

# Cross-sectional determinants of an executive performance metric index

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## Abstract

**Purpose** – Performance-based executive compensation has been well studied in the academic literature but relatively little attention has been paid to the performance metrics disclosed by corporations in their proxy statements. The paper aims to discuss this issue.

**Design/methodology/approach** – Using these statements from a large sample of US firms from 1996 to 2005, the author constructs an accounting-based-metric index based on the inclusion or exclusion of performance benchmarks from five categories.

**Findings** – The author finds firm rely more heavily on accounting-based evaluation when their stock market valuation is low. Larger firms, firms with a high marginal tax rate, and firms with low earnings per share are more likely to use accounting-based pay, levered firms are not more or less likely.

**Originality/value** – These results are consistent with accounting-based pay being used by firms with fewer intangible assets, smaller unrealized growth options, and more established lines of business.

**Keywords** Corporate governance, Executives, Compensation

**Paper type** Research paper

## I. Introduction

The wages of the worker have long been of interest to the economist and few wages have received more attention than that of the chief executive. Certainly some executives have been paid handsomely for their service while others have received modest wages, often a single dollar per annum. On average we expect executives to make significantly more than their rank and file employees but significantly less than the large owners of capital or other classes of employees, e.g. actors and professional athletes.

It is clear that firms are paying for something of value with their executive compensation dollars; it is not conclusively understood exactly what that is. Certainly shareholder value is a good start, but can we be more specific about what, exactly, the executive is providing that creates the added value in the first place? In order to begin to address this question I examine the preferences of compensation committees revealed in firms' annual proxy statements. In detailing what qualities or achievements justify the scale of the bonus and salary paid to the executive, these statements show the specific characteristics the committees consider worth paying for.

I focus specifically on the relative strength of accounting performance measures in a particular firm relative to other frequently used measures also used to set pay in that firm. Accounting performance has been recognized by the literature as an important evaluator of CEO performance (e.g. Lambert and Larcker, 1987) but other non-financial measures are also often used (see Ittner *et al.*, 1997). Where accounting performance fares more prominently in compensation decisions than non-financial measures, revenue growth, or stock price performance, the compensation committee can be assumed to more greatly value accounting performance than other outputs the executive might achieve like a successful merger or good labor relations.



The natural question then arises, what types of firms pay for the different kinds of performance? For accounting performance it appears that larger, established firms are more interested in accounting performance from their CEO than younger firms with more growth options. This is consistent with what desires we would expect compensation committees to have for their firms. In firms with clearly established lines of business it makes more sense to be concerned about overall financial performance than in, say, a young software firm with negative free cash flow and large growth prospects. Industry averages support this assertion; low accounting concentration is frequent in the service sector (business services, health services, engineering and management services) and infrequent in commodity and manufacturing firms (textile mills, coal and petroleum products, transportation services).

Accounting-based compensation seems to be strongly industry related in general. Average industry concentration is a strong predictor of individual firm ROE concentration, adding it to a simple two factor regression increases  $R^2$  by nearly five times, and performs nearly as well as two-digit SIC indicators. Since there seems to be significant variation in compensation metrics across industries some must value certain outcomes, and perhaps certain skill sets, over others. It is easy to imagine how such a situation could arise. Suppose significant consolidation is expected in a given industry in the near future. "Successful acquisition" might be an important metric for those firms worth paying for or turnaround prowess in a troubled industry. So while shareholder value is probably the goal in general across industries and metric types, there is significant variation in what methods used to generate value are compensated across industries.

In subsequent sections I will review the relevant literature, describe the metric in detail, review the empirical results, and conclude.

## II. Literature review

The closest study in spirit to mine is that of Gillan *et al.* (2009). These authors studied the employment contracts that executives often sign when they agree to serve as the chief executive. Some firms elect to have an implicit contract with some generally agreed upon behavior but no explicit legal document while others spell out, often in great detail, what the executive is and is not permitted to do, and what specific remuneration she can expect. While the source material is different, explicit contracts with executives should contain some evidence of what the board expects of their manager. In their study the authors found that explicit contracts were more likely to be observed when CEOs needed to make firm specific human capital investments and less likely when the relationship was uncertain which is similar in spirit to findings in this study around uncertain firm performance and accounting-based evaluation.

