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RESEARCH NOTES AND COMMENTARIES

THE EFFECT OF CEOS ON FIRM PERFORMANCE

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The extent to which CEOs influence firm performance is fundamental to scholarly understanding of how organizations work; yet, this linkage is poorly understood. Previous empirical efforts to examine the link between CEOs and firm performance using variance decomposition, while provocative, nevertheless suffer from methodological problems that systematically understate the relative impact of CEOs on firm performance compared to industry and firm effects. This study addresses these methodological problems and reexamines the percentage of the variance in firm performance explained by heterogeneity in CEOs. The results of this study suggest that in certain settings the 'CEO effect' on corporate-parent performance is substantially more important than that of industry and firm effects, but only moderately more important than industry and firm effects on business-segment performance. Copyright © 2008 John Wiley & Sons, Ltd.

INTRODUCTION

Do CEOs have an impact on firm performance? And if they do, where in a firm do they matter most—at the corporate or segment level? These questions have captured the attention of business scholars and practitioners for over a century (Bass, 1991; Carpenter, Geletkanycz, and Sanders, 2004; Yukl, 2002). On the one hand, some theorists (Barnard, 1938) and many practitioners (e.g., Drucker 1954; Collins, 2001) have argued that leadership—especially in a firm's senior positions— has an important impact on firm performance and survival at all levels. Barnard (1938), for example, argued that top leaders formulate a collective purpose that binds participants in an organization; Selznick (1957) described how top leaders infuse an organization with values; Schein (1992) argued that top leaders help create an organization's culture; and Tichy and Cohen (1997) argued for the crucial role of top leaders in deciding an organization's course of action—especially in the face of technical and environmental change (Woodward, 1965; Lawrence and Lorsch, 1967; Thompson, 1967). All these effects of leadership are thought to be leveraged throughout an organization (Rosen, 1990), resulting in a substantial impact on a firm's performance.

On the other hand, some scholars have argued that leadership influence on firm outcomes is limited by environmental, organizational, and legitimacy constraints, which restrict executive choice

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(e.g., Hannan and Freeman, 1989; Pfeffer and Salancik, 1978; DiMaggio and Powell, 1983). Without choice, CEOs can do little to influence firm outcomes (Hambrick and Finkelstein, 1987). From quite a different perspective, other scholars have suggested that leaders, such as CEOs, play more of a symbolic than substantive role in organizations (Pfeffer, 1981). In this view, performance outcomes are attributed to CEOs as a way to make sense out of complex organizational outcomes (Calder, 1977; Pfeffer, 1977; Meindl, Ehrlich, and Dukerich, 1985). Empirical support for these perspectives is often linked to a body of research that estimates the percentage of variance in firm performance explained by a firm's CEO (e.g., Lieberson and O'Connor, 1972; Weiner, 1978; Thomas, 1988). Overall, this empirical literature suggests that the impact of CEOs on firm performance is modest at best (Finkelstein and Hambrick, 1996), which has led some scholars to conclude that the search for explanations of variance in firm performance needs to focus on other variables, since 'factors outside the control of any single individual drive organizational performance' (Podolny, Khurana, and Hill-Popper, 2005 : 2).

This study investigates the possibility that conclusions about the modest impact of CEOs on firm performance may be premature. In particular, in some settings—settings that have not been identified in much of the previous empirical work (e.g., Lieberson and O'Connor, 1972; Weiner, 1978; Thomas, 1988)—CEOs can have a significant impact on firm performance. By adopting new methodological approaches that focus on settings where the effects of CEOs on firm performance can actually be estimated, this study shows that CEOs can, in fact, have a substantial impact, explaining as much as 29.2 percent of the variance in a firm's performance. In addition, this study shows that much of this effect occurs at the corporate level of analysis, and that at the segment level corporate CEOs have much less impact on performance than other factors. CEOs are also shown to be much more influential on firm outcomes in diversified firms than in focused firms.

