first and second hypotheses:

$$\Delta COMP_{it} = b_0 + b_1\,\Delta SALES_{it} + b_2\,\Delta INCOME_{it} + b_3\,REC_{it} + b_4\,REC\ x\ \Delta SALES_{it}$$

$$+ b_5\,REC\ x\ \Delta INCOME_{it} + Error_{it} \qquad\qquad (1)$$

$\Delta COMP$ is change in salary plus bonus of CEO. $\Delta SALES$ is change in sales, $\Delta INCOME$ is change in net income[12], and REC is a dummy variable that takes a value of '1' during recession years and '0' otherwise. Following the National Bureau of Economic Research (NBER), we classify 2001, 2008, and 2009 as recession years.[13] See Appendix I for a complete list of variable definitions.

Equation (1) suggests that other things being equal, changes in compensation are a function of changes in sales and income. The model is specified in 'changes' form to control for factors that vary by firm, such as industry and size, and by CEO, such as experience, qualifications, and stock ownership. We expect b_4 (b_5) to be positive (negative) as the weight on

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[11] See Appendix III for examples of discretion.

[12] In practice, companies frequently use non-GAAP variations of income. However, determining the exact income measure used by the firm requires significant investment of time and effort in reading the proxy statement for each firm year and we still need to choose one measure for regression analysis. In any case, using an imprecise measure biases the tests against finding results.

[13] See https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions (Accessed on July 14, 2023). According to NBER, the official recession periods are from March 2001 to November 2001 (2001 recession), and from December 2007 to June 2009 (2008-09 recession). We classify a year as recessionary if six or more months of the year fell in the recessionary period as defined by the NBER. We recognize that this causes recessionary period to include some normal period.

sales (income) should increase (decline) during the recessionary periods. To test our last two hypothesis (H4 and H5), we rerun equation (1) for the CSO sample.

To test our third hypothesis, we estimate equation (1) separately for each life cycle stage. We categorize sample firms in life cycle stages using a cash flow proxy based on Dickinson (2011). She classifies firms into life cycle stages based on the signs of cash flow components, i.e., operating, investing, and financing cash flows. An advantage of her proxy is that it does not require sequential movement of firms through introductory, growth, maturity, and decline stages. The following table shows how we classify firms in the life cycle stages based on the signs of cash flow components (See Appendix I for more details):

	Introductory	Growth	Maturity	Shakeout	Decline
Cash flows from operating activities	-	+	+	+/-	-
Cash flows from investing activities	-	-	-	+/-	+
Cash flows from financing activities	+	+	-	+/-	+/-

To select the CEO sample, we begin with firms included in the EXECUCOMP database during the 1992-2018 period. Since we require one year of lagged data, our regressions are run for 1993-2018 period. To be included in the sample, a firm must also have relevant data on the Compustat database. This yields a sample of 3,574 firms (40,922 firm-years).

To form the CSO sample, we include only those executive officers from Execucomp database that have 'Sales' as part of their title (Execucomp variable: TITLEANN). The Execucomp database extracts title and compensation items related to five "Named Executive Officers" (NEOs[14]) from the proxy statements. This means that a CSO is only included in our

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[14] These NEOs are- CEO, CFO, and three other most highly compensated executive officers of the firm. Executive officers include any president, vice president in charge of a principal business unit, division, or function (such as sales, administration, or finance), or any other officer who performs a substantive policy-making function.

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sample if she/he makes it to the list of NEOs. Assuming pay equates to influence and power, these NEOs constitute the most influential and powerful part of the top management team. If the CSO is represented in this uppermost echelon of management, we take that as a reflection of the strategic importance of selling at the corporate level decision-making. Since Execucomp collects only the title of NEOs, CSOs are excluded from our sample if they have other titles. In some companies, the Chief Marketing Officer also oversees the sales function. The recent trend is to have a Chief Revenue Officer who is responsible for all revenue generating and customer-facing activities. Such cases are also excluded from our sample. As a result, we lose a significant number of observations. The final CSO sample consists of 844 firms (4,048 firm-years). Appendix II describes the sample selection process.

/Table 1/

Table 1 presents the descriptive statistics. Sample firms are large with median (mean) total assets of \$1.3 billion (\$6.3 billion). Median (Mean) compensation (COMP) for CEOs is \$592.6 (\$823.4) thousand during normal periods. As expected, both sales (SALES) and net income (INCOME) are lower during recessionary periods. The total compensation is also lower during recession. While the decrease in salary (SALARY) is small, bonus (BONUS) declines significantly during the recessionary period. This is expected since bonus targets, which are often based on sales and income, are likely to be missed during recession.

4. Results

4.1 Temporal Distribution of Weights on Sales and Income

We begin our analysis by comparing the compensation weights on sales and income during normal and recessionary periods. This complements the regression analysis presented in

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the next section. H1 predicts a lower weight on income while H2 predicts a higher weight on sales during the recessionary period.

Figure 1 presents mean weights on these two performance measures. These are means of coefficients of annual regressions (Equation 1). The mean weight on income is 0.98 during normal times but it falls to 0.54 (45 percent decrease) during recession. The mean weight on sales during normal times is 0.30 and it rises to 0.42 (40 percent increase) during the recessionary period. These results lend support to H1 and H2.

/Figure 1/

Next, we take a granular look at relative weights on sales or the sales-to-income ratio. The sales-to-income ratio is the compensation weight on sales divided by compensation weight on income. If compensation committees increase weight on sales and decrease weight on income during recession, the sales-to-income ratio should rise when recession begins and fall when it ends. In other words, we should observe an inverted 'U' shaped pattern of sales-to-income ratio surrounding recession- lower weight preceding recession, higher weight during recession, and again lower weight during the post-recession recovery period.

To determine whether this is indeed the case, we compute the mean sales-to-income ratio for two years preceding recession and two years following recession. In computing the average, we exclude the immediate one-year period surrounding recession. The reason is that some firms may begin to feel the effects of recession earlier and some firms may take longer to recover from recession than the official window of recession as determined by the NBER. The inclusion of these firms may result in bias in our findings. We then compare these pre- and post-recession weights to the mean recession weights.

