Does a better education make for better managers? An empirical examination of CEO educational quality and firm performance

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Abstract

This paper represents the first attempt, to our knowledge, to empirically examine the relationship between the quality of Chief Executive Officer (CEO) education and firm performance. This is an important question as many papers in the management literature have postulated that managers with higher educational attainment will have better cognitive abilities, training or social ties that may improve firm performance. We find three results in our analysis. First, using the mean entrance scores as proxies for the prestige of undergraduate and graduate programs, we find very little evidence that firms with CEOs from more prestigious schools perform better than firms with CEOs from less prestigious schools. Second, we find that firms managed by CEOs with MBA or law degrees perform no better than firms with CEOs without graduate degrees. Third, we find that compensation is somewhat higher for CEOs who attended more prestigious schools.

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I. Introduction

Does a better education make for a better manager? If one were to read the academic literature there is a considerable amount of evidence that suggests it should. For example, a number of studies find that Chief Executive Officers (CEOs) with higher educational attainment have a greater capacity to process information and to innovate than CEOs with lower educational attainment.[1] Moreover, there is evidence that highly educated top executives are more likely to use sophisticated methodologies when conducting capital budgeting and when estimating the cost of capital. There are also indications that CEO education is positively related to the CEO's social capital. That is, CEOs with higher educational profiles enjoy more social ties to other CEOs and government officials, which may improve the performance of the firm. However, in spite of all these findings, to our knowledge there has been no study that directly examines the critical corporate finance question of whether the educational quality of a CEO influences firm performance. This paper fills that void.

How does one measure the quality of CEO education? The answer is not straightforward as a high quality education can be attained at any school and even without attending a formal academic institution. Our approach is to define educational quality in two ways. First, we define educational quality by the level of educational attainment. Hence, CEOs with graduate degrees are assumed to have higher quality educations than CEOs without graduate degrees. Second, we define educational quality by the prestige of the schools from which the CEO graduated. To define prestige we use an approach similar to Chevalier and Ellison (1999) and Palia (2000) in

[1] Kimberly and Evansiko (1981), Bantel and Jackson (1989), Hitt and Tyler (1991), Thomas et. al. (1991), Wiersema and Bantel (1992), and Wally and Baum (1994) have found that more educated CEOs are better able to process information and are more receptive to change than CEOs with lower educational attainment. In addition, Barker and Mueller (2002, p. 787) state in a survey of the literature that "the prevailing pattern of results suggests that more educated CEOs will have preferences towards higher R&D spending as part of being more receptive to innovation".

which we extract the mean SAT, GMAT, and LSAT scores of the undergraduate and graduate schools from which CEOs graduated. Our assumption is that since more prestigious schools generally have higher entrance requirements, the use of mean test scores captures the educational prestige of the CEO education. Using this logic, a CEO who graduated from a high mean SAT undergraduate institution would be said to have a higher quality education than a CEO who attended a low mean SAT undergraduate institution. Similarly, a CEO who graduated from a high mean GMAT business school would be said to have a higher quality education than a CEO who graduated from a low mean GMAT business school.

To conduct the study we survey all firms listed on the New York Stock Exchange and gather those firms for which the CEO of the firm has at least an undergraduate degree. Then, using the measures of educational quality described above, we examine how educational quality is related to seven measures of firm performance as well as to CEO compensation.

The rest of this paper is organized as follows. Section II presents some hypotheses as to why CEO education may influence firm performance. Section III describes the data and Section IV explains the methodology used in the study. Section V presents the results and we conclude with Section VI.

II. Hypotheses for why CEO education may impact firm performance

Why should CEO education impact firm performance? Using research in the education, finance, management, and psychology literatures, we devise three basic hypotheses describing how a CEO's education may influence firm performance.

II.A. Educational background measures the cognitive ability of the CEO, which influences firm performance

We contend that the cognitive ability of a CEO is positively related to firm performance, and that we can proxy cognitive ability with the educational background of the CEO. With respect to our postulated positive relationship between CEO cognitive ability and firm performance, psychology researchers[2] have shown that individuals with higher intelligence (regardless of how intelligence is measured) are better able to process information than are less intelligent individuals. More specifically, this research has found that highly intelligent individuals can process more information and process information more quickly than others. Because one of the key qualities of a successful CEO is the ability to weave together and make use of different kinds of knowledge, we argue that the kinds of information processing abilities linked to higher intelligence should improve firm performance. For example, when a CEO is making a key decision he has to consider a number of factors such as financing, marketing, forecasting, etc. If he cannot process all of the factors nor take into consideration all the advice he receives from subordinates, he could easily make poor decisions which, in turn, would harm firm performance.

In addition to being able to better process information, we contend that more intelligent managers may also be better at absorbing new ideas and thus are more inclined towards innovation than less intelligent managers. This enhanced ability to innovate should produce better firm performance as it keeps the company ahead (or at least abreast) of changes in the industry. Support for the relationship between intelligence and innovation comes from the management literature. Specifically, Hitt and Tyler (1991) and Wally and Baum (1994) have found that managers with greater "cognitive complexity" are more likely to lead innovative

[2] For a good introduction on recent research on the psychology of intelligence see Deary (2000).

organizations and are more likely to support research and development than managers with less cognitive complexity.

Our method for determining the cognitive ability of a CEO is to use the prestige of the schools attended by CEOs as a proxy for cognitive abilities. Our argument here is based upon the fact that to gain entrance into top undergraduate and graduate programs an individual generally must have high standardized test scores, which are indicative of high intelligence. Indeed, for many years, scholars have argued that the SAT, and other standardized entrance exams, are really intelligence tests.[3] Hence, in the absence of a direct measure of CEO intelligence, we measure cognitive ability by the mean entrance exam scores of the schools attended by the CEOs.

While there are no previous papers, to our knowledge, that examine the link between cognitive ability and CEO performance, there are examples from the education and finance literatures that support the idea of using cognitive ability, as measured by test scores, to determine future performance. For example, a number of education studies[4] have found that SAT scores are solid predictors of students' college performance. Similarly, researchers have found that the best predictor of a student's business school performance is the GMAT score.[5] Likewise, Anthony, Duffy and Reese (2001) have documented that a student's LSAT score is the best predictor of performance in law school. Moreover, Chevalier and Ellison (1999) have found that the mean SAT of the undergraduate institution attended by mutual fund managers is positively and significantly related to risk-adjusted mutual fund performance; as a result, after controlling for various factors, fund managers who graduated from Ivy League schools were found to have

[3] See Frey and Detterman (2005) for example.

[4] For a recent survey of these studies see Burton and Ramist (2001).

[5] See Graduate Management Admissions Council (1999).

better average performance than managers who graduated from state universities. These studies all suggest that cognitive ability, as measured by entrance test scores, is related to performance. Is the same true of CEOs and firm performance? This is what we test in our paper.

II.B. Educational background of the CEO influences the CEO's behavior, which influences firm performance

CEO education can influence firm performance if the type of education received influences the operating behavior of the CEO. Students with educational backgrounds in certain fields bring with them certain behaviors, learned from their education, which may impact firm performance. For example, in the management literature, Finkelstein and Hambrick (1996), Tyler and Steensma (1998), and Barker and Mueller (2002) find that companies run by CEOs with degrees in technical fields have significantly higher funding of research and development (R&D). Conversely, CEOs with educational backgrounds in business or law tend to be more risk-adverse with regard to R&D. Several other studies e.g., Graham and Harvey (2001, 2002) and Graham, Harvey and Rajgopal (2005), find that CEOs and Chief Financial Officers (CFO's) holding MBAs were more likely than other executives to use such learned techniques as net present value for capital budgeting and the capital asset pricing model in cost of capital calculations. In yet another example, a *Wall Street Journal* article (White, 2005) argues that CEOs with liberal arts undergraduate degrees may perform better than other CEOs as they possess an education that offers a "broader foundation to operate in an increasingly complicated, global and fast moving business arena."

These results all suggest that the type of educational training can affect the managerial behavior of CEOs. These behavior differences, in turn, may translate into differences in firm performance. For example, it is plausible that a CEO with an MBA from a top school may

implement (or at least understand) more cutting-edge capital budgeting techniques than a CEO without a business education background, and hence produce better firm performance.[6] We test this hypothesis, while controlling for industry differences, in our paper.

II.C. Educational background of the CEO impacts the social capital of the CEO, which influences firm performance

Yet another reason to expect CEO education to be related to firm performance is that it provides a measure, to some extent, of the CEO's social capital. It is well known that education can be a strong indicator of social prestige and class status. Indeed, one can surmise that a large part of why the CEO rose to his or her position is due to their social network. In addition to using social capital for personal advancement up the corporate ladder, research by Burt (1992) and Belliveau et al. (1996) finds that CEOs with more prestigious educational profiles enjoy more "weak-ties" to government officials and other decision makers that can improve firm performance. For example, a CEO with strong social linkages to politicians and policy makers can help the company receive government contracts or favorable tax treatment.

[6] A related point that should be mentioned here is that CEO education may be related to firm type. In a paper that uses somewhat similar methodology to ours, Palia (2000) measures the quality of CEOs by the prestige of their educational backgrounds. That is, CEOs who went to more prestigious schools (as determined by school rankings) are assumed to be of higher quality. Using this logic, he finds that firms in non-regulated industries disproportionately hire CEOs from more prestigious academic programs as compared to firms in regulated industries. Palia provides two possible explanations for this result. First, since non-regulated firms have fewer restrictions, the impact of the CEO on the firm may be greater for a firm in a non-regulated industry than it would be for a firm in a regulated industry. As a result, the non-regulated firms will tend to hire more high-quality CEOs, i.e., those with more prestigious educational backgrounds, as compared to regulated firms. Second, non-regulated industries have significantly higher CEO compensation than regulated industries. Consequently, those high quality executives with prestigious educational backgrounds will be drawn to non-regulated industries and away from regulated industries.

