

WHEN DOES DIVERSIFICATION ADD VALUE: EVIDENCE OF CORPORATE GOVERNANCE AND ABNORMAL LONG-TERM STOCK PERFORMANCE

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Abstract

Contrary to prior research indicating that on average, shareholders do not benefit from corporate diversification, we provide evidence of a significant positive relation between diversification and abnormal buy-and-hold returns. Additionally, we show that shareholder gain from corporate diversification is a function of managerial accountability. We introduce and test the *effective monitoring hypothesis* for diversified firms, and demonstrate that the positive relation between diversification and abnormal returns is concentrated in firms where managers are most likely to be held accountable for policies that reduce shareholder value. The main implication is that gains from corporate diversification are concentrated in firms in which managerial accountability deters managers from taking advantage of asymmetric information created by diversification.

Keywords: Corporate diversification, shareholders, monitoring

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1. Introduction

Financial research has long made a strong case against the value implications of corporate diversification. It is well documented that diversified firms (i.e., firms that operate in more than one industry) trade at a discount relative to their single segment counterparts, and several studies have reported evidence that corporate diversification is inversely related to firm value. For instance, Berger and Ofek (1995) report a discount of approximately 15 percent for U.S. firms. Lins and Servaes (1999) report a discount for Japanese firms of about 10 percent and a 15 percent discount of firms in the U.K. Lang and Stulz (1994) report that diversification is inversely related to Tobin's Q. Comment and Jarrell (1995) also suggest that firm value increases as firms refocus. These findings suggest that on average, shareholders do not benefit from corporate diversification.¹

The observed discount associated with diversification has been interpreted as evidence that corporate diversification reduces firm value. However, several recent studies have challenged this interpretation. The debate centers on the cause of the discount and the subsequent inferences. Graham et al. (2002) report that about half of the reductions in excess value occur not because diversification destroys value, but because firms acquire already discounted business units.

Villalonga (2004) suggests that the discount may be attributable to segment data. Using the Business Information Tracking Series (BITS) on a sample that yields a discount according to segment data, she documents evidence of a diversification premium. Campa and Kedia (2002) argue that the discount should not be interpreted as evidence that diversification destroys value. They report that the discounts substantially decrease and sometimes turn into premiums, after controlling for the endogeneity of the decision to diversify.

Maksimovic and Phillips (2002) also support this view. They argue that the standard methodology, which benchmarks the value of a division in diversified firms with the value of the median industry stand-alone firm, may lead to incorrect inference because it ignores firm differences such as their ability to exploit market opportunities. Graham et al. (2002) also observe that stand alone firms that are used as the benchmarks to compute the diversification discount differ systematically from the divisions of diversified firms. Villalonga (2002) shows that the discount disappears when a more comparable benchmark based on the propensity score is used. In addition, Mansi and Reeb (2002) found no evidence of a diversification discount for a sample of *all-equity* firms.

Taken together these results indicate that (1) the interpretation that diversification destroys value may be misleading because the excess value approach has its limitations, (2) the discount is sensitive to the benchmark used, and (3) the discount may be a

¹ However, they do benefit from diversifying.

segment data phenomenon. Hence, the literature does not offer clear or consistent answers to the question of whether diversification destroys value. Villalonga (2002) found support for both a value-enhancing as well as a value-destroying argument for diversification. If this assessment is correct, then the natural question that follows is: When does diversification add value?

In light of the absence of a consensus on the interpretation of the diversification discount and since most of the existing literature documenting an inverse relation between diversification and firm value is based on cross-sectional comparisons of the discount, we examine two issues in this paper. First, we re-examine the diversification question. Specifically, we investigate the relationship between corporate diversification and abnormal long-term stock performance by using a buy-and-hold investment strategy. Second, we examine whether the observed relationship between corporate diversification and abnormal long-term returns is a function of managers' ability to exploit the asymmetric information that diversification creates. Although past research has examined the structure of corporate governance in diversified firms, the evidence is limited to only a comparison between diversified and focused firms.

We used the COMPUSTAT Industry Segment data files to examine the diversification profiles of large US firms, between 1999 and 2003. Firms that report more than one business segments for a given firm-year is deemed diversified. If corporate diversification reduces firm value, then the value lost from diversification among large firms, in absolute term, would be economically significant. In addition, studying a sample of large firms naturally controls for small firm effects.

Contrary to the view that shareholders do not benefit from corporate diversification, our results indicate that at least for large firms, corporate diversification enhances rather than destroys market value. We find that abnormal long-term stock performance² and corporate diversification are positively related. However, the favorable long-term valuation effect of corporate diversification is a function of "effective" monitoring.

We find that when the percentage of ownership by institutional investors is high, when the board is small, and when the ratio of the board size to total assets (or firm size) is high, there is a distinct positive relationship between diversification and buy-and-hold abnormal returns. Otherwise no significant relation is documented. The valuation effect of diversification appears to be insensitive to the level of CEO ownership and the percentage of independent board members. Overall, these findings are consistent with the effective monitoring hypothesis, which posits that the gains from corporate diversification are concentrated in firms where managerial accountability

prevents managers from taking advantage of the asymmetric information created by diversification.

The long-term valuation effects of corporate diversification may be useful information not only to long-term investors, but also to regulators and academicians. The impact of corporate diversification on long-run performance enables us to document a relationship that smoothes out the effects of short-run market fluctuations. This study provides evidence that diversification creates value for shareholders of large firms. Perhaps, the value enhancing implication of diversification for large firms is due to the fact that large firms tend to issue a substantially large number of shares, and hence are more closely monitored not only by shareholders but also regulatory agencies. Stocks issued by large firms tend to be very liquid, which increases the probability of a hostile takeover if managers are perceived as pursuing non-value maximization goals.

The rest of the paper is organized as follows. In Section 2, we review the literature on why firms diversify and develop the *effective monitoring hypothesis* for diversified firms. Data and methodology are discussed in Sections 3 and 4, respectively. In Section 5, we discuss the empirical results and the implications of our findings. In Section 6, we present our conclusions.

2. Literature Review

2.1 Agency Explanations

While many explanations have been proposed about why firms diversify, agency conflicts are the most widely cited. For instance, Jensen (1986) and Stulz (1990) argue that managers derive personal benefits from increasing firm size because of the power and prestige of managing larger firms. Amihud and Lev (1981) suggest that managers use corporate diversification to reduce the risk of their undiversified portfolios. Jensen and Murphy (1990) suggest that managers diversify because managerial compensation is related to firm size; while Shleifer and Vishny (1989) suggest that managers use diversification to entrench themselves. Since diversification reduces transparency, and potentially managerial accountability, if managers derive personal benefits from diversification at shareholders' expense, they will exploit the information asymmetry that diversification creates. Therefore, the asymmetric information hypothesis, predicts a negative relationship between diversification and abnormal long-term performance.