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Figure 2 presents the sales-to-income ratio for recession and the surrounding period. As predicted, the inverted 'U' pattern is clearly evident for 2001 and 2008-09 recessions. This strengthens our confidence that the increase in sales-to-income ratio is likely caused by recession.

/Figure 2/

Figures 3 and 4 present mean compensation weights on sales/income and sales-to-income ratio respectively for the CSO sample. As shown in Figure 3, the mean weight on sales rises from 0.15 during normal times to 0.23 (53 percent increase) during the recessionary period. In contrast, the mean weight on income falls catastrophically from 1.41 during normal times to 0.17 (88 percent decrease) during the same period. These results lend support to H4 and H5.

/Figures 3 and 4/

Next, we look at the sales-to-income ratio for the CSO sample. Since H4 predicts the weight on income to fall and H5 predicts the weight on sales to rise during recession, the sales-to-income ratio should exhibit an inverted 'U' pattern. As shown in Figure 4, the hypothesized inverted 'U' pattern is clearly evident for the 2001 recession. However, there is no discernible pattern for the 2008-09 recession.[15]

To summarize, mean weights on sales (income) are higher (lower) during recession. The relative weight on sales, as measured by the sales-to-income ratio, rises during recession and falls during the post-recession period.

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[15] The mean sales-to-income ratio is negative, though small, in the post 2008-09 recession period. This anomaly is caused by a negative (though statistically insignificant) weight on sales for 2011 year.

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4.2 Regression Analysis

4.2.1 Sales and Income Weights

Table 2 presents the results for our main hypotheses (H1 and H2). The coefficients on both '$\Delta SALES$' and '$\Delta INCOME$' are positive and significant at .01 level (Panel A). This provides clear evidence that both sales and income are used as performance measures. Although CEO compensation is increasing in both sales and income, the weight on sales (0.37) is smaller than the weight on net income (0.73) and the difference is significant at .01 level.

/Table 2/

Our first hypothesis, H1, predicts that the weight on income falls during the recession. To test it, we add a dummy variable ('*REC*') that takes a value of '1' during recession years and '0' otherwise. We then interact it with sales ('*REC* x $\Delta SALES$') and income ('*REC* x $\Delta INCOME$') to measure the impact of recession. The results are presented in Table 2, Panel B. The coefficient on '*REC* x $\Delta INCOME$' is -0.32 and is significant at 0.01 level. This constitutes a statistically and economically significant decline of 40% in the weight on income providing strong support to H1.

Our second hypothesis, H2, predicts that the weight on sales will rise during recession. The coefficient on dummy variable, '*REC* x $\Delta SALES$' fails to attain statistical significance. However, as a result of sharp decline in the weight on income, sales and income receive equal weight during recession as the difference between them is not statistically significant.

The above analysis is based on absolute weights on sales and income. If we consider the relative weights[16] on sales and income (sales-to-income ratio), then a combination of decline in

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[16] A few studies in the agency literature focus on relative weights on performance measures. For example, Banker and Datar (1989) characterize optimal linear aggregate of two stochastic performance signals y and z, (ly + mz) as relative weights (l:m) that are directly proportional to the product of sensitivity and precision of the signal. We interpret l and m as weights on sales (b_1) and income (b_2).

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weight on income (H1) and an increase in weight on sales (H2), yields an unambiguous prediction that the sales-to-income ratio will rise during recessionary period.

However, conventional testing of statistical significance of ratios is problematic because distributional properties of financial ratios exhibit heteroscedasticity and non-normality (McDonald and Morris, 1984). This problem is exacerbated in our sample which includes firms across many industries (Barnes, 1987). To address these concerns, we conduct tests of statistical significance of sales-to-income ratio based on Lye and Hirschberg (2018).[17] When we examine weights on sales and income from a relative perspective, we find that the sales-to-income ratio (b_1/b_2) is 0.45 (Panel B, Table 2) during normal times. However, during recessionary period, it ((b_1+b_4) / (b_2+b_5)) jumps to 0.82, an increase of 82 percent.

To summarize, during normal times, the weight on income is significantly greater than the weight on sales. However, during recessionary periods, sales receive as much weight as income and the relative weight on sales rises by as much as 82 percent. This provides clear evidence that firms dynamically adjust weights on sales and income in response to economic cycles.

4.2.2 Impact of Firm Life Cycle

H3 predicts that the changes in weights on sales and income during recession are influenced by the life cycle stage. To test it empirically, we estimate the regression model of

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[17] Assuming regression coefficients are asymptotically normally distributed random variables, the ratio of two regression coefficients is a non-central Cauchy distribution for which there are no finite moments. Thus, the traditional approach of constructing a confidence interval (CI) using expected value and variance may not be possible. To overcome this, Lye and Hirschberg (2018) emphasize the construction of CI using the Fieller method. An advantage of the Fieller method is that the estimated $100(1-\alpha)$ interval is not forced to be symmetric. This approach enables one to make finite probability statements about the ratio over a limited range of probabilities. One limitation of this approach is that it may not result in a finite CI for some values of α.

equation (1) separately for each life cycle group. Table 3 presents the results.[18] The coefficients

on sales and income are positive and significant for each of the four life cycle groups. This

shows that both sales and income are important determinants of CEO compensation regardless of

the life cycle stage. However, when we look at the absolute and relative weights on sales and

income, a distinct pattern is observed across life cycle stages. At the introductory stage, both

sales and income receive low weights. This is consistent with the notion that both sales and

income convey little information about managerial efforts for firms in this stage. As the firms

move from introductory to growth and maturity stages, the weight on income steadily rises. This

is expected since earnings now reflect managerial efforts to a greater degree and exhibit higher

persistence. Finally, for decline stage firms, the weights on income and sales decline as

turnaround and revival efforts take center stage. Looking at relative weights, we find that the

sales-to-income ratio (b_1/b_2) falls steadily from 0.87 (introductory stage) to 0.45 (growth stage)

and hits a trough of 0.22 during maturity stage. The ratio is significant for all stages except

decline.

