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EDITORIAL NOTES

The continuing goal of the Journal of Business, Economics and Technology (JBET) is the publication of general-interest business and economics articles that demonstrate academic rigor, while at the same time are readable and useful to others in academia. Consistent with these goals, this and future issues of JBET presents authors' papers in the three research categories recommended by AACSB: Research that advances the knowledge of business and management theory (Theoretical), Research that advances the practice of business and management (Practice), and Research that advances learning/pedagogy (Pedagogical).

In addition to being *white listed* in Cabell's Directory, JBET is also available through the EBSCO Host research database. The current acceptance rate for JBET is roughly 35%. In this regard we have striven to accept only high-quality research, while at the same time maintaining JBET as a realistic publishing outlet for Business, Economics and Information Technology faculty throughout the United States. Key to this process is our referees who have worked hard to help "grow" papers that have significant potential by providing authors with critical review comments. We generally require two to three rounds of review prior to accepting articles for publication. At the same time, we are attempting to shorten the average review time for each article to less than three months.

JBET Research Notes include, but are not limited to updates to previous work, additions to established methods, relatively short articles, research where the thesis is narrow in scope, null results, case series, research proposals, and data management plans: Articles of good quality which cannot be considered as full research or methodology articles. Further, articles in the Research Notes category have undergone the same double-blind peer review process as all articles that are published in JBET. At JBET, we support the research community across all of the disciplines of Business, Economics, and Information Technology by providing the Research Notes forum for sharing information and data of works-in-process or works that have a limited scope of application.

In the web publication of JBET, the editors have chosen to present JBET in a single column instead of the traditional two-column presentation of an academic journal. We have done this to enhance readability in the web presentation.

The Editors thank the officers of the National Association of Business, Economics and Technology, the NABET Executive Board, as well as the referees for their support in the production of this 25th Volume of JBET.

Jerry D. Belloit, co-Editor
Clarion University of Pennsylvania – Retired

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THE NEW REVENUE RECOGNITION STANDARD AND STOCK PRICE REACTION

Tibebe Assefa, Bowie State University
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ABSTRACT

This paper investigates whether abnormal returns exist around the announcement of changes in accounting principles, namely the New Revenue Recognition Standard (NRRS). On May 28, 2014, the Financial Accounting Standards Board (FASB) issued new guidance for companies recognizing revenue in contracts with customers-*Accounting Standard Update (ASU) No. 2014-09, Revenue from Contracts with Customers (Topic 606).* This study analyzes the impact of the announcement of the NRRS on Stock Market Reactions. Our sample consisted of the 30 Companies from The Dow Jones Industrial Average. Using event-study methodology, Eventus, from the Wharton Research Database Services (WRDS), we test for the presence of abnormal returns around the event dates. Our results shows a statistically significant 4.32% mean Cumulative Abnormal Returns (CAR) thirty days to two days before the announcement. This indicated that Investors were optimistic about the announcement of NRRS for transparency of earnings and are willing to pay higher prices.

INTRODUCTION

"The mission of the Financial Accounting Standards Board (FASB[1]) is to establish and improve financial accounting and reporting standards to provide decision-useful information to investors and other users of financial reports." (FAF) On May 28, 2014, the FASB issued new guidance on recognizing revenue in contracts with customers-*Accounting Standard Update (ASU) No. 2014-09, Revenue from Contracts with Customers (Topic 606).* The purpose of the New Revenue Recognition Standard (henceforth NRRS) is to improve consistency of and increase transparency in financial reporting. Prior to the new guidance, industries used different accounting methods for similar economic transactions resulting in inconsistencies and impaired usefulness of financial reporting. The objective of NRRS is to bring forth guidance that is useful for reporting financial information that pertains to the amount, timing, nature and uncertainty of revenue from contracts with customers. This is important because "revenue is one of the most important measures used by investors in assessing a company's performance and prospects" (FASB). Hence, FASB adopted a five-step model for revenue recognition to reduce the risk of revenue fraud and abuse, and improve consistency. This paper investigates the presence of abnormal returns around the announcement and implementation dates of NRRS.

LITERATURE REVIEW

The new Revenue Recognition Standard (NRRS) required publicly-traded companies to comply with the new guidance for recognizing revenue in contracts with customers in financial reporting. Prior studies suggest that some accounting changes provoke a response from the stock market. In this study, we review prior research that examined accounting changes at the regulator level (for example, a FASB mandated change in accounting for operating leases) versus accounting changes at the firm level (for example, a corporation changes to an alternative method to account for depreciation).

Earlier studies in accounting changes and their impact on the stock market showed mixed results. Lev (1979) examined the market reaction to a change in the accounting for the oil and gas industry that required oil and gas firms to account for cost not connected to successful drilling using the Success Exploration (SE) method (i.e., expense the costs in the current period and reduce net income) rather than the Full Costing (FC) method (e.g., capitalize all costs and allocate the costs over time) (Lev 1979). When the FASB issued an Exposure Draft considering the possibility of an accounting change from FC to SE, the market reacted. The stock prices of FC companies declined by 4.5% compared to 1.0% for SE companies (Lev 1979). The author concluded, "This market reaction appears to be relevant to accounting policy makers" (Lev 1979).

[1] "The FASB derives its authority to see accounting standards from the U. S. Securities and Exchange Commission (SEC). The standards issued by the FASB are officially recognized as authoritative…" https://www.accountingfoundation.org/jsp/Foundation/Page/FAFSectionPage&cid=1351027541293 (accessed February 2, 2022)

Conversely, Vigeland (1981) did not find evidence of a market reaction to the change in accounting for research and development costs. In 1974, the FASB issued Financial Accounting Standards No. 2: *Accounting for Research and Development Costs* (SFAS No. 2)[2] requiring research and development costs to be expensed in the current period, disclosed in the financial statements, and written off as prior period adjustments if costs were deferred (Vigeland, 1981). The author reasoned that investors did not change their expectations about management decisions due to SFAS No. 2 (Vigeland 1981) and therefore, the market did not react.

More recently, in a study examining SFAS 142-*Goodwill and Other Intangible Assets* concerning the reporting of goodwill for firms in mergers and acquisitions, Stunda (2018) concluded that the accounting change for reporting goodwill—eliminating goodwill amortization—had a negative effect on the acquiring firm stock prices when the firm recorded goodwill.

Milian and Lee (2021) examined the market response to Accounting Standards Codification® (ASC) 842-*Leases*, which effectively eliminates the off-balance sheet treatment of operating leases, moving the leases from the notes, which are an integral part of the financial statements to the face of the balance sheet in assets and liabilities sections. The authors found equity investors reacted to the accounting change, although efficient market theory would suggest investors adjusted the financial statements for the operating lease information that was disclosed in the notes to the financial statements.

Although results of prior studies are mixed, we expect positive abnormal returns for NRRS because increasing consistency among firms in all industries improves the quality of reporting overall. Unlike the studies referenced, NRRS will be more widely applied because it is not industry specific. Therefore, we hypothesize that the stock market will show positive abnormal returns for the time period surrounding the announcement of NRRS and when the companies implement the change.

H1: *There are statistically significant positive, abnormal returns for the time period surrounding the announcement of the New Revenue Recognition Standard.*

H2: *There are statistically significant positive, abnormal returns for the time period surrounding the implementation of the New Revenue Recognition Standard.*

RSEARCH METHODOLOGY

Event Study: An event study is a statistical method of an empirical investigation of the relationship between security prices and economic events (Dyckman et al., 1984). Most event studies have focused on the behavior of share prices in order to test whether their stochastic behavior is affected by the disclosure of firm-specific events. Furthermore, incorporating context, the usefulness of events studies arises from the fact that the magnitude of abnormal performance at the time of an event provides a measure of the unanticipated impact of this type of event on the wealth of the firms' claimholders (Kothari and Warner 2006).

EMPIRICAL MODEL

Methodology

This study employs a standard event study methodology, using Eventus from WRDS and we fit a standard market model to measure normal performance:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it,} \qquad \text{where } E(\varepsilon_{it}) = 0 \text{ and } \operatorname{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon t} \tag{1}$$

Each sample calendar date is converted to event time by defining the date of the NRRS announcement date (and the implementation date) as event date 0. So, for the announcement date, event date 0 is the same trading day. The

[2] On July 1, 2009, FASB reorganized U.S. GAAP pronouncements into an estimated 90 accounting topics. https://www.fasb.org/news/nr060309.shtml#:~:text=FASB%20Accounting%20Standards%20CodificationTM%20to%20Officially%20Launch%20on%20July%201%2C%202009 Accessed February 10, 2022.

regression coefficients α_i and β_i are estimated in an ordinary least squares (OLS) regression during the estimation period one year (255 trading days) prior to the event period (event days -300 through -46). The event period consists of 61 trading days centered on NRRS announcement date (-30 through +30). We define four event windows based on the event date, [-30,-2], [-1, 0], [+1, +2] and [+3, +30]. As proxy for the return for the market portfolio R_{mt}, both the CRSP value weighted index and the CRSP equal weighted index are used.

Under standard assumptions, OLS is a consistent estimation procedure for the market model parameters. Under the assumption that asset returns are jointly multivariate normal and independently and identically distributed (iid), OLS is also efficient. The prediction errors, $PE_{i\tau}$, which represent abnormal returns, are simply the OLS residuals, $\hat{\varepsilon}_{it}$.

$$PE_{i\tau} \equiv \hat{\varepsilon}_{i\tau} = R_{i\tau} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \tag{2}$$

with

$$\hat{\sigma}^2_{\varepsilon t} = \frac{1}{255-2} \sum_{\tau=t-299}^{t-46} (R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau})^2 \tag{3}$$

The prediction error, PE_{it} is used as an estimator of the abnormal return. In other words, the abnormal return is the residual term of the market model calculated on an out of sample basis. Let $AR_{i\tau}, \tau = t-30, t-29, \ldots t+29, t+30$ be the sample of 61 abnormal returns for firm i in the event window. Under the null hypothesis, conditional on the event window market returns, the abnormal returns will be jointly normally distributed with a zero conditional mean and conditional variance:

$$AR_{i\tau} \sim N(0, \sigma^2(AR_{i\tau})) \tag{4}$$

The conditional variance $\sigma^2(AR_{i\tau})$ has two components. The first component is the disturbance $\hat{\sigma}^2_{\varepsilon t}$ from (3), and the second component is additional variance due to sampling error in estimating the market model parameters α_i and β_i:

$$\sigma^2(AR_{it}) = \sigma^2_{\varepsilon\tau} + \frac{1}{255}[1 + \frac{(R_{m\tau} - \bar{R}_m)^2}{\hat{\sigma}^2_m}] \text{ where } \bar{R}_m = \frac{1}{255} \sum_{\tau=t-299}^{t-46} R_{m\tau} \tag{5}$$

Since the estimation window is large (255 trading days), I assume that the contribution of the second component to $\sigma^2(AR_{i\tau})$ is zero.

To draw inferences about the average price impact of an event, abnormal return observations have to be aggregated across securities and through time. Average abnormal returns AAR_τ are formed by aggregating abnormal returns $AR_{i\tau}$ for each event period $\tau = t-30, t-29, \ldots t+29, t+30$. Given N events (for our sample, $N = 147$),

$$AAR_\tau = \frac{1}{N} \sum_{i=1}^{N} AR_{i\tau} \tag{6}$$

Under the assumption that average abnormal returns are independent across securities, the asymptotic variance equals to

$$Var(AAR_\tau) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma^2_{\varepsilon\tau} \tag{7}$$

The average abnormal returns are aggregated through time to give the cumulative average abnormal return,

$$CAAR_i(\tau_1,\tau_2)=\sum_{\tau=\tau_1}^{\tau_2} AAR_{i\tau} \tag{8}$$

Setting the covariance terms to be zero,

$$\text{var}(CAAR_i(\tau_1,\tau_2))=\sum_{i=1}^{N}\text{var}(AAR_{i\tau}) \tag{9}$$

Hence $CAAR_i(\tau_1,\tau_2)\ \square\ N(0,\text{var}(CAAR_i(\tau_1,\tau_2))$ (10)

This can be used to test the null hypothesis that the abnormal returns are zero.

The estimated variance of AAR_τ is

$$\hat{\sigma}^2_{AAR}=\frac{\sum_{\tau=t-299}^{t-46}(AAR_\tau-\overline{AAR})^2}{255-2}\ \text{where}\ \overline{AAR}=\frac{\sum_{\tau=t-299}^{t-46}AAR_\tau}{255} \tag{11}$$

The portfolio test statistic for day τ in event time is

$$t=\frac{AAR_\tau}{\hat{\sigma}^2_{AAR}} \tag{12}$$

Assuming time series independence, the test statistic for $CAAR_i(\tau_1,\tau_2)$ is

$$t=\frac{CAAR_i(\tau_1,\tau_2)}{\sqrt{(\tau_2-\tau_1+1)}\hat{\sigma}_{AAR}} \tag{13}$$

The abnormal return estimators often have different variances across firms. A common way of addressing this problem is the standardized residual method (Patell, 1976). Define the *standardized abnormal return*, $SAR_{i\tau}$ as

$$SAR_{i\tau}=\frac{AR_{i\tau}}{\hat{\sigma}_{MLE_{i\tau}}} \tag{14}$$

Where

$$\hat{\sigma}_{MLE_{i\tau}}=\hat{\sigma}^2_{\varepsilon\tau}\left(1+\frac{1}{T}+\frac{(R_{m\tau}-\bar{R}_m)^2}{\sum_{\tau=t-299}^{t-46}(R_{m\tau}-\bar{R}_m)^2}\right) \tag{15}$$

Is the maximum likelihood estimate of the variance. Under the null hypothesis each $SAR_{i\tau}$ follows a Student's t distribution with T-2 degrees of freedom. Summing the $SAR_{i\tau}$ across the sample yields

$$ASAR_{i\tau}=\sum_{i=1}^{N}SAR_{i\tau}\ \text{where}\ ASAR_{i\tau}\ \square\ N(0,Q_\tau) \tag{16}$$

The Z-test statistic for the null hypothesis that $CAAR_i(\tau_1,\tau_2)=0$ is

$$Z(\tau_1,\tau_2)=\frac{1}{\sqrt{N}}\sum_{i=1}^{N}Z_i(\tau_1,\tau_2) \text{ where } Z_i(\tau_1,\tau_2)=\frac{1}{\sqrt{(\tau_2-\tau_1+1)\frac{T-2}{T-4}}}\sum_{\tau=\tau_1}^{\tau_2}SAR_{i\tau} \quad (17)$$

The two test statistics so far discussed use the variance estimate from the market model during the estimation period to estimate the variance of the abnormal return estimator. But frequently, events increase the variance of returns, so that the event period variance is greater than the estimation period variance. The portfolio test statistic for day t in event time is

$$t=\frac{AAR_\tau}{\hat{\sigma}_{AAR_\tau}/\sqrt{N}} \text{ where } \hat{\sigma}_{AAR_\tau}=\frac{1}{N-1}\sum_{i=1}^{N}(AR_{i\tau}-\frac{1}{N}\sum_{i=1}^{N}AR_{i\tau})^2 \quad (18)$$

We use the above equation to calculate *Adjusted-t*

We ran two Eventus Ordinary List Squares (OLS) Regression Models: the New Revenue Recognition Standard announcement date (May 28, 2014) and implementation date (various dates in 2017, 2018, and 2019). We utilized CRSP (Center for Research in Security Prices) Equally Weighted for the benchmark and market indices. Our sample consisted of the 30 companies in the Dow Jones Industrial Average. Using quantitative analysis of the Cumulative Abnormal Returns (CAR) above or below equally weighted market index, we analyzed stock returns to ascertain if there were significant abnormal returns.

We used four window periods surrounding the announcement date and implementation date to determine whether there are indications that NRRS, an accounting standard change, resulted in abnormal returns for our sample. The four window periods are: 1. thirty days before the announcement to two days before the announcement (-30, -2); 2. one day before the announcement and the day of the announcement (-1, 0); 3. one day after the announcement to two days after the announcement (+1, +2), and 4. three days after the announcement up to thirty days after (+3, +30).

RESULTS

Results are presented in Tables 1 and 2 and illustrated in Figures 1 and Figure 2 in the Appendix.

Hypothesis 1 predicts positive, abnormal returns around the announcement date of the new standard. In Table 1, the mean Cumulative Abnormal Return (CAR) of the first window for the announcement date, thirty days before the announcement to two days before the announcement (-30, -2), was 4.32% and statistically significant. Result of the second window, one day before the announcement and the day of the announcement (-1, 0) was a mean CAR of negative -0.29%, which was not statistically significant. This suggests that investors began factoring in this accounting change in their decision making. The mean CAR for the third window, one day after the announcement to two days after the announcement (+1, +2), was 0.65%, though statistically significant, it is of less magnitude when compared to the first window (-30, -2). Finally, for fourth window of the announcement date model, three days after the announcement up to thirty days after (+3, +30), the mean CAR, was 0.08% and was not significant. Two of the four time periods reported statistically significant abnormal returns and two did not; therefore, hypothesis 1 is partially supported.

Hypothesis 2 predicts positive, abnormal returns around the new standard implementation dates. In Table 2, we show the results of the mean CAR for the four windows surrounding the implementation dates for the sample companies. Implementation dates for the NRRS were in 2017, 2018, and 2019. Our analyses for the implementation dates showed there were no statistically significant abnormal returns around the dates the companies implement the new standard. Hypothesis 2 is not supported.

CONCLUSION

Prior studies report mixed results when analyzing the impact changes in accounting principles have on stock returns. In this study, we investigate whether abnormal returns existed around the dates of announcement date and implementation of the New Revenue Recognition Standard. We hypothesized that the standard issued by FASB in 2014 would render positive abnormal returns because it improves consistency and transparency in financial reporting.

Our results showed abnormal returns indicating that investors were optimistic about NRRS's probability of increasing consistency and transparency in financial reporting. However, this optimism held true only thirty days to two days before the announcement. The abnormal did not persist closer to the announcement date nor did it persist up to 30 days after the announcement. The reason for this result could be that proposed new accounting standards are publically discussed before FASB officially issues the new standard with its implementation date. Investors would have time to consider the implications of the proposed standard before becoming authoritative. However, since there is no guarantee that a proposed standard will be adopted and implemented, discussions closer to the announcement date may give investors confidence that the standard will be issued. Conversely, investors did not react to companies implementing the new standard. It may be that after the FASB has officially issued an accounting change, investors incorporate the change and understand that it is just a matter of time before comply.

Regulators in the U.S. seek to improve financial reporting. As they issue new accounting pronouncements requiring publically -traded companies to comply with changes, they must also be cognizant of the effect of accounting changes may have on the stock market and economy. Further research analyzing stock market reaction to changing accounting principles would be beneficial to accounting regulators and investors.

Appendix

Table 1. Market Model Abnormal Returns, Equally Weighted Index

Announcement Date

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Uncorrected Patell Z	Uncorrected Patell p-value	Portfolio Time-Series (CDA) t	Portfolio Time-Series p-value	Generalized Sign Z	Generalized Sign p-value
(-30,-2)	29	4.32%	4.33%	25:4>>>	4.260	<.0001	2.241	0.0250	4.033	<.0001
(-1,0)	29	-0.29%	-0.31%	10:19	-1.154	0.2484	-0.572	0.5675	-1.540	0.1236
(+1,+2)	29	0.65%	0.65%	25:4>>>	2.422	0.0155	1.281	0.2003	4.033	<.0001
(+3,+30)	29	0.08%	0.20%	13:16	0.205	0.8378	0.042	0.9665	-0.425	0.6705

The symbols (,<,<<,<<< or),>,>>,>>> show the direction and significance of a generic one-tail generalized sign test at the 0.10, 0.05, 0.01 and 0.001 levels, respectively

Table 2. Market Model Abnormal Returns, Equally Weighted Index
Implementation Date

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Uncorrected Patell Z	Uncorrected Patell p-value	Portfolio Time-Series (CDA) t	Portfolio Time-Series p-value	Generalized Sign Z	Generalized Sign p-value
(-30,-2)	27	1.61%	1.49%	14:13	1.443	0.1490	1.193	0.2327	0.299	0.7650
(-1,0)	27	-0.51%	-0.54%	10:17	-1.983	0.0473	-1.427	0.1536	-1.241	0.2146
(+1,+2)	27	-0.22%	-0.22%	12:15	-0.800	0.4239	-0.612	0.5403	-0.471	0.6376
(+3,+30)	27	-2.27%	-2.50%	10:17	-2.457	0.0140	-1.714	0.0865	-1.241	0.2146

The symbols (,<,<<,<<< or),>,>>,>>> show the direction and significance of a generic one-tail generalized sign test at the 0.10, 0.05, 0.01 and 0.001 levels, respectively.

Figure 1. Cumulative Abnormal Returns Equally Weighted Market Index – Announcement Date

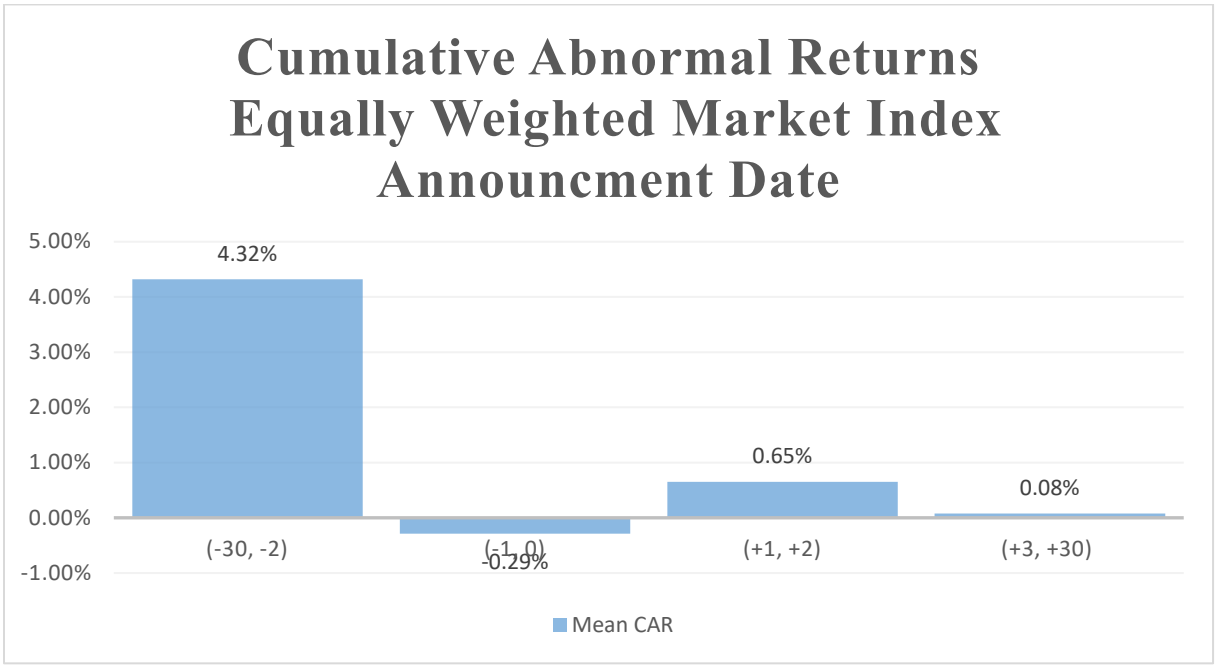
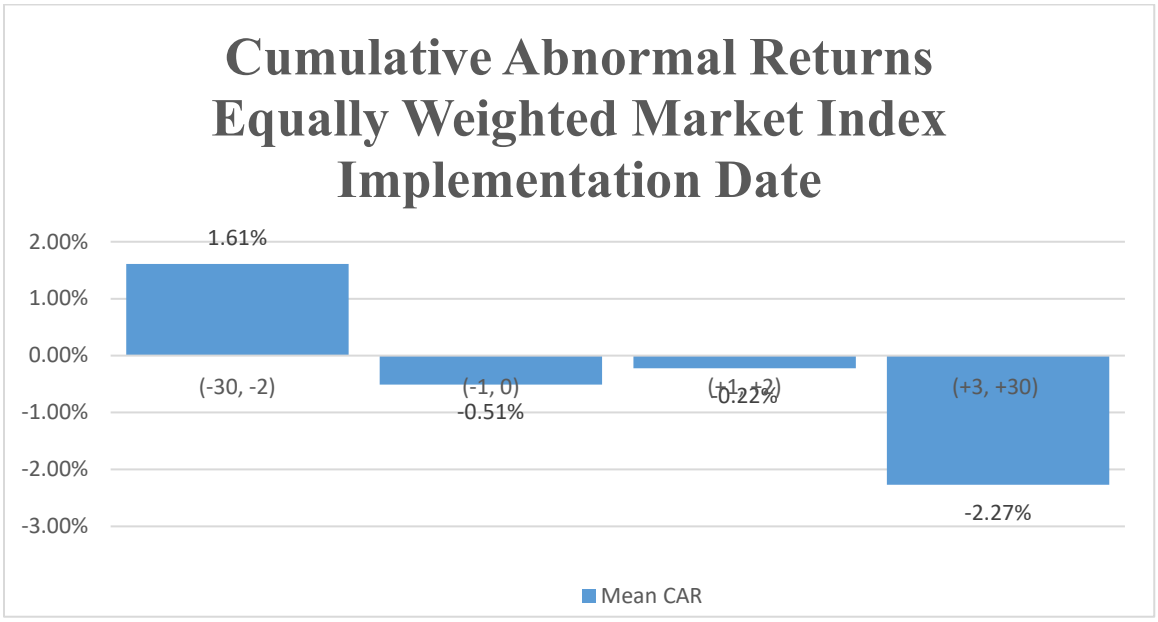


Figure 2. Cumulative Abnormal Returns Equally Weighted Market Index –Implementation Date



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https://wrds-www.wharton.upenn.edu/pages/get-data/center-research-security-prices-crsp/annual-update/stock-security-files/monthly-stock-file/

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THE DETERMINANTS AND EVOLUTION OF CORPORATE OWNERSHIP STRUCTURE: EVIDENCE FROM SPINOFFS

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ABSTRACT

This paper examines the determinants of ownership structure from a sample of corporate spinoffs. Spinoffs offer a valuable empirical design to study corporate ownership because parent and spun-off firms have an identical ownership structure from pro-rata distribution of shares right after spinoffs. By tracking the evolution of ownership structures for spinoffs and their parent firms over a period of 10 years, this study demonstrates that firms adjust their ownership structures over time to fit their firm characteristics. More specifically, larger firms with high leverage, low free cash flow, high tangibility, and low research and development expenses (R&D) tend to have lower managerial ownership. Larger firms with low leverage often have a higher level of institutional ownership.

INTRODUCTION

The impact of ownership structure on corporate performance and policies has been widely studied in the finance literature. Researchers find that ownership structure significantly affects a firm's value (Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990) as well as corporate policies including investment (Cho, 1998), executive turnover and compensation (Denis, Denis and Sarin, 1997; Hartzell and Starks, 2003), and payout policies (Grinstein and Michaely, 2005). However, the fundamental question of how firms determine their ownership structures has not been resolved. Some researchers argue that ownership structure is endogenously determined by the firm's contracting environment and is unrelated to a firm's performance (Demsetz and Lehn, 1985; Himmelberg, Hubbard, and Palia, 1999). Conversely, several researchers find that ownership structure is strongly influenced by investors' preference for risk and reward, especially with institutional investors, such as preference for firms with large liquid stocks (Gompers and Metricks, 2001), dividend-paying firms (Grinstein and Michaely, 2005), and firms with good governance (Chung and Zhang, 2011). This paper seeks to address this gap in the literature through analysis of corporate ownership structure, specifically through the lens of corporate ownership structure after spinoffs.

A spinoff is one of the most common types of asset divestitures. It creates a new independent, public firm by separating a subsidiary from a parent firm. A pure spinoff transaction involves a pro-rata distribution of the subsidiary's shares to the parent firm's existing shareholders. Due to the nature of the transaction, spun-off firms and parent firms have identical ownership structures at the time of the pro-rata distribution. As a result, a pure spinoff offers an interesting empirical setting to observe two firms that start at the same point in terms of ownership structure but might diverge over time depending on their firms' characteristics, managers' preferences, or a variety of other reasons. By utilizing this unique design of pure spinoff transactions, this paper examines some of the potential firm characteristics that determine corporate ownership structure and how the ownership structure evolves over time.

In addition, this paper addresses a major limitation of the existing research on ownership structure: the lack of standardization and accessibility of ownership data. A popular data source on ownership, Compact Disclosure has broad coverage of this information but contains many mistakes and biases including biases of overlaps and preferred shares as pointed out by Dlugosz, Fahlenbrach, Gompers and Metrick (2006). In response to this concern, the ownership data for the research described in this paper has been hand-collected directly from proxy statements of spinoffs and their parent firms. This approach leads to a clean data set, which allows for accurate examination of corporate ownership determinants.

By observing the ownership evolution of both spun-off and parent firms for 10 years after the spinoffs, this paper first demonstrates that ownership structures, including institutional ownership and managerial ownership components, are significantly different between spun-off firms and parent firms. Next, determinants of ownership structure are explored in regression settings leading to findings that firm size, leverage, free cash flow, tangibility and R&D are important firm characteristics for managerial ownership. Specifically, bigger firms with high leverage, low free cash flow, high tangibility, and low R&D tend to have lower level of managerial ownership. In addition, bigger firms with low leverage tend to have higher level of institutional ownership. Finally, parent firm institutional ownership is shown to have a significant impact on shaping the new public unit's firm institutional ownership in their early years.

The paper will proceed as follows: Section II summarizes the literature; Section III describes the data collection and descriptive statistics; Section IV provides empirical analyses on determinants of corporate ownership; and Section V provides conclusions based in these analyses.

LITERATURE REVIEW ON CORPORATE OWNERSHIP

The following section summarizes prior literature on corporate ownership, theoretical predictions, and existing evidence regarding the determinants of managerial and institutional ownership. It is important to note that a big strand of the literature documents that legal environment, common-law based vs. civil-law based countries, is the biggest determinant of ownership structure (Prowse, 1992; La Porta et al., 1998; Faccio and Lang, 2002), however this paper only focuses on the determinants of corporate ownership within the United States.

Managerial Ownership

The Effect of Managerial Ownership on Corporate Policies

Existing literature provides ample evidence of managerial ownership on firm performance, value, and policies. Most of this strand of literature is based on Jensen and Meckling (1976)'s agency theory, where high managerial ownership helps align managers' incentives with those of shareholders and reduces agency costs (Morck, Shleifer and Vishny, 1988; Stulz, 1988). Indeed, Lilienfeld-Toal et al. (2014) find that owner-CEOs are value increasing: they reduce empire building and run their firms more efficiently. However, both Morck et al. (1988) and McConnell and Servaes (1990) warn that the relationship between managerial ownership and firm value is not monotonic. When managers act on their own interests at the expense of the firm's shareholders, their entrenchments and associated agency costs lead to suboptimal corporate policies and can be detrimental to the firm (Jensen, 1986; Berger, Ofek and Yermack, 1997).

The Determinants of Managerial Ownership

Jensen and Meckling (1976) have fundamentally influenced the finance literature by their theory of the firm, in which they argue that, due to the separation between ownership and control, we often have agency problems or conflicts of interest between owners of the firm (shareholders) and managers. Therefore, we could expect firms with potentially high level of agency problem to have high managerial ownership. Specifically, firms with high free cash flow might have high level of insider ownership since free cash flow is one of the major sources of managers' discretionary spending (Jensen, 1986).

Moreover, free cash flow decreases with capital expenditures and leverage, therefore, firms with more capital expenditures and higher leverage are expected to have lower insider ownership. Similarly, firms with high ratio of fixed assets (or high tangibility) might have low managerial ownership since there is less scope for the managers to expropriate in firms with more hard assets (Jensen, 1986). Finally, bigger firms usually have more publicity, making it easier to attract public investors, including institutional investors (for investment or monitoring purposes). Thus, we could expect big firms to have diluted ownership or low level of managerial ownership.

As Myers and Majluf (1984) point out, managers often have superior information about the firm, so they would only dilute their holding when they can issue equity at an advantageous price. Under this explanation, firms with high information asymmetry would have high level of insider ownership. Particularly, larger firms that get more analyst and news coverage would have less information asymmetry problem and should have low managerial ownership. Firms with high information asymmetry problems, often characterized by high R&D, high growth (market-to-book), and high intangible assets (low tangibility) make it prohibitively expensive for managers to sell equity and therefore, are predicted to have higher level of managerial ownership.

Institutional Ownership

In their seminal paper, Jensen and Meckling (1976) emphasize that the agency problems arising from the separation of ownership and control are mainly due to the managerial owners' inadequate stakes in their firms. As a result, large shareholders can have more power and play a far more active role in corporate governance than dispersed individual investors due to their sizable equity ownership and incentives to monitor. In addition to the theoretical motivation, the surge of institutional investors in recent decades also inspires finance researchers to study and understand the behaviors of institutional investors. Blume and Keim (2012) stated that "Of the total market value of US common

stocks of $1.4 trillion in 1980, institutions held $473 billion, or 34%. By 2010, the total market value of common stocks had increased to $17.1 trillion, and institutions had increased their holdings to $11.5 trillion, or 67% of all stocks." However, the literature thus far mostly focuses on the monitoring role of institutional investors and their effect on firm outcomes, rather than the determinants of institutional ownership.

The Effect of Institutional Ownership on Corporate Policies

With their large stakes in the firm, institutional investors have incentives and sufficient power to influence corporate policies and outcomes. Indeed, prior literature has provided abundant evidence that institutional investors help relieve agency costs by monitoring manager's behaviors, reducing executive compensations, influencing the merger outcomes, and overall have a considerably positive effect on firm's performance. More specifically, Cornett et al. (2007) document a significant positive relationship between a firm's operating performance and both the percent of institutional stock ownership and the number of institutional stockholders. Hartzell and Starks (2003) and Almazan, Hartzell, and Starks (2005) find that institutions reduce the level of executive compensation and increase pay-for-performance sensitivity. Chen, Harford and Li (2007) show that the presence of institutional investors help improve post-merger performance and reduce the likelihood of bad acquisitions. In addition, Brav et al. (2008) find that activism activities initiated by institutional investors (hedge funds) effectively reduce agency problems, increase payout, and improve firms' operating performance.