Alternatively, recent evidence reported by Denis, Denis and Sarin (1997) and Berger and Ofek (1999) seem to suggest that the market is able to identify firms with value reducing diversification strategies. For instance, Denis, Denis and Sarin (1997) report that between 1985 and 1989, 54 percent of U.S. firms experienced at least one major corporate control event the year prior to reducing diversification levels.

² measured by using a buy-and-hold investment strategy

Berger and Ofek (1999) found that between 1984 and 1993, 62 percent of U.S. firms experienced at least one major corporate control event before restructuring; and 31 percent of firms that refocus experienced a change in top management—a change in CEO—in the period before they restructure.

These results are consistent with the view that managers who implement policies that reduce shareholder value over time are subjected to adverse corporate control events. The results are also congruent with Comment and Jarrell (1995) and Bhagat et al. (1990) who suggest that the market for corporate control helps to reverse inefficient corporate diversification. The threat of control events that might displace top management, on average, will force managers to be more responsive to shareholders' interest, suggesting that there should be a positive relationship between diversification and abnormal long-term performance. Moreover, since diversified firms are less transparent than single-segment firms, managers of diversified firms are more likely to be closely monitored by shareholders. If stock price performance is a reflection on management, and managers of diversified firms with poor stock performance are more likely to be disciplined and forced to refocus (as the literature suggests), we expect a positive relation between diversification and abnormal long-horizon returns.

2.2 Information Asymmetry Explanations

We also examine whether the observed relationship between diversification and abnormal long-term stock performance is a function of managers' ability to exploit the added information asymmetry that diversification creates. If, on average, the market is able to identify and penalize managers of diversified firms that do not maximize shareholders' wealth, then gains from diversification should be concentrated in firms where corporate control mechanisms are more likely to hold managers accountable. Accountability lowers the probability that managers will exploit asymmetric information. We refer to this line of reasoning as the *effective monitoring hypothesis* for diversified firms. Congruent with agency theory, the effective monitoring hypothesis predicts a positive relationship between diversification and abnormal long-term returns for firms where managerial accountability prevents managers from exploiting the added information asymmetry.

Contrary to the view that on average shareholders do not benefit from corporate diversification, using a sample of 347 large U.S. firms between 1999 and 2003, we provide evidence that there is a positive and significant relationship between diversification and abnormal buy-and-hold returns. This suggests that shareholders' wealth was enhanced by corporate diversification over the holding period between 1999 and 2003. We further show, however,

that the gains from corporate diversification for shareholders are a function of managerial accountability. By introducing and testing the effective monitoring hypothesis for diversified firms, we demonstrate that the positive relation between diversification and abnormal returns is concentrated in firms where managers are mostly likely to be held accountable for policies that reduce shareholders value. Overall, these findings are consistent with the view that the observed discount associated with diversified firms is not, per se, evidence that diversification destroys value.

The main implication of these findings is that diversification can potentially create value for shareholders when managers are effectively monitored. The evidence suggests that for large firms, on average, the traditional corporate governance mechanisms are effective at promoting managerial accountability and hence value maximizing diversification strategies. This might conceivably explain why diversification continues to be an important corporate strategy, despite the fact that past studies imply that diversification may be value reducing.³

2.3 Predictions of the Effective Monitoring Hypothesis

The general consensus in the academic literature is that governance mechanisms that promote more monitoring of managerial activities increase firm value by reducing agency conflicts. Hence, there is an expected positive relationship between firm performance and corporate governance indicators that promote more managerial accountability. Consistent with this notion, the effective monitoring hypothesis predicts a positive relationship between diversification and firm value for diversified firms in which the corporate governance indicators prevent managers from exploiting the higher level of information asymmetry that diversification creates. To examine the effective monitoring hypothesis, we investigate the relationship between several corporate governance indicators and the abnormal long-term stock returns of diversified firms. These corporate control mechanisms include: (1) the percentage of shares owned by institutional investors, (2) the percentage of shares owned by the CEO, (3) the percentage of independent members on the board, (4) and the size each firms' board of directors.

Recent evidence on shareholder activism suggests that activism by institutional investors has been successful as an external control mechanism to monitor managers. Black (1992) suggests that the voice of institutional investors can significantly

³ The market for corporate control acts as a disciplinary mechanism as well. The stocks of large firms are very liquid, which may also increase the probability of hostile takeovers if managers are perceived as pursuing non-value maximizing goals.

enhance firm performance. Smith (1996) documents that institutional investors tend to target diversified firms and that there is a positive stock price reaction for successful targeting events through this channel.

Since institutional owners typically hold large equity stakes in firms and many times control large percentages of the voting shares, they often become vigilant monitors. Therefore, when institutional ownership is high in a firm, governance mechanisms may also improve substantially. This leads to increased managerial accountability. Therefore, the effective monitoring hypothesis predicts that when the level of institutional ownership is high, diversification should be positively related to abnormal long-horizon returns. Diversified firms are more likely to be targeted by institutional investors. When institutional investors own a large proportion of shares, the probability that managers may be replaced is higher, and therefore managers are inclined to make value enhancing decisions. However, when the level of institutional ownership is low, managers might exploit the information asymmetry that diversification creates because the probability that managers will be disciplined is low.

Agency theory also suggests that increasing management's ownership in the firm aligns their interest with that of shareholders, thereby reducing deviations from the goal of shareholder wealth maximization. However, the evidence regarding the effect of managerial ownership is mixed. Morck, Shlifer and Vishney (1988) and McConnell and Servaes (1990) report evidence of a non-linear relationship. Demsetz (1983) and Demsetz and Lehn (1985) suggest that a firm's ownership structure is endogenous. Kole (1993) argue that firm performance is a determinant of management ownership. Hence, the functional form of the relationship between ownership and firm performance remains an imperial question.

If managers derive personal benefits from diversification, under the effective monitoring hypothesis, diversification and abnormal firm performance are expected to be positively related when the level of CEO ownership is high. Alternatively, when the level of CEO ownership is low, incentives may be insufficient to converge the goals of managers and shareholders. Managers may pursue personal gains from exploiting asymmetric information that diversification creates since the CEO might have incentives to pursue other goals at shareholders' expense.

In addition, one school of thought suggests that as board size increases, board efficacy declines (see Jensen (1993), Eisenberg et al (1998), and Yermack (1996)). This observation seems consistent since the number of directors is an internal decision made by management. Larger boards may lead to confusion and members may have difficulty communicating. If small boards are more effective than large boards as a monitoring tool, board size should be inversely

related to abnormal firm performance. Furthermore, it follows that diversification should be positively related to the abnormal long run performance when the board is small. Conversely, there should be a negative relation between diversification and abnormal long-run returns for firms with large boards if board efficacy wanes as the size of the board increases.