/Table 3/

The interaction variables '*REC* x *ΔSALES*' and '*REC* x *ΔINCOME*' measure the impact

of recession on weights on sales and income, respectively. Although introductory firms increase

the weight on sales (from 0.37 to 0.67) and income (from 0.42 to 0.75), the null hypothesis that

weights on sales and income are equal during either normal periods (b_1-b_2=0) or recession

((b_1+b_4) - (b_2+b_5) = 0) cannot be rejected at conventional levels of significance. In other words,

both sales and income receive equal weights for introductory firms. On the other hand, firms in

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[18] We include 'Shakeout' firms for completeness following Dickinson (2011). This is a default category for firms which, based on the signs of cashflows, do not fall into any of the four life-cycle stages. The life cycle theory does not have any predictions for these firms.

the growth and maturity stages significantly reduce weight on income during recessionary times. Mature firms reduce the weight most (0.61) followed by growth (0.40) firms. Declining firms do not experience any significant changes in weights on sales or income.

Changes in relative weight on sales during recession are also driven by life cycle stage. During the recessionary period, the sales-to-income ratio rises from 0.46 to 0.81 (76 percent increase) for growth firms and from 0.22 to 0.63 (186 percent increase) for mature firms. Overall, these results support H3 which predicts that the magnitude of adjustment of weights on sales and income in response to economic conditions is conditioned by life cycle stage.

4.2.3 Chief Sales Officer (CSO) Compensation

We now test the empirical validity of H4 and H5 as they relate to the Chief Sales Officer (CSO). The results are presented in Table 4. Panel A reproduces the results of CEO compensation regression to facilitate comparison. In addition to regressing the CSO compensation on sales and income (Panel B), we also regress compensation of Chief Financial Officer (CFO) on sales and income (Panel C). Since the CFO has no executive responsibility for sales, we do not expect any changes in weight on sales during the recessionary period. The CFO sample serves as a control to mitigate any firm related confounding effects. The reason is that if the changes in compensation weights of sales and income for CEO and CSO are caused by unspecified firm level confounding factors then CFO sample should also exhibit similar changes.

/Table 4/

Looking at the CSO regression results (Panel B, Table 4), we find that during normal times the weights on both sales and income are positive and significant. Sales receive a greater weight than income though the difference is insignificant at conventional levels. For the CEO and CFO group, income receives a greater weight during normal times than sales and the

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difference (b_1-b_2) is significant at 0.01 level (Panels A and C, Table 4). This indicates that net income is a better summary statistic for these two groups.

H4 predicts a decline in the weight on income for the CSO during recession. Consistent with it, the weight on net income indeed falls significantly from 0.19 to 0.06 (68 percent decline) during recession. In comparison, the weight on income for CEO falls 40 percent during recession (Panel A). Stanching sales decline is often crucial for a firm's survival during recession and the CSO, as head of sales, plays a vital role in this effort. The weight on sales indeed rises significantly from 0.17 to 0.28 (65 percent increase) during recession. This is consistent with H5 which predicts a higher weight on sales during recession. In contrast, the weights on income and sales remain unaffected by recession for the CFO. This strengthens our confidence that the observed results for the CSO group are unlikely to be caused by confounding events.

Relative weights paint an even starker picture. For the CSO, the sales-to-income ratio (b_1/b_2) is almost even (0.90) during normal times. As reported above, the weight on sales (income) rises (falls) significantly during recession. As a result, the sales-to-income ratio explodes from 0.90 to 5.10 (467 percent increase). The CFO group, on the other hand, registers a small decline (7 percent). For comparison, the sales-to-income ratio for the CEO rises by 82 percent during recession (Panel A).

In summary, the weight on sales rises significantly for the CSO and the weight on income declines for the CSO and CEO during recession. The increase in the sales-to-income ratio during recession is highest for the CSO followed by the CEO. The CFO group remains unaffected by recession. These differential intra-firm adjustments are concordant with the responsibility of sales for these three groups of executives. It further increases our confidence that the observed changes in relative weight on sales reflect a firm's strategic response to recession.

5. Additional Tests

5.1 Impact of Loss Years

Hayn (1995) argues that losses are not likely to perpetuate since shareholders can always liquidate the firm rather than suffering indefinite losses. Thus, losses can be viewed as an extreme case of very low persistence. Consistent with this, she shows that when only loss years are included in the sample the earnings response coefficient is insignificant. Gaver and Gaver (1998), using a sample of firms covering 1970-1996 period, regress CEO cash compensation on components of earnings and find that the compensation committees reward managers for positive recurring and nonrecurring income but shield them from recurring and nonrecurring losses. More recently, Potepa (2020) confirms that compensation committees continue to reward CEOs for recurring positive income but shield them from recurring negative income. Since more firms are likely to incur losses in recession, it is plausible that the reduction in weight on income seen in Table 2 reflects the compensation committee's desire to shield the CEO from losses. To investigate this, we divide the sample into two subsamples- loss firm-years and profit firm-years. We then run separate regressions on each subsample. Results are reported in Table 5. Consistent with prior studies, coefficient on losses is much smaller (0.394) than profits (1.355). When we focus on profit firm-years subsample only, we still find a significant decline in weight on income during recession. This indicates that the results are not driven by loss-making firms in the sample. In fact, the weight on losses is unaffected by recession.

/Table 5/

5.2 Inclusion of Additional Variables

As indicated in section 4 (research design), we employ regression specifications in change form. This eliminates the influence of myriads of known and unknown factors (for

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instance, industry, firm size, and CEO attributes) that influence compensation but do not change much from year to year. To mitigate any concerns that the results are influenced by correlated omitted variables, we include three additional control variables—size, return on assets (ROA), and market-to-book ratio (MTB) and rerun the regression.[19] The results are reported in Table 6. These results are similar to those reported in Table 2.

/Table 6/

5.3 Industry-Adjusted Performance Measures

It is possible that the observed changes in weights on sales and income are driven by the compensation committee's desire to shield the CEO from recessionary conditions rather than the hypothesized strategic response to recession. However, shielding cannot explain why only the weight on income is reduced. To filter the impact of macroeconomic conditions, we use industry-adjusted sales and income measures and rerun the regression. Industry consists of firms in the same two-digit SIC code. To derive our industry-adjusted measure, we first calculate industry median income and sales for each year and then subtract them from the sales and income of each firm in the industry. Results, presented in Table 7, are similar to those reported in Table 2. Thus, our results cannot be explained by risk-shielding.