The Determinants of Institutional Ownership

Understanding that institutional investors can have a big impact on firms' policies and outcomes, some researchers have examined which firm characteristics can attract institutional investment in the first place. Falkenstein (1996) and Gompers and Metricks (2001) suggest that institutional investors have a strong demand for large and liquid stocks because of their liquidity and transaction-cost motives. Grinstein and Michaely (2005) find that institutions prefer stocks that pay dividends or repurchase shares, but institutions do not show any preference for firms that pay high dividends, inconsistent with the clientele effect. Moreover, Parrino, Sias and Starks (2003) show that institutions are attracted to companies with better managerial performance and abandon stocks around forced CEO turnover because they favor prudent securities.

In addition, using a comprehensive governance score which covers 50 governance factors, Chung and Zhang (2011) find that institutional investors prefer firms with good governance practices to meet fiduciary responsibility and to minimize monitoring and exit costs. Furthermore, Demsetz and Lehh (1985) find that ownership choices vary in a way that is consistent with the firm's contracting environment. More specifically, they find that ownership concentration is negatively correlated with firm size, while positively correlated with profit instability. They argue that firms with more volatile profitability are more difficult to monitor, thus require a higher level of institutional ownership to control managers' misbehaviors.

In summary, existing literature provides various theories and predictions on the drivers of corporate ownership, including managerial and institutional ownership. Empirical research provides ample evidence on the important effect of ownership on corporate performance and policies. However, the fundamental question of which factors determine ownership structure remains. The paper seeks to address this gap in the literature by examining corporate ownership determinants through an empirical design centered on corporate spinoffs.

DATA COLLECTION AND SUMMARY STATISTICS

The data collection for this research provides an accurate basis to examine corporate ownership determinants. Thus far, research on this topic has relied on potentially biased data sources. This research, however, starts with a methodical collection of relevant and accurate data directly from companies' proxy statements.

Data Collection

Initially, the data sample for this research was extracted from the Securities Data Corporation (SDC) Mergers and Acquisition database for the period from 1/1/1986 to 12/31/2005 with the *spinoff* flag for U.S. issuers. This initial data collection yielded 743 spinoff transactions. After exploratory analyses, the following exclusions were applied to the initial sample. First, any firm (either parents or units) in the financial or utility industries was excluded because they usually have special ownership structure due to regulations. Next, private firms or limited partners where ownership

data are not available were excluded. Last, firms with missing Compustat total assets variable were excluded because this is one of the main explanatory variables for the study. These exclusions left 330 spinoff transactions.

Next, a manual review was completed to confirm whether each spinoff was a pure spinoff. In a pure spinoff, parent firms use Form 10 filings to make their subsidiary/unit go public (not Form S-1 like a traditional IPO) and distribute in pro-rata basis all units' new shares to their existing shareholders. Only those that met these criteria were included for this research. There is another type of spin-off called two-stage spinoff in which parents launch a partial IPO for their units but sell less than 20% of shares to public investors. Then after a short period of time (usually less than 2 years) they distribute the remaining units' shares, which helps them qualify for a tax-free distribution to existing parent shareholders. These two-stage spinoffs were excluded from the sample data.

Finally, ownership data was manually collected from the U.S. Securities and Exchange Commission (SEC) proxy statements for parents and unit firms from 1 year to 10 years following their spinoffs in for the period after 1996. Ownership data was manually collected from Thomson One for the period before 1996 (SEC does not consistently provide filings before 1996). All financial data was pulled from Compustat. Due to limited ownership data, the final sample described in this paper includes 100 spinoffs with 100 unit firms and 92 parent firms for a total of 1,210 firm-year observations. The number of parent firms is less than the unit firms because some conglomerate firms spun off more than one subsidiary, or some unit firms have the same parents.

Summary Statistics

Table 1 provides the distribution over time of pure spin-off transactions. The sample has more firms in the earlier years in 1990s, but this does not mean spinoffs have not been popular in recent years. According to Khorana (2011), corporate spin-off activities around the world had increased at a steady pace from 2001 to 2011 as conglomerate firms navigated away from diversification. However, the sample described herein excludes private firms and foreign firms for the purpose of collecting data on ownership structures. This may significantly reduce the sample size.

Table 2 provides an overview of the ownership structures in unit firms (Panel A) and parent firms (Panel B). This table also offers the evolution of their ownership structures over time (for maximum of 10 years). Importantly, the number of observations in the ownership tables changes over time due to the limited ownership data availability in the early period (1985-1990). In addition, these observations decrease over time as units or parents were merged or went bankrupt.

It appears that the sample pooled means of institutional ownership over 10 years is not much different between parents and units. However, it makes more sense to look at the ownership differences within each parent-unit pair, instead of the ownership averages in the full sample. Therefore, a new variable is included as the difference between the parent's and unit's ownership. This provides a clear picture within each parent-unit pair in Table 3.

As shown in Table 3 Panel A, the differences in parent-unit managerial ownership are positive and significant over a 10-year period indicating that spun-off firms have higher managerial ownership as compared to their parents (the mean difference is 4.64%, positive with t-test at 1% significance). The managerial ownership difference does not seem to change much over time. One possible explanation for this higher level of managerial ownership in spun-off firms is that existing parent firms' managers and directors may use their operational knowledge and expertise to help it get the newly formed firm established. As documented by Feldman (2015), after corporate spinoffs, 60% of directors serve in both parent and unit firms, and 35% of their dual directors' stay for at least 3 years.

Conversely, Table 3 Panel B shows that the differences in parent-unit institutional ownership are negative and significant over a 10-year period. This indicates that spun-off firms have lower institutional ownership percentages as compared to their parents and the magnitude of this difference is greater at the managerial level (the mean difference is -7.77% with t-test at 1% significance). Due to the nature of the spinoff events, this is the first time that spun-off firms become public entities, as compared to parent firms who already have a long history of operation. Parent firms are often well established and on average are larger than the spun-off firms as shown in Table 4.

Firm characteristics are summarized in Table 4 with spun-off firms in Panel A and parent firms in Panel B. All variables are defined in Appendix A. All financial data was collected from the Compustat database.

$$\text{Book Leverage} = \frac{DLTT+DLC}{AT}$$

Following Denis and McKeon (2012), I calculate market leverage as:

$$\text{Market Leverage}_{it} = \frac{DLTT+DLC}{DLTT+DLC+(PRCC*CSHO)}$$

where *DLTT* is the amount of long-term debt, *DLC* is debt in current liabilities, including the portion of long-term debt due within one year. *AT* is total assets, *PRCC* is the year-end common share price, and *CSHO* is the year-end number of common shares outstanding. Both book and market leverage were included in this analysis but since the results are qualitatively similar, the market leverage is applied in the results for discussion. All continuous variables are winsorized at 1% and 99% to reduce possible effects of outliers.

As shown in Table 4, on average, parent firms are much bigger (in total assets and firm size, t-test significance at 1% level) than spun-off firms, consistent with previous literature that spinoff is one of popular divestiture methods for conglomerates to reverse mergers and unlock company value (Veld and Merkoulova, 2009; Khorana, 2011). Parent firms are often more profitable, hold more cash, have higher tangibility, and lower R&D expenses than spun-off firms, and they are usually in unrelated industries after spinoff transactions (29% in the sample are related vs. 71 % are unrelated). Again, this is consistent with prior literature on spinoff motivations. Parent firms often want to refocus on their core business segments and separate out the unrelated subsidiaries in spinoffs (Powers, 2001; Khorana, 2011).

Overall, these descriptive statistics provide valuable information about parent and spun off firms related to their ownership structures.

EMPIRICAL ANALYSIS

This research includes an analysis on the determinants of managerial and institutional ownership compositions and explores the potential factors that lead to differences in ownership structures over time. The following section describes this analysis.

Managerial Ownership

Table 5 presents the regressions on managerial ownership. Managerial ownership is regressed on different firm characteristics including firm size, free cash flow, tangibility, and leverage. The regression has the following specification for Column 1:

$$\text{Managerial Ownership}_{it} = \alpha + \beta_1 \text{ Firm Size}_{i,t-1} + \beta_2 \text{ Free Cash Flow}_{i,t-1} + \beta_3 \text{ Tangibility}_{i,t-1} + \beta_4 \text{ Leverage}_{i,t-1} + \epsilon_{i,t}$$

Column 1 includes firm characteristics that have predicted signs under Jensen and Meckling (1976)'s agency theory as discussed in the previous section. As shown here, firm size is negatively and significantly related to managerial ownership, indicating that bigger firms tend to have lower managerial ownership. This is consistent with the dilution of ownership of large public companies. In addition, the coefficient of free cash flow is positive and significant, suggesting that firms with high free cash flow (often associated with more agency problems) tend to have higher managerial ownership. This is again consistent with the free cash flow argument in Jensen (1986). Finally, both coefficients on tangibility and leverage are negative, as predicted, indicating that firms with a high level of fixed assets and high debt make it more difficult for managers to expropriate and tend to have lower managerial ownership.

Column 2 includes several other explanatory variables, including R&D expense and market-to-book based on the predictions under Myers and Majluf (1984)'s information asymmetry theory discussed in the previous section. The coefficient on R&D is positive and significant, while market-to-book is insignificant. The positive relation between managerial ownership and R&D expenses suggests that firms with high R&D tend to have higher managerial ownership, consistent with the argument that these firms often have a high information asymmetry problem. This makes it difficult and expensive for managers to dilute their ownership. Firm size and tangibility have the same negative signs as in Column 1, so the directions of these relationships with managerial ownership are consistent; however, this may be explained by either agency theory or information asymmetry or both. This paper only aims to identify the determinants of ownership structure without trying to distinguish different theoretical explanations. Column 3 shows the full regression where all firm variables and their coefficient signs stay the same as the first 2

columns. Please note that free cash flow and R&D are not included in the same regression because they are highly correlated. A full correlation table among firm characteristics is summarized in Appendix B.

Institutional Ownership

Table 6 presents the regressions on institutional ownership. Institutional ownership is regressed on different firm characteristics including firm size, leverage, free cash flow, and profit volatility. The regression has the following specification:

$$\text{Institutional Ownership}_{it} = \alpha + \beta_1 \text{ Firm Size}_{i,t-1} + \beta_2 \text{ Leverage}_{i,t-1} + \beta_3 \text{ Free Cash Flow}_{i,t-1} + \beta_4 \text{ Volatility}_{i,t-1} + \epsilon_{i,t}$$

Positive significant coefficient on firm size indicates that bigger firms tend to attract more institutional investors, consistent with the increase in publicity and analyst coverage of large public companies. This is also in line with the agency theory in regard to monitoring (Jensen and Meckling, 1976). The positive correlation between firm size and institutional ownership is consistent with the summary statistics shown in Table 3. Parent firms are often larger in size and have higher institutional ownership than their spunoff firms. This finding is also consistent with existing literature on the incentives and power of institutional investors. With their sizable stakes in the firm, they are incentivized to monitor and benefit from a firm's performance improvement (Hartzell and Starks, 2003, Cornett et al., 2007).

In addition, the coefficient on leverage is negative and significant. Again, market leverage is used in the regressions, but the results with book leverage is quantitatively similar. This negative relationship between leverage and institutional ownership could be interpreted in at least two ways. First, leverage represents debt financing while institutional ownership represents equity financing in the firm's capital structure. Therefore, as one form of financing increases, the other decreases mathematically. Second, a negative relationship between leverage and institutional ownership might suggest that institutional investors prefer lower leverage firms, which helps lower risk of bankruptcy in these firms. Both explanations are plausible, but more importantly, the results in Table 6 show that leverage is an important determinant of institutional ownership.

As discussed in the previous literature review section, Chung and Zhang (2011) suggest that institutional investors prefer firms with good governance, measured by free cash flow. This is because firms with good governance should have low agency problems including the free cash flow problem. Demsetz and Lehh (1985) argue that institutional investors prefer firms with low profit volatility (or high stability). However, the last two variables in Table 6, free cash flow and profit volatility, are not shown to be significant in this sample.

In Table 7, the regression re-run but only related to spun-off firms' institutional ownership and this regression includes lagged parent's initial institutional ownership as an additional explanatory variable. The reason is that the unit's initial institutional ownership is inherited from the parent is due to the pro-rata distribution of its new shares to existing parent shareholders. Therefore, the parent's initial institutional ownership might have some influence in shaping the unit's ownership structure. As seen in Column 1 Table 7, the coefficient of a parent's institutional ownership lag by 1 year is positive and significant, with the magnitude strongest among all explanatory variables with the first 4 lags. However, the significance and magnitude of a parent's effects are gradually reduced and become insignificant in Column 6, indicating that after 6 years, a parent's initial institutional ownership no longer has an impact on the unit's institutional ownership. In short, parent's institutional ownership has a significant impact in the early life of the unit firm's institutional ownership.

CONCLUSION

This paper investigates the determinants of firm ownership structure by using a sample of pure spinoffs. Pure spinoff transactions provide the basis for a unique experimental design because they create two firms with identical ownership structure. This structure is characterized by pro-rata share distribution of a new public unit firm to existing parent's shareholders. Analysis of this data demonstrates that ownership structures evolve over time to better fit a firm's characteristics, including firm size, leverage, tangibility, free cash flow, and R&D. More specifically, larger firms with more publicity often have higher institutional ownership and low managerial ownership. In addition, firms with high leverage often have low managerial ownership and low institutional ownership. Finally, firms with low tangibility, high agency problems as measured by free cash flow and high R&D expenses tend to have high managerial ownership.

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Table 1

Distribution of Pure Spinoff Sample for the Period 1986-2005

This table provides the distribution of my spinoff final sample during the data collection period 1986-2005. The initial spinoff sample is from Securities Data Corporation (SDC) Mergers and Acquisition. A pure spinoff is a corporate transaction where a firm's subsidiary goes public, separated from a parent firm, and all of its newly public shares are distributed in pro-rata basis to existing parent' shareholders. The final sample has 100 spinoffs with a total of 1,210 firm-year observations.

Year	N
1986	1
1987	3
1988	3
1989	1
1990	5
1991	2
1992	3
1993	7
1994	6
1995	12
1996	11
1997	7
1998	8
1999	6
2000	7
2001	2
2002	6
2003	7
2004	1
2005	2
Total	**100**

Table 2

The Evolution of Ownership Structure in Spinoffs over 10-Year Period

This table provides the ownership structures, including institutional and managerial ownership, of spunoff firms and parent firms from 1 to 10 years after their spinoffs. Panel A presents spunoff firms' ownership structures while Panel B presents parent firms' ownership structures. Number of observations is not the same every year due to the limitability of ownership data in SEC or Thomson One database before 1996. Numbers are shown as percentages.

Panel A: Ownership Structure in Spunoff Firms

		Managerial Ownership			Institutional Ownership		
Year After Spinoffs	**N**	**Mean**	**Median**	**Std Dev**	**Mean**	**Median**	**Std Dev**
1	69	11.81	4.70	14.11	48.10	48.90	22.83
2	95	11.80	4.76	13.06	50.51	55.52	21.96
3	94	14.18	5.07	14.33	52.89	56.88	26.77
4	87	12.93	5.39	13.38	54.01	59.85	27.13
5	72	12.67	5.99	13.67	56.95	65.69	27.39
6	72	12.19	6.20	14.64	61.66	66.52	25.26
7	68	12.69	5.62	15.61	60.19	69.76	28.14
8	59	12.01	5.70	15.14	63.69	69.24	27.24
9	52	11.68	5.83	15.91	62.27	69.34	26.96
10	44	12.71	4.95	15.30	63.14	67.91	28.99

Panel B: Ownership Structure in Parent Firms

		Managerial Ownership			Institutional Ownership		
Year After Spinoffs	**N**	**Mean**	**Median**	**Std Dev**	**Mean**	**Median**	**Std Dev**
1	67	12.73	7.55	14.07	40.00	37.63	20.65
2	87	11.91	6.05	13.90	51.00	51.63	23.14
3	81	11.53	5.40	15.93	53.99	58.11	24.38
4	66	9.82	4.45	14.63	56.79	62.37	26.01
5	57	9.42	4.01	15.39	60.46	65.26	21.11
6	58	10.42	4.45	15.95	58.12	65.09	22.60
7	50	9.92	4.52	16.67	56.10	61.93	25.62
8	44	9.54	4.20	16.98	56.38	61.80	24.97
9	40	9.82	3.98	17.61	59.94	63.83	23.90
10	39	10.59	3.90	18.23	61.66	68.20	24.63

Table 3

Differences in Ownership Structures between Parent-Unit Firms after Spinoffs

This table provides a summary of differences between ownership compositions between each parent-unit pair following their separations after spinoffs. Panel A summarizes the differences in Managerial Ownership and Panel B in Institutional Ownership. This table also includes the t-test results to check if the mean difference is significantly different from 0. Numbers are shown as percentages.

Panel A: Differences in Managerial Ownership

Year After Spinoffs	Mean	Stdev
1	4.97	8.16
2	5.32	8.21
3	4.09	6.11
4	4.02	5.78
5	3.95	4.44
6	5.08	7.69
7	5.10	7.41
8	4.38	5.29
9	4.31	5.36
10	5.09	6.22
Overall	**4.64**	**6.65**

```
. ttest dinside==0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
 dinside |     546    4.460551    .2701725    6.313025    3.929844    4.991258
---------+--------------------------------------------------------------------
    mean = mean(dinside)                                          t =  16.5100
Ho: mean = 0                                     degrees of freedom =      545

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Panel B: Differences in Institutional Ownership

Year After Spinoffs	Mean	Stdev
1	-3.50	14.70
2	-6.35	15.28
3	-6.47	17.18
4	-5.39	20.45
5	-9.99	17.96
6	-10.13	19.78
7	-13.43	18.49
8	-8.43	19.94
9	-10.46	16.34
10	-6.95	17.09
Overall	**-7.77**	**17.75**

```
. ttest dinst==0

One-sample t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dinst |     513   -7.773273    .7835402    17.7468   -9.312622   -6.233923

    mean = mean(dinst)                                            t =  -9.9207
Ho: mean = 0                                     degrees of freedom =       512

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Table 4

Firm Statistics of Spunoff Firms and Parent Firms

This table provides firm characteristics of spunoff firms and parent firms (financial data collected from Compustat). All variables are defined in Appendix A. *Total Assets* are in millions, other variables are ratios.

	Variable	N	Mean	Median	Std Dev	t-test
Spun-off Firms	**Total Assets**	545	925.35	399.14	1,272.74	***
	Book Lev.	540	0.214	0.200	0.200	**
	Mkt. Lev.	538	0.223	0.161	0.222	
	Mkt-to-book	529	1.838	1.366	1.788	
	Tangibility	544	0.306	0.269	0.229	**
	Cash Ratio	544	0.119	0.058	0.160	***
	R&D	404	0.102	0.025	0.214	***
	Profitability	542	0.063	0.120	0.262	***
	FCF	491	0.027	0.076	0.250	***
Parent Firms	**Total Assets**	542	5,092.27	1,787.45	9,459.78	
	Book Lev.	542	0.262	0.241	0.232	
	Mkt. Lev.	542	0.229	0.147	0.240	
	Mkt-to-book	531	1.818	1.517	1.209	
	Cash Ratio	551	0.090	0.047	0.125	
	R&D	365	0.064	0.034	0.092	
	Profitability	452	0.119	0.153	0.149	
	FCF	419	0.059	0.091	0.118	
	Relatedness	545	0.286	0.000	0.453	

Table 5

Regression on Managerial Ownership

This table provides regression results on managerial ownership. The dependent variable is managerial ownership which is hand-collected for a sample of firms after spinoffs from proxy statements.

VARIABLES	(1)	(2)	(3)
Firm Size	-0.0475***	-0.0537***	-0.0474***
	(0.00343)	(0.00505)	(0.00343)
Free Cash Flow	0.104***		0.109***
	(0.0195)		(0.0202)
Tangibility	-0.0803**	-0.161***	-0.0820***
	(0.0311)	(0.0527)	(0.0312)
Leverage	-0.126***		-0.133***
	(0.0269)		(0.0278)
R&D		0.228***	
		(0.0389)	
Mkt-to-book		0.00395	0.00279
		(0.00326)	(0.00314)
Constant	0.333***	0.400***	0.325***
	(0.0216)	(0.0349)	(0.0230)
R-squared	0.264	0.232	0.266
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Table 6

Regression on Institutional Ownership

This table provides regression results on institutional ownership. The dependent variable is institutional ownership which is collected for a sample of firms after spinoffs from proxy statements.

VARIABLES	(1)
Firm Size	0.0996***
	(0.00578)
Leverage	-0.356***
	(0.0443)
Free Cash Flow	0.0508
	(0.0463)
Volatility	0.000102
	(0.000253)
Constant	0.0864**
	(0.0347)
R-squared	0.442
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	

Table 7

Regression on Institutional Ownership with Lagged Variables

This table provides regression results on spunoff firms' institutional ownership with lagged parent's institutional ownership as additional explanatory variables. Lag1-6 are parent's institutional ownership lagged 1-year to 6-year after spinoffs.

VARIABLES	(1) lag1	(2) lag2	(3) lag3	(4) lag4	(5) lag5	(6) lag6
Firm Size	0.0868***	0.0937***	0.0983***	0.100***	0.102***	0.103***
	(0.00590)	(0.00585)	(0.00566)	(0.00551)	(0.00531)	(0.00509)
Leverage	-0.279***	-0.310***	-0.318***	-0.328***	-0.329***	-0.298***
	(0.0453)	(0.0478)	(0.0485)	(0.0505)	(0.0498)	(0.0491)
Lag1	0.347***					
	(0.0444)					
Lag2		0.256***				
		(0.0425)				
Lag3			0.173***			
			(0.0412)			
Lag4				0.115***		
				(0.0406)		
Lag5					0.0889**	
					(0.0395)	
Lag6						0.0584
						(0.0386)
Constant	-0.0558*	-0.0407	-0.0192	0.00483	0.0120	0.0174
	(0.0306)	(0.0330)	(0.0346)	(0.0357)	(0.0363)	(0.0379)
R-squared	0.528	0.485	0.457	0.441	0.440	0.445

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix A: Variable Definition

All financial variables are collected from Compustat Database.

- Book leverage is measured as debt in current liabilities (*DLC*) plus total long-term debt (*DLTT*) divided by total assets (*AT*).
- Market Leverage $_{it} = \frac{DLTT+DLC}{DLTT+DLC+(PRCC*CSHO)}$

where *DLTT* is the amount of long-term debt, *DLC* is debt in current liabilities, including the portion of long-term debt due within one year, *PRCC* is the year-end common share price, and *CSHO* is the year-end number of common shares outstanding.

- Market-to-Book (M/B) is computed as:

$$M/B_{it} = \frac{AT_{it} - SEQ_{it} - TXDITC_{it} + (PRCC_{it} * CSHO_{it}) + PSTKL_{it}}{AT_{it}}$$

where *AT* is total assets, *SEQ* is book equity, *TXDITC* is deferred tax, *PRCC* is the year-end common share price, *CSHO* is the year-end number of common shares outstanding, and *PSTKL* is liquidation value of preferred stock.

- *Profit Volatility* is the standard deviation of Profitability. *Profitability* is operating income before depreciation (*OIBDP*) over total assets.
- *Tangibility* is fixed assets (*PPENT*) over total assets.
- *Firm size* is the natural log of total assets.
- *R&D* is Research and Development expense over total assets.
- *Free Cash Flow* (FCF) is free cash flow over total assets.
- *Relatedness* in an indicator, equal 1 if parent and spunoff firms are in the same industry (2-digit SIC code), 0 otherwise.

Appendix B: Correlation Table

This table provides correlation among explanatory variables. Variables are coded as followed:

umktlev: Market leverage; usize: Firm Size; utang: Tangibility; ufcf: Free Cash Flows; umb: Market-to-book; rd: R&D; uvola: Volatility.

	umktlev	usize	utang	ufcf	umb	urd	uvola
umktlev	1.0000						
usize	0.4301	1.0000					
utang	0.3664	0.2897	1.0000				
ufcf	0.1678	0.5301	0.2323	1.0000			
umb	-0.2799	-0.2368	-0.2006	-0.2328	1.0000		
urd	-0.2584	-0.5490	-0.2602	-0.8610	0.2325	1.0000	
uvola	-0.0406	-0.0628	-0.1320	-0.0244	0.0101	0.0392	1.0000

THE SEARCH FOR ALPHA AND THE PUBLIC FIRM RESPONSE

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ABSTRACT

Financial theory indicates that idiosyncratic risk may be important to investors that hold under-diversified portfolios. We investigate this issue by looking at hedge fund activism and target firm returns. We find that changes in idiosyncratic risk have an asymmetrical relation within positive and negative abnormal return samples. Changes in idiosyncratic risk have positive relation within target firms with positive abnormal returns and a negative relation within negative abnormal return target firms.

INTRODUCTION

Recently, new information has been learned about hedge fund activism and target firm returns. Hedge funds that acquire large equity stakes in target firms and intend to influence control of the firms must make a 13d filing. (Securities Exchange Act, 1934) Early empirical research by Brav et al. (2008) document positive target firm abnormal returns on the trading days surrounding the 13d filing event, and these firms do not experience return reversal afterwards. More recently, using a longer sample period and larger sample than Brav et al. (2008), von Lilienfeld-Toal and Schnitzler (2020) find hedge fund target firms earn positive abnormal returns and hedge funds help set payout policy of these firms. Consistent with these studies, Krishnan, Partnoy, and Thomas (2016) find that the abnormal returns to target firms during the 2008 to 2014 period were around seven percent.

In the capital asset pricing model of Sharpe (1964), Lintner (1965), and Mossin (1966), investors have homogeneous expectations and are able to diversify away firm-specific risk. As a result, only market risk is priced and investors are not compensated for bearing idiosyncratic risk. All investors hold the market portfolio since it earns the highest Sharpe (1966) ratio. However, recent empirical evidence indicates that hedge funds may not hold well-diversified portfolios. Griffin and Xu (2009) find that hedge funds hold on average 168 stocks. More recently, Agarwal et al. (2013) find that hedge funds hold an average of 138 and a median of 63 stocks. Since hedge funds hold portfolios that are concentrated in relatively few securities, they likely have not fully diversified away all idiosyncratic risk. This is supported by Ackermann, McEnally, and Ravenscraft's (2002) finding that hedge fund returns are more volatile than market indices. However, the higher volatility is likely not due to leveraged positions in the market portfolio since the existing literature finds hedge funds have relatively low exposure to market risk. (Asness, Krail & Liew, 2001; Bali, Brown & Caglayan, 2011) Therefore, idiosyncratic risk is likely to be important to hedge funds.

Hedge fund activists may tend to target companies that are small and undervalued (Brav et al., 2008). On the other hand, a company that sees itself as 'in trouble' or potentially in trouble may ask a hedge fund to make an investment to inject some capital. Building on the hedge fund activism and idiosyncratic risk literatures, we investigate the relation between abnormal target firm returns and firm specific risk, i.e., idiosyncratic risk. Merton's (1987) theoretical model predicts that firms with larger firm-specific variances have higher expected returns. However, Shleifer and Vishny (1997) present a model where idiosyncratic volatility cannot be diversified away, leading them to the conclusion that idiosyncratic volatility is important to specialized arbitrageurs. Based on their model, stocks with high idiosyncratic volatility may be overpriced and as a result earn a lower future return.

There is mixed empirical support for the Merton (1987) and Shleifer and Vishny (1997) models. Ang et al (2006, 2009) document a negative relation between idiosyncratic risk and returns while Fu (2009) finds a positive relation between expected idiosyncratic risk and returns. Kang, Kondor, and Sadka (2014) document the relation between hedge fund ownership and idiosyncratic risk. Extreme idiosyncratic risk stocks with high hedge fund ownership experience the largest quarterly changes in idiosyncratic volatility. We contribute to this literature by providing evidence that target firm abnormal returns are related to changes in idiosyncratic risk.

Recent research on hedge fund activism investigates a variety of topics, but to the authors knowledge current research has not investigated the relation between target firm returns and idiosyncratic risk. There is evidence hedge funds help facilitate bankruptcy restructurings, improve innovation and operating performance, and assist target firms in their acquisition and divestiture strategy. (See respectively Lim, 2015; Brav et al., 2018; Brav, Jiang & Kim, 2015b; Tang, 2020; Gantchev, Sevilir & Shivdasani, 2020; Danis, 2020) develops a theoretical model of shareholder activism in which the activist holds a large position and monitors the target firm. Boyson, Gantchev, and Shivdasani (2017) provide evidence activist help facilitate mergers and acquisitions of the target firm and this helps increase target firm shareholder value. Aslan and Kumar (2020) investigate spillover effects of hedge fund activists on target firm rivals. Reviews of the hedge fund activism literature are available in Brav, Jiang, and Kim (2015a) and Denes, Karpoff, and McWilliams (2017).

DATA AND METHODOLOGY

Accounting and stock market return data are obtained from Compustat and CRSP, respectively. Carhart (1997) four factor data are collected from Kenneth French's personal website.[3]

We identify a sample of hedge fund activism using Schedule 13d filings, or "beneficial ownership reports", submitted to the SEC.[4] We use 13d filings to determine instances where hedge funds acquire more than five percent of a company's shares outstanding. The Securities Exchange Act of 1934 section 13(d) requires that any natural person, company, government, or political subdivision, agency, or instrumentality of a government that directly or indirectly becomes the beneficial owner of more than five percent of any equity security must file within ten days a statement with the Securities and Exchange Commission. This financial statement, commonly referred to as a 13d filing, must contain, among other things:

- Background, and identity, residence, and citizenship of, and the nature of such beneficial ownership
- Source and amount of the funds or other consideration used or to be used in making the purchases
- If the purpose of the purchases or prospective purchases is to acquire control of the business of the issuer of the securities
- The number of shares of such security which are beneficially owned, and the number of shares concerning which there is a right to acquire. (Securities Exchange Act, 1934)

Beneficial owner is defined in the Code of Financial Regulations section 240.13d-3 as any person who directly or indirectly has voting or investment power over a security (e.g., ability to sell the security).

As part of our analysis, we utilize the Baron and Kenny (1986) econometric methodology to assess whether changes in idiosyncratic risk act as moderating and mediating variables. They define a moderating variable as a variable that changes the direction or magnifies the relation between dependent and independent variables. Moderation can be assessed by estimating regression models containing interaction terms between moderating and explanatory variables. If a variable act as a moderator, the interaction term regression coefficient should be statistically significant. Based on Baron and Kenny (1986), a mediating variable is an intermediary variable that is influenced by other independent variables and directly impacts the dependent variable. Baron and Kenny (1986) provide a three-step econometric approach to assess whether a variable is a mediating variable (for details see Appendix A). The three steps are:

1. Regress the dependent variable on the independent variables.
2. Regress the mediating variable on the independent variables.
3. Regress the dependent variable on the independent variables and mediating variable.

In step three, we use a stepwise forward regression approach to determine the variables included in the final model.[5] We start by regressing the dependent variable on a single independent variable. If the independent variable is statistically significant, we keep that variable in successive models, otherwise the variable is discarded and we move on to the next independent variable. To be included in subsequent models, an explanatory variable must be statistically

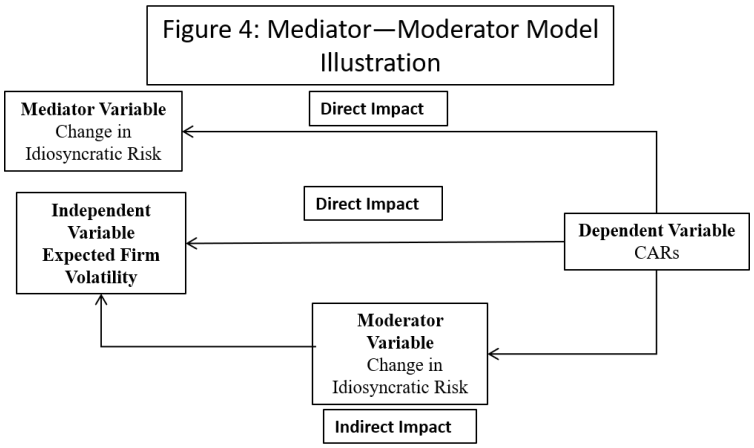
[3] Kenneth French's website is http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html .
[4] We would like to thank Alon Brav and his coauthors for providing data on Schedule 13d filings.
[5] We obtain similar results by using Ordinary Least Squares (OLS) regressions with standard errors clustered by target firms in step three.

significant at the ten percent level when first introduced and be statistically significant at the five percent level in any successive models. This process continues through all variables. Equation (1) provides the model.

$$CAR_{it} = \alpha_i + \sum_{j=1}^{n} \beta_i X_{jit} + \varepsilon_{it} \quad (1)$$

Our dependent variable is cumulative abnormal returns (CARs) calculated by regressing daily stock returns in excess of the Treasury bill rate on the Carhart (1997) book-to-market, market, momentum, and size factors. The independent variables X_j $(j = 1 \ldots n)$ include amount of cash held by the target firm, change in idiosyncratic risk, quarterly changes in shares held by financial institutions, stock volatility, trading volume, indicator variables for the Technology bubble, subprime loan crisis, and white-collar outsourcing periods, as well as indicator variables for high, moderate, or low values of Altman's Z score and an indicator variable if the target firm delists after the 13d filing date. Variable definitions for all variables can be found in the Appendix B. The hypothesized relation between cumulative abnormal returns surrounding hedge fund acquisition events is shown in Figure 1.

Figure 1
Mediator – Moderator Flow Chart



Notes: This figure provides a visual representation of the hypothesized relation between cumulative abnormal returns, expected firm volatility, and changes in idiosyncratic risk.

RESULTS

We calculate the average and ratio of positive to negative cumulative abnormal returns for target stocks on trading days surrounding hedge fund 13d filing events and report these statistics in Table 1. The evidence presented in Table 1 indicates that there are positive abnormal returns earned during the ten days surrounding the announcement of a hedge fund acquisition. However, in the roughly six months following the announcement, target stocks earn negative abnormal returns.

Table 1

Cumulative abnormal return statistics for 13d filing events

Event Window	Average CAR	Positive/Negative
(-137, -11)	0.74%	1317: 1569***
	(0.74)	(-4.69)
(-10, +10)	4.54%***	1822:1170***
	(12.44)	(11.92)
(+11, +137)	-5.21%***	1106:1890***
	(-6.61)	(-14.32)

Notes: This table shows the average (Average CAR) and ratio of positive to negative (Positive/Negative) cumulative abnormal returns for target stocks on the trading days surrounding 13d filing dates. *z*-statistics are presented in

parentheses. Statistical significance at the ten, five, and one percent levels are denoted with *, **, and ***, respectively.