To further investigate the relationship between board size and the performance of diversified firm, we also consider a standardized board size measure that is equal to the ratio of the number of directors to the total assets of the firm. A second measure standardizes board size to firm size. The effective monitoring hypothesis predicts that investors favor firms with high board size to total assets ratios, since higher ratios signal to the market that there are enough directors to oversee the entire operations of firms. Hence, the ratio of board size to total assets (and to firm size) is expected to be positively related to abnormal performance. Moreover, when the board size to total assets ratio is high, diversification is expected to be positively related to abnormal long-term returns. When this ratio is low, there is an expected negative relationship between diversification and abnormal firm performance. Low ratios indicate that managers are not being adequately monitored.

Weibach (1988) documents evidence that firms with outsider-dominated boards were significantly more likely to remove the CEO from office, than those firms with insider-dominated boards. Rosenstien and Wyatt (1990) find a positive stock price reaction to the appointment of outside directors. In their 1997 paper, they document a negative (positive) relation to the appointment of insider directors with low (high) stock ownership. Hence, board independence also has significant valuation effects. The literature suggests that board independence increases corporate monitoring and therefore reduces agency problems. Hence, there should be a positive relation between abnormal long-term returns and the percent of outside directors.

If board independence increases monitoring, then as the number of independent board members increases, the board efficacy should improve. Consequently, the effective monitoring hypothesis predicts that diversification is positively related to abnormal long horizon returns for firms with outsider-dominated boards. Conversely, if managers derive personal benefits from diversification at the expense of shareholders, then when the percent of independent members on the board is low (insider-dominated boards) diversification should be inversely related to long-term firm performance.

3. Data and descriptive statistics

3.1 Sample selection

We used the Standard and Poor's COMPUSTAT database to collect a sample of *Fortune 500* firms

during the period from 1999 and 2003. The *Fortune 500* is a ranking of the largest 500 corporations listed in the United States as measured by gross revenue, and published annually by Fortune magazine. This is a suitable starting point, since these firms are among the largest firms traded in the U.S.; if diversification reduces firm value, then the value lost from diversification for these firms, in absolute term, would be economically significant. Moreover, it naturally controls for small firm effects.

We exclude all firms in the regulated utilities industry (SIC 4900 to 4999) as well as all firms in the financial service industry (SIC 6000 to 6999) from the sample. In addition, we restricted the sample to those sample firm-years for which a single-segment domestic matching firm could be identified in order to calculate buy-and-hold abnormal returns. Firm-years for which no useful benchmark firm could be identified were dropped from the sample. The final sample consisted of 347 firms, totaling 1639 firm-year observations.

3.2 Empirical Metrics

3.2.1 Diversification Measure

U.S. firms are required to report audited financial information for business segments that account for more than 10 percent of consolidated sales, profits, or assets. We used the COMPUSTAT Industry Segment data files to identify the diversification profiles for the firms within the sample. COMPUSTAT reports a maximum of 10 business segments regardless of whether a firm operates in more than 10 business segments. For the purpose of this study, any firm that report more than one business segments for a given firm-year is deemed diversified. More specifically, a dummy variable (DIVERS), which takes the value of 1 if a firm reports more than one business segment in a given year (zero otherwise) is the primary diversification measure. This dummy variable approach is not new to the literature; it has been used in several studies including Denis et al. (1997), Graham et al. (2002), and Anderson et al. (2000).

3.2.2 Ownership Measures

Information on institutional ownership was collected from the Thomson Financial *Share-World* database. *Share-World* provides information on the total shares owned by 13F institutions. In accordance with the provisions of section 13(f) of the Securities and Exchange Act of 1934, institutional investment managers who are in charge of over \$100 million on the last trading day of any month of the calendar year must disclose their holdings on a quarterly basis. This filing requirement for 13F institutions makes it the most frequent and complete ownership filing system. For the purpose of this study, the percentage of shares owned by 13F institutions at the end of the

fourth quarter is used as the measure of institutional ownership.

Institutional investors are informed traders who tend to be long-term investors. Therefore, they would be interested in the valuation effect of diversification on long-term firm performance. Based on previous research, we anticipate finding a significant and positive relationship between percentage of shares owned by institutional investors and the performance of relatively diversified firms.

The information on CEO ownership was collected from two sources: the Standard and Poor's *ExecuComp* database and the annual corporate proxy statements from the SEC's Electronic Data Gathering and Retrieval system (EDGAR). The *ExecuComp* database reports the percent of shares owned by each CEO in a given year. We used the annual corporate proxy statements that are available through EDGAR to collect data on the percentage of shares owned by the CEO when the data was not available in *ExecuComp*.

Previous research suggests that there is an alignment effect as well as an entrenchment effect associated with managerial ownership. While other studies maintain that ownership structure is endogenous, CEO ownership suggests incentive alignment. However, high CEO ownership may also imply low institutional- or block- ownership. Therefore, we leave the relationship between CEO ownership and performance as an empirical issue.

3.2.3 Board of Director Index

Information on board size and the composition of the board of directors was collected primarily from the Spencer Stuart Board Index (SSBI). The SSBI is an annual report produced by Spencer Stuart, a global executive research firm, on board practices and governance issues at some of the world's leading corporate giants. We use the annual corporate proxy statements from EDGAR to collect data on the size and composition of the board of directors for firm-years for which the board information is not available in SSBI.

Based on previous research, we anticipate finding that there is a significant and negative relationship between the performance of diversified firms and the number of members on the board. In addition, the effective monitoring hypothesis predicts that diversification is positively related to abnormal long horizon returns for firms with outsider-dominated boards.

3.3 Control Variables

All control variables were generated from financial statement data extracted from the Standard and Poor's COMPUSTAT database. The natural logarithm of total assets is used as a proxy for firm size (which is denoted SIZE). The ratio of earnings before interest

and taxes to sales (EBIT/Sales) is used as a proxy measure for firm profitability. In a similar fashion, firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, the ratio of long-term debt to total assets (Debt/Assets) is used as a proxy to measure financial leverage. These proxies are consistent with the literature on diversification (see Bodnar et al. (2002), Graham et al. (2002) and Campa and Kedia (2002).

3.4 Descriptive Statistics

Table I provides descriptive statistics for firm specific characteristics and corporate governance indicators (monitoring mechanisms) by diversification profile. Firms are categorized in either of two groups: single-segment or diversified firms. To examine whether the groups exhibit different characteristics, we also report the difference in mean test statistics and the non-parametric two-sample median test statistic under the null hypothesis that there is no difference in median. The difference in mean t-test assumes unequal variance across groups when a test of equal variance is rejected at the 10 percent level.