/Table 7/

5.4 Alternative Life Cycle Proxy

As a robustness check we also use an alternative life cycle stage proxy based on Anthony and Ramesh (1992). Their proxy uses dividend payout, sales growth, capital expenditure, and age to classify firms in growth, growth/maturity, maturity, and maturity/stagnant stages. The

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[19] Size is the logarithm of total assets. Return on assets (ROA) is calculated as income before extraordinary items divided by total assets. Market-to-book ratio (MTB) is calculated as market value of equity divided by book value of common equity. See Appendix I for complete definition of variables.

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tenor of results (untabulated) using this alternative proxy remains unchanged except that the difference in weights on sales and income in non-recessionary period is statistically insignificant (significant) for the maturity/stagnant (introductory) stage firms.

5.5 *Alternative Measure of Compensation*

In our alternative measure of compensation, we include long-term incentive plans awards (LTIP). These awards are given when executives reach a target level of goals (such as total shareholder return, return on assets, or earnings per share) over a multi-year horizon. Award payouts are given only at the end of the plan period and can take the form of cash or stock-based compensation, such as stock options, restricted stock, and performance units. We have excluded them from compensation because inclusion of multi-year award payout in annual regression introduces noise in the dependent variable. As a robustness check we now include them in compensation and rerun regressions. The tenor of our results (untabulated) remains unchanged.

5.6 *Stock Option Grants*

Prior literature (Sun and Shin, 2014) has found that companies increase option grants during recessionary period. This is done to shield the CEO from the wealth effects of stock price decline caused by recession and to restore incentives to create shareholder wealth. When we analyze the options granted to firms in our sample, we also find a similar pattern. The mean (median) number of options granted during recessionary periods is 181.3 (60) thousand. In contrast, the mean (median) number of options granted during normal period is 128.3 (37) thousand. The difference is statistically significant at .01 level.

6. Conclusions

We find that both sales and income performance measures are positively and significantly associated with the CEO compensation and, consistent with profit-seeking behavior, income is

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assigned a greater weight than sales during normal periods. However, these weights are not stationary. Firms dynamically adjust weights on performance measures in response to phases of economic cycle. During the recessionary period, firms reduce the weight on income but not on sales resulting in an increase in relative weight on sales. We also find that the firm level response to recession is conditioned by the life cycle stage. Introductory firms prioritize both sales and income during normal times and they stay course during recession. In contrast, firms in growth and mature life cycle stages prioritize income during normal times and respond to recession by significantly reducing the weight on income. Declining firms have low weights on sales and income that are unaffected by recession.

An analysis of Chief Sales Officer (CSO) compensation reveals that both sales and income receive equal weights. This is not surprising since CSO is the highest officer responsible for sales in the firm. Given the strategic significance of sales during recession, we expect firms to further incentivize CSO to stem any decline in sales. Consistent with this, we find that with the onset of recession, the weight on sales rises significantly (65%) while the weight on income falls significantly (68%). To our knowledge, ours is the first study to look at how the use of sales and income performance measures in the CEO and CSO compensation is impacted by recession.

In conclusion, by dynamically changing the weights on sales and income measures, the firms use compensation policies as a strategic tool to capitalize on opportunities present in the expansionary phase of economic cycle and mitigate the adverse effects of recessionary phase of economic cycle. These findings may be of interest to compensation committees who are tasked with designing pay structure of CEO and CSO to elicit behavior congruent with organizational objectives during different phases of economic cycle and at any given life cycle stage of a firm.

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Appendix I- Variable Definitions

Variable	Definition
AT	Total assets at the end of year *t*.
BONUS	The dollar value of bonus earned in year *t*.
COMP	Compensation defined as the sum of *BONUS* and *SALARY*.
DECLINE	Decline stage of firm life cycle: 1 when operating cash flows (OANCF)<0 and investing cash flows (IVNCF)>0 and financing cash flows (FINCF)< or > 0, 0 otherwise.
GROWTH	Growth stage of firm life cycle: 1 when operating cash flows (OANCF)>0, investing cash flows (IVNCF)<0, and financing cash flows (FINCF)>0; 0 otherwise.
INCOME	Net income in year *t*.
INTRODUCTION	Introduction stage of firm life cycle: 1 when operating cash flows (OANCF)<0, investing cash flows (IVNCF)<0, and financing cash flows (FINCF)>0; 0 otherwise.
MATURE	Mature stage of firm life cycle: 1 when operating cash flows (OANCF)>0, investing cash flows (IVNCF)<0, and financing cash flows (FINCF)<0; 0 otherwise.
MTB	The market capitalization (PRCC_F*CSHO) divided by the book value of common equity (CEQ) at the end of year *t*.
REC	Recessionary period defined as a dummy variable equal to 1 if the year is 2001, 2008 or 2009; 0 otherwise.
ROA	Return on assets defined as the income before extraordinary items (IB) in year *t* divided by total assets (AT) at the end of year *t*.
SALARY	The dollar value of the base salary earned in year *t*.
SALES	Net sales in year *t*.
SHAKEOUT	Shakeout stage of firm life cycle: 1 when a firm is not in introduction, growth, mature, or decline stage; 0 otherwise.
SIZE	Firm size defined as the logarithm of total assets (AT) at the end of year *t*.
ΔCOMP	The change in compensation defined as change in salary and bonus from *t-1* to *t* scaled by salary in year *t-1*.
ΔINCOME	The change in net income from *t-1* to *t* scaled by total assets in year *t-1*.
ΔSALES	The change in sales from *t-1* to *t* scaled by total assets in year *t-1*.