III. Data

To facilitate the description of the data and methodology, this section is divided into three subsections: CEO selection criteria and firm data; the out-of-sample period; and survivorship issues.

III.A. CEO Selection Criteria and Firm Data

We extract CEOs from the EXECUCOMP database. We select all CEOs with U.S. undergraduate degrees that managed NYSE-listed firms as of January 1, 2000. Moreover, we require each of the firms managed by the CEO to have three years of stock return data prior to January 1, 2000, i.e., 1997 through 1999, as some of our performance measures require in-sample data (see Section IV for more on this issue).

For each of these CEOs we then extract biographical information from the Register Executives publication provided by Standard and Poor's NetAdvantage database. This information includes the CEO tenure, age, gender, and educational background. The educational background information provides the name of the educational institution where each CEO received their undergraduate and graduate degrees, and whether the graduate degree was an MBA, law degree, or other graduate degree.[7] Unfortunately, information on the undergraduate field of study is unavailable.

For each of the CEOs we then identify several other education variables. First, we identify the mean composite SAT score (math and verbal combined) associated with each CEO's undergraduate school using the latest available data from the schools. Hence, while the CEO may have graduated as many as 50 years earlier, we use the current mean SAT scores for their school.

[7] For CEOs for which the graduate field of study was not easily identifiable, we performed a general Internet search to identify each CEO's field of study, focusing primarily on business-oriented publications such as *Forbes.com*, biographical sketches provided by the CEO's firm, or information available through the CEOs alma mater's alumni affairs departments.

In this way, we are implicitly making the assumption that the prestige of the school today (as measured by SAT scores) is similar to that when the CEO graduated. While there are certainly examples of schools that have improved or receded in terms of prestige, most schools that were considered prestigious years ago are still so today. Second, similar to the SAT extraction, for each CEO that completed an MBA we identify the latest mean GMAT score of the graduate business school attended by the CEO. Likewise, for each CEO that completed a law degree we identify the latest mean composite LSAT score of the law school attended by the CEO. We also identify whether the CEO's undergraduate school was a liberal arts college. The process through which we identify these educational variables can be found in Appendix A.

After selecting the CEOs and identifying their educational backgrounds, we next gather firm level data. Using the above listed EXECUCOMP database, as well as the COMPUSTAT and CRSP databases, we gather three types of firm level data over the period 1997-2003. First, we gather the monthly returns of all of the firms. Second, we collect annual operational performance measures such as total sales, Tobin's *q*, ROA, ROE, liquidity and leverage.[8] Third, we extract CEO specific variables from the firm such as annual CEO compensation[9], the

[8] Total sales is the net annual sales as reported by the company. ROA is return on assets, calculated as the net income before extraordinary items and discontinued operations divided by total assets. ROE is return on equity, calculated as the net income before extraordinary items and discontinued operations divided by total common equity. Total sales, ROA, and ROE are extracted from the EXECUCOMP database. Tobin's *q* is calculated for each firm using the Chung and Pruitt (1994) approximation, where all data are extracted from COMPUSTAT. The liquidity ratio is calculated as cash and short-term investments divided by total assets. Leverage is calculated as the sum of total long-term debt and debt in current liabilities, divided by total assets. The data used to calculate the liquidity ratio and leverage are from COMPUSTAT.

[9] For Tables I-VI, CEO compensation is defined as the total current compensation comprised of salary and bonus. We do not include the value of CEOs' options as part of compensation. As a robustness check we re-estimated all our results in Tables I-VI using a CEO compensation measure that included the value of exercisable in-the-money options held by the CEO. We found the results using this compensation measure were very similar to the reported results. These results are available upon request.

percentage of the firm's stock that is owned by the CEO (defined as OWNERSHIP), the CEO's age, and tenure as CEO.[10]

III.B. The Out-of-Sample Period

Our study is constructed using an out-of-sample approach. As stated in Section III.A., all the CEOs are chosen as of January 1, 2000. We then evaluate these CEOs over the out-of-sample period 2000-2003. In this way, all CEOs who meet our criteria are included in the sample. We use the data from 1997-1999 as in-sample data to create lagged variables for some of our regressions and performance measures.

The reason we use the out-of-sample approach is that it allows us to measure performance over the relatively lengthy period of four years (2000-2003).[11] If we were to instead gather all CEOs each year and examine their annual performance, we would be limiting our measure of performance to an unnecessarily small window of time that may not be long enough to accurately measure a CEO's impact on the firm.

III.C. Survivorship Issues

Since most of the CEOs in our sample retained their position for the entire out-of-sample period, and most firms survived the entire period, obtaining the data required to measure their out-of-sample performance is a simple extraction from EXECUCOMP and CRSP. However, some CEOs either retired or resigned during the out-of-sample evaluation period, and some firms

[10] Harvey and Shrieves (2001) find that the extent of incentive compensation is negatively related to the percentage of the firm's stock held by the CEO. The percentage of firm's stock that is owned by the CEO is the aggregate number of shares held by the named executive officer, excluding stock options, divided by the number of common shares outstanding as reported by the company. Age and tenure are as of January 2000. The data used to calculate all of these measures are from EXECUCOMP.

[11] Note that our results our robust to different sample periods. For example, using our same sample, we find the similar results as those reported in the paper for the 2002-2003 post internet bubble period.

disappeared during this time. If we were to simply exclude these firms, it would create a survivorship bias, as we would only be including those CEOs and firms that survived throughout the entire out-of-sample period. To avoid this survivorship bias problem we proceed in the following fashion. For the operational-based firm performance measures (ROE, Tobin's Q, ROA, AROA (which are discussed in detail in the next section)) we calculate the average annual measure for the amount of time that the CEO is actually running the firm. Hence, if a CEO ran the firm from January 2000 to December 2001, we use the 2000 and 2001 annual numbers to calculate the annual average. If a CEO drops out in the first half of a year, we only use the years previous to the drop out year to calculate the annual average.[12] Thus, if a CEO dropped out in June 2002, we use the annual average based on the 2000 and 2001 numbers. If instead the CEO managed the firm from January 2000 to July 2002, we use the 2000, 2001, and 2002 numbers.

For the stock return performance measures (simple, 4-index, BHAR (discussed in the next section)) we handle cases where the CEO drops out of the sample before the end of 2003, by using the actual number of months that the CEO is in office from January 2000 to the time he/she leaves the firm. Hence, if a CEO managed the firm from January 2000 to March 2001, we used these 15 months to calculate the stock return performance measures.

IV. Methodology

To examine performance, we use seven different performance measures: out-of-sample simple excess monthly returns, a four-index alpha, the Barber-Lyon (1997) buy-and-hold-abnormal

[12] We eliminate six observations in which the firm disappeared in 2000, as no COMPUSTAT data are available for these observations for the entire period 2000-2003. Of the remaining 488 observations, 16 dropped out in 2001, four dropped out in 2002, 27 dropped out in 2003, and 441 are present for the entire period 2000-2003. Our results are robust to an alternative method in which the missing data are replaced with the average of all firms in our sample that share the same two-digit SIC industry code as the given firm. Our results are highly robust to the implementation of this method. We chose not to report results using this method as one of our performance measures, AROA, uses firms in the same two-digit SIC industry code as a control group, as described in the next section.

return (BHAR), Tobin's *q*, return on assets (ROA), return on equity (ROE), and a modified version of the Barber and Lyon (1996) adjusted return on assets (AROA). The simple excess returns, 4-index alpha, and BHAR are market measures of performances while Tobin's *q*, ROA, ROE, and AROA can be seen as operational measures of performance.

IV.A. Out-of-Sample Simple Excess Returns

Simple excess returns are excess mean monthly returns less the one-month T-Bill rate during the out-of-sample evaluation period (2000-2003), where monthly returns for each firm are extracted from the CRSP database. For firms that drop out of the sample before the end of 2003, the simple excess returns are based the actual number of months that the CEO is in office from January 2000 to the time he/she leaves the firm.

IV.B. A Modified 4-index Alpha

Four-index alpha is the Fama-French-Jagadeesh-Titman-Carhart four-index alpha, which represents a risk-adjusted measure of performance.[13] To estimate the four-index alpha, the following time-series regression model is used:

$$R_{it} - R_{ft} = \alpha_i + \beta_{i1} RMRF_t + \beta_{i2} SMB_t + B_{i3} HML_t + \beta_{i4} UMD_t + \varepsilon_{it} \quad (1)$$

where $R_{it} - R_{ft}$ is the excess total return (net of the 30-day T-bill return) for firm *i* in the in-sample Month *t;* α_i is the alpha for firm *i;* $RMRF_t$ is the value weighted market return on all NYSE/AMEX/NASDAQ firms in excess of the risk-free rate; SMB_t is the difference in returns across small and big stock portfolios controlling for the same weighted average book-to-market equity in the two portfolios; HML_t is the difference in returns between high and low book-to-

[13] See Fama and French (1993) Jagadeesh and Titman (1993) and Carhart (1997).

market equity portfolios; UMD_t is the momentum factor, the average return on two high prior return portfolios minus the average return on two low prior portfolios, computed by Fama and French.[14]

IV.C. Buy and Hold Adjusted Return (BHAR)

We use the buy- and-hold adjusted return (BHAR) as described by Barber and Lyon (1997) and similar to Nelson (2005) as another measure of market-return performance. The BHAR is the long-run buy-and-hold return of a sample firm less the long-run return of a control firm. Barber and Lyon advocate this measure as this method yields well specified test statistics and because they also find significant biases in using reference portfolios (as used in the calculation of alphas).

