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EMPIRICAL INVESTIGATION OF THE EFFECT OF NAFTA ON THE ECONOMY IN CANADA

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ABSTRACT

In this study, we investigate using statistical time series analysis the effect NAFTA may have had on some economic factors in Canada. These factors were GDP growth rate, unemployment rate, total export, export to and import from the US, and labor productivity. Results from the intervention time series analysis and the regression analysis with auto correlated errors did not show any significant relationship between NAFTA and any of the above economic variables. The only significant negative effect of NAFTA on total export was explained as being primarily due to the 2009 observation resulting from the 2008 great recession.

INTRODUCTION

In 1992, the United States, Canada, and Mexico signed the North American Free Trade Agreement (NAFTA), which took effect on January 1, 1994. Under this agreement, restrictions on trade among the three countries were phased out. One would expect this free trade agreement to benefit both import and export of the countries involved. However, it is not clear how effective NAFTA would be on other parts of the economy such as the GDP, unemployment and labor productivity. There have been many empirical studies in the literature on the effect of NAFTA on different aspects of the economy of Mexico. However, not many studies in the literature have addressed the effect of NAFTA on the economy in Canada. Studies done dealt mostly with the effect of NAFTA on trade. Proponents of NAFTA argued that the free trade agreement would have a positive impact on the economies of the three countries involved. On the other hand, the Nobel Prize economist Krugman has expressed the view that there has been zero effect of NAFTA on Canada (Contenta, 1996). The interest in this study is to determine if 22 years of NAFTA , has had any significant effect on the economy of Canada in terms of GDP, imports, exports, employment, and labor productivity. Time series analysis is used to determine if NAFTA has had significant effects on any of these macroeconomic variables.

LITERATURE REVIEW

Anderson (2009) reported on the regional and national effects of NAFTA in Canada. His analysis utilized an ordinary multiple regression not accounting for serial correlation in error that is likely to arise in time series data. The dependent variables were the logarithm of international trade with the US as well as both interprovincial and international trade with the US. The independent variables were the logarithms of GDP and GDP per capita, capital-labor ratios, land-labor ratios, tariff, exchange rate value, time t for trend and NAFTA as a dummy variable that is zero at or before 1994 and 1 after 1994. It was determined form this regression analysis that NAFTA had a significant positive effect on trade with the United States. In the provinces, NAFTA had a significant positive effect in Saskatchewan and Manitoba. Also, NAFTA had positive as well as negative effects on interprovincial trade.

Gould (1998) found that NAFTA had no statistically significant effect on international trade between Canada and the US as well as Canada and Mexico. Wall (2003) in a study of the effect of NAFTA on international trade between the US and three Canadian regions (western, central, and eastern), reported that over all Canada's imports from the US increased by 14% and export to the US were up 29%. By region, the increase in import and export was in the central region, 43% and 18%, respectively. The eastern region showed a decrease in export and import (9% and 13%, respectively) and there was no significant change for the western region.

Brox (2001) reported that NAFTA had a negative impact on the interprovincial trade in Canada. He estimated a reduction of 6.2%. On the other hand, there was evidence for increased trade with other countries. Thus, this increase in international trade may have been at the expense of interprovincial trade.

Caliendo and Parro (2015) extended the Ricardian model to include sectorial linkages, trade in intermediate goods, and sectorial heterogeneity in productivity and applied it to estimate the effect of tariff reduction under NAFTA on welfare and trade for Mexico, US, and Canada. It was found that welfare increased by 1.31% for Mexico and 0.08% for the US. On the other hand, welfare for Canada decreased by 0.06%. Trade for Mexico increased by 118%, 41% for the US, and 11% for Canada.

Dutt and Ghosh (2014) investigated the effect of NAFTA on the purchasing power parity (PPP) hypothesis in Mexico, Canada and the US using the Pedroni (2004) panel co-integration test. The PPP hypothesis states that under free trade and in the absence of non-tradable sectors and transportation costs, the prices of same goods should be the same in the three NAFTA countries. The analysis showed that PPP did not exist in these countries. This was explained as due perhaps to lack of free movement of labor among the countries even though there may have been free flow of trade among them.

Galbraith (2014) by examining estimates for gross household income, market, and disposable income, showed an evolution of income inequality since NAFTA in the US, Canada, and Mexico. Admittedly, this inequality may not have been due to NAFTA, but to other economic factors like the stock market boom in the 1990's and the mortgage-finance problem that lead to the recession of 2008.

Mejias and Vargas-Hernández (2001) reported that import and export between Canada and Mexico have increased under NAFTA. However, this increase has been leveling off. In other words the increase is occurring at a decreasing rate. Authors believe that Canada and Mexico would benefit by pursuing bilateral trade agreements, perhaps outside the NAFTA accord.

METHODS

In order to determine if NAFTA had any effect on different factors of the economy, two analytical procedures (intervention time series analysis, and auto-regression analysis) were utilized using the SAS software.

Intervention Analysis

The model by Box and Tiao (1975) is used to analyze for the effect of an intervention (NAFTA in this case) on a stationary time series response variable when the time (T) of the intervention is known. The intervention or NAFTA is entered in the model as a step function, S_t^T (0 before T=1994 and 1 at and after 1994). If the response due to the impact is felt b periods after

the intervention at time T, the impact of the intervention on the response variable can be specified in general as

$$wB^bS_t^T , \quad (1)$$

where, B is the shift operator, w is the impact coefficient and

$$S_t^T = \begin{cases} 0, & t < T \\ 1, & t \geq T \end{cases}$$

However, if the response due to the impact is gradual, the impact can be specified as

$$(wB^b/ (1-\delta))S_t^T \quad (2)$$

Where δ is between 0 and 1 (Wei, 2006).

For the purpose of this analysis, both (1) and (2) were used. The intervention model can be written as

$$y_t = \mu + x_t + wB^bS_t^T \quad (3)$$

or

$$y_t = \mu + x_t + (wB^b/ (1-\delta))S_t^T \quad (4)$$

where μ is the mean of the series x_t, y_t is the observed series and x_t is the series with no intervention. Of all the variables, only the unemployment mean was determined to be not significantly different from zero.

Auto-regression

The auto-regression model used in this analysis can be expressed as

$$y_t = a + cx_t + n_t \quad (5)$$

Where n_t is an auto-regressive process of the first order, $n_t = \theta n_{t-1} + e_t$ ($|\theta| < 1$) and e_t is random error. The order was determined using the Durbin-Watson statistic.

Here, $x_t = \begin{cases} 0, & t < 1994 \\ 1, & t \geq 1994 \end{cases}$

DATA

Data for unemployment rate, GDP rate, total export growth rate, labor productivity index (2010 =1), export to the US in millions of US dollars, and import from the US in millions of US dollars were from the Organization for Economic Co-operation and Development (OECD) and retrieved form the Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org). Plots of the data over years are presented in the Appendix

RESULTS

In this analysis, different b values in Eqs. (3) and (4) were tried. In all cases w was not significant for any of the b values greater than 1. Hence, it was determined that there was no delayed effect of NAFTA. Also, there was no evidence from the model in (4) that there was a gradual effect. Hence, we report on the results of the model in (3) with b = 0 and T = 1994.

Using the standard time series diagnostic techniques, namely the dampening patterns of the auto regression, inverse auto regression, and partial auto regression of the time series, it was determined that the GDP rate and total export were stationary. On the other hand, the first difference of labor productivity, export to the US, import from the US, and unemployment were stationary.

All stationary series followed an auto regression of the first order AR(1). The AR(1) model gave a good fit to all of the dependent variables. Hence, x_t in the intervention model was assumed to be an AR(1).

Since the interest in this paper is to determine if NAFTA had any significant effect or association with each of the dependent variables, we present in Tables 1 and 2 the estimates W from (3) and c from (5) and their p values, indicating the level of significance.

It is seen from the W estimates of the intervention model in Eq. (3) and their corresponding p values that there were no significant associations between NAFTA and GDP, unemployment, labor productivity, import from the US, and export to the US. The W estimate was negative and significant for total export indicating a negative relationship of NAFTA with total export.

Results from Table 2 for the auto-regression model in Eq. (5) are the same as those in Table 1. Except for the negative association between NAFTA and export, there was no significant association between NAFTA and any of the other economic factors.

Table 1
Estimates of W in the intervention model of Eq. (3) with b =0. NAFTA is the independent variable (S_t) and GDP, unemployment, export, export to the US, import from the US, and labor productivity are the dependent variables (y_t)

Dependent Variables	W estimates	p values
GDP	-0.812	0.349
Unemployment	-0.779	0.337
Total Export	-6.007	0.0254
Labor Productivity	0.0099	0.276
Import from US	594.19	0.692
Export to US	1024.20	0.675

Table 2
Autoregressive analysis results of the model in Eq. (5). NAFTA is the independent variable (x_t) and GDP, unemployment, export, export to the US, import from the US, and labor productivity are the dependent variables (y_t)

Dependent Variables	c estimate	p value
GDP	-0.812	0.354
Unemployment	-0.783	0.395
Total Export	-6.000	0.029
Labor Productivity	0.0211	0.119
Import from US	1354	0.420
Export to US	2075	0.425

DISCUSSION

It is of interest to observe that NAFTA had no significant relationship with GDP, unemployment, labor productivity, or import and export between Canada and the US. There was a significant negative relationship between NAFTA and total export. The trend in total export over years (Figure 6), except for 2009, did not change noticeably after NAFTA. The big negative change came in 2009 due, no doubt, to the big recession in 2008. So it is likely that the significant negative association between NAFTA and export was due largly to the negative change in 2009. To verify this assertion, the 2009 observation was replaced by the average of 2008 and 2010. In this case the results gave W= -4.126 (p =0.116) and c = -4.134 (p=0.114), both not significant. When the observation of 2009 was deleted from the data set, the results from auto regression gave c= -4.19 (p=0.10), which is not significant.

Both analysis in Tables 1 and 2 showed a negative relationship between NAFTA and GDP and unemployment. However these were not significant. For GDP (Figure 3), there was no noticeable change in trend after NAFTA. However, in the case of unemployment (Figure 1) there was a definite negative trend after NAFTA came into effect in 1994. However, this did not seem to be significant perhaps due to the volatility effect.

There was a positive relationship between NAFTA and each of labor productivity, import from and export to the US (Tables 1 and 2). However, none of these associations are significant as seen from the p-values. It is seen from Figures 2, 4, and 5 that the trends were positive for import from the US, export to the US, and labor productivity. These trends started before NAFTA and continued after NAFTA. There was no indication of a change in trend after NAFTA. This would indicate as the analysis shows that NAFTA had no effect on these trends. One may conclude from this analysis that NAFTA has had no effect on these economic factors at the national level in Canada. This conclusion is in agreement with Krugman (1996). NAFTA may have had regional effects on trade as shown by some studies in the literature.

CONCLUSION

This study examined the effect of 22 years of NAFTA on the economy of Canada in terms of imports from and export to the US, total exports, employment, and labor productivity. Statistical analyses using the time series intervention analysis and the auto regression analysis did not show any significant relationship between NAFTA and any of the economic variables. NAFTA was significantly related to total export, but the significance was attributed primarily to the great recession of 2009, rather than to NAFTA. NAFTA showed a negative relationship with GDP growth rate and with

unemployment rate, but these were not significant. Also, NAFTA was positively related to import from and export to the US, and labor productivity. However, none of these relationships were significant.