Appendix II- Sample Selection

	No. of firms	No. of observations
Initial Execucomp and Compustat sample with non-missing gvkey (1992 to 2018)	3,741	297,233
Less: Observations with Execucomp data for executive officers who are not CEOs	2	249,491
	3,739	47,742
Less: Observations with missing values of $\Delta SALES$ and $\Delta INCOME$	165	6,820
Final sample (CEO Compensation)	**3,574**	**40,922**
Less: Observations with missing values of cash flows needed to calculate life cycle stages	59	630
Final sample (CEO Compensation- Life Cycle)	*3,515*	*40,292*
Less: Observations with Execucomp data for executive officers who are not CFOs	149	5,879
Final sample (CFO Compensation)	*3,366*	*34,413*
Less: Observations with Execucomp data for executive officers who are not CSOs	2,522	30,365
Final sample (CSO Compensation)	*844*	*4,048*

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Appendix III- Examples of Discretion in Bonus Awards

Case I- Bonus Paid Outside the Parameters of Bonus Plan-

"The bonuses and options were given in recognition of the services Messrs. Jackson (Chief Financial Officer) and Comen (Executive Vice President of Sales) provided during the first quarter of 2008 and were paid outside of our Cash Bonus Plan. Particularly, the bonuses and options were meant to recognize Messrs. Jackson and Comen for the contributions each of them made during the first quarter of 2008 in helping us respond to the recession in the freight market."

(Knight Transportation Inc. 2009 proxy statement)

Case II- Bonus Reduced Below the Parameters of Bonus Plan-

"The financial targets for our non-equity incentive compensation program and our PCDS program were approved by the Committee early in 2008, but the impact of the global economic recession on CDI dramatically accelerated during the later part of the year. ……In light of the disappointing financial results in 2008 and the extraordinary macroeconomic challenges which CDI faces in 2009, the Committee decided, on the recommendation of the CEO, to use its discretion to reduce the 2008 non-equity incentive compensation payouts below even the levels which were achieved."

(CDI Corp 2009 proxy statement)

Case III- Bonus Forfeited as Per the Parameters of Bonus Plan-

"We did not, however, achieve our key operational objectives, which were established prior to the deteriorating economic conditions that occurred in the second half of the year. While the Committee felt the Company performed well leading up to the economic downturn, and responded aggressively and appropriately to the downturn, it agreed with management's recommendation that no payouts be made under our annual variable pay or long-term equity incentive compensation plans in 2008. The Committee's decision was consistent with our highly results-oriented compensation strategy."

(Eastman Kodak Company 2009 proxy statement)