To calculate the BHAR we proceed as follows. First, we calculate the long-run buy-and-hold return for the sample firm over the period 2000-2003. Second, using pre-sample data from 1997-1999, we find a control firm by matching the sample firm to a control firm closest in size and book-to-market ratio. To do this, we first identify all NYSE-listed firms with a market value of equity between 70 and 130 percent of the market value of equity of the sample firm during the period 1997-1999. From this set of firms we then choose the firm with the book to market ratio (again over the period 1997-1999) closest to the sample firm. We then subtract the geometric average of the 2000-2003 buy and hold return of the control firm from the geometric average of the 2000-2003 buy and hold return of the sample firm to arrive at the buy-and-hold abnormal return (BHAR) of the sample firm. If the firm dropped out of the sample during 2000-2003, the buy and hold return of both the sample and control firm is calculated over the months for which

[14] The data for the four-index alpha were obtained from Kenneth French's webpage.

data are available for the sample firm, and the geometric average is calculated over the number of months for which data are available.

IV.D. Tobin's q, ROE, ROA

Tobin's *q*, ROA, and ROE, the extraction of which we described in Section III, are constructed as the average annual value for the period 2000-2003. As stated in Section III, if a CEO retires or resigns, or the firm disappears before the end of the out-of-sample period, we do not eliminate the observation. Instead, the value for the observation is the average annual measure for the amount of time that the CEO is actually running the firm.

IV.E. Adjusted ROA (AROA)

As a supplement to the existing accounting based performance measures, we also calculate an adjusted ROA (AROA) described first by Barber and Lyon (1996) and similar to that used in Huson, Malatesta, and Parrino (2005). To calculate the AROA we first calculate the annual average of the 1997-1999 ROA of the sample firm (again all firms in our sample had to have three years worth of data history). We then match the sample firm to all NYSE-listed firms that have the same two-digit SIC industry code and whose annual average ROA is +/-10% of the sample firm over the period 1997-1999. If there are no firms with similar performance with the same two-digit SIC code, we match to all firms within the filter bounds that have the same one-digit SIC industry code. For firms without matches after this procedure, we find all firms in the sample with ROA's within the filter bounds regardless of SIC code.

Then for each sample firm we calculate the AROA as the annual average ROA (from 2000-2003) of the sample firm less the mean annual average ROA (again from 2000-2003) of the

control group as described above. If the firm dropped out of the sample during 2000-2003, the annual average ROA of both the sample firm and control group is calculated over the years for which data are available for the sample firm.

V. Results

V.A. Summary Statistics

Summary statistics are presented in Table I. The table reports several noteworthy findings. The mean composite SAT score of undergraduate institutions of the CEOs is approximately 1,222.4 (out of a possible 1600). Moreover, approximately 32.6 percent of firms have CEOs who hold MBA degrees, and the mean GMAT score of these MBA programs is approximately 658.8 (out of a possible 800). Approximately 13.9 percent of firms have CEOs who hold law degrees, and the mean LSAT score of these law programs is approximately 162.1 (out of a possible 180). Table I also reports that approximately 9.8 percent of firms have CEOs with graduate degrees other than an MBA, and approximately 10 percent of the CEOs received their undergraduate degrees from liberal arts institutions.

To fully examine the effect of MBA and law degree quality on performance, we create five dummy variables, GMAT1, GMAT2, GMAT3, LSAT1, and LSAT2 to rank-order the quality of the MBA and law programs by their GMAT and LSAT scores, respectively. Specifically, GMAT1, GMAT2, and GMAT3 are dummy variables that are equal to unity if the CEO completed an MBA from a graduate school with mean GMAT scores 700 or greater, between 600-699, and 599 or less, respectively.[15] Similarly, LSAT1 and LSAT2 are dummy variables that are equal to unity if the CEO completed a law degree from a graduate school with

[15] For example, the business schools from which fund managers in our sample graduated in the GMAT1 group include Wharton, Columbia, Harvard, Stanford, NYU, MIT, Northwestern, UCLA, Duke and UC-Berkeley.

mean LSAT scores equal to or greater than 165 and below 165, respectively. The reference group is the group of firms with CEOs who do not hold graduate degrees.

Table I reports that approximately 15.8, 10.7, and 6.1 percent of firms in our entire sample are run by CEOs holding MBAs from GMAT1, GMAT2, and GMAT3 schools, respectively. Approximately 6.1 and 7.8 percent of the firms are run by CEOs holding law degrees from LSAT1 and LSAT2 schools, respectively. Table I also provides summary statistics for other CEO characteristics, measures of firm performance, and other firm characteristics that we use in our tests.

Finally, Table II reports correlations between the variables. One interesting result is the correlation coefficient of 0.39 between the SAT and GMAT scores of CEOs who have both undergraduate and MBA degrees. This indicates that CEOs who graduate from high-prestige undergraduate institutions do not necessarily attend high-prestige MBA programs. The relatively low degree of correlation, which implies less potential for multicollinearity, validates the approach of specifically examining the effect of MBA programs. Otherwise, correlations are universally below 0.50, and generally much lower, between variables that appear in the same multivariate estimation.[16]

V.B. CEO Performance and Education Characteristics

Tables III through VI provide the results of tests of the relation between CEO education and performance. In each of these four tables, we estimate CEO performance over the period 2000 through 2003 using excess simple (mean monthly) returns, the modified 4-index alpha, BHAR,

[16] We also test for multicollinearity using the methodology suggested by Belsley, Kuh, and Welsch (1980). We found no evidence of problematic multicollinearity in any of the reported results.

Tobin's q[17], ROE, ROA and AROA. For each of these seven measures of performance, we run two types of regressions. First, using ordinary least squares (OLS) we run a regression using CEO education variables, age, tenure, ownership, compensation, sales (as a proxy for size), and dummy variables for the 2-digit SIC of the firm. The purpose of these regressions is to examine the effect of CEO educational quality on firm performance while controlling for other factors. The age and tenure variables are used to control for the presence of any age or tenure effects.[18] Ownership is used to control for the fact that some CEOs may have more control over the firm than others and as a result may have more influence over performance. Compensation is used to control for the possibility that more highly compensated CEOs perform differently than less well compensated CEOs. Sales is used to control for the size of the firm. Dummy variables based on the 2-digit SIC codes are used to control for any industry effects that may predominate. This is an important effect to control for as certain types of CEO education may have greater impact in different industries. For example an MBA may be highly valued in running a bank but not for a pharmaceutical company. Finally, note that all the control variables are reported in our results tables with the exception of the industry dummies which are not reported due to size limitations. These results are available upon request.

For the second regression, we run an instrumental variable (IV) regression where we use the same variables as in the OLS regressions but also include out-of-sample leverage and the out-of-sample liquidity ratio as endogenous variables, given that the CEO may be able to influence

[17] Tobin's Q has significantly fewer observations than the other measures of performance because in many cases the data needed to calculate this performance metric were not available.

[18] CEO quality may influence tenure, as higher quality CEOs may retain their positions for longer periods. To control for this possibility, we re-estimated all tests in this paper excluding tenure as a regressor. The results are very robust to the exclusion of tenure as a regressor. Note that we set missing tenure observations as equal to zero in the regressions. Note that Allgood and Farrell (2000) find that founding CEOs are entrenched early in their careers and held accountable for firm performance later in their careers. Outside CEOs become entrenched following a probationary period, and the entrenchment weakens later in their tenure as CEO.

these variables. Lagged values of leverage and liquidity, specified as the 1999 values of these measures, as used as instruments in the regression. [19]

The results of CEO education on performance are organized as follows. Table III presents the results of tests where the education variables include SAT (divided by 100), the liberal arts dummy, and indicator variables equal to unity if the CEO completed an MBA, law degree, or other graduate degree, respectively.[20] In Table IV we replicate the same regressions as estimated in Table III but replace the MBA and law degree indicator variables with the three GMAT and two LSAT indicator variables, GMAT1-3 and LSAT1-2. In Table V, we present results for the sample of firms whose CEOs hold MBA degrees. Because all observations in this sample have a GMAT score, we include the GMAT score as a regressor. Similarly, Table VI displays the results for the sample of firms whose CEO hold law degrees. Since all observations in this sample have a LSAT score, we include the LSAT score as a regressor.

The performance regressions show four interesting findings. First, we find no consistent evidence that firms run by CEOs from higher prestige undergraduate institutions perform any better than firms lead by CEOs with educations from less prestigious undergraduate schools. All fourteen of the SAT coefficients in Tables III and IV are insignificant, indicating that undergraduate educational prestige has little impact on firm performance. Only in the MBA only sample (Table V) do we find any positive and significant results (AROA/IV at the ten percent level) while in the LAW only sample (Table VI) we actually find negative and significant results for ROA and ROE.

[19] Note that we conducted the analysis presented in Tables III-VI using lagged performance measures to control for past performance of the firm. In all cases, that the inclusion of these variables did not significantly impact our results.

[20] The reference group for the MBA and Law dummies is composed of firms with CEOs who do not hold graduate degrees.

Second, we find that firms managed by CEOs with MBA or law degrees perform no better than firms with CEOs without graduate or law degrees. As can be seen in Tables III, the dummy variables, MBA, LAW and OTHER GRAD DEGREE, are all insignificant with the exception of Law, which is negative and significant (at the ten percent level) when using the BHAR measure. Hence, while our theory (as described in Section II) suggests that CEOs with higher levels of education attainment will have training that helps them better manage the firm, we do not find that higher levels of CEO educational attainment (in terms of MBA and law degrees) improves firm performance.