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APPENDIX

Figure 1
Trend in unemployment rate over years

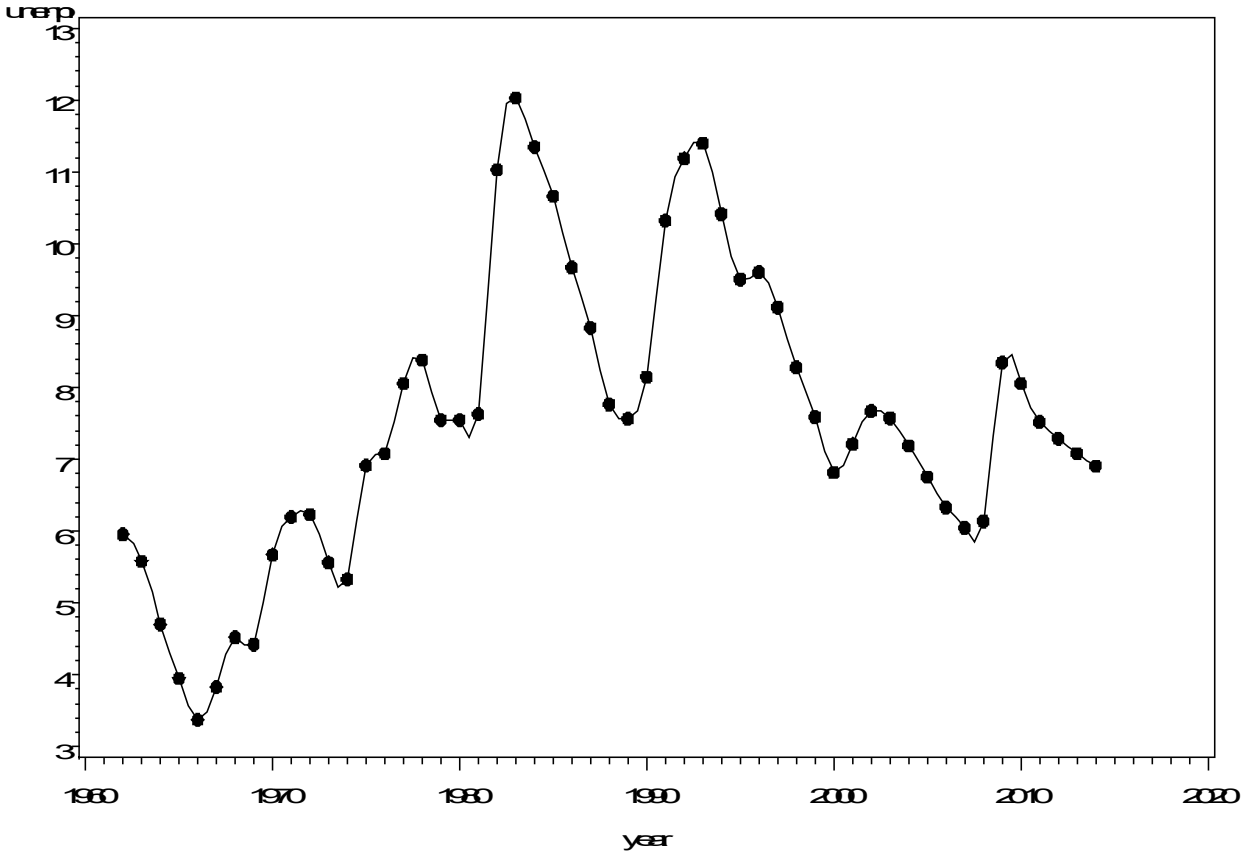

Figure 2
Trend in export to the US over years

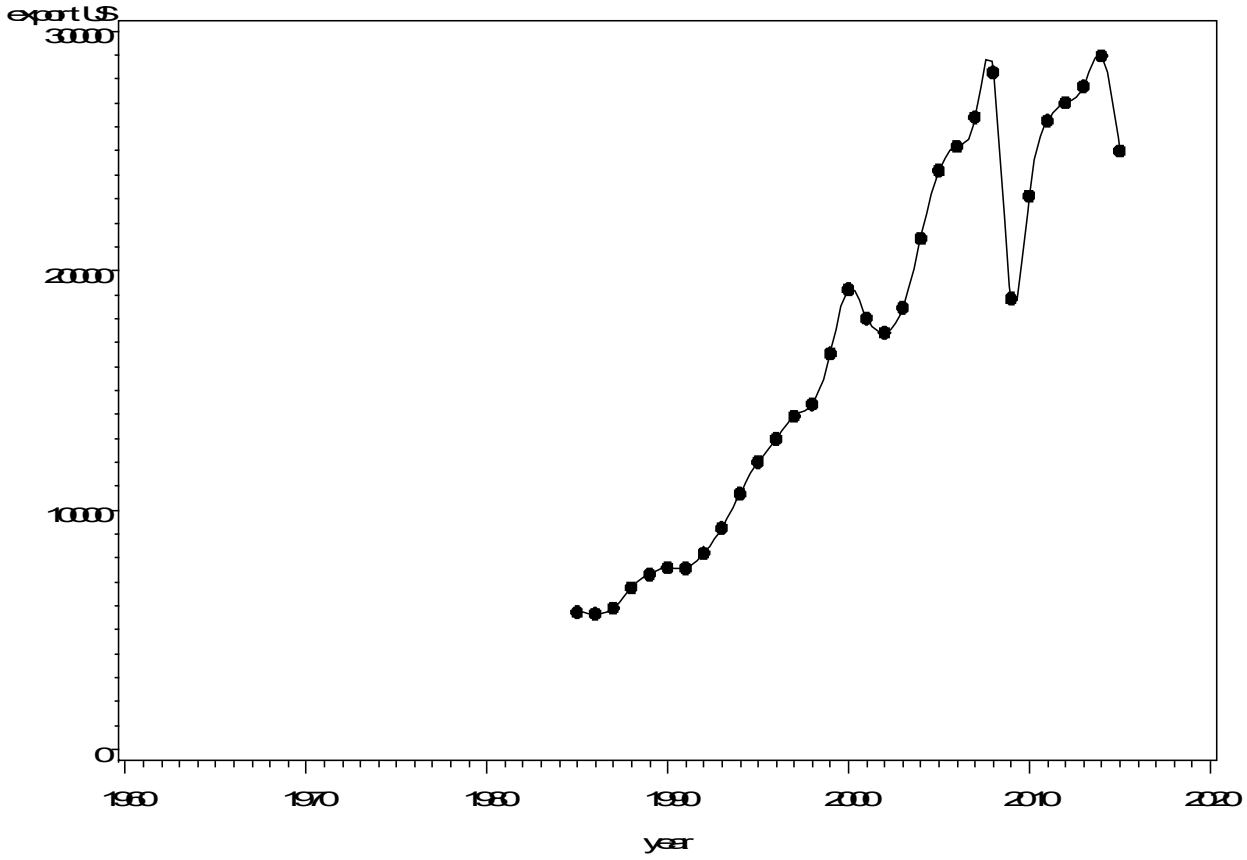

Figure 3

Trend in the gross domestic product (GDP) over years

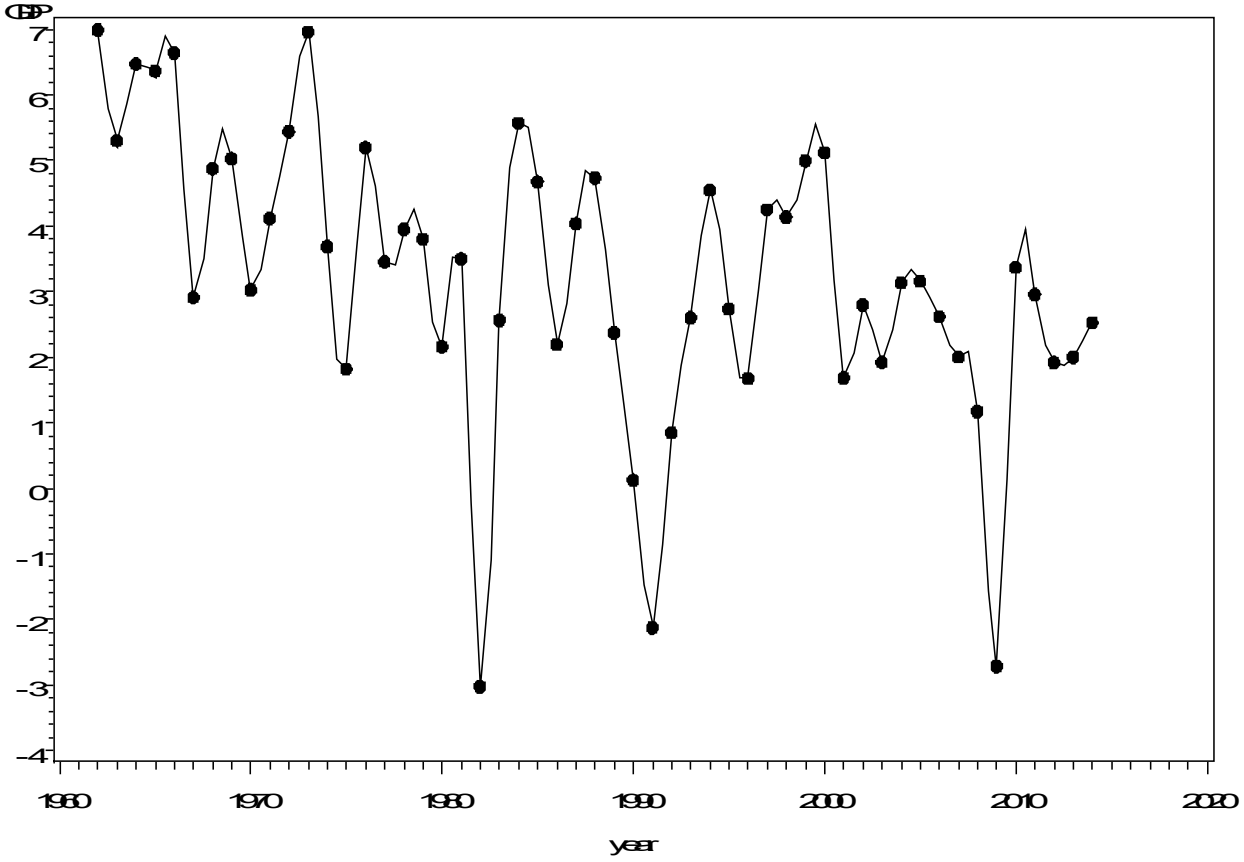

Figure 4

Trend in import from the US over years

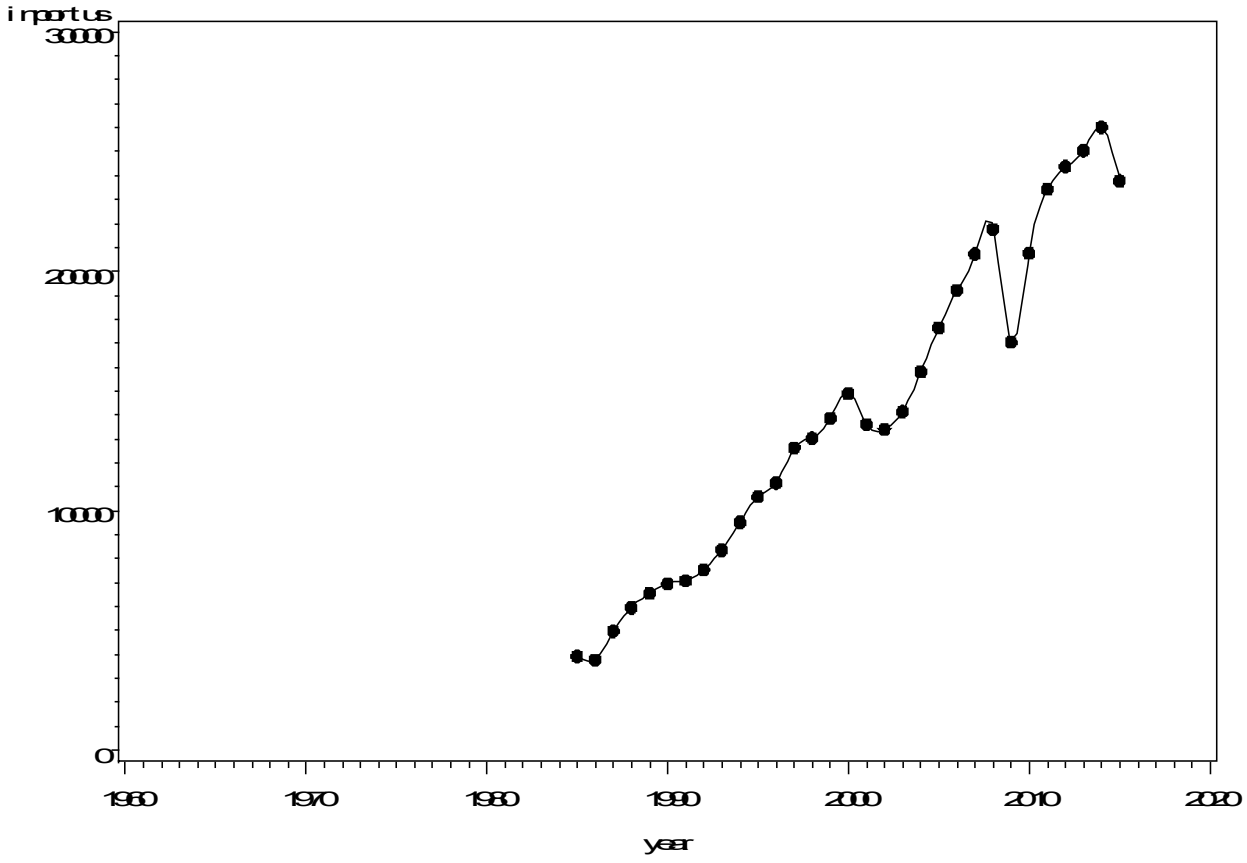

Figure 5

Trend in the labor productivity index over years

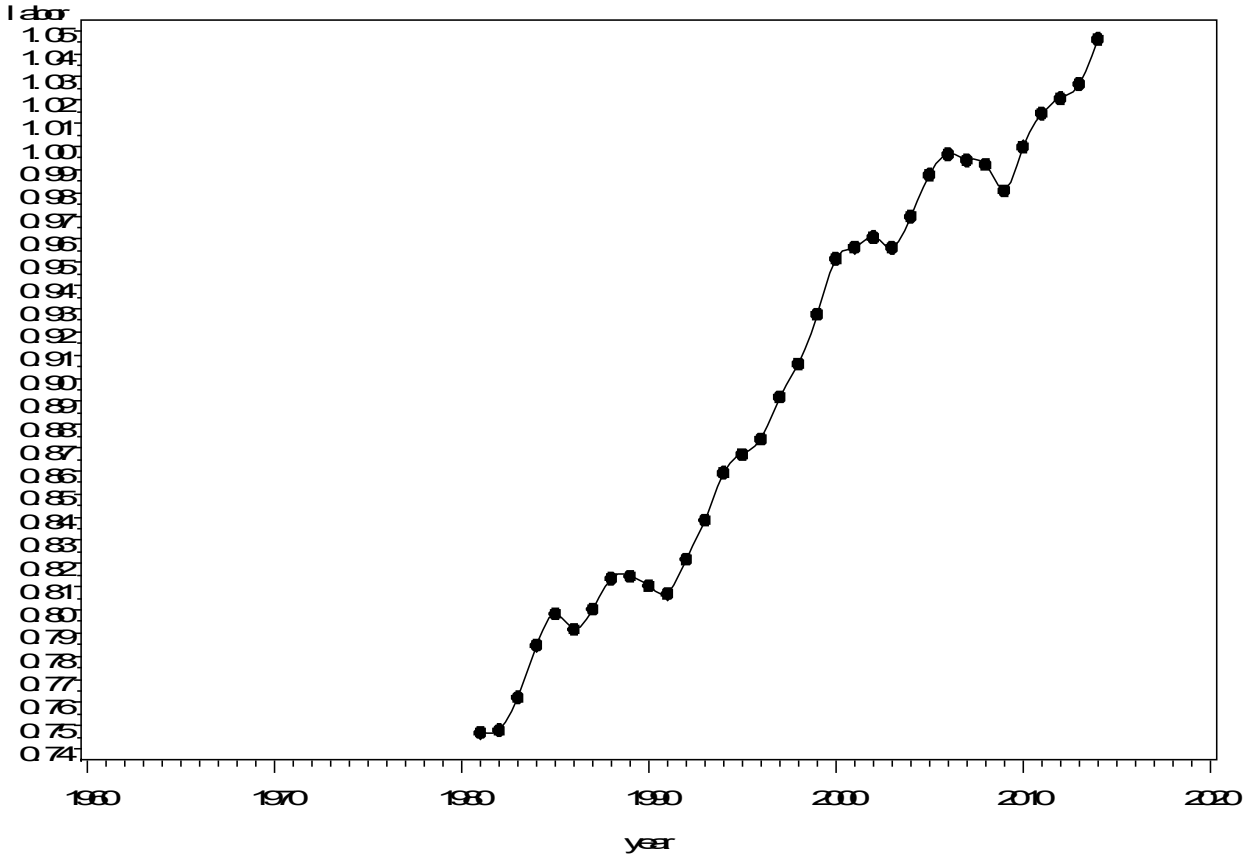

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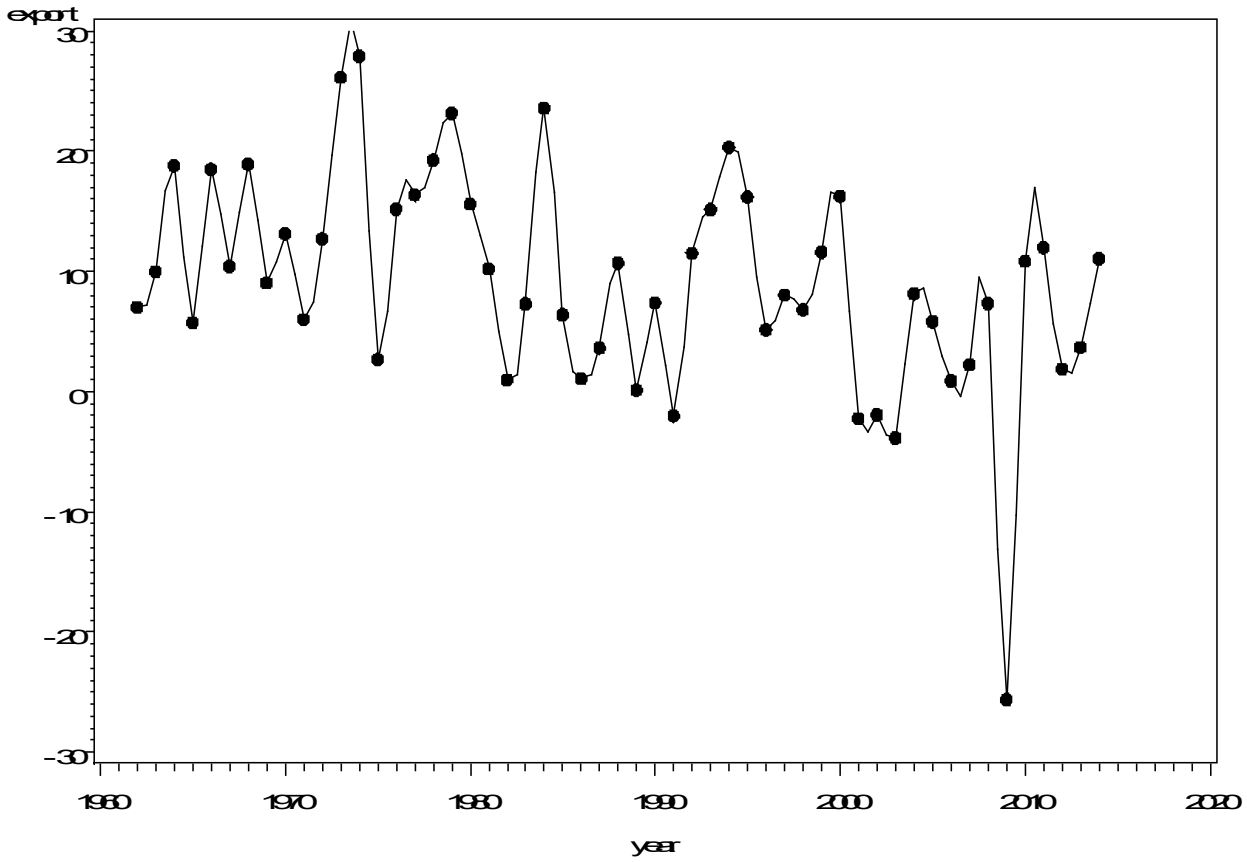
Figure 6

Trend in total export over years



AUDIT QUALITY DIFFERENTIALS FOR CONSTRAINING COSMETIC EARNINGS MANAGEMENT IN THE PRE-SOX ERA: AN ANALYSIS OF AUDIT FIRM SIZE AND BRAND

Charles E. Jordan, Florida State University – Panama City
Stanley J. Clark, Middle Tennessee State University
Paula B. Thomas, Middle Tennessee State University

ABSTRACT

Cosmetic earnings management (CEM) exists when a nine appears in the second digital position of the earnings number and management increases income through the use of discretionary accruals just enough to boost the second digit from nine to zero. The purpose of this earnings rounding is the resulting increase in the first (left-most) income digit by one. For example, unmanipulated income of $696 million would be managed upward with the earnings number reported at slightly above $700 million. Significant research shows that managers consistently practiced CEM in the U.S. for several decades before the 2000s but that it disappeared around the time of SOX's implementation. Another stream of research suggests that an audit quality differential exists between Big N and non-Big N audit firms with respect to their ability to constrain the use of discretionary accruals and thus restrict earnings management. This article contributes to the literature by assessing an historical aspect of audit quality between Big N and non-Big N firms by testing for the presence of an audit quality differential relative to constraining CEM during an extensive pre-SOX period. The results indicate little, if any, audit quality differential exists as the clients of both Big N and non-Big N auditors practiced significant levels of CEM as did the clients of each individual Big N firm. The results also show that, regardless of auditor size, smaller companies appeared to practice CEM more aggressively than larger entities.

INTRODUCTION

Kinnunen and Koskela (2003, p. 40) note that cosmetic earnings management (CEM) results from a company rounding income up by a small amount, "when such rounding yields an earnings number that seems abnormally larger than would be the case otherwise." For example, unmanipulated earnings of $4.94 million would be boosted through the use of discretionary accruals until it just exceeds $5.00 million. The objective of this relatively slight, but impactful, earnings manipulation is to enhance the first (left-most) income digit, which is frequently the only digit remembered by financial statement readers (Carslaw, 1988). For example, in the case above, if earnings had been reported at $4.94 million investors would have likely recalled it as $4 million something, while the upwardly managed earnings number would be remembered as $5 million something.

Even though these diminutive manipulations of income might seem harmless, Thomas (1989, p. 774) speculates that "small changes in reported earnings near user reference points have disproportionately large effects on firm value." Research shows that CEM consistently occurred in the U.S. at least from the 1920s through the 1990s (e.g., Cox et al., 2006; Guan et al., 2006; Jordan & Clark, 2015; Thomas, 1989) but vanished in the post-Sarbanes-Oxley (SOX) era (e.g., Aono & Guan, 2008; Lin & Wu, 2014; Wilson, 2012).

Numerous studies examine whether audit quality acts as a deterrent to earnings management, with audit quality often captured by the Big N (i.e., 8/7/6/5/4) versus non-Big N dichotomy. Compared to non-Big N firms, Big N auditors are often viewed as capable of performing better audits because of their supposedly superior training of personnel, economies of scale, greater industry specialization, etc. (e.g. Craswell et al. 1995, DeAngelo, 1981). Such an audit quality differential is documented in the U.S. as research (e.g., Becker et al., 1998; Francis & Krishnan, 1999; Krishnan, 2003; Reichelt & Wang, 2010) demonstrates that Big N auditors constrain their clients' use of discretionary accruals to manage earnings more aggressively than non-Big N auditors.

The current study tests for the presence of an audit quality differential in the U.S. based on the comparative ability of Big N versus non-Big N audit firms to constrain the practice of CEM. Examining a period of time when CEM was known to occur, the study shows relatively little, if any, audit quality differential existed as major groups of clients of both Big N and non-Big N auditors exhibited strong signs of CEM. Furthermore, no audit quality differential is observed among the individual Big N firms relative to their ability to restrict CEM as this form of earnings manipulation occurred at significant levels for the clients of each Big N firm.

The next section examines the literature concerning CEM as well as audit quality differentials relative to constraining earnings management. Then, the methodology and data collection are discussed. The final two sections present the results and conclusions drawn from the research.

LITERATURE REVIEW

Carslaw (1988) speculates that when the second digital position in the earnings number is high (e.g, nine), management frequently manipulates earnings to round up this second digit to zero, thus causing the first digit to increase by one. Carslaw (1988) theorizes that if this type of earnings management exists in practice, reported income numbers would be expected to possess an abnormally low proportion of nines and an unusually high frequency of zeros in the second digital position.

Carslaw (1988) tests his theory on a large sample of New Zealand entities with positive earnings and discovers precisely what he had posited. That is, nines occur in the second earnings position much less frequently than expected while zeros appear in this position at an unusually high rate. The numbers one through eight occur in the second position of earnings at their normal rates. Carslaw (1988) notes that this result provides direct evidence of goal oriented behavior as earnings are manipulated so that income can be rounded up to key benchmarks or reference points.

Following Carslaw's (1988) work, numerous researchers test for CEM in various countries using data from the 1980s and 1990s. For example, Thomas (1989) replicates Carslaw's study in

the U.S.; his results echo those of Carslaw (i.e., significantly smaller rates of nines and larger rates of zeros than typically expected in the second digital position of earnings). Thomas (1989) also examines entities with negative earnings and finds just the opposite effect (i.e., significantly more nines and less zeros than anticipated in the second earnings digit), suggesting that managers of companies with negative income frequently manipulate income to avoid having to increase the first digit by one.

Niskanen and Keloharju (2000) test for CEM with Finnish companies with positive income. They find that Finnish managers are quite aggressive in their earnings manipulation as the upward rounding of the second digit of income is more than just from nines to zeros. That is, Finnish managers boost the second earnings digit from as low as sixes and sevens to zeros and ones.

Van Caneghem (2002) replicates the previous CEM research for U.K. companies with positive earnings. His results are consistent with those of the prior research in that firms report unusually low rates of nines and high rates of zeros in the second position of the earnings number. He further adds to the CEM literature by showing that managers use discretionary accruals to increase income so that the second digit can be rounded up from nine to zero.

Kinnunen and Koskela (2003) examine 18 countries for the presence of CEM and find patterns of earnings rounding consistent with CEM in each country. They also discover that the degree of CEM practiced appears to be related to certain country-specific factors. For example, the aggressiveness of the CEM exhibited increases with the liberalism of a country's accounting policies.

Skousen et al. (2004) test Japanese entities with positive income for the existence of CEM. Their findings are consistent with those in other countries in that nines appear in the second digital position of earnings at an abnormally low rate while zeros occur at a much higher frequency than anticipated. Skousen et al. (2004) also learn that digits other the first digit appear to be the object of manipulation for Japanese managers. As an example, they find that nines appear significantly less often than anticipated while zeros occur much more often than expected in the third earnings position, suggesting that many managers round up the third digit of income to enhance the second digit by one.