Panel A indicates that diversified firms report a mean (median) of 4.4 (4.0) business segments. There is also evidence that, on average, diversified firms are larger than single-segment firms. The mean (median) firm size is 9.053 (8.96) for diversified firms, while mean (median) single segment firm size is 8.597 (8.61). Both the difference in mean and the difference in median tests are significant at the 1 percent level.

There is also evidence to suggest, at least in this sample, that diversified firms have, on average, slightly higher R&D-to-sales and EBIT-to-sales ratios than single segment firms. These differences are observed at the 1 percent of significance as indicated by the difference in median test. It also appears that diversified firms, on average, have a lower debt-to-assets ratio than their single-segment counterparts; the difference in mean and the difference in median tests are significant at the 5 percent level. Overall, these findings suggest that within this sample of large firms, diversified and single-segment firms exhibit different firm characteristics.

Panel B reports descriptive statistics for the corporate governance indicators also based on diversification profile. The table shows that the mean (median) level of institutional ownership for diversified firms is 65.89% (69.04%). This evidence indicates that single segment firms have similar levels of institutional ownership. Both the mean test statistics and the Wilcoxon signed rank test statistics fail to reject the null hypothesis that there is no difference in the level of institutional ownership.

Panel B also shows that, on average, diversified firms tend to have larger boards. The test in means indicates that the observed difference is significant at the 5 percent level. However the Wilcoxon signed

rank test statistic is insignificant, suggesting that both diversified and single-segment firms have a median of 11 directors on their boards. Furthermore, consistent with the findings of Anderson et al (2000) the table also shows that, on average, diversified firms tend to have more outside directors than single-segment firms. Both the mean test and the Wilcoxon signed rank test statistics are significant at the 5 percent level. Contrary to their findings, the table suggests, that CEOs in diversified firms own about the same amount of company shares as CEOs in focused firms—an average of about 2%.

4. Methodology

Several recent academic papers have proposed improved methods for measuring abnormal returns over long horizons. Barber and Lyon (1997) recommend buy-and-hold returns; while, Lyon, Barber, Tsai (1999) illustrates that buy-and-hold abnormal returns using a matching firm methodology yields well-specified test statistics. These findings motivate the use of the matching firm approach employed in this study.

4.1 Measuring abnormal buy-and-hold returns

Annualized abnormal long-term performance is calculated as the compounded buy-and-hold returns of a sample firm minus the compounded buy-and-hold returns of a benchmark firm. In a functional form, annualized abnormal buy-and-hold return is defined as:

$$BHAR_{it} = \prod_{t=0}^T [(1 + R_{it}) - 1] - \prod_{t=0}^T [(1 + R_{bt}) - 1]$$

where R_{it} is the raw monthly return on the sample firm at time t . The raw monthly return on the benchmark firm at time t is denoted R_{bt} . The mean annualized buy-and-hold abnormal return is given as:

$$\overline{BHAR} = \frac{\sum_{t=0}^N BHAR_{it}}{N}$$

The statistical significance of the mean annualized buy-and-hold abnormal return (\overline{BHAR}) is determined by using a t-statistic that is computed as:

$$t = \frac{\overline{BHAR}_T}{\sigma(BHAR_T) / \sqrt{N}}$$

where $\sigma(BHAR)$ is the cross-sectional sample standard deviation of the distribution abnormal buy-and-hold returns and N is number of observations.

If a firm stops trading for any reason within the sample period, the buy-and-hold return is computed up to the last year's stock price data that is available in the CRSP database. If the firm so happens to be a

matching firm, then the next closest matching firm is then chosen as the new benchmark thereafter. Again, sample firm-years for which no matching firm could be identified were removed from the sample.

4.2 Matched-firm procedure

The use of the matching firm approach is motivated by the results of Barber and Lyon (1997) and Lyon et al. (1999), which illustrates that buy-and-hold abnormal returns yield well-specified test statistics when this approach is used. To identify an appropriate size and book-to-market benchmark firm, we restricted the pool of matching firms to a sample of single-segment domestic firms. As Lyon et al. (1999) suggest, we first identified all potential matching firms with market capitalization between 70 and 130 percent of the market capitalization of the sample firm. From this group, the firm with the closest book-to-market ratio and size (natural log of total assets) to that of the sample firm was selected as the benchmark firm. A second and a third matching firm was also identified, based on the next closest book-to-market ratio and size firm.

4.3 Descriptive statistics for buy-and-hold abnormal returns

Table II provides descriptive summary of the annualized buy-and-hold abnormal returns for the sample by diversification profile. The difference in mean and the difference in median test statistics are also reported. The significance level of the difference in median test is based on the non-parametric two-sample median test.

The results suggest that, on average, diversified firms experienced significantly larger annual buy-and-hold abnormal returns over the sample period, than their single-segment counterparts. The mean (median) buy-and-hold abnormal return for diversified firms over the holding period is -0.66 percent (-0.23 percent), while that of single-segment firms is -1.08 percent (-0.36 percent). The difference in mean test is significant at the 1 percent level of significance. The two-sample median test statistic also indicates that the difference in median is also significant at conventional levels. In other words, on average the diversified firms outperformed the single-segment firms during the sample period from 1999 to 2003. This suggests that over this holding period, corporate diversification enhanced shareholders' wealth. Thus, contrary to the view that shareholders do not benefit from corporate diversification, the average shareholder benefited significantly from corporate diversification over the long run.

Table III reports the preliminary results of OLS estimates for a simply multivariate regression that regress abnormal buy-and-hold returns against diversification. The basic model specification also includes firm size (natural logarithm of total assets), firm specific information (R&D/sales), profitability (EBIT/Sales), and financial leverage (Debt/Assets).

The coefficient of interest is the estimate for the diversification dummy variable. The results show a positive and significant relationship at the 1 percent level between diversification and abnormal buy-and-hold returns. The estimated coefficient is 0.664 (significant at the 1% level), suggesting shareholders have benefited from corporate diversification over the holding period between 1999 and 2003. The results also show that abnormal buy-and-hold returns are positively related to firm specific information at traditional significance levels.

The main implication of these results is that diversification has had value-enhancing effects on firm value, but has gone unnoticed in past research. The finding that diversification is positively related to abnormal buy-and-hold returns support the view that the discount associated with diversification is not an indication that diversification reduce shareholders' wealth.