Third, the results of Tables IV and V illustrate that there is no evidence that firms run by CEOs from higher prestige graduate business schools perform any better than firms lead by CEOs with educations from less prestigious graduate business schools. Table IV shows that the graduate business school quality dummy variables (GMAT1, GMAT2, and GMAT3) are almost always insignificant across all the regressions, indicating that the quality of the CEO's graduate business program has little to do with firm performance. Similarly, Table V illustrates that the GMAT variable is also insignificant when the tests are conducted on samples of CEOs who all hold MBA degrees. Moreover, the point estimates of these variables are often negative, indicating that, if anything, the educational prestige of the CEO's graduate business school predicts lower firm performance. Indeed, in the case of Table V we actually find the GMAT score is negatively and significantly related to firm performance when using the BHAR measure as the measure of performance.

Fourth, we find mixed evidence as to whether firms run by CEOs from higher prestige law schools perform any better than firms lead by CEOs who attended less prestigious law schools. Table IV shows that the law school quality dummy variables (LSAT1, and LSAT2) are

generally insignificant. The only exception is in the case of the BHAR when we find negative and significant results for LSAT2, indicating that CEOs from less prestigious law schools performed worse than other CEOs. Table VI illustrates that when the tests are conducted on samples of CEOs who all hold law degrees, the LSAT variable is not significant in the majority of the fourteen. We do find positive and significant results for the LSAT variable in Table VI when the performance measure is either ROA or ROE or BHAR (instrumental variable case only); however, these results should be interpreted with caution as they are based on a relatively small sample.

V.C. CEO Compensation and Education Characteristics

While Tables III-VI illustrate the results of educational quality on CEO performance, another issue to examine is whether the quality of the education of the CEO influences his/her compensation. In the literature, Palia (2000) finds that CEOs in non-regulated industries receive greater compensation than CEOs in regulated industries. Moreover, Palia also finds that CEOs of firms in non-regulated industries have more prestigious educations. Taken together, these results suggest that CEOs with better educational backgrounds extract higher compensation. To more directly examine this issue, we examine the relationship between CEO educational quality and CEO compensation.

To estimate CEO compensation we use two measures. First, similar to Tables I-VI, we use the average annual salary and bonus for each CEO in our sample for the period 2000 through 2003. Second, to capture the effects of options, we use the average annual salary, bonus, and the value of exercisable in-the-money options for each CEO over the period 2000 through 2003.[21]

[21] As we stated in footnote 9 we re-estimated all the results in Tables I-VI with this alternative measure of compensation. The results were very similar to those reported in the paper.

Using OLS only, we then examine the linkage between educational quality and CEO compensation. As control variables we use age, tenure, ownership, compensation, sales, and 2-digit SIC variables as independent variables, though the results for 2-digit SIC are unreported. As well, we include a single performance measure in each regression (simple mean monthly returns, the 4-index alpha, BHAR, Tobin'q, ROE, ROA, AROA) to control for performance of the firm, given that the literature has shown that CEO compensation is related to firm performance (see Jensen and Murphy (1990), for example).

In the first seven regressions, columns 1 through 7 of Table VII, we limit the educational variables to the ones we use in Table III: SAT, the liberal arts indicator variable, and indicator variables that are equal to unity if the CEO completed an MBA, law degree, or other graduate degree, respectively. In the subsequent seven regressions, columns 8 through 14, we replace the MBA and law degree indicator variables with the three GMAT and two LSAT indicator variables, GMAT1-3 and LSAT1-2, respectively, similar to the refinement we presented in Table IV.

The results of Table VII are presented in two panels. Panel A provides the results using the salary and bonus only measure of compensation, while Panel B provides the results using the measure of compensation that includes salary, bonus and the value of exercisable in-the-money options.

The results of Panel A indicate that the quality of CEO education is, at best, only weakly related to CEO compensation. In regressions 1 through 14, we find a positive but insignificant coefficient associated with the SAT variable, indicating that CEOs from higher prestige undergraduate institutions receive slightly more compensation than CEOs from lower prestige undergraduate institutions. For the regressions in columns 8 through 14, we find a significantly

negative coefficient associated with the LSAT2 variable, significant throughout at the one percent level. Hence, CEOs who graduated from low LSAT law schools have significantly worse compensation.

When we include the value of exercisable in-the-money options in the compensation measure (Panel B of Table VII), we find that the quality of CEO education is more strongly related to compensation. Specifically, in regressions 1-7 we generally find a positive and significant coefficient associated with the MBA dummy, indicating that CEOs with MBA degrees have significantly higher compensation than other CEOs. In addition, we find CEOs from more prestigious MBA and LAW school programs receive significantly higher compensation as the coefficients for GMAT1 and LSAT1 are generally positive and significant.

Table VII (panels A and B) also indicates that tenure and compensation are positively and significantly related. Indeed, in all but one of the regressions, tenure is significantly related to compensation. This result is consistent with Palia (2001) who also finds that CEO compensation rises as the length of CEO tenure grows. .

V.D. Event Study Examination of Announcement Effects

In Section V.C we presented evidence that supports the contention that firm performance is generally unrelated to the quality of the education acquired by the firm's CEO. One possible explanation for this finding is that the impact of CEO educational quality takes place only when a new CEO is first announced. That is, since educational backgrounds of CEOs are available to investors, it could be that the stock price of the company moves only when the CEO is first appointed and not throughout his or her tenure. To further investigate this issue, we perform an event study to determine whether the market's reaction to the announcement of a CEO switch is

related to the differences in the quality of the education of the outgoing and incoming CEOs. If CEO education positively influences performance, then we should expect market reaction to be stronger (weaker) when the quality of the incoming CEO's education is higher (lower) than the quality of the education of the outgoing CEO. However, if CEO education does not influence performance, then we should not expect a relation between market reaction and differences in CEO educational quality.

The event study was implemented as follows. We use EXECUCOMP to extract a sample of NYSE firms that experience a CEO switch during the time period of 1997-2003.[22] For each of the CEO switches that we identified, we searched Lexis Nexis for the initial announcement of the CEO switch. To permit us to test for effects associated with quality differences between incoming and outgoing CEOs, we eliminate any announcement that does not identify the names of both the incoming and outgoing CEOs. For example, if the initial announcement simply specifies that the current CEO is retiring without specifying the name of the replacement CEO, then the CEO switch observation is eliminated from the sample. Further, we eliminated any announcement for which educational data are unavailable for both the incoming and outgoing CEOs. This resulted in a sample size of 106 CEO switches.

For each CEO switch announcement, we estimate the abnormal return (AR) for the day of the announcement and the cumulative abnormal return (CAR) for the day before, day of, and the day following the announcement using standard event study methodology (see MacKinlay (1997)). Abnormal return is calculated in excess of a three-index model consisting of market return (RM_t); the difference in returns across small and big stock portfolios controlling for the same weighted average book-to-market equity in the two portfolios (SMB_t); and the difference in

[22] We used this sample period to gather as many CEO switches as possible.

returns between high and low book-to-market equity portfolios (HML_t).[23] The parameters used to calculate AR are estimated during the period between 130 and 10 days before the announcement date.[24] The mean value of AR for the day of the announcement is approximately 0.27% while the mean value of the 3-day CAR is approximately -0.15%. Both of these values are not statistically different from zero at the usual levels.

We then performed OLS estimation of models in which the AR or CAR is the dependent variable and measures of the difference in quality between the incoming and outgoing CEOs' educational quality are independent variables. The results of the estimations are presented in Table VIII. For each of the identified CEO switches, differences in quality were measured as the difference between the SAT scores of the incoming and outgoing CEO's undergraduate institutions. In addition, several quality dummies were specified and tested. We report the results for the quality dummies MBA TO UNDERGRAD and UNDERGRAD TO MBA, which are indicator variables equal to unity if the outgoing CEO holds an MBA and the incoming CEO only holds an undergraduate degree, and vice versa. For no test do we find any statistically significant relation between AR or CAR and measures of differences in CEO educational quality whatsoever.[25] Hence, the market does not seem to react to educational quality differences between incoming and outgoing CEOs.

[23] The results are very robust to a single-index model, in which abnormal return is calculated in excess of market return.

[24] The results are very robust to alternative parameter estimation period specifications.

[25] Note that we did not create a measure equal to the difference in GMAT score between the incoming and outgoing CEOs, as the joint occurrence of both the incoming and outgoing CEOs holding an MBA from a school for which GMAT data are available is limited to only a few cases. For the same reason, we did not create a measure equal to the difference in LSAT score. Also note that we tested a number of additional quality dummies, and include as control variables measures of firm characteristics such as 2-digit SIC dummies, and find very similar results.

VI. Conclusions

In this paper, we empirically relate the quality of CEO education to firm performance and to CEO compensation. We measure educational quality by examining both the level of education attained by the CEO and by measuring the prestige of the schools from which CEOs graduated; for the latter we measure the prestige by using mean entrance exam scores. We find three results. First, we find very little evidence that firms run by CEOs from more prestigious schools (undergraduate or graduate) perform better than firms run by CEOs from less prestigious schools. Second, we find that firms managed by CEOs with MBA or law degrees perform no better than firms with CEOs without graduate degrees, suggesting that the impact of a graduate business or law degree is minimal on CEO performance. Third, and finally, we find that compensation is somewhat higher for CEOs who attended high mean SAT undergraduate institutions and lower for CEOs that attended low LSAT law schools.