PRIOR CEO EFFECTS RESEARCH

Perhaps the most influential work on the impact of CEOs on firm performance applies variance decomposition methods (O'Reilly, Caldwell, and Chatman, 2005). The first of these studies was published in 1972 by sociologists Stanley Lieberson and James O'Conner in the *American Sociological Review* and was based on a sample of 167 firms in 13 different industries over a 20-year time period (1946–1965). Lieberson and O'Connor. (1972) utilized sales, earnings, and profit margins as performance metrics and concluded that industry (18.6% to 28.5% variance explained) and firm effects (22.6% to 67.7% variance explained) are far more important than CEO effects (6.5% to 14.5% variance explained) in explaining variance in firm performance.

This initial study generated intense criticism from organizational scholars (e.g., Hambrick and Mason, 1984; Romanelli and Tushman, 1988) and multiple empirical critiques and extensions. Weiner (1978) published the first follow-up study using 193 manufacturing firms and replicated Lieberson and O'Conner's (1972) results using sequential analysis of variance (ANOVA) but found radically different results by reversing the sequence of the decomposition (e.g., decomposing CEO effects before industry or firm effects). Then, Thomas (1988) studied the CEO-performance relationship in 12 firms in one industry in the United Kingdom. Unable to estimate an industry effect, Thomas (1988) found that firm effects accounted for 72.7 percent to 89.6 percent of the variance in firm performance while CEO effects accounted for 3.9 to 7 percent of this variance.[1]

More recently, Wasserman, Nohria, and Anand (2001) used a sample of 531 companies across 42 industries and found that CEO effects accounted for 14.7 percent of the variance in firm profitability (using return on assets [ROA] as the dependent variable)—still, relatively less explanatory power than industry and company effects. Crossland and Hambrick (2007) further extend this line of inquiry into a global setting and find CEO

[1] Some reviews of this empirical literature (e.g., Waldman and Yammarino, 1999) cite Thomas (1988) as finding CEO effects ranging from 51 percent to 66 percent instead of the 3.9 percent to 7 percent as reported in Table 2 of this study. Thomas (1988) converted his reported CEO effects from the percent of explained total variance in firm performance to the percent of unexplained variance in the firm performance (what percent of the residual was the CEO effect). In other words, a CEO effect of 3.9 percent was converted into a CEO effect of 61.4 percent because only 6.3 percent of the total variance in firm performance remained for the CEO effect to explain after the year and firm effects were estimated. This article, as the majority of research citing Thonmas (1988), elects not to take such an interpretation of Thomas (1988).

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effects consistent with previous work—varying from 4.6 percent (in Japan) to 13.4 percent (in the United States) when ROA is used to proxy firm performance.[2]

Limitations of previous empirical studies

The methodology of some of these studies, e.g., Lieberson and O'Connor (1972), has already been extensively criticized (e.g., Hambrick and Mason, 1984; Pfeffer and Davis-Blake, 1986; Day and Lord, 1988; Romanelli and Tushman, 1988). However, at least some of the additional methodological limitations discussed here apply to all the studies in this line of research. These limitations have the effect of systematically reducing the reported level of the CEO effect on firm performance, thus making it difficult to evaluate both the size of this effect and where in an organization it is most likely to manifest itself.

CEO movement and estimating CEO effects

The ability to identify different kinds of effects using variance decomposition techniques depends critically on the extent to which different effects in the data are nested in other effects. For example, it is not possible to isolate industry effects if all the firms in a sample are in the same industry (see Thomas, 1988); it is also not possible to estimate firm effects if there is only one firm in each industry (i.e., if each firm studied is a monopoly). Of course, these two forms of nesting are relatively rare in real datasets and so most of the time it is possible to apply variance decomposition techniques to identify industry and firm effects.

However, many researchers in this tradition have failed to recognize that CEO effects can be nested in either industry or firm effects. This will be the case when CEO movements across firms or across industries either do not exist or are not tracked in a dataset. In these datasets, each CEO is identified with a single firm or industry, and it becomes difficult to disentangle CEO effects from firm and industry effects.