4.4 Corporate governance and firm performance: the endogeneity problem

Using simultaneous equations models, Agrawal and Knoeber (1996) and Chung and Pruitt (1996) show that several corporate control mechanisms are jointly determined. Furthermore, no dominant functional form for the relationship between ownership and performance has emerged from the literature. Endogeneity and the joint determination of the variables pose a problem for OLS models. Therefore, to examine the relationship between diversification, performance and corporate governance, we employ Zellner's (1962) seemingly unrelated regressions technique.⁴

The seemingly unrelated regression model takes into account any correlation among the disturbances in the system of equations. The efficiency of the estimation is improved by taking these cross-equation correlations into account. It would be unrealistic to expect that the equation errors would be uncorrelated since the literature document evidence of endogeneity and joint determination of corporate control mechanisms.

Seemingly Unrelated Regressions Model (SUR)

To examine the relationship between long run performance, corporate governance and diversification, we divide the sample into portfolios based on the corporate control variables. For each governance mechanism, we split the sample into two groups based on the median level. The above-median sub-sample is denoted "high" and the below-median sub-sample is denoted "low." Subsequently, Zellner's (1962) seemingly unrelated regressions technique is used to re-estimate the following model:

⁴ Simultaneous-equations techniques are widely used in corporate governance research.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \epsilon_{ip}$$

Test Statistics

We test linear hypotheses about the model parameters with *T*-test statistics and *S*-test statistics. The *T*-test identifies the significance of individual coefficients in the system. The *S*-test is used to tests hypotheses that relate parameters in different equations. We used the *S*-test to compare the parameter estimates for the effect of diversification on long-run performance across the two equations for the portfolios of “high” and “low” corporate control variables.

5. Empirical Results

So far we have shown that diversification is positive and significantly related to buy-and-hold abnormal returns, suggesting that diversification enhances firm value. In this section we examine whether the observed positive relationship between diversification and abnormal long-term stock performance is a function of managerial accountability. The effective monitoring hypothesis predicts that the gains from diversification should be concentrated in firms where corporate control mechanisms are more likely to hold managers accountable rather than in firms where managers can exploit the asymmetric information created by diversification to pursue personal goals.

Institutional ownership and the valuation effects of diversification

The effective monitoring hypothesis predicts that when level of institutional ownership is high, diversification should be positively related to firm performance. Since diversified firms are more likely to be targeted by institutional investors, this increases the probability that managers may be replace, therefore managers are inclined to making value enhancing decisions. However, when the level of institutional ownership is low, managers might exploit the information asymmetry that diversification creates because the probability that managers will be disciplined is also low. To test this conjecture, we split the sample into two groups based on the median level of institutional ownership. The above-median sub-sample is denoted as the high institutional ownership group and the below-median sub-sample is denoted as the low institutional ownership group.

Table IV reports the SUR results for the two regressions in the system. The coefficient of interest is the estimate for the diversification dummy variable. Consistent with effective monitoring hypothesis, Panel A shows that when the percentage of ownership by institutional investors is high, diversification is positively related to abnormal buy-and-hold returns. We interpret this to mean that high levels of institutional ownership are associated with more monitoring and consequently less agency costs. The

estimated coefficient is 2.328 (significant at the 1% level). As predicted, when the level of institutional ownership is low, the influence of diversification on abnormal return is insignificant. These results suggest that when institutional ownership is high, managerial accountability improves substantially. Hence, over the holding period between 1999 and 2003, shareholders have benefited from corporate diversification where institutional ownership is high.

Panel B reports the results from the *S*-test under the hypothesis that diversification estimates are the same across the two groups. The evidence indicates that we can comfortably reject this hypothesis at the 1% level of significance. Hence, when the level of institutional ownership is high, managers are unable to exploit the additional level of informational asymmetry created by corporate diversification since institutional investors are more likely to target diversified firms. These findings are consistent with agency theory, which suggests that agency conflicts are reduced when managers are effectively monitored. The results also support the findings of Smith (1996) and Black (1992), which suggest that monitoring by institutions has significant benefits.

CEO ownership and the valuation effects of diversification

The effective monitoring hypothesis also predicts that when the level of CEO ownership is high, diversification should be positively related to firm performance. Increasing managers’ ownership aligns their interest with that of shareholders, thereby reducing deviations from the goal of shareholder wealth maximization. Alternatively, when the level of CEO ownership is low, there might not be enough incentives to converge the goals of managers and shareholders, so managers may pursue personal gains from exploiting the additional level of information asymmetry that diversification creates. However, in light of the endogeneity problem we leave this as an empirical issue.

Table V reports the SUR estimates. The above-median sub-sample is denoted as the high CEO ownership group and the below-median sub-sample is denoted as the low CEO ownership group. Panel A shows that diversification is positive and significantly related to buy-and-hold abnormal returns for both the high- and low- CEO ownership groups at the 5 percent level. The estimated parameters are 1.357 (*t-stat* = 2.48) and 0.856 (*t-stat* = 2.00), respectively.

Even though the results show that the magnitude of the coefficient is larger when the level of CEO ownership is high rather than low, the evidence fails to support the hypothesis that the coefficients are statistically different. That is, the *S*-test fails to reject the hypothesis that estimates are the same across the two groups. As positive diversification effects for both the high- and low- CEO ownership groups is consistent with Morck, Shlifer and Vishney (1988)

and McConnell and Servaes (1990) who suggest that the relationship between firm performance and managerial ownership is *U*-shaped.

Furthermore, Agrawal and Knoeber (1996) suggest that corporate governance mechanisms are interdependent. Consequently, the estimated effect of diversification when the CEO ownership is low may reflect other monitoring mechanisms that promote managerial accountability. For instance, when the CEO ownership is low, there might be outside block-ownership or high institutional ownership. The ownership levels are mutually exclusive since the number of shares outstanding at any point in time must sum to 100 percent. Monitoring by outside block-holders or institutions might explain the observed positive valuation effect of diversification even when CEO ownership is low. Many governance studies suffer from the endogeneity and the joint determination of the variables problem.

Board size and the valuation effects of diversification

The effective monitoring hypothesis also predicts that diversification is positively related to the abnormal long run performance when the board is small, rather than when the board is large because board efficacy wanes as the size of the board increases. To test this hypothesis, we split the sample into two groups based on the median number of directors. The above-median sub-sample is denoted as the large board size group and the below-median sub-sample is denoted small board size group.

Consistent with the view that small boards are more effective at monitoring managers than large boards, Table VI shows that when the board is small, diversification is positively related to buy-and-hold abnormal returns. The estimated coefficient is significant at the 5 percent level (*t*-statistic is 2.01). However, when the board is large, there is no statistically significant relationship. This is consistent with Yermack's (1996) finding that as board size increases, board efficacy declines. These results support the predictions of the effective monitoring hypothesis, which posits that diversification and abnormal firm performance are positively related when the board is small because larger boards have more coordination problems than lower board efficacy. The *S*-test statistic reported in Panel B clearly rejects the hypothesis that the estimated coefficients of the effect of diversification are the same across the two groups. This difference is significant at the 5 percent level.