Other important works for this study include Ittner *et al.* (1997) who study the relative weights of financial and non-financial bonus contracts and find non-financial measures increase for more regulated firms, firms that follow an innovation strategy, and firms for whom financial information is noisier. The innovation strategy finding in particular relates to the discussion later of a negative relation between accounting performance use and asset intangibility. Also comparing financial and non-financial performance are Core *et al.* (2003) which compares the relative value of price and non-price performance measures by comparing which was more predictive of pay in a multiple regression using total compensation. They find, contrary to the standard agency prediction, metric use increases rather than decreases with variance, the opposite result than cash compensation. Aggarwal and Samwick (1999) do not study

different metrics specifically, but they do find a positive relation between compensation and both own and rival performance which is likely also in effect here. Mehran (1992) found a positive relation between leverage and the percentage of pay in incentive plans, a different variate than accounting-based compensation but similar in that both studies examine leverage dispersion and incentive pay. Murphy (1999) provides an excellent survey of the executive compensation literature in general.

The study also relates to the value relevance of accounting literature, e.g. Amir *et al.* (1993) and Amir and Lev (1996) as compensation metrics should be value relevant if they are worth paying for and accounting performance is a paid-for metric of particular focus in this work. This paper owes a methodological debt to Graham *et al.* (1998) who use some similar covariates in their analysis of operating leases.

### III. Data and methodology

In order to construct the ROE concentration index, I rely on an SEC requirement that firms report the performance metrics they use to evaluate their executives in the proxy statement. This report typically is comprised of two portions. First, the board discloses which metrics they felt were pertinent for setting compensation in this particular year. For example, “successfully completed a major acquisition” would be an important metric in some years whether an acquisition was successful or not. The metric will be less relevant, and likely not used, when the firm is not pursuing mergers. So from among the menu of available options the compensation committee chooses a set of metrics pertinent this fiscal year and discloses this list in the proxy.

The second portion is the list of metrics the shareholders feel is appropriate for the compensation committee to use in general, if not specifically this year. This list is typically much larger as there are significant frictions to changing it. Therefore it is often quite comprehensive, and excluding a measure from this list is important in that it is generally not permitted for the compensation committee to explicitly use a non-approved metric. As a result, the inclusion of a particular metric in a proxy is not necessarily a clear signal of its importance in a given fiscal year; the exclusion of a metric is a credible signal that it is not pertinent this fiscal year.

My process for collecting this information from the proxies was the following. The corpus of proxies contained on EDGAR (the Securities and Exchange Commission’s online resource for public disclosures posted to their web site) was downloaded using a modified version of the open-source web crawler WebSphinx. In WebSphinx the proxies are fed through an HTML interpreter which strips out the HTML tags and other technical information. Then, from the text of the transformed proxy, a different version of the crawler does a regular expression search for terms relating to performance metrics. Essentially the software looks for a collection of performance metric-specific key words and categorizes proxies by whether they include one term from the list of terms in the list. Naturally this limits the class of metrics that can be successfully used. For example, cash flow alone is a common performance metric but is frequently used elsewhere in a proxy for non-executive performance-related purposes, while a mention of “return on equity” or “return on assets” is more likely to be occurring in the performance evaluation section.

Using this process I categorize the proxies along five dimensions. I formulate ROE concentration as follows: if there is no ROE mentioned on the proxy, that firm is given an ROE concentration of 0. If it does show up, I then check for four other categories of performance measures: total stock return, revenue or sales growth, non-financial measures (like customer satisfaction and completing acquisitions), and cash flow.

For each additional category represented in the big list it reduces ROE concentration. For example, if a firm tied bonus to ROE and nothing else, that firm would have an ROE concentration of  $1/(0+0+0+0+1) = 1$ . If a firm tied the bonus to all four additional categories that firm would have an ROE concentration of  $1/(1+1+1+1+1) = 0.2$ . Firms that commit to tying bonus to ROE by having a short big-list should have stronger financial incentives for accounting performance than firms that are less focussed.

Using the CIK identifier from Edgar I merge with Compustat to link firm characteristics to compensation metrics. Summary statistics are presented in Table I. The median firm has an ROE concentration of 0, that is, they do not use return on equity as an evaluation metric and so the numerator of the ROE concentration fraction is 0. The distribution is right skewed with a mean value of about 10 percent. Market to book is calculated using book assets minus book equity plus market equity plus present value of five-year rental commitments with the median firm trading at book value. Other capital structure variables for my sample are also presented in Table I. Overall my sample does not appear markedly different from Compustat as a whole.