Using univariate regressions, we regress cumulative abnormal returns on each independent variable and report the coefficients and corresponding *t*-statistics in Table 2. We estimate regressions for the positive, negative, and pooled cumulative abnormal return samples. Cumulative abnormal returns are calculated for the ten trading days surrounding the hedge fund 13d event. Stocks that are fully acquired by hedge funds earn lower cumulative abnormal returns during the trading days surrounding the 13d filing event. Changes in idiosyncratic risk are negatively related with cumulative abnormal returns. This result holds for the full sample as well as for the positive and negative cumulative abnormal return subsamples.

Table 2
Cumulative abnormal return regression coefficients

	Cumulative Abnormal Return Sample		
Independent Variable:	All	Positive	Negative
Altman Z (high)	0.0074	-0.0316***	0.0321***
	(0.84)	(-3.27)	(3.82)
Altman Z (low)	-0.0092	0.0442***	-0.0412***
	(-1.06)	(4.53)	(-5.15)
Altman Z (middle)	0.0028	-0.0164	0.0181*
	(0.27)	(-1.41)	(1.79)
Cash	-0.0274	0.0211	-0.0740***
	(-1.56)	(1.11)	(-4.50)
Change in idiosyncratic risk	-0.0061***	-0.0031**	-0.0044***
	(-5.56)	(-1.97)	(-5.35)
Delisted	-0.3217***	-0.1076	-0.2105***
	(-6.47)	(-0.88)	(-6.48)
Subprime loan crisis	-0.0081	-0.0025	-0.0152**
	(-1.11)	(-0.30)	(-2.12)
Technology bubble	0.0036	0.0216**	-0.0003
	(0.39)	(2.10)	(-0.03)
Volatility	-0.0523	7.4224***	-6.1169***
	(-0.06)	(8.09)	(-8.27)
White-collar outsourcing	-0.0062	0.0169*	-0.0245***
	(-0.72)	(1.80)	(-2.86)

Notes: This table shows coefficient estimates and *t*-statistics (in parentheses) from univariate ordinary least squares regressions of cumulative abnormal returns on financial variables for target stocks. Cumulative abnormal returns are calculated during the ten trading days surrounding the acquisition event. Descriptions of these variables are given in the Appendix. Statistical significance at the ten, five, and one percent levels are denoted with *, **, and ***, respectively.

Regression estimates for the positive and negative cumulative abnormal return samples are reported in the third and fourth columns of Table 2, respectively. For the positive cumulative abnormal return sample, consistent with investors being compensated for bearing distress risk, low distress risk stocks i.e., high Altman *Z*-score stocks, earn lower abnormal returns while stocks with high distress risk earn higher abnormal returns. Additionally, stocks with high return volatility in the period preceding the 13d event earn higher abnormal returns in the days surrounding the event.

Within the negative cumulative abnormal return sample, amount of cash a target firm has on hand, changes in idiosyncratic risk, stock return volatility, and target stock delistings have a negative relation with cumulative abnormal returns. Cumulative abnormal returns are also lower during the white-collar outsourcing period than other periods. These results indicate that risk is particularly important within stocks with negative cumulative abnormal return stocks.

We regress changes in idiosyncratic risk on the explanatory variables and report the regression coefficients and *t*-statistics in Table 3. We find that low distress risk stocks have lower changes in idiosyncratic risk. Changes in idiosyncratic risk for target firms were higher on average during the subprime loan crisis than during other periods. Additionally, changes in idiosyncratic risk are positively related with the amount of cash held by target firms.

For positive and negative cumulative abnormal return samples, we repeat the changes in idiosyncratic risk on other explanatory variable regressions and report the results in table 3, columns 3 and 4. For the positive cumulative abnormal return sample, we find a negative relation between changes in idiosyncratic risk and volatility and distress risk. Consistent with the pooled results, changes in idiosyncratic risk are on average higher during the subprime loan crisis. Changes in idiosyncratic risk are again negatively related with distress risk within the negative cumulative abnormal return sample.

Table 3

Changes in idiosyncratic risk regression coefficients

	Cumulative Abnormal Return Sample		
Independent Variable:	All	Positive	Negative
Intercept	0.5026**	0.4318***	0.3599
	(2.23)	(3.09)	(0.65)
Altman Z(high)	-0.6255***	-0.2772**	-0.9052*
	(-3.18)	(-2.20)	(-1.96)
Altman Z(middle)	-0.3256	-0.2735*	-0.1669
	(-1.34)	(-1.83)	(-0.30)
Cash	0.7879**	0.3838	0.4852
	(2.13)	(1.61)	(0.54)
Subprime loan crisis	0.7579**	0.4648**	1.0266
	(2.51)	(2.33)	(1.54)
Technology bubble	0.2480	0.1738	0.1187
	(0.69)	(0.74)	(0.14)
Volatility	-19.3120	-21.3780**	-28.7767
	(-1.37)	(-2.44)	(-0.84)
Volume	-0.0000	-0.0000	0.0000***
	(-0.24)	(-0.55)	(2.78)
White-collar outsourcing	-0.2896	-0.3499	0.0435
	(-0.87)	(-1.63)	(0.06)
Number of Observations	1144	698	446
F-statistic	2.72	2.12	2.16
Probability > F	0.0026	0.0210	0.0190
Adjusted R2	0.0148	0.0158	0.0255

Notes: This table shows statistically significant regression coefficient estimates and *t*-statistics (in parentheses) from ordinary least squares regressions of changes in idiosyncratic risk on financial variables. Statistical significance at the ten, five, and one percent levels are denoted with *, **, and ***, respectively.

We further investigate the relation between cumulative abnormal returns and explanatory variables using regression models that include interactions between changes in idiosyncratic risk and other independent variables. The explanatory variables appearing in the final regression model are determined using the stepwise approach discussed earlier. Table 4 reports coefficients and *t*-statistics from these regressions. We report results for the pooled sample as well as for the positive and negative cumulative abnormal return samples. Explanatory variables for the positive and negative cumulative abnormal return subsamples are determined using the stepwise approach, independently of each other and independent from the variables used in the full sample.

During the ten days surrounding 13d filing events, cumulative abnormal returns are negatively related to changes in idiosyncratic risk. The relation between cumulative abnormal returns and the interaction between changes in idiosyncratic risk and volatility is positive within positive cumulative abnormal return stocks but negative within negative cumulative abnormal return stocks. In net, cumulative abnormal returns are negatively related with the interaction between changes in idiosyncratic risk and volatility. Volatility magnifies cumulative abnormal returns, having a positive relation within positive cumulative abnormal return stocks and a negative relation within negative cumulative abnormal return stocks.

Positive cumulative abnormal returns are lower within firms with low distress risk. Negative cumulative abnormal returns are lower during the white-collar outsourcing period and within distressed firms. Trading volume and the interaction between trading volume and changes in idiosyncratic risk are statistically related to negative cumulative abnormal returns.

Table 4
Cumulative abnormal return interaction model regression coefficients

	Cumulative Abnormal Return Sample		
Independent Variable:	All	Positive	Negative
Intercept	0.0461***	0.1303***	-0.0374***
	(74.83)	(232.07)	(9.09)
Altman Z (high)	.	-0.0271**	.
	.	(5.75)	.
Altman Z (low)	.	.	-0.0380***
	.	.	(11.33)
Altman Z (low)*Volatility	.	.	9.8665**
	.	.	(5.26)
Change in idiosyncratic risk	-0.0051**	-0.0134***	.
	(4.86)	(7.26)	.
Volatility	.	12.7936***	-13.8249***
	.	(27.66)	(10.58)
Volatility*ΔIdiosyncratic risk	-1.2041***	9.9523***	-4.8989***
	(10.08)	(15.39)	(41.45)
Volume	.	.	-0.0000***
	.	.	(36.54)
Volume*ΔIdiosyncratic risk	.	.	0.0000****
	.	.	(27.44)
White-collar outsourcing	.	.	-0.0245**
	.	.	(4.12)
Number of Observations	1144	698	446
F-statistic	18.90	10.91	23.36
Probability > F	<0.0001	<0.0001	<0.0001
Adjusted R2	0.0321	0.0592	0.2719

Notes: This table shows regression coefficient estimates and *t*-statistics (in parentheses) from ordinary least squares regressions of cumulative abnormal returns on financial variables. Regression variables are determined using a stepwise regression approach. Statistical significance at the ten, five, and one percent levels are denoted with *, **, and ***, respectively.

DISCUSSION

The evidence presented in this paper indicates that changes in idiosyncratic risk act as a moderating variable between cumulative abnormal returns and distress risk, volatility, and trading volume. Based on Baron and Kenny (1986), to determine whether or not a variable is a mediating variable, an independent variable must have a relation with the dependent variable and mediating variable and the mediating variable must have a relation with the dependent variable. We provide evidence that there are relations between cumulative abnormal returns and risk, i.e., changes in idiosyncratic risk and volatility. Thus, there is some evidence that changes in idiosyncratic volatility act as a mediating variable. We find that volatility is positively related to cumulative abnormal returns in the positive cumulative abnormal return sample, but negatively related within the negative sample.

CONCLUSION

The existing literature shows a relation between hedge fund activism and target firm performance. Our results add to this by documenting the relation between target firm returns and changes in idiosyncratic risk. However, we find that this relation is asymmetric, changes in idiosyncratic risk and returns are positively related within positive cumulative abnormal returns target firms but negatively related within negative cumulative abnormal return firms. These results contribute to the hedge fund activism literature by showing that some results may change within different samples of target firms. Future research can investigate whether some common findings in the literature are robust across positive and negative cumulative abnormal return samples.

APPENDIX

A. Mediator and Moderator Models

Baron and Kenny (1986) provide a three-step econometric approach to understand the relationship between independent variables and a dependent variable in a time series or cross-sectional regression. Our dependent variable is the cumulative abnormal returns (CARs). Our independent variables include amount of cash held by the target firm, quarterly changes in shares held by financial institutions, stock volatility, trading volume, indicator variables for the Technology bubble, subprime loan crisis, and white-collar outsourcing periods, as well as indicator variables for high, moderate, or low values of Altman's Z score and an indicator variable if the target firm delists after the 13d filing date. We select the change in idiosyncratic risk around an event date as our mediator or moderator variable. Figure 1 depicts an illustrative relationship among three variables: cumulative abnormal returns, expected firm volatility and the change in idiosyncratic risk.

For example, the moderator variable, change in idiosyncratic risk, influences the independent variable, expected firm volatility, to transform how the independent variable (expected firm volatility) explains the dependent variable, CARs. Just as the Carhart (1997) four-factor model explains a return, we modify the residuals by extracting the change in idiosyncratic risk from them. If the change in idiosyncratic risk is statistically significant when we regress it against CARs, i.e., if it stands alone and acts directly on the dependent variable, then we use it as a mediator variable. As a moderator variable, the change in idiosyncratic risk works in conjunction with other independent variables on the dependent variable, i.e., the Carhart four-factor residuals.

We modify Baron and Kenny's (1986) three-step approach for use in our stepwise regression process. In step one, we regress CARs using ordinary least squares against each independent variable X_j to determine that the relationship is statistically significant.

$$CAR_{it} = \alpha_i + \beta_i X_{jit} + \varepsilon_{it} \quad (2)$$

In step two, we develop the mediator/moderator variable. We partition the variance of returns ($Var(R_i)$) on each firm i's stock into systematic risk (SYS_i) and idiosyncratic risk (Var(ε_i)) and use the four-factor event study methodology to develop the slopes and residuals. We compute the pre- and post-variances for each event using the residuals and calculate the change in idiosyncratic risk for each event on a pre-announcement, t = (-137 to - 11), to post-announcement, t = (+11 to +137) basis. We measure changes in the variance as

$$\Delta Var(R_i) = \frac{Var(R_{i,post}) - Var(R_{i,pre})}{Var(R_{i,pre})} \quad (3)$$

We calculate systematic risk based on the four-factor model of Carhart (1997), using Bali, Brown and Caglayan (2012) methodology.

$$R_{it} = \alpha_i + \beta_{i,MKT} MKT_{it} + \beta_{i,SMB} SMB_{it} + \beta_{i,HML} HML_{it} + \beta_{i,MOM} MOM_{it} + \varepsilon_{it} \quad (4)$$

where R_{it} is the excess return on stock i, MKT_{it} is the excess market return, and SMB_{it}, $HML_{it}, and\ MOM_{it}$ are the size, book-to-market, momentum factors, respectively. The total risk is the variance of R_{it}: $\sigma_i^2 = Var(R_i)$. The idiosyncratic risk is the variance of ε_{it}: $\sigma_{\varepsilon i}^2 = Var(\varepsilon_i)$. The systematic risk of stock i is defined as the difference between total and unsystematic variance: $SYS_{it} = Var(R_i) - Var(\varepsilon_i)$. We measure changes in idiosyncratic risk as

$$\Delta idiosyncratic\ risk = \Delta Var(\varepsilon_i) = \frac{Var(\varepsilon_{i,post}) - Var(\varepsilon_{i,pre})}{Var(\varepsilon_{i,pre})} \quad (5)$$

We then regress the mediator/moderator variable against the independent variables using ordinary least squares regression to determine whether it is statistically significant. The mediator/moderator variable must be statistically significant for it to me used in the stepwise regression.

$$ME_{it} = \gamma_i + \sum_{j=1}^{n} \beta_i X_{jit} + \varepsilon_{it} \quad (6)$$

where

$$ME_i = \Delta idiosyncratic\ risk = \frac{Var(\varepsilon_{i,+11,+137}) - Var(\varepsilon_{i,-137,-11})}{Var(\varepsilon_{i,-137,-11})} \quad (7)$$

In the final step, we include the mediator/moderator variable in the stepwise regression. The moderator model is the more general model with both the standalone moderator variable and the interaction terms between the moderator variable and the independent variables.

B. Variable Definitions

Abnormal return (*AR*): Daily abnormal returns are calculated as the difference between a stock's return in excess of the daily Treasury bill rate and the stock's expected return based on the Carhart (1997) four factor model. Four factor model parameters are estimated for each stock event using 126 days of daily data occurring from 137 to 11 days before the event.
Altman Z Score: Calculated using the definition given in Altman (1968): 1.2 times net working capital to assets plus 1.4 times retained earnings to assets plus 3.3 times EBIT to assets plus 0.4 times market value of equity to book value of liabilities plus sales to assets.
Altman Z Score (*high*): Indicator variable that takes a value of 1 if a firm's Altman Z score is greater than or equal to 2.97 and is zero otherwise.
Altman Z Score (*low*): Indicator variable that takes a value of 1 if a firm's Altman Z score is less than 1.81 and is zero otherwise.
Altman Z Score (*moderate*): Indicator variable that takes a value of 1 if a firm's Altman Z score is greater than or equal to 1.81 and less than 2.97 and is zero otherwise.
Cumulative abnormal return (*CAR*): Cumulative abnormal returns are estimated by compounding daily abnormal returns occurring during the ten trading days surrounding the hedge fund 13d acquisition event, inclusive of the event date.
Cash: Cash & marketable securities scaled by total assets from the target's balance sheet for the quarter preceding the 13D filing event window.
Change in idiosyncratic risk (*ΔIdiosyncratic risk*): Defined as the change in idiosyncratic risk scaled by idiosyncratic risk prior to the 13D event date. Idiosyncratic risk is defined as the variance of residuals estimated by regressing daily excess returns on the Carhart (1997) four factors. Change in idiosyncratic risk is calculated as the difference between the variance of the residuals from days -137 to -11 and days +11 to +137.
Change in institutional shares held (*Change in shares held*): Quarterly change in the number of shares held by institutional investors scaled by the number of shares held by institutional investors at the start of the period multiplied by 100, calculated using the most recent holdings data available prior to the 13D event date.
Leader – Follower: Indicator variable that takes a value of one if a different hedge fund filed form 13D within 180 calendar days of the original 13D filing event.
Delisting: Indicator variable that takes a value of one if the firm delists at any point between 11 and 262 days after the event and is zero otherwise.
Subprime loan crisis: Indicator variable that is one if event window is between the years 2003 and 2009 and is zero otherwise.
Technology bubble: Indicator variable that is one if event window is between the years 1996 and 2001 and is zero otherwise.
Volatility: Expected stock return volatility estimated using a GARCH model over days -137 to -11, where day 0 is the 13d filing date.
Volume: Total trading volume during the 21 trading days surrounding the event window, inclusive of the event date, scaled by the firm's total assets at the end of the fiscal quarter immediately before the start of the event window.
White – collar outsourcing: Indicator variable that is one if event window is between the years 1996 and 2010 and is zero otherwise.

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EXAMINING THE IMPACT OF NEW STADIUM CONSTRUCTION ON LOCAL PROPERTY PRICES USING DATA ANALYTICS AND THE ZILLOW ZTRAX DATABASE

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ABSTRACT

In February of 2016, Stan Kroenke – the owner of the Los Angeles Rams – argued that the construction of the team's new stadium in Inglewood, California would, with a $5.5 billion price tag, create a "ripple effect so profound" that it would "boost the neighborhood's subpar property values along the way." Kroenke made his point while ignoring what an increase in property value can produce through such a gentrification process: marginal damage to the local education systems as neighborhoods skew towards higher-income residents, the depletion in long-term viability and supply of low-cost housing, and the deepening class polarization within the neighboring urban housing markets are among just some of the chief concerns. To examine Kroenke's claims and the underlying economic impacts, this paper uses Zillow's proprietary ZTRAX database (n = 9,068,189 total data points) to construct a difference-in-differences model to explore whether the construction of new NFL stadiums does indeed boost the neighborhood's property values. In doing so, both home and rental prices are dissected as well as any potential influence on shifting racial demographics. Included in the examination are SoFi Stadium (Los Angeles, CA), Mercedes-Benz Stadium (Atlanta, GA), U.S. Bank Stadium (Minneapolis, MN), and Allegiant Stadium (Paradise, NV). The four locations represent the newest stadiums in the NFL as well as different geographic regions of the country.

INTRODUCTION

The impact of sport franchises and their respective stadiums on neighboring communities has long been debated. Proponents argue that stadiums, if built new, not only create construction jobs in the short term, but also create additional revenues in the communities, create hospitable areas for new businesses, and ultimately attract tourists in the long term (Tu 2005). Case in point, and one of the stadiums of specific interest to this research, is the owners of the Los Angeles Rams, Stan Kroenke, arguing that the construction of SoFi Stadium in Inglewood, California would result in a ripple effect so profound that it would boost the neighborhood's subpar property values along the way (Ligato 2019). Kroenke makes hit point while ignoring what an increase in property value can produce through such a gentrification process: marginal damage to the local education system as neighborhoods skew towards higher-income residents, the depletion in the long-term viability and supply of low-cost housing, and the deepening class polarization within the neighboring urban housing markets are among just some of the chief concerns (Murdie and Teixeira 2011; Newman and Wyly 2006). Indeed, those weary of the relationship between sport franchises and neighboring communities contend that not only are the revenues generated by the stadiums not spent locally but not enough businesses are attracted to justify the cost and that, as a result, the local community is ultimately harmed. The two beliefs – that of NFL ownership and that of residents living in the vicinity of new NFL stadiums – cannot be mutually exclusive as, for example, Kroenke's stated goal of increasing property value often negatively impacts current residents. Drawing upon this background, this paper explores this contradictory structure through a data-driven approach to determine if and how residents are affected by stadium construction. Specifically, both housing and rental unit prices are examined using big data obtained from the Zillow ZTRAX database and the United States Census, respectively. In both cases, a difference-in-differences regression analysis with the groundbreaking of the stadium serving as the pre- and post-treatment periods is used to determine the impact on prices. Moreover, the obtained data is manipulated to place all house sales and rental units into concentric circles (5 miles, 5 to 10 miles, 10 to 15 miles, and 15 to 20 miles) to provide further contextualization regarding the impact of distance from each stadium and an increase in housing and rental prices. As well, by using data from the United States Census Bureau, demographic composition and change by race (Black, White, Hispanic, and Asian) is charted for each stadium in the pre- and post-treatment periods. The result is a robust and concrete overview of a stadium's impact on four cities built upon an abundant amount of data points (n = 9,068,189): Allegiant Stadium (n = 3,821,238), Mercedes-Benz Stadium (n = 553,470), SoFi Stadium (n = 2,048,456), and U.S. Bank Stadium (n = 2,645,025).

Each of those datapoints, of course, is the personal story of a resident. And each city has a unique history that ultimately shaped how the stadium's impact occurred. For example, at a cost of $5 billion, SoFi Stadium is the most expensive stadium ever built. Already serving as host to the 2022 Super Bowl, the stadium will also host the 2023 NCAA football

championship game, and the opening and closing ceremonies of the 2028 Los Angeles Olympic Summer Games. The stadium also serves as the home field for both the Los Angeles Rams and Los Angeles Charger. As well, Kroenke plans to build a massive entertainment, retail, commercial, and residential development complex on approximately 300 acres surrounding the stadium that was previously home to the Hollywood Park racetrack. By July 2017, shortly after the groundbreaking of the stadium, online real estate listings in the city of Inglewood were already using the promise of SoFi Stadium to help sell houses. More than half of some 80 listings explored by *LA Curbed* mentioned either the stadium or the entertainment and commercial complex being planned around it. One of the listings included just an "exterior shot of a three-bedroom home and a flashy rendering of the future stadium, as if buying a house in Inglewood were equivalent to snagging a seat on the 45-yard line" (Chiland 2018).

The story is much the same when exploring the other cities and stadiums highlighted in this research. As a brief example, in March of 2013, Atlanta City Council voted 11-4 to approve the city using a portion of its hotel tax revenue to cover the approximate $200 million public contribution towards the construction of Mercedes-Benz Stadium. Kasim Reed, then the Mayor of Atlanta, extolled the pending construction as an avenue towards the revitalization of some of the city's most historic neighborhoods and that it would assist in Atlanta remaining a competitive, leading city with world-class attractions. Steve Carr, a 30-year resident near the area of construction urged the council to remember prior socio-economic impacts of stadiums in Atlanta, alluding to the displacement of people to build Turner Field and the Atlanta Civic Center (NFL 2013). Carr's concerns were quickly proven correct. In order to build Mercedes-Benz Stadium in Atlanta, Georgia, ownership bought out two historical African-American churches, forced the rerouting of Martin Luther King Drive, and – according to local residents – disconnected people on the Westside of town from the Eastside of town (Lefkowicz and Jones 2019). Moreover, as Mercedes-Benz Stadium prepared to host Super Bowl 53, local residents used the spotlight to bring awareness to the poverty, vacant homes, and homelessness as a result of what they considered an unsustainable increase in the cost of housing (Abdulahi 2019). The impact created by Las Vegas' Allegiant Stadium was evident prior to the Raiders hosting their first game in the new venue. In 2019, a Boston real estate firm purchased six buildings adjacent to the location of the stadium, with the assumption that the stadium's construction was likely to boost rent growth in the area. Local real estate broker, Dan Doherty, projected at the time that nearly two-million square feet of the city's tenants would face displacement because of high rents, redevelopment, and increased traffic in the area surrounding Allegiant Stadium (Segall 2019).

The socio-economic impact of these increases in housing prices because of new stadium construction cannot be ignored as it is most often the city's minority population impacted by the downstream effects. For example, Inglewood, as a city, was ultimately shaped by racist housing policies. As part of the Great Migration, many Blacks found news homes on the West Coast particularly in areas such as Long Beach and South Central Los Angeles. However, redlining – or the deeming of areas hazardous to lenders based on racial and ethnic demographics – made loans for minorities virtually impossible to receive (Jan 2018). It was not until white flight, caused by the Watts riots of 1965, did white residents move to more conservative outskirts like Orange County (Coleman 2020). The white flight to Maria del Rey, Playa Vista, and other upscale and non-Black communities was a decisive moment in the city's racial history as it was now populated by African Americans with Hispanics quickly moving into the enclave as well.

This population change ultimately shifted the demographic makeup of the city, including income, housing, and education. No longer was Inglewood considered a white upscale community. Rather, it was shifting towards being categorized as a ghetto by outside observers. By the early 1980s, the impact of Proposition 13 engulfed Inglewood. The outcome of Proposition 13, which capped funding for public schools and other services, indirectly led to the city's crack cocaine epidemic overseen at the street level by burgeoning gangs. As well, the demographic racial makeup of the city shifted, being reshaped by waves of immigrants come from war-torn Central America and Mexico (Kaplan 2020). The impact of Proposition 13 also resulted in the citizens of Inglewood finding great difficulty in obtaining assistance from state and federally funded community-based assistance programs. Of utmost concern was the inability to source the necessary funding for affordable housing, immediately placing the program at risk.

After the impact of Proposition 13, Inglewood came to be characterized as a city with boarded-up storefronts, widespread poverty and unemployment, rampant disorder, and high rates of violent crimes. By the mid-1990s, Inglewood claimed the 14th highest murder rate in the United States among those cities with a population of at least 100,000. As well, Inglewood's school district was virtually bankrupt and its buildings were considered to be decrepit, rat infested, underperforming, underfunded, and understaffed. However, the construction of SoFi Stadium and the

conversion of the land previously home to the Hollywood Racetrack to mixed-use real estate that is set to include retail and office space, hotels, a casino, and an entertainment complex, has the city that hip-hop icon Dr. Dre deemed as "always up to no good" positioned to become the country's next global city (Taboada 2020).

Without a doubt, Inglewood is in the midst of gentrification – a phenomena concisely defined by Smith (1996) as the process whereby poor, urban, and working-class neighborhoods get rejuvenated through a sudden increase of private capital investment and an influx of middle-class residents. The term gentrification is a loaded concept, often pieced together from local governments under the auspices of "revitalization, renaissance, regeneration, renewal, redevelopment, rejuvenation, restructuring, resurgence, reurbanization, and residentialization." All are part of the "alliterative governmental garble" that attempts to hide the true capitalist-city-building ideals behind gentrification which is nothing more than the "transformation of a working-class or vacant area of a city into a middle-class residential and/or commercial use area (Daniyelyan 2020; Slater 2009). One of the most common impacts of gentrification is the "demolition of old apartment rentals and the construction of new high-rise commercial buildings" (Greene 2015). Moreover, gentrification is no longer simply just this process as outlined by Greene – rather, and as evidenced by the ongoing process in Atlanta, Minneapolis, Las Vegas, and Inglewood, gentrification now "frequently entails construction of luxury condominiums, chain stores, high-end boutiques, and corporate entertainment and tourism venues" (Boston 2020).

LITERATURE REVIEW

Despite the importance of examining the relationship between professional stadium and their impact on real estate value – for all the reasons listed in the introduction – there has been surprisingly little academic work on the topic. That said, of the studies conducted on this topic, a vast majority of them conclude that the construction of a professional sports stadium often coincides with an increase in the value of the surrounding property value. As well, nearly all studies in this area of research make use of hedonic analysis to examine the difference in impact between those houses within proximity to the stadium to those at further distances. The advantage to using hedonic analysis is, of course, to allow for the characteristics of the houses – square footage, number of bathrooms and bedrooms, etc. – to be held constant despite inconsistent distances.

Tu (2005) was the first to employ a hedonic analysis to examine the impact of professional stadiums on neighboring real estate values. Tu utilized the Maryland Department of Planning's publicly available GIS data to review over 35,000 individual housing transactions between October of 1992 and December 2001. In his findings, Tu argued that the construction of the Washington Football Team's FedEx field improved the value of single-family homes in the area surrounding the facility.

Conversely to Tu's results, Dehring, Depkin, and Ward (2007) examined the effect of the Dallas Cowboys' search for a new stadium site on the Dallas-Fort Worth metroplex. Using residential property sales data collected from the Multiple Listing Service (hereafter MLS), the authors employed a hedonic pricing model to determine average property values in the Arlington, Texas area decreased shortly after the new stadium location was announced. As noted by the authors, questions regarding property value as construction commenced and after the opening of the stadium remained unanswered, in no small part due to the inability to obtain data in a timely fashion for the metroplex area. As well, employing another hedonic analysis, Kiel Mathewson, and Sullivan (2010) used the 1993 and 1999 American Housing survey to determine that NFL franchises had no significant impact on housing prices in their respective cities.

Feng and Humphreys (2018) used a spatial hedonic model to explore the impact of sports facilities in Columbus, Ohio on local residential real estate values. The study's findings indicated that both facilities – Nationwide Arena and Crew Stadium – created a net positive effect on intangible benefits that decreased as distance from the facilities increased. The data used in the study consisted of transaction completed in 2000 in the city of Columbus. Several other studies have made use of this dataset, including Brasington and Haurin (2006), Brasington (2007), and Brasington and Hite (2008).

As well, other studies studied the impact of professional stadiums on communities outside of real estate value. For example, Lavoie and Rodriguez (2005) employed a customized Box-Jenkins procedure to study the impact of

professional teams on the occupancy rates on hotels in Canadian cities. Using monthly data over a ten-year period, the results are somewhat ambiguous, though – and not surprisingly – the 1994-1995 NHL season lost to collective bargaining strife did show evidence of negatively impacting occupancy rates nationwide in those Canadian cities home to professional hockey franchises. Lertwachara and Cochran (2007) explored both the short-term and long-term financial impact to determine whether an increase in local income coincided with either the expansion or relocation or a professional sport franchise. In short, the finding found just weak relationships between a city's financial concession and incentives often used to lure franchises to a city.

Similarly to Lertwachara and Cochran, Coates and Humphreys (1999) used data from the Regional Economic Information System, ranging from 1969 to 1994, to explore the relationship between professional sport franchises and the real per capital personal income in the neighboring communities. The study allowed, among other variables, for the inclusion of the movement of professional franchises from one city to another and the construction of new facilities. The findings argued that a new sports franchise or facility had little, if any, impact on local economic growth. Miller (2002) reached the same conclusion when exploring the impact of stadium construction in St. Louis on the local construction industry. Using an econometric model "developed to explain the time series trend of the construction industry employment," Miller concluded that "levels of employment in the construction industry were neither higher nor lower during the construction." As well, Nelson (2001) examined the effects of Major League Baseball stadium locations, concluding that development in the core business district of the city is the best option; otherwise, the stadium could result in localized blight that dampens the ability to collect regional income.

With a focus on the Olympic Games, Hotchkiss, Moore, and Zobay (2003) examined the impact on employment and wages in Georgia because of Atlanta hosting the 1996 Olympic Summer Games. Using a standard differences-in-differences technique, the authors found that hosting the Olympic Games results in a 17-percent increase in employment across the state. Feddersen and Maenning (2013) also studied the economic impact of the Olympic Games by using monthly data over 16 different economic sectors. Using a nonparametric approach to "flexibly isolate employment effect," the authors concluded – contrary to the earlier findings of Hotchkiss et al. – that hardly any evidence exists to support a persistent shift in economic change in the aftermath of or the preparation for the Olympic Games. Any short-term effect was within the *retail trade, accommodation and food services* and *arts, entertainment, and recreation sectors* of the economy and quickly dissipated at the conclusion of the Olympic Games.

DATA PREPARATION & METHODOLOGY

The ZTRAX data used in this study provided unique challenges that needed to be addressed prior to any analysis being complete. The computing power necessary to wrangle a dataset with tens-of-millions of observations provided additional challenges. From a schematic standpoint, ZTRAX data is quite organized. All required information is housed in one of two formats, thus requiring a final compiling process. First, identifier columns are house within two separate layout stylesheets in Microsoft Excel format (*ZTrans* for real estate transactions and *ZAsmt* for real estate assessment data). To properly retrieve the associated data from the stylesheets, the *readxl* package is used:

```
layoutZAsmt <- read_excel(file.path(dir, 'layout.xlsx'), sheet = 1)
layoutZTrans <- read_excel(file.path(dir, 'layout.xlsx'),
                           sheet = 2,
                           col_types = c("text", "text", "numeric", "text", "text"))
```

Afterwards, to retrieve the actual data that coincides with the column names, it is necessary to first pull the unique column identifiers from the layout stylesheets, pivot them from long to wide format, and then read in the data from the associated text format files:

```
col_namesValue.new <- layoutZAsmt[layoutZAsmt$TableName == 'utValue', 'FieldName']

col_namesValue.new <- col_namesValue.new %>%
  pivot_wider(names_from = FieldName, values_from = FieldName)
  so.fi.data <- read.table(file.path(dir, "ZAsmt/Value.txt"),
                           sep = '|',
```

```
header = FALSE,
stringsAsFactors = FALSE,
skipNul = TRUE,
comment.char="",
quote = "")
```

Unfortunately, the process of reading in the actual data proved to be extremely time and resource intensive. Because of this, the process of data compilation was moved to the Amazon Cloud to make use of the Elastic Computing system. Specifically, a RStudio Server Amazon Machine Image was virtually booted onto an Amazon virtual server with a 64-core CPU and 488GB of RAM. Even with such computing power – far beyond any commercially available system – the process of compiling the data from the text files into a date frame within the virtual, cloud-based environment was difficult, taking over two hours to compile and then another two hours to complete the proceeding cleaning and preparation process.

The cleaning process, in short, entailed removing any transaction with incomplete data. As well, only those transactions with a sales price greater than $15,000 were kept avoiding family-based gifts of equity where the house was sold for nominal amounts, thus creating extreme outliers in the data. As well, only those residences within a 20-mile radius were kept limiting the scope of the study, as previous studies suggest that real estate value outside of that radius see drastically decreasing impact residuals. Finally, the *geosphere* package was used to calculate each houses' total distance, in miles, from each respective stadium. To do so, the latitude and longitude of each house was compared against the latitude and longitude of the respective stadium and, using Vincenty's ellipsoid formula, the distance was found:

```
sofi.cleaned <- sofi.cleaned %>%
  mutate(sofilat = 33.95356,
         sofilog = -118.33859)
meter2mile <- 0.000621371
sofi.cleaned[, distance := meter2mile * geosphere::distVincentyEllipsoid(
  cbind(PropertyAddressLongitude, PropertyAddressLatitude),
  cbind(sofilog, sofilat)) ]
sofi.cleaned
```

To explore the impact of stadium construction on sales prices based on proximity to the location, it was necessary to build several different treatment groups into the data. To do so, I partitioned the homes into different groups based upon their relative distance from each stadium:

```
sofi.cleaned <- sofi.cleaned %>%
  mutate(distance_ord = factor(
    case_when(
      distance <= 5 ~ "Short",
      distance >= 5.0001 & distance <= 10  ~ "Moderate",
      distance >= 10.0001 & distance <= 15 ~ "Long",
      distance >= 15.0001 & distance <= 20 ~ "Very Long")))
```

Categorizing the houses in such a fashion in effect create a series of concentric circles with each stadium serving as the focal point. All the residences fall into one of the pre-determined groups – under five miles, between six and ten miles, between 11 and 15 miles, and between 15 and 20 miles – without overlap.