Tables VII and VIII, report results for the standardized board size measures. In Table VII, board size is standardized by taking the ratio of board size to total assets; in Table VIII, we used the natural logarithms of total assets as a proxy measure for firm size to standardize board size. The tables indicate that the two approaches yield similar results. We find in

both cases, that when the ratio of board size to total assets (firm size) is high, diversification is positive and significantly related to abnormal buy-and-hold returns at the 1 percent level. There is also marginal evidence to suggest that diversification and abnormal buy-and-hold returns are positively related at the 10 percent level when the ratios are low. Additionally, the test for the difference across the two groups rejects the hypothesis that the coefficients are statistically the same at conventional significance levels.

These results are consistent with the predictions of the effective monitoring hypothesis, which posits that when the board size to total size ratio is high, managers are being adequately monitored and the probability of agency conflicts is reduced. In essence, these results suggest that small boards are more effective at monitoring managers, but there need to be enough directors to oversee the entire operation of firms. Under these conditions, diversification is positively related to buy-and-hold abnormal returns, suggesting that diversification at the corporate level can be beneficial to shareholders.

Board independence and the valuation effects of diversification

The literature suggests that board independence increases corporate monitoring and therefore reduces agency problems. Accordingly, the effective monitoring hypothesis predicts that diversification is positively related to abnormal long horizon returns for firms with outsider-dominated boards. To test this conjecture, we split the sample into two groups based on the median percent of outside directors. The above-median sub-sample is denoted as the outsider-dominated board group and the below-median sub-sample is denoted as the insider-dominated board group.

Table IX reports the SUR estimates. Panel A shows that diversification is positive and significantly related to buy-and-hold abnormal returns for both the outsider- and insider- dominated board groups. Contrary, to the predictions of the effective monitoring hypothesis, the evidence shows that the magnitude of the estimate is larger and more significant when the percentage of independent members on the board is low, than when the percentage of independent members on the board is high. The estimated coefficients for the outsider- and insider- dominated board groups are 0.721 (*t*-statistic is 1.98) and 1.769 (*t*-statistic is 3.29), respectively. The *S*-test marginally rejects the hypothesis that estimates are the same across the two groups.

Although there is only limited evidence to suggest that the estimates differ, one possible interpretation is that the market rewards diversified firms for having independent members on the board, since having an independent member will lower the probability of management creating entrenchment

policies or pursuing their personal interest. However, based on the difference in the magnitude and significance of the coefficients, it appears that the market penalizes diversified firms for having too many independent board members since independent directors have less knowledge of firm specific information and may lack expertise in areas that the firm operates. Another possible explanation centers around board control: having many independent board members with little control can be less effective as a monitoring tool than having less independent board members with more control.

6. Conclusion

This study examines the relationship between diversification and abnormal-long-horizon performance. For a sample of large US firms, between 1999 and 2003, diversification and buy-and-hold abnormal returns are positively related. This suggests that the observed discount associated with diversified firms cannot be interpreted as evidence that diversification destroys value. Contrary to the view that shareholders do not benefit from corporate diversification, this study indicates that at least for large firms, diversification enhanced rather than destroyed firm value over the specified holding period.

We also investigate whether the long-term valuation effect of diversification is a function of “effective” monitoring. The results show that when the percentage of ownership by institutional investors is high, when the board is small, and when the ratio of the board size to total assets (or firm size) is high, there is a distinct positive relationship between diversification and buy-and-hold abnormal returns. Otherwise no significant relation is documented. The valuation effect of diversification appears to be insensitive to the level of CEO ownership and the percentage of independent board members. Overall, these findings are consistent with the effective monitoring hypothesis, which posits that the gains from corporate diversification are concentrated in firms where managerial accountability prevents managers from taking advantage of the asymmetric information created by diversification.

The long-term valuation effects of diversification may be useful information not only to long-term investors, but also to regulators and academicians. The impact of diversification on long-run performance enables us to document a relationship that smoothes out the effects of short-run market fluctuations. This study provides evidence that diversification creates value for shareholders of large firms. Perhaps, the value enhancing implication of diversification for large firms is due to the fact that large firms tend to issue a substantially large number of shares, and hence are more closely monitored not only by shareholders but also regulatory agencies. Stocks issued by large firms tend to be very liquid,

which increases the probability of a hostile takeover if managers are perceived as pursuing non-value maximization goals.

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Appendices

TABLE I

PANEL A: DESCRIPTIVE STATISTICS FOR FIRM SPECIFIC CHARACTERISTICS

Descriptive statistics for firm specific characteristics and corporate governance indicators (monitoring mechanisms) by diversification profile. The sample consists of 347 large firms between 1999 and 2003. We also report the t-test statistic for the difference in means. The significance level of the difference in median is based on the non-parametric two-sample median test.

	Single-Segment Firms <i>N=485</i>	Diversified Firms <i>N=1154</i>	Difference (t-statistics)
Number of Business Segments (NBS)			
Mean	1.00	4.40	-45.00***
Median	1.00	4.00	79.00***
Firm Size [ln (Total Assets)]			
Mean	8.60	9.05	-7.56***
Median	8.61	8.96	13.81***
Ratio of R&D-to-Sales			
Mean	0.03	0.01	-0.93
Median	0.03	0.02	82.12***
Ratio of EBIT-to-Sales			
Mean	0.11	0.08	-0.49
Median	0.11	0.09	7.52***
Ratio of Total Debt-to-Total Assets			
Mean	0.26	0.24	-2.21**
Median	0.24	0.23	4.99**

PANEL B: DESCRIPTIVE STATISTICS FOR FIRM GOVERNANCE CHARACTERISTICS

Percent Owned by Institutional Owners (PHIO)			
Mean	65.35	65.90	-0.48
Median	68.63	69.04	0.07
Percent Owned by CEO (PHCEO)			
Mean	1.55	1.90	-1.17
Median	1.19	1.13	1.38
Board Size (BS)			
Mean	10.91	11.22	-2.07**
Median	11.00	11.00	0.87
Percent Independent Members on the Board (PIMOB)			
Mean	77.51	79.40	-2.86**
Median	80.00	81.82	5.10***

***, **, * denotes statistically significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

TABLE II

DESCRIPTIVE STATISTICS FOR BUY-AND-HOLD ABNORMAL RETURNS

Descriptive statistics for buy-and-hold abnormal returns for the sample of 347 large firms between 1999 and 2003. The statistical significance of the mean and median buy-and-hold abnormal return is determined by using a t-statistic that is computed as:

$$t = \frac{\overline{BHAR}_t}{\sigma(\overline{BHAR}_t) / \sqrt{N}}$$

where \overline{BHAR}_t is the sample mean, $\sigma(\overline{BHAR}_t)$ is the cross-sectional sample standard deviation of the distribution abnormal buy-and-hold return, and N is number of observation. We also report the t-test statistic for the difference in mean. The significance level of the difference in median is based on the non-parametric two-sample median test.