#### IV. Results

Industry distribution of ROE concentration is presented in Table II. The industries with the highest value of the index are financials (SIC codes 60-63) and contractors (15-17). Interestingly SIC 16 heavy construction except building has a very low value of the index so it seems likely that real estate development is a strong covariate with ROE concentration. Other industries of note are trucking and warehousing (SIC 42) which has an overall.

ROE concentration of less than 1 percent, insurance agents, brokers, and service which is a financial (SIC 64) and yet has an ROE concentration just above 3 percent.

	Obs.	Median	Mean	SD
Long-term debt	8,614	0.0792	0.1170	0.1284
Capital leases	8,618	0	0.0027	0.0105
Operating leases	9,225	0.0262	0.0533	0.0772
Tax rate before investment	8,779	0.35	0.3132	0.0910
Bankruptcy cost	11,395	0.0001	0.0098	0.5725
M/B	9,289	0.993	1.4932	2.0801
Collateral	12,046	0.2111	0.2792	0.2408
ROE concentration	9,750	0	0.1032	0.2288
Size	12,358	7.0687	7.2019	1.6168

**Notes:** Summary statistics for the sample of US firms from Compustat from 1996 to 2005. Financial claims are scaled by the market value of the firm which is defined as book value of assets minus book value of equity plus market value of equity plus present value of rental commitments for the next five years. Operating leases is the estimated present value of operating leases inferred from rental commitments from Compustat. Long-term debt and capital leases are from Compustat, scaled by firm market value. Size is the natural log of total assets from Compustat. Tax rate before investment is the before investment rate of Graham *et al.* (1998). Bankruptcy Cost is the standard deviation of the first difference of the firm's earnings before interest, depreciation, and taxes divided by total assets multiplied by the sum of research and development expense and advertising scaled by total assets. M/B is the market to book ratio or market value of equity divided by book assets plus present value of rental commitments. Collateral is net property plant and equipment divided by total assets. ROE Concentration is composed of a dummy variable for the presence of "return on equity" in a firm's proxy statement divided by the sum of five dummies for each of five possible compensation metric categories

**Table I.**  
Summary statistics

**Table II.**  
Accounting-based  
compensation by  
industry

Industry	SIC	ROEx	Obs.	Industry	SIC	ROEx	Obs.	Industry	SIC	ROEx	Obs.
Agricultural production crops	1	0.1007	28	Primary metal industries	33	0.0892	243	Furniture and home furnishings stores	57	0.0826	78
Agricultural services	7	0.1250	5	Fabricated metal products	34	0.1000	139	Eating and drinking places	58	0.0782	231
Metal mining	10	0.0409	80	Industrial machinery and equipment	35	0.1048	708	Miscellaneous retail	59	0.0556	224
Coal mining	12	0.0513	15	Electronic and electric equipment	36	0.0575	914	Depository institutions	60	0.2762	869
Oil and extraction	13	0.0482	413	Transportation equipment	37	0.1118	280	Non-depository institutions	61	0.2546	101
Non-metallic minerals, except fuels	14	0.0167	35	Instruments and related products	38	0.0667	543	Security and commodity brokers	62	0.2244	204
General building contractors	15	0.3876	90	Misc. manuf. industries	39	0.1148	74	Insurance carriers	63	0.2396	541
Heavy construction, except building	16	0.0270	40	Railroad transportation	40	0.0650	51	Insurance agents, brokers, and service	64	0.0333	47
Special trade contractors	17	0.2857	25	Local and inter-urban passenger transit	41	0.0417	11	Real estate	65	0.0476	8
Food and kindred products	20	0.0755	317	Trucking and warehousing	42	0.0087	115	Holding and investment offices	67	0.0354	178
Tobacco products	21	0.1146	17	Water transportation	44	0.0741	47	Hotels and other lodging places	70	0.0481	39
Textile mill products	22	0.1641	88	Transportation by air	45	0.0661	80	Personal services	72	0.0660	27
Apparel and other textile products	23	0.1535	138	Transportation services	47	0.1396	45	Business services	73	0.0463	1,070
Lumber and wood products	24	0.0109	73	Communication	48	0.0937	302	Auto repair, services, and parking	75	0.0889	18
Furniture and fixtures	25	0.0946	68	Electric, gas, and sanitary services	49	0.1182	785	Motion pictures	78	0.0406	65
Paper and allied products	26	0.0591	170	Wholesale trade durable goods	50	0.0656	266	Amusement and recreation services	79	0.0593	81
Printing and publishing	27	0.0829	214	Wholesale trade non-durable goods	51	0.1177	129	Health services	80	0.0390	214
Chemicals and allied products	28	0.0763	801	Eating and drinking places	52	0.1902	23	Educational services	82	0.1174	32
Petroleum and coal products	29	0.1309	141	General merchandise stores	53	0.0497	129	social services	83	0.0417	10
Rubber and misc. plastics	30	0.0761	104	Food stores	54	0.0847	80	Engineering and management services	87	0.0571	141
Leather and leather products	31	0.1171	47	Automotive dealers and service stations	55	0.0261	41	Non-classifiable establishments	99	0.0294	25
Stone, clay, and glass products	32	0.0934	78	Apparel and accessory stores	56	0.0861	184				