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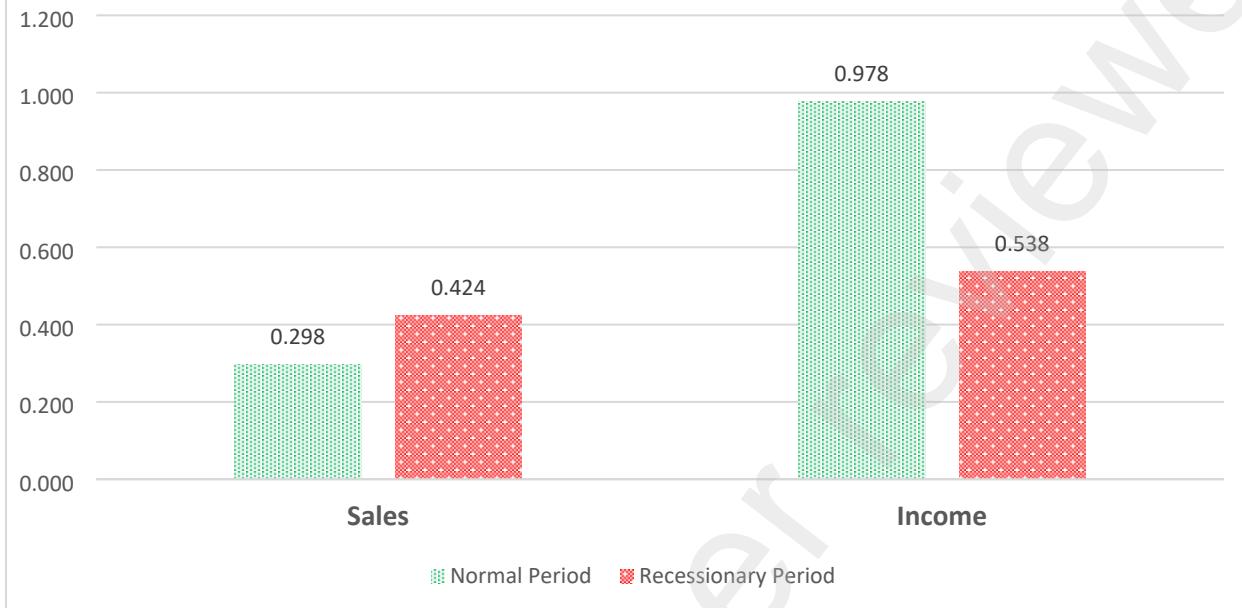
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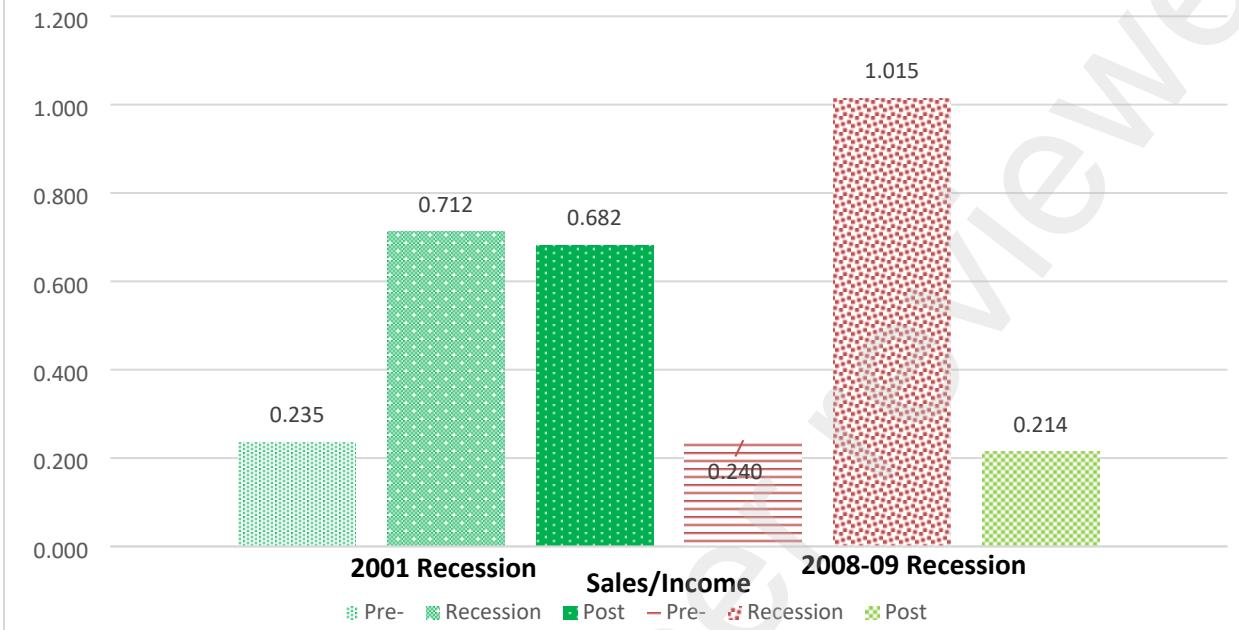
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Figure 1- Mean CEO Compensation Weights on Sales and Income During Normal and Recessionary Periods
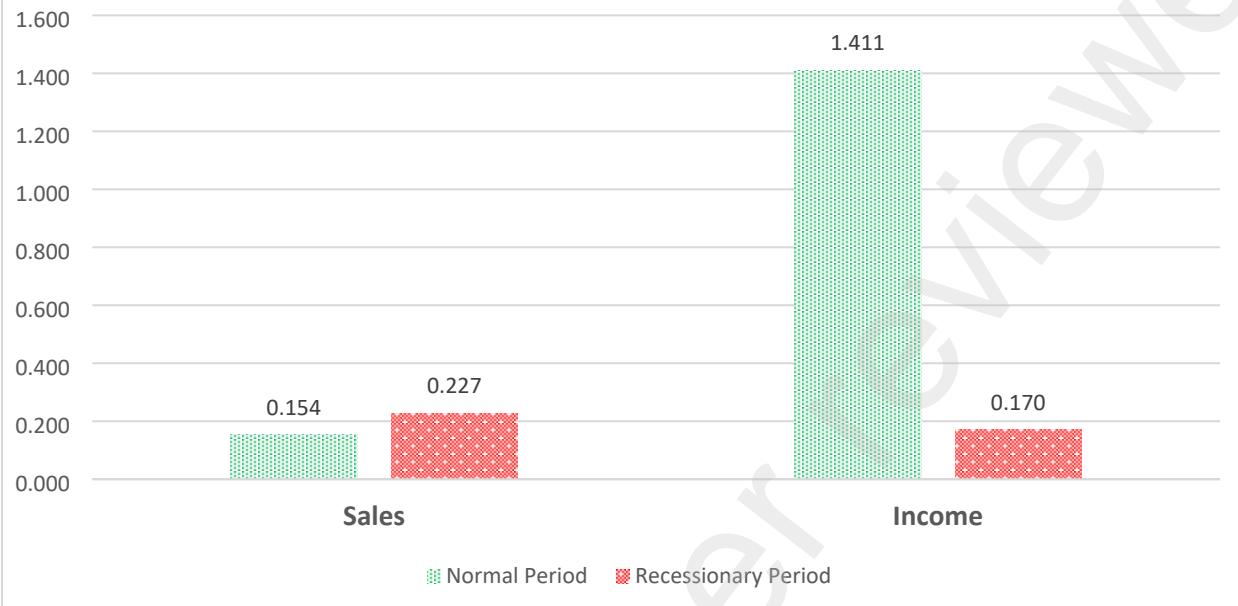
The figure shows the means of coefficients on sales and income from annual regressions of CEO compensation on sales and income for two periods– recessionary (years 2001, 2008 and 2009) and normal (the remaining years).

Figure 2- Relative Sales-to-Income CEO Compensation Weights During Pre-Recession, Recession, and Post-Recession Periods
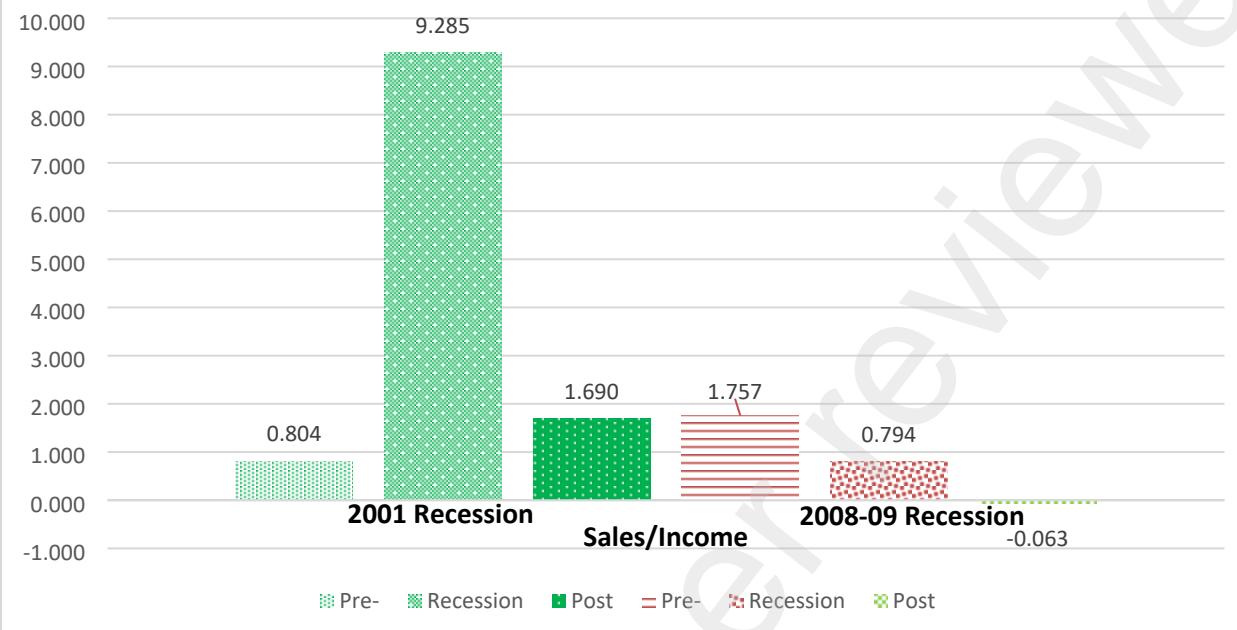
The figure shows the sales-to-income ratios. We first compute the means of coefficients on sales and income from annual regressions of CEO compensation on sales and income for three different periods: two years preceding recession, recession, and two years following recession. The sales-to-income ratio is then computed for each period as the mean weight on sales divided by the mean weight on income.