Our results suggest little support for our hypotheses concerning the relationship between CEO education and firm performance. With respect to our argument that CEOs with higher cognitive ability (as measured by the mean entrance exam score of the schools attended by the CEO) should produce better firm performance than other CEOs, it may be that CEO cognitive ability is in fact not an important factor in firm performance. Instead other CEO personality traits such as charisma, collegiality, effort, etc. may be more important in producing superior firm performance. Alternatively, CEO cognitive ability may positively predict firm performance, but may be easily overwhelmed by these other CEO personality traits. For example, it may be that CEOs with lower cognitive ability work harder or longer than CEOs with higher cognitive ability. As a result, any positive effect of higher cognitive ability, i.e., the ability to process more

information and process that information more quickly, may be offset by other CEOs putting in superior effort.

Furthermore, the fact that CEO cognitive ability does not seem to influence firm performance may reflect our use of mean entrance test scores as a proxy for cognitive ability. Although test scores have been shown to be relatively good measures of intelligence, the use of the mean entrance exam score for the school attended is less optimal than a direct measure of the individual's intelligence. In other words, because of the variation around the mean exam scores for each school, there are clearly individuals with very high cognitive ability attending less prestigious schools and individuals with relatively low ability attending very prestigious schools. Indeed, many people are admitted to very prestigious undergraduate and graduate schools based not on test scores, but on other factors apart from cognitive ability. Hence, graduation from an institution with a high mean SAT, GMAT or LSAT does not guarantee that the individual has high cognitive ability. Nevertheless, since individual intelligence information is impossible to attain, the mean entrance exam scores do represent our best opportunity to capture the cognitive ability of CEOs.

Next, consider our hypothesis that the educational training of CEOs should influence firm performance. As stated above, our results indicate that firms with CEOs with MBA or law degrees do not perform any better than do firms headed by CEOs without graduate degrees. These results suggest, in part, that the skills learned by CEOs in these programs have little impact on firm performance. One potential explanation for this finding is that the length of time between the CEO's completion of the degree(s) and the attainment of the CEO position may be sufficiently long to diminish any benefit that can flow from a superior education (whether the education or the social connections picked up at the school). Indeed, anyone who becomes a

CEO of a NYSE firm likely has certain skills, developed over a lifetime, which enabled them to achieve their position. Thus, anyone who has risen to the position of CEO probably possesses certain characteristics that make them an effective manager regardless of their educational background. As an analogy consider players in the National Football League (NFL). A player that makes it into the National Football League can be regarded as a good player regardless of whether they went to Mississippi Valley State or Notre Dame. Similarly, by rising to their position, we can assume that CEOs are strong managers and possess certain skills regardless of whether they graduated from Harvard Business School or a much lower ranked business school. Consequently, the quality of CEO education, particularly education that was completed years earlier, may have little to do with the current performance of CEOs.

Another potential explanation is that these graduate programs may not provide the type of training necessary for a CEO to produce better firm performance. Indeed, many critics have noted (see Porter and McKibbin (1988), Mintzberg (1996) and Pfeffer and Fong (2002)) that quantitative-based analytical techniques receive too much attention in MBA programs, while little attention is given to developing the kind of leadership and interpersonal skills that are necessary for high-level managerial success. The sentiment that business schools do a poor job in educating CEO is best summed up by Mintzberg and Lampel (2001, p.244) who state:

> "The MBA tends to be heavy on the "B" and light on the "A," teaching business functions, yet not developing the practice of administering. These programs give students the confidence to make decisions but not the competence to deal with the messy reality in which decisions are executed. Students learn to analyze situations and propose "implementation." Unfortunately you cannot replicate true managing in the classroom. The case study is a case in point: Students with little or no management experience are presented with 20 pages on a company they do not know and told to pronounce on its strategy the next day."

An alternative explanation for our results is related to the state of the firm when the CEO takes over. That is, if distressed firms disproportionately hire CEOs with graduate degrees in

business and or law, then our results may indicate that the CEOs are in fact performing better than the average CEO and that their advanced education may be of some positive impact. Alternatively, if healthier firms disproportionately hire CEOs with graduate degrees in business and law, it would suggest that these CEOs may be detrimental to performance. In the end it is difficult to state which of these outcomes holds without a more in-depth examination of the types of companies that hire CEOs with graduate degrees in business or law. This is a subject for future research.

Finally, consider the issue of compensation. Similar to Palia (2000), we do find some evidence that attending more prestigious graduate (business and law) schools implies higher compensation. These results suggest that even though performance may not be influenced by education, the ability of a CEO to extract higher compensation is enhanced by a more prestigious educational background. In a sense, companies are willing to pay more for a CEO with a prestigious educational background even though our results suggest that this prestigious educational background may not be worth the price.

Appendix A: Further Description of Education Quality Variables.

SAT

We obtain up-to-date SAT scores for the undergraduate schools through initially searching *Collegeboard.com* for the SAT I Verbal and SAT I Math test score ranges for the middle 50% of first-year students.[26] The mean values of the verbal and math score ranges are calculated, and the average of the verbal and math scores is calculated to identify a single SAT score for each school. For all schools for which SAT scores were not identified on *Collegeboard.com*, we then search the *Princeton Guide to Colleges* (2004) for mean SAT scores. For a select few schools, while SAT scores are unavailable, ACT scores are reported. In these cases, the ACT scores are converted into SAT scores using the SAT – ACT score comparisons provided on *Collegeboard.com*.[27]

GMAT

We obtain GMAT scores for the MBA schools through initially searching *MBA.com* for the mean GMAT score of new entrants.[28] For all schools for which GMAT scores are not identified on *MBA.com*, we then search *Businessweek.com's 2003 Full-Time MBA Profiles* for the mean GMAT scores. For all schools for which GMAT scores are not identified on either of the above

[26] *Collegeboard.com* is the website of the College Board, the organization that administers the SAT tests, among other activities. The search was performed December 2003.

[27] For a few of the CEOs, the undergraduate school reported is actually a system of schools. In these cases, the SAT score identified is the average of the SAT scores for the schools within the system for which SAT scores are reported on *Collegeboard.com*.

[28] *MBA.com* is the website of the Graduate Management Admission Council, the organization that administers the GMAT tests. The search was performed December 2003.

two sources, we search *Peterson's Guide to MBA Programs* (2004) for the mean GMAT scores.[29]

LSAT

We obtain LSAT scores for the law schools through searching *LSAT.org* for test score ranges for the middle 50% of first-year students.[30] The mean values of these ranges are calculated to identify a single LSAT score for each law school.

Liberal Arts

Using *USnews.com*'s 2004 list of liberal arts colleges we determine whether the CEO's undergraduate institution is a liberal arts college or not. We choose this variable since many educators argue that the individual attention given to students at liberal arts schools is superior to that in larger, research-oriented institutions.

[29] As for the SAT scores extraction, the graduate school reported is occasionally a system of schools. In these cases, we proceeded in an identical fashion as described above for SAT scores.

[30] *LSAT.com* is the website of the Law School Admission Council, the organization that administers the LSAT tests, among other activities. The search was performed December 2003.

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Table I: Summary Statistics

SAT is the mean composite SAT score of the CEO's undergraduate school. LIBERAL ARTS is a dummy variable that is equal to unity if the CEO attended a liberal arts school. MBA is a dummy variable that is equal to unity if the CEO completed an MBA degree. GMAT is the mean GMAT score of the CEO's MBA graduate school. GMAT1-3 are dummy variables that are equal to unity if the CEO completed an MBA from a graduate school with mean GMAT scores equal or greater than 700, between 600-699, and 599 or less, respectively. LAW is a dummy variable that is equal to unity if the CEO completed a law degree. LSAT is the mean LSAT score of the CEO's law school. LSAT1-2 are dummy variables that are equal to unity if the CEO completed a law degree from a graduate school with mean LSAT scores equal to or greater than 165 and below 165, respectively. OTHER SECOND DEGREE is a dummy variable that is equal to unity if the CEO completed a graduate degree that is not identifiable as a law or MBA degree. AGE is the CEO's age. TENURE is the tenure of the CEO at the firm. The remaining variables are calculated over the period 2000-2003. OWNERSHIP is the average annual percentage of the firm's stocks that the CEO holds. COMPENSATION is the average annual total compensation of the CEO. SIMPLE EXCESS RETURNS are the mean monthly excess returns of the CEO's firm. 4-INDEX ALPHA is the 4-index alpha of the CEO's firm. BHAR is the buy-and hold abnormal returns. TOBIN'S Q is the average annual Tobin's *q*. ROE is the average annual return on equity for the CEO's firm. ROA is the average annual return on assets for the CEO's firm. AROA is the adjusted ROA. SALES is the average annual sales of the CEO's firm. LEVERAGE is the average annual debt ratio of the CEO's firm. LIQUIDITY RATIO is the average annual liquidity ratio of the CEO's firm.

Name	Number	Mean	STD
CEO Education Variables:			
SAT/100	488	12.224	1.470
MBA	488	0.326	0.469
GMAT/100	159	6.588	0.655
GMAT1 (700 and above)	488	0.158	0.365
GMAT2 (600-699)	488	0.107	0.309
GMAT3 (599-below)	488	0.061	0.240
LAW	488	0.139	0.347
LSAT/100	68	1.621	0.065
LSAT1 (165 and above)	488	0.061	0.240
LSAT2 (164 and below)	488	0.078	0.268
LIBERAL ARTS	488	0.100	0.301
OTHER GRAD DEGREE	488	0.098	0.298
Other CEO Characteristics:			
AGE/10	488	5.778	0.705
TENURE	458	6.745	6.443
OWNERSHIP	488	0.022	0.049
COMPENSATION/1,000	488	1,728.338	1,633.332
Firm Performance:			
SIMPLE EXCESS RETURNS	488	0.013	0.014
4-INDEX ALPHA	488	0.014	0.017
BHAR	486	0.003	0.023
TOBIN'S Q	390	1.424	1.020
ROE	487	11.441	32.463
ROA	488	3.913	5.716
AROA	442	3.576	11.627
Other Firm Characteristics:			
LOG SALES/1,000,000	488	6,281.856	13,715.876
LEVERAGE	488	0.274	0.165
LIQUIDITY RATIO	488	0.088	0.112

Table II: Correlations.