Consider the implications of this nesting for estimating the effects of CEOs that change firms or industries. The scenario whereby a single individual is a CEO in multiple firms or industries is exactly the context within which the effects of CEOs on firm performance should be the easiest to estimate. However, by having datasets that do not have these kinds of employment changes, or by not tracking these employment changes when they exist, prior scholars have effectively treated each CEO/firm and CEO/industry combination as if they are independent data points, ignoring the fact that a single CEO links these data. This nests the potential effect of CEOs within either firm or industry effects and significantly reduces the size of the reported CEO effect.

CEO turnover and estimating CEO effects

A second form of nesting can also exist in datasets used to examine CEO effects. In particular, if firms in a sample had the same CEO during the entire time when the data was collected, then for these firms, there is no difference between a CEO effect and a firm effect on firm performance. Failing to eliminate firms without CEO turnover from the sample is likely to systematically bias results against finding a CEO effect. Of course, eliminating such firms from the sample may create sample selection bias problems that would also need to be controlled for in statistically appropriate ways.

Corporate and segment CEO effects

Since most of the previous research in this tradition has failed to identify large CEO effects, overall, it is not surprising that most of this work has not gone on to examine where in a firm these effects are likely to manifest themselves—at the corporate level or at the segment level. In fact, since previous work in this area has collected data at only the firm and not the segment level, even if scholars were interested in where within a firm the CEO effect is manifest, the potential impact of CEOs at the segment level could not have been examined.

[2] Crossland and Hambrick (2007) also use a random effects model with maximum likelihood estimation in their study. This approach has not been used before in the CEO effects literature, but has been used at some length in the strategic management debate on industry versus firm effects (e.g., Schmalensee, 1985; Rumelt, 1991; McGahan and Porter, 1997). This approach came under heavy criticism from Brush and Bromiley (1997) because of problems with the interpretation of variance estimates created with variance components methods and because this approach assumes that the covariance between the effects as well as the effects themselves are randomly generated (McGahan and Porter, 2002).

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Sequential ANOVA

Finally, with one exception (Crossland and Hambrick, 2007), previous variance decomposition studies in the CEO effects literature have used sequential ANOVA techniques. This estimation procedure has at least two important limitations.

First, sequential ANOVA assumes that each estimated effect is independent and thus covariance between effects is not modeled. This assumption does not seem appropriate in this context where, for example, industry and corporate effects have been shown to be highly correlated (McGahan and Porter, 1997).

Second, and perhaps more importantly, the order in which variables are entered in a sequential ANOVA model can have a significant impact on the percentage of variance explained associated with each variable. This is especially the case when there is serious nesting in the dataset of the type described previously. For example, Lieberson and O'Connor (1972) found relatively small CEO effects by entering their CEO variable last into the variance decomposition procedure. By reversing the order of entry, Weiner and Mahoney (1981) dramatically changed these results from, 8.7–19.0 percent of explained variance to 77.5–96.1 percent variance explained by the CEO. This very large change suggests significant nesting of the CEO variable in Lieberson and O'Connor's (1972) and Weiner's (1978) datasets, that is, that either CEOs in their samples did not change firms or industries, or that these changes were not tracked at the individual level.

For these reasons, most current variance decomposition studies (e.g., McGahan and Porter, 2002)—including the most recent work on CEO effects done by Crossland and Hambrick (2007)—abandons sequential ANOVA in favor of simultaneous ANOVA methods.

METHODOLOGY

These four limitations of prior research on the size of the CEO effect—not tracking CEOs across changes in firms and industries, including firms in the sample where CEOs did not change, not including segment data, and using sequential ANOVA estimation procedures—are likely to have significantly understated the size of the reported CEO effect and made it difficult to identify where within a firm this effect is likely to manifest itself. Addressing these limitations of prior work is the objective of the remainder of this article.

Model

As previously suggested CEOs can affect firm performance at two levels—corporate and business-segment. In this study, CEO effects are estimated for both these levels.