As well, a variable needed to be created to indicate whether the sale of the property took place before or after the groundbreaking of each stadium (Allegiant Stadium in 2017, Mercedes-Benz Stadium in 2014, SoFi Stadium in 2016, and U.S. Bank Stadium in 2013):

```
sofi.cleaned$post16 = as.numeric(sofi.cleaned$year >= 2016)
```

In this research, I use a difference-in-differences approach to compare the pre- vs. post-groundbreaking of each stadium to explore the impact of home value assessments for those residences near the construction site based upon the hard-coded concentric circles. As well, the difference-in-differences framework used accounts for unique property characteristics, including the number of bedrooms, the total square footage, the age of the dwelling, and total calculated bathrooms. A classical difference-in-differences model is used, with those houses situated in the short distance serving as a reference category. However, given that the regression intercept is the prediction when all other coefficients are zero – meaning, zero years old, zero bedrooms, zero bathrooms, and zero square feet – it is necessary to means center these coefficient variables, as it is understood that houses indeed have age, bedrooms, bathrooms, and square footage. Doing so is common practice when working with linear regression models using real estate data (Dong and Hansz 2016; Shin, Saginor, and Van Zandt 2011). Once the linear model is created, the mean centering can be conducted by passing a list of vectors with the variable names to be centered:

```
model <- lm(SalesPrice ~ relevel(distance_ord, ref = “Short”) * year_ord +
age + TotalBedrooms + TotalCalculatedBath + SqFt, data = sofi.cleaned)

v.center <- c("TotalBedrooms", "SqFt", "age", "TotalCalculatedBath")

meanCenter(model, centerOnlyInteractors = TRUE, centerDV = FALSE,
standardize = FALSE, terms = v.center)
```

The construction of the DiD regression for rental units followed suit with housing prices. However, to determine rent-to-income burden, I retrieved monthly rent and income for census tracts within the 20-mile concentric circles. Afterward, the results are calculated by grouping the data by the distance variable and year and then dividing by the total number of census tracts over the widely accepted 30-percent income-to-rent ratio by the total number of census tracts:

```
rental.did.income.chart <- rental.did.income.chart %>%
  mutate(ratio = rentE / (median_incomeE / 12))

rental.did.income.chart <- data.frame(lapply(rental.did.income.chart$distance_ord, as.character),
                                      stringsAsFactors = FALSE)

final.ratio.numbers <- ratio.numbers %>%
  group_by(distance_ord, year) %>%
  summarize(over.ratio = sum(ratio >= .30))

final.ratio.numbers <- final.ratio.numbers %>%
  mutate(total.plots = as.numeric(
    case_when(
      distance_ord =="Short" ~ "182",
      distance_ord == "Moderate" ~ "995",
      distance_ord == "Long" ~ "2412",
      distance_ord == "Very Long" ~ "2150")))

final.ratio.numbers <- final.ratio.numbers %>%
  mutate(percent = over.ratio / total.plots)
```

Finally, information pertaining to race percentages surrounding each specific stadium was obtained via the US Census by using the *tidycensus* package with the percentage of each race being determined by dividing via the total population of each distance and/or census tract.

```
inglewood.race <- get_acs(
  geography = "tract",
```

```
  variables = c(white = "B03002_003",
  black = "B03002_004",
  asian = "B03002_006",
  hispanic = "B03002_012"
),
state = "CA",
county = "Los Angeles",
geometry = TRUE,
year = 2014,
summary_var = "B03001_001") %>%
  mutate(percent = 100 * (estimate / summary_est))
```

RESULTS

Table 1 present the results of the difference-in-differences regression model for each city with the ground-breaking for each specific stadium set as the time of interest. As well, to avoid a failed regression via a singular matrix, the 'Short' distance_ord classification was used as the reference point in each regression model and, as a result, serves as the *Intercept*. In each city, the *Intercept* reflects the average price of home sales prior to the groundbreaking of the stadium. The first price listed for 'Moderate', 'Long', and 'Very Long' indicates the difference from the *Intercept* average. In the case of Inglewood, this means homes in the 'Moderate' distance sold, on average, at $132,112.67 more than those homes in the closest reference point. The *year_ord* results showcase the average price increase/decrease over the *Intercept.* For example, homes in the 'Short' distance in Inglewood sold for, on average, $1,777,626.96. Therefore, homes in the 'Moderate' distance sold for $814,966.30 more than the calculated difference in the *Intercept*.

Table 1: Results of DiD Regression for Home Prices

City/Stadium		Estimate	t-value
Inglewood/SoFi	Intercept	$445,659.73	34.53
	Moderate	$132,112.67	12.83
	Long	$127,935.43	12.42
	Very Long	$107,749.94	10.53
year_ord	Intercept	$731,957.23	28.56
	Moderate	$814,966.30	26.93
	Long	$202,345.83	6.70
	Very Long	$107,749.94	4.89
Paradise/Allegiant	Intercept	$1,408,964.25	148.39
	Moderate	-$94,264.07	-17.25
	Long	-$143,391.54	-23.60
	Very Long	$667,758.15	71.66
year_ord	Intercept	$275,949.50	13.29
	Moderate	-$52,805.07	-2.23
	Long	-$56,744.20	-2.22
	Very Long	-$399,974.68	-36.07
Minneapolis/US Bank	Intercept	$128,508.83	21.05
	Moderate	$8,356.27	5.42
	Long	$2,307.77	1.29
	Very Long	$57,625.35	24.25
year_ord	Intercept	$181,317.43	16.39
	Moderate	-$75,562.82	2.85

	Long	-$66,930.44	-15.56
	Very Long	$173,646.28	-16.62
Atlanta/Mercedes	Intercept	$127,670.69	16.39
	Moderate	$11,820.80	2.85
	Long	-$77,284.59	-15.56
	Very Long	-$84,865.04	-16.62
year_ord	Intercept	$220,069.17	47.27
	Moderate	$44,471.19	5.93
	Long	-$36,001.22	-4.16
	Very Long	-$95,406.51	-10.68

Table 2 presents these numbers in their entirety. In Inglewood, homes in the 'Short' distance, the *Intercept*, with the additional post-2016 average included, sold for, on average, $1,177,626.96, resulting in a 90.18-percent difference from the average pre-construction to post-construction of SoFi Stadium. Homes within the 'Moderate' distance had a 110.8% difference between the adjusted control and treatment, while homes in the 'Long' and 'Very Long' distance witnessed less of an impact, with an 82.55-percent and 79.61-percent difference, respectively. Homes in the vicinity of Allegiant Stadium maintained a vastly different impact, with those closest – within the 5-mile distance radius - saw just a 17.83-percent increase in average price. This is relative, though, as Paradise was the locale of the most expensive homes pre-construction of any other city as, for example, those homes within a 5-mile radius averaged a sale price of over $1.4 million. Homes within the 'Moderate' and 'Long' distances had similar price increases at 21.54 percent and 25.06-percent. However, homes in the 'Very Long' distance were a stark outlier within the totality of the data, as they were the only group to see a negative difference pre- and post-construction. Homes in the closest distance to both U.S. Bank Stadium and Mercedes-Benz Stadium were like those homes in Inglewood, with the closest distances shouldering the largest impacts among the locales. In Minnesota, homes within 5-miles of U.S. Bank Stadium had an 82.73-percent difference while those homes closest to the home of the Atlanta Falcons saw a 92.58-percent increase. Only homes within the 'Very Long' distance in Minnesota saw a larger increase between the two cities at 88.8-perent.

Table 2: Percent Difference Between Adjusted Control and Treatment for Homes

City & Stadium	Distance in Miles	Adjusted Control	Adjusted Treatment	Percent Difference
Inglewood /Sofi	**< 5**	$445,659.73	$1,177,626.96	90.18%
	5.1 – 10	$577,772.40	$1,992,593.26	110.08%
	10.1 – 15	$573,595.16	$1,379,972.79	82.55%
	15.1 – 20	$553,409.67	$1,285,376.90	79.61%
Paradise/ Allegiant	**< 5**	$1,408,964.25	$1,684,913.75	17.83%
	5.1 – 10	$1,314,700.18	$1,632,108.68	21.54%
	10.1 – 15	$1,265,572.71	$1,628,169.55	25.06%
	15.1 – 20	$2,076,722.40	$1,284.939.06	-47.10%

Minn./ US Bank	**< 5**	$128,508.83	$309,826.26	82.73%
	5.1 – 10	$136,865.10	$234,263.44	52.48%
	10.1 – 15	$130,816.60	$242,895.82	59.98%
	15.1 – 20	$186,134.18	$483,472.54	88.80%
Atlanta/ Mercedes	**< 5**	$127,670.69	$347,739.86	92.58%
	5.1 – 10	$231,889.80	$392,211.05	51.37%
	10.1 – 15	$142,784.58	$311,738.64	74.34%
	15.1 – 20	$135,204.13	$252,333.35	60.44%

Tables 3 and 4 present the results of the difference-in-difference regression model for the average monthly cost of rent. Just as the housing sales price model was designed, the 'Short' distance in the rent regression model serves as the reference point and, therefore, is referenced to as the *Intercept*. Compared to the housing sales price model, the differences in rent from pre- to post-construction are quite similar across all four cities as those rental units closest to each respective stadium saw the largest increase across the board. Aside from the 'Long' and 'Very Long' distance in Minnesota, the rent differences base on distance in the other three cities fell into descending order with the biggest difference appearing in the 'Short' distance and the smallest different between pre- and post-construction occurring at the 'Very Long' distance.

Table 3: Results of DiD Regression for Rental Units

City/Stadium		Estimate	t-value
Inglewood/SoFi	Short	-$106.73	-3.83
	Moderate	-$10.68	21.36
	Long	$1,272.55	74.84
	Very Long	$185.28	5.89
year_ord	Short	-$14.85	-0.43
	Moderate	$18.94	26.13
	Long	$127.76	6.13
	Very Long	$8.60	0.22
Paradise/Allegiant	Short	-$237.74	-9.01
	Moderate	-$162.54	-7.53
	Long	$1,275.63	71.36
	Very Long	$136.41	2.81
year_ord	Short	-$4.35	-0.11
	Moderate	-$7.98	-0.26
	Long	$74.73	2.95
	Very Long	-$51.12	-0.75
Minneapolis/US Bank	Short	-$281.13	-10.40
	Moderate	-$170.28	-6.15
	Long	$1,172.39	53.37
	Very Long	-$68.67	-1.39

year_ord	Short	-$21.90	-0.67
	Moderate	-$10.00	-0.30
	Long	$144.02	5.46
	Very Long	-$37.08	-0.62
Atlanta/Mercedes	Short	-$201.46	-5.85
	Moderate	-$127.63	-3.42
	Long	$1,087.97	34.81
	Very Long	-$121.91	-2.78
year_ord	Short	-$39.80	-0.89
	Moderate	-$44.90	-0.93
	Long	$174.85	4.34
	Very Long	-$40.59	-0.71

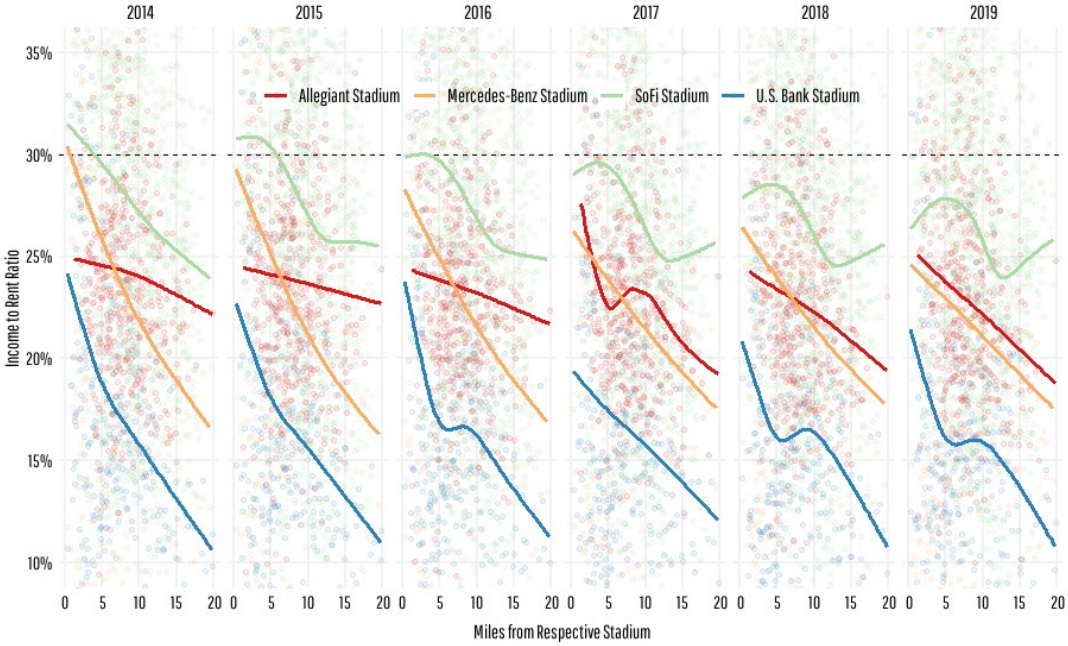
Table 4: Percent Difference Between Adjusted Control and Treatment for Rentals

City & Stadium	Distance in Miles	Adjusted Control	Adjusted Treatment	Percent Difference
Inglewood /Sofi	**< 5**	$1,165.62	$1,385.46	17.23%
	5.1 – 10	$1,261.87	$1,419.25	11.73%
	10.1 – 15	$1,272.55	$1,400.31	9.55%
	15.1 – 20	$1,457.83	$1,408.91	-3.41%
Paradise/ Allegiant	**< 5**	$1,037.89	$1,346.01	25.85%
	5.1 – 10	$1,113.09	$1,342.38	18.67%
	10.1 – 15	$1,275.63	$1,350.36	5.69%
	15.1 – 20	$1,412.04	$1,299.24	8.32%
Minn./ US Bank	**< 5**	$891.26	$1,294.51	36.89%
	5.1 – 10	$1,002.11	$1,306.41	26.36%
	10.1 – 15	$1,172.39	$1,316.41	11.57%
	15.1 – 20	$1,103.72	$1,279.33	14.73%

Atlanta/ Mercedes	**< 5**	$886.51	$1,223.02	31.90%
	5.1 – 10	$960.34	$1,217.92	23.65%
	10.1 – 15	$1,087.97	$1,262.82	14.87%
	15.1 – 20	$966.06	$1,222.23	23.41%

Moreover, examining the data through the lens of income-to-rent ratio provides further insight into the financial impact those living closest to each stadium compared to those living at further distances. Graph 1, below, highlights the income-to-rent ratio for all census tracts that comprise all four cities faceted by year in relation to the construction timeline of respective stadiums. The most common metric to determine the amount of burden placed on renters is the rent-to-income ratio – or dividing rent by income. The U.S. Department of Housing and Urban Development (HUD) "defines households that spend more than 30-percent of their income on housing" a rent burdened (Schuetz 2017). Graph 1 visualizes the amount of rent burdened census tracts based on distance, in minutes, from each respective stadium. Those renters in the closest vicinity to Allegiant Stadium were immediately impacted by the 2017 groundbreaking as indicated by the alarming swing upwards towards the 30-percemt "rent burdened" household. The income-to-rent ratio returned to more stable conditions in the following two years. However, a noticeable increase in the slope of the line is indicative that a wealthier population is moving into the further distances as the income-to-rent ratio lessons. With a groundbreaking in 2014, the collectable data for Mercedes-Benz Stadium shows a classic sign of ongoing gentrification as the income-to-rent ratio in the areas closest to the stadium declined for five continuous years. With a groundbreaking in 2016, the data for SoFi Stadium shows a similar trend towards clear gentrification as those renters in immediate proximity to the stadium began to skew towards a wealthier population, indicated by the continuingly lowered income-to-rent ratio. The same occurred in Minneapolis in the time directly after U.S Bank Stadium's groundbreaking. In each instance, the income-to-rent ratio closest to the stadiums decreased – sometimes drastically. At face value, a lowered income-to-rent ratio can be a positive impact of a stadium. However, as Table 4 highlights, rent prices increased by nearly a combined 30-percent across all four cities. Increased rent, yet a lowering income-to-rent ratio, is yet another classic sign that gentrification is occurring wherein a wealthier population is moving into the area as the prior population is no longer able to afford the increasing cost of living.

Graph 1: Income to Rent Ratio Based on Miles from Each Stadium



Given gentrification's pertinacity for displacing minority populations as areas skew towards higher costs of living and rent-to-income ratios, Table 5 displays the change in percentage of four races (Asian, Black, Hispanic, and White) based on distance from respective stadiums. It is contextually important to compare the percentages in Table 5 to those, for example, in Table 4. For example, in Inglewood, those renters in closest proximity to SoFi Stadium were most impacted by increased rent yet, despite this, the income-to-rent ratios decreased. In the *Short distance pre-groundbreaking*, the two majority races were Hispanic (50.4-percent) and Black (33.60-percent). After the groundbreaking of SoFi Stadium, the Black population decreased by 8.6-percent while the Hispanic population remained relatively stable at a small 3.8-percent increase. However, the Asian population of the area increased by an even 12-percent. The same transition occurred in Atlanta in the rental units closest to Mercedes-Benz Field. Prior to groundbreaking, Black renters accounted for nearly 60-percent of the population. After groundbreaking, there was a 2.3-percent decrease in Black population and an 8.3-percent increase in the Asian population.

Table 5: Change in Demographic Pre- and Post-Groundbreaking of Stadiums

	Pre-Groundbreaking Race Percentage			
	Asian	**Black**	**Hispanic**	**White**
Inglewood/Short	4.39	33.60	50.4	8.71
Inglewood/Moderate	13.00	8.25	51.8	24.20
Inglewood/Long	14.10	5.02	48.3	29.40
Inglewood/Very Long	17.10	3.91	42.9	33.3
Atlanta/Short	3.10	59.80	4.82	30.20
Atlanta/Moderate	2.41	55.20	8.31	33.00
Atlanta/Long	4.40	46.70	9.03	38.80
Atlanta/Very Long	4.36	29.40	10.50	53.50
Minneapolis/Short	5.41	18.60	9.56	61.4
Minneapolis/Moderate	6.17	11.8	7.60	70.70
Minneapolis/Long	6.21	5.34	3.28	82.60
Minneapolis/Very Long	3.30	1.70	2.70	90.40
Paradise/Short	12.50	9.86	30.50	42.70
Paradise/Moderate	8.37	10.20	34.70	42.30
Paradise/Long	6.82	11.60	23.90	52.90
Paradise/Very Long	7.75	7.42	15.50	64.50

Post-Groundbreaking Race Percentage (% diff.)			
Asian	**Black**	**Hispanic**	**White**
4.92 (12.0)	30.80 (-8.6)	52.40 (3.8)	9.00 (3.2)
13.00 (0)	8.09 (-1.9)	51.50 (0.5)	24.30 (0.4)
14.40 (2.1)	4.94 (-1.6)	48.70 (0.8)	28.90 (-1.7)
17.60 (2.8)	4.09 (4.5)	42.70 (-0.4)	32.00 (-3.9)
3.37 (8.3)	58.40 (-2.3)	4.49 (-7.0)	31.3 (3.5)
3.13 (25.9)	56.60 (2.5)	5.05 (-48.8)	33.10 (0.3)
5.53 (22.7)	46.90 (.4)	9.90 (9.1)	35.40 (-9.1)
4.51 (3.3)	30.0 (2.0)	11.60 (9.9)	51.10 (-4.5)
5.45 (0.7)	18.90 (1.6)	9.83 (2.7)	60.10 (-2.1)
7.54 (19.9)	13.30 (11.9)	8.24 (8.0)	67.10 (-5.2)
7.04 (12.5)	7.52 (33.9)	3.55 (7.9)	78.60 (-4.9)
4.59 (32.6)	2.15 (23.3)	3.39 (22.6)	87.60 (-3.1)
13.40 (6.9)	12.00 (19.5)	32.10 (5.1)	37.40 (-13.2)
8.87 (5.8)	10.90 (6.6)	36.10 (3.9)	39.10 (-7.8)
6.63 (-2.8)	12.10 (4.2)	26.40 (9.9)	50.00 (-5.6)
6.57 (-16.4)	9.02 (19.4)	16.80 (8.0)	61.70 (-.4.4)

DISCUSSION AND CONCLUSION

The findings highlighted in this research indicate several concerning trends for those citizens living in closest proximity to site of a new professional football stadium. First, using a standard difference-in-differences regression model, I found that, except for Paradise and Allegiant Stadium, home sales prices closest to the location of stadium construction – that is, within the *Short* and *Moderate* distances – increased at a higher percentage relative to house in further concentric circles. Moreover, the findings for the monthly cost of rental units are even more linear. Rental units in census tracts closest to the stadium location, as measured by distance in minutes, all had the largest increase between the adjusted control and treatments. Specifically, those rental units in the 'Short' distance across all four cities averaged a 27.9-percent increase while the *Moderate*, *Long*, and *Very Long* distances average 20.1, 10.2, and 10.7-percent respectively. Further, rental units in census tracts closest to the stadiums, as measured by distance in minutes, maintained a higher income-to-rent ratio than census tracts at further distances and were often the most impacted by a rapid swing towards higher income-to-rent ratios as the result of the coinciding increase in rent. And, while not a direct correlation given the structure of the available data, the prior majority population decreased in overall percentage post-groundbreaking.

My findings therefore differ converge from Coates and Matheson (2011), Dehring, Depken, and Ward (2007), and Kiel, Matheson, and Sullivan (2010) who all found little relationship between professional sport stadiums and rent and/or house value/sale prices as Table 2 shows an increase in the percent difference between the Adjusted Control and Adjusted Treatment of prices of those houses sold in the closest concentric circles. Indeed, Hwang and Ding (2020) stated. "negative effects of gentrification are felt disproportionately by minority communities, whose residents have fewer options of neighborhoods they can move to compared to their white counterparts." As mentioned, Table 5 highlights this phenomenon. For example, as the core of Inglewood continues to redevelop, it is likely that the city will follow the trend of others, wherein white home buyers arrive in the core with incomes that are on average twice as high as that of their existing neighbors, and two-thirds higher than existing homeowners (Badger, Bui, and Gebeloff 2019). As mentioned, Graph 1 clearly shows this residual impact of gentrification taking place. Shortly after the construction of SoFi Stadium began, a noticeable downward trend appeared in the percentage of census tracts above the 30-percent threshold that indicated rent-burden, which is a telltale sign of gentrification.

The results of this study unquestionably affirm Los Angeles Rams' owner Stan Kroenke's belief that the construction of the new stadium would ultimately boost the property values in the surrounding area relative to home values at further distances. However, Kroenke's stadium was not a trendsetter in this process, as this research highlighted that many of the stadiums built prior to SoFi Stadium – U.S. Bank Stadium in Minneapolis, and Mercedes-Benz Stadium in Atlanta – impacted local neighborhoods in much of the same fashion. That said, SoFi Stadium did not hold its first football game until September of 2020, meaning the gentrification process is likely still in its infancy stage, as is the process in Paradise, Nevada and the area surrounding Allegiant Stadium. Citizens of both locales, based on the findings of this study, can reasonably look towards neighborhoods in Atlanta and Minneapolis to gauge the continued impact of the stadium on the gentrification process. The findings of this study provide the necessary arguments for substantial planning and policy attention for current impacted cities as well as future ones, including Arlington Heights, Illinois (the future home of the Chicago Bears) and the citizens of Buffalo, New York as the Bills prepare to construct a new, state-of-the-art stadium. Short of significant preparation, the concerns outlined by Murdie and Teixeria (2011) and Newman and Wyly (2006) of damage to the local education system, the depletion of long-term viability and supply of low-cost housing, and a widening gap in class polarization are likely to become a stark reality in impacted neighborhoods.

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SCENARIOS NOT ADEQUATELY ADDRESSED BY ECONOMIC THEORIES

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ABSTRACT

This paper illustrates by using examples how some key and useful real-life factors are not considered in theoretical studies of economics. It explains what differences these factors will make if one or several of them are looked at. A comparison with the development of mathematics and physics suggests why it is necessary for economists to identify elementary postulates (in the language of mathematics) and laws (in the language of Newtonian physics) at the level of the four human endowments (self-awareness, imagination, conscience, and free will) as the bases for developing the rest of the theory of economics. To demonstrate the potential of this proposal, this paper develops a theorem on when a firm experiences organizational inefficiency. This work contributes to the literature by considering decision-making based on the most fundamental systems of values and beliefs of economic agents. By doing so, it will potentially help realize the goals of behavioral economics at the height of analytical analysis with greatly enhancing practical applicability.

INTRODUCTION

As the title suggests, this paper employs a few examples to illustrate how some key and useful real-life factors are not considered in theoretical studies of economics. And by comparing researches of economics with those of mathematics and physics, it points to the necessity of developing economic knowledge through using logical reasoning, which is parallel to that employed in mathematics, and through originating each analysis on some elementary postulates (in the language of mathematics) and/or laws (in the language of Newtonian physics). To this end, this paper proposes to develop these elementary postulates and/or laws at the level of the four human endowments – self-awareness, imagination, conscience and free will. This idea is different of that of standard economic models, which are developed on the assumption of a *homo economicus* who is rational and selfish, has computational capability, and never mistakes (Cartwight, 2014).

Although what is proposed herein seems to be related to positive/normative economics, the two bear fundamental differences. Specifically, the latter aims to describe and address what various economic programs, scenarios and environments are and should be (Caplin & Schotter, 2008); this paper suggests a possibility to reshape the theoretical foundation of economic theories on a more manageable footing by starting all logical reasonings on the four human endowments and relevant elementary facts. By accomplishing this goal, the consequently established theory will be able to avoid the difficulty, facing normative economics, of rigorously explaining problems and issues, and the inevitable emphasis on empirical confirmations of the positive economics. The importance of avoiding the difficulty of normative economics is evident for both theoretical and practical purposes. At the same time, although empirical studies are inevitable in economic investigations, economists face the problem of erroneous thinking of the fallacy of composition when general recommendations need to be produced for decision makers based on empirical discoveries (Finocchiaro, 2015). Historically, this present work is also warranted, if we see the parallelism between the current state of economic and business studies and that when Isaac Newton developed his laws of physics. In particular, presently in the world of business, deluges of data are collected and made available for analysis; and at the time when Newton was developing his laws of motion, large amounts of data were collected and various empirical formulas were proposed by different scholars (Lin, 2009).

If this proposal can be carried out successfully in the years to come, one can expect to improve a current situation of economic studies. In particular, the current situation can be described as follows: although a recognized business success is carefully analyzed, the established theory most likely cannot help reproduce the desired economic outcomes in another business setting at a different geographical location. One good example to illustrate this end is the Industrial Revolution of England. It has been widely investigated and theorized by many scholars over the years. However, when

their theories were employed in practice by many developing countries, these countries experienced failures, because the applied theories, no matter which one was adopted, did not really work (Forrest et al., 2018; Wen, 2016).

Specifically, although many human characteristics, such as personal charms and abilities, are not within the purview of economics (Pancs, 2018, p. 5), this paper uses a fictitious example to illustrate a commonly existing social phenomenon and show that when individuals' wishes are involved, some conclusions in neoclassical economics will be different. The given example demonstrates that when human desires and wishes are involved, the mainstream economics can be further enriched by logical reasonings that start on individuals' systems of values and beliefs.

In terms of the concept of rationality, it is traditionally treated as that of optimization constrained by given conditions (Wu, 2003; 2006). It is later generalized by Herbert A. Simon (Campitelli & Gobet, 2010) when he introduces the concept of bounded rationality as an alternative approach to modeling decision-making, see Hudik (2019) for very nice interpretations of rationality. Along this line of tradition, this paper proposes that each person in general is rational in his/her own sense, as defined or bounded by his/her underlying values and beliefs. When a person makes decision, he/she reasons simply by retrieving categorized values and beliefs and information in the memory (e.g., Chiou et al., 2018; Sahni, 2016;) to quickly optimize the expected potential. Corresponding to their different value-and-belief systems, individuals use their correspondingly varied methods to optimize utilities, profits, costs, risks, etc., although the stated objective functions might look the same from one economic agent to another.

This paper points out what issues exist with the analysis of the well-known prisoners' dilemma from the angle of individuals' value-and-belief systems in general and moral codes in particular. And to demonstrate how our proposed approach will work, this paper develops a theorem on when a firm experiences organizational inefficiency.

In terms of the contribution this study makes to the literature, it can be readily seen that by considering decision-making on the basis of economic agents' most fundamental systems of values and beliefs, the goals of behavioral economics (Zeiler & Teitelbaum, 2018) are naturally carried many steps forward. The agents considered here can be either individuals or firms; and for the latter case, the value-and-belief systems take the form of organizational cultures that are crystalized as companies' missions (Forrest et al., 2020; McGrath, 2013). In particular, psychological, cognitive, emotional, cultural and social factors can all be related to the natural human endowments – self-awareness, imagination, conscience and free will, on which individuals establish their systems of values and beliefs (Lin & Forrest, 2012).

The rest of this paper is organized as follows: The following section looks at an example that vividly demonstrates the fact that when individuals pursue their respective selfish good, they do not necessarily achieve the collective best good for all. Next, we use a directed, weighted network to show that even when economic agents are rational, their rationalities tend to be different from one agent to another so that consequent optimizations used in their decision making follow different sets of criteria. After paying a revisit to the well-known prisoners' dilemma, we show that this dilemma does not exist if prisoners' systems of values and beliefs are introduced in the analysis of the game. Based on the discussions in the previous sections, it is proposed to rebuild theories of economics on the basis of the four human endowments – self-awareness, imagination, conscience and free will – as some of the most basic building blocks. The presentation of this research concludes with a few last comments.

ATOMICALLY MAXIMIZED UTILITIES CAN AND DO LEAD TO COLLECTIVE MISERY

To see such a situation that respective maximizations of individuals' utilities can and do produce collective misery, let us first paraphrase a fictitious scenario constructed initially by Dr. Scott W. Williams of SUNY at Buffalo over thirty years ago when he visited Auburn University, Alabama.

Three friends, named A, B, and C, did some honorable deeds. So, Genie likes to grant each of them a wish. Jumping on the opportunity, A demands that instead of the current location in a remote mountainous area, he wishes he could be living in the middle of a prosperous city center with all the wealth he will ever need in life. Bang, in a fraction of second, A now lives in the condition he wishes for.

Turning to B, Genie asks: "What wish do you like to materialize?" Looking at Genie. B answers: "I don't like to spend any additional single day of my life in this boring country out of nowhere. What I truly love is to live on a beach day after day with many beautiful women around me." Bang, as soon as having finished stating his wishes, B is now sunbathing on a beautiful beach, sipping his favorite drinks while served by many gorgeous women.

Facing C, Genie questions: "What is the wish you like me to grant you?" Without thinking much, C answers, "I really like this mountainous area. The air is always fresh, water is clean, and everything around me is green. So, my wish is that my friends A and B can live with me right here and immerse ourselves in the nature."

What happens next will be either that both A and B will be not happy or C be not happy, because their individual wishes are not consistent and cannot be compromised with each other.

If we use the terminology of utilities, we can model this fictitious scenario in terms of the utility functions U_i, $i = A, B, C$, as follows, where $X_i,\ i = A, B, C$, represent respectively the consumptions of these people:

$$U_A = U_A(X_A, X_B, X_C), U_B = U_B(X_B, X_A, X_C), U_C = U_C(X_C, X_A, X_B, U_A, U_B)$$

satisfying that U_A, U_B and U_C are increasing functions in X_A, X_B, and X_C, while U_C is also a convex function in U_A and U_B, respectively, so that U_C is an increasing function in U_A until a given upper bound B_A and in U_B until a given upper bound B_B, then U_C becomes a decreasing function in U_A and U_B, respectively. In this expression, the friendship is reflected in the appearance of individual consumptions in each utility function.

In this modeling, both A and B are self-centered, because their utility functions do not contain the utility of C except their own consumptions. At the same time, C treats both A and B as his friends up to a point. Specifically, after A or B or both of A and B reach certain levels of 'success' in life, C starts to feel bad and then worse. In other words, the maximization of C's utility can only be reached when the utilities of friends A and B are not more than their respective upper bounds B_A and B_B, while his diminishing utility cannot be offset by any amount of increasing consumption of goods.

Although the previous example is fictitious, it does depict a huge collection of commonly existing social phenomena in real life, where some people enjoy their respectively increasing utilities through belittling others. Beyond the existence of such people, another fundamental issue not within the purview of economics is individual differences in terms of personal charms, abilities and other human characteristics (Pancs, 2018, p. 5), most of which are dictated by people's deeply rooted systems of values; and these value systems control what is considered moral or right or wrong in life (Lin & Forrest, 2012). In mathematical terms, this end means that even with the assumption that people do make consumption decisions by maximizing their utilities, the specifically employed criteria of maximization can be totally different from one person to another.

In discussions of economics, the famous 'invisible hand' of Adam Smith (1776) originally describes merely how individuals' actions, in terms of production of goods, employment of capital and domestic industries, that are self-centered without involving any public goods can lead to unintended social benefits. However, such initial description with a well-defined scope has been interpreted over the years in various ways by many different authors in different contexts (too many works to be listed here, so they are all omitted). For example, according to Paul Samuelson's (1998), a 1970 Nobel laureate in economics, writing in 1948, this mystical principle – the existence of the invisible hand – means that when individuals pursue their respective selfish good, they collectively achieve the best good for all. The example we just discussed above clearly and undoubtedly points out the fact that this interpretation of Smith's 'invisible hand' is not correct in general. This end is exactly as what Basu (2010) states: Popularizers of economics often misrepresent conditionally-true conclusions of economics in general terms with the underlying conditions ignored. Especially, what is discussed above indicates that when human desires beyond living necessities are involved, the mainstream economics can be further enriched by starting logical reasonings from the basic properties of the human systems of values and beliefs.