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]
SAT/100	[1]																									
MBA	[2]	0.02																								
GMAT/100	[3]	0.39	n.a.																							
GMAT1 (700 and above)	[4]	0.16	0.62	0.72																						
GMAT2 (600-699)	[5]	-0.07	0.50	-0.03	-0.15																					
GMAT3 (599-below)	[6]	-0.12	0.37	-0.88	-0.11	-0.09																				
LAW	[7]	0.09	-0.28	n.a.	-0.17	-0.14	-0.10																			
LSAT/100	[8]	0.34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.																		
LSAT1 (165 and above)	[9]	0.15	-0.18	n.a.	-0.11	-0.09	-0.07	0.64	0.85																	
LSAT2 (164 and below)	[10]	-0.02	-0.20	n.a.	-0.13	-0.10	-0.07	0.72	-0.85	-0.07																
LIBERAL ARTS	[11]	0.00	0.16	0.04	0.15	0.02	0.06	-0.04	0.03	0.00	-0.05															
OTHER GRAD DEGREE	[12]	-0.01	-0.23	n.a.	-0.14	-0.11	-0.08	-0.13	n.a.	-0.08	-0.10	-0.06														
AGE/10	[13]	0.02	0.01	0.16	0.04	0.01	-0.06	0.07	0.28	0.15	-0.05	0.04	0.10													
TENURE	[14]	0.01	-0.08	0.05	-0.05	-0.03	-0.05	0.09	0.17	0.14	-0.01	-0.01	0.04	0.37												
OWNERSHIP	[15]	0.12	-0.12	0.17	-0.01	-0.11	-0.09	0.11	0.10	0.14	0.02	-0.06	-0.07	0.15	0.42											
COMPENSATION/1,000	[16]	0.11	-0.05	0.02	-0.03	-0.03	-0.02	0.08	0.10	0.12	-0.01	0.00	0.05	0.16	0.02	-0.03										
SIMPLE EXCESS RETURNS	[17]	-0.02	-0.07	0.09	-0.07	0.03	-0.08	0.04	-0.03	-0.02	0.07	-0.07	-0.02	-0.06	0.06	0.05	-0.04									
4-INDEX ALPHA	[18]	0.02	-0.07	0.12	-0.06	0.05	-0.10	0.02	-0.06	-0.03	0.06	-0.06	0.01	-0.08	0.03	0.02	0.00	0.84								
BHAR	[19]	0.00	-0.04	-0.09	-0.08	0.04	0.00	-0.03	0.07	-0.01	-0.04	-0.13	-0.07	-0.05	-0.06	0.02	0.01	0.55	0.44							
TOBIN'S Q	[20]	-0.05	-0.05	0.18	0.01	-0.01	-0.10	0.02	0.07	0.02	0.01	-0.02	0.02	0.06	0.08	0.05	0.06	0.18	0.14	0.25						
ROE	[21]	0.04	0.00	0.04	0.01	0.00	0.00	-0.04	0.18	-0.01	-0.05	-0.08	-0.03	-0.02	-0.07	-0.02	0.11	0.00	-0.03	0.15	0.31					
ROA	[22]	-0.01	0.00	0.08	0.02	-0.02	-0.02	-0.05	0.24	0.02	-0.08	-0.08	-0.03	0.05	0.02	0.07	0.07	0.14	0.11	0.22	0.54	0.58				
AROA	[23]	-0.02	-0.04	0.11	-0.02	0.01	-0.06	-0.05	0.17	-0.02	-0.04	-0.09	0.04	-0.04	0.02	0.02	-0.04	0.19	0.21	0.09	0.37	0.15	0.42			
LOG SALES/1,000,000	[24]	0.00	0.02	-0.04	-0.01	0.01	0.03	-0.02	-0.21	-0.04	0.00	-0.04	0.14	0.07	-0.05	-0.10	0.45	-0.22	-0.19	-0.14	-0.04	0.02	-0.02	-0.06		
LEVERAGE	[25]	0.00	-0.05	-0.09	-0.06	-0.02	0.02	0.05	-0.08	0.02	0.04	-0.02	0.05	0.00	-0.10	-0.11	0.09	-0.02	-0.05	0.05	-0.33	0.03	-0.21	-0.21	0.00	
LIQUIDITY RATIO	[26]	0.00	-0.08	0.16	-0.02	-0.02	-0.10	0.08	-0.03	0.07	0.04	-0.07	0.09	-0.03	0.13	0.16	0.02	0.12	0.17	-0.02	0.38	-0.01	0.17	0.21	-0.07	-0.43

Table III: **Performance Regressions Using MBA and LAW Dummy Variables.**

We examine the relation between firm performance and CEO education using MBA and LAW Dummy variables. Each regression is estimated using both Ordinary Least Squares (OLS) and Instrumental Variables (IV) methodologies. For the IV regressions liquidity and leverage are treated as endogenous variables where the instruments of the regression are lagged liquidity and lagged leverage. These regressions include dummy variables for 2-digit SIC codes. The results for the industry dummies are not reported. ***, **, * indicate significance at the one, five, and ten percent levels, respectively.

	Dependent Variable is the Performance Measure													
Independent Variables:	SIMPLE / OLS	4-INDEX / OLS	BHAR /OLS	TOBIN'S Q /OLS	ROE /OLS	ROA /OLS	AROA /OLS	SIMPLE /IV	4-INDEX /IV	BHAR /IV	TOBIN'S Q /IV	ROE /IV	ROA /IV	AROA /IV
Intercept	0.0834***	0.0718***	0.0399*	0.7940	-51.9153	-2.7783	16.3367	0.0840***	0.0650***	0.0429*	0.0401	-54.2688	-2.9421	16.8822
SAT/100	-0.0002	0.0003	0.0000	-0.0450	0.0902	-0.2489	-0.0226	-0.0001	0.0004	0.0000	-0.0400	0.1928	-0.2543	-0.0653
LIBERAL ARTS	-0.0014	-0.0013	-0.0078**	0.0112	-7.2522	-1.0885	-3.5801*	-0.0011	-0.0009	-0.0069*	-0.0163	-6.4741	-1.171	-3.6754*
MBA	-0.0009	-0.0010	-0.0021	-0.0830	-1.5562	-0.0642	-0.9645	-0.0007	-0.0008	-0.0015	-0.1143	-1.1143	-0.1246	-1.1098
LAW	0.0003	-0.0002	-0.0062*	0.1073	-4.1265	-0.9161	-1.6055	0.0001	-0.0010	-0.0064*	0.0563	-4.7344	-0.8773	-1.4790
OTHER GRAD DEGREE	0.0010	0.0026	-0.0058	0.0428	-3.4503	-0.3585	1.0723	0.0012	0.0016	-0.0051	-0.0285	-3.4686	-0.4076	1.0626
AGE/10	-0.0003	-0.0012	0.0007	0.0878	-0.5058	0.3614	-0.8843	-0.0005	-0.0011	0.0002	0.1313*	-0.7915	0.4095	-0.7573
TENURE	0.0000	0.0000	-0.0002	0.0054	-0.2411	-0.0239	0.0630	0.0000	0.0000	-0.0002	0.0044	-0.2705	-0.0218	0.0668
OWNERSHIP	0.0051	0.0068	0.0202	2.0517*	-6.9571	10.6291*	11.8582	0.0159	0.0114	0.0440*	1.1312	13.6729	8.0978	7.3239
log(COMPENSATION)	0.0004	0.0008	0.0006	0.1345**	3.2213	1.0695***	0.8318	0.0006	0.0007	0.0012	0.0998*	3.5989*	1.0145***	0.7415
LOG SALES	-0.0034***	-0.0031***	-0.0022**	-0.0742	1.0785	-0.3504	-0.9358*	-0.0039***	-0.0031***	-0.0032***	-0.0157	0.3092	-0.2465	-0.7650
LEVERAGE								0.0190***	0.0181**	0.0388***	-1.1976**	39.6198**	-4.3957*	-8.8771
LIQUIDITY RATIO								0.0005	0.0178*	-0.0029	1.2121	6.9326	-0.0514	-1.2842
# OBS.	488	488	486	390	487	488	442	488	488	486	390	487	488	442
Adj-R2	0.237	0.183	0.068	0.174	0.050	0.115	0.053	0.219	0.189	0.074	0.264	0.033	0.140	0.069

Table IV: Performance Regressions using GMAT1-3 and LSAT1-2 Dummy Variables.
The table examines the relation between firm performance and CEO education using GMAT1-3 and LSAT1-2 dummy variables. Each regression is estimated using both Ordinary Least Squares (OLS) and Instrumental Variables (IV) methodologies. For the IV regressions liquidity and leverage are treated as endogenous variables where the instruments of the regression are lagged liquidity and lagged leverage. These regressions include dummy variables for 2-digit SIC codes. The results for the industry dummies are not reported. ***, **, * indicate significance at the one, five, and ten percent levels, respectively.