**Notes:** Average ROE concentration score by industry for a sample of US firms from Compustat from 1996 to 2005. ROE concentration is composed of an indicator variable for the presence of "return on equity" in a firm's proxy statement divided by the sum of five indicator variables for each of five possible compensation metric categories

The largest SIC code in terms of number of firms, business services (SIC 73) has an average ROE concentration of 4.6 percent. Business services has most web and software startups, so in terms of “new economy” firms ROE as a performance metric is less relevant. There is likely a Ittner *et al.* (1997) life cycle issue here as firms age and have established lines of business they have more consistently measurable income and the signal to noise ratio would increase making ROE more useful.

In order to test for the cross-sectional determinants of the ROE concentration metric I use a series of pooled time-series, cross-sectional panel regressions, with ROE concentration metric as the dependent variable. For my initial test I run a two-factor model with size and market to book as the covariates. We know that these two firm characteristics have a strong relation to return and earnings (see Fama and French, 1995) and so it is reasonable to suspect that these characteristics would also yield dispersion in executive compensation metrics, with the life cycle hypothesis predicting that large firms and value firms will have a greater proportion of accounting-based evaluation as these metrics would be relatively more reliable and useful for them compared to young, growing firms where outcomes and practices are more uncertain. Consistent with this hypothesis I find that large firms and firms with low market-to-book value have higher concentrations of accounting performance in their metric menu, both significant at the 0.1 percent level.

To alleviate concerns that this result in an industry effect rather than specifically a size and value effect I repeat the previous analysis with two different industry controls. First, I include two-digit SIC code indicators; this results in lower coefficients overall, in particular for the value effect, but significance levels are still well above conventional requirements. The same is true if I use industry average ROE concentration instead of indicator variables, coefficients are of similar size, and significance to the indicator regression. Therefore, while there are industry-based effects that drive metric choice, like regulation, this does not subsume the value and size effect and provide further evidence for the lifecycle hypothesis.

The next dimensions along which I test are asset intangibility and financial distress. For firms with significant brand value or in process R&D it may be difficult to use accounting performance, as invested funds may not be accurately represented in book value and earnings effects of research may be long in coming. For distressed firms, negative income is problematic for awarding CEOs bonuses as shareholders may react negatively to a performance bonus for negative performance, even if the result was an improvement on previous results. The turn-around skill set may require different outcomes, shuttering costly divisions or negotiating cheaper labor contracts, than the captain of an already succeeding firm. To test these potential concerns I include three additional variables in the analysis: collateral, which is the ratio of property plant and equipment to total assets, Expected Bankruptcy Cost which is an interaction of an operating risk measure and two asset intangibility measures (advertising expense and research and development expense), and book equity negative an indicator variable selecting firms with prolonged periods of distress. Using these variables I find little evidence of the turnaround skill set hypothesis. There also appears to be little relation to asset intangibility beyond that already captured by the growth/value factor.

For firms that are leveraged and have firm cash flow commitments, short-term earnings and cash flow performance can have increased necessity as bankruptcy can be costly and disruptive. A leverage hypothesis would suggest that these firms will be relatively more interested in income performance than firms with more financial flexibility or that are not credit constrained. To test this hypothesis I include three

additional measures of leverage based on three different leverage sources: long-term debt, capital leases, and operating leases (Table III). Per Graham *et al.* (1998) all of these sources can be significant contributors to firm leverage and therefore potentially influence compensation metrics.