	Single-Segment Firms (1) N=485	Diversified Firms (2) N=1154	Difference (1-2) (t-statistics)
Buy-and-hold Abnormal Returns (BHAR)			
Mean (t-statistics)	-1.083*** (-7.57)	-0.658*** (-6.93)	-2.74***
Median (t-statistics)	-0.36** (-2.30)	-0.23** (-2.12)	2.885*

***, **, * denotes statistically significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

TABLE III

DESCRIPTIVE STATISTICS FOR BUY-AND-HOLD ABNORMAL RETURNS

Coefficient Estimates from Ordinary Least Squares (OLS). The model regress abnormal Buy-and-hold returns against diversification dummy variable, which is equal 1 if firm report more than one business segment per firm-year denoted as DIVERS. The sample consists of 347 large firms between 1999 and 2003. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earning before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. The ratio of capital expenditure to sales (CAPX/Sales) is used as a proxy measure for firm investments. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets).

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \varepsilon_{ip}$$

VARIABLES	COEFFICIENTS	T-STATISTICS
INTERCEPT	-0.938	-1.25
DIVERS	0.664***	3.05
SIZE [LN(TOTAL ASSETS)]	-0.042	-0.47
R&D/SALES	3.832**	2.11
EBIT/ SALES	-0.100	-0.08
TOTAL DEBT/TOTAL ASSETS	-0.336	-0.60
R ²	0.0314	
ADJUSTED R ²	0.0265	
F-VALUE	2.97**	

***, **, * denotes statistically significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

TABLE IV: SUR RESULTS BY INSTITUTIONAL OWNERSHIP LEVELS

Seemingly Unrelated regression estimates for the two groups based on percent owned by institutional investors (PHIO). Panel A reports the regression the estimates. Panel B report the results from the S-test under the hypothesis that diversification estimates are the same across the two groups. The diversification dummy variable (DIVERS) is equal 1 if firm report more than one business segment per firm-year. The sample consists of 347 large firms between 1999 and 2003. All financial data was obtained from COMPUSTAT. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earnings before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets). These proxies are consistent with the literature on diversification.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SAL$$

PANEL A: THE ESTIMATES FOR THE TWO PORTFOLIOS BASED ON PERCENT OWNED BY INSTITUTIONAL INVESTORS.

Portfolios Types	α	β_1	β_2	β_3	β_4	β_5	n	Adjusted R ²	F-value
High level of Institutional Ownership	-4.437**	2.328** *	0.070	1.656	2.224	7.924	768	0.1096	5.41** *
t-statistic	(-2.16)	(4.21)	(0.28)	(0.51)	(1.34)	(0.81)			
Low level of Institutional Ownership	-2.402**	0.3741	0.151	-1.386	0.817	4.764	871	0.0236	1.07
t-statistic	(-2.01)	(0.93)	(1.15)	(-0.69)	(0.96)	(1.52)			

PANEL B: THE S-TEST STATISTICS UNDER THE HYPOTHESIS THAT THE DIVERSIFICATION ESTIMATES ARE THE SAME ACROSS PORTFOLIOS

	F-value	p-value
$H_0 : \beta_{1H} = \beta_{1L}$	8.23***	0.0043

*** Statistically significant at the 1 percent levels.

** Statistically significant at the 5 percent levels.

* Statistically significant at the 10 percent levels.

TABLE V: SUR RESULTS BY CEO OWNERSHIP LEVELS

Seemingly Unrelated regression estimates for the two groups based on percent owned by the CEO (PHCEO). Panel A reports the regression the estimates. Panel B report the results from the S-test under the hypothesis that diversification estimates are the same across the two groups. The diversification dummy variable (DIVERS) is equal 1 if firm report more than one business segment per firm-year. The sample consists of 347 large firms between 1999 and 2003. All financial data was obtained from COMPUSTAT. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earnings before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets). These proxies are consistent with the literature on diversification.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \varepsilon_{ip}$$

PANEL A: THE ESTIMATES FOR THE TWO PORTFOLIOS BASED ON PERCENT OWNED BY INSTITUTIONAL INVESTORS.

Portfolios Types	α	β_1	β_2	β_3	β_4	β_5	n	Adjusted R ²	F-Value
High level of CEO Ownership	-0.254	1.357**	-0.188	-1.02	-0.316	5.609	725	0.0305	1.42
t-statistic	(-0.12)	(2.48)	(-0.73)	(-0.33)	(-0.24)	(0.71)			
Low level of CEO Ownership	-1.201	0.856**	-0.018	2.707	-0.025*	1.103	914	0.0453	2.13**
t-statistic	(-0.86)	(2.00)	(-0.11)	(1.18)	(-1.69)	(0.38)			

PANEL B: THE S-TEST STATISTICS UNDER THE HYPOTHESIS THAT THE DIVERSIFICATION ESTIMATES ARE THE SAME ACROSS PORTFOLIOS

	F-value	p-value
$H_0 : \beta_{1H} = \beta_{1L}$	0.52	0.4704

*** Statistically significant at the 1 percent levels.

** Statistically significant at the 5 percent levels.

* Statistically significant at the 10 percent levels.

TABLE VI: SUR RESULTS BY BOARD SIZE

Seemingly Unrelated regression estimates for the two groups based on board size (BS). Panel A reports the regression the estimates. Panel B report the results from the S-test under the hypothesis that diversification estimates are the same across the two groups. The diversification dummy variable (DIVERS) is equal 1 if firm report more than one business segment per firm-year. The sample consists of 347 large firms between 1999 and 2003. All financial data was obtained from COMPUSTAT. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earnings before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets). These proxies are consistent with the literature on diversification.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \varepsilon_{ip}$$

PANEL A: THE ESTIMATES FOR THE TWO PORTFOLIOS BASED ON BOARD SIZE

Portfolios Types	α	β_1	β_2	β_3	β_4	β_5	n	Adjusted R ²	F-Value
Large Board	-2.979**	0.532	0.237	-2.190	-1.906	9.267*	708	0.0651	2.90**
t-statistic	(-2.11)	(0.212)	(1.55)	(-0.76)	(-1.52)	(1.79)			
Small Board	3.350	1.052**	0.500*	0.834	0.197	1.408	931	0.0314	1.94*
t-statistic	(1.51)	(2.01)	(-2.11)	-0.28	(0.14)	(0.37)			

PANEL B: THE S-TEST STATISTICS UNDER THE HYPOTHESIS THAT THE DIVERSIFICATION ESTIMATES ARE THE SAME ACROSS PORTFOLIOS

	F-value	p-value
$H_0 : \beta_{1H} = \beta_{1L}$	5.35**	0.022

*** Statistically significant at the 1 percent levels.

** Statistically significant at the 5 percent levels.

* Statistically significant at the 10 percent levels.