INDIVIDUAL RATIONALITIES DIFFERENT FROM ONE ECONOMIC AGENT TO ANOTHER

To support the previous claim that even if people make consumption decisions by maximizing their utilities, the specifically employed definitions of maximization can be totally different from one person to another, let us look at the following example, constructed based on Hu (1982) and Lin (1999, p. 136).

Assume that the directed and weighted network in Figure 1 represents a production routine of a business operation. The manager likes to find the minimum path that connect node A, representing the start of the production, with node E, the end of the production. If in his calculation the manager orders the real-number weights the same way as how real numbers are conventionally ordered, then the path A → B_1 → C → D_1 → E is what the manager is looking for. The weight of this path is equal to 1. In comparison, other possible paths from node A to node E have weights 2, 3, and 4, respectively.

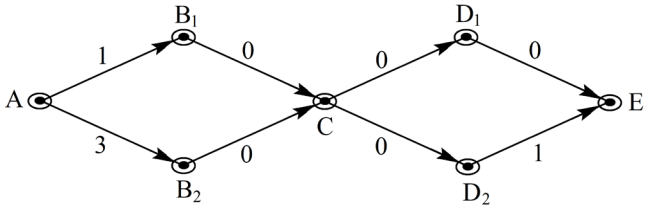

Figure 1. The concept of minimum is defined differently

However, if in the manager's set of decision criteria there is a mod4 function, that is, in his set of criteria, for any two real numbers x and y, $x < y$ if and only if $x(\mathrm{mod}4) < y(\mathrm{mod}4)$, then the path with the minimum weight is A → B_2 → C → D_2 → E. In particular, the weight of this particular path is 3 + 0 + 0 + 1 = 4 (mod 4) = 0, while other paths respectively have weights 1, 2, or 3.

Speaking differently, what this example demonstrates is that when the criteria of priority are different from one person or business situation to another, the same profit (respectively, cost) function can have totally different maximum (respectively, minimum) values due to the fact that the measurements of optimization are different. Such differences in the measurement of optimization reflects the differences in individuals' systems of value and beliefs.

When looking at a real-life economic process, the mod4 function in this example can be considered as periodicity 4, where the underlying process repeats itself periodically with period 4. In particular, if we apply this mod function on the time variable underneath an economic process, then the specific period 4 can be replaced by any positive real number r. In this case, it simply means that the economic process starts at time moment 0 and finishes at moment r, from which the process starts all over again to repeat itself. With this understanding, the time line (or the real number line) becomes a circle of circumference r on which a point travels one loop after another starting at the origin without end in sight, Figure 2.

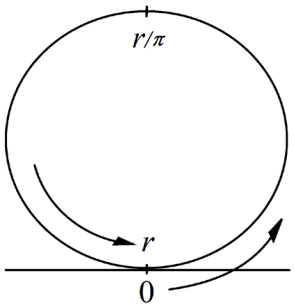

Figure 2. How mod$r$ function is modelled by a point on the circle of radius $r/2\pi$

To illustrate the concept involved in the previous discussion, let us look at school semesters of an education system. Assume that the student evaluation of every course contains a question on student learning and the effectiveness of

professor's teaching. Due to differences in the value and belief systems of individual professors, each professor generally employs his/her unique approach to maximize students' learning. In other words, although each chosen optimum approach comes out of the same objective function, different personal systems of value and beliefs lead to different optimal outcomes. In this example, the length of one school semester is the period, over which professors seek for their individually unique ways to deliver their effective teaching and produce the maximal student learning.

To summarize, instead of assuming that every economic agent is rational in a universally accepted sense and makes decisions by optimizing his/her expected outcomes through using tools from a defined set of approaches (Campus, 1987), the more realistic situation is the following:

> Each person has his/her own specific system of value and beliefs (Lin & Forrest, 2012). When a person makes decision, he/she optimizes the given situation by using his/her underlying individually specific criteria rooted in the person's system of value and beliefs.

To this end, one might challenge by asking: How can you explain impulsive purchase decisions, which later turn out to be against some of the underlying values or beliefs of the purchaser? Such purchases generally end up in one of two possibilities: the purchased good is returned or it is not used for the originally expected purpose. In either case, the violated values and beliefs are corrected.

More specifically, the aforementioned assumption of universally accepted rational agents implicitly means the existence of an external system of measurement, which judges whether a particular behavior is rational or the procedure of optimization is gone through universally no matter who is conducting the optimization. In the contrary, the realistic situation, as given above, assumes away any external measurement system and allows economic agents to optimize their objective functions by using their individually different sets of criteria; and these criteria are developed out of these individuals' underlying systems of value and beliefs. Because of this reason, to deal with a situation of concern, different economic agents take their individually different optimization approaches. These differences in approaches then lead to drastically different outcomes due to diversely dissimilar courses of actions taken. In short, what is considered optimal is different from one economic agent to another; and instead of being universal, the used methods of optimization are in fact also different from one decision maker to another.

In terms of the literature, the concept of rationality has been studied in many fields of knowledge, including, but not limited to, economics (e.g., Krugman & Wells, 2017), game theory (e.g., *Osborne & Rubinstein, 2001*), decision science (e.g., *Parmigiani & Inoue, 2009)*, artificial intelligence (e.g., *Russell & Norvig, 2003*), cognitive science (e.g., Varela et al., 1991), ethics (e.g., Ferrel et al., 2018) and philosophy (e.g., Bourdieu, 1998). In particular, in the context of economics, a customer is considered rational, if he/she has clear preferences, handles uncertainties by using functions of variables, and takes actions to optimize expected outcomes for him/herself from among all feasible possibilities. When such a concept of rationality is employed to develop a scholarly body of knowledge as one of the fundamental building blocks, one can readily see that the knowledge will not be adequate enough to capture a major part of the reality. It is because in real life many decisions are made under the dominating influence of psychological, cognitive, emotional, cultural and social factors. The realization of such challenge has led to the development of behavioral economics (Teitelbaum & Zeiler, 2019) in order to study the effects of psychological, cognitive, emotional, cultural and social factors on the decisions of individuals and institutions and how such decisions vary from those implied by classical economic theory (Zeiler & Teitelbaum, 2018).

Since psychological, cognitive, emotional, cultural and social factors are associated with the content in the value-and-belief system of a decision maker for these factors to be part of decision making (Lin & Forrest, 2012), we propose that each person in general is rational in his/her own sense as defined by his/her underlying values and beliefs. When a person makes decision, he/she reasons by retrieving categorized values and beliefs and information in the memory to quickly optimize the expected potential. This end has been confirmed repeatedly by scholars in the area of the categorization paradigm of the marketing research (e.g., Chiou et al., 2018; Mandler 1982; Moss, 2009; Nedungadi 1990; Sahni, 2016; Sujan 1985), and by studies of politics and the science of mind (Lakoff & Wehling, 2016). Because individuals have their own different systems of values and beliefs, the methods individuals use to optimize utilities, profits, costs, risks, etc., have to be different from one another although the stated objective function might look the same, as demonstrated by the previous example. That explains why a perfect logical reasoning in one person's

standard, such as Donald Trump's handling of national and international affairs during his presidency from 2017 - 2021, can be seen as irrational in many other people's eyes.

ISSUES WITH THE ANALYSIS OF PRISONERS' DILEMMA

Before we present our suggestion on using human systems of values and beliefs as a fundamental building block of economic theories, let us first look at issues with the prisoners' dilemma (Poundstone, 1993). To make our points cross more easily, let us first outline the related details.

> Two members of a gang are arrested and placed in solitary detention so that they cannot communicate with each other. Without adequate evidence to convict them on the principal charge other than a lesser charge, the prosecutors offer each gang member a bargain opportunity: betray the other by testifying the other's committing the crime, or remain silent. The associated payoffs are given below, where each negative number standards for the number of years in prison.

		B's choice	
		Stay silent	Betray
A's choice	Stay silent	-1, -1	-3, 0
	Betray	0, -3	-2, -2

The conventional study of this game assumes that the prisoners will not be rewarded or punished in any other way than what is given here. So, if the prisoners are rational, betraying the other is the only optimal choice. As a consequence, both of these prisoners serve 2 years in prison. That is worse outcome than that if they both stay silent cooperatively.

With the given assumptions, the analysis of this game is perfect. However, the very problem with this dilemma that disagrees with what often happens in real life appears with the assumptions, because in real life people make decisions by using their systems of values and beliefs instead of merely considering self-centered payoffs based on the so-called rationality. In other words, people generally do not make decisions that are against their moral codes rooted in their systems of values and beliefs even when offered with rewards. That explains why in real life, people tend to be biased towards behaving cooperatively instead of individually maximizing their own utilities without considering consequences others have to bear (Fehr & Fischbacher, 2003). Besides from the bias toward behaving cooperatively, there is also a part of conscience that could play a role in decision making because betray a close associate is generally regarded as a selfish or immoral act. On top of that, there may be a fear for revenge when the other gang member is released from the prison, which is also part of the imagination (Lin & Forrest, 2012).

Beyond what is presented above in terms of how some key real-life factors are not considered in theoretical studies of economics and business, another interesting observation is that scholars in economics commonly use such words as *believe*, *should*, *would*, and *might*. That is very different from how scientists speak in affirmative tones when they talk about their derived conclusions and established results. By comparing mathematics/physics and economics, one can readily see some major differences between the two. For example, for the former case, scholars traditionally investigate totally abstract concepts or lifeless objects, the associations among the concepts, and the operational laws underneath the evolution of physical things. They develop the consequent bodies of knowledge based on some basic postulates and the laws through logical reasoning. The magnificent success of this approach has been well confirmed by the recent scientific history and rapid development of technology of the past several hundred years. On the other hand, studies of economics do not evolve in the same way as that of mathematics and physics, as described above, due to the reason that as of this writing, those very elementary laws or postulates that are underneath mostly seen economic activities have not been identified and established.

The aforementioned differences between mathematics/physics and economics lead to quite varied practical consequences. For example, when a mathematical theorem is established, different mathematicians will be able to reestablish the result without knowing exactly how the theorem was initially proved, even though these mathematicians might experience some great difficulties to accomplish this end. Similarly, when a physical gadget is

produced, other people will be able to develop gadgets with almost identical functionalities although these people do not know exactly how the initial gadget was designed and produced. On the other hand, for applications of economics theories, the situation is completely different. For example, by carefully analyzing business successes and by theorizing the reasons behind a business success, people most likely cannot reproduce the desired economic outcomes in another business setting at a different geographical location. To this end, one good example is the Industrial Revolution of England. It has been widely investigated and theorized by many scholars over the years. However, when their theories were employed in practice by many developing countries, these countries experienced failures, because the applied theories did not really work (Forrest et al., 2018; Wen, 2016).

HUMAN ENDOWMENTS AS BASIC BUILDING BLOCKS OF ECONOMIC THEORIES

Following the discussions in the previous sections, this section demonstrates how individuals' systems of values and beliefs can be theoretically employed to establish new insights of economics. It attempts to show that what we propose here will go beyond what Cartwight (2014) states about behavioral economics – it analyses the psychological underpinnings of human economic behaviors; it will improve economics on its own term. Related to this claim, in the fields of management and organizational behaviors, the fit between person and organization (PO fit) has been widely recognized since late 1980s and early 1990s. It is defined as the similarity between the characteristics of people and corresponding characteristics of organizations (Kristof, 1996). More specific, this concept refers to the alignment or congruence between characteristics of employees (*i.e.*, personality, preferences, attributes, and perceptions) and those of organizations (*i.e.*, business strategy, values, culture, and leadership) (Chatman, 1989; Joo, 2020; Kristof, 1996).

Before we can present related details, let us look at two concepts – a firm's mission and organizational inefficiency. First, for each firm, its mission clearly spells out the firm's purpose (including its values and beliefs), what it does and what the targeted market segment it serves (McGrath, 2013). The goal of the firm is to maximize its business objective, as given in the mission statement, which might be making as much profit as possible, contributing to the wellbeing of the society as much as possible, or others. Because different people have different underlying systems of values and beliefs (Lin & Forrest, 2012), each firm that desires to succeed in the marketplace needs to have a mission (statement) to unify these individually different systems of values and beliefs (Forrest, 2018; Forrest & Orvis, 2016). Second, by organizational efficiency, it is defined (Forrest & Orvis, 2016) as such a state of a firm that all employees help their firm reach the objectives stated in the firm's mission. So, a firm is said to be (organizationally) efficient, if all employees help the firm approach or actualize the firm's mission in one way or another. Otherwise, the firm is said to be inefficient. The following theorem confirms the existence of organizational inefficiency, assuming that the criteria a focal firm employs to maximize its business objective, as clearly spelled in its mission, follow the conventional ordering of real numbers.

Theorem 1. If the value-and-belief system of a full-time employee is not in total agreement with his/her firm's mission, then the firm naturally experiences organizational inefficiency.

Proof. By contradiction, assume the opposite is true. That is, there is such a firm within which the value-and-belief system of its full-time employee k is not in total agreement with the firm's mission. Hence, there is a variable Y that measures one aspect of k's personal values and beliefs such that the utility of k increases with Y while the work efficiency of k in terms of helping realize the mission of his/her firm decreases with Y. In real life, although it is very possible that this variable Y cannot be explicitly measured or even defined, its existence is definitely unquestionable. For example, when an employee goes through his/her annual performance evaluation, written comments generally reflect the totality of those underlying implicit measures of the evaluator.

Symbolically, what are assumed here can be written as follows:

$$U_k = U_k(X_k, Y), \text{satisfying } \frac{\partial U_k}{\partial X_k} > 0 \text{ and } \frac{\partial U_k}{\partial Y} > 0, \tag{1}$$

where U_k is k's utility function and X_k stands for k's total consumption. And, the objective function Obj of the firm can be respectively written as follows:

$$Obj = Obj(X_c, U_k, U_1, U_2, \dots), \text{satisfying } \frac{\partial Obj}{\partial X_c} > 0, \frac{\partial Obj}{\partial U_i} > 0, i = k, 1,2, \dots \quad (2)$$

where X_c stands for the aggregated expenditure of the firm, including the monetary expenses on all employees except k, and $U_1, U_2, \dots$ represent all other employees' utilities. Because this objective function is an increasing function in every employee's utility, the firm keeps its employees' well-being as part of its business objectives.

The monetary bonus that measures the work efficiency of k is written as follows:

$$B_k = B_k(Y), \text{satisfying } \frac{dB_k}{dY} < 0. \quad (3)$$

Once again, the existence of the variable Y might only exist implicitly, and cannot be measured readily in real life. However, its negative effect on the work quality and efficiency generally can be clearly seen by other people of the firm. Hence, for this symbolic proof, without loss of generality we assume that Y can be measured and used in determining the amount of employee k's monetary bonus.

The firm distributes its monetary resources to its employees by maximizing its objective function Obj in equation (2) subject to the budgetary constraint below:

$$X_c + X_k = X_c + (I_k + B_k), \quad (4)$$

where I_k stands for k's base salary from the firm. By maximizing the firm' objective function, equation (2), subject to the budgetary constraint, equation (4), the following appear

$$\frac{\partial X_k}{\partial Y} > 0 \text{ and } \frac{\partial X_k}{\partial Y} = \frac{\partial B_k}{\partial Y} < 0, \quad (5)$$

a contradiction. This end implies that the firm that satisfies the given conditions is organizationally efficient is incorrect. (QED)

According to Lin and Forrest (2012), for each person, his/her system of values and beliefs is systemically developed over time on the four human endowments – self-awareness, imagination, conscience and free will. Hence, all the discussions above points to that it will be adequate to employ human endowments as the starting postulates for us to develop theories of economics.

Note: In the proof of Theorem 1, we maximized the focal firm's objective function. Corresponding to this optimization, in economics, there is such a long-standing convention that firms' objective is to maximize their profits (Wu, 2006). In reality, however, are business firms truly place profit maximization as its primary objective? There has been a substantial debate on this issue (e.g., Hussain, 2012; Jensen, 2001). Recently, a group of powerful US chief executives abandoned the idea that companies must maximize profits for shareholders above all else (https://opportunity.businessroundtable.org/ourcommitment/, accessed on January 30, 2021). "Americans deserve an economy that allows each person to succeed through hard work and creativity and to lead to a life of meaning and dignity" and "we commit to deliver value to all of them, for the future success of our companies, our communities, and our country," said the organization (https://s3.amazonaws.com/brt.org/BRT-StatementonthePurposeofaCorporationOctober2020.pdf, accessed on January 30, 2021), chaired by JP Morgan Chase CEO Jamie Dimon.

The reason why many managers and executives don't put profit maximization as the number one priority can be explained by the four human endowments – self-awareness, imagination, conscience and free will. In particular, the conscience of these decision makers makes them want to contribute more to their respective communities, such as

donations and offering various kinds of necessary supports to their communities. This end also supports the notion that how an individual behaves is dictated by his/her value-and-belief system

CONCLUSIONS

This paper examines examples on how the mainstream economics can be enriched if (1) personal wishes are considered as one of the decision-making criteria, or (2) rationality is seen as respectively bounded by individuals' value-and-belief systems; or (3) moral codes are treated as the foundation behind decision making and the taking of particular actions. By summarizing the analyses of these examples, this paper proposes that each person in general is rational in his/her own sense, as defined and bounded by his/her underlying values and beliefs. When a person makes decision, he/she reasons simply by retrieving categorized values, beliefs and information in the memory (e.g., Chiou et al., 2018; Sahni, 2016) to quickly determine the optimal expected potential. What is particularly important is that corresponding to their different value-and-belief systems, individuals use their correspondingly varied methods to optimize utilities, profits, costs, risks, etc., although the stated objective functions might look the same from one economic agent to another. Speaking differently, the mainstream economics implicitly assumes the existence of an external reference frame, which dictates what is considered rational and how optimization is carried out. Contrary to this assumption, this paper suggests that the real-life situation is the following: instead of the existence of such an external reference frame, each decision-making entity is its own reference frame that determines the meanings of rationality and optimality and the consequent method of optimization.

Because each person's system of values and beliefs is determined by the contents of his/her particular endowments – self-awareness, imagination, conscience and free will (Lin & Forrest, 2012), this paper proposes to identify elementary postulates (if speaking in the language of mathematics) and/or laws (if speaking in the language of Newtonian physics) at the level of these endowments. On the bases of these postulates and laws, the entire edifice of economics will be constructed in such a way that each time when a new concept is introduced, relevant results and knowledge will be established by logical reasoning that traces back to some of the postulates and laws. By doing so, many of the inconsistent results, developed by different scholars over time, such as those in the studies of the Industrial Revolution (e.g., Rostow, 1960), and many endless and emotional debates, where debaters generally base their arguments on some empirical conclusions (e.g., Andreoni & Chang, 2019), can be affirmatively settled.

As for potential future works along the line developed in this paper, one can first identify the aforementioned postulates and laws. And then, similarly to how Theorem 1 is established, all other known theorems of economics can be reformulated on the bases of the identified postulates and laws. Doing so will inevitably help uncover new results. By referencing to the magnificent successes of mathematics and physics, one can expect that the economics knowledge established in the fashion just described here will possess a much wider range of practical applications.

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UNDER WHAT CONDITIONS, CORPORATE SOCIAL RESPONSIBILITY INFLUENCE FIRM PERFORMANCE - THE MEDIATING ROLE OF BRAND EQUITY

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ABSTRACT

Previous research has shown that the effects of CSR are controversial. In 2008, an article in *Forbes* indicated that CSR offered no real competitive advantage for a firm. This article intimated that very few people know or even care about CSR and that as always, most products continue to be purchased based on quality or price and yet, many companies continue to increase their CSR programs and reach (Vogel, 2008). CSR continues to be a hot topic in the corporate world. Many companies are increasingly creating programs to show how socially responsible they are. However, the results of these programs and initiatives continue to be mixed from a bottom-line view as many stakeholders see it. As more companies continue to engage in CSR activities, it is important to understand the realm of effectiveness of these programs. Our research seeks to address these questions by showing why a CSR program may be related to firm performance, as well as, when and where the CSR relationship is the strongest.

INTRODUCTION

Previous research has shown that the effects of CSR are controversial. In 2008, an article in *Forbes* indicated that CSR offered no real competitive advantage for a firm. This article intimated that very few people know or even care about CSR and that as always, most products continue to be purchased based on quality or price and yet, many companies continue to increase their CSR programs and reach (Vogel, 2008). CSR continues to be a hot topic in the corporate world. Many companies are increasingly creating programs to show how socially responsible they are. However, the results of these programs and initiatives continue to be mixed from a bottom-line view as many stakeholders see it. As more companies continue to engage in CSR activities, it is important to understand the realm of effectiveness of these programs. Our research seeks to address these questions by showing why a CSR program may be related to firm performance, as well as, when and where the CSR relationship is the strongest. Some prior research has shown that CSR can be positively related to firm performance and it is believed that when a corporation engages in CSR activities, the firm will be viewed more favorably in the eyes of the consumer (Simmons and Beck-Olsen, 2006). Research has shown that a strong record in CSR is expected to enhance a firm and its brands (Holt, Quelch and Taylor, 2004).

To our knowledge, no studies across disciplines have examined the CSR, brand equity and firm performance relationship among consumers in the manner that we undertake in this paper. More specifically, very few mechanisms that explain *how* CSR is related to firm performance have been investigated. As well, to our knowledge, no studies have sought to understand the moderating power of CSR and high-tech industries. These are key ingredients for our CSR research because they provide routes where the CSR, firm performance relationship may be the most effective and this is an important idea for managers to understand.

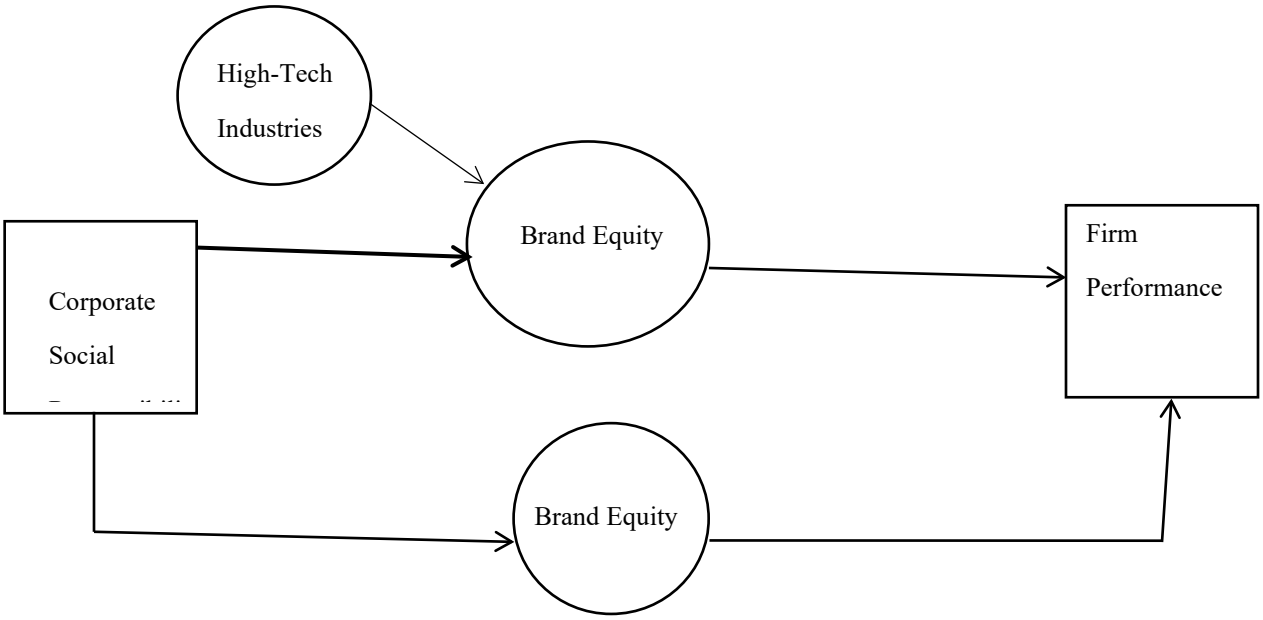
We seek to fill this gap in the literature by examining the relationship of CSR initiatives with brand equity and by examining the mediating role of brand equity as a mechanism between CSR and firm performance. We also show that high-tech industries moderate the relationship between CSR and brand equity. In order to do this, we answer several important questions. First, is CSR positively related to brand equity and if so, to what extent? Second, in the context of our data, can we confirm that CSR is positively related to firm value and in doing so, what is the route it takes to reach this conclusion? The mixed results from previous studies may be due to the mechanism involved in the study. When a mediator is present, the positive relationship between CSR and firm performance should be evident. In contrast, when a mediator is absent, the results of CSR should not be related to firm performance. This leads to the final question we seek to answer, does brand equity partially mediate the relationship between CSR and firm performance and if so, does the technological aptitude of the industry moderate this relationship?

The key contributions of our research are to show that CSR has a relationship with brand equity. In doing this, we further extend the work of Torres et al. (2012) in that we are one of the few papers that show that CSR initiatives have a positive relationship with brand equity and further we show that the high-tech industries see a stronger relationship with CSR than other industries. Next, we extend the work of Stahl et al. (2012), who showed that brand equity mediated the relationship between marketing activities and CLV, we show that brand equity at least partially mediates the relationship between CSR and firm performance and by discovering new mechanisms in the CSR, firm performance relationship, we offer key implications for managers. This is important because this mechanism in the consumer context has not been studied before.

Our work also extends the work of Luo and Bhattacharya (2006), which showed that customer satisfaction partially mediates the role between CSR and firm performance. Thus, our analysis will show another key route in the relationship between CSR and firm performance. The final key contribution of our research, as was previously stated, is that we show that being a part of a high-tech industry moderates this relationship with CSR. This offers important practical implications for managers, especially for those in the high-tech industries. Managers in these sectors need pay close attention to the types of CSR activities they are involved in and the relationship these may have on the consumer mindset. Finally, we add to the existing literature as we examine these areas further by utilizing new resources for analysis, which has been called for in the literature.

The remainder of the paper is structured as follows; first we discuss each of the concepts of our conceptual framework. Then we provide the data collection, method and model. Finally, we offer results, provide discussion, and offer managerial and marketing implications and limitations for future research.

FIGURE 1- CONCEPTUAL FRAMEWORK



THEORY AND HYPOTHESES

Figure 1 provides a conceptual overview of the expected relationships in our theoretical framework. The framework implies that first; CSR has a direct relationship with brand equity. Second, CSR can also be directly related to firm performance and the CSR, brand equity relationship is moderated by high-tech industries. Finally, this framework suggests that brand equity partially mediates the relationship between CSR and firm performance.

Brand Equity

Brand equity is defined by Keller (1993) as the differential relationship of brand knowledge on consumer responses to MARKETING of the brand. Conceptually, brand knowledge is one of the most important assets for marketing productivity (Keller, 1993). The importance of knowledge to consumers' memory has been well documented (Alba, Huthcinson and Lynch, 1991), so it is important to understand the structure of brand knowledge and how it is composed of awareness and image so that a brand will be recalled in a consumers' mind (Keller, 1993). In Keller's (1993) conceptual model, awareness arises from recall, whereas recognition and image are created from associations that are built by attitudes, benefits and attributes. Brand attitudes are the basis for consumer behavior. Marketing creates awareness and associations that enhance brand attitudes (Stahl et al., 2012) and when a consumer has great knowledge about a company, in general, they notice the ethics of the company. This plays an important role in how they appraise the company (Singh et al., 2007).

CSR and Brand Equity

There have been very few studies that examine the relationship of CSR with brand equity. We believe that CSR initiatives will cause the customer to act and this will have a positive effect on the relationship with brand equity. A key ingredient in our logic lies in social identity theory. Social identity theory as defined by Tajfel and Turner (1979), suggests that people define their self-concepts by their organizations and social groups. If that is the case, then CSR should offer a way for consumers to identify more strongly with their favorite brands, this in turn should increase brand equity. Tajfel (1982) sees social identity theory as being composed by three key components; a cognitive component, where there is a sense of membership in the group or organization, an evaluative component, where the sense of awareness is related to some notion of value and an emotional component, where there is an affective investment in the awareness and evaluations. These components integrate well with Keller (1993) who suggested that the key power of the brand lies in what consumers have seen, felt or heard about the brand and consumers have rated CSR as the most likely reason for loyalty to a company (Bhattacharya and Sen, 2004). Marketing research on social identity theory has also shown that members of brand communities engage in in-group behaviors in order to show their love for their brand (Bagozzi and Dholakia, 2006; McAlexander, Schouten and Koenig, 2002; Muniz and O'Guinn, 2001). Du et al. (2007a) found that when a company engages in visible CSR activities this leads to stronger loyalty, attitudes and stronger identifications to that brand and customer attitudes have been shown to be precursors to actions (Lavidge and Steiner, 1961). Therefore, as CSR enhances social identification with a brand, that company should experience increases in brand equity as well. Previous research on brand communities also focused on the interaction of customers and how they identify with a brand community or a competing brand. The research discovered that the self; collective or public, becomes embedded in the brand community (Triandis, 1989) and it is thus logical to conclude that as consumers identify socially more with key brands, their awareness of the activities of that brand will increase leading to further and more powerful loyalty to that brand. As was shown by Keller (1993), when the awareness of a firm increases, brand equity should follow as well. Other research by Keller (2003) found that CSR and marketing could enhance brand awareness, image and credibility and when these concepts are enhanced, customers then become more loyal to chains engaged in CSR activities (Lichtenstein, Drumwright and Braig, 2004).

Marketing literature has shown that CSR has a positive effect on brand evaluations, brand choice and brand recommendations (Brown and Dacin, 1997). This leads to the following conclusions: first, because brand equity is driven by knowledge, awareness and image, we believe that CSR initiatives that are credible will increase awareness and image. Second, this will lead to an increase in knowledge, which will enhance the customer's social identification with their brand and lead to more loyal customers. Loyal customers will take action in the form of increased patronage to that company and increased patronage from increased customer identification and loyalty will lead to enhanced brand equity. Therefore, CSR initiatives will have a positive and direct relationship with brand equity.

H1: CSR initiatives will be positively related to a firm's brand equity.

The Moderating Role of High-Tech Industries

High-technology firms lead the charge to support economic growth; they accomplish this with the insertion into new industries and the creation of new and innovative products to drive modern economies (Grinstein and Goldman, 2006).

One key reason why company in high-tech industries will see CSR activities more highly related to brand equity is because recent research has shown that companies in the high-tech industries industry do a better job of addressing elements of CSR initiatives, per the KLD database. These include elements such as compliance of environmental requirements, and this sector is showing the "importance of environmental friendliness in components to make technology products green" (Albino et al., 2009). In a 2003 survey by GlobeScan Inc., the results show that the general public agrees companies in high-tech industries are leading other industries in CSR efforts. If the public believes that high-tech industries are doing a better job with their CSR efforts, then this should be reflected in the brand equity of that company.

Another important reason why CSR activities may be highly related to brand equity in high-tech industries is because a key ingredient for membership to a high-tech industry is R&D spending, beyond this, companies in high-tech industries typically have a high involvement in science, a multitude of technical personnel and high number of patients applied for or received. High-tech industries also have many features that differentiate them from other industries such as high levels of innovativeness, high capital expenditures, fast diffusion and obsolescence of technical products, high risk and an always increasing level of competition (Grinstein and Goldman, 2006). So, in an industry that is comprised of high uncertainty, CSR offers a way to bring stability to the environment and thus, CSR activities should be highly related to increased brand equity in high-tech industries.

In short, it would then be logically expected that the results of CSR initiatives and their relationship with brand equity, would vary greatly across industries, more importantly leading to the conclusion that CSR effects on high-tech industries are more powerful and more noticeable than the CSR effects on non-technology sectors and this will moderate the relationship between CSR and brand equity.

> *H2: CSR initiatives will have a stronger relationship with brand equity in high-tech industries than in low-tech industries.*

The Mediating Role of Brand Equity

Thus far, we have offered hypotheses on the relationship between CSR and brand equity. As previously stated, when consumers identify strongly with a brand, they notice the ethics and activities of the brand (Singh et al., 2007) and this knowledge impacts brand equity. Much research has shown the relationship of brand equity with many customer related outcomes. In a study by Stahl et al. (2012), the authors showed that customer-based brand equity affected customer lifetime value and this lead to increased profit and revenues.

Given that brand equity can impact revenues and profit, it follows that market value should be positively affected. It is reasonable to expect a "chained" relationship: as CSR becomes increasingly related to brand equity; customer knowledge and awareness increase, strengthening social identification with the brand, leading to an increase in firm performance. This chain implies that because brand equity acts as an intermediary between marketing investments and firm performance, brand equity is likely to act as a channel between CSR and a specific firm performance element such as market value. A reasonable conclusion would be that brand equity plays a mediating role in the path between CSR and firm performance.

In contrast, if CSR does not have a strong relationship with brand equity, it is unlikely that this mechanism has any impact on firm performance. As was shown by Singh et al. (2007), customers notice the ethics of a company and this

impacts their appraisal of that company. It would then seem logical that brand equity may represent a vessel accounting for the presence or absence of a relationship between CSR and firm performance.

However, multiple studies have shown that CSR has a positive and direct relationship with firm performance due to other peripheral routes that bypass the customer. For example, authors such as Godfrey (2005) and Margolis and Walsh (2003) have both shown the relationship with stakeholders, such as employees, manager and investors. As we discuss later in this paper, when employees become more dedicated and committed to a firm, many aspects of the firm will improve, and this will enhance performance (Berman, Wicks and Jones, 1999). Since it is possible for CSR to be positively related to firm performance without directly traveling through customer-related outcomes, one would logically reason that brand equity would at least partially mediate the relationship between CSR and firm performance.

H3: Brand equity will partially mediate the relationship between CSR and firm performance.

CSR and Firm Performance

There have been many studies on the relationship between CSR and firm performance. Some studies found that CSR had a positive relationship with financial performance (Fombrun and Shanley, 1990; Soloman and Hansen, 1985), while other studies have found a negative relationship (Aupperle, Carroll and Hatfield, 1985; McGuire, Sundgren and Schneeweis, 1988). Stakeholder theory offers guidance to these conflicting findings. Stakeholder theory posits that cooperative relationships among the various stakeholder groups leads to a competitive advantage (Jones, 1995), which means CSR should in turn satisfy needs of the various stakeholders including employees, customers, investors and the community (Clarkson 1995; Hillman and Keim, 2001). As the stakeholders' needs are satisfied, firm performance should be positively affected as well (Barnett, 2007; Luo and Bhattacharya, 2006; Orlitzky et al., 2003). The literature shows that customers favor companies and products when they engage in socially responsible activities, which also leads to increased performance (Berens, van Riel and van Bruggen, 2005).