Jordan and Clark (2015) test for the presence of CEM in U.S. companies with positive income for an extended period of time to determine when this form of manipulation began and to ascertain if any events (e.g., rule making bodies or laws) produced an apparent effect on management's propensity to engage in CEM. Using data going back to the 1920s, they discover that CEM consistently occurred in each unique decade from the 1920s through the 1990s, and no event during this time period seemed to deter management's proclivity for practicing CEM.

Subsequent to SOX's implementation, several studies test for the existence of CEM in the U.S. to ascertain whether SOX inhibited this form of earnings management. In particular, these projects test for CEM in unique periods before and after SOX became effective (e.g., Aono & Guan, 2008; Jordan & Clark, 2011; Lin & Wu, 2014). All these studies examine companies with positive income and find strong signs of CEM in the pre-SOX periods (i.e., abnormally low rates of nines and high rates of zeros reported in the second digital positon of earnings). However, in their post-SOX samples, the researchers discover little to no evidence of CEM as, in general, all

numbers (i.e., zero through nine) appear in the second earnings position at their anticipated rates. A fourth study (Wilson, 2012) examines data from one post-SOX year (2008) and finds no signs of CEM. As Jordan and Clark (2015, p. 648) note, the evidence suggests "that CEM existed continuously in the U.S. for many decades prior to SOX" but seems to have disappeared in the aftermath of the significant financial scandals occurring at the turn of the millennium and the advent of the corporate governance legislation (i.e., SOX) intended to restore integrity to the financial reporting process.

Two studies suggest that financial statement audits, and perhaps the quality of those audits, may be related to the propensity at which CEM occurs. Examining U.S. data, Guan et al. (2006) test for CEM in quarterly earnings figures for the decade immediately preceding SOX's implementation. They discover significant levels of CEM in all four quarters of the year; however, it is less severe in quarter four relative to quarters one through three. Since only the fourth quarter financial numbers are audited, Guan et al. (2006) speculate that, at least to a certain degree, audits inhibit managers' rounding of earnings to user reference points. The previously noted Kinnunen and Koskela (2003) study that tests for the existence of CEM in 18 nations during the period 1995-1999 shows that one of the country-specific factors associated with the severity of CEM is the amount spent on audit fees. Countries whose companies spend more on their audits experience lower levels of CEM compared to entities operating in nations where less is spent on auditing.

Craswell et al. (1995), DeAngelo (1981), and Krishnan (2003) provide a myriad of reasons why Big N auditors might provide better or higher quality audits than non-Big N firms (e.g., better staff training, greater industry expertise, etc.). Frequently, audit quality refers to an audit firm's prowess in restricting a client's use of discretionary accruals to manage earnings. Several U.S. studies present evidence suggesting that Big N audit firms indeed constrain their client's use of discretionary accruals more aggressively and thus provide audits of higher quality than non-Big N firms (e.g., Becker et al., 1998; Francis et al., 1999; Davidson & Neu, 1993; Krishnan, 2003; Lai, 2009).

The majority of non-U.S. studies, though, find little if any indication of an audit quality differential between Big N and non-Big N auditors (e.g., Huang & Liang, 2014; Maijoor & Vanstraelen, 2006; Piot & Janin, 2007; Thoopsamut & Jaikengkit, 2009; Vander Bauwhede & Willekens, 2004). Only a few non-U.S. studies find evidence of an audit quality differential based on the Big N versus non-Big N dichotomy (e.g., Chen et al., 2005; Van Tendeloo & Vanstraelen, 2008).

Khurana and Raman (2004) test for a quality differential between Big N and non-Big N auditors in four Anglo-American nations (i.e., U.S., Canada, Australia, and U.K.). They examine these four countries because the economic role of the audit is similar in each nation while the auditor's litigation risk exposure is greater in the U.S. than in the other three countries. The researchers find that the quality of Big N audits surpasses that of non-Big N audits in the U.S. only. Khurana and Raman (2004) conclude that the primary reason an audit quality differential exists in the U.S. and not in other nations is the higher risk of lawsuits faced by U.S. auditors coupled with the "deep pockets" associated with Big N firms.

The nexus of the CEM studies and the audit quality differential research provides the impetus for the current project. As noted previously, Guan et al. (2006) and Kinnunen and Koskela

(2003) provide some reason to believe that the incidence of CEM practiced could be affected by audit quality. Furthermore, significant research shows the presence of an audit quality differential for constraining discretionary accruals in the U.S. based on the Big N versus non-Big N dichotomy.

Only two studies examine whether audit quality, as captured by audit firm size, restricts the incidence of CEM. First, using the Big N/non-Big N auditor classification as a surrogate for audit quality, Van Caneghem (2004) examines a 1998 sample of U.K. companies. For his full sample of entities, he finds the classic pattern of CEM (i.e., significantly less nines and more zeros than normally expected in the second digital position of the income number). He then splits the sample according to the size of the companies' auditors (Big N versus non-Big N) and discovers that both groups exhibit the same signs of CEM as the full sample. Accordingly, Van Caneghem (2004) concludes that for his sample of U.K. companies, no audit quality (i.e., audit firm size) differential exists relative to constraining CEM. Still, he notes that his results might have been different in the U.S., where auditors face greater litigation risk than in the U.K. (e.g., see the Khurana & Raman (2004) study above).

Second, Jordan et al. (2011) test for an audit quality differential relative to constraining CEM in the U.S., but do so based on post-SOX (2008) data. The researchers understood that by examining a post-SOX period, no CEM would be expected for their overall sample. They were testing to see whether CEM exists in their subsamples segregated by auditor size (i.e., did the clients of non-Big N firms engage in CEM while the Big N clients did not, or vice versa). Their results show that neither group engaged in CEM. Jordan et al. (2011, p. 56) note that this does not indicate necessarily that "no audit quality differential exists between Big N and non-Big N auditors as the result may simply mean that the clients of neither group of auditors presently attempt to engage in CEM."

No study examines whether an audit quality differential relative to constraining CEM existed in the U.S. during the period of time when this form of earnings management was aggressively practiced in this country (i.e., prior to SOX). The current study fills this void in the literature. Some research (e.g., Francis & Yu, 2009; Knechel et al., 2007) suggests that audit quality differentials may even exist among the individual Big N firms.

As an example, Fuerman and Kraten (2009) examine the outcomes of 1,017 lawsuits filed against Big N firms during 1999-2004 relative to financial reporting issues. They surmise that the litigation outcome provides a surrogate measure of whether an audit failure occurred. Fuerman and Kraten (2009) find a differential among the Big N firms, with Ernst & Young outperforming the other firms relative to better litigation outcomes. Thus, the key research question in the present study involves ascertaining whether an audit quality differential existed in the pre-SOX period between Big N and non-Big N firms and/or among individual Big N firms with respect to their ability to constrain CEM.

The present study provides an historical analysis of audit quality differentials based on audit firm size and brand. Even though studies show that CEM does not currently occur in the U.S., it existed as a very real and pervasive form of earnings management for many decades, which provides a unique opportunity to add to the literature on audit quality differentials as captured by the Big N versus non-Big N dichotomy. Although examining audit quality differentials for deterring CEM in a pre-SOX setting is historical in nature, this study possesses continuing

relevance because the general topic of audit quality differentials based on audit firm size and brand is still a debated and unsettled issue. Numerous auditing studies explore historical issues because they add to the literature on a particular topic.

For example, one issue often examined in the auditing literature is whether nonaudit services impair auditor independence. Because of the SEC's 2003 prohibition of specific kinds of nonaudit services provided to audit clients, nonaudit service fees declined following the passage of SOX. Krishnan et al. (2011) used this decline to perform an historical analysis exploring the relationship between nonaudit services fees and earnings management. They posited that the audit firms with a larger decline would show greater earnings management in the pre-SOX period (2000-2001), and that the difference would be eliminated in the post-SOX period (2004-2005). Using discretionary accruals to proxy for earnings management, the results supported their hypothesis. But after further analysis, Krishnan et al. (2011) found that the reported results held only for negative discretionary accruals. They concluded that any impairment of auditor independence resulting from nonaudit services is observed only for downward earnings management, and that income-increasing earnings management is not associated with auditor provided nonaudit services. The key point here is that Krishnan et al.'s (2011) historical analysis of pre-SOX data provides relevant findings about the relationship between nonaudit services and earnings management. Even though audit firms are now greatly limited in the types of nonaudit services they can provide, research on whether nonaudit services impact auditors' ability or willingness to constrain earnings management is still relevant.

In a similar vein, even though research shows that CEM is not practiced in the post-SOX era, the present study examining audit quality differentials in deterring CEM in the pre-SOX era provides information of continuing historical relevance. In particular, a long debated topic in the auditing literature is whether an audit quality differential exists between Big N and non-Big N auditors in terms of their ability to constrain earnings management. If such an audit quality differential is observed relative to constraining CEM in the pre-SOX era (i.e., when CEM existed as a common form of earnings management), another piece of evidence is added to the literature suggesting that, indeed, such an audit quality differential exists. On the other hand, if the current study fails to find any real differences between Big N and non-Big N firms (or among individual Big N firms) relative to their ability to constrain CEM in the pre-SOX era, additional evidence is added to the literature indicating no audit quality differentials exist between Big N and non-Big N firms relative to constraining earnings management.

METHODOLOGY AND DATA

As discussed previously, CEM occurs when the second digital position of unmanipulated earnings is relatively high (e.g., nine) and management increases income just enough to boost the second digit to zero, thus enlarging the first (and most critical) digit by one. The telling sign of CEM is an under representation of nines in the second digital position of the earnings number and a corresponding overabundance of zeros in this position. The numbers one through eight should appear in the second position at their normal rates. Therefore, a key aspect of testing for CEM is comparing the observed frequencies of the numbers zero through nine occurring in the second

position of earnings for a large sample of companies with the expected distributions for these numbers.

Benford (1938) derived mathematical formulas for ascertaining the expected frequencies of numbers appearing in the various digital positions of real world data (i.e., not computer generated or fabricated by humans). He demonstrates that low numbers (e.g., ones or twos) occur more often than high numbers (e.g., eights or nines) in the left two digital positions. Starting in the third digital position from the left, all numbers zero through nine appear at nearly proportional frequencies (i.e., each number occurs about 10 percent of the time). In the number 53,627, five appears in the first digital position, with three in the second position, six in the third position, and so on. Table 1 presents Benford's expected distributions for numbers occurring in the first three digital positions of real world data.

As an example, the distributions in Table 1 (often known simply as Benford's Law) show that the normal frequency of twos in the first digital position is 17.61 percent, while the expected rate of eights as the second digit is 8.76 percent. As Nigrini (1996) suggests, conformity of a financial data set to Benford's Law does not guarantee the numbers are not manipulated, but lack of conformity with these expected distributions raises serious concerns about the data's naturalness. All prior studies testing for CEM use Benford's Law for evaluating the actual rates of the numbers zero through nine occurring in the second digital position of the earnings figure; accordingly, the current study uses it as well.

Table 1
Benford's Expected Digital Distributions

	Position of digit in number		
Digit	First	Second	Third
0		11.97%	10.18%
1	30.10%	11.39	10.14
2	17.61	10.88	10.10
3	12.49	10.43	10.06
4	9.69	10.03	10.02
5	7.92	9.67	9.98
6	6.70	9.34	9.94
7	5.80	9.04	9.90
8	5.12	8.76	9.86
9	4.58	8.50	9.83

Source: Nigrini & Mittermaier (1997).

Data are collected for all U.S. companies in COMPUSTAT's Annuals Fundamental files for the period 1950-1999. 1950 represents the start date for the sample as this is the earliest date for which COMPUSTAT data are available; the sample period ends in 1999 because prior research shows that CEM in the U.S. stopped in the early 2000s (e.g., Aono & Guan, 2008; Lin & Wu, 2014). The earnings figure examined is annual income before extraordinary items, and only company-years with positive income are included in the sample because, as Thomas (1989)

demonstrates, entities with positive earnings exhibit stronger tendencies than those with negative income to engage in CEM.

The statistical significance of the differences between the observed and anticipated (i.e., Benford's) distributions for the ten numbers (i.e., zero through nine) in the second digital position of income is determined using proportions tests and their resulting Z statistics. A rigorous alpha level of .01 helps ensure that differences between the actual and expected distributions occurring from chance are not erroneously deemed to be the result of earnings manipulation. That is, if testing at a .10 alpha level, at least one of the ten digits would be expected to produce a statistically significant difference merely due to chance. Even testing at a .05 alpha level results in a 50 percent probability that at least one digit would produce a statistically significant difference due to random occurrence.

To ascertain whether CEM exists during the period under study in general, the distributions of the numbers one through nine occurring in the second earnings position are examined for the entire sample. Then, to determine whether an audit quality differential exists relative to audit firm size, the sample is segregated into two subsamples, with one containing clients of Big N auditors only and the other one comprising strictly clients of non-Big N firms. The tests for CEM are run again for each of these two subsamples. To ascertain if an audit quality differential exists among individual Big N firms, the subsample of company-years with Big N auditors is further subdivided into five unique subgroups (i.e., groups for Arthur Andersen (AA), PricewaterhouseCoopers (PwC), Ernst & Young (E&Y), Klynveld Peat Marwick Goerdeler (KPMG), and Deloitte Touch Tohmatsu (Deloitte)).

During much of the 50-year time period (1950-1999) under study, precursor firms to the above merged Big N firms existed. For example, two separate firms (Arthur Young and Ernst & Whinney) existed until they merged into one firm in 1989 (i.e., E&Y). For consistency purposes, any company-years audited by the precursor firms are included in the subgroup for the resulting merged firm (i.e., as an example, audit clients of Arthur Young and Ernst & Whinney, or even Ernst & Ernst, prior to 1989 are included in the subgroup with the clients audited by E&Y). Tests for CEM are conducted for each of the five subgroups of Big N firms.

RESULTS

Table 2 shows the findings for the full sample of company-years for the period 1950-1999. The sample comprises clients of both Big N and non-Big N audit firms. The first two rows provide the observed counts and rates for each number (zero through nine) occurring in the second digital position of income. For example, nines appear as the second digit 9,177 times, representing 7.78 percent of the total 117,930 company-years. The third row contains the normal frequency, according to Benford's Law, at which each number is expected to occur in the second digital position of real world data (i.e., absent any intentional human interference). As an example, under ordinary circumstances nines would be expected in the second digital position of earnings 8.50 percent of the time. The final two rows in the table present the Z statistic and p-level for a two-tailed proportions test used for comparing the observed and expected rates for each number appearing in the second digital position of income. Staying with the analysis of nines, Table 2

shows that the Z statistic and significance level for the difference between the actual and expected rates of nines are -8.839 and .000, respectively.

Table 2
Distributions for Second Income Digit (Full Sample)

N = 117,930										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	15392	13589	12735	12388	11728	11314	10806	10618	10183	9177
Actual rate (%)	13.05	11.52	10.80	10.50	9.94	9.59	9.16	9.00	8.63	7.78
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	11.440	1.432	-.891	.833	-.968	-.880	-2.083	-.430	-1.516	-8.839
p-level	.000*	.152	.373	.405	.333	.379	.037	.667	.130	.000*
*significant at .01 level.										

To make sure the findings are not affected by potential rounding of the second earnings digit that may have occurred when including the data in the COMPUSTAT files, the sample excludes all company-years with income figures having less than three digits. Not surprisingly given the results of prior research testing for CEM during this period, the results in Table 2 depict a clear pattern of earnings rounding intended to boost the first income digit by one. In particular, following the classic form of CEM, nines occur in the second digital position of income much less often than anticipated while zeros appear in this position at an unusually high rate. The numbers one through eight occur in the second digital position at their anticipated frequencies (i.e., with statistical significance tested at the .01 level).

A primary emphasis of this study is ascertaining whether an audit quality differential exists between Big N and non-Big N auditors relative to their ability to constrain CEM. Panels A and B of Table 3 present the results when the full sample of company-years is separated between those with Big N auditors and those with non-Big N auditors, respectively. A difference in audit quality would be apparent if one group of auditors restricts the practice of CEM while the other group does not. However, it appears that neither Big N nor non-Big N auditors constrain their clients' tendencies to engage in CEM. In particular, for both groups, nines occur in the second position of income significantly less frequently than expected and zeros appear in this position far more often than anticipated. The numbers one through eight occur in the second earnings position at their normal, expected rates. Thus, similar to Van Caneghem's (2004) findings in the U.K., there seems to be no audit quality differential between Big N and non-Big N audit firms in the U.S. with respect to restricting CEM.

Table 3
Distributions for Second Income Digit (Big N and non-Big N Samples)

Panel A: (Big N clients), N = 99,284										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	12884	11479	10654	10418	9873	9564	9154	8910	8588	7760
Actual rate (%)	12.98	11.56	10.73	10.49	9.94	9.63	9.22	8.97	8.65	7.82
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	9.769	1.699	-1.504	.646	-.895	-.389	-1.294	-.717	-1.221	-7.723
p-level	.000*	.089	.132	.519	.371	.697	.196	.473	.222	.000*
Panel B: (non-Big N clients), N = 18,646										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2508	2110	2081	1970	1855	1750	1652	1708	1595	1417
Actual rate (%)	13.45	11.32	11.16	10.57	9.95	9.39	8.86	9.16	8.55	7.60
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	6.217	-.306	1.219	.592	-.358	-1.303	-2.241	.559	-.982	-4.396
p-level	.000*	.760	.223	.554	.720	.193	.025	.576	.326	.000*
*significant at .01 level.										

As noted earlier, some research (e.g., Francis & Yu, 2009; Fuerman & Kraten, 2009; Knechel et al., 2007) suggests that audit quality differentials may exist among individual Big N firms. To determine whether such an audit quality differential occurs relative to constraining CEM, the group of 99,284 company-years with Big N auditors is split into five subsamples based on their audit firm (i.e., KPMG, Deloitte, AA, E&Y, and PwC). Panels A, B, C, D, and E in Table 4 provide the results for these five firms. The number of company-years audited by these firms during the period under study ranges from 15,227 for KPMG to 24,762 for PwC.

With respect to constraining CEM, no audit quality differential seems to exist among the Big N firms. In particular, Table 4 shows that the clients of each audit firm engaged in significant CEM. That is, for each Big N firm, its clients' earnings figures contain abnormally low rates of nines and high frequencies of zeros as the second digit while the numbers one through eight occur in this digital position of income at approximately their expected frequencies.

The results of the study cover a number of decades in the pre-SOX era, and there is a question of whether separate time periods during this span could provide differing results. Gu et al. (2005) find that the variability of accounting accruals increased consistently from the 1950s to the 1990s, when they reached their zenith and leveled off. Thus, because the variability of accounting accruals increased steadily over time, a possibility exists that the incidence of various forms earnings management, like CEM, rose over time as well (i.e., since, as Van Caneghem (2002) shows, CEM is accomplished through the use of discretionary accruals).