Consider first a model of the CEO's influence on the variance in corporate-parent performance across firms:

$$R_{i,j,k,t} = \alpha_i + \beta_j + \delta_k + \gamma_t + \varepsilon_{i,j,k,t} \qquad (1)$$

In this equation, $R_{i,j,k,t}$ is the corporate-parent accounting profit (ROA) in year t of corporate-parent j's business in industry i, which corporate-parent is led by CEO k. The other variables in the model are α_i, the industry effect; β_j, the corporate effect; δ_k, the CEO effect; γ_t, the year effect, and $\varepsilon_{i,j,k,t}$, the residual. Note that the observations in the data are at the business-segment level of analysis (for estimating accurate industry effects), but the dependent variable is corporate-parent performance—that is, each observation is a unique business-segment instead of a corporate-parent, but the dependent variable is corporate ROA.[3]

The specification for assessing the CEO's influence on the variance in business-segment performance across firms is as follows:

$$r_{i,j,k,t} = \alpha_i + \beta_j + \delta_k + \gamma_t + \varphi_{i,j} + \varepsilon_{i,j,k,t} \qquad (2)$$

In this equation, $r_{i,j,k,t}$ is the business-segment accounting profit (ROA) in year t of corporate-parent j's business in industry i, which corporate-parent is led by CEO k. The other variables in the model are α_i, the industry effect; β_j, the corporate effect; δ_k, the CEO effect; γ_t, the year effect; φ_{ij}, the segment effect, and $\varepsilon_{i,j,k,t}$, the residual. Although some prior work in variance decomposition in strategic management has specified models with interaction effects (e.g., Rumelt, 1991), other work elects not to do so because of *overspecification* from including all interaction effects instead

[3] Note that business-segment effects are excluded from this model since the dependent variable is corporate-parent performance. We would not expect business-segments to significantly impact the variance in corporate ROA.

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of just one set of interaction effects (see McGahan and Porter, 1997: 18 for further discussion). Regardless, there are not sufficient degrees of freedom to include transient industry effects (industry-year interaction) or corporate-executive effects in this study.

Consistent with traditional variance decomposition work in the strategic management literature, an accounting-based measure of firm performance (ROA) is used for the dependent variable. The weaknesses of using accounting measures of firm performance are well-known (e.g., Fisher and McGowan, 1983). However, this measure is adopted for two reasons. First, to make this research directly comparable to previous work, it is helpful to adopt the same dependent variable as previous work. Second, to estimate segment effects and industry effects for multidivisional firms, information on segment performance is required. Since segments of firms are not publicly traded, market-based measures of segment performance are not available.

Both models are estimated using simultaneous ANOVA (McGahan and Porter, 2002) unlike much of the previous work that used sequential ANOVA (Lieberson and O'Connor, 1972; Weiner, 1978; Thomas, 1988). Unlike sequential ANOVA, simultaneous ANOVA methods allow for covariance among effects. Since common variance is captured by covariance effects, estimates from simultaneous ANOVA are usually smaller than those from sequential ANOVA.

Data and sample

Business-segments are identified from the Compustat Business-Segment reports. Criteria for inclusion in the sample were based on the conventions in the strategic management literature (e.g., McGahan and Porter, 1997). Namely, segments in financial institutions were deleted as returns are not comparable to other industries (standard industrial classification [SIC] codes in 6000s), segments in government or unclassifiable industries were deleted as firms in these segments are not direct competitors (SIC codes greater than 9000), and segments with less than 20 million in assets were deleted.

These data were merged with the Compustat Executive Compensation database, which reports compensation variables for executives in the Standard & Poor's (S&P) 500, S&P MidCap 400, and S&P SmallCap 600. The available years were 1992–2002 since 2002 is the last fully populated year in the business segment file.[4]

As suggested earlier, CEO effects cannot be separated from corporate effects if the same CEO is running a corporation for the entirety of the data range. Thus, firms were omitted from the sample if there were no changes in the CEO position—avoiding a common limitation of prior empirical work in this area. Dropping companies without a leadership event resulted in 496 firms and 5,028 segment year observations being deleted from the sample. The remaining sample comprises 520 firms and 8,522 segment year observations.