A key part of our logic is that CSR satisfies various stakeholders and as that happens, firm performance will increase. It is expected that CSR programs will require improved managerial competencies in preparedness for external changes and improved scanning skills of the industry environment (Barney, 1991) and this is one key reason that tells us why CSR will have a positive relationship on firm performance. The logical conclusion from these key articles then are first, as CSR increases the competencies of managers and credibility of the firm, the symmetry of the information and the satisfaction for the stakeholders will lead to positive firm performance. Next, in companies that actively engage in CSR activities, employees will become more loyal to the firm, reducing turnover and increasing production, efficiency will increase, and costs will fall, all of which will be positively related to firm performance.

METHODOLOGY

Sample

In testing these hypotheses, we collect data on CSR, brand equity, firm performance and control variables. Our data comes from three different sources. Our CSR data comes from the KLD database from Wharton. This database consists of over 3000 companies spanning many years. The CSR data from KLD consists of over 126 different variables. Some of these refer to weaknesses, some refer to strengths and others are more implicative of corporate governance and demographic type variables. Our brand equity data comes from Interbrand. Interbrand keeps an extensive data set of companies in many industries with the highest brand equity ratings. Our final data set consists of 44 companies and over 350 data points spanning an eight-year period and including nine different industry segments. To our knowledge this time frame for brand equity analysis is one of the broader ranges of time analyzed in the literature thus far. The firm performance data was obtained from COMPUSTAT. Our firm performance data was matched with the companies from Interbrand in order to evaluate the mediating role of brand equity. Firm performance data was compiled and based on previous literature ROA and market value were used as our dependent variables.

TABLE 1 – VARIABLES AND MEASURES

Variables	Measures	Source	Types
CSR	Company's activities related social responsibilities measured by variables measuring what the company does well; latent variable as indicated at time t-1.	KLD	0 to 7
Brand Equity	The conceptualization of the brand in the minds of the consumers as measured by marketing activities.	Interbrand	Quantitative measure
Firm Performance (Market Value)	The value of the company as measured by shares outstanding multiplied by share price.	COMPUSTAT	Quantitative measure
Firm Performance (ROA)	Ratio of net income to assets. Indicator of the profitability of the company relative to its total assets	COMPUSTAT	Ratio

Measuring Corporate Social Responsibility

CSR data comes from the KLD database, mimicking the work of Torres et al. (2012). This database consists of over 126 different variables to measure many types of CSR activity. These are divided between positive CSR activities and negative CSR activities. Our key variable was built by taking the total of each of seven key categories that measured positive CSR performance, thus giving a range for our final scale of zero to seven. The higher the total score for each company, the greater amount of positive CSR activities they are engaging in.

Dependent Variable Brand Equity

Following the work of Torres et al. (2012) brand equity data was gathered from the Interbrand database. This database keeps an extensive list of companies in various industries that rank the highest among brand equity as defined by a continuous variable that is measured monetarily and this database has been used often in the scant research on brand equity. Our data is broad and spans an eight-year range from 2003 to 2010.

Dependent Variable Market Value and ROA

Mimicking the work of Luo and Bhattacharya (2006), market value and ROA were retrieved from COMPUSTAT to match the CSR and brand equity time frames. These two variables have been key financial performance indicators in previous literature and were once again employed for the purposes of our research. Taking a company's net income and dividing it by their total assets, computed ROA. Market value represents the overall value of a company as seen by its shareholders. This is a continuous variable is measured monetarily and can easily be computed by multiplying stock price by outstanding shares.

Measuring Control Variables

Modeling the work of Thomas (2002), we developed an extensive list of firm and industry-level control variables. Our key control variables were retrieved from COMPUTSTAT and matched with our other data. Normalcy tests were run on each of these and those that needed it were logarithmically transformed.

Following the work of Luo and Bhattachaarya (2006), we control for firm size with the log of the number of employees. In our model it was important to control for the size of a firm and its effects on firm performance or brand equity. Larger firms are apt to have more resources and thus, the relationship between CSR and our dependent variables may vary depending on the effectiveness of the use of these resources, therefore, controlling for firm size was imperative.

Our next control variable was profit. Since it is possible that previous profit will be related to future firm performance or brand equity, based on previous research on financial control variables by Ferreira and Laux (2007), we controlled for this effect in our model.

Our next control variable was debt. Based on previous literature, such as Luo, Homburg and Wieseke (2010) we controlled for debt. Debt or leverage has been linked earnings (Thomas, 2002) and is likely to influence market value. We felt like debt acquired by a firm from one year to the next, could affect the relationship of future firm performance or brand equity. Therefore, this was an important variable to have as a control in our model.

Finally, we closely followed the work of Luo, Homburg and Weiske (2010) by controlling for dividend to asset ratio. This variable influence recommendation and is likely to influence brand equity and firm performance as well. By utilizing this ratio, our analysis allows us to have a broader range of variables and effects that could also offer explanatory power for an increase in firm performance or brand equity. Therefore, we felt this was imperative to include in our model in order for our results to offer more meaningful implications.

ANALYSIS AND RESULTS

The Effect of CSR on Brand Equity

H1 predicts that CSR initiatives will have a positive effect on brand equity, after controlling for firm performance items such as debt, dividend to asset ratio and employees, we found that CSR initiatives have a significant positive and direct relationship to brand equity. The beta coefficient is positive (.224) and significant ($p < .001$). This implies that when companies engage in CSR activities that are seen by the consumers as strengths, it will be positively related to their future brand equity, even after controlling for many firm performance variables. We also found that when controlling for year dummy variables, CSR remained significant and positive with brand equity. As such H1 is supported.

TABLE 2
DESCRIPTIVES STATISTICS – BRAND EQUITY and FIRM PERFORMANCE

	M	SD	1	2	3	4	5	6	7	8
CSR	6.00	1.2188	**1**							
Brand Equity (Log)	11.16	9.3058	.296***	**1**						
Market Value (Log)	12.86	10.5235	.261***	.248***	**1**					
ROA (Log)	-1.43	-2.6928	-.160***	-.181***	.009	**1**				
Profit	-.12	.24	-.171***	-.112**	.039	.874***	**1**			
Debt	-4.61	.90	.072	-.091	-.174***	-.403***	-.403***	**1**		
Dividend to Asset Ratio (Log)	.00	.42	-.034	.020	.040	.400***	.472***	-.102	**1**	
Number of Employees (Log)	1.28	6.14	.338***	.265***	.419***	-.053	-.088	.178***	.009	**1**

*** Significant at the .01 level
** Significant of the .05 level
* Significant at the .1 level

The Moderating Role of High-tech industries

H2 predicts that high-tech industries will moderate the relationship between CSR and brand equity. Based on SIC code each company was coded either as being in a high-tech industry or not being in a high-tech industry. Then, following Baron and Kenny (1986), a moderation analysis was performed for each of the dependent variables. The results, as table 4 will show, confirmed that high-tech industries did positively moderate the relationship of CSR with brand equity, in that companies engaging in CSR in the high-tech industries should see a stronger relationship with brand equity ($p < .001$). However, further analysis was performed. For each industry an individual regression was performed to see if CSR had a relationship in that particular industry. As might be expected, the results were mixed. For brand equity, five of the nine industries were significantly affected by CSR initiatives. Auto and food were each negatively related to CSR activities. To some degree this is partially in line with the literature. On the other hand, beverages, high tech industries and technology services were positively related to CSR initiatives, which is what our theory predicted. This is also consistent with the literature as well. Thus, the results confirm H2 is supported.

The Mediating Role of Brand Equity

H3 predicts that brand equity will partially mediate the relationship between CSR and firm performance. Following the method of Baron and Kenny's (1986), we tested for mediation. In step one, CSR was regressed against market value and the results were significant ($p < .05$). In step two, CSR was regressed against brand equity the results were significant ($p < .001$). In step three, brand equity was regressed against market value and the results were significant

($p < .001$). Finally, in step four, all variables were included in the model and the results showed, that in the presence of brand equity, CSR partially lost its power, thus as table 4 indicates, the results confirm that brand equity partially mediates the relationship between CSR and market value. H3 is supported. The mediation results are important because we have found another important mechanism in the relationship between CSR and firm performance.

TABLE 3
RESULTS FOR THE MEDIATING RELATIONSHIP
OF BRAND EQUITY ON MARKET VALUE

	Brand Equity	**Market Value**	
Brand Equity (Log)			.105**
CSR	.224***	.151**	.128**
Number of Employees (Log)	.197***	.398***	.378***
Debt	-.161**	-.206***	-.189***
Profit	-.166**	.007	.025
Dividend to Asset Ratio (Log)	.081	.010	.002
R^2	**.146**	**.234**	**.244**
Adj R^2	**.133**	**.223**	**.230**
F	**11.8**	**21.037**	**18.44**

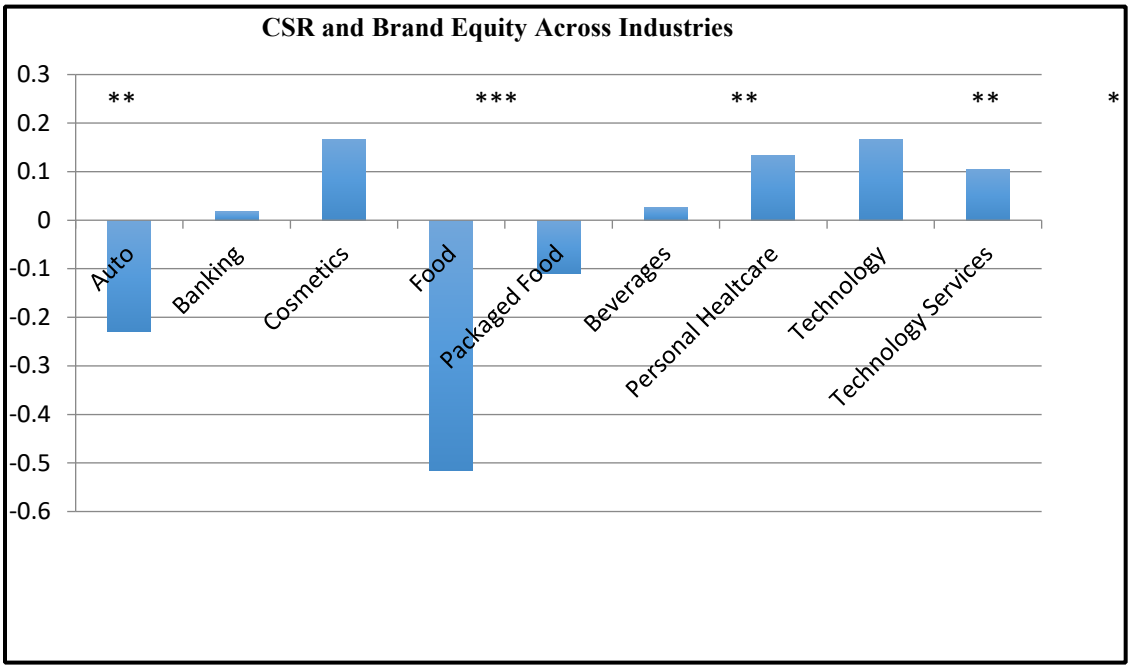
** Significant of the .05 level
* Significant at the .1 level

TABLE 4
RESULTS FOR THE MODERATING RELATIONSHIP
OF HIGH-TECH INDUSTRIES ON CSR AND BRAND EQUITY

Model	**Beta**
CSR	.135**
High Tech	.299***
CSR x High Tech	.268***
Number of Employees (Log)	.117**
Debt	-.059
Profit	-.202***
Dividend (Log)	.090*
Market Value (Log)	.094
R^2	**.322**
Adj. R^2	**.304**
F	**17.964**

*** Significant at the .01 level
** Significant of the .05 level
* Significant at the .1 level

FIGURE 2
INDUSTRY RESULTS



*** Significant at the .01 level
** Significant of the .05 level
* Significant at the .1 level

The Effect of CSR on Firm Performance

We performed an analysis to see that CSR initiatives have a positive relationship with firm performance. After running a regression analysis, the results revealed that CSR had a stronger relationship with market value than ROA. After controlling for other firm performance items including profit, dividend to asset ratio, debt and the number of employees, CSR initiatives have a significant direct effect on market value. The beta coefficient was positive (.151) and significant ($p < .05$). Our results also confirm that when a firm engages in CSR programs, they have a greater relationship on market value than ROA, as when CSR was regressed against ROA, the results were not significant.

DISCUSSION AND IMPLICATIONS

There has been much interest and research in recent years on the relationship of CSR with firm performance and our paper examined this relationship further. Prior work has demonstrated the relationship of CSR with firm performance variables; however, the nature in which this relationship has traveled has varied. The more important aspect of our research is that we show that one possible mechanism for a successful CSR program is the partial mediation through brand equity. This is a key finding from a consumer standpoint that has not been studied before in the literature and adds to the understanding of CSR by providing another route for affecting financial performance. Our work is also important because we go further than previous authors and show the specific effects of CSR in specific industries. By showing that CSR is moderated by whether a firm is in a high-tech industry, we provide important results to the literature that have not been examined as deeply in the past.

This paper also extends the work of previous authors in new and important ways. First, we extend the work of Marin, Ruiz and Rubio (2008) by showing that customers are more likely to identify with a brand and their CSR activities when knowledge is great and this manifests itself in the form of stronger brand equity. When consumers have great knowledge about a company, the ability to increase social identification with that company will increase as well (Stahl et al., 2012). We also further the work of Lai et al. (2010), showing that brand equity partially mediates the relationship from CSR to firm performance in the consumer market. Their work examined this relationship in the industrial industry, but we extend their work further by broadening it to consumers and a wide range of industries as well. Next, in the work of Singh et al. (2007), the authors show that consumer's main concern for any company is its products. We further this by showing that the relationship of CSR is moderated by high-tech industries and that its effects differ both in valence and in strength across industries. By including brand equity as a mediator in this relationship, a concept that is built by knowledge of the company, its products and its activities, we are able to give further evidence of the importance of product performance in consumer evaluations of a company and their CSR activities.

Further, our work extends the research of Schreck (2011), who found that single stakeholder-related issues and CSR activity are related to positive firm performance. We confirm these, as well as we show that CSR initiatives have a strong relationship with market value, both directly and indirectly through brand equity. In doing this, we strengthen the previous research on the relationship between stakeholders and CSR and show that CSR is related to market value or financial performance directly, which could only be achieved by the relationship with stakeholders. Finally, in a paper by Stanaland, Lwin and Murphy (2011), the findings show that consumers care about the ethics and financial performance of a company. This directly impacts how they perceive the CSR activities of that company and by showing that brand equity partially mediates the relationship between CSR and market value, we confirm that the knowledge consumers have about a company and its CSR activities, is related to financial performance.

In this paper, we have examined the relationship of CSR activities with firm performance and brand equity, and we further the research by showing that brand equity partially mediates the relationship from CSR to market value. If we examine Keller's (1993) conceptualization of brand equity deeply enough, this relationship logically makes sense. We add to the literature by showing that industry and more specifically, high-tech industry, moderates the relationship from CSR to brand equity. This allows us to discover important managerial implications. Our results confirm the importance of CSR on future firm performance and customer-related outcomes, and this should affect other outcomes

as well, such as customer loyalty. Along with these implications, we also show that CSR has a greater relationship with market value, which is a greater marker for all stakeholders in the company, than ROA.

MANAGERIAL IMPLICATIONS

As the recent decade has passed, more and more companies have begun to engage in socially responsible activities in order to positively impact the environment around them. CSR has become such an integral part of the corporate framework that just recently two news companies in Vancouver Canada partnered to form a stakeholder news program called *Sustainable Solutions*. This program will share stories of its members and the innovative ideas and initiatives they are launching, in order to benefit their investors and the environment (SVN Launches Story Initiative, 2012). Elsewhere since 2007, Baskin-Robbins has been raising money to help alleviate poverty. Thanks to a partnership with Feeding America and a campaign on Facebook, they have raised over 1 million dollars to help support local food banks (Baskin-Robbins' Offer for Feeding America, 2012).

With all of the current activity that companies undertake to increase social responsibility, our findings provide several important implications for managers. As was shown in this paper, CSR offers one way to improve brand equity. This means first, managers should look to Social Identification theory for answers, as evidenced by this, there are important implications for CSR activities in the minds of consumers and this consumer mindset can lead to an increase in brand equity. Further, as has been shown both in the literature (Berens, van Riel and van Bruggen, 2005; Brown and Dacin, 1997) and in this paper, by ensuring strong CSR initiatives, mangers will be able to reduce marketing costs and increase the new customer base through increased social identification and customer loyalty programs.

Next, manager must understand the dynamics of their industry in order to develop appropriate CSR programs; they should know what type of return to expect for their industry or sector. Managers should have a clear idea of what goal they are trying to achieve as a result of their CSR activities. As the results show, the relationship with CSR can depend on whether the goal is to improve brand equity or improve market value, as we have shown, the type of industry that a firm is in can moderate this path.

Finally, managers should understand that the mechanism between CSR and firm performance could cause results to vary. This is important because the direct relationship from CSR to firm performance is often mixed. As managers understand the appropriate the path to take from CSR to firm performance, the results of CSR investments will become stronger.

LIMITATIONS AND FUTURE RESEARCH

The findings in this paper highlight the importance of the continual study of CSR and its outcomes. At the present, there are many studies in this area of research but the analysis is far from complete. As was shown in this paper and by Luo and Bhattacharya (2006) the path from a successful CSR program to positive firm performance may vary. Future research should exploit this possibility by finding other mechanisms between CSR and firm performance.

The primary limitation of our research is our data. In the brand equity database, we are constrained by what is currently available. Future researchers should seek to find ways to call for increases in data to achieve greater and more extensive sets of information to be analyzed. Second, our analysis was very simple and straightforward. Future researchers should seek to enhance the literature by finding models with greater complexities that can introduce new and interesting findings to the CSR literature.

In our examination, we only included CSR strengths to form our independent variable from the KLD database. Future research should focus on other CSR datasets and seek to understand if the results parallel what is currently in the literature. Further, as more information becomes available in the future, it is important to not only investigate other measures that are potentially related to CSR, but it is also important that researchers look at CSR as the dependent

variable as well. A great enhancement in literature would be to understand antecedents of successful CSR initiatives, as well as the consequences.

Finally, researchers should continue to investigate new moderators of CSR both in terms of a larger corporate view and a more detailed view at the industry level, as this will provide greater managerial insights to those who need it most. CSR programs continue to be commonplace among firms and it is important that researchers continue to seek to understand when and why they are most effective.

CONCLUSION

In conclusion, the effects of CSR initiatives are an important aspect of firm performance. Their effects can be partially mediated by customer-related outcomes, which lead to greater identification with the company, and as we have shown in this paper, the relationship of CSR initiatives can vary from one industry to another.

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DIVIDEND POLICY FOR FIRMS WITH NEGATIVE BOOK VALUE OF EQUITY

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ABSTRACT

This paper investigates whether negative book equity firms have a dividend policy and whether that dividend policy is different from positive book equity firms. In most prior studies of dividend policy, firms with negative book equity (NBE) are specifically excluded from the data sample. NBE firms have been perceived to be financially distressed and insignificant. However, recent studies of NBE firms by Jan and Ou (2012), Ang (2015), and Luo, Liu, and Tripathy (2021) find evidence that the percentage and frequency of NBE firms is increasing, and a portion of NBE firms are financially and operationally healthy, which suggests that some NBE firms potentially have a dividend policy.

Based on analysis of the summary statistics and logit regressions, this investigation of the 2020 NBE dividend paying firms indicates that the negative book equity (NBE) dividend payers have the *same* firm characteristics as positive book equity (PBE) dividend paying firms. This study shows that the 2020 NBE dividend payers are larger, more profitable, older, and have higher earned capital - identical to the prior research of positive book equity (PBE) dividend payers. Moreover, logit regression analysis of NBE dividend growing firms indicates that the *same* characteristics [larger market equity size, higher profitability, and lower volatility] that increase the probability of being a PBE dividend growing firm also increase the probability of an NBE dividend paying firm growing the dividend in 2020.

INTRODUCTION

In many of the most seminal investigations of dividend policy[6], firms with negative book equity (NBE) are specifically excluded from the data sample. Several very good reasons often lead researchers to omit the NBE firms from empirical studies. Historically the number and market capitalization of NBE firms seems to be a small and insignificant (or rare) part of the overall sample of firms (Fama and French, 1993). In addition, NBE firms are perceived to be financially distressed and expected to fail. Finally, and perhaps most importantly, the presence of negative book equity firms in large, cross-sectional data sets complicates the calculation and economic interpretation of common financial ratios such as market-to-book ratio (M/B), return on equity (ROE), and total equity-to-total capital ratio (TE/TA).

Recent studies indicate that these negative book equity (NBE) firms are becoming harder to omit from empirical data sets. Jan and Ou (2012), Ang (2015), and Luo, Liu, and Tripathy (2021) all find evidence that the percentage and frequency of NBE firms is increasing over time. Clearly the incidence of some of the largest market capitalization companies in the investment universe (including well-known, brand-name companies such as McDonalds, Starbucks, and Boeing) as negative book equity firms in 2020, indicates that NBE firms are no longer small and insignificant in the data sample. Furthermore, Ang (2015) and Luo, Liu, and Tripathy (2021) show evidence that NBE firms exhibit heterogeneous characteristics. They show that at least a portion of NBE firms are financially and operationally sound. Jan and Ou (2012) and Ang (2015) document that many U.S. corporations report negative book equity but survive for many years. Given these findings show some NBE firms survive many years, and a portion of NBE firms are financially as well as operationally healthy, it suggests that some NBE firms may have a dividend policy.

This study examines the dividend policy of negative book equity (NBE) firms in 2020 and investigates whether the factors that influence the dividend policy of negative book equity (NBE) firms are different than the factors that motivate the dividend policy of positive book equity (PBE) firms. While I continue to follow the current NBE literature researching the heterogenous characteristics amongst NBE firms, I focus on dividend policy rather than topics related to financial distress. This paper extends the expansive literature on dividend policy in the following ways. I believe that this is the first study to specifically investigate the dividend policy of firms with negative book equity, as these firms are typically omitted from typical empirical research of positive book equity firms. Furthermore, I extend the

[6] For example, DeAngelo, DeAngelo, and Stulz (2006)

examination of dividend policy of NBE firms to the economically significant issue of dividend growth, which impacts firm market value (Damodaran, 2006).

This study provides evidence confirming the recent NBE literature that a portion of 2020 NBE firms, especially NBE dividend payers and dividend growers, are financially and operationally strong, and not in financial distress. For example, about 95% of the 2020 NBE dividend growers have been profitable over the past 10 years, and about 50% of the 2020 NBE dividend growers are rated investment-grade. The investigation finds that the prior literature of NBE firms classified as large negative book equity (LNBE) firms by Ang (2015) and healthy negative book equity (HNBE) firms by Luo, Liu, and Tripathy (2021) with sound financials have a higher percentage of dividend payers and dividend growers than other negative book equity firms that are considered financially distressed.

Most importantly, this investigation of the 2020 NBE dividend paying firms indicates that the negative book equity (NBE) dividend paying firms have the *same* characteristics as positive book equity (PBE) dividend paying firms reported in the dividend policy literature. This paper shows that the 2020 NBE dividend payers are larger, more profitable, older, and with higher earned capital - identical to the prior research of (PBE) dividend payers.

Based on analysis of the summary statistics and logit regressions, the 2020 NBE dividend payers are much larger in asset size and market capitalization compared to NBE non-payers, and increasing size significantly increases the probability that a 2020 NBE firm pays a dividend. The 2020 NBE dividend payers are much more profitable than NBE non-payers. Furthermore, the 2020 NBE dividend payers have profitability similar to the profitability of PBE dividend payers reported in the literature. Increasing profitability significantly increases the probability that a 2020 NBE firm pays a dividend, just as increasing profitability increases the likelihood that a PBE firm pays a dividend.

The 2020 NBE dividend payers have lower asset growth rates than the NBE non-payers consistent with the life-cycle model researched by DeAngelo, DeAngelo, and Stulz (2006) with PBE firms. Also, the 2020 NBE dividend payers have a greater median age than the NBE non-payers, which again is consistent with the maturity hypothesis literature for PBE dividend payers. In the same manner as PBE dividend payers, I report that the earned capital median RE/TA of the 2020 NBE dividend payers is larger than NBE non-payers, and logit regressions show that a larger RE/TA increases the probability that a 2020 NBE firm pays a dividend. However, the median RE/TA of NBE dividend payers is *negative* and consequently much lower than the past literature on PBE dividend payers. The fact the 2020 NBE dividend payers have a negative median RE/TA presents a considerable quandary incorporating NBE firms in data sets with PBE firms for dividend policy research when the RE/TA variable is to be investigated. The negative median RE/TA for the 2020 NBE dividend payers seems to arise due to accounting practices for share repurchases.

Analysis of the 2020 NBE dividend growers shows this subset to be the most financially and operationally healthy NBE firms. The fact that dividend growers even exist amongst NBE firms may seem surprising given the prior perceptions of all NBE firms as distressed. In DeAngelo and DeAngelo's (1990) study of distressed firms, they report that "almost all [*of the distressed*] sample firms reduced dividends". However, descriptive statistics of the 2020 NBE dividend growers show the same firm characteristics as PBE dividend growers – larger market capitalization, better credit quality, higher profitability with lower volatility, and higher growth rates. The 2020 NBE dividend growers are *much larger* in market equity than any other type of NBE firms The 2020 NBE dividend growers have much better credit quality than other NBE dividend payers - higher interest coverage, higher total debt coverage, and a higher percentage of investment-grade ratings. The interest coverage and total debt coverage ratios of the NBE dividend growers are similar to interest coverage and total debt coverage ratios of PBE dividend growers. The NBE dividend growing firms are the most profitable category of NBE firms examined and achieve the higher levels of profitability with lower earnings volatility than other NBE dividend payers. These high levels of profitability with lower earnings volatility with the NBE dividend growers are in accordance with the results of Hauser and Thornton (2015) who find that PBE dividend growers also attain higher high levels of profitability with lower risk. The logit regression analysis of NBE dividend growing firms confirms that the *same* reported characteristics of larger market equity size, higher profitability, and lower volatility that increase the probability of being a PBE dividend growing firm (Hauser & Thornton, 2015b) also increase the probability of an NBE dividend paying firm growing the dividend in 2020.

Finally, a robustness test of the matched sample of PBE dividend payers confirms these conclusions. Although the 2020 NBE dividend payers (growers) and the matched PBE dividend payers (growers) have opposite signed equity capital ratios, the parameters that motivate dividend policy and dividend growth are the same for NBE and PBE firms.

LITERATURE REVIEW OF NEGATIVE BOOK EQUITY FIRMS

Until recently, relatively little attention in the accounting and finance literature has been given to the existence of negative book equity firms[7]. In fact, companies with negative book equity are excluded from many research studies. In the literature, NBE firms are described as small in terms of market capitalization and rare (Fama and French 1993). Bartov and Kim (2004) and Li and Lajbcygier (2007) indicate that part of the reason for excluding NBE firms is the lack of interpretation and economic meaning of negative book equity and the computational issues with common financial ratios such as market-to-book ratio (M/B), return on equity (ROE), and total equity-to-total capital ratio (TE/TA). Furthermore, NBE firms are perceived as financially distressed, have persistent negative earnings, and are expected to fail (Fama and French, 1992; Dichev, 1998).

However, Li and Lajbeygier (2007) make the argument that exclusion of NBE firms may result in weakening modeling representativeness and sample selection bias; consequently, Li and Lajbeygier (2007) and Brown, Lajbcygier, and Li (2008) develop methodology for inclusion of NBE firms in asset pricing factor models. Besides the need for examination of NBE firms rather than exclusion, Jan and Ou (2012), Ang (2015), and Luo, Liu, and Tripathy (2021) correct another misperception and find evidence that the percentage and frequency of negative book equity firms is increasing over time. Jan and Ou (2012) report that the frequency of NBE firms increases from 5% (1976 -1985) to 15% (1996-2005) with Compustat firms, excluding financials and utilities. Furthermore, Jan and Ou (2012) dispel the stereotype that NBE firms quickly fail. On the contrary, they find that a majority of NBE firms survive a long time and continue to report negative book value for several years, and some practitioners even claim that such surviving NBE firms outperform the market[8]. Jan and Ou (2012) search for explanations for the negative book equity phenomena and find that accumulated R&D expenses contributes to the increasing trend of negative book equity frequency.

While Jan and Ou (2012) investigate explanations for the negative book equity occurrences, Ang (2015), and Luo, Liu, and Tripathy (2021) extend the research to show that at least a portion of the NBE firms are not in financial distress. Ang (2015) reveals the heterogenous characteristics among NBE firms by examining firms with different magnitudes of negative book equity. Ang (2015) sorts NBE firms into four quartiles and refers to NBE firms in the quartile with the largest magnitude of negative book equity as large negative book equity (LNBE) firms. The investigation of the sorted quartiles finds that the LNBE firms have lower distress risk and failure rate than NBE firms in the quartile of the smallest magnitude of negative book equity. Ang (2015) reports that the negative book equity firms in the quartile of the smallest magnitude of book equity firms suffer persistent negative earnings and financial distress. Luo, Liu, and Tripathy (2021) also examine the divergent characteristics among NBE firms but use a two-way sorting method based on both the Altman's (1968) Z-score and Tobin's (1969) q to filter healthy NBE firms from unhealthy ones. Luo, Liu, and Tripathy (2021) classify NBE firms with the highest Z-scores and medium to high Tobin's q as healthy negative book equity (HNBE) firms. These HNBE firms have superior operating performance and financial healthiness compared to the remaining other negative book equity ONBE firms. Pertinent to this paper, Luo, Liu, and Tripathy (2021) find that HNBE firms pay more dividends than ONBE firms. The revelation that any NBE firms would pay dividends seems to add to Black's (1976) dividend "puzzle", especially if all NBE firms are perceived to be financially distressed.

[7] Deep into Negative Territory: Who Negative Book Equity Stocks Are and Their Risk-Return Implications – Auckland Center for Financial Research https://acfr.aut.ac.nz/__data/assets/pdf_file/0003/3 0000/403278.pdf

[8] Negative Equity, Veiled Value, and the Erosion of Price-to-Book – O'Shaughnessy Asset Management https://www.osam.com/pdfs/research/44_Negative_ Equity_Veiled_Value_and_the_Erosion_of_Price-toBook-April-30-2018.pdf

The fact that some NBE firms survive many years and are financially as well as operationally healthy, suggests that some NBE firms may have a dividend policy. Based on the research of Ang (2015) and Luo, Liu, and Tripathy (2021), LNBE and HNBE firms may be aspirant dividend payers. This study extends the investigation of NBE firms with healthy financial conditions and examines the dividend policy of NBE firms. The investigation focuses on whether the factors that influence the dividend policy of NBE firms are different than the factors that motivate the dividend policy of positive book equity (PBE) firms.

DATA AND METHODOLOGY

Data sample and Methodology

The data sample consists of all U.S. firms listed on the NYSE and NASDAQ that report negative book equity in 2020. This contrasts with most dividend policy studies that exclude firms with negative book equity. Consistent with the prior dividend literature, financial companies, utilities, REITs, MLPs, SPACs, and ADRs are excluded from the sample. Firms with missing book equity, accounting data, and dividend data are omitted from the sample. Following Ang (2015), I define firms with negative book equity as firms whose book value of common equity is negative. After imposing these restrictions, the sample consists of 187 NBE firms in 2020.

Following the methodology of Ang (2015), the 2020 NBE firms are sorted and classified as large negative book equity (LNBE) firms or secondary negative book equity (SNBE) firms. Next, following the method of Luo, Liu, and Tripathy (2021), the NBE firms are sorted and classified as healthy negative book equity (HNBE) firms or ONBE firms. For examination of dividend policy, the 2020 NBE firms are sorted into dividend payers and non-payers. Finally, the 2020 NBE dividend payers are separated into dividend growers and dividend cutters. Non-parametric Mann-Whitney-Wilcoxon tests evaluate the significance of the difference in medians. Following Fama and French (2001), I investigate the firm characteristics that differentiate firms that pay dividends from those that do not – size, profitability, and investment (growth). Since DeAngelo, DeAngelo, and Stulz (2006) find that the earned capital ratio is significantly related to the propensity to pay dividends, I also examine the earned capital ratio. Appendix A lists the relevant study variables and the variable definitions.

In addition to the summary statistics tests on the difference in medians between dividend payers and nonpayers, logit regressions are used to investigate the firm characteristics of dividend payers and dividend growers. Finally, I follow the method of Ang (2015) and perform robustness analysis by matching NBE dividend payers with PBE dividend payers on the basis of market value of equity.

Summary statistics for 2020 large negative book equity (LNBE) Firms

In this section, I report the findings of the empirical analysis and descriptive statistics of the 2020 LNBE firms. Following the methodology of Ang (2015), the 2020 negative book equity (NBE) firms are sorted by the magnitude (absolute value) of the book value of common equity. The firms in the top quartile with the largest magnitude of negative book equity are defined as LNBE firms as per Ang (2015). In this context of sorting the 2020 NBE firms by the magnitude of the book value of common equity, all other NBE firms smaller (in magnitude) than the top quartile are considered as secondary negative book equity (SNBE)[9] firms. Table 1 presents the summary statistics for the 2020 LNBE firms compared the 2020 SNBE firms.

Based on the sorting procedure, it follows that 2020 LNBE firms are larger in size than SNBE firms based on median total assets and median market value of equity. Although somewhat more levered in terms of the book leverage, TL/TA, LNBE firms have better credit quality – higher median Altman Z-score, higher median interest coverage,

[9] Note that Ang (2015) uses the definition of SNBE firms as only the smallest quartile of NBE firms sorted by the magnitude of the book value of common equity. Since I use all firms other than the largest quartile for analysis, I refer to these other quartiles as secondary.

higher median total debt coverage, and a higher percentage of investment-grade rated firms. LNBE firms are more profitable by median EBIT/TA and median ROA with lower earnings volatility. At the median, LNBE firms have more long-term assets, but less cash. SNBE firms have higher median asset growth rates, while LNBE firms have a higher median age. Interestingly, there is no statistical difference in median market valuation between LNBE and SNBE firms, using q, (Enterprise Value) EV/Sales, or (Market Value of Equity) ME/TA. The HNBE firms defined by Luo, Liu, and Tripathy (2021) are not systematically the same firms as the LNBE firms defined by Ang (2015). Consequently, it seems that the LNBE and HNBE firm classifications describe the portion of NBE firms that are fiscally sound in a different manner.