Table 4
Distributions for Second Income Digit (Individual Big N Firms)

Panel A: (KPMG), N = 15,227										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2023	1719	1612	1627	1495	1463	1397	1339	1368	1184
Actual rate (%)	13.29	11.29	10.59	10.68	9.82	9.61	9.17	8.79	8.98	7.78
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	4.989	-.379	-1.150	1.016	-.857	-.245	-.688	-1.046	.964	-3.191
p-level	.000*	.705	.250	.310	.391	.806	.492	.295	.335	.001*
Panel B: (Deloitte), N = 17,955										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2295	2073	1921	1894	1811	1692	1664	1649	1569	1387
Actual rate (%)	12.78	11.55	10.70	10.55	10.09	9.42	9.27	9.18	8.74	7.72
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	3.340	.644	-.767	.508	.239	-1.105	-.321	.660	-.089	-3.711
p-level	.001*	.519	.443	.612	.811	.269	.749	.509	.929	.000*
Panel C: (AA), N = 20,202										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2565	2392	2208	2104	2060	1992	1800	1821	1711	1549
Actual rate (%)	12.70	11.84	10.93	10.41	10.20	9.86	8.91	9.01	8.47	7.67
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	3.171	2.004	.215	-.059	.779	.904	-2.088	-.117	-1.448	-4.230
p-level	.002*	.045	.830	.953	.436	.366	.037	.907	.148	.000*
Panel D: (E&Y), N = 21,138										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2799	2419	2223	2259	2093	2014	1913	1949	1809	1660
Actual rate (%)	13.24	11.44	10.52	10.69	9.90	9.53	9.05	9.22	8.56	7.85
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.685	.236	-1.686	1.211	-.610	-.688	-1.437	.903	-1.026	-3.360
p-level	.000*	.814	.092	.226	.542	.492	.151	.367	.305	.001*
Panel E: (PwC), N = 24,762										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	3202	2876	2690	2534	2414	2403	2380	2152	2131	1980
Actual rate (%)	12.93	11.61	10.86	10.23	9.75	9.70	9.61	8.69	8.60	8.00
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	4.649	1.102	-.074	-1.002	-1.462	.172	1.457	-1.906	-.846	-2.832
p-level	.000*	.270	.941	.317	.144	.863	.145	.057	.397	.005*
*significant at .01 level.										

In order to address this issue, the data are separated into three distinct decades (i.e., 1970s, 1980s, and 1990s). Data for the 1950s and 1960s are not examined due to an insufficient number of companies in COMPUSTAT for these decades to allow statistical testing. Table 5 presents the results for all companies for each decade and shows a clear pattern of CEM in each decade (i.e., significantly fewer nines and more zeros than expected in the second digital position of income).

Table 6 provides the results by decade for companies audited by Big N auditors; again, the classic pattern of CEM appears for each decade.

Table 5
Distributions for Second Income Digit (by Decade for All Companies)

Panel A: (1970-1979), N = 24,511										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	3216	2843	2653	2547	2384	2355	2246	2284	2124	1859
Actual rate (%)	13.12	11.60	10.82	10.39	9.73	9.61	9.16	9.32	8.67	7.55
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.540	1.019	-.273	-.188	-1.573	-.318	-.940	1.508	-.512	-5.335
p-level	.000*	.308	.785	.851	.116	.750	.347	.132	.609	.000*
Panel B: (1980-1989), N = 41,954										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	5510	4900	4495	4420	4264	4013	3777	3784	3595	3196
Actual rate (%)	13.13	11.68	10.71	10.54	10.16	9.57	9.00	9.02	8.57	7.62
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	7.334	1.859	-1.083	.698	.902	-.718	-2.366	-.139	-1.376	-6.470
p-level	.000*	.063	.279	.485	.367	.473	.018	.890	.169	.000*
Panel C: (1990-1999), N = 51,463										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	6665	5846	5587	5421	5080	4946	4783	4550	4464	4121
Actual rate (%)	12.95	11.36	10.86	10.53	9.87	9.61	9.29	8.84	8.67	8.01
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	6.849	-.210	-.165	.763	-1.192	-.447	-.351	-1.564	-.681	-3.997
p-level	.000*	.834	.869	.445	.233	.655	.726	.118	.496	.000*
*significant at .01 level.										

Table 6 Distributions for Second Income Digit (by Decade for Big N Clients)										
Panel A: (1970-1979), N = 18,952										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2505	2204	1997	1988	1833	1847	1747	1814	1623	1394
Actual rate (%)	13.22	11.63	10.54	10.49	9.67	9.75	9.22	9.57	8.56	7.36
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.280	1.026	-1.504	.257	-1.629	.340	.565	2.539	-.943	-5.637
p-level	.000*	.305	.133	.797	.103	.734	.572	.011	.346	.000*
Panel B: (1980-1989), N = 34,946										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	4571	4113	3714	3684	3552	3341	3164	3104	3018	2685
Actual rate (%)	13.08	11.77	10.63	10.54	10.16	9.56	9.05	8.88	8.64	7.68
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	6.385	2.225	-1.505	.676	.827	-.684	-1.828	-1.019	-.809	-5.465
p-level	.000*	.026	.132	.499	.408	.494	.068	.308	.418	.000*
Panel C: (1990-1999), N = 45,385										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	5808	5162	4943	4746	4488	4376	4243	3991	3947	3681
Actual rate (%)	12.80	11.37	10.89	10.46	9.89	9.64	9.35	8.79	8.70	8.11
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.421	-.101	.070	.182	-.994	-.194	.057	-1.822	-.469	-2.966
p-level	.000*	.919	.945	.856	.320	.846	.954	.068	.639	.003*
*significant at .01 level.										

Table 7 presents the findings by decade for entities audited by non-Big N auditors. The one surprising result in Table 7 is for the decade of the 1970s (see Panel A) where the clients of non-Big N auditors do not appear to engage in CEM, at least at a statistically significant level. There is some evidence of CEM as most of the high digits (i.e., five, six, seven, and nine) occur at below expected frequencies and the three lowest digits (i.e., zero, one, and two) occur at higher than expected frequencies; the discrepancies are just not large enough for statistical significance. Possible explanations for this could be that these non-Big N clients engaged in CEM less aggressively than the Big N clients during this period or that non-Big N firms constrained CEM through their audit practices in the 1970s. Perhaps a more likely possibility relates to the findings in the Gu et al. (2005) study above that the variability of accounting accruals increased over time. More specifically, of the three decades examined in the current analysis for the non-Big N clients, significant signs of CEM appear in the latter two decades (i.e., 1980s and 1990s) but not in the earliest decade (i.e., 1970s).

Table 7
Distributions for Second Income Digit (by Decade for non-Big N Clients)

Panel A: (1970-1979), N = 5,559										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	712	639	656	559	550	508	499	469	501	466
Actual rate (%)	12.81	11.49	11.80	10.06	9.89	9.14	8.98	8.44	9.01	8.38
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	1.904	.225	2.183	-.891	-.316	-1.319	-.909	-1.545	.642	-.289
p-level	.057	.822	.029	.373	.752	.187	.363	.122	.521	.772
Panel B: (1980-1989), N = 7,008										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	939	787	781	736	712	672	613	680	577	511
Actual rate (%)	13.40	11.23	11.14	10.50	10.16	9.59	8.75	9.70	8.23	7.29
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	3.667	-.403	.692	.178	.342	-.209	-1.685	1.915	-1.538	-3.606
p-level	.000*	.687	.489	.858	.732	.834	.092	.055	.124	.000*
Panel C: (1990-1999), N = 6,078										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	857	684	644	675	592	570	540	559	517	440
Actual rate (%)	14.10	11.25	10.60	11.11	9.74	9.38	8.88	9.20	8.51	7.24
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.096	-.314	-.692	1.702	-.731	-.748	-1.198	.405	-.678	-3.502
p-level	.000*	.753	.489	.089	.465	.454	.231	.686	.498	.000*
*significant at .01 level.										

In addition to showing that the variability of accounting accruals increased over time from the 1950s to the 1990s, Gu, et. al. (2005) also find that entity size is negatively related to the variability of accruals (i.e., smaller companies experience greater variability of accruals than larger entities). In addition, Johnson (2009) uses Benford's Law to show that companies with lower levels of capitalization (i.e., smaller entities) demonstrate a greater risk of engaging in earnings management behavior than larger companies. To assess the effects of entity size in the current study, the sample is divided into quintiles using a company's total assets as the measure of entity size. To reduce the noise created by combining entities across many years (e.g., a large entity in 1970 would be relatively small compared to another entity in 1999), the sample is first segregated by individual years. The quintiles based on asset size within each year are then identified and included in overall samples for particular quintiles. For example, the overall sample for quintile one comprises the largest companies for each individual year while the sample for quintile five comprises the smallest companies for each year. Table 8 presents the results for each of the five quintiles for the total sample and shows a clear pattern of CEM for each quintile.

Table 8
Distributions for Second Income Digit (by Size Quintile for All Companies)

Panel A: (Quintile one), N = 23,248										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	3020	2659	2527	2433	2371	2203	2097	2039	2031	1868
Actual rate (%)	12.99	11.44	10.87	10.47	10.20	9.48	9.02	8.77	8.74	8.04
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	4.783	.218	-.040	.166	.846	-.989	-1.665	-1.421	-.117	-2.530
p-level	.000*	.828	.968	.868	.398	.323	.096	.155	.907	.011*
Panel B: (Quintile two), N = 23,247										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2917	2741	2475	2434	2269	2261	2163	2096	2060	1831
Actual rate (%)	12.55	11.79	10.65	10.47	9.76	9.73	9.30	9.02	8.86	7.88
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	2.704	1.913	-1.133	.190	-1.358	.278	-.175	-.115	.535	-3.398
p-level	.007*	.056	.257	.850	.175	.781	.861	.908	.593	.001*
Panel C: (Quintile three), N = 23,248										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	3036	2686	2440	2379	2341	2203	2134	2185	2016	1828
Actual rate (%)	13.06	11.55	10.50	10.23	10.07	9.48	9.18	9.40	8.67	7.86
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.106	.775	-1.872	-.971	.191	-.989	-.831	1.896	-.465	-3.471
p-level	.000*	.438	.061	.331	.849	.323	.406	.058	.642	.001*
Panel D: (Quintile four), N = 23,248										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2964	2638	2575	2474	2271	2245	2151	2111	2014	1805
Actual rate (%)	12.75	11.35	11.08	10.64	9.77	9.66	9.25	9.08	8.66	7.76
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	3.651	-.195	.950	1.046	-1.316	-.057	-.448	.203	-.511	-4.012
p-level	.000*	.845	.342	.296	.188	.954	.654	.839	.609	.000*
Panel E: (Quintile five), N = 23,251										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	3232	2681	2541	2512	2298	2234	2103	2035	1921	1694
Actual rate (%)	13.90	11.53	10.93	10.80	9.88	9.61	9.04	8.75	8.26	7.29
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	9.058	.665	.227	1.854	-.733	-.308	-1.536	-1.518	-2.674	-6.628
p-level	.000*	.506	.820	.064	.464	.758	.125	.129	.007*	.000*
*significant at .01 level.										

One important outcome in Table 8, though, lends support to the findings in the Gu et al. (2005) and Johnson (2009) studies that smaller entities may exhibit a greater tendency to manage earnings than larger companies. In particular, quintiles one through four (i.e., Panels A through D in Table 8) demonstrate the classic pattern of CEM (i.e., significantly fewer nines and more zeros than expected in the second earnings digit). This suggests the upward manipulation of earnings was just enough to increase the second digit from nine to zero. However, for quintile five in Panel

E (which contains the smallest companies in the sample), the earnings rounding is more aggressive. That is, both eights and nines appear in the second digital position of earnings significantly less often than expected; zeros occur significantly more frequently than expected. Thus, the smaller companies rounded up the second digit over a wider range than their larger counterparts (i.e., from eights and nines to zeros rather than simply from nines to zeros). Table 9 presents the results by size quintile for the companies audited by Big N firms, and the patterns of CEM are similar (albeit not quite as strong) as those of the full sample of companies in Table 8.

Table 9
Distributions for Second Income Digit (for Big N Clients in Each Size Quintile)

Panel A: (Big N clients in quintile one), N = 22,331										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2908	2561	2431	2320	2273	2114	2022	1959	1941	1802
Actual rate (%)	13.02	11.47	10.89	10.39	10.18	9.47	9.05	8.77	8.69	8.07
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	4.834	.358	.019	-.189	.729	-1.017	-1.454	-1.382	-.348	-2.295
p-level	.000*	.720	.985	.850	.466	.309	.146	.167	.728	.022
Panel B: (Big N clients in quintile two), N = 21,731										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2714	2546	2327	2273	2128	2118	2049	1948	1921	1707
Actual rate (%)	12.49	11.72	10.71	10.46	9.79	9.75	9.43	8.96	8.84	7.86
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	2.349	1.502	-.802	.132	-1.154	.370	.439	-.378	.405	-3.397
p-level	.019	.133	.422	.895	.248	.712	.661	.705	.686	.001*
Panel C: (Big N clients in quintile three), N = 20,604										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2688	2417	2144	2107	2065	1966	1890	1926	1782	1619
Actual rate (%)	13.05	11.73	10.41	10.23	10.02	9.54	9.17	9.35	8.65	7.86
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	4.747	1.529	-2.175	-.946	-.025	-.611	-.812	1.528	-.552	-3.294
p-level	.000*	.126	.030	.344	.980	.541	.417	.126	.581	.001*
Panel D: (Big N clients in quintile four), N = 19,103										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	2429	2184	2062	2038	1851	1878	1790	1726	1660	1485
Actual rate (%)	12.72	11.43	10.79	10.67	9.69	9.83	9.37	9.04	8.69	7.77
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	3.162	.175	- .370	1.067	-1.554	.740	.131	-.010	-.331	-3.587
p-level	.002*	.861	.712	.286	.120	.459	.896	.992	.741	.000*
Panel E: (Big N clients in quintile five), N = 13,888										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	1928	1590	1522	1530	1386	1326	1249	1209	1148	1000
Actual rate (%)	13.88	11.45	10.96	11.02	9.98	9.55	8.99	8.71	8.27	7.20
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	6.930	.205	.286	2.248	-.183	-.473	-1.389	-1.361	-2.044	-5.476
p-level	.000*	.838	.775	.025	.855	.636	.165	.174	.041	.000*
*significant at .01 level.										

Table 10 shows the results for the companies audited by non-Big N firms within each size quintile. Not surprisingly, for quintile one Panel A shows that relatively few of the largest companies in the sample were audited by non-Big N firms (i.e., only 917 of the largest 23,248 companies were audited by non-Big N auditors). Panel E reveals that a much larger number of the smallest companies in the sample were audited by non-Big N auditors (i.e., 9,363 of the smallest 23,251 entities were audited by non-Big N auditors).

Table 10
Distributions for Second Income Digit (for non-Big N Clients in Each Size Quintile)

Panel A: (non-Big N clients in quintile one), N = 917										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	112	98	96	113	98	89	75	80	90	66
Actual rate (%)	12.21	10.69	10.47	12.32	10.69	9.71	8.18	8.94	9.81	7.20
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	.177	-.618	-.347	1.821	.607	.019	-1.152	-.046	1.071	-1.355
p-level	.860	.536	.729	.069	.544	.984	.249	.964	.284	.175
Panel B: (non-Big N clients in quintile two), N = 1,516										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	203	195	148	161	141	143	114	148	139	124
Actual rate (%)	13.39	12.86	9.76	10.62	9.30	9.43	7.52	9.76	9.17	8.18
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	1.664	1.765	-1.356	.200	-.902	-.269	-2.391	.936	.518	-.402
p-level	.096	.078	.175	.841	.367	.788	.017	.349	.605	.688
Panel C: (non-Big N clients in quintile three), N = 2,644										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	348	269	296	272	276	237	244	259	234	209
Actual rate (%)	13.16	10.17	11.20	10.29	10.44	8.96	9.23	9.80	8.85	7.90
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	1.858	-1.938	.489	-.208	.667	-1.196	-.164	1.321	.130	-1.063
p-level	.063	.053	.625	.835	.505	.231	.870	.186	.897	.288
Panel D: (non-Big N clients in quintile four), N = 4.145										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	535	454	513	436	420	367	361	385	354	320
Actual rate (%)	12.91	10.95	12.38	10.52	10.13	8.85	8.71	9.29	8.54	7.72
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	1.835	-.861	3.069	.161	.194	-1.751	-1.369	.530	-.473	-1.773
p-level	.067	.389	.002*	.872	.846	.080	.171	.596	.637	.076
Panel E: (non-Big N clients in quintile five), N = 9,363										
Second income digit	0	1	2	3	4	5	6	7	8	9
Actual count (n)	1304	1091	1019	982	912	908	854	826	773	694
Actual rate (%)	13.93	11.65	10.88	10.49	9.74	9.70	9.12	8.82	8.26	7.41
Expected rate (%)	11.97	11.39	10.88	10.43	10.03	9.67	9.34	9.04	8.76	8.50
Z statistic	5.818	.783	.007	.167	-.915	.073	-.710	-.718	-1.707	-3.756
p-level	.000*	.434	.995	.867	.360	.942	.477	.473	.088	.000*
*significant at .01 level.										

Table 10 for the non-Big N auditees presents different results from those of the clients of Big N auditors appearing in Table 9. For the non-Big N clients (i.e., Table 10), only quintile five, comprising the smallest entities, shows a clear pattern of CEM. Sample size may play a role in this outcome since the number of companies in quintiles one and two, the larger entities, for the non-Big N auditees is questionable for applying Benford's Law. However, there is no doubt that at certain levels of entity size, the clients of non-Big N auditors exhibit the same patterns and intensity of CEM as that demonstrated by the auditees of Big N firms. In particular, the majority of entities audited by non-Big N firms fall in quintile five, where the classic pattern of CEM occurs (i.e., see Panel E in Table 10). A final note of interest on the size issue is that both Tables 9 and 10 present evidence that the smaller entities, whether audited by Big N or non-Big N firms, appear more aggressive in their CEM behavior than larger companies. For the clients of both Big N and non-Big N auditors, the Z statistics in quintile five for zeros and nines are far larger than the Z statistics for these two digits in any other quintile.

SUMMARY AND CONCLUSION

Echoing the findings of previous research, the results of the current study demonstrate that significant levels of CEM existed in the U.S. throughout the second half of the 20th century. More importantly, though, the study provides evidence suggesting the pervasiveness of this form of earnings manipulation was largely unaffected by a traditional measure of audit quality. In particular, very noticeable levels of CEM were practiced by the clients of both Big N and non-Big N auditors as well as by the clients of each Big N firm. With respect to constraining CEM, there appears to be little, if any, audit quality differential in the U.S. based on audit firm size or brand.

As noted earlier, research (e.g., Jordan et al., 2011) shows that subsequent to SOX, CEM is no longer practiced in the U.S. by the clients of either Big 4 or non-Big 4 auditors. The findings in the current study suggest that prior to SOX, CEM was routinely practiced by the clients of both Big N and non-Big N auditors and by the clients of each individual Big N firm, thus adding to the literature on audit quality differentials (or lack thereof) based on audit firm size and brand. The present study also adds to the literature concerning the relationship between company size and the propensity to engage in earnings management. In particular, results suggest that, whether audited by Big N or non-Big N firms, smaller entities practiced CEM more aggressively than larger companies.

One final point relates to a limitation concerning the generalizability of this study's results. In addition to suggesting an audit quality differential may occur based on audit firm size, prior research also indicates the degree of industry specialization, even among Big N firms, may be positively related to audit quality (e.g., Green, 2008; Romanus et al., 2008; Stanley & DeZoort, 2007). Thus, there exists a possibility that audit quality, as captured by the degree of industry specialization, may have affected the rate at which CEM occurred during the period under study. Future research could address this question.

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CONTINGENT INCREASE IN CASH DIVIDENDS UPON THE 2003 DIVIDEND TAX CUT

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ABSTRACT

Utilizing a natural experiment setting of the 2003 Dividend Tax Cut, this study documents that as the tax rate on dividends drops, corporate payout policy is contingent on firm's growth opportunity, shareholder rights, and their interactions. The study confirms that firms with high shareholder rights act in the interest of the shareholders. It also provides evidence that the 2003 Dividend Tax Cut helps move the cash flow out of the firms with low growth.