Lastly, to avoid the problem of nesting CEO effects in corporate or industry effects, only firms that had a CEO who worked (as CEO) for *more than one* company in the dataset were included in the sample. All observations for these firms are included in the sample—that is, the CEOs who worked at the firm before or after the 'mobile' CEOs were also included in the sample so that all years of observations for these firms will be in the dataset (required for accurate firm effects). Hence, this is not just a study of 'outsider' CEOs and their impact on firm performance.

In the end, this sample contains 801 segment year observations—92 CEOs and 51 firms across 10 years and represents the activities of 181 distinct business segments in a total of 98 four-digit SIC code industries. The average business segment reports 4.43 years of data. The majority (83%) of the observations are associated with diversified firms. Table 1 reports descriptive statistics for this sample and for the sample without the mobility restriction.

RESULTS

The main hypothesis of this study is that the previous empirical work using variance decomposition to estimate CEO effects underestimates the size of this effect. To demonstrate that the methodological

[4] Due to Statement 131 of the Financial Accounting Standards Board, companies began reporting information related to operating segments differently. One significant change was a switch from reporting SIC codes for operating segments to using NAICS (North American Industry Classification System) codes instead. To be consistent with prior research, only SIC codes were used to identify industries and hence, 2002 was the last year of data for the study.

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Table 1. Descriptive statistics

	Execucomp file 1992–2002	Sample restriction #1: only firms with CEO turnover	Sample restriction #2: only firms with CEO turnover and serial CEOs
Executive characteristics			
Salary	$656,280	$672,836	$713,987
Salary + bonus	$1,291,412	$1,322,461	$1,553,545
Total compensation	$3,816,000	$4,211,427	$6,618,000***
Firm characteristics			
Return on assets	4.63	4.66	4.23
Tobin's q	1.78	1.78	1.67
Net income	281,952,100	346,400,100	259,658,900
Operating income before depreciation	901,276,100	1,060,647,000	985,708,500
Sales	5,526,265,000	6,626,926,000	6,869,000,000**
Percent change in sales	9.95%	8.35%	12.54%*
Employees	24,941	30,504	43,263***
Assets	7,558,000,000	9,109,517,000	6,987,000,000
Segment year observations	*13 550*	*8522*	*801*
Industries	*562*	*459*	*98*
Corporate-parents	*988*	*520*	*51*
Business-segments	*3025*	*1802*	*181*
CEOs	*1641*	*1176*	*92*

Significance test denotes differences between the most restrictive sample and the entire Execucomp file.
* $p < 0.1$, ** $p < 0.01$, *** $p < 0.001$

Table 2. Replication of prior empirical studies*

	Lieberson and O'Connor (1972)	Weiner (1978)	Thomas (1988)	Wasserman, Nohria, and Anand (2001)	Current replication *with limitations*	
Year effect	1.8%	2.4%	5.6%	2.6%	1%	1%
Industry effect	28.5	20.5	n/a	6.3	18.0	n/a
Corporate effect	22.6	45.8	83.2	25.5	29.5	47.5
CEO effect	14.5	8.7	5.7	14.7	12.9	12.9
Error	32.6	22.6	5.4	50.9	38.5	38.5
Total	100	100	100	100	100	100

* ROA as dependent variable

issues identified in this article are in fact impacting the size of the CEO effect, the results in this study are first reported without correcting for these methodological limitations. The results for this model are presented in Table 2.

This model represents analysis conducted with sequential ANOVA for a nested sample of executives—including firms without CEO turnover and with corporate level observations for multisegment firms (biases industry effect). The results are consistent with prior variance decomposition studies within the leadership literature—namely, industry (18.0%) and firm influences (29.5%) are significantly higher than CEO effects (12.9%) on corporate performance.