With regards to dividend policy, a significantly higher percentage of 2019 and 2020 dividend payers are categorized as LNBE firms. Likewise, the LNBE firms have a higher proportion of corporations that increased their dividend in 2020 than SNBE firms. In general, the 2020 LNBE firms have the traditional Fama-French (2001) characteristics of positive book equity (PBE) dividend payers – larger size, more profitable, lower growth rate (investment opportunities), and higher age.

Summary Statistics for 2020 healthy, negative book equity (HNBE) Firms

Next, I examine the descriptive statistics for the 2020 HNBE firms. Using the method of Luo, Liu, and Tripathy (2021), NBE firms are sorted by Tobin's q and Altman Z-score, with firms having high values of q and Z-score labeled as HNBE firms. The remaining firms with lower values of q and Z-score are labeled as other negative book equity (ONBE) firms. Table 2 displays the summary statistics for the 2020 HNBE firms compared the 2020 ONBE firms.

The 2020 HNBE firms have a higher median market value of equity compared to ONBE firms; however, the median total assets and median book equity of HNBE firms are not statistically significant from ONBE firms. HNBE firms have higher credit quality since HNBE firms are sorted by Z-score. At essentially the same book TL/TA leverage, HNBE firms have higher median interest coverage, higher median total debt coverage, and a higher percentage of investment-grade rated firms.

See Tables 1 and 2, below:

Table 1 Summary Statistics for 2020 Large Negative Book Equity (LNBE) Firms

Variables	Secondary NBE Firms	Large NBE Firms	Z (t) statistic for difference in medians (percentage)
Size			
Median Total Assets ($)	289,000,000	5,850,000,000	-7.948 ***
Median Total Common Equity ($)	-80,800,000	-1,270,000,000	10.247 ***
Median Market Value of Equity ($)	462,000,000	7,150,000,000	-6.969 ***
Credit			
Median Altman's Z-score	0.1863	1.5067	-2.532 **
Median EBIT / Interest Expense	-0.5855	1.7459	-4.268 ***
Median EBIT / Total Liabilities	-0.0537	0.0451	-5.142 ***
Median Total Liabilities / Total Assets	1.2365	1.3161	-1.962 **
Profitability			
Median 2019 EBIT / Total Assets	-6.7%	7.9%	-5.301 ***
Median 2020 EBIT / Total Assets	-3.8%	9.4%	-5.432 ***
Median standard deviation of EBIT / Total Assets	5.6%	3.3%	3.47 ***
Median 2020 ROA	-17.2%	1.3%	-4.398 ***
Median Average ROA	-12.7%	2.2%	-5.108 ***
Median 2020 ROA minus Average ROA	-4.7%	-2.8%	-1.361
Assets			
Median Working Capital / Total Assets	0.1016	0.0771	1.043
Median Property, plant, equipment / Total Assets	0.0997	0.142	-1.682 *
Median Intangible Assets /Total Assets	0.067	0.2405	-3.749 ***
Median Cash / Total Assets	0.2121	0.1273	1.959 *
Median Sales / Total Assets	0.5207	0.716	-1.265
Median Total Asset growth rate	13.9%	5.6%	2.255 **
Capital			
Median Total Common Equity / Total Assets	-0.2729	-0.3341	1.193
Median Retained Earnings / Total Assets	-1.0694	-0.4018	-3.778 ***
Valuation			
Median Tobin's q	2.6082	2.2112	0.716
Median Enterprise Value/ Revenue	14.555	14.1	0.082
Median Market Value of Equity / Total Liabilities	1.3818	0.8505	1.458
Age			
Median Age from Incorporation (years)	17	35	-3.477 ***
Percentages			
Percentage of 2019 Dividend Payers	15.0%	42.6%	-3.49 ***
Percentage of 2020 Dividend Payers	11.4%	46.8%	-4.515 ***
Percentage of 2020 Dividend Growers	6.4%	21.3%	-2.326 **
Percentage of 2020 Dividend Cutters	7.9%	21.3%	-2.08 **
Percentage of HNBE	25.0%	34.0%	-1.146
Percentage of Investment Grade	1.4%	21.3%	-3.244 ***
N	140	47	

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

Table 2 Summary Statistics for 2020 Healthy Equity (HNBE) Firms

Variables	Other ONBE Firms	Healthy HNBE Firms	Z (t) statistic for difference in medians (percentage)
Size			
Median Total Assets ($)	457,000,000	800,000,000	-0.84
Median Total Common Equity ($)	-120,000,000	-207,000,000	0.74
Median Market Value of Equity ($)	438,000,000	5,180,000,000	-6.854 ***
Credit			
Median Altman's Z-score	-0.6059	4.1493	-10.2930 ***
Median EBIT / Interest Expense	-0.2153	2.8639	-3.0800 ***
Median EBIT / Total Liabilities	-0.0181	0.0625	-4.4870 ***
Median Total Liabilities / Total Assets	1.2504	1.2655	0.3060
Profitability			
Median 2019 EBIT / Total Assets	1.3%	11.8%	-3.6620 ***
Median 2020 EBIT / Total Assets	-3.0%	11.0%	-4.7750 ***
Median standard deviation of EBIT / Total Assets	5.2%	4.1%	1.3260
Median 2020 ROA	-16.2%	3.8%	-5.0420 ***
Median Average ROA	-8.3%	3.4%	-4.4050 ***
Assets			
Median Working Capital / Total Assets	0.0830	0.1526	-1.3110
Median Property, plant, equipment / Total Assets	0.1034	0.1321	-0.7740
Median Intangible Assets /Total Assets	0.1034	0.0991	-0.5810
Median Cash / Total Assets	0.1590	0.1962	-1.3380
Median Sales / Total Assets	0.4660	0.8061	-3.8530 ***
Median Total Asset growth rate	8.9%	14.0%	-2.1480 **
Capital			
Median Total Common Equity / Total Assets	-0.2902	-0.2799	-0.1700
Median Retained Earnings / Total Assets	-1.0800	-0.4127	-4.3530 ***
Valuation			
Median Tobin's q	1.6542	8.3765	-7.3380 ***
Median Enterprise Value/ Revenue	13.3500	17.3600	-2.6740 ***
Median Market Value of Equity / Total Liabilities	0.7175	7.1264	-7.9900 ***
Age			
Median Age from Incorporation (years)	22	18	0.126
Percentages			
Percentage of 2019 Dividend Payers	19.1%	29.4%	-1.4140
Percentage of 2020 Dividend Payers	16.9%	29.4%	-1.7350 *
Percentage of 2020 Dividend Growers	5.2%	23.5%	-2.9210 ***
Percentage of 2020 Dividend Cutters	14.0%	3.9%	-2.4790 **
Percentage of LNBE	22.8%	31.4%	-1.145
Percentage of Investment Grade	3.7%	13.7%	-1.959 *
N	136	51	

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

HNBE firms are more profitable as measured by median EBIT/TA and median ROA, but there is no significant difference in earnings volatility between HNBE and ONBE firms. Also, HNBE firms were more profitable than ONBE firms in 2019 based on median EBIT/TA and average ROA over the past 10 years. HNBE firms have higher median asset growth rate and higher median sales/assets ratio. There is no statistical difference between HNBE and ONBE firms in terms of assets – standardized working capital, property-plant-equipment, intangibles, or cash. In addition, there is no statistical difference in firm age between HNBE and ONBE firms. Since the classification process sorts by q, HNBE firms have higher market valuations as measured by higher median EV/Sales and higher median ME/TL.

In terms of dividend policy, the 2020 HNBE firms have a higher percentage of dividend payers than ONBE firms, but the percentage is not as high as the percentage of dividend payers classed as LNBE firms. In addition, the high Z-score HNBE firms, have more dividend growers and fewer dividend cutters. While HNBE firms are larger by market equity and more profitable than ONBE firms, the HNBE firms have higher growth rates (more investment opportunities) and no statistical difference in age. Consequently, the 2020 HNBE firms only have *some* of the traditional Fama-French (2001) characteristics of PBE dividend payers – larger size and more profitable. The HNBE firms do not have the typical lower growth rates (investment opportunities) and higher age attributes of PBE dividend payers.

EMPIRICAL RESULTS FROM THE INVESTIGATION OF DIVIDEND POLICY

Summary Statistics for 2020 Dividend Paying, Negative Book Equity Firms

Now, I directly investigate the summary statistics and summary percentages for the 2020 dividend paying, negative book equity firms and present the results in Table 3 and Table 4. Consistent with the PBE literature[10], the 2020 NBE dividend payers are larger in size than NBE non-payers based on median total assets, and median market value of equity. A higher percentage of NBE dividend payers are classified as LNBE or HNBE firms, which are considered to be larger, fiscally healthier, and not in financial distress. With similar leverage, the 2020 NBE dividend payers have better credit quality – higher Altman's Z-score, higher interest coverage, higher total debt coverage, and a significantly higher percentage of investment-grade rated firms. In fact, about 75% of the 2020 NBE non-payers are considered high default risk firms (by Z-scores less than 1.81) and only 1.3% of NBE non-payers are investment-grade rated firms. The 2020 NBE dividend payers are more profitable by median EBIT/TA and median ROA. Furthermore, the 2020 NBE dividend payers were more profitable in both 2019 as well as over the past 10 years. In fact, about 80% of the NBE dividend paying firms were profitable, on average, over the past 10 years. In addition to being more profitable, the 2020 NBE dividend payers have lower median earnings volatility than NBE non-payers.

The 2020 NBE dividend payers have a somewhat different balance sheet asset structure than NBE non-payers, with NBE dividend payers having more long-term assets but less cash. Interestingly, Hauser and Thornton (2017b) show that PBE dividend payers also have lower cash ratios PBE non-payers. Consistent with the firm life cycle or maturity hypothesis for dividend policy, the 2020 NBE dividend payers have a lower median asset growth rate and a higher age.

[10] Fama and French (2001); DeAngelo, DeAngelo, and Stulz (2006); Hauser and Thornton (2016,2017a)

Table 3 Summary Statistics for 2020 Dividend Paying Negative Book Equity Firms

Variables	Non-Paying Firms	Dividend Paying Firms	Z statistic for difference in medians	
Size				
Median Total Assets ($)	324,000,000	5,640,000,000	-6.477	***
Median Total Common Equity ($)	-102,000,000	-806,000,000	5.557	***
Median Market Value of Equity ($)	634,000,000	6,260,000,000	-5.298	***
Median NYSE Percentile of Median Market Value of Equ	0.10	0.55		
Credit				
Median Altman's Z-score	0.1341	1.8415	-3.895	***
Median EBIT / Interest Expense	-0.3098	3.1122	-5.097	***
Median EBIT / Total Liabilities	-0.0448	0.0822	-5.577	***
Median Total Liabilities / Total Assets	1.2737	1.1871	1.266	
Profitability				
Median 2019 EBIT / Total Assets	-3.4%	10.4%	-5.802	***
Median 2020 EBIT / Total Assets	-5.6%	10.5%	-5.47	***
Median standard deviation of EBIT / Total Assets	5.3%	3.7%	2.659	***
Median 2020 ROA	-18.2%	2.2%	-5.12	***
Median Average ROA	-13.5%	6.3%	-6.457	***
Median 2020 ROA minus Average ROA	-4.2%	-3.1%	-0.557	
Assets				
Median Working Capital / Total Assets	0.1059	0.0596	0.89	
Median Property, plant, equipment / Total Assets	0.0997	0.1597	-2.723	***
Median Intangible Assets /Total Assets	0.0870	0.1670	-1.977	**
Median Cash / Total Assets	0.2298	0.1364	2.599	***
Median Sales / Total Assets	0.5156	0.6893	-1.951	*
Median Total Asset growth rate	14.8%	3.6%	3.525	***
Capital				
Median Total Common Equity / Total Assets	-0.3027	-0.1871	-2.065	**
Median Retained Earnings / Total Assets	-1.1126	-0.2766	-5.349	***
Valuation				
Median Tobin's q	2.5612	1.9430	1.662	*
Median Enterprise Value/ Revenue	14.6100	13.9350	0.575	
Median Market Value of Equity / Total Liabilities	1.3447	0.9168	1.088	
Age				
Median Age from Incorporation (years)	17	58	-5.318	***
N	149	38		

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

Table 4 Summary Percentages for 2020 Dividend Paying Negative Book Equity Firms

Variables	Non-Paying Firms	Dividend Paying Firms	t statistic for difference in percentage
LNBE , HNBE			
Percentage of LNBE Firms	16.8%	57.9%	-4.738 ***
Percentage of HNBE Firms	24.2%	39.5%	-1.746 *
Credit			
Percentage of Investment Grade Firms	1.3%	26.3%	-3.421 ***
Percentage of High Default Risk Firms (by Z-score)	74.5%	50.0%	2.732 ***
Profitability			
Percentage of Profitable Firms (Average)	20.1%	79.0%	-7.874 ***
Percentage of Profitable Firms (2020)	20.8%	58.0%	-4.226 ***
Payout Policy			
Percentage of 2019 Dividend Payers	3.4%	94.7%	-23.087 ***
Percentage of 2020 Dividend Growers	0.0%	50.0%	-6.0828 ***
Percentage of 2020 Dividend Cutters	3.4%	42.1%	-4.697 ***
Percentage of Payers with Unsustainable Payout Ratio	-	52.6%	-6.412 ***
Percentage of Firms with Prior Repurchases	30.9%	89.5%	-9.28 ***
Capital			
Percentage of Firms with Positive RE/TA	2.0%	23.7%	-3.059 ***
Percentage of Firms Financing with Preferred Stock	20.8%	0.0%	6.236 ***
Sectors			
Percentage of Consumer Cyclicals	17.4%	39.5%	-2.555 **
Percentage of Consumer Defensive	1.3%	2.6%	-0.461
Percentage of Industrials	10.1%	15.8%	-0.8
Percentage of Technology	18.8%	15.8%	0.4
Percentage of Health Care	32.9%	5.3%	5.184 ***
Percentage of Communication Services	11.4%	13.2%	-0.2
Percentage of Energy	5.4%	7.9%	-0.5
Percentage of Basic Materials	2.7%	0.0%	2.021 **
N	149	38	

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

Also consistent with the life-cycle hypothesis for dividend policy, the 2020 NBE dividend payers have a higher (but still negative) median RE/TA. An interesting point is that only 24% of 2020 NBE dividend paying firms have a positive RE/TA. The NBE dividend payers have somewhat lower market valuations than NBE non-payers as measured by median q and median EV/Sales ratio; however, only the lower median q is statistically significant (at 10% level). Notably, the literature of PBE dividend payers shows that they have somewhat lower market valuations than PBE

non-payers as measured by median M/B ratio.[11] While NBE firms must have a negative TE/TA ratio, by definition, the 2020 NBE dividend payers have a greater median TE/TA. Although an investigation of capital structure is outside the scope of this research, *none* of the 2020 NBE dividend paying firms use preferred stock in the capital structure, while 21% of NBE non-payers use preferred stock for financing.

Although the sample size limits a complete industry analysis of the 2020 NBE firms, an examination of industry sectors is instructive. The 2020 NBE dividend payers are significantly more prevalent in the Consumer Cyclicals industry sector, while the 2020 NBE non-payers are more predominant in the HealthCare industry sector. The percentage of 2020 NBE dividend payers is not statistically different from the 2020 NBE non-payers in the Consumer Defensive, Industrials, Technology, Communication Services, or Energy industry sectors.

An assessment of the payout policy of the 2020 NBE dividend payers shows that 90% of these firms repurchased shares at least one time within the last 10 years, while 95% of the 2020 NBE dividend payers paid a dividend in 2019, which is consistent with the literature of PBE dividend payers. In addition, I classify 50% of the 2020 NBE dividend payers as dividend growers, while 42% are dividend cutters. The fact that dividend growers even exist amongst NBE firms may seem surprising given the perception of NBE firms. In DeAngelo and DeAngelo's (1990) study of distressed firms, they report that "almost all [*distressed*] sample firms reduced dividends". Three percent of 2020 NBE non-payers previously paid a dividend in 2019 but omitted the dividend in 2020.

To summarize the analysis of the univariate, descriptive statistics for the 2020 NBE firms, the results confirm the prior NBE literature that a portion of 2020 NBE firms, especially NBE dividend payers, are financially healthy (about 28% of NBE firms were profitable in 2020) and not in financial distress. The investigation finds that LNBE and HNBE firms do have a higher percentage of dividend payers and dividend growers than SNBE or ONBE firms, which are not considered financially healthy. Most importantly, the examination of the 2020 NBE dividend paying firms indicates that the NBE dividend paying firms have the same characteristics of PBE dividend paying firms reported in the dividend policy literature. Identical to the prior research of PBE dividend payers, I find the 2020 NBE dividend payers to be larger, more profitable, older, and with higher earned capital.

Logit Regressions for 2020 Dividend Paying, Negative Book Equity Firms

After analysis of the summary statistics, I report the results of the multivariate logit regressions for the probability that a 2020 NBE firm pays a dividend in Table 5. In the logit regressions, I report 6 models[12] to investigate the multivariate relationship to the probability of paying a dividend. In the first 2 logit regressions (Model 1 and Model 2), the explanatory variables are simply the classification of LNBE and HNBE (modeled as q and Z). In these two simple logit regressions, being classified as LNBE and HNBE (modeled with q and Z) firms increases the probability that a NBE firm pays a dividend in 2020. While the LNBE and HNBE variables are significant in the simple models, the overall fit is rather poor with low Pseudo R^2 values. In the next 2 logit regressions (Model 3 and Model 4), I add the explanatory variables from the DeAngelo, DeAngelo, Stulz (2006) life-cycle model to the LNBE and HNBE variables. The results in Table 5 report that being an LNBE or HNBE firm is not significant when the logit regression controls for firm size, profitability, asset growth rate, and RE/TA (all of which are significant at the 1% or 5% level).

Furthermore, the inclusion of the highly significant firm size, profitability, asset growth rate, and RE/TA variables greatly increases the Pseudo R^2 values and correct classifications. In Model 5, firm age is incorporated with the DeAngelo, DeAngelo, Stulz (2006) life-cycle model variables. Although adding the firm age variable does not improve the Pseudo R^2 value or correct classifications, the firm age is statistically meaningful (while still controlling with the highly significant firm size, profitability, asset growth rate, and RE/TA variables). The logit regression analysis of NBE firms in Models 3-5 confirms the univariate analysis. That is the same reported characteristics of PBE

[11] In the negative book equity (NBE) literature, q is used as an alternative to the M/B ratio.
[12] Models including industry sectors showed no significance when controlled for size, growth, profitability, and earned capital.

dividend paying firms (larger size, higher profitability, lower growth rates, higher RE/TA, and higher age) increased the probability of a 2020 NBE firm paying a dividend. Even controlling for size, profitability, asset growth rate, RE/TA, and age in Model 6, paying a prior dividend in 2019 significantly increased the probability of an NBE paying a dividend in 2020. Model 6, which includes the prior dividend paying status greatly improves the model fit to a Pseudo R^2 of .85 with 98% of NBE firms correctly classified.

Table 5 Logit Regressions for the Probablity of a 2020 Dividend Paying NBE Firm

Variable Coefficients (standard errors in parentheses)

Variable	Logit Model					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	-0.9431 ***	-2.0477 ***	-8.9572 ***	-13.4696 ***	-13.3212 ***	-24.1407 **
	(0.2337)	(.2656)	(3.3051)	(3.4341)	(3.5001)	(9.4911)
q	-0.0974 **			0.0645		
	(0.0426)			(.1077)		
Z	0.0773 **					
	(.0313)					
LNBE		1.9199 ***	0.5363			
		(.3950)	(.5674)			
Size			0.3912 **	0.606 ***	0.5226 ***	0.9796 **
			(.1577)	(.1576)	(.1492)	(.4138)
Profitabilty			3.2803 **	3.997 **	2.9724 **	1.3397
			(1.5756)	(1.7995)	(1.4632)	(2.2763)
Asset Growth			-5.3588 ***	-5.7268 **	-5.8021 ***	-8.038 *
			(1.9962)	(2.3899)	(2.1430)	(4.7917)
RE/TA			0.6372 **	0.5762 **	0.5756 **	0.1992
			(.3064)	(.2801)	(.2641)	(.3822)
TCE/TA			0.0784			
			(.5900)			
Cash/TA			0.2263			
			(1.8135)			
WC/TA				2.2091 *	1.4638	
				(1.2318)	(1.1157)	
ME/TL				-0.276		
				(.2202)		
Sales/TA				0.1706		
				(.3426)		
Age					0.4564 *	-0.2282
					(.2518)	(0.4693)
2019 Prior Dividend						7.5694 ***
						(1.7962)
Pseudo R^2	0.0711	0.1289	0.424	0.4557	0.4493	0.8501
Correct	79.1%	79.7%	86.1%	87.2%	86.6%	97.9%

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

Summary Characteristics of 2020 NBE Dividend Payers

Based on the summary statistics and logit regressions, the significant attributes that differentiate the 2020 NBE dividend payers from the NBE non-payers are as follows.

1. Size

The 2020 NBE dividend payers are much larger in asset size and market capitalization compared to NBE non-payers. The median NYSE Percentile for the market value of equity is the 55% NYSE Percentile for NBE dividend payers compared to the 10% NYSE Percentile for NBE non-payers (reported in Table 3). This compares remarkably well to Hauser and Thornton's (2016,2017a) findings of 40% NYSE Percentile for PBE dividend payers and the 10% NYSE Percentile for PBE non-payers. Increasing size significantly increases the probability that a 2020 NBE firm pays a dividend.

2. Profitability

The 2020 NBE dividend payers are much more profitable than NBE non-payers and again, very similar in median profitability to PBE dividend payers in the literature. The median 2020 NBE non-paying firm is not profitable. While median profitability is down in 2020, the average ROA over the last 10 years for the 2020 NBE dividend payers is 6.26% (reported in Table 3) compared to Hauser and Thornton's (2016, 2017a) findings of a median ROA of 5.67% for PBE dividend payers. Increasing profitability significantly increases the probability that a 2020 NBE firm pays a dividend.

3. Lower Growth Rates

The 2020 NBE dividend payers have lower asset growth rates than the NBE non-payers consistent with life-cycle models typically investigated with only PBE firms. Logit regressions indicate that lower asset growth rates (negative asset growth variable coefficient in Table 5) increase the probability that a 2020 NBE firm pays a dividend.

4. Higher Firm Age (from incorporation)

The 2020 NBE dividend payers have a greater median firm age (58 years) than the NBE non-payers (17 years), which is consistent with the maturity hypothesis literature[13] for PBE dividend payers. Logit regressions (in Table 5) show that higher firm age increases the probability that a 2020 NBE firm pays a dividend.

5. Greater earned capital, RE/TA

The 2020 NBE dividend payers have significantly greater earned capital, RE/TA than the NBE non-payers, which is consistent with the life-cycle model and maturity hypothesis in the PBE dividend payer research (DeAngelo and DeAngelo, 2007). While the median RE/TA of the 2020 NBE dividend payers is larger than NBE non-payers, the median RE/TA is negative and consequently much lower (and opposite in sign) than the past literature on PBE dividend payers. The median RE/TA of the 2020 NBE dividend payers is -0.277 (reported in Table 3) compared to a median RE/TA of PBE dividend payers of 0.347 reported by Hauser and Thornton (2016, 2017a) and 0.341 reported by DeAngelo, DeAngelo, and Stulz (2006). Logit regressions (in Table 5) show that a larger RE/TA increases the probability that a 2020 NBE firm pays a dividend.

The RE/TA Quandary

The fact the 2020 NBE dividend payers have a negative median RE/TA presents considerable problems incorporating NBE firms in data sets with PBE firms for Dividend Policy research when the RE/TA variable is to be investigated. The negative median RE/TA for the 2020 NBE *dividend payers* (-.277) is less than the reported values of the median RE/TA for PBE *non-payers* [0.035 by Hauser and Thornton (2016,2017a) and 0.015 by DeAngelo, DeAngelo, and Stulz (2006)]. Consequently, even a relatively large RE/TA (i.e., above the -0.277 median RE/TA for NBE dividend

[13] See, for example, Grullon, G., Michaely, R., and Swaminathan, B., (2002) and Julio, B., and Ikenberry, D., (2004).

payers) in the NBE sample would be relatively small in the PBE sample. An issue here is the "classical" interpretation of the RE/TA ratio versus accounting practices for stock repurchases. In the "classical" interpretation of the RE/TA ratio, dividend paying firms are very profitable with sizable accumulated retained earnings that can be distributed to shareholders while non-paying firms had low profitability with little accumulated retained earnings for distribution. However, some accounting practices for stock repurchases reduce the value of the retained earnings rather than the value of the contributed capital[14]. Consequently, a firm with large share repurchases can have negative retained earnings due to the accounting of the stock repurchases rather than accumulated losses. Figure 1 depicts an example of this issue with 2020 NBE firms Starbucks and Yum! Brands with reported negative retained earnings. As can be seen in Figure 1, the negative retained earnings for these firms is due to accounting of repurchases and not accumulated losses since these firms were always profitable over the period.

Not only does this RE/TA quandary create problems for the analysis of the dividend policy for NBE firms, but it also confounds the determination of financial distress. The issue of a negative RE/TA for a financially healthy firm (such as Starbucks with investment-grade rated debt in 2020) also muddles the Altman's Z score, which uses RE/TA as a factor in the model. A negative RE/TA lowers Altman's Z score, even if the firm is financially sound (such as Starbucks in 2020) and simply accounts for stock repurchases by reducing the retained earnings account. It is outside of the scope of research for this project to resolve this RE/TA quandary, and it is left for future research.

See Figure One, below:

[14] For a detailed discussion on the accounting of stock repurchases and its effect on the components of equity, see Ball, Gerakos, Linnainmaa, Nikolaev (2020).

Figure 1 Retained Earnings and Net Income for 2020 NBE Firms Starbucks Corporation and Yum! Brands, Inc. (2011 -2020)

Figure 1 shows that the accumulated retained earnings of Starbucks Corporation and Yum! Brands fell dramatically despite the fact that net income was always positive over the time period. The declines in retained earnings correspond to large share repurchases where repurchases are subtracted from retained earnings rather than contributed capital.

Summary Statistics for 2020 Dividend Growing, Negative Book Equity Firms

Finding that the characteristics of dividend paying NBE firms are nearly identical to the firm characteristics of dividend paying PBE firms, I turn my attention to the payout policy of NBE dividend payers, specifically dividend growers. The findings of the empirical analysis and descriptive statistics of the 2020 NBE dividend growing firms are reported in Table 6.

The descriptive statistics for the 2020 NBE dividend growers show the subset to be the most financially healthy NBE firms. The 2020 NBE dividend growers with the median market equity at the 75% of NYSE percentile are *much larger* in market equity than the NBE dividend cutters, and that median market equity is much larger than all NBE dividend paying firms or any subset of NBE firms studied in this research. Given this difference in size of market equity, it is surprising that the size of the median assets and median common book equity of the NBE dividend growers is not statistically different from dividend cutters.

Not surprisingly, the 2020 NBE dividend growers have much better credit quality than dividend cutters – higher Altman Z score, higher interest coverage, and higher total debt coverage. The interest coverage and total debt coverage ratios of the NBE dividend growers are the best ratios of any NBE firm subset in this study – even the HNBE firms specifically sorted by high Z-score. Although the 2020 NBE dividend growers have a higher median TL/TA leverage ratio, it is not statistically different from the NBE dividend cutters. The NBE dividend growers have a significantly higher percentage of investment-grade rated firms with almost half of the 2020 NBE dividend growers rated as investment-grade. As expected, the 2020 NBE dividend growing firms are the most profitable subset of NBE firms examined. The NBE dividend growers are more profitable by median EBIT/TA, ROA, or any other measure of profitability in the study. The 2020 NBE dividend growers achieve the higher levels of profitability with lower earnings volatility than NBE dividend cutters. Hauser and Thornton (2015) find that PBE dividend growers also attain higher high levels of profitability with lower risk.

The 2020 NBE dividend growers have a higher median asset growth rate than the NBE dividend cutters. Although, the 2020 NBE dividend growers have the highest median asset growth rate among the NBE dividend payers, the NBE dividend grower's median asset growth rate is lower than the median asset growth rate of NBE non-payers. These growth rate results are very similar to the findings reported by Hauser and Thornton (2015) for PBE dividend growers. The PBE dividend growth research by Hauser and Thornton (2015) shows that PBE dividend growers have higher sales and earnings growth rates than PBE dividend cutters, but lower than PBE non-payers.

The 2020 NBE dividend growers have a significantly higher valuation measured by higher median q. The Tobin's q and EV/Sales valuation ratios of the NBE dividend growers are even higher than the q and EV/Sales valuation ratios of the NBE non-payers, although the higher EV/sales ratio of the NBE dividend growers is not statistically significant. Furthering the issue of the RE/TA quandary, even the NBE dividend growers have a negative median RE/TA earned capital ratio. In terms of dividend payout policy, the 2020 NBE dividend growers pay a significantly higher median cash dividend than NBE dividend cutters, but essentially have the same median dividend yield. Research by Hauser and Thornton (2015) also shows that PBE dividend growers have higher median cash dividends (per share) than PBE dividend cutters.

Table 6 Summary Statistics for 2020 Dividend Growing and Dividend Cutting Negative Book Equity Firms

Variables	Dividend Growing Firms	Z statistic	Dividend Cutting Firms	Z statistic
Size				
Median Total Assets ($)	5,850,000,000	-0.044	2,950,000,000	-0.030
Median Total Common Equity ($)	-558,000,000	-0.102	-806,000,000	0.030
Median Market Value of Equity ($)	17,500,000,000	-3.304 ***	2,350,000,000	2.779 ***
NYSE Percentile of Median Market Value of Equity	0.75		0.30	
Credit				
Median Altman's Z-score	2.8555	-4.131 ***	0.7496	4.228 ***
Median EBIT / Interest Expense	6.4272	-4.306 ***	0.4064	4.701 ***
Median EBIT / Total Liabilities	0.1192	-3.956 ***	0.0108	4.464 ***
Median Total Liabilities / Total Assets	1.3655	-0.657	1.1230	0.739
Profitability				
Median 2019 EBIT / Total Assets	16.9%	-3.197 ***	8.3%	2.631 ***
Median 2020 EBIT / Total Assets	15.3%	-4.043 ***	1.2%	4.464 ***
Median standard deviation of EBIT / Total Assets	1.5%	2.496 **	4.6%	-2.365 **
Median 2020 ROA	9.0%	-4.189 ***	-6.2%	3.903 ***
Median Average ROA	8.4%	-3.868 ***	1.4%	3.814 ***
Median 2020 ROA minus Average ROA	0.9%	-3.518 ***	-9.3%	3.045 ***
Assets				
Median Cash / Total Assets	0.1495	-1.504	0.1077	0.798
Median Sales / Total Assets	0.9658	-2.992 **	0.3651	3.370 ***
Median Total Asset growth rate	4.6%	-1.270	0.8%	2.010 **
Capital				
Median Total Common Equity / Total Assets	-0.2804	0.511	-0.1283	-0.562
Median Retained Earnings / Total Assets	-0.2661	-0.598	-0.2939	0.325
Valuation				
Median Tobin's q	3.3362	-3.372 ***	1.0318	3.725 ***
Median Enterprise Value/ Revenue	16.7400	-1.182	11.5900	0.828
Median Market Value of Equity / Total Liabilities	2.3253	-3.985 ***	0.4041	4.110 ***
Dividend Policy				
Median 2019 Regular Cash Dividend ($/share)	$1.44	-0.979	$0.78	0.385
Median 2020 Regular Cash Dividend ($/share)	$1.66	-3.709 ***	$0.28	3.327 ***
Median 2020 Dividend Yield	1.6%	0.774	1.7%	-0.976
Median 2020 Dividend Payout Ratio	38.5%	0.448	96.5%	-0.599
Percentages				
Percentage of LNBE	52.6%	0.643	62.5%	-0.480
Percentage of HNBE	63.2%	3.325 ***	6.3%	4.697 ***
Percentage of Investment Grade	47.4%	-3.266	6.3%	2.791 ***
Percentage of Profitable Firms (Average)	94.7%	2.521 **	62.5%	2.031 *
Percentage of Profitable Firms (2020)	84.2%	-3.780 ***	25.0%	4.060 ***
Percentage of Payers with Unsustainable Payout Ratio	26.3%	3.721 ***	81.3%	-3.454 ***
N	19		16	

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

In sum, the descriptive statistics of NBE dividend growers show the same firm characteristics of PBE dividend growers – larger market capitalization, better credit quality, higher profitability with lower volatility, and higher growth rates.

The 2020 NBE dividend cutters basically have the opposite characteristics of NBE dividend growers. The NBE dividend cutters have lower median market equity value, have poor credit quality with such low operating profitability that interest expenses cannot be covered (the median interest coverage ratio is less than 1). The 2020 NBE dividend cutters have high median earnings volatility with low median asset growth rates. Only 25% of NBE dividend cutters are profitable in 2020 leading to over 80% of NBE dividend cutters to have an unsustainable payout ratio (either a negative payout ratio or a payout ratio over 100%).

Logit Regressions for 2020 Dividend Paying, Negative Book Equity Firms

In order to confirm the univariate analysis of the 2020 NBE dividend growers, I investigate the multivariate relationship to the probability of a 2020 NBE dividend payer increasing the dividend in 2020. The results of the multivariate logit regressions are reported in Table 7.