Independent Variables:	SIMPLE / OLS	4-INDEX / OLS	BHAR /OLS	TOBIN'S Q /OLS	ROE /OLS	ROA /OLS	AROA /OLS	SIMPLE /IV	4-INDEX /IV	BHAR /IV	TOBIN'S Q /IV	ROE /IV	ROA /IV	AROA /IV
Intercept	0.0824***	0.0712***	0.0385*	0.8448	-51.0753	-2.0465	15.6881	0.0836***	0.0650***	0.0426*	0.0585	-52.4034	-2.1907	16.2307
SAT/100	-0.0001	0.0004	0.0001	-0.0492	0.1084	-0.2848	-0.0040	-0.0001	0.0004	0.0001	-0.0412	0.1812	-0.2871	-0.0381
LIBERAL ARTS	-0.0012	-0.0010	-0.0074**	0.0148	-7.0146	-1.1166	-3.4622*	-0.0009	-0.0006	-0.0065*	-0.0098	-6.2500	-1.1996	-3.5605*
GMAT1	-0.0022	-0.0024	-0.0059*	-0.0598	-3.8167	0.0837	-1.3099	-0.0019	-0.0022	-0.0051	-0.1216	-3.2603	0.0065	-1.4844
GMAT2	0.0019	0.0035	0.0015	0.0198	0.6569	-0.0575	0.7783	0.0025	0.0038	0.0027	-0.039	1.6113	-0.1800	0.5219
GMAT3	-0.0030	-0.0054*	0.0007	-0.2832	0.1245	-0.3635	-3.1376	-0.0034	-0.0054*	-0.0002	-0.2088	-0.5425	-0.2795	-3.0107
LSAT1	-0.0006	-0.0009	-0.0039	0.1299	-0.0758	0.0462	-2.8152	-0.0006	-0.0016	-0.0037	0.0702	-0.3001	0.0471	-2.7681
LSAT2	0.0010	0.0003	-0.0081*	0.0948	-7.1773	-1.6022	-0.6687	0.0007	-0.0004	-0.0085**	0.0507	-7.9580	-1.5283	-0.4746
OTHER GRAD DEGREE	0.0011	0.0027	-0.0055	0.0473	-3.1621	-0.3258	1.1121	0.0013	0.0019	-0.0047	-0.0232	-3.0791	-0.3657	1.1130
AGE/10	-0.0004	-0.0013	0.0006	0.0766	-0.6753	0.2974	-0.8918	-0.0006	-0.0013	0.0000	0.1249*	-1.0425	0.3509	-0.7570
TENURE	0.0000	0.0000	-0.0002	0.0051	-0.2612	-0.0244	0.0642	0.0000	0.0000	-0.0003	0.0041	-0.2883	-0.0222	0.0682
OWNERSHIP	0.0068	0.0089	0.0218	2.0760*	-7.1236	10.1840	13.0139	0.0179	0.0140	0.0456*	1.1684	13.6720	7.7068	8.6496
log(COMPENSATION)	0.0005	0.0009	0.0005	0.1340**	2.9948	1.0133***	0.9017	0.0007	0.0008	0.0011	0.1001	3.3748	0.9634***	0.8229
LOG SALES	-0.0035***	-0.0031***	-0.0021**	-0.0708	1.2101	-0.3101	-0.9624*	-0.0039***	-0.0032***	-0.0031***	-0.0145	0.4408	-0.2127	-0.8072
LEVERAGE								0.019***	0.0182**	0.0383***	-1.1894**	39.2186**	-4.4203*	-8.7390
LIQUIDITY RATIO								-0.0003	0.0165	-0.0041	1.1835	5.6356	-0.2401	-1.5367
# OBS.	488	488	486	390	487	488	442	488	488	486	390	487	488	442
Adj-R2	0.239	0.191	0.071	0.170	0.046	0.112	0.052	0.221	0.196	0.077	0.258	0.029	0.136	0.066

Table V: **Performance Regressions MBA Only.**
The table examines the relation between firm performance and CEO education using a sample of CEOs that hold MBA degrees. GMAT is the mean GMAT score of the CEO's MBA graduate school. Each regression is estimated using both Ordinary Least Squares (OLS) and Instrumental Variables (IV) methodologies. For the IV regressions liquidity and leverage are treated as endogenous variables where the instruments of the regression are lagged liquidity and lagged leverage. These regressions include dummy variables for 2-digit SIC codes. The results for the industry dummies are not reported. ***, **, * indicate significance at the one, five, and ten percent levels, respectively.

	Dependent Variable is the Performance Measure													
Independent Variables:	SIMPLE / OLS	4-INDEX / OLS	BHAR /OLS	TOBIN'S Q /OLS	ROE /OLS	ROA /OLS	AROA /OLS	SIMPLE /IV	4-INDEX /IV	BHAR /IV	TOBIN'S Q /IV	ROE /IV	ROA /IV	AROA /IV
Intercept	0.0563*	0.0350	0.0041	-6.4501**	-8.5640	-22.9453*	32.8809	0.0489	0.0303	-0.0096	-6.3228**	-14.7722	-20.7307*	30.9208
SAT/100	-0.0006	-0.0010	0.0011	0.0487	-0.6337	0.2967	1.0107	-0.0005	-0.0009	0.0012	0.0765	-1.0301	0.2726	1.3300*
LIBERAL ARTS	-0.0008	-0.0044	0.0004	0.0476	-18.4152**	-0.7212	-2.8267	-0.0007	-0.0043	0.0011	0.1026	-19.2426**	-0.7461	-2.2076
GMAT	0.0007	0.0036	-0.0071**	0.0207	1.5793	-0.3547	0.6617	0.0007	0.0035	-0.0069**	-0.1105	2.6823	-0.3553	-0.1781
AGE/10	-0.0009	-0.0016	-0.0002	0.3245*	-12.8370**	0.7248	-1.4520	-0.0003	-0.0012	0.0011	0.3273*	-11.8796**	0.5570	-1.6279
TENURE	0.0003	0.0004	-0.0006	0.0026	-0.0445	-0.0403	-0.0574	0.0002	0.0003	-0.0007*	0.0030	-0.1226	-0.0168	-0.0602
OWNERSHIP	-0.0086	-0.0021	0.0344	1.9555	-100.9668	-16.0087	13.8905	0.0183	0.0121	0.0910	1.2645	-37.3911	-24.0969	-8.2347
log(COMPENSATION)	0.0030	0.0004	0.0109**	0.3880	11.2765	3.5881***	1.8384	0.0028	0.0003	0.0106**	0.2849	11.5588	3.6374***	1.6686
LOG SALES	-0.0037***	-0.0015	-0.0054**	-0.0201	-2.9330	-1.3222***	-2.9353***	-0.004***	-0.0016	-0.0061***	0.0531	-3.6608	-1.2422***	-2.7239**
LEVERAGE								0.0316**	0.0190	0.0647**	-0.3684	39.9924	-9.5054*	-0.7732
LIQUIDITY RATIO								0.0088	0.0089	0.0118	3.4101	-42.0253	-2.6956	33.2119
# OBS.	159	159	158	128	159	159	145	159	159	158	128	159	159	145
Adj-R2	0.293	0.154	0.143	0.100	0.159	0.127	-0.012	0.275	0.149	0.193	0.146	0.146	0.181	0.057

Table VI: **Performance Regressions LAW Only.**

The table examines the relation between firm performance and CEO education using a sample of CEOs that hold law degrees. LSAT is the mean LSAT score of the CEO's law school. Each regression is estimated using both Ordinary Least Squares (OLS) and Instrumental Variables (IV) methodologies. For the IV regressions liquidity and leverage are treated as endogenous variables where the instruments of the regression are lagged liquidity and lagged leverage. These regressions include dummy variables for 2-digit SIC codes. The results for the industry dummies are not reported. ***, **, * indicate significance at the one, five, and ten percent levels, respectively.

	Dependent Variable is the Performance Measure													
Independent Variables:	SIMPLE / OLS	4-INDEX / OLS	BHAR /OLS	TOBIN'S Q /OLS	ROE /OLS	ROA /OLS	AROA /OLS	SIMPLE /IV	4-INDEX /IV	BHAR /IV	TOBIN'S Q /IV	ROE /IV	ROA /IV	AROA /IV
Intercept	0.0608	0.0798	-0.1841	-8.3450	-118.0163	-82.6289***	-38.6668	0.0355	0.0458	-0.2611**	-7.4746	-143.6886*	-84.6095***	-39.1579
SAT/100	0.0002	0.0008	0.0002	-0.1239	-2.8044*	-1.8091***	-0.3969	-0.0002	0.0004	-0.0002	-0.0926	-2.8182*	-1.7420***	-0.3228
LIBERAL ARTS	-0.0023	-0.0016	-0.0212	-0.5032	-12.8894*	-7.0034**	-10.0413**	-0.0026	-0.0031	-0.0268**	-0.5717	-15.3889**	-7.6029**	-10.6557**
LSAT	0.0086	-0.0099	0.1165	4.7946	69.4626*	49.2976***	7.1682	0.0259	0.0082	0.1454**	4.6141	75.7829*	47.6747***	4.9280
AGE/10	0.0065	0.0086*	0.0055	0.5761**	-1.4574	-0.3032	1.4822	0.0086*	0.0123**	0.0157**	0.5130	2.4494	0.3155	1.8494
TENURE	-0.0008*	-0.0008*	-0.0006	-0.0158	-0.1052	-0.0819	-0.1877	-0.0011**	-0.0011**	-0.0014**	-0.0013	-0.3314	-0.0910	-0.1764
OWNERSHIP	-0.0545	-0.0677	-0.0297	-7.3825**	0.9498	6.1213	13.7854	-0.0646	-0.0935	-0.1171	-7.3768**	-36.1044	-1.7969	7.8493
log(COMPENSATION)	-0.0013	-0.0011	-0.0025	-0.1132	0.4646	0.2829	0.6320	-0.0015	-0.0016	-0.0039*	-0.1082	-0.0879	0.1819	0.5592
LOG SALES	-0.0029	-0.0029	-0.0004	0.1449	2.4171	1.3346*	1.1055	-0.0032	-0.0034	-0.0018	0.1088	1.8629	1.2471	1.0637
LEVERAGE								0.0607*	0.0707*	0.1343***	-2.2718	37.7967	-1.5454	-4.6959
LIQUIDITY RATIO								-0.0044	0.0126	0.0722	0.1045	36.0230	10.4035	9.0134
# OBS.	68	68	68	49	68	68	63	68	68	68	49	68	68	63
Adj-R2	0.096	0.116	-0.002	0.687	0.798	0.570	0.083	0.113	0.122	0.118	0.686	0.796	0.581	0.073