Table 3 presents the main results of the study—with all the methodological corrections identified in the previous section. CEO effects on corporate performance are quite substantial (29.2%)—almost four times larger than the corporate effect (7.9%) and almost five times larger than the industry effect (6.2%). CEO influence on the variance in business-segment performance is smaller (12.7%) than on corporate performance; however, the CEO effect on segment performance is still greater than the industry (7.74%) and corporate effect (6.76%).

Industry effects (6.2%), though smaller than early work in variance decomposition (Rumelt, 1991; Roquebert, Phillips, and Westfall, 1996; McGahan and Porter, 1997, 2002), are consistent

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Table 3. How much CEOs influence firm performance

	DV: corporate ROA		DV: segment ROA	
	ANOVA estimate	% of total	ANOVA estimate	% of total
Year effect	0.0181	0.66%	0.405	1.15%
Industry effect	0.1712	6.20	2.63	7.47
Corporate effect	0.2168	7.86	2.38	6.76
CEO effect	0.8063	29.21	4.47	12.7
Segment effect	—	—	6.27	17.81
Residual SS	0.6030	21.84	12.06	34.26
Total SS	2.7604	100.00	35.2	100.0
N	*801*		*801*	

with recent empirical work that suggests that the industry effect declined in the 1990s (McNamara, Vaaler, and Devers, 2003; Mackey, Kiousis, and Barney, 2005; Misangyi *et al*., 2006). Since the data used in this study is from the years 1992–2002 and early work in variance decomposition utilizes data for years in which the industry effect was more substantial (e.g., Rumelt, 1991; Roquebert *et al*., 1996; McGahan and Porter, 1997, 2002), it is not surprising to find small industry effects. Additionally, due to the small sample size, many of the firms in the sample are the only representatives of their respective industries (48% of the observations). This creates a problem for estimating accurate industry effects; however, the size of the industry effect is only of secondary interest in this study.

Corporate effects estimated in this model (7.86%) are also consistent with prior empirical work that has found, on average, a nine percent corporate effect (Schmalensee, 1985; Rumelt, 1991; Roquebert *et al*., 1996; McGahan and Porter, 1997, 1999, 2002, 2003).

Robustness checks

Two sample restrictions were imposed on the data—only firms with CEO turnover and only firms with CEOs that had worked for more than one firm in the dataset—were selected for the final sample. It is possible that these restrictions might introduce sample selection bias. However, using the Heckman two-step procedure (1979) it can be demonstrated that the results in this study are not artifacts of sample selection bias. A document outlining how the Heckman procedure was implemented as well as the results from the procedure is available at http://buiznt.cob.calpoly.edu/cob/MGT/mackeyA/. Other methodological choices made in this study are evaluated in this section as well.

Expanded sample

The initial model (Table 3) was estimated from a sample with a two selection restrictions—only firms with CEO turnover and only firms with CEOs that worked (as CEO) at more than one firm in the sample could be included in the sample. Although the resulting sample is smaller than ideal ($n = 801$), the sample size is sufficiently large for estimation. Nevertheless, the restriction on executive mobility is relaxed to examine the impact on the results. Relaxing this restriction increases the sample size substantially—8,522 firm years (1,176 CEOS in 520 corporations across 10 years). (Refer to Table 1 for more descriptive statistics on both samples.) The limitation of this 'expanded' sample is the nesting of CEOs within corporate and industry effects—effectively understating the CEO effect on performance.

The results from this new estimation are presented in Table 4. The largest influence on corporate performance is now the corporate effect, which has increased from 7.86 percent (Table 3, first column) to 24.4 percent[5] (Table 4). CEO effects, as expected, have decreased to 23.8 percent (Table 4)—down from 29.2 percent in the initial model (Table 3) because of the introduction of CEO observations that are nested within corporate and industry data. Since some of the observations of CEOs are not nested and since firms without turnover are still excluded from this sample, CEO effects on corporate performance are more than in the prior literature.