TABLE VII: SUR RESULTS BY STANDARDIZED BOARD SIZE

Seemingly Unrelated regression estimates for the two groups based on standardized board size [Board Size/Total Assets (BSTA)]. Panel A reports the regression the estimates. Panel B report the results from the S-test under the hypothesis that diversification estimates are the same across the two groups. The diversification dummy variable (DIVERS) is equal 1 if firm report more than one business segment per firm-year. The sample consists of 347 large firms between 1999 and 2003. All financial data was obtained from COMPUSTAT. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earnings before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets). These proxies are consistent with the literature on diversification.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \varepsilon_{ip}$$

PANEL A: THE ESTIMATES FOR THE TWO PORTFOLIOS BASED ON STANDARDIZE BOARD SIZE (BOARD SIZE/TOTAL ASSETS)

Portfolios Types	α	β_1	β_2	β_3	β_4	β_5	n	Adjusted R ²	F-Value
Large Board Size to Total Assets Ratio	-1.138	1.239***	0.054	4.075	-2.608**	0.558	606	0.0748	3.06** *

t-statistic	(-0.38)	(2.66)	(-0.14)	(1.24)	(-2.17)	(0.10)			
Small Board Size to Total Assets Ratio	6.054***	0.837*	0.359*	0.896	2.338	10.748**	1033	0.0718	2.92** *
t-statistic	(-3.09)	(1.66)	(-1.84)	(-0.37)	(1.64)	(2.37)			

PANEL B: THE S-TEST STATISTICS UNDER THE HYPOTHESIS THAT THE DIVERSIFICATION ESTIMATES ARE THE SAME ACROSS PORTFOLIOS

	F-value	p-value
$H_0 : \beta_{1H} = \beta_{1L}$	2.93*	0.0874

*** Statistically significant at the 1 percent levels.

** Statistically significant at the 5 percent levels.

* Statistically significant at the 10 percent levels.

TABLE VIII: SUR RESULTS BY STANDARDIZED BOARD SIZE

Seemingly Unrelated regression estimates for the two groups based on standardized board size [Board Size/Firm Size (BSFS)]. Panel A reports the regression the estimates. Panel B report the results from the S-test under the hypothesis that diversification estimates are the same across the two groups. The diversification dummy variable (DIVERS) is equal 1 if firm report more than one business segment per firm-year. The sample consists of 347 large firms between 1999 and 2003. All financial data was obtained from COMPUSTAT. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earnings before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets). These proxies are consistent with the literature on diversification.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \varepsilon_{ip}$$

PANEL A: THE ESTIMATES FOR THE TWO PORTFOLIOS BASED ON STANDARDIZE BOARD SIZE (BOARD SIZE/FIRM SIZE)

Portfolios Types	α	β_1	β_2	β_3	β_4	β_5	n	Adjusted R ²	F-value
Large Board Size to Firm Size Ratio	-1.939	1.762**	0.024	-4.737	-2.446	12.299	606	0.0965	3.80** *
t-statistic	(-0.80)	(3.15)	(0.09)	(-1.05)	(-1.42)	(1.44)			
Small Board Size to Firm Size Ratio	2.274*	0.631*	-0.378**	0.888	-0.650	1.105	1033	0.0481	1.80*
t-statistic	(1.87)	(1.75)	(-2.78)	(0.45)	(-0.74)	(0.38)			

PANEL B: THE S-TEST STATISTICS UNDER THE HYPOTHESIS THAT THE DIVERSIFICATION ESTIMATES ARE THE SAME ACROSS PORTFOLIOS

	F-value	p-value
$H_0 : \beta_{1H} = \beta_{1L}$	2.89*	0.0899

*** Statistically significant at the 1 percent levels.

** Statistically significant at the 5 percent levels.

* Statistically significant at the 10 percent levels.

TABLE IX: SUR RESULTS BY BOARD INDEPENDENCE

Seemingly Unrelated regression estimates for the two groups based on board independeces. Panel A reports the regression the estimates. Panel B report the results from the S-test under the hypothesis that diversification estimates are the same across the two groups. The diversification dummy variable (DIVERS) is equal 1 if firm report more than one business segment per firm-year. The sample consists of 347 large firms between 1999 and 2003. All financial data was obtained from COMPUSTAT. The natural logarithm of total assets is used as a proxy measure for firm size. The ratio of earnings before interest and taxes to sales (EBIT/Sales) is a proxy measure for firm profitability. Firm specific information is proxied by taking the ratio of research and development expenses to sales (R&D/sales). Finally, financial leverage is proxied by the ratio of long term debt to total assets (Debt/Assets). These proxies are consistent with the literature on diversification.

$$BHAR_{ip} = \alpha_{ip} + \beta_1 DIVERS_{ip} + \beta_2 SIZE_{ip} + \beta_3 (EBIT / SALES)_{ip} + \beta_4 (Debt / TA)_{ip} + \beta_5 (R \& D / SALES)_{ip} + \varepsilon_{ip}$$

PANEL A: THE ESTIMATES FOR THE TWO PORTFOLIOS BASED ON PERCENT INDEPENDENT MEMBERS ON THE BOARD

Portfolios Types	α	β_1	β_2	β_3	β_4	β_5	n	Adjusted R ²	F-Value
Outsider-dominated Board	-0.659	0.721* *	-0.013	-0.899	-2.384**	3.429	684	0.0659	2.83**
t-statistic	(-0.51)	(1.98)	(-0.09)	(-0.48)	(-2.33)	(1.42)			
Insider-dominated Board	0.601	1.769* **	-0.350	-1.594	1.249	2.42	955	0.6154	2.64**
t-statistic	-0.31	(3.29)	(-1.54)	(-0.44)	(0.97)	(0.48)			

PANEL B: THE S-TEST STATISTICS UNDER THE HYPOTHESIS THAT THE DIVERSIFICATION ESTIMATES ARE THE SAME ACROSS PORTFOLIOS

	F-value	p-value
$H_0 : \beta_{1H} = \beta_{1L}$	2.89*	0.0899

*** Statistically significant at the 1 percent levels.

** Statistically significant at the 5 percent levels.

* Statistically significant at the 10 percent levels.