Table VII: Compensation Regressions

The table examines the relation between CEO compensation and CEO education. Each regression is estimated using Ordinary Least Squares (OLS). The dependent variable is log (average annual CEO compensation over the period 2000-2003). Regressions 1-5 use MBA and LAW dummies. Regressions 6-10 use GMAT1-3 and LSAT1-2 dummies. To control for performance, regressions 1 and 6 use the mean monthly excess returns of the CEO's firm over the period 2000-2003; regressions 2 and 7 use the 4-index alpha; regressions 3 and 8 use Tobin's *q*; regressions 4 and 9 use ROE; regressions 5 and 10 use ROA. These regressions include dummy variables for 2-digit SIC codes. The results for the industry dummies are not reported. ***, **, * indicate significance at the one, five, and ten percent levels, respectively.

Panel A: Compensation defined as salary and bonus

Dependent Variable is log(COMPENSATION)

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Intercept	5.9355***	5.9106***	6.0392***	5.883***	6.1305***	5.9944***	6.2365***	6.0182***	6.0017***	6.1511***	6.0549***	6.2334***	6.0944***	6.3152***
SAT/100	0.0369	0.0359	0.0367	0.0451	0.0365	0.0411	0.0377	0.0257	0.0246	0.0255	0.0346	0.0252	0.0307	0.0258
LIBERAL ARTS	-0.0147	-0.0143	-0.0174	-0.1129	-0.0032	0.0065	-0.0296	-0.0227	-0.0226	-0.0272	-0.1098	-0.0127	-0.0022	-0.0259
MBA	-0.0392	-0.0386	-0.0384	-0.0164	-0.0379	-0.0385	-0.0657							
LAW	-0.1916*	-0.1904*	-0.1858	-0.2559*	-0.1824	-0.1673	-0.2110*							
GMAT1								-0.0086	-0.0071	-0.0085	-0.0048	-0.0062	-0.0142	-0.0540
GMAT2								-0.0700	-0.0744	-0.0671	-0.0384	-0.0673	-0.0639	-0.0690
GMAT3								-0.0328	-0.0259	-0.0363	0.0143	-0.0385	-0.0304	-0.0762
LSAT1								0.1564	0.1572	0.1586	0.1635	0.1545	0.1513	0.1473
LSAT2								-0.436***	-0.4344***	-0.4291***	-0.5718***	-0.4199***	-0.3939***	-0.4706***
OTHER GRAD DEGREE	0.0736	0.0696	0.0792	0.0498	0.0811	0.0812	0.0607	0.0835	0.0792	0.0885	0.0670	0.0905	0.0903	0.0742
Age/10	0.0884	0.0902	0.0871	0.0686	0.0885	0.0782	0.0886	0.0683	0.0705	0.0670	0.0467	0.0685	0.0603	0.0682
TENURE	0.0147**	0.0146**	0.0150**	0.0197**	0.0151**	0.0149**	0.0125*	0.0140**	0.0140**	0.0143**	0.0183**	0.0145**	0.0143**	0.0112
OWNERSHIP	-4.6737***	-4.6749***	-4.7085***	-5.9638***	-4.6271***	-4.7888***	-4.6787***	-4.7397***	-4.7422***	-4.7721***	-5.9729***	-4.6945***	-4.8386***	-4.7232***
LOG SALES	0.3153***	0.3160***	0.3116***	0.3146***	0.3061***	0.3103***	0.3027***	0.3234***	0.3237***	0.3185***	0.3189***	0.3134***	0.3169***	0.3116***
SIMPLE	1.6074							1.8758						
4-INDEX		2.1239							2.3029					
BHAR			0.7594							0.6109				
TOBIN'S Q				0.1031**							0.1004**			
ROE					0.0019							0.0017		
ROA						0.0213***							0.0199***	
AROA							0.0042							0.0044
# OBS.	488	488	486	390	487	488	442	488	488	486	390	487	488	442
Adj-R2	0.329	0.329	0.328	0.263	0.331	0.343	0.308	0.338	0.338	0.336	0.276	0.340	0.350	0.317

Panel B: Compensation defined as salary, bonus, and the value of exercisable in-the-money options

	Dependent Variable is log(COMPENSATION)													
Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Intercept	3.9338***	4.4595***	4.8694***	4.7335***	5.4943***	5.0568***	5.6151***	4.105***	4.6401***	5.0822***	4.9653***	5.6855***	5.219***	5.8000***
SAT/100	0.0252	0.0187	0.0232	0.0317	0.0237	0.0374	0.0193	0.0061	0.0002	0.0036	0.0164	0.0057	0.0223	-0.0028
LIBERAL ARTS	-0.0944	-0.1033	-0.0454	-0.1393	-0.0630	-0.0405	-0.1048	-0.1115	-0.1203	-0.0630	-0.1306	-0.0796	-0.0539	-0.1033
MBA	0.2517*	0.2477*	0.2604*	0.2608*	0.2444*	0.2438*	0.1642							
LAW	0.0198	0.0278	0.0904	-0.0678	0.0558	0.1016	-0.0742							
GMAT1								0.3567**	0.3479*	0.3851**	0.2878	0.3430*	0.3156*	0.2308
GMAT2								0.2042	0.1962	0.2207	0.3447	0.2279	0.2438	0.2195
GMAT3								0.1218	0.1341	0.0685	0.1033	0.0723	0.1002	-0.0676
LSAT1								0.4682*	0.4681*	0.5005*	0.4143	0.4521*	0.4451*	0.4169
LSAT2								-0.2902	-0.2767	-0.1905	-0.4256*	-0.2177	-0.1385	-0.4273*
OTHER GRAD DEGREE	0.7371***	0.7244***	0.8128***	0.5899***	0.7748***	0.7731***	0.7475***	0.7474***	0.7345***	0.8219***	0.6139***	0.7844***	0.7821***	0.7675***
Age/10	0.1149	0.1222	0.1020	0.0175	0.1139	0.0782	0.1457	0.0838	0.0923	0.0707	-0.0169	0.0837	0.0531	0.1086
TENURE	0.0311***	0.0314***	0.0343***	0.0332***	0.0331***	0.0325***	0.0325***	0.0307***	0.0309***	0.0342***	0.0313***	0.0329***	0.0322***	0.0312***
OWNERSHIP	-7.1632***	-7.1456***	-7.3507***	-9.1857***	-6.9527***	-7.5053***	-7.3644***	-7.2752***	-7.2551***	-7.4636***	-9.1584***	-7.0496***	-7.5688***	-7.4214***
LOG SALES	0.4243***	0.4031***	0.3913***	0.3933***	0.3568***	0.3724***	0.3493***	0.4360***	0.4138***	0.4016***	0.4013***	0.3669***	0.3809***	0.3636***
SIMPLE	16.0839***							16.4041***						
4-INDEX		11.1552***							11.2898***					
BHAR			10.2944***							10.3007***				
TOBIN'S Q				0.5728***							0.5654***			
ROE					0.0074***							0.0072***		
ROA						0.0697***							0.0681***	
AROA							0.0236***							0.0237***
# OBS.	488	488	486	390	487	488	442	488	488	486	390	487	488	442
Adj-R2	0.340	0.335	0.344	0.399	0.347	0.386	0.356	0.345	0.339	0.348	0.405	0.350	0.388	0.364

Table VIII: Event Study Tests

The table examines the relation between measures of the difference between incoming and outgoing CEO quality and both the abnormal return (AR) surrounding announcements of CEO switches and the 3-day cumulative abnormal return (CAR). CAR is calculated as the sum of the AR for the day before, the day of, and the day following the announcement. Abnormal return is estimated as the return in excess of the expected return based on a three-index model, incorporating market return (RM_t), the difference in returns across small and big stock portfolios controlling for the same weighted average book-to-market equity in the two portfolios (SMB_t); and the difference in returns between high and low book-to-market equity portfolios (HML_t). The parameters used to calculate abnormal return are estimated during the period between 130 and 10 days before the announcement date. Variable definitions are as follows: CEO SAT Difference (New-Old) is the difference between the mean composite SAT score of the incoming CEO's and outgoing CEO's undergraduate schools. MBA TO UNDERGRAD is an indicator variable that is equal to unity if the outgoing CEO holds an MBA and the incoming CEO holds only an undergraduate degree. UNDERGRAD TO MBA is an indicator variable that is equal to unity if the outgoing CEO holds only an undergraduate degree and the incoming CEO holds an MBA. ***, **, * indicate significance at the one, five, and ten percent levels, respectively.

	Dependent Variable			
Variable	AR		3-Day CAR	
Intercept	0.2802	0.5486	-0.0837	-0.1470
CEO SAT Difference (New – Old)	0.0003	0.0002	0.0021	0.0022
MBA TO UNDERGRAD		-1.9984		0.5644
UNDERGRAD TO MBA		-0.6679		0.0897
# OBS.	106	106	106	106
R2	0.0002	0.0278	0.0044	0.0051
Adj-R2	-0.0094	-0.0008	-0.0052	-0.0241