A similar impact to the CEO effect from introducing nested observations is seen for the model predicting business-segment performance. As the variance decomposition work in strategic management would predict, business-segment effects are the most important influence over business-segment performance (34.4%, Table 4, second column) and CEO effects have decreased from 12.7 percent (Table 3, second column) to 7.6 percent

[5] Corporate effects of 24.4 percent are only slightly higher than those reported by McGahan and Porter (2002), who also used simultaneous ANOVA (corporate effects in their study ranged from 12.0 to 23.7%).

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Table 4. Robustness check: relaxing mobility restriction to expand sample

	DV: corporate ROA		DV: segment ROA	
Year effect	0.274	0.8%	0.491	0.02%
Industry effect	0.546	1.6	90.92	4.6
Corporate effect	8.387	24.4	154.45	7.8
CEO effect	8.166	23.8	150.21	7.6
Segment effect	—	—	685	34.4
Residual	9.681	28.2	807.4	40.6
Total SS	34.311	100.0	1988.9	100.0
N	*8522*		*8522*	

(Table 4, second column). Nevertheless, because of the vast majority of the observations in this model are nested, results from this 'expanded' sample and previous studies that have used samples of CEOs that only worked in one industry and for one firm in the sample should be interpreted with caution.

Business-segment effects

In accordance with convention in the variance decomposition work in strategic management, business-segment effects are estimated for models in which business-segment performance is the dependent variable. The size of the segment effect is estimated at 17.81 percent (Table 3)—a smaller number than that reported in other studies. For example, McGahan and Porter (1997) report segment effects of 35.1 percent and Rumelt (1991) reports slightly lower business-unit effects of 33.9 percent. However, the business-segment effect reported for the 'expanded' sample (34.4%, Table 4) is very similar to the prior literature.

It is reasonable to expect that the business-segment effect might be larger in the 'expanded' sample compared to the sample in which executives are not nested within industry and corporate effects for the following reason. When corporate and business-segment effects are included in variance decomposition, the simultaneous ANOVA reverts to sequential ANOVA. The impact of this estimation change on the business-segment effect is that this effect essentially becomes a residual of the effects decomposed first. Thus industry, corporate, and CEO effects are all 'taking away' from the business-segment effect. In the 'expanded' sample, the impact of CEOs is systematically understated because of its nesting within industry and corporate effects. Consequently, the CEO effect takes less away from the business-segment effect in this scenario, making business-segment effects higher than in a sample in which CEO effects are not understated and can take away more from the business-segment effect.

DISCUSSION

This study demonstrates that in a sample of firms with CEO turnover and of firms with CEOs who have been CEO at least twice, the impact of CEOs on firm performance is quite significant. This impact is manifest primarily at the corporate level as the CEO effect is estimated as 29.2 percent of the variance in corporate profitability while only accounting for 12.7 percent of the variance in business-segment profitability.

One question of interest is the extent to which these results generalize to the population of CEOs. It may be that the data required to estimate CEO effects on firm performance leads to a sample of firms in which, for whatever reason, the role of CEO in impacting firm performance matters more than it does in other firms (Hambrick and Finkelstein, 1987).

For example, these data requirements may filter out firms with low levels of managerial discretion. This could happen for at least two reasons. First, it is very likely that firms with low levels of managerial discretion are not likely to have CEO turnover events very often—since who the CEO is in these firms is not likely to have a big impact on firm value. This would decrease the probability of these types of firms making it into the sample. Second, firms with high levels of managerial discretion might view the CEO position as more critical to the firm's success than firms with low levels of managerial discretion. One consequence of this might be that the firms with high levels of managerial discretion tend to prefer to select individuals with prior CEO experience. This would increase the probability that given a sample of firms all experiencing turnover events, the firms with high levels of managerial discretion will be more likely to make it into the sample because of having mobile CEOs.