INTRODUCTION

The Job and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) has significantly dropped the tax rate on dividends. Instead of taxing dividends as ordinary income with the highest progressive tax rate of 35%, the JGTRRA dropped tax rates on qualified dividends to 15% or 5% for the years 2003 to 2007, depending on shareholders' taxable income. Besides significantly dropping the dividend tax rate, the legislation also decreased the tax rate on capital gains. Under the prior law, long-term capital gains were taxed at a maximum rate of either 20% or 10%, depending on taxable income level. The JGTRRA reduced the old 20% rate to 15% and the old 10% rate to 5%, respectively. The JGTRRA dropped the tax rates on both dividends and capital gains. However, the drop is much more dramatic for the dividends than for capital gains.

Intuitively, the decrease in dividend taxes should give shareholders incentives to demand more cash dividend from the firm for the tax savings. Management of a firm may treat such demand more seriously when their shareholders are more powerful. Jiraporn, Kim and Kim (2011) find that shareholders with stronger rights force managers to disgorge more cash in the format of a cash dividend. For the firm, the decrease in the dividend tax rate is not only factor to consider when it sets dividend payout policy. Future needs for cash flow, the historic level of dividends, and the availability of profitable investments are also important (Brav, Graham, Harvey and Michaely (2008)). Then it would be interesting to see how these factors interact.

There are no prior studies empirically examining how the change of the dividend tax rate from the 2003 Dividend Tax Cut, shareholder rights, and the firm's growth potential interact with each other in association with cash dividends. This study will use the 2003 Dividend Tax Cut as a natural experiment setting to address this gap in the literature.[1]

The passage of the JGTRRA is an exogenous event to corporations. It is a good natural experiment for testing relations in corporate finance research, which are often complicated by the endogenous issues (Wintoki, Linck and Netter (2012)). If the dividend tax rate, shareholder rights, and firm growth interact with each other in affecting cash dividends, then dividend payout is a

[1] Major tax reforms offer natural experiments for evaluating firms' responses. See . Christie and Nanda (1994) studied the relationship between free cash flow and shareholder value due to the undistributed profits tax of 1936 and 1937.

rather complicated matter. It may call for the combination of many different theories on dividends to provide complete explanations to firms' dividend policy.

In this study, we test whether the firm's shareholder rights, growth opportunities, and the 2003 Dividend Tax Cut interact with each other in affecting the firm's dividend payout. The study contributes to the literature in several respects. First, it documents the contingent nature of firms' dividend payout. With the drop of the tax rate on dividends, whether the firm will pay out cash dividends is contingent on the firm's growth and shareholder rights. Firms with good governance (measured by stronger shareholders rights) do not always pay more dividends. The growth plays a role as well. Likewise, firms with low growth do not necessarily pay high dividends, since the shareholder rights are important too. The study shows that dividend payout is a result of multiple factors, and a rather complicated matter. Secondly, utilizing a natural experiment setting, our study shows that firms with high shareholder rights act in the interest of shareholders. The literature has remained mixed on whether shareholder rights really serve shareholders' interests. Bebchuk, Cohen and Ferrell (2009), Masulis, Wang and Xie (2007), and Gompers, Ishii and Metrick (2003) show that entrenched managers (weak shareholder rights) are associated with lower firm values. However, Bates, Becher and Lemmon (2008) challenge the idea that the classified board, one of the most important anti-takeover devices, facilitates managerial entrenchment, and leads to poor firm performance.[2] Using the 2003 Dividend Tax Cut as a natural experimental setting exogenous to firms, we add clear evidence that shareholder rights do serve shareholders' interest. Thirdly, we find that firms with weak shareholders right pay less amount of dividend in response to the tax cut. This supports the free cash flow theory of Jensen (1986), and is at odds with the argument that poor governance and dividend payout are substitutes for each other. Lastly, our study provides evidence that the 2003 Dividend Tax Cut helped move cash flow out of firms with low growth. This shows some positive impact of the 2003 Dividend Tax Cut on the economy.

LITERATURE REVIEW AND DIVIDEND TAX CUT

Relevant theories

Since Miller and Modigliani (1961)'s dividend irrelevance theory, many new theories were developed to explain the dividend puzzle. The transaction cost theory states that when it is more costly for shareholders to cash in stocks in the stock market, they may prefer cash dividends. The uncertainty resolution theory (Gordon (1962)) says that shareholders prefer dividends when future capital gains are highly uncertain. Similarly, Bird-in-hand theory states that when the future of a firm in uncertain, investors wants dividends now. The tax-clientele hypothesis (Elton and Gruber (1970)) holds that investors select their stock holdings to minimize the tax bite of dividends. It follows that a high-dividend tax-rate investor would avoid holding dividend-paying stocks, while a low/zero-dividend-tax-rate investor would prefer doing so. Life cycle theory (Fama and French (2001); Grullon, Michaely and Swaminathan (2002) DeAngelo, DeAngelo and Stulz (2006)) predicts that mature firms are more likely to pay dividends due to their shrinking investment opportunity set, declining growth rate, and decreasing cost of raising external capital. The agent's free cash flow theory (Jensen (1986)) states that managers like to keep the cash flow and reinvest it in the firm, even in projects with negative NPV, in pursuit of their own benefits. The catering theory (Baker and Wurgler (2004)) implies that managers cater to investors by paying dividends

[2]The Classified board, defined as a board structure in which a portion of the directors serve for different term lengths, is an important aspect that weakens shareholders' rights.

when investors put a stock price premium on dividend payers, and by not paying dividend when investors prefer non-payers. The essence of the catering theory on dividends is that managers opportunistically modify corporate payout policies and give investors what they prefer currently.

The 2003 Dividend Tax Cut and firm dividend paying behaviors

The JGTRRA of 2003 introduced favorable treatment for an individual's dividend income. Essentially, it dropped tax rates on qualified dividends to 15% or 5% for the years 2003 through 2007 (depending on a tax payer's marginal tax rate of higher or lower than 15%). With this reform, investors would not face the regular progressive individual income tax schedule with a top rate of 35 percent for income from dividends. The JGRRRA also decreased the tax rate on capital gains. Under the prior law, long-term capital gains were taxed at a maximum rate of either 20% or 10%, depending on income level. The JGTRRA reduced the old 20% rate to 15%, and the old 10% rate to 5%. The eminent change that the JGTRRA brings in is on the dividend tax rate. It has a large decrease, compared with tax rate change on capital gains. The reform was officially signed into law on May 28, 2003. At the end of year 2003, all shareholders should enjoy the tax cut according to this legislature.

Due to the tax rate cut on the dividend, for the same amount of cash dividend from a firm, the shareholders receive a higher amount of after-tax dividend due to the tax savings. This gives the taxable shareholders incentive to demand higher dividend payouts from their firm. The 2003 Dividend Tax Cut has reversed the trend of the disappearing dividend in the U.S. to some extent. After its implementation, many firms either increase the amount of their dividend or initiate dividends (Chetty and Saez (2005)). Brav, Graham, Harvey and Michaely (2008) report similar findings after surveying 328 financial executives. The 2003 Dividend Tax Cut also has some spillover effect. Edgerton (2010) finds that REIT's dividends also increase, even though their dividends did not qualify for the rate cut.

DEVELOPMENT OF HYPOTHESES

Interaction between the 2003 Dividend Tax Cut and shareholder rights on dividend payout

In respect to the exogenous shock in dividend tax rates due to the 2003 Dividend Tax Cut, the free cash flow theory and the catering theory may be the most relevant among many dividend theories and work complementarily in predicting firms' responses. Both theories consider managers' role in making dividend decisions, but have different focuses: the demand of the shareholders is the focus of the catering theory, and the needs of managers are that of free cash flow theory.

Shareholders may have different tax preferences. However, the cut in the dividend tax rate gives the tax savings to taxable shareholders without negatively affecting dividend neutral shareholders. In other words, no shareholders are worse off due to the tax rate drop. Thus, upon the rate cut, shareholders, especially those taxable, should demand high cash dividends. Gadarowski, Meric, Welsh and Meric (2007) find that firms with higher dividend yields earned higher returns around the proposal for JAGTRRA and its formal passage. That is, market associates a dividend premium with stocks paying higher dividend upon the event. If the catering theory works, we should observe that firms pay more cash dividends after the 2003 Dividend Tax Cut. If the free cash flow theory works, we should observe that in the firms with the most serious

agency problems, the cash dividend should be less. If both theories work simultaneously and complementarily, we may expect the cash dividend to increase upon the 2003 Dividend Tax Cut, but the increase will be less for firms with serious agency problems.

The literature remains mixed on the relations between agency problems and dividend payout. Christie and Nanda (1994) find that the actual growth in dividends responding to the undistributed profits tax of 1936 and 1937 was lower among firms judged more likely to be subject to higher agency cost. Jiraporn, Kim and Kim (2011) find that firms with stronger governance exhibit a higher propensity to pay dividends. They conclude that shareholders of firms with better governance quality are able to force managers to disgorge more cash through dividends, therefore reducing what is left for expropriation by opportunistic managers.[3] In contrast with Jiraporn, Kim and Kim (2011), several other studies show that dividend is a substitute for weak governance. Knyazeva (2007) finds that weak governance has a positive effect on dividend changes, mainly in response to large cash flow increases. Weakly governed managers make fewer dividend cuts, and are more likely to raise dividends through regular small increases. Total payout adjustments made by weakly governed managers support the dividend commitment. Officer (2006) provides evidence that the dividend policy is a substitute for weak internal and external governance by focusing on a sample of firms that should pay dividends. For those studies that find that the dividend is a substitute for weak governance, it is unclear what the underlying forces are that make these firms pay shareholders. Due to the 2003 Tax Cut, shareholders demand more dividends for the tax savings. However, do firms respond to such demands? The answer may depend on whether managers listen to their shareholders. In this case, the rights of shareholders on firm governance should become important.

Shareholder rights, a proxy for how much shareholders can say in firm governance and whether shareholders can discipline managers if they do not act in the interest of shareholders, may be underlying forces. Shareholders with strong rights should interact with the tax rate via their board to affect the dividend payout. According to the free cash flow hypothesis, managers may invest free cash flow in the project with negative NPV in pursuing the interest of their own. Black (1976) argues that paying dividends can mitigate the potential overinvestment problem by reducing the amount of free cash flow. The 2003 Dividend Tax Cut on dividends gives taxable shareholders an incentive to ask for more cash dividends. This has the potential to reduce the free cash flow issue. However, in each firm, shareholders have different levels of rights. The shareholders' rights may affect whether firms respond positively to shareholders' call for dividends. When shareholders have weak rights, managers will be able to keep more cash under their discretion, incurring Jensen's free cash flow problem (Jensen, 1986). When shareholders have strong rights, through their board, they can demand the managers use the cash in the interest of shareholders, and effectively discipline managers if them do otherwise. If shareholders have weak rights relative to firm managers, then managers may try to keep more cash. In this case, the drop in the tax rate from the 2003 Dividend Tax Cut will not matter much, and the dividend payout amount will be low. Thus, we have the following hypothesis:

[3] Jiraporn, Kim and Kim (2011) do not find a significant impact of the 2003 Dividend Tax Cut on the relationship between governance quality and the dividend policy. They used Gov-score to proxy for governance quality, regress dividend payout on the interaction between Gov-score and dummy variable for the 2003 Dividend Tax Cut after year 2003, and the obtained insignificant coefficient of the interaction item. Their study seemingly adds to the evidence that the 2003 Dividend Tax Cut does not matter in affecting the dividend payout associated with governance.

H1: Firms with weak shareholders rights will exhibit low cash dividends post the 2003 Dividend Tax Cut.

Interaction between the 2003 Dividend Tax Cut and firm growth on dividend payout

The impact of tax cut on the dividend payout may differ depending on the level of firm growth, which is often measured as forecasted sales growth as in Chetty and Saez (2005) and Gadarowski, Meric, Welsh and Meric (2007) or Tobin's Q (firm's market value divided by its book value). Frankfurter, Kosedag, Wood Jr and Kim (2008); Gadarowski, Meric, Welsh and Meric (2007) find that for both traditional (predisposed to paying dividends) and growth-oriented (paying dividends only to satisfy stockholders' demands) firms, dividend payouts increased before the Job Growth and Taxpayer Relief Reconciliation Act of 2003. Chetty and Saez (2005) show that the number of firms initiating regular dividend payment increases and the firms raise their dividends significantly in 2003. They find that the tax response was confined to firms with lower levels of forecasted growth, as well as in the firms whose executives have high levels of stock holdings. Gadarowski, Meric, Welsh and Meric (2007) find that high-dividend stocks outperform low-dividend stocks with a reduction in dividend taxation. They find that firms that were currently not paying dividends, have high cash holdings, low debt ratio, and low Tobin's Q, were winners under the 2003 Dividend Tax Cut.

The 2003 Dividend Tax Cut may affect firms differently, dependent on their level of growth. The impact also reflects the economic contribution of the 2003 Dividend Tax Cut from a new perspective other than consumption. The contribution of the tax rate cut to the economy is unclear in the literature. Through surveying individual shareholders, Dong, Robinson and Veld (2005) find that investors have a strong preference to receive dividends; these investors do not tend to consume a large part of their dividends. As a result, they cast doubt on whether a reduction or elimination of the dividend tax stimulates the economy. If a firm's growth affects cash payout upon the 2003 Dividend Tax Cut, for instance, upon the tax cut, firms with low growth pay higher cash dividends than those with high growth do. Then, at the aggregate level, the funds will be channeled into more efficient uses, supporting firms with high growth. This will benefit the economy.

In summary, the tax cut should give shareholders incentives to take the cash out of the firms through cash dividends. However, the amount of the payout should be reduced when the firm has good growth, even with the drop of the dividend tax rate. Our second hypothesis is as follows:

H2: firms with good growth opportunity reduce cash dividend post 2003 Dividend Tax Cut.

DATA AND EMPIRICAL MODEL

Sample construction and data description

The sample firms are firms covered in the Governance index dataset described as in Gompers, Ishii and Metrick (2003)). The sample years are from 1998 to 2006.[4] For each firm

[4] There are two reasons that we focus on this period. First, initially the JGTRRA dropped tax rates on qualified dividends to 15% or 5% only for the years from 2003 to 2007. Companies are clear with this and are able to budget the dividend payout clearly. The cut was later extended by the Congress. But from year 2007, the financial crisis may affect firm's dividend policy.

year in the governance index dataset, we obtain information on board characteristics and executive pay from RiskMetrics and ExecuComp, respectively, using the following process.

First, we compress the director data from the individual director level to the firm level using a firm identifier (CUSIP) and the shareholder meeting date. This step develops the *director* dataset and provides board characteristics. Second, from ExecuComp, we obtain the total number of options and the total percentage of shares held by the top executives by CUSIP for each fiscal year.[5] Then, we merge this dataset with the governance index data compiled by Gompers, Ishii and Metrick (2003) based on CUSIP and fiscal year. The merger at this second step produces the *governance* dataset. Third, the firm's beginning calendar date and ending calendar date for each fiscal year from Compustat are added to the *governance* dataset. Fourth, we merge the *director* and the *governance* datasets by CUSIP, meeting date and the firm's ending calendar date for a fiscal year. The *director* dataset only provides the annual meeting date, while the *governance* dataset includes fiscal year. However, for each fiscal year we have beginning and ending calendar dates. We merge the files and ensure that the ending calendar date of each firm's fiscal year is immediately preceding its annual meeting date, but has the shortest distance.

After the mergers mentioned above, for every fiscal year of each firm in the dataset, we obtain its financial information from Compustat. We exclude both utility firms (SIC code from 4000 to 4999) and financial firms (SIC code from 6000 to 6999). Our final sample consists of 7,272 firm-year observations.

Key measures

Shareholders rights

Gompers, Ishii and Metrick (2003) construct a governance index to proxy shareholder rights. The index is a sum of twenty four anti-takeover provisions (ATPs). In general, ATPs in the index serve to entrench managers and directors, Bebchuk, Cohen and Ferrell (2009) highlight that some provisions may be irrelevant or even may be beneficial to firms. To address this concern, they focus on six provisions that have systematically drawn considerable opposition from institutional investors. Four of these six provisions limit shareholder voting, which is the primary power of shareholders. They include staggered boards, limits to shareholder amendments of the bylaws, supermajority requirements for mergers, and supermajority requirements for charter amendments. The remaining two provisions are the most prominent in preventing a hostile offer: poison pills and golden parachute arrangements. Bebchuk, Cohen and Ferrell (2009) show that these six provisions drive the negative relationship between ATPs and firm performance, and they code them as entrenchment index (E-index). In this study, we use the E-Index as the proxy for shareholder rights to capture managerial agency problems.

Firm growth

Following Lehn and Poulsen (1989), Chetty and Saez (2005) , Gadarowski, Meric, Welsh and Meric (2007), Aslan and Kumar (2011), we used sales growth as a to measure for firm growth. This measure is easy to understand for shareholders, is not affected by the volatilities in the stock

[5] I compress the ExecuComp data from the option granting level to the individual executive level and then to the firm level. Many firms make multiple option grants during a year.

market, and is comparable across industries. We also use the Price-to-book ratio to measure firm growth in the robustness analyses, and the results are qualitatively the same.

Cash dividend payer and an amount of cash dividend

Cash dividend payer is a dummy variable. Following Grullon, Paye, Underwood and Weston (2011) and Fama and French (2001), this variable has a value of 1, if the total amount of cash dividends paid to common shareholders by the firm during a given fiscal year (Compustat item 21) is greater than 0, and 0 otherwise. The second variable is the amount of the cash dividend payout to common shareholders (Compustat item 21). The drop of the tax rate on dividends is more dramatic than the reduction in the capital gains tax rate due to the 2003 Dividend Tax Cut. We expect the cash dividend will be affected more by the legislation. So we mainly use the amount of cash dividends as the key variable to test the hypotheses.

The 2003 Dividend Tax Cut

Our sample fiscal years are from 1998 to 2006. To capture the impact of the 2003 Bush tax cut, we create a dummy variable Bush, which has value of 1 for fiscal years no earlier than 2003, and 0 otherwise. This variable is associated with the drop in the dividend tax rate and an increase of tax savings on cash dividends. Gadarowski, Meric, Welsh and Meric (2007) (2007) find high-dividend stocks gain more value than low-dividend stocks after the reduction of dividend taxation from the JAGTRRA. There is about a 20% increase in dividend payments by nonfinancial, nonutility, publicly traded corporations following the JAGRRA (Chetty and Saez (2005)). Thus, the 2003 Dividend Tax Cut dummy variable should be a good proxy for taxable shareholders' demand for cash dividends, with all other variables equal.