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Figure 3- Mean CSO Compensation Weights on Sales and Income During Normal and Recessionary Periods

The figure shows the means of coefficients on sales and income from annual regressions of CSO compensation on sales and income for two periods– recessionary (years 2001, 2008 and 2009) and normal (the remaining years).

Figure 4- Relative Sales-to-Income CSO Compensation Weights During Pre-Recession, Recession, and Post-Recession Periods

The figure shows the sales-to-income ratios. We first compute the means of coefficients on sales and income from annual regressions of CSO compensation on sales and income for three different periods: two years preceding recession, recession, and two years following recession. The sales-to-income ratio is then computed for each period as the mean weight on sales divided by the mean weight on income.

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Table 1: Descriptive Statistics

Variable	Normal Period			Recessionary Period		
	N	**Mean**	**Median**	**N**	**Mean**	**Median**
SALARY	35,435	507.5	477.1	5,487	491.1	456.2
BONUS	35,435	315.9	0.0	5,487	212.5	0.0
COMP	35,435	823.4	592.6	5,487	703.6	539.6
INCOME	35,435	234.9	49.7	5,487	120.5	25.6
SALES	35,435	3581.2	992.6	5,487	3205.3	826.8
ASSETS	35,435	6320.3	1307.0	5,487	5583.9	1082.7

SALARY, *BONUS*, and *COMP* are in thousands of dollars, and represent the compensation for CEOs. The remaining amounts are in millions of dollars. All amounts are adjusted for inflation based on 1992 Consumer Price Index. The variables are winsorized at the extreme 1%. See Appendix I for variable definitions.

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Table 2: CEO Compensation Weights on Sales and Income

		Dependent Variable: $\Delta COMP$	
		Coefficient (t-statistic)	Coefficient (t-statistic)
		Panel A	Panel B
$\Delta SALES$	b_1	0.374***	0.361***
		(15.459)	(13.521)
$\Delta INCOME$	b_2	0.726***	0.800***
		(11.807)	(12.114)
REC	b_3		-0.033***
			(-2.770)
REC x $\Delta SALES$	b_4		0.032
			(0.534)
REC x $\Delta INCOME$	b_5		-0.321***
			(-2.774)
Constant	b_0	0.014***	0.019***
		(5.325)	(5.639)
$b_1 - b_2$		-0.352***	-0.439***
$(b_1 + b_4) - (b_2 + b_5)$			-0.086
b_1 / b_2		0.510***	0.450***
$(b_1 + b_4) / (b_2 + b_5)$			0.820***
# of Obs.		40,922	40,922
Adj. R^2		2.0%	2.1%
p-value		0.000	0.000

The coefficient estimates are from an OLS pooled regression (Equation 1). t-statistics are given in parentheses. Standard errors are 1-way (firm) cluster-robust. Variable definitions are given in Appendix I. Statistical significance for hypothesized variables is based on one-tail test.
* p<=0.10, ** p<=0.05, *** p<=0.01.

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Table 3: CEO Compensation Weights on Sales and Income by Life Cycle Stages

		Dependent Variable: $\Delta COMP$				
		Introduction	**Growth**	**Mature**	**Shakeout**	**Decline**
		Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
$\Delta SALE$	b_1	0.367***	0.454***	0.265***	0.226**	0.170*
		(4.549)	(10.134)	(6.950)	(2.325)	(1.404)
$\Delta INCOME$	b_2	0.422***	0.998***	1.192***	0.819***	0.257*
		(3.216)	(8.899)	(10.598)	(4.616)	(1.399)
REC	b_3	-0.076	-0.048**	-0.018	-0.044	-0.053
		(-1.181)	(-1.980)	(-1.114)	(-1.028)	(-0.602)
$REC*\Delta SALE$	b_4	0.301*	0.031	0.100	0.124	-0.077
		(1.507)	(0.261)	(1.134)	(0.538)	(-0.342)
$REC*\Delta INCOME$	b_5	0.325	-0.397*	-0.614***	-0.560**	-0.157
		(1.139)	(-1.426)	(-3.389)	(-1.958)	(-0.486)
Constant	b_0	0.005	0.002	0.013***	0.035**	0.085***
		(0.192)	(0.284)	(2.615)	(2.191)	(3.268)
b_1-b_2		*-0.055*	*-0.544****	*-0.927****	*-0.593****	*-0.087*
$(b_1+b_4)-(b_2+b_5)$		-0.079	-0.116	-0.213	*0.091*	-0.007
b_1/b_2		0.869***	0.455***	0.222***	*0.276***	*0.664*
$(b_1+b_4)/(b_2+b_5)$		0.894***	0.807*	0.631***	*1.349*	*0.932*
# of obs.		1,824	12,953	20,436	3,846	1,233
Adj. R^2		2.4%	3.3%	1.9%	1.3%	0.2%
p-value		0.000	0.000	0.000	0.000	0.472

The coefficient estimates are from an OLS pooled regression (Equation 1). The regressions are run separately for each stage of firm life cycle. t-statistics are given in parentheses. Standard errors are 1-way (firm) cluster-robust. Variable definitions are given in Appendix I. Statistical significance for hypothesized variables is based on one-tail test. * p<=0.10, ** p<=0.05, *** p<=0.01.