In the first 2 logit regressions (Model 1 and Model 2), the explanatory variables are simply the classification of LNBE and HNBE. The logit regression results for Model 1 show that being classified as an HNBE firm increases the probability that a dividend paying NBE firm increases the dividend in 2020. While the HNBE variable is significant in the simple Model 1, the overall fit is rather poor with a relatively low Pseudo R^2 value. In the Model 2 logit regression, being an LNBE is not significantly related to an NBE dividend paying firm growing the dividend in 2020. In the next 2 logit regressions (Model 3 and Model 4), the logit regression controls for size, profitability, and earnings volatility per the Hauser and Thornton (2015) dividend grower model for PBE dividend payers. In the Model 3 baseline logit regression, the probability of being an NBE dividend grower in 2020 increases with larger size, higher profitability, and lower earnings volatility. The Model 3 baseline logit regression provides an excellent fit of the data with a Pseudo R^2 of .63 as well as 92% of the observations correctly classified. In Model 4, the HNBE variable is included with the baseline Model 3 variables. After controlling for market equity size, profitability, and earnings volatility the HNBE variable is not statistically significant, while size, profitability, and earnings volatility remain significant. In Model 5, the ROA profitability variable in the baseline Model 3 is replaced with EBIT/TA. Although Model 5 is an excellent fit of the data, it provides no improvement over Model 3. In Model 6, the HNBE variable is included with Model 5 variables (with EBIT/TA for profitability). After controlling for market equity size, profitability, and earnings volatility in Model 6, again the HNBE variable is not statistically significant, while size, profitability, and earnings volatility remain significant.

In sum, the logit regression analysis of NBE dividend growing firms reported in Table 7 confirms the univariate analysis for the characteristics of NBE dividend paying firms that increase the dividend in 2020. In fact, the *same* reported characteristics of larger market equity size, higher profitability, and lower volatility that increase the probability of being a PBE dividend growing firm (Hauser & Thornton, 2015b) also increase the probability of an NBE dividend paying firm growing the dividend in 2020.

Table 7 Logit Regressions for the Probablity of a 2020 Dividend Growing NBE Firm

Variable Coefficients (standard errors in parentheses)

Variable	Logit Model					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	-0.8267 *	0.2513	-16.5177 *	-17.5326 **	-19.8205 **	-20.1801 **
	(0.4532)	(.5040)	(8.5824)	(9.2954)	(9.2284)	(9.2970)
HNBE	2.213 **			-1.0035		-0.4363
	(0.7887)			(1.5391)		(1.3231)
LNBE		-0.4336				
		(.6613)				
Size			0.7983 **	0.8516 **	0.8623 **	0.8767 **
			(.3917)	(.4289)	(.4023)	(.4023)
Profitabilty			20.2379 *	26.9129 *		
			(10.9271)	(14.6882)		
					17.8628 **	19.5843 **
					(8.4623)	(9.5966)
Earnings Volatility			-64.4567 **	-69.6858 **	-51.8241 *	-51.7889 *
			(32.1465)	(34.337)	(28.2281)	(28.5146)
2019 Cash Dividend			-0.1148		-0.0245	
			(.3961)		(.4064)	
Pseudo R^2	0.1784	0.0082	0.6313	0.6385	0.600	0.6021
Correct	73.68%	55.26%	92.11%	89.47%	92.11%	89.47%

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *.

See Appendix A for variable definitions.

Matched Sample 2020 Dividend Paying, Negative Book Equity Firms with 2020 Dividend Paying Positive Book Equity firms

As a robustness test on the univariate descriptive statistics and the multivariate logit regressions, I perform an analysis between the 2020 NBE dividend payers and a matched sample of 2020 PBE dividend payers. The NBE and PBE dividend payers are matched for size (market equity capitalization) and dividend payout policy (dividend grower or dividend non-grower). The comparison results of the 2020 NBE dividend payers and the matched sample of 2020 PBE dividend payers are shown in Table 8.

As Table 8 shows in Panel A, the overall 2020 NBE dividend payers are well matched with the 2020 PBE dividend payers on the basis of market equity value. The 2020 operating performance between NBE dividend payers and matched PBE dividend payers is remarkably similar in terms of median profitability and median asset growth rate. In fact, the 2020 profitability as measured by median ROA is 2.22% for both the 2020 NBE dividend payers and the matched 2020 PBE dividend payers. While even the median age of the 2020 NBE dividend payers and the matched 2020 PBE dividend payers is similar, by definition, the median TE/TA equity capital ratios are opposite in sign. As per the above discussion regarding the RE/TA quandary, the NBE dividend payers have a negative median RE/TA ratio while the matched PBE dividend payers have a positive RE/TA (as well documented in the literature for PBE dividend payers.

Table 8 Comparisons of 2020 NBE Dividend Payers and 2020 Matched PBE Dividend Payer

Panel A Dividend Payers		
Variable	2020 NBE Dividend Payers	2020 Matched PBE Dividend Payers
Size[1]		
Median Market Value of Equity ($)	6,260,000,000	6,700,000,000
NYSE Percentile of Median Market Value of Equity	0.55	0.55
Profitability		
Median EBIT/TA	10.5%	5.8%
Median ROA (2020)	2.2%	2.2%
Growth		
Median Asset Growth Rate	3.6%	2.3%
Age		
Median Age from Incorporation (years)	58	51
Capital Ratios[2]		
Median RE/TA	-0.2766	0.2207
Median TE/TA	-0.1871	0.3265
Panel B Dividend Growers		
Variable	2020 NBE Dividend Growers	2020 Matched PBE Dividend Growers
Size[1]		
Median Market Value of Equity ($)	17,500,000,000	18,600,000,000
NYSE Percentile of Median Market Value of Equity	0.75	0.75
Profitability		
Median EBIT/TA	15.3%	11.8%
Median ROA (2020)	9.0%	7.2%
Earnings Volatility		
Median standard deviation of EBIT/TA	1.5%	1.5%
Capital Ratios[2]		
Median TE/TA	-0.2804	0.4005
Median RE/TA	-0.2661	0.2657
Panel C Dividend Cutters		
Variable	2020 NBE Dividend Cutters	2020 Matched PBE Dividend Cutters
Size[1]		
Median Market Value of Equity ($)	2,350,000,000	1,885,000,000
NYSE Percentile of Median Market Value of Equity	0.30	0.30
Profitability		
Median EBIT/TA	1.2%	2.4%
Median ROA (2020)	-6.2%	-2.5%
Earnings Volatility		
Median standard deviation of EBIT/TA	4.6%	4.0%
Capital Ratios[2]		
Median TE/TA	-0.1283	0.2423
Median RE/TA	-0.2939	0.1956

[1] NBE and PBE Dividend payers are matched on the basis of market value of equity

[2] NBE and PBE Dividend payers have opposite sign capital ratios by definition

In Panel B of Table 8, the 2020 NBE dividend growers are also well matched with the 2020 PBE dividend payers on the basis of market equity value. The 2020 operating performance between NBE dividend payers and matched PBE dividend payers is remarkably similar in terms of median profitability and median earnings volatility. As per the univariate analysis, both the 2020 NBE dividend growers and the 2020 PBE dividend growers have high median profitability with low earnings volatility. While the operating performance of the 2020 NBE dividend growers and the matched 2020 PBE dividend growers is nearly equivalent, by definition, the median TE/TA equity capital ratios are opposite in sign.

To summarize, the robustness test of the matched sample of PBE dividend payers confirms the conclusions of the univariate summary statistics and multivariate logit regressions. Although the 2020 NBE dividend payers (growers) and the matched PBE dividend payers (growers) have opposite sign equity capital ratios, the same operating performance parameters characterize *both* NBE and PBE dividend policy and dividend growth. Moreover, the 2020 operating performance of the NBE dividend payers and the matched PBE dividend payers is remarkably similar.

CONCLUSIONS

This study provides evidence confirming the recent NBE literature that a portion of 2020 NBE firms, especially NBE dividend payers and dividend growers, are financially healthy and not in financial distress. For example, about 95% of the 2020 NBE dividend growers are profitable over the past 10 years, and about 50% of the 2020 NBE dividend growers are rated investment-grade. The investigation finds that the prior literature of negative book equity firms classified as LNBE firms by Ang (2015) and HNBE firms by Luo, Liu, and Tripathy (2021) have a higher percentage of dividend payers and dividend growers than financially distressed SNBE or ONBE firms. This study shows that LNBE and HNBE firms have some of the characteristics of PBE dividend payers.

Most importantly, this investigation of the 2020 NBE dividend paying firms indicates that the NBE dividend paying firms have the same characteristics of PBE dividend paying firms reported in the prior dividend policy literature. This paper shows that the 2020 NBE dividend payers are larger, more profitable, older, and with higher earned capital - identical to the prior research of PBE dividend payers.

Based on analysis of the summary statistics and logit regressions, the significant attributes of the 2020 NBE dividend payers are as follows. The 2020 NBE dividend payers are much larger in asset size and market capitalization compared to NBE non-payers, and the NYSE percentile compares remarkably well to Hauser and Thornton's (2016, 2017a) findings for PBE dividend payers. Logit analysis shows that increasing size significantly increases the probability that a 2020 NBE firm pays a dividend. The 2020 NBE dividend payers are much more profitable than NBE non-payers and again are similar in median profitability to PBE dividend payers in the literature. Based on logit analysis, increasing profitability significantly increases the probability that a 2020 NBE firm pays a dividend. The 2020 NBE dividend payers have lower asset growth rates than the NBE non-payers consistent with the life-cycle model developed with PBE firms. Logit regressions indicate that lower asset growth rates (lower investment opportunities) increase the probability that a 2020 NBE firm pays a dividend. The 2020 NBE dividend payers have a greater median age (58 years) than the NBE non-payers (17 years), which is also consistent with the maturity hypothesis literature for PBE dividend payers. This research shows that higher firm age increases the probability that a 2020 NBE firm pays a dividend. Based on these results, NBE firms appear to follow a dividend policy based on a life cycle or maturity model similar to PBE firms.

The 2020 NBE dividend payers have significantly greater RE/TA than the NBE non-payers consistent with the life-cycle model and maturity hypothesis in the PBE dividend payer research. While the median RE/TA of the 2020 NBE dividend payers is larger than NBE non-payers, the median RE/TA is *negative* and consequently much lower (and oppositive in sign) than the past literature on PBE dividend payers. Logit regressions show that a larger RE/TA increases the probability that a 2020 NBE firm pays a dividend. The fact the 2020 NBE dividend payers have a negative median RE/TA presents a considerable quandary incorporating NBE firms in data sets with PBE firms for Dividend Policy research when the RE/TA variable is to be investigated. The quandary seems to arise because some

NBE firms have negative RE/TA due to accounting practices for share repurchases and some NBE firms have negative RE/TA due to accumulated losses.

Analysis of the 2020 NBE dividend growers shows the dividend grower subset to be the most financially healthy NBE firms. The 2020 NBE dividend growers are *much larger* in market equity than any type of NBE firms studied in this research. Moreover, the 2020 NBE dividend growers have much better credit quality than other NBE dividend payers with higher Altman Z score, higher interest coverage, and higher total debt coverage. The interest coverage and total debt coverage ratios of the NBE dividend growers are the best ratios of any NBE firm subset in this study – even the HNBE firms specifically sorted by high Z-score.

The 2020 NBE dividend growing firms are the most profitable category of NBE firms examined. The NBE dividend growers are more profitable by median EBIT/TA, ROA, or any other measure of profitability in the study. The 2020 NBE dividend growers achieve the higher levels of profitability with lower earnings volatility than NBE dividend cutters. In fact, this study of NBE dividend growers shows the same firm characteristics of PBE dividend growers – larger market capitalization, better credit quality, higher profitability with lower volatility, and higher growth rates.

The logit regression analysis of NBE dividend growing firms confirms the univariate analysis for the characteristics of NBE dividend growers in 2020. Indeed, the *same* reported characteristics of larger market equity size, higher profitability, and lower volatility that increase the probability of being a PBE dividend growing firm (Hauser & Thornton, 2015b) also increase the probability of an NBE dividend paying firm growing the dividend in 2020.

Finally, a robustness test of the matched sample of PBE dividend payers confirms the univariate summary statistics and multivariate logit regressions. Although the 2020 NBE dividend payers (and growers) and the matched PBE dividend payers (and growers) have opposite signed equity capital ratios, the parameters that distinguish dividend payers from non-payers and dividend growers from non-growers are the same for NBE and PBE firms. Interestingly, this investigation, which focuses specifically on NBE firms, which are typically excluded from dividend policy studies, indicates that NBE firms indeed have a dividend policy, and the dividend policy of NBE firms parallels the dividend policy of PBE firms.

Appendix A

Variable Definitions

Variable	Definition
Assets	
TA, Total Assets	Book value of total assets
Cash/Total Assets	Cash and cash equivalents divided by total assets
WC/TA, Working Capital/Total Assets	Working capital divided by total assets
Net PPE/Total Assets	Net property, plant, and equipment divided by total assets
Net Intangibles/Total Assets	Net Intangibles divided by total assets
Sales/Total Assets	Sales divided by total assets
Asset Growth Rate	(Total assets in year t divided by total assets in year t-1) minus 1
Liabilities	
Total Liabilities	Book Value of total liabilities
TL/TA, book leverage	Total liabilities divided by total assets
Capital	
Total Equity	Book value of total equity
Total Common Equity	Book value of total common equity
Retained Earnings	Book value of retained earnings
TE/TA	Total equity divided by total assets
Earned Capital, RE/TA	Retained earnings divided by total assets
RE/TE	Retained earnings divided by total equity
Preferred Stock	Book value of Preferred stock
Percentage of Firms Financing with Preferred Stock	The percentage of NBE firms in the sample or subset that have preferred stock included in the book value of total equity
Equity	
Negative Book Equity	Firms with a negative book value of total common equity
NBE firms	Negative book equity firms.
PBE firms	Positive book equity firms
LNBE firms	Large negative book equity firms. Negative book equity firms in the quartile with the largest magnitude of negative book equity.
SNBE firms	Secondary negative book equity firms. All negative book equity firms except the LNBE firms in the quartile with the largest magnitude of negative book equity.
HNBE firms	Healthy negative book equity firms. Negative book equity firms with the (H) highest Z-score and firms with medium (M) Z-scores and (H) Tobin's q ratio
ONBE firms	Other negative book equity firms. All negative book equity firms except the HNBE firms.
Profitability	
EBIT	Earnings before interest and tax expenses
EBIT/TA	EBIT divided by total assets
ROA	Return on total assets
Average ROA	Return on total assets averaged over the lesser of the prior 10 years or number of years of SEC 10-k filings.

Appendix A (continued)

Variable Definitions

Variable	Definition
Profitability	
ROE	Return on total equity
Earnings Volatility, Standard Deviation of EBIT/TA	Standard deviation of EBIT/TA based on year t and year t-1
Percentage of profitable firms	The percentage of NBE firms in the sample or subset that had positive ROA
Firm Age	
Firm Age	The age of the firm based on the number years from incorporation.
NYSE Percentile	The percentile ranking of firm's market equity. NYSE market equity capitalization percentile breakpoints provided at Dr. Kenneth R. French's website, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
Credit	
Z-Score	Altman's Z-score
Interest Coverage, EBIT/Interest Expense	EBIT divided by interest expense
Total Debt Coverage, EBIT/TL	EBIT divided by total liabilities
Investment Grade	Firms with debt rated investment grade
High Default Risk Firms	Firms with an Altman's Z-score below 1.81
Valuation	
EV, Enterprise Value	Enterprise Value, Enterprise value is the sum of the market value of equity plus debt minus cash
EV/Revenue	Enterprise value divided by revenue
ME/TL	Market value of equity divided by the book value of total liabilities
q	Tobin's q. In this paper, q is computed based on the method of Chung and Pruitt (1994)
M/B	Market equity value divided by book equity value
Payout Policy	
Dividend Payers	Firms that pay a regular cash dividend in year t
Dividend Non-Payers	Firms that do not pay a regular cash dividend in year t
Dividend Growers	Firms that pay a greater regular cash dividend in year t than the cash dividend paid in year t-1
Dividend Cutters	Firms that pay a lower regular cash dividend in year t than the cash dividend paid in year t-1
Cash Dividend	Dividends paid to common shareholders in year t, measured as dividends per share.
Dividend Yield	Annual dividends paid divided by stock price
Dividend Payout	Annual dividends paid divided by the net income to common
Prior Repurchases	A firm that conducted a share repurchase any time in the last 10 years

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Research Note

STUDENTS' APPRAISAL OF ZOOM CLASSES DURING A PANDEMIC

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ABSTRACT

The COVID pandemic forced unpreceded changes in higher education. Zoom classes became prevalent in response. We asked students from two universities taking Zoom classes during the pandemic to evaluate them. The traditional classroom is viewed as superior. Students prefer, learn more, and believe participation is more equitable in the traditional versus Zoom classroom. When examined by cluster, a segment emerged that endorsed and preferred Zoom classes.

INTRODUCTION

The COVID-19 pandemic forced schools to pivot away from face-to-face classes. The COVID pandemic created a seismic shift in education worldwide to mostly online courses (Crawford et al., 2020). In higher education, many faculty were unprepared technologically and pedagogically for the change (Rapanta et al., 2020; Teras et al., 2020). This is not all faculty had to deal with. In a study of 141 international students in Bahrain, over 70 percent of students felt COVID affected their psychological and social status negatively. A similar number were unstable and insecure about their plans but ready for future crises (Buheji & Ahmed, 2020). Interviews among 195 college students revealed that 71 percent had increased stress from COVID) (Son et al., 2020).

This is not the first crisis necessitating higher education to migrate online (Dhawan, 2020). Three powerful earthquakes hit Italy in 2016. The University of Camerino saw its structures collapse, and many students became homeless (Barboni, 2019). The university worked with Cisco using Webex to design courses. Before the earthquakes, online learning there was cumbersome. The University of Canterbury in New Zealand suffered a devasting earthquake where online learning allowed them to continue educating students (Todorova & Bjorn-Anderson, 2011). Higher education has not heeded the clarion call from these events and adequately prepared contingencies. Disasters will continue, and technology will continue to aid us through them.

E-Learning

E-learning has been defined as computer-mediated learning connected to a network where learning can occur anywhere and anytime (Cojocariu et al., 2014). Its strengths include: time and location flexibility, broad audience and content available, and immediate feedback (Dhawan, 2020). Weaknesses are technological difficulties, time management, and "distractions, frustrations, anxiety, and confusion" (p. 14). During the pandemic, its opportunities were readily apparent: digital and pedagogical innovation, flexible programs, and accommodating users of all ages.

Working on a computer can lead to distractions from email, smartphones, and social media notifications resulting in accomplishing twice as much work half as well (Solis, 2019). Students' multitasking and school performance are negatively correlated (Giunchiglia et al., 2018). Cellphones are checked on average every 10 minutes or 96 times daily (Asurion, 2019).

Zoom

Zoom became the biggest alternative (Wiederhold, 2020). Differences exist between the traditional and Zoom classroom (Gordon, 2020). The former is a shared physical space, while the latter is multiple individual locations. Most Zoom classes end at the allotted time; in the traditional classroom, students may spontaneously linger to ask questions or just walk with the professor out of the class. This makes it easier to create bonds between faculty and students. Non-verbal communication and body language is limited in Zoom where the camera focuses on faces. Active learning is more complicated in Zoom. Breaking the class into groups face-to-face is easily accomplished and monitored. Zoom requires technology, and the faculty member can see only one group at a time. Humor can reduce

anxiety and make students more relaxed (Garner, 2006); humor is harder to accomplish in Zoom. Typically, communication involves moving your face, head, arms, and hands; this energizes the speaker or listener or sometimes distracts them (Kendon, 2004). Zoom limits a speaker's movement. Ninety-four percent of undergraduate students found learning was somewhat to extremely difficult on Zoom (Peper & Yang, 2021). One way to increase attention, involvement, and energy while listening is to pretend you are in a personal conversation and increase your face and body animation to what is said, for example, nodding your head in agreement or disagreement (Peper & Yang, 2021). Attention is increased and distractions decreased when students actively take notes (Flanigan & Titsworth, 2020). A survey of primarily traditional-aged Business Administration freshmen attributed success with Zoom to teachers' digital competence with the platform and the students' ability to monitor current and potential progress (Joia & Lorenzo, 2021).

With Zoom, the unreliability of technology may create anxiety. Often, a student's connection is dropped because of bandwidth, Wi-Fi, power, etc. (Peper et al., 2021). Sheltering in place may not offer a private workspace and allows distractions by others or pets. The Zoom classroom means passive engagement, observer instead of participant, and decreased energy (Oswald, Rumbold, Kedzior, & Moore, 2020; Yalçin, Özkurt, Özmaden & Yagmur, 2020). Learning is inhibited by sitting then slouching; it also increases negative and decreases positive memories (Peper, Lin, Harvey, & Perez, 2017). From a professor's perspective, do students have their cameras on? If on, is the lighting sufficient to see the student clearly (Peper et al., 2021). When speaking, students can see themselves, which may increase anxiety or merely have their faces visible to the class enhancing anxiety (Degges-White, 2020). Zoom had an attentiveness score (discontinued in April 2020), which examined whether a viewer opened another tab when the host was screen sharing. There was no correlation between students ' attentiveness score and their performance in a class of 15 with lectures, tutorials, and labs (Spathis & Dey, 2020).

Prior research recommends four themes for effective online learning: supporting students success; "providing clarity and relevance through course structure and content presentation;" "establishing presence to encourage a supportive learning community;" and "being better prepared and more agile as an educator" (Dunlap & Lowenthal, 2018).

METHODOLOGY

We used existing scales to measure the Zoom classroom and developed a scale to compare the Zoom classroom to the traditional face-to-face classroom. The Zoom learning scale is a four-item scale that was previously validated through confirmatory factor analysis (Chintalapati and Darui, 2017). It was developed to measure learning on YouTube. One question was reverse coded. It is a seven-point scale anchored by strongly agree to strongly disagree. The scale was summed after measuring internal consistency.

The Zoom's worth scale is a six-item seven-point scale anchored by strongly agree to strongly disagree. It was validated to measure online services (Deshwal, Trivedi, & Himanshi, 2017). The scale was summed. The final scale was developed to compare the traditional face-to-face classroom and Zoom classes. During the pretest, internal consistency was estimated.

Two universities were used to gather data: A medium-sized private southeastern university and medium-sized public northeast university. The private southeastern university has a 20-year history with online courses and migrated relatively quickly to online. Almost all faculty had some online asynchronous teaching experience. The latter has little experience with online education. The data was gather from full-time traditional-age undergraduate students in upper-level business classes. The survey was done in Qualtrics. Six undergraduate students were used to pretest the survey using protocol analysis. Corrections were identified and implemented.

To determine whether segments exist within respondents, we used a Latent Class Clustering model (Collins & Lanza, 2009). It offers the Bayesian Information Criterion (BIC) and Log-Likelihood (LL) statistics as a guide to the proper number of clusters in the data. The BIC introduces a penalty for adding parameters or potentially overfitting. The BIC is based on LL, the number of parameters, and the classification error. The BIC is considered the best measurement (Vermunt & Magidson, 2005). The classification error, or model predicting the wrong cluster, is

estimated to determine the number of clusters. Given the sample size, we estimate two to four clusters. The number of clusters is determined before covariates are added.

Covariates include gender, grade point average, and university. Gender and grade point average may be correlated; however, since we are examining perceived learning, we included both. Women, in general, are better students than men. Women enter college with higher non-cognitive skills such as dependability, organization, and self-discipline (Conger and Long, 2010). The result: Men have lower GPAs for the first semester, and it gets worse over their undergraduate careers. Women also are the majority of bachelor degree earners at 56 percent (EducationalData.org, 2021). This is partly because more women are enrolled in undergraduate programs than men (9.6mm vs. 7.4mm) (Statista.com, 2021). Finally, the two universities have different experiences with e-learning which may influence instruction and perceived learning.

RESULTS

A convenience sample was used in six undergraduate traditional-aged classes. Students were emailed a link to complete the survey in Qualtrics. The survey was anonymous. One-hundred-seventeen respondents were recorded. Seven respondents did not complete all the demographics; these were included since they completed the main section. Examining frequencies, no variable had more than seven missing values. (Note: Forced response was used in Qualtrics.) Variability within respondent was estimated by a standard deviation for the Likert-type questions in the main section (21 questions); four surveys were removed for low variability. Questions were positively and negatively worded (reverse coded).

To locate outliers, Mahalanobis Distance was estimated where the dependent variable is respondent number, and the independent variables were those used in the analysis (Tabachnick & Fidell, 2013). Multivariate outliers are unaffected by the dependent variable in a regression. Mahalanobis Distance is evaluated through a chi-squared test with degrees of freedom equal to the number of independent variables. Three observations were removed because they exceeded the critical values of a chi-square test. The final sample size is 113.

Respondents are predominantly female (64%) and business majors (84%). Almost a third are members of a University sports team (31%). They are predominately from suburban areas (52%), and more than a third live on-campus (39%). (The private southeastern university had on-campus living during the pandemic; the public northeastern did not.) More than seven in 10 are upper-classmen (73%). The mean and median for grade point average are 3.41 and 3.50, respectively.

Table 1
Demographics (n=113)

Attribute	*Level*	*Percentage*
Gender [1]	Female	35
	Male	64
Major	Business	84
	Non-business	15
Class Rank	Freshman	3
	Sophomore	26
	Junior	39
	Senior	32
Race [2]	White	55
	Hispanic	15
	African American or Black	19
	American Indian	1
	Asian	4
	Prefer Not to Answer	4
Residence	Urban	26

	Rural	22
	Suburban	52

[1] Because of rounding error, it may not sum to 100.

[2] Note: Students were able to check more than one category.

Coefficient Alpha for the four-item scale on Zoom learning is .794, indicating acceptable internal consistency. This exceeds the threshold for scale reliability (i.e., internal consistency) of 0.70 (Fornell & Larcker, 1981). The scale mean is 15.18. Neutral for the scale is 16. Students are neutral on whether Zoom is an excellent tool for learning (t(112)=-1.64, p<. 104, M=15.18). Respondents were neutral on the scale items except for "I feel good using Zoom for learning; however, they were neutral on: whether "Zoom is an excellent tool for learning"; advising friends to take Zoom classes; and whether they are proud of the learning achieved through Zoom (Table 2). The learning scale (four-item) is not statistically significant (t(112)=-1.64, p<.104, M=15.18) from neutral (16).

Table 2

Attribute Importance (n=113)

Scale	*Question*	*t (mean)*	*p-value*
Zoom Learning [1]			
	I advise my friends to take classes using Zoom (live undergraduate classes) for their learning.	-0.33 (3.95)	.743
	Zoom (live undergraduate classes) is an excellent tool for learning.	-1.48 (3.76)	.142
	I am proud of the learning I achieve in Zoom.	-0.28 (3.96)	.780
	I feel good using Zoom (live undergraduate classes) for learning.	-3.10 (3.51)	.002
Zoom Worth [1 2]			
	Zoom (live undergraduate classes) is:		
	Productive	-1.50 (3.77)	.137
	Valuable	-5.41 (3.25)	.000
	Useful	-8.90 (2.87)	.000
	Informative	-7.06 (3.07)	.000
	Worthwhile	-2.87 (3.58)	.005
	I am happy with the Zoom (live undergraduate classes).	-1.96 (3.65)	.053
Comparison (Zoom vs. Traditional) [2]			
	I prefer Zoom (live undergraduate classes) over the traditional classroom (live face-to-face).	4.86 (4.87)	.000
	I learned more in Zoom classes (live undergraduate) than traditional classes (live face-to-face).	7.96 (5.24)	.000
	Zoom (live undergraduate classes) has a more equitable distribution of participation than the traditional classroom (live face-to-face).	5.27 (4.83)	.000
	Zoom (live undergraduate classes) is more convenient than the traditional classroom (live face-to-face).	-6.30 (3.01)	.000
	If Zoom (live undergraduate classes) were offered in the future at my university, I would take them even if the class were offered in the traditional classroom (live face-to-face).	0.24 (4.04)	.812
	I would prefer one Zoom class (live undergraduate) every semester at my university along with the traditional classroom classes (live face-to-face).	-1.75 (3.67)	.083

[1] Scale Strongly agree to strongly disagree (seven-point)
[2] Scale: Bi-polar adjectives

Our second scale measures Zoom's worth. It is a six-item scale. Coefficient Alpha is .921. The scale mean is 20.18 and neutral is 24. The worth scale is statistically significant (t(112)=-5.089, p<.000, M=20.18). In examining the scale components, respondents see Zoom as valuable, useful, informative, and worthwhile, and they are happy with it. They are neutral on whether it is productive (t(112)=-1.50, p<. 137, M=3.77).

The final scale compares Zoom to the traditional face-to-face classroom. It is a seven-item scale with a Coefficient Alpha of .891. The scale mean is 30.31, and the neutral point is 28. Respondents prefer the traditional classroom (t(112)=2.44, p<. 016, M=30.31). When analyzing the scale questions, they prefer learning more and having more equitable participation in the traditional classroom. The Zoom classroom is more convenient. They are neutral on whether they would take classes through Zoom if offered in the traditional classroom. They would not want all or even one of their classes on Zoom.

We compared results from the two universities on the three scales. The groups differed on the learning and overall scales but not the comparison scale. For the learning scale, the students from the private school agreed that Zoom was beneficial for learning (t(70)=-3.22, p<. 002, M=13.94); the students from the public university were neutral (t(36)=1.64, p<. 109, M=17.39). With the overall scale, the private university students disagreed that Zoom increased learning (t(69)=-5.57, p<. 000, M=18.50). The public university students were neutral (t(35)=-1.25, p<. 219, M=22.61). (Note: Even though a forced response was required, this was the last question, and six students did not identify their university.)

Latent Class Model

Additional analysis was conducted to ascertain if respondents were homogeneous in their evaluation of Zoom courses. The three summed scales: learning, worth, and comparison (Zoom vs. face-to-face classes) were used to estimate the model and establish the number of clusters. They are estimated as continuous variables. Covariates are added after the segments are established.

Most other clustering methods use ad hoc rules to suggest the proper number of clusters. Two, three, and four cluster solutions were estimated. The two-cluster solution had the largest decrease in BIC value given the number of additional parameters estimated (Table 3). The classification error, or model predicting the wrong cluster, is lowest for the two-cluster solution at less than five percent. This indicates that two clusters are the proper solution.

Table 3
Four-Segment Solution (n=113)

Statistic / Segments	*Two*	*Three*	*Four*
Log-likelihood	1097.02	1067.68	1049.12
BIC	2255.49	2229.91	2225.88
Classification Error	.047	.077	.078

[1] One-to-seven scale

A two-cluster model is estimated with covariates: gender, grade point average, and university. The model explains at least 44 percent of the variability in the three scales. All are statistically significant at the .05 level (Table 4). The only covariate statistically significant is university (p<.031). Gender and grade point average do not differ across segments.

Table 4
Two-Segment Solution (n=113)

Variable / Statistics	*Wald*	*P-value*	R^2
Scales			
Zoom Learning [1]	146.05	1.3e33	.60
Zoom Worth	130.98	2.5e-30	.58
Comparison	71.34	3.0e-17	.44
Covariates			
Gender	.49	.48	
Grade Point Average	.29	.59	
University	4.68	.03	

The clusters are similar in size (52 vs. 48 percent) (Table 5). The Zoom Learning scale is a four-item scale bounded by four (strongly agree) to 28 (strongly disagree), with 16 being neutral. The Zoom's worth scale is a six-item scale bounded by six (strongly agree) to 42 (strongly disagree), with 24 being neutral. The comparison scale has seven items. It is bounded by seven (strongly agree) and 49 (strongly disagree), with 28 neutral.

Cluster one equates Zoom with learning and sees value in it. They prefer Zoom for learning, participation, and convenience. They are primarily from the southeastern university where online classes are prevalent (76%). Cluster two is the mirror opposite of cluster one. They do not see the worth in Zoom or prefer it over face-to-face classes. This cluster is comprised of more students from the northeast public university where online courses do not exist (45%).

Table 5
Four-Segment Solution (n=113)

Variable / Statistics	*One*	*Two*
Segment Size (percent)	52	48
Scales		
Zoom Learning [1]	11.02	19.47
Zoom's Worth [2]	14.03	26.23
Comparison [3]	23.98	37.35
Covariates		
Gender (female percentage)	69.9	59.1
Grade Point Average	3.41	3.42
University (private southeast percentage)	76.4	55.0

[1] Four-item scale with a neutral point of 16
[2] Six-item scale with a neutral point of 24
[3] Seven-item scale with a neutral point of 28

CONCLUSION

Zoom classes received support for its convenience. It is viewed as good for learning, not excellent. It is described as valuable, useful, informative, and worthwhile. However, it pales in comparison to the traditional classroom. Students believe they learn more in the traditional classroom, partly because there is a more equitable distribution of participation in the traditional classroom. Students do not want to take Zoom classes, not even one per semester. Zoom appears to have fulfilled an important gap when COVID hit: educating students without face-to-face contact. The technology provided rapid deployment.

These results must be tempered since they were made during a pandemic. It also may be associated with curtailing social activities or preventing students from returning to campus. Both universities used in this study have small class sizes and high faculty-student interaction in the classroom. The northeastern public university did not have students on campus, while the other private southeastern did.

When examined by cluster, the results are different. One cluster supports Zoom for learning while the other does not. The cluster supporting it is 76 percent from the private university that embraces online asynchronous learning. They prefer Zoom over the traditional face-to-face classroom; they are amenable to Zoom classes. They also believe in Zoom for learning and see merit in it overall. The cluster that does not support Zoom learning is comprised 55 percent from the same university, or conversely, almost 45 percent are from a university that does not have an online presence.

It appears having been exposed to online classes leads to greater support for Zoom classes. Most students, if not all, at the southeastern university, would have taken an online class by their junior year. Most faculty would have taught online. The next disruption may lead to students embracing the change more.

A moderating factor for the students from the university that endorsed Zoom is that many were living on-campus (39% of all respondents). The residence hall at that university were approximately 75 percent full. A very limited number of students were allowed in the classroom. Regardless, students were still experiencing college life by living on-campus. At the university, where the majority of students opposed Zoom classes, students were not allowed on-campus. The university with limited face-to-face interaction and students on-campus had a more favorable view of Zoom.

Pandemics and natural disasters seem to be accelerating. Higher education must prepare for emergency remote teaching. Preparation must include training faculty. The COVID pandemic illustrated higher education's ability to move quickly and faculty to adapt. The lessons learned bode well for future events.

LIMITATIONS AND FUTURE RESEARCH

Comparing results during and after the pandemic may yield different results. Would personality separate the clusters? The results are limited since we could compare before and after the switch to Zoom. We did not compare actual students' grades before and after to determine external validity. Data should have been gathered about how many students lived on-campus and attended the majority of their classes in person. The universities differ in their embracing of online learning. One has a 20-year history, and the other a minimal experience.

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