Models

Since dividend paying firms may systematically differ from dividend non-paying firms, we first run Probit models to test the firms' dividend paying behaviors as they respond to the 2003 Dividend Tax Cut. We obtain the reverse mills ratio from a Probit model and add it to the regression with the amount of the cash dividend as a dependent variable to address the sample selection issue. Specifically, we estimate the following two models:

Probit model (model 1):

$$CDD = \beta_0 + \beta_i \sum (Bush, SalesGrowth, EIndex) + \beta_i \sum Interactions + \beta_i \sum Controls + \mu_i$$

Regression model (model 2):

$$CD = \beta_0 + \beta_i \sum (Bush, SalesGrowth, EIndex) + \beta_i \sum Interactions + \beta_i \sum Controls + \mu_i$$

In both models (1) and (2), CDD is Dummy variable taking a value of 1 if the firm pays the cash dividend in a fiscal year, and 0 otherwise. CD is the amount of the cash dividend the firm pays in

the fiscal year (in millions). SalesGrowth is a 3 year compound annual sales growth rate as reported in Compustat. The EIndex is the entrenchment index. A high value of index indicates weak shareholder rights. Bush is the dummy variable, with a value of 1 for the firm's fiscal year for no earlier than 2003, and 0 otherwise. The control variables include BoardSize, OutsideDirector, NumOptions, ExeShare, Institutions, FirmSize, FCF, RER, CAR, EPS, Leverage, MTB, and Tobin's Q. Their detailed definitions are in Appendix.

BoardSize is the number directors. OutsideDirector is the percentage of outside directors on the board is % Outsider Directors. NumOptions is the natural logarithm of the number of options held by the top executives, as reported in ExecuComp. The number of options held by firms' executives may affect firms paying dividend as paying dividend may drop the stock price and subsequently the value of options. ExeShare represents the total percentage of shareholdings by the top executives. Chetty and Saez (2005) find that firms whose executives have high levels of stock holdings raise the dividend significantly in 2003. Brown, Liang and Weisbenner (2007) find that executives with higher ownership were more likely to increase dividends after the tax cut in 2003. RER is defined as the percentage of a firm's retained earnings divided by its non-retained earnings in its total equity. This variable is added based on life-cycle theories (DeAngelo, DeAngelo and Stulz (2006); Denis and Osobov (2008)). More mature firms, with a higher potion of equity from accumulated retained earnings, are more likely to pay dividends. Liquidity is how often a company's stock was traded. It is computed as the average of monthly traded stock shares divided by the number of shares outstanding. Banerjee, Gatchev and Spindt (2007) find that firms with more liquid shares pay lower dividends. That is, the dividend and the stock liquidity substitute for each other. Industry dummy variables are coded following the Fama-French classification. The reverse mills ratio in Model 2 is computed from Model 1 to control for the sample selection issue. In both models, we also control for institutional share holdings.[6] Institutional shareholders can be tax-exempt/tax-deferred. The literature is mixed when discussing the relationship between institutional investors and their preference of dividends. Michaely, Thaler and Womack (1995) fail to find a significant change in institutional ownership after dividend omission. Del Guercio (1996) finds that dividend yield has no power in explaining the portfolio choice of banks and mutual funds Brav, Graham, Harvey and Michaely (2005) survey the literature and conclude that institutional investors as a whole do not show a clear preference for dividends over repurchase. Jain (2007) finds that institutional investors prefer low-dividend-yield stocks.

ANALYSIS OF RESULTS

Descriptive statistics

Descriptive statistics are provided in Table 1. The mean of Cash Dividend Dummy (CDD) is 0.562, indicating that 56.2% firms pay cash dividend. The average amount of cash dividend (CD) paid by firms is $110.935 million. The mean E-Index is 2.227. The average board includes 9.110 directors, with median of 9.000 and a maximum of 21.000. The average proportion of independent directors is 68.2 percent.

[6] The institutional holdings data is from the CDA/Spectrum 13F institutional investors holding database. As pointed out by Desai and Jin (2011) a number of institutions are improperly classified in 1998 and beyond. Therefore, the results for institutional investor holdings need to be treated with caution.

Table 1
SUMMARY OF DESCRIPTIVE STATISTICS

Variable	N	Mean	Median	Minimum	Maximum
CDD	7272	0.562	1.000	0.000	1.000
CD ($mil)	7222	110.935	4.204	0.000	36112.000
E-index (Shareholder rights)	7272	2.227	2.000	0.000	6.000
Sales Growth	7270	11.565	8.802	-84.294	960.805
BoardSize	7272	9.110	9.000	3.000	21.000
OutDirector	7272	0.682	0.714	0.000	1.000
Bush	7272	0.451	0.000	0.000	1.000
NumOptions	7138	6.767	6.802	-1.609	11.483
ExeShare	7033	0.059	0.006	0.000	94.500
Leverage	7252	1.951	1.062	-396.000	4564.580
FirmSize	7271	7.424	7.271	3.461	13.529
EPS	7272	1.103	0.998	-2042.500	2622.490
FCF ($mil)	7254	582.454	125.157	-50579	46383
CAR	7051	0.073	0.027	0.000	0.938
RER	6656	2.131	0.332	-380.705	2353.210
Liquidity	4937	0.118	0.079	0.006	1.366
Institution	6504	0.634	0.660	0.000	0.956

Table 2 reports the evolution of payouts to shareholders in the sample period. Before year 2003, the percentage had been slowly decreasing. This pattern is consistent with Fama and French (2001) who document that the dividend is disappearing. After the 2003 Dividend Tax Cut, the trend seemingly reversed. The percentage of firms paying cash dividends increases dramatically in year 2003, compared with year 2002. The change is consistent with prior findings: more firms initiated dividend payout due to the 2003 Dividend Tax Cut. For the amount of the cash dividend paid, there is a clear jump before and after the year 2003. These results are consistent with prior studies documenting the cash dividend increase due to the 2003 Dividend Tax Cut.

Table 2
TIME TREND OF CASH DIVIDEND

Year	CDD(Percentage)	CD ($mil)
1998	59.80%	89.764
1999	58.80%	91.800
2000	55.90%	97.130
2001	56.90%	107.599
2002	49.60%	85.758
2003	55.30%	115.353
2004	54.50%	110.824
2005	58.60%	176.868
2006	55.50%	122.350

The likelihood of the firm paying the cash dividend

Table 3 reports the testing results of the Probit model. The results from all models are similar. In all models, the E-index has positive coefficients, for instance, 0.087 and 0.069, significant at the 5% and the 10% level in models (1) and (2), respectively. This indicates that firms with high managerial rights relative to the shareholders are more likely to pay cash dividends. The interaction between the E-index and the Bush dummy has negative coefficients, -0.066 in model (1) and -0.096 in model (2), significant at 10% and 5% level, respectively. However, the coefficients are not significant in model (3) and (4). The negative coefficients indicate that firms with high managerial rights are less likely to pay a cash dividend after the 2003 Dividend Tax Cut. Such relations disappear when we control for other variables such as institutional investor holdings, which is negatively associated with the likelihood of paying cash dividends.

Sales Growth has negative and significant coefficients in first two models, indicating that firms with good sales growth are less likely to pay a cash dividend than firms with low sales growth. This is consistent with findings in previous literature. Firms with good growth are more likely to retain cash flow to support growth. The Bush dummy variables have positive and significant coefficients in last three models (2), (3) and (4). Again, the results are consistent with the prior finding that after the 2003 Dividend Tax Cut more firms initiate cash dividends.

Several other control variables significantly affect the likelihood of firms paying cash dividends. The number of options that top executives hold is negatively associated with the

likelihood of these firms paying cash dividends. Firm size, board size, percentage of outside directors on the board, and firm's free cash flows are positively associated with the likelihood. These results are not surprisingly.

Table 3
PROBIT REGRESSION-THE LIKELIHOOD FOR FIRM TO PAY CASH DIVIDENDS

Cash Dividend Dummy	(1)	(2)*	(3)	(4)
E-index	0.087** (2.320)	0.069* (1.770)	0.101** (2.500)	0.109*** (2.680)
E-index*Sales Growth	-0.001 (-0.490)	-0.001 (-0.420)	-0.002 (-1.430)	-0.002 (-1.310)
E-index*Bush	-0.066* (-1.610)	-0.096** (-2.280)	-0.065 (-1.430)	-0.066 (-1.430)
Sales Growth*Bush	-0.007 (-1.040)	-0.013* (-1.880)	-0.010 (-1.240)	-0.010 (-1.190)
E-index*Sales Growth*Bush	0.001 (0.460)	0.003 (1.070)	0.002 (0.570)	0.002 (0.490)
Sales Growth	-0.009** (-2.420)	-0.006* (-1.770)	-0.003 (-0.720)	-0.003 (-0.770)
Bush	0.119 (1.080)	0.254** (2.240)	0.264** (2.130)	0.264* (2.110)
NumOption	-0.278*** (-7.990)	-0.237*** (-6.630)	-0.227*** (-6.040)	-0.230*** (-6.130)
ExeShare	-0.098 (-0.870)	-0.105 (-0.940)	-0.233 (-0.670)	-0.226 (-0.660)
FirmSize	0.314*** (8.160)	0.349*** (8.380)	0.375*** (8.640)	0.334*** (6.870)
BoardSize	0.088*** (4.120)	0.069*** (3.150)	0.047** (2.030)	0.046** (1.960)
OutDirector	0.785*** (3.380)	0.646** (2.580)	0.784*** (2.950)	0.740*** (2.770)
EPS	0.002 (0.540)	0.002 (0.640)	0.002 (0.540)	0.000 (0.090)
FCF				0.000** (2.530)
Leverage	0.000 (-0.200)	0.000 (-0.490)	0.000 (-0.610)	0.000 (-0.620)
CAR	-0.421 (-1.030)	0.346 (0.810)	0.249 (0.560)	0.156 (0.340)
RER	0.001** (2.170)	0.001** (2.520)	0.001*** (2.920)	0.001*** (2.860)
Liquidity	-4.427*** (-6.100)	-4.149*** (-5.720)	-4.037*** (-5.460)	-3.979*** (-5.380)
Institution			-0.736*** (-3.940)	-0.684*** (-3.620)
Intercept	-1.111*** (-3.530)	-1.580*** (-3.280)	-1.264** (-2.22)	-1.010* (-1.70)
Control for industry	No	Yes	Yes	Yes
N	4553	4553	4077	4064
Pseudo R-square	0.267	0.318	0.326	0.324

Amount of the cash dividend

Table 4 reports the results of the regression model. Model (1) use all observations while Models (2), (3), and (4) only use the firm quarters, in which firms pay non-zero cash dividends, that is, these models focus on firms, which actually pay cash dividends. We add the reverse mills ratios in these models to control for sample selection bias.

Table 4
REGRESSION ANALYSIS: AMOUNT OF CASH DIVIDEND

Amount of Cash Dividend	(1)	(2)	(3)	(4)
E-index	-31.924** (-2.360)	-24.285** (-2.070)	-15.841 (-1.580)	4.406 (0.650)
E-index*Sales Growth	-0.092 (-0.370)	0.494 (0.950)	-0.043 (-0.080)	0.212 (0.660)
E-index*Bush	-44.365** (-2.070)	-38.125** (-2.130)	-54.807** (-2.490)	-22.077* (-1.880)
Sales Growth*Bush	-1.493 (-0.990)	-4.319 (-1.330)	-5.194 (-1.320)	-4.029* (-1.780)
E-index*Sales Growth*Bush	0.348 (0.620)	1.164 (1.010)	1.844 (1.470)	0.899 (1.160)
Sales Growth	-0.739* (-1.610)	-5.886*** (-4.750)	-4.619*** (-3.830)	-3.470*** (-3.080)
Bush	156.884** (2.450)	129.152** (2.330)	202.037*** (2.790)	65.119* (1.670)
NumOption		-45.722*** (-2.140)	-44.403*** (3.040)	-30.073*** (-3.110)
ExeShare		-500.813 (-1.090)	-706.297 (-1.380)	-236.231 (-1.200)
FirmSize		227.785*** (6.360)	226.207*** (6.000)	63.643*** (3.160)
BoardSize		40.400*** (3.220)	26.492*** (3.380)	13.801*** (3.000)
OutDirector		159.051* (1.660)	130.253 (1.480)	76.038 (1.550)
EPS		0.783 (0.50)	-0.093 (-0.090)	-2.885* (-1.760)
FCF				0.190*** (6.96)
Leverage		0.007 (0.01)	0.077 (0.180)	0.198 (0.780)
CAR		763.379*** (4.870)	611.359*** (4.460)	103.352 (1.100)
RER		0.166** (2.120)	0.115 (1.070)	0.018 (0.038)
Liquidity		-2476.023*** (-5.050)	-2606.817*** (-4.000)	-1517.986*** (-3.750)
Institution			-325.769*** (-3.950)	-5.686 (-1.400)
Intercept	1120.393 (1.150)	-517.431 (-0.490)	-93.324 (-0.090)	52.319 (0.13)
Control for industry	Yes	Yes	Yes	Yes
Reverse mills ratio		435.734*** (4.280)	385.325*** (4.010)	226.430*** (4.090)
N	7189	2579	2354	2348
R-square	0.090	0.467	0.449	0.789

E-index carries negative and significant coefficients in the model (2), but the significance disappears in models (3) and (4) when more control variables are added in. The results overall are consistent with Francis, Hasan, John and Song (2011)), who find that dividend payout ratios fall when managers are insulated from takeover. It seems that firms with high E-index are more likely to pay dividend but they pay less amount than firms with low E-index. The Bush dummy has positive and significant coefficients. As the tax rate drops due to 2003 Dividend Tax Cut, shareholders like to have more cash dividends to take advantage of tax savings.

The interaction between the E-index and the Bush dummy is negative and significant at the 10% level or better, this shows that firms with high E-index pay less cash dividends after the 2003 Dividend Tax Cut than other firms do. These results indicate the 2003 Dividend Tax Cut does not cause firms with a high E-index, that is, firms with low shareholder rights, to pay more dividends. These results confirm hypothesis 1: for a firm with weak shareholder rights (high E-index), the cash dividend is lower upon the 2003 Dividend Tax Cut. Even with the increased demand from shareholders, firms with weak shareholder rights still payout less cash dividends. The managers in these firms probably like to hold onto more cash for managerial interests, as the free cash flow theory implies.

The interaction between the Sales Growth and the Bush dummy has negative coefficients, significant at 10% level in model (4). This indicates that firms with high sales growth pay fewer cash dividends after the 2003 Dividend Tax Cut. This confirms hypothesis 2: when the firm has good growth, the payout should be reduced upon the tax cut. The negative coefficient of the interaction between the Sales Growth and the Bush dummy indicates that firms with low sales growth pay more cash dividends upon the 2003 Dividend Tax Cut. These results show the some positive economic implications of the 2003 Dividend Tax Cut. It helps move the cash flow out of firms with low growth. To some extent, this will help redistribute cash flow into more efficient use. Not surprisingly, the Sales Growth carries negative coefficients, significant at the 1% level. Firms with high sales growth need more cash to support the growth. Therefore, they are associated with less cash dividend payouts. In model (4), we add the firm's free cash flow as another control variable. The similar results still hold. When controlling for the firm's free cash flow, firms with high an E-index, and firms with good growth still pay less cash dividends upon the 2003 Dividend Tax Cut.

Several other control variables are also significantly associated with the amount of the cash dividend. Both the number of options and the shares held by the top executives are negatively associated with the amount of the cash dividend. Firm size and board size are positively associated with the amount of the cash dividend. CAR has positive coefficients, indicating that firms have more cash and are more likely to pay cash dividends.

RER has a positive coefficient in model (2). This is consistent with what the life cycle theory implies: firms with more accumulated retained earnings in its equity pay more cash dividends. Liquidity has negative and significant coefficients. The results are consistent with Banerjee, Gatchev and Spindt (2007), who find that shareholders substitute stock liquidity for dividends. When shareholders easily home-make dividend on the stock market, they demand less dividend from the firm.

The coefficients of the institutional investors' holdings have a significant, negative sign in model (3). This indicates that the more institutional investors hold a firm's shares, the less the firm pays in cash dividends. This is consistent with some prior studies, which find that institutional investors can be dividend averse. Besides using a cluster-adjusted error robust OLS regression, we

also run a Tobit regression since the dependent variable is the cash dividend, which is non-negative. The results are consistent with those from the OLS.

CONCLUSION

Using the 2003 Dividend Tax Cut as a natural experimental setting, we find that firms with weak shareholder rights are more like to pay cash dividends, but pay a smaller amount than firms with strong shareholder rights. The firms with weak shareholder rights cannot achieve as much tax savings from the 2003 Dividend Tax Cut for their shareholders as the firms with strong shareholder rights. This evidence shows the firms with weak shareholder rights do not act in the interest of shareholders. We find that firms with weak shareholders right pay less amount of dividend in response to the tax cut. This supports the free cash flow theory of Jensen (1986), and does not support the argument that poor governance and dividend payout are substitutes to each other. The study also indicates that the 2003 Dividend Tax Cut facilitates the cash flow to move out of the firms with low sales growth. This finding indicates the some positive impact of the 2003 Dividend Tax Cut on the economy. The study first documents that the firm's shareholder rights, sales growth and dividend tax rate interactively affect whether the firms pay cash dividends and the amount of the payout. It shows that dividend payout is a result of multiple factors, and a rather complicated matter.

The changes in the U.S. tax law are more often driven by politics rather than corporation's business need. This makes them exogenous to the corporations, an ideal arena to test economic theories on corporate behaviors. As a switch of American president's party affiliation between the republicans and democrats occurs, the changes in the tax law are often warranted. Whether corporations change their behaviors responding to the changes in tax law can be good topics for future research. More research work on these aspects, taking advantage of the natural experimental settings, without doubt, will generate more informative and robust findings.

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Appendix: Variable Definition

	Variables	Definitions
Key Variables		
	CDD	Dummy variable taking a value of 1 if the firm pays the cash dividend in a fiscal year, and 0 otherwise
	CD	Amount of the cash dividend the firm pays in the fiscal year (in millions)
	SalesGrowth	3 year compound annual sales growth rate as reported in Compustat
	E-Index	Entrenchment index created by Bebchuk, Cohen and Ferrell (2009)
	Bush	Dummy variable with a value of 1 for the firm's fiscal year for no earlier than 2003, and 0 otherwise
Governance Variables		
	BoardSize	Total number of board of directors in a given year
	NumOptions	Natural logarithm of the number of options held by top executives, as reported in ExecuComp
	OutsideDirector	Percentage of outside directors on the board
	ExeShare	Total percentage of shareholdings by top executives
	Institution	Percentage of shares held by institutional investors.
Financial Variables		
	FirmSize	Natural logarithm of firm's total assets
	FCF	Net income plus depreciation and amortization
	RER	Firm's accumulated retained earnings divided by the total equity of excluding retained earnings
	CAR	Firm's cash divided by the firm's total assets
	EPS	Earnings per share reported in Compustat
	Leverage	Total liability of the firm, divided by firm's total equity.
	MTB *Tobin's Q*	Market value divided by book value Market value of assets divided by book value of assets [(PRCC_F*CSHO + at - CEQ)/at)]

SAMPLE INDICATORS FOR PREDICTING U.S. PUBLICLY-TRADED FOR-PROFIT HOSPITAL FINANCIAL SOLVENCY

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ABSTRACT

The performance of all health care organizations is dependent on balancing the interrelationships of three dynamic dimensions - quality of care, access to care, and cost containment, called the "iron triangle" (Federal Trade Commission & Department of Justice, 2004). Administrators of U.S. hospitals and health systems must contend with the increasing pressures of changing economic conditions in response to the current regulatory changes in the health care industry. The detection of early warning signs of financial distress is imperative for management to be able to align strategic plans in advance to meet these challenges and prevent financial insolvency and bankruptcy. Research on financial and non-financial measures as indicators of financial solvency of U.S. hospitals is limited at the hospital system level; particularly U.S. publicly traded for-profit hospitals.