The leverage hypothesis is not supported by results from my sample; there does not appear to be a positive relation between accounting-based compensation and leverage. The coefficients on the three leverage terms are insignificant and their inclusion has little effect on the other covariates. It is possible that multicollinearity in the three

	Coef./p-value					
Market to book	-0.0113	-0.0060	-0.0062	-0.0065	-0.0056	-0.0052
	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.026
Size	0.0123	0.0080	0.0091	0.0072	0.0072	0.0049
	< 0.001	0.001	< 0.001	0.010	0.006	0.078
Industry average ROE concentration		0.8724		0.7991	0.8344	0.8033
		< 0.001		< 0.001	< 0.001	< 0.001
Debt to value				0.0034		
				0.914		
Capital leases to value				-0.3036		
				0.102		
Operating leases to value				-0.0465		
				0.258		
Collateral				0.0102	0.0180	0.0058
				0.582	0.329	0.779
Book equity negative				-0.0250	-0.0269	-0.0203
				0.116	0.0590	0.2380
Expected bankruptcy cost				0.0422	0.0384	0.0722
				0.496	0.536	0.202
Tax rate before investment						0.1131
						< 0.001
Constant	0.0131	-0.0401		-0.0287	-0.0373	-0.0501
	0.471	0.030		0.199	0.067	0.015
Observations	7,381	7,381	7,381	6,332	6,386	5,274
R <sup>2</sup>	0.0153	0.0727	0.0781	0.0655	0.0642	0.0614
Industry indicators	No	No	Yes	No	No	No

**Notes:** Summarizes results from six separate pooled time-series cross-sectional regressions of accounting-based performance as a fraction of performance metrics. ROE Concentration is composed of a dummy variable for the presence of "return on equity" in a firm's proxy statement divided by the sum of five dummies for each of five possible compensation metric categories. Market value of the firm is defined as book value of assets minus book value of equity plus market value of equity plus present value of rental commitments for the next five years. Industry average ROE concentration is the average within industries of the ROE concentration index. Long-term debt and capital leases are from Compustat, scaled by firm market value. Operating Leases is the estimated present value of operating leases inferred from rental commitments from Compustat. Tax rate before investment is the before investment rate of Graham *et al.* (1998). Expected Bankruptcy Cost is the standard deviation of the first difference of the firm's earnings before interest, depreciation, and taxes divided by total assets multiplied by the sum of research and development expense and advertizing scaled by total assets. The Book Equity Negative Dummy takes a value of 1 when the book value of common equity is negative. M/B is the market to book ratio or market value of equity divided by book assets plus present value of rental commitments. Collateral is net property plant and equipment divided by total assets. Size is the natural log of total assets from Compustat. Industry Indicators represents two-digit SIC code industry controls

**Table III.**  
Regressions of  
accounting-based  
performance as  
a fraction of  
performance metrics

measures prevent them from being individually statistically significant when included together, but if statistical evidence exists it would be opposed to rather than in favor of the leverage hypothesis as the sign on the two leverage variables with the strongest relation is negative rather than positive.

As a further test of the lifecycle theory I use the simulated marginal tax rates of Graham (1996). Younger firms and firms in the development stage or with rapidly changing business models can accumulate operating loss carry-forwards to offset future earnings, while older firms and firms with few growth options will likely have fewer options available for deferring tax. Thus the marginal tax rate may capture an additional aspect of the lifecycle hypothesis, with firms with a large marginal tax rate representing the firms in established businesses the life cycles hypothesis expects to have accounting-based compensation. In order to test this hypothesis I include those rates and exclude the capital structure variables. Consistent with the tax-based lifecycle hypothesis I find that firms with high-tax rates do rely on accounting evaluation more often, significant at the 0.1 percent level. For this test the coefficient on size drops to the 10 percent level, indicating that size and marginal tax rate may be capturing a similar effect.

## V. Conclusions

Overall this evidence supports the relation that the usefulness of accounting income as an evaluation measure of executives is directly related to situations where we would expect it to be useful to compensation committees in evaluating their executives. Large firms with low market to book value are just the kind of mature established firms that we would expect to find accounting information more useful. This assertion could be tested more directly by directly incorporating firm age; Jay Ritter has founding dates for many IPOs on his web site, so a logical extension of this work would be to include firm age in the multiple regressions. While accounting concentration is certainly of interest, non-financial concentration, or sales growth concentration also might have interesting variation in the cross-section. These relations would be of interest for future research.

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