The descriptive statistics reported in Table 1 offer some limited support for this perspective. These statistics highlight some important differences between the sample used in this paper (51

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firms and 92 CEOs) and the entire population contained in S&P's Execucomp database (988 firms and 1,641 CEOs) during the years 1992–2002. Specifically, the firms in the narrower sample are growing faster (as measured by percent change in sales) and pay their CEOs almost twice as much as the population at large (as measured by total compensation)—despite the fact that these firms are not significantly different than the population at large in terms of assets or profitability (ROA, net income, operating income before depreciation). CEOs in fast-growing firms generally have more discretion, and thus more of an impact on firm value then CEOs in slow-growing firms (Finkelstein and Hambrick, 1996). In this setting, it is not surprising that these CEOs get compensated at a higher level (e.g., Magnan and St-onge, 1997).

If the data requirements in this study lead to the creation of a sample where CEO discretion is systematically high, another way to interpret the results obtained here is: CEOs have a significant impact on the performance of a firm under those conditions where this kind of impact is possible. Since this set of firms was included within the broader group of firms where the potential for CEO impact on firm value is limited, it is not surprising that most of this previous work identified only a small impact of CEOs on firm performance.

While the results presented here are suggestive, there are limitations in this study that can be addressed in further research. Also, some of the issues raised in this study have implications beyond the literature on CEO effects. These issues and opportunities are discussed below.

Other methodologies for examining CEO-firm performance linkage

Variance decomposition is not the only methodology for examining the linkage between CEOs and firm performance. Structural models using theoretical variables to capture the specific industry, corporate, or individual leadership effects on performance have also been used (e.g., Weiner and Mahoney, 1981; Pfeffer and Davis-Blake, 1986). Of course, empirical studies of the CEO-performance linkage with structural methodologies are limited by their measures (e.g., Weiner and Mahoney, 1981), samples (e.g., Gamson and Scotch, 1964; Eitzen and Yetman, 1972; Allen, Panian, and Lotz, 1979; Brown, 1982), and some of the same methodological limitations identified in this article (e.g., nested samples). Nevertheless, structural methodologies will be instrumental in explaining the phenomenon identified in this study—namely, that CEOs can have substantial impact on firm outcomes.

Top management team effects

Some empirical work on the CEO-firm performance linkage suggests that top management teams are better predictors of firm outcomes than individual executives (e.g., Hage and Dewar, 1973; Ancona, 1990; Haleblian and Finkelstein, 1993). A growing body of literature on leadership effects, however, has found important individual-level effects on firm performance (e.g., Bertrand and Schoar, 2003; Jensen and Zajac, 2004). Even though this study examines only changes in the position of CEO and not in the top management team, it is likely that the CEO effect in this study is capturing part of the entire top management team influence on firm performance (Hambrick and Mason, 1984), since when a CEO succession event occurs, changes are likely to be made in the top management team as well.

Industry versus firm effects debate in strategic management literature

The variance decomposition literature in strategic management has grown rapidly over the last several years (see Bowman and Helfat, 2001 for a comprehensive review). Most of this work has focused on the percentage of firm performance explained by industry, corporate, and firm effects (e.g., Schmalensee, 1985; Rumelt, 1991; Roquebert *et al*., 1996; McGahan and Porter, 1997, 1999, 2002, 2003). This work has not examined the percentage of variance in firm performance explained by CEO effects. The results of this study suggest that CEO effects would be an important addition to this line of inquiry.

Nested effects in other literatures

Finally, one of the reasons that the CEO effect reported in this study is so much larger than in other studies is that the sample used here eliminated the effects of nesting the CEO effect in

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the firm or industry effect. This nesting probably is likely to be a problem in other areas of research within executive leadership as well, including work on executive compensation, succession, and the effects of top management teams. Datasets in these literatures in which executive movements across firms or across industries either do not exist or are not tracked may confound individual, corporate, and industry heterogeneity. Without executive mobility, for example, efforts to decompose the determinants of executive compensation into industry-, firm-, and individual-level effects would be difficult to interpret.

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