The Healthcare Negative Feedback System Model served as the theoretical framework developed for this study. It is a significant contribution to the literature in the healthcare area. This theoretical framework was developed by collectively relating three solvency theories: (1) the cash flow theory, (2) the resource dependency theory, and (3) the organizational-environmental theory, to quality, access, and cost indicators of the "iron triangle". This idea is an unpublished concept adapted from peer-reviewed literature developed by Corbett and Gossett (2013). The purpose of this non-experimental quantitative study was to evaluate the effectiveness of financial and non-financial indicators in predicting financial solvency of U.S. publicly traded for-profit hospitals. Data was collected from annual audited financial reports electronically filed on Form 10-K by U.S. publicly traded for-profit hospitals with the Security and Exchange Commission. The use of publicly accessible archival audited data ensures data continuity negating reliability and validity concerns.

INTRODUCTION

Researchers have presented data and analyses to support various financial distress models comprised of financial ratios calculated from data obtained from standard financial statements that are prepared using both the accrual basis of accounting and the cash basis of accounting to analyze United States U.S. hospital financial statements in order to predict financial insolvency and potential bankruptcy (Altman, 2000; Coyne, Singh, & Smith, 2008; Kocakülâh & Austill, 2007; Langabeer, 2006; Morey, Scherzer, & Varshney, 2003; Price, Cameron, & Price, 2005; Vélez-González, Pradhan, & Weech-Maldonado, 2011). Researchers have developed models containing accrual-based financial ratios calculated from data obtained from the accrual-based income statement and balance sheet, such as the Altman Z-score (Altman, 2000) and the Financial Strength Index (FSI) (Cleverly et al., 2011) for study as indicators of hospital financial distress. Coyne, Singh, and Smith (2008) have also examined cash-based financial ratios

calculated from data obtained from the all three standard financial statements – income statement, balance sheet, and the statement of cash flows prepared on the cash basis – as indicators for inclusion in a model for predicting of hospital financial distress. However, the reliability of both types of indicators in assessing financial condition to predict hospital financial insolvency and bankruptcy has been questioned because of the examples of incorrect assessments when purely relying on either one of the two types of indicators (Price et al., 2005; Semritc, 2009). Instead of relying on either of the two types of indicators, Price, Cameron, and Price (2005) suggest that a balanced reporting system incorporating both types of financial indicators, accrual-based and cash -based, should provide a more reliable assessment of hospital financial condition to predict financial insolvency and bankruptcy.

FINANCIAL INDICATORS BASED ON HISTORICAL OUTCOMES

Boblitz (2006) emphasizes that financial indicators are based on historical outcomes reported in financial statements and may not be adequate to assess financial condition to reliably predict financial distress and insolvency. While most studies have focused on financial indicators, Semritc (2009) identified statistically significant indicators in three categories: financial, market, and operational. Because different types of health care organizations have different financing patterns and structures (Broyles, Brandt, and Baird-Holmes, 1998; McCue & Diana, 2007), a mix of indicators from all categories, financial, market, and operational, is suggested as more effective for predicting financial insolvency. From the results of a study of U.S. for-profit hospital systems, Vélez-González, Pradhan, and Weech-Maldonado (2011) find that non-financial measures (efficiency, productivity, and quality indicators) in combination with financial measures provide a useful mix of indicators of future hospital financial performance. In particular, their demonstration of the positive effect of quality on hospital financial performance may provide incentive for managerial and policy decisions to improve hospital quality of care. According to Vélez-González et al., (2011), the study of the influence of non-financial measures on financial performance in the health care industry is limited and requires more research.

PURPOSE OF THIS STUDY

The purpose of this quantitative study was to evaluate the effectiveness of financial and non-financial indicators in predicting financial solvency of U.S. publicly-traded for-profit hospitals. The criterion variable is the financial group status (solvent or insolvent) of the hospital. The independent predictor variables included Altman Z-score, Altman Z-score_2, Financial Strength Index, Financial Strength Index_2, debt service coverage ratio, cash flow margin ratio, operating cash flow ratio, and cash flow to total debt ratio as financial indicators and Medicaid revenue percentage, uninsured revenue percentage, average length of stay, occupancy rate, outpatient revenue percentage, salaries and benefits expense to total operating expenses ratio, salaries and benefits expense to net revenue, and interest expense to net revenue ratio as non-financial indicators. The sixteen indicators selected were reflective of a posteriori and a priori approach in researching scholarly literature to establish key indicators from the findings of multiple empirical studies. Data was collected from annual audited financial reports electronically filed on Form 10-K by U.S. publicly-traded for-profit hospitals through the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database system, electronically accessible by the public. The use of archival audited data ensured data continuity negating

reliability and validity concerns. The predictor variables were analyzed for significance as indicators for predicting hospital financial solvency using logistic regression.

THEORETICAL FRAMEWORK

The research questions of this study were examined through a theoretical framework developed by collectively relating three solvency theories - the cash flow theory, the resource dependency theory, and the organizational-environmental theory - to quality, access, and cost indicators of the "iron triangle" within a Health Care Negative Feedback System model. This idea is an unpublished concept adapted from peer-reviewed literature developed by Corbett and Gossett (2013) shown below in Figure 1.

The performance of all health care organizations is dependent on balancing the interrelationships of three dynamic dimensions - quality of care, access to care, and cost containment, called the "iron triangle" (Federal Trade Commission & Department of Justice, 2004). Measures of quality of care, access to care, and cost containment (Cleverly et al., 2011; Flex Monitoring Team, 2005; Flex Monitoring Team, 2012; Health Care Cost Institute (HCCI), 2012) may be interrelated within the financial, market, and operational categories (Gapenski, 2012; Semritc, 2009) to create a comprehensive collective set of financial and non-financial indicators of hospital financial solvency. This comprehensive set of hospital solvency indicators, specifically developed for managers, investors, and analysts of U.S. publicly-traded for-profit hospital systems, may be a more effective tool to identify those components most influencing hospital performance. The integration of this set of specific financial and non-financial indicators into a balanced scorecard, as a strategic performance measurement and management tool, may further enhance the likelihood of correctly detecting components negatively affecting hospital performance as early warning signs of financial distress and predicting financial insolvency.

The cash flow theory (Jensen, 1986) and two financial distress models - the Altman Z-score (Altman, 2000) and Cleverly's Financial Strength Index (Cleverly et al., 2011) - provided support for the use of financial indicators. The resource dependency theory (Pfeffer & Salancik, 1978) and the organizational-environmental theory (Thompson & McEwen, 1958) provided support for the use of market and operational solvency indicators. This theoretical framework linked the three categories of solvency indicators - financial, market, and operational (Gapenski, 2012; Semritc, 2009) to the measures of the three dynamic dimensions of the "iron triangle" of health care (Federal Trade Commission & Department of Justice, 2004) – quality of care, access to care, and cost containment – in establishing a set of reliable indicators that enhances the assessment of financial condition for predicting U.S. publicly-traded for-profit hospital financial solvency.

The premise of the three solvency theories within the "iron triangle" of health care was that an organization's ability to survive financially is dependent on management's ability to adapt operations to changing environmental conditions. According to the resource dependency theory developed by Pfeffer and Salancik (1978), the key to an organization's survival is its capability to secure and maintain limited and valuable resources, critical to an organization's continued existence, from the changing market environment in which it operates. The premise of the organizational-environmental theory developed by Thompson and McEwen (1958) is that an organization's survival depends upon its ability to interact with its changing environment and develop sustainable resource relationships with patients, physicians, suppliers, contractors, and the community. According to the cash flow theory developed by Jensen (1986), an

organization's ability to maintain an "optimal" amount of debt to generate positive cash flow is dependent on the organization's access to capital resources. In the current economic environment, voluntary hospital health systems tend to rely more heavily on liquid reserves, such as cash and marketable securities, before resorting to debt or equity financing (Kim & McCue, 2008), primarily due to the high correlation between leverage and risk, particularly the risk of bankruptcy (Jensen, 1986), whereas, investor-owned hospital health systems tend to rely more on the ability to raise new equity funds (Cleverly et al., 2011). Kim and McCue (2008) found a positive feedback loop where increases in cash flow from new capital investments increases hospital financial solvency, which facilitates increases in capital investments, further securing hospital financial solvency by increasing cash flow.

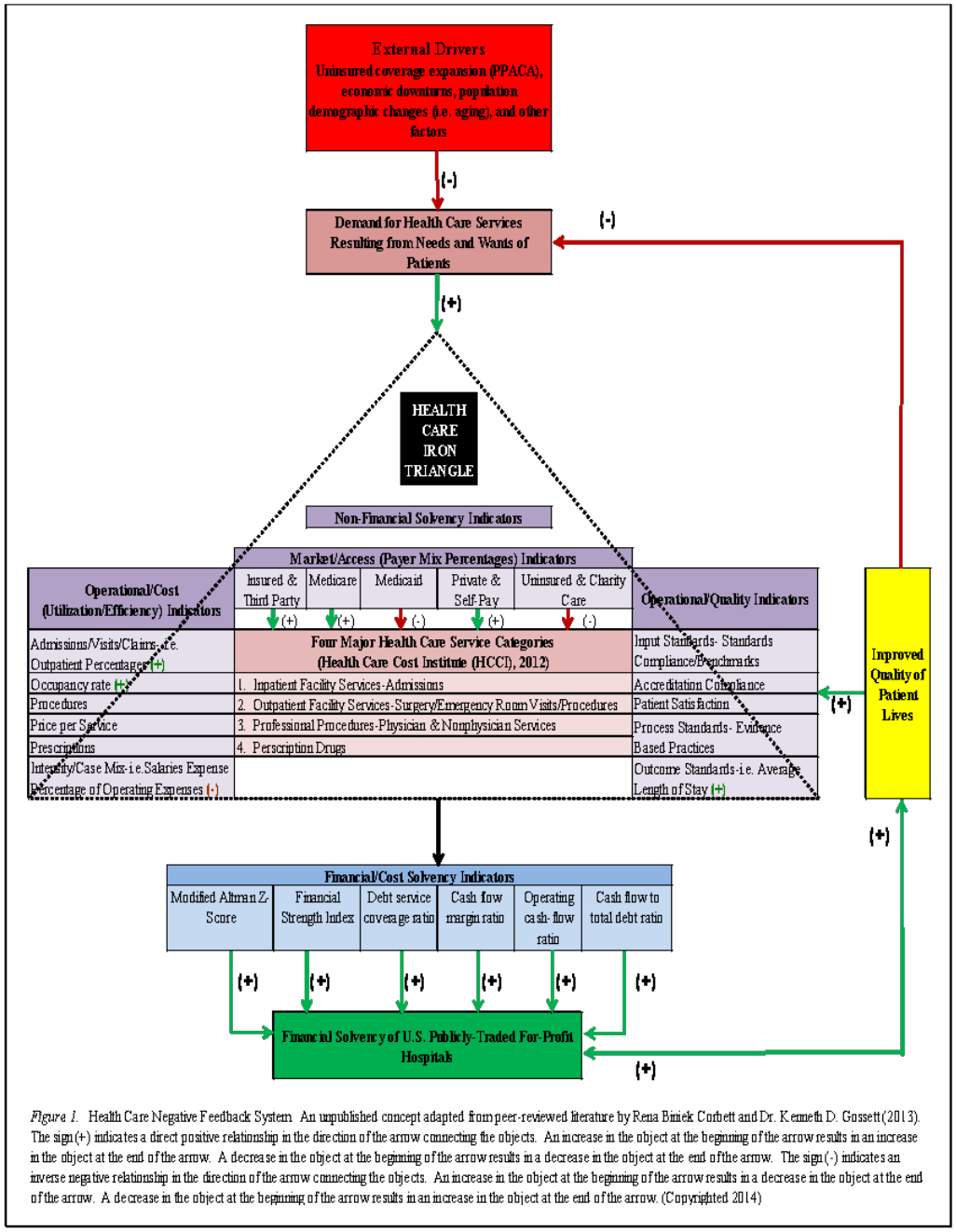

Figure 1. Health Care Negative Feedback System. An unpublished concept adapted from peer-reviewed literature by Rena Biniek Corbett and Dr. Kenneth D. Gossett (2013). The sign (+) indicates a direct positive relationship in the direction of the arrow connecting the objects. An increase in the object at the beginning of the arrow results in an increase in the object at the end of the arrow. A decrease in the object at the beginning of the arrow results in a decrease in the object at the end of the arrow. The sign (-) indicates an inverse negative relationship in the direction of the arrow connecting the objects. An increase in the object at the beginning of the arrow results in a decrease in the object at the end of the arrow. A decrease in the object at the beginning of the arrow results in an increase in the object at the end of the arrow. (Copyrighted 2014)

HYPOTHESES

Management must continuously assess the hospital's financial condition, considered as the viability or capacity of the hospital to continue pursuing its strategic goals, to successfully adapt to changing economic and political environments in the short-run and long-run (Cleverly et al., 2011). To be viable, a hospital must be a solvent hospital, which is in good financial condition to operate as an ongoing business and meet short-term and long-term obligations when due within the current market environment (Fraser & Ormiston, 2007). While solvency measures may be considered primary financial indicators for assessing hospital financial condition (Morey et al., 2003), several other non-financial measures have been found effective in many hospital studies for assessing financial condition to predict financial distress and financial insolvency (Semritc, 2009). The central research question was whether financial/cost indicators, market/access indicators, operational/quality indicators, and operational/cost indicators can be used to determine if any are effective as predictive discriminators of financially solvent or financially insolvent U.S. publicly-traded for-profit hospitals. The following hypotheses were developed to guide the research.

$H1_0$ *Financial/cost indicators (Altman Z-score, Altman Z-score_2, Financial Strength Index, Financial Strength Index_2, debt service coverage ratio, cash flow margin ratio, operating cash flow ratio, and cash flow to total debt ratio) are not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

$H2_0$. *Market/access indicators (Medicaid revenue percentage and uninsured revenue percentage) are not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

$H3_0$. *Operational/quality indicator (average length of stay) is not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

$H4_0$. *Operational/cost indicators (occupancy rate, outpatient revenue percentage, salaries and benefits expense to total operating expenses ratio, salaries and benefits expense to net revenue ratio, and interest expense to net revenue ratio) are not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

RESEARCH METHOD AND DESIGN

The research design for this quantitative predictive research study is a nonexperimental correlational design used as the technique to analyze independent ratio variables - financial/cost, market/access, operational/quality, and operational/cost indicators - to determine if any serve as predictive discriminators of the dependent criterion variables, financially solvent or financially insolvent U.S. publicly-traded for-profit hospitals. A step-by-step view of the nonexperimental correlational research design and implementation sequence for this quantitative predictive research study is depicted below in a schematic diagram in Figure 2 followed by descriptions of the steps.

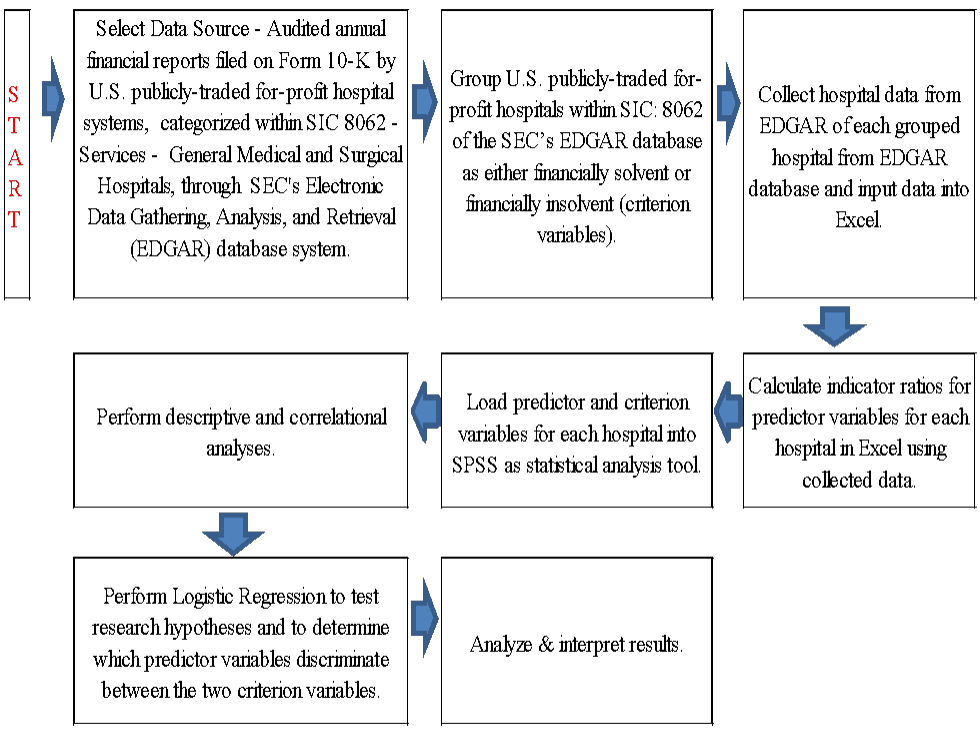

Figure 2. Schematic Diagram of Steps of Proposed Research Design and Implementation Sequence

The data for the calculation of the independent predictor variables were collected from the three most current consecutive 10-K filings of annual audited financial reports for each grouped hospital. The extracted data was inputted into a Microsoft Excel 2007 spreadsheet created for calculating three-year averages of the sixteen financial and non-financial independent predictor variables in four categories - financial/cost, market/access, operational/quality, and operational/cost ratio indicators. The indicators within these categories chosen as independent predictor variables for this study are reflective of a posteriori and a priori approach in researching scholarly literature to establish key indicators for predicting hospital financial solvency from the findings of multiple empirical studies (Altman, 2000; Aziz & Dar, 2006; Broyles et al., 1998; Cleverly et al., 2011; Coyne et al., 2008; Flex Monitoring Team, 2005; Griffith, Alexander, & Warden, 2002; Kim & McCue, 2008; Kocakülâh & Austill, 2007; Langabeer, 2006; McCue & Diana, 2007; Price et al., 2005; Semritc, 2009; Younis & Forgoine, 2005; Vélez-González et al., 2011).

The following independent predictor variables have been shown to have a direct or positive effect on hospital financial solvency. These independent predictor variables are expected to have significantly higher values, considered stronger positive correlational relationships, for the grouped financially solvent hospitals as compared to the grouped financially insolvent hospitals. The selected sixteen specific indicators, categorized as financial/cost, market/access, operational/quality, or operational/cost indicators, the studies identifying significance of indicators, and other researchers and professional organizations recommending indicators for study.

Financial/cost indicators:

Altman Z-score,

Altman Z-score_2

Financial Strength Index,

Financial Strength Index_2,

Debt service coverage ratio,

Cash flow margin ratio,

Operating cash flow ratio,

Cash flow to total debt ratio,

Operational/quality indicator:

Average length of stay, and

Operational/cost indicator:

Occupancy rate,

Outpatient revenue percentage.

Interest expense to net revenue ratio.

The following independent predictor variables have been shown to have an inverse or negative effect on hospital financial solvency. These independent predictor variables are expected to have significantly lower values, considered stronger negative correlational relationships, for the grouped financially solvent hospitals as compared to the grouped financially insolvent hospitals.

Market/access indicator:

Medicaid revenue percentage,

Uninsured revenue percentage,

Operational/cost indicator:

Salaries and benefits expense to total operating expenses ratio, and

Salaries and benefits expense to net revenue ratio.