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Table 4: Compensation Weights on Sales and Income for CEO, CSO, and CFO

		Dependent Variable: ΔCOMP		
		(1)	**(2)**	**(3)**
		CEO	**CSO**	**CFO**
		Coefficient (t-statistic)	**Coefficient (t-statistic)**	**Coefficient (t-statistic)**
		Panel A	**Panel B**	**Panel C**
ΔSALES	b_1	0.361***	0.172***	0.196***
		(13.521)	(5.135)	(9.295)
ΔINCOME	b_2	0.800***	0.191**	0.417***
		(12.114)	(2.397)	(7.938)
REC	b_3	-0.033***	-0.037	0.012
		(-2.770)	(-1.164)	(1.220)
REC x ΔSALES	b_4	0.032	0.108*	0.019
		(0.534)	(1.312)	(0.410)
REC x ΔINCOME	b_5	-0.321***	-0.136*	0.076
		(-2.774)	(-1.380)	(0.778)
Constant	b_0	0.019***	0.023***	0.045***
		(5.639)	(2.669)	(16.002)
b_1-b_2		*-0.439***	*-0.019*	*-0.221****
(b_1+b_4)-(b_2+b_5)		*-0.086*	*0.225****	*-0.278****
b_1/b_2		*0.450****	*0.901***	*0.471****
(b_1+b_4)/(b_2+b_5)		*0.820****	*5.091*	*0.438****
# of Obs.		40,922	4,048	34,413
Adj. R^2		2.1%	2.1%	1.2%
p-value		0.000	0.000	0.000

The coefficient estimates are from an OLS pooled regression (Equation 1). The regressions are run separately for each sample of executives (CEOs, CSOs and CFOs). t-statistics are given in parentheses. Standard errors are 1-way (firm) cluster-robust. Variable definitions are given in Appendix I. Statistical significance for hypothesized variables is based on one-tail test.
* p<=0.10, ** p<=0.05, *** p<=0.01.

Table 5: CEO Compensation Weights on Sales and Income for Profit and Loss Firm-Years

		Dependent Variable: ΔCOMP	
		Profit Firm-Years	**Loss Firm-Years**
		Coefficient (t-statistic)	**Coefficient (t-statistic)**
		Panel A	**Panel B**
ΔSALES	b_1	0.341***	0.292***
		(10.717)	(5.962)
ΔINCOME	b_2	1.355***	0.394***
		(12.590)	(4.946)
REC	b_3	-0.018	-0.094***
		(-1.313)	(-3.309)
REC x ΔSALES	b_4	0.099*	-0.067
		(1.298)	(-0.647)
REC x ΔINCOME	b_5	-0.561***	-0.166
		(-2.724)	(-1.102)
Constant	b_0	0.006	0.022**
		(1.532)	(2.237)
b_1-b_2		*-1.014****	*-0.102*
(b_1+b_4)-(b_2+b_5)		*-0.354**	*-0.003*
b_1/b_2		*0.251****	*0.743****
(b_1+b_4)/(b_2+b_5)		*0.553****	*0.991*
# of Obs.		33,409	7,513
Adj. R^2		2.5%	1.3%
p-value		0.000	0.000

The coefficient estimates are from an OLS pooled regression (Equation 1). The regressions are run separately for two samples (profit and loss firm-years). The loss firm-years have income before extraordinary items (IB) less than zero. t-statistics are given in parentheses. Standard errors are 1-way (firm) cluster-robust. Variable definitions are given in Appendix I. Statistical significance for hypothesized variables is based on one-tail test. * p<=0.10, ** p<=0.05, *** p<=0.01.

Table 6: CEO Compensation Weights on Sales and Income Including Controls

		Dependent Variable: $\Delta COMP$
		Coefficient (t-statistic)
$\Delta SALES$	b_1	0.383***
		(13.837)
$\Delta INCOME$	b_2	0.871***
		(12.374)
REC	b_3	-0.035***
		(-2.922)
$REC \times \Delta SALES$	b_4	0.043
		(0.717)
$REC \times \Delta INCOME$	b_5	-0.250**
		(-2.164)
$SIZE$	b_6	-0.000
		(-0.096)
ROA	b_7	-0.245***
		(-5.980)
MTB	b_8	0.002**
		(2.225)
Constant	b_0	0.020
		(1.423)
$b1-b2$		-0.488***
$b1+b4-(b2+b5)$		-0.195
b_1/b_2		0.440***
$(b_1+b_4)/(b_2+b_5)$		0.686***
# of obs.		40,518
Adj. R^2		2.2%
p-value		0.000

The coefficient estimates are from an OLS pooled regression. t-statistics are given in parentheses. Standard errors are 1-way (firm) cluster-robust. Variable definitions are given in Appendix I. Statistical significance for hypothesized variables is based on one-tail test. * $p<=0.10$, ** $p<=0.05$, *** $p<=0.01$

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Table 7: CEO Compensation Weights on Industry-adjusted Sales and Income

		Dependent Variable: $\Delta COMP$
		Coefficient (t-statistic)
$\Delta SALES$	b_1	0.338***
		(12.957)
$\Delta INCOME$	b_2	0.750***
		(11.196)
REC	b_3	-0.068***
		(-5.658)
$REC \times \Delta SALES$	b_4	0.033
		(0.493)
$REC \times \Delta INCOME$	b_5	-0.356***
		(-3.027)
Constant	b_0	0.043***
		(13.708)
$b1-b2$		-0.412***
$b1+b4-(b2+b5)$		-0.023
b_1/b_2		0.451***
$(b_1+b_4)/(b_2+b_5)$		0.940***
# of obs.		40,922
Adj. R^2		1.6%
p-value		0.000

The coefficient estimates are from an OLS pooled regression. In this regression, *SALES* and *INCOME* have been calculated after subtracting the industry-year median. t-statistics are given in parentheses. Standard errors are 1-way (firm) cluster-robust. Variable definitions are given in Appendix I. Statistical significance for hypothesized variables is based on one-tail test.
* $p \le 0.10$, ** $p \le 0.05$, *** $p \le 0.01$