The strength of the correlation of each independent predictor variable, either positive or negative, was evaluated as part of determining the appropriate independent variables included in the study. A correlation matrix was also used to identify multicollinearity and singularity problems, which occur when independent variables are too correlated (a correlation coefficient of .90 and above) and may negatively affect the validity of the research design, both logically and statistically (Huberty & Olejnik, 2006; Norusis, 2008; Tabachnick & Fidell, 2007). Problems of multicollinearity, where variables are very highly correlated, and singularity, where variables

are redundant, were evaluated to determine which independent predictor variables are appropriate for inclusion in the study.

RESULTS

This section provides a systematic description and analysis of each finding and the incremental steps that were needed to address the research questions and hypotheses. Descriptive and correlational statistics for each of the predictor variables are provided, followed by the results from logistic regression analyses for both single-predictor and multi-predictor models. Each step, with detailed findings is provided in the paragraphs following the research questions and related hypotheses below.

The following guidelines were used in the selection of the independent predictor variables for testing each research hypothesis using logistic regression:

> From the observed correlation coefficients (*r*), any two independent predictor variables with Pearson correlation coefficients showing a strong relationship (large effect where $r \geq .8$) were removed to minimize multicollinearity concerns (Cohen, 1992).

> Further exclusion of independent variables from testing was to obtain a reliable regression model, resulting in obtainable hospital cases of 23% of the population of 99 (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996).

Using the guidelines for each hypothesis, the resulting independent predictor variables selected for testing and the results of testing using logistic regression are shown in Table 1.

Table 1
Model Statistical Results for Logistic Regression Testing of Research Hypotheses

Hypothesis	Research Category	Independent Predictor Variable	Odds Ratio	Individual Wald Pr > ChiSq	Model $\chi 2$ Pr>ChiSq
H1	Financial/Cost	ALT2	0.68	0.23	0.18
		FSI2	0.27	0.22	
H2	Market/Access	MRP	61.66	0.68	0.60
		URP	60.84	0.63	
H3	Operational/Quality	ALS	0.94	0.74	0.74
H4	Operational/Cost	INTNETREV	>999.99	0.12	0.05

ANALYSIS OF RESULTS

Logistic regression was used to create a statistically significant model to predict the classification of future hospital cases as either financially solvent or financially insolvent. Four models, using financial/cost indicators (ALT2 and FSI2), market/access indicators (MRP and URP), the operational/quality indicator (ALS), and the operational/cost indicator (INTNETREV) as independent predictor variables, were used in testing the four research hypotheses using logistic regression. Prior to logistic regression testing, all predictor variables were found to be insignificantly ($p \geq 0.05$) correlated with hospital financial solvency. As shown above in Table 18 in the Evaluations of Findings section, according to Pearson correlation coefficients, ALT2 and FSI2, financial/cost indicators tested in Hypothesis 1, were found to be negatively correlated with hospital financial solvency, although expected, given the literature, to have a positive effect on hospital financial solvency. MRP and URP, market/access indicators tested in Hypothesis 2, were found to be positively correlated with hospital financial solvency, although expected, given the literature, to have a negative effect on hospital financial solvency. ALS, the operational/quality indicator tested in Hypothesis 3, was found to be negatively correlated with hospital financial solvency, although expected, given the literature, to have a positive effect on hospital financial solvency. INTNETREV, the operational/cost indicator tested in Hypothesis 4, was found to be positively correlated with hospital financial solvency, as expected, given the literature. Differences between these findings and the expected relationships, given the literature, may potentially be the result of the small number of hospitals used in the analysis and not necessarily because of the quality of the independent predictor variables.

As shown above in Table 1 in the Evaluations of Findings section, according to Model χ^2, Pr>ChiSq, the overall predictive models using, ALT2 and FSI2, as financial/cost indicators tested in Hypothesis 1, MRP and URP, as market/access indicators tested in Hypothesis 2, and ALS, as operational/quality indicator tested in Hypothesis 3, were not statistically significantly better in predicting hospital financial solvency, than the model with only the intercept. The overall predictive model, using INTNETREV as the operational/cost indicator tested in Hypothesis 4, was minimally significantly better in predicting hospital financial solvency than the model with only the intercept. According to the Wald criterion (Pr > ChiSq), the independent predictor variables - ALT2 and FSI2, as financial/cost indicators tested in Hypothesis 1, MRP and URP, as market/access indicators tested in Hypothesis 2, ALS, as operational/quality indicator tested in Hypothesis 3, and INTNETREV as the operational/cost indicator tested in Hypothesis 4, did not significantly ($p \geq .05$) contribute individually to the prediction of hospital financial solvency.

Therefore, each of the four null hypotheses cannot be rejected. There were two primary reasons why the predictors were not a good fit for each of the models. Although variables with strong relationships were deleted from the models to minimize multicollinearity concerns, there may have been correlations among predictor variables which could have influenced the results. The number of hospitals (23% of the population) included in the analysis may not have been large enough to have the power to identify statistically significant relationships or were not representative of the population.

POTENTIAL LIMITATIONS

Differences between these findings from testing the hypotheses and the expected predictor variable relationships to hospital financial solvency, based on the literature, may potentially be the result of the small sample size of hospitals that was used in the analysis and not necessarily because of the quality of the independent predictor variables. The inclusion in the analyses of the 23% of the population of hospitals in SIC 8062, fitting the criteria of having at least three consecutive 10-K filings, was not under the control of the researcher, but may have been a potential limitation of the study. The use of a small sample size should not prevent this study to contribute additional value to the knowledge base in this research area (Aziz & Dar,2006; Semritc, 2009; Vélez-González et al., 2011).

Another potential limitation to the study is the method of grouping of the hospitals as either financially solvent or financially insolvent. Hospitals operating as an ongoing business with current 10-K filings of annual audited financial reports were categorized as solvent hospitals. Although the lack of current 10-K filings of annual audited financial reports were considered indicative of the hospital no longer operating as an ongoing business and of hospital financial insolvency, the lack of current 10-K filings may have been the result of hospital and hospital system mergers and acquisitions. From the available data, this was impossible to determine. Hospitals, particularly non-profit hospitals, with deteriorating financial condition, are found to merge or consolidate into health systems to maintain solvency and to avoid bankruptcy (Zuckerman, 2011). A case in point is the recent partnership of LifePoint, Inc. with Duke University Health System to create the joint venture, Duke LifePoint Healthcare in 2011 and the multiple hospital system mergers since then. A review of the annual audited financial reports provided on the 10-K filings also revealed that LifePoint, Inc., a hospital used in this study analyses as financially solvent, was the result of the merger, in 2005, of Historic LifePoint Hospitals, Inc. and Province Healthcare Corp., two hospitals used in this study analyses as financially insolvent. Sixty hospitals in twenty states were listed as properties of LifePoint Hospitals, Inc. In the annual audit report as of December 31, 2013, According to Management's Discussion and Analysis of Financial Condition and Results of Operations as part of the reports, these mergers and acquisitions are the pursuit of the coalignment of strategies to provide complimentary outcomes-focused services with a range of management, financial, and operational resources, including access to capital for ongoing investments in new technology and facility renovations (LifePoint Hospitals, Inc., 2014). This growing trend of consolidations in the industry that results in ever-changing hospital organization structures potentially clouded the analyses. The limited number of financial solvency indicators and the lack of market and operational indicators, identified in the literature, and at the hospital system level potentially indicates that the financial solvency indicators at the hospital level may not also be applicable at the hospital system level (Semritc, 2009). Hospitals and hospital systems may have different patterns of financing and methods of cash management, which potentially yield significant differences in solvency analyses using financial/cost, market/access, operational/quality, and operational/cost indicators.

SIGNIFICANCE AND CONTRIBUTIONS

The theoretical framework developed for this study is a significant contribution to the literature in the healthcare area. The research questions and related hypotheses of this study

were examined through this theoretical framework for the purpose of establishing a set of reliable indicators that enhances the assessment of financial condition for predicting U.S. publicly-traded for-profit hospital financial solvency. The conceptual; framework was developed by collectively relating three solvency theories - the cash flow theory, the resource dependency theory, and the organizational-environmental theory – and linking the three categories of solvency indicators - financial, market, and operational (Semritc, 2009) to the measures of the three dynamic dimensions of the "iron triangle" of health care (Federal Trade Commission & Department of Justice, 2004) – quality of care, access to care, and cost containment indicators of the "iron triangle" of healthcare.

The secondary data of U.S. publicly-traded for-profit hospitals used in this study was obtained from data included on Form 10-K: Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934, which is available for public inspection accessed through the SEC EDGAR database, considered an under-utilized source of reliable data (Yazdipour, 2011). The use of publicly accessible archival audited data was expected to ensure continuity of data quality negating reliability and validity concerns. The quality of the data was evaluated by exercising reasonable care to provide accuracy of the data to the extent possible. During the process of collecting data from the annual audited financial reports filed on Form 10-K by U.S. publicly-traded for-profit hospitals for the study, the need for greater transparency in financial reporting of these hospitals was noted. A lack of the availability of data in the 10-K filings for certain independent predictor variables was noted. In particular, the market/access indicator, Medicare revenue percentage (MRP), was not provided by three hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. The market/access indicator, uninsured revenue percentage (URP), was not provided by four hospitals categorized as financially solvent and five hospitals categorized as financially insolvent. The operational/quality indicator, average length of stay (ALS), was not provided by four hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. The operational/cost indicator, occupancy rate (OCR), was not provided by four hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. The operational/cost indicator, outpatient revenue percentage (ORP), was not provided by three hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. Salaries and benefits expense, for the calculation of the operational/cost indicators, salaries and benefits expense to total operating expenses (SBT) and salaries and benefits expense to net revenue (SBNETREV), was not provided by one hospital categorized as financially solvent and one hospital categorized as financially insolvent. A summary of the hospitals with unavailable indicators is shown in Table 2, potentially reflecting a lack of transparency in reporting.

Further review of filings by hospitals, categorized as financially insolvent, provided additional insight and a better understanding of the SEC's EDGAR database. The independent auditor reports of two of the ten hospitals, Paracelsus Healthcare Corp. and RX Medical Services Corp., categorized as financially insolvent, included an explanatory paragraph noting uncertainties raising substantial doubt about the hospital's ability to continue as a going-concern. Statement on Auditing Standards (SAS) 59: The Auditor's Consideration of an Entity's Ability to Continue as a Going Concern requires the auditor to evaluate whether there is substantial doubt about the entity's ability to continue as a going concern (Auditing Standards Board, 2010). Potential indicators of going-concern problems include negative trends, negative cash flows, adverse key financial ratios, loss of key personnel, new legislation, pending litigation, and loan

defaults or restructurings. According to Moore and Baker (2010), auditors may be reluctant to issue an audit report highlighting going-concern problems for several reasons. Issuance of a going-concern opinion, by itself, might cause the company to go bankrupt, creating a "self-fulfilling prophecy." The auditor may be worried that issuing a report when the company might survive will cause the auditor to lose the client and future audit fees. A final explanation is that it may be very difficult to know beforehand whether or not a financially distressed client will actually cease operations or will somehow survive the expected outcome.

Table 2
Hospitals with Unavailable Indicators

Hospital	Solvency	MRP	URP	ALS	OCR	ORP	SBT	SBNETREV
First Physicians Capital Group, Inc.	S	X	X	X	X	X	X	X
Nova Natural Resources Corp	S	X	X	X	X	X		
Tongi Healthcare Group, Inc.	S	X	X	X	X			
United Surgical Partners International, Inc.	S			X	X	X		
Universal Health Services, Inc.	S		X					
American Hospital Management Corp	I	X	X	X	X	X		
IASIS Healthcare Corp	I		X					
MHM Services, Inc.	I	X	X	X	X	X	X	X
Quorum Health Group, Inc.	I		X					
RX Medical Services Corp	I	X	X	X	X	X		

Managers of publicly traded companies, required by federal securities laws to submit information to the SEC, must report certain unscheduled material events on Form 8-K, Current Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Significant events disclosed on Form 8-K include bankruptcy, changes in the certifying accountant of the registered company, departure of directors or certain officers, and business combinations. Unscheduled material events, such as termination of registration or suspension of duty to file, are required to be reported on Form 15-15D, Certification and Notice of Termination of Registration under Section 12(g) of the Securities Exchange Act of 1934 or Suspension of Duty to File Reports under Sections 13 and 15(d) of the Securities Exchange of 1934. Electronic filings of Form 8-K and Form 15-15D are available in the EDGAR database (SEC, 2011). Form 15-15D A review of the Forms 8-K and Forms 15-15D filed by each hospital, categorized as financially insolvent in the study, was conducted. Two hospitals, MHM Services, Inc. and Paracelsus Healthcare Corp., categorized as financially insolvent, had 8-K filings that noted pending dissolution and bankruptcy, respectively. RX Medical Services Corp. filed Form 8-K including independent auditor going-concern opinion. Five hospitals filed Form 8-K noting mergers supporting the trend in increased hospital combinations. Reasoning for the mergers, such as to improve financial performance, were not provided. Two hospitals, American Hospital Management Corp. and Ardent Health Services, LLC, filed Form 15-15D. Results of the review of the Forms 8-K and Forms 15-15D filed by each hospital, categorized as financially insolvent in the study, is shown below in Table 3.

Table 3
Form 8-K or Form 15-15D Filings by Hospitals Categorized as Financially Insolvent

Hospital	Form 8-K or Form 15-15D Filings
American Hospital Management Corp	2004 Form 15-15D Registration Termination or Filing Suspension
Ardent Health Services LLC	2005 Form 15-15D Registration Termination or Filing Suspension
Historic Lifepoint Hospitals, Inc.	2005 Merger with LifePoint Hospitals, Inc.
IASIS Healthcare Corp	2004 Merger with IASIS Healthcare, LLC
MHM Services, Inc.	2000 Corporate Dissolution
Paracelsus Healthcare Corp	2001 Chapter 11 Bankruptcy
Province Healthcare Corp	2005 Merger with LifePoint Hospitals, Inc.
Quorum Health Group, Inc.	2000 Merger with Triad Hospitals, Inc.
RX Medical Services Corp	2002 Auditor Going-Concern Opinion
Triad Hospitals, Inc.	2007 Merger with Community Health Systems, Inc.

RECOMMENDATIONS

The trend in increased consolidation of U.S. healthcare organizations is expected to continue to combat the combined effects of the national recession of 2007, the credit crisis of 2008/2009, and the passage in 2010 of the Affordable Care Act. All of these combined are considered to have a significant impact on the financial condition and solvency of organizations, particularly hospital and hospital health systems (Semtitc, 2009; Zuckerman, 2011). Administrators of U.S. hospitals and health systems must detect early warning signs of financial distress to be able to adjust operational objectives in advance to meet the challenges of the changing economic environment in order to prevent financial insolvency and bankruptcy. Scholarly literature is a source of numerous empirical studies of various indicators and models of indicator groups for analyzing a health system's financial condition to access financial solvency of U.S. hospitals and health systems, but provides no conclusive evidence as to whether solvency indicators for individual hospitals are valid indicators for health systems (Semritc, 2009). Because different types of health care organizations, or sectors of the hospital industry, vary in complexity with different financing patterns and structures, indicators or a set of indicators, unique to each type of organization, enhances the capability of each administrator to focus on those critical measures pertinent in addressing the organization's specific needs (Cleverly et al., 2011; Semritc, 2009).

A combination of financial and non-financial indicators as measures of quality, access and cost impacting hospital performance (Federal Trade Commission & Department of Justice, 2004) categorized as financial, market, and operational, enhances the analysis of financial solvency of U.S. publicly-traded for-profit hospitals at the hospital system level (Cleverly et al., 2011; Flex Monitoring Team, 2005; Flex Monitoring Team, 2012; Health Care Cost Institute, 2012). As research is limited in this area (Aziz & Dar, 2006; Balcaen & Ooghe, 2006; Landry, Landry, & Nowak, 2009; Semritc, 2009; Vélez-González et al., 2011; Yazdipour, 2011), a unique set of financial and non-financial indicators comparable across peer organizations within the sector of U.S. publicly-traded for-profit hospitals would provide administrators valuable insight for aligning strategic plans for contending with the changing economic and regulatory environment. The research in this quantitative-predictive study addressed the pressing issue of the lack of evidence of financial, market, and operational measures related to quality, access, and cost as indicators of financial solvency at the U.S. health system level. Research in this area

extended the use of financial and non-financial indicators into a balanced scorecard for analyzing and predicting financial solvency in U.S. hospitals and health systems. Findings related to available data and the consistency of data within 10-K filings submitted by hospitals to the SEC is useful to the SEC for setting policies, regarding requirements for the inclusion of specific data and the presentation of that data within 10-K filings, to improve the usefulness to investors in making more informed decisions.

As the economic recession and healthcare legislation requirements continue to strain the financial condition of U.S. healthcare organizations and the trend of consolidations in the healthcare industry increases, the need for greater transparency in financial reporting increases, particularly for publicly-traded for-profit hospital systems. Investors need contextual information on important areas impacting performance, including nonfinancial performance indicators, to be included in Edgar filings with the SEC to make optimal and timely informed decisions. Disclosure of indicators of market environment and access to healthcare, of operations in providing quality healthcare, and of operations in cost containment in providing quality healthcare is imperative to the analysis of hospital system performance and solvency. The collaboration of investors, creditors, regulators, management, and other stakeholders to improve the quality, integrity, and transparency of information in addition to the traditional financial statements is suggested for the determination of the optimal level of disclosure in an enhanced reporting model for decision making. Standards of reporting disclosures of financial and nonfinancial indicators of financial solvency of U.S. publicly-traded for-profit hospitals must also be consistent within this sector in order to afford comparative analysis within and between hospital health systems by stakeholders and researchers.

A review of the information provided in filings by U.S. publicly-traded for-profit hospitals in the SEC's EDGAR database was conducted in connection with this study suggests the need for improved disclosures about the entity's ability to continue as a going concern to be included in Form 10-K filings to reveal problems prior to financial insolvency. Potential indicators of going-concern problems include the following (Auditing Standards Board, 2010):

> Negative trends, such as recurring losses, negative cash flows from operations, and adverse key financial ratios,
>
> Internal matters, such as loss of key personnel, employee strikes, outdated facilities and products, and uneconomic long-term commitments,
>
> External matters, such as new legislation, pending litigation, loss of a key franchise or patent, loss of a principal customer or supplier, and uninsured or underinsured casualty loss,
>
> Other matters, such as default on a loan, inability to pay dividends, restructuring of debt, violation of laws and regulations, and inability to buy from suppliers on credit, and
>
> Significant changes in the competitive market and the competitiveness of the client's products.

The indicators of financial solvency tested in this study may be applied to individual hospitals and tested as an effective balanced scorecard. Another possible direction for future

research is the systematic analyses of which indicator(s) explain the largest percent of the variance of hospital solvency. Discriminate analysis has the ability to separate groups using multivariate measures and is used primarily to classify or make predictions in problems where the dependent variable appears in qualitative for, such as solvent and insolvent (Altman, 2000). An entire variable profile of hospital financial solvency may be analyzed simultaneously rather that sequentially to examine hospital characteristics.

SUMMARY AND CONCLUSIONS

The problem addressed in this study was the need to identify the most effective financial and non-financial indicators as predictive discriminators of financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals. The purpose of this nonexperimental quantitative study was to evaluate the effectiveness of eight financial indicators (financial/cost) and eight non-financial indicators (market/access, operational/quality, and operational/cost) in the predicting financial solvency of U.S. publicly traded for-profit hospitals. To address the research questions and related hypotheses, from the population of ninety-nine (99) U.S. publicly-traded for-profit hospitals with filings within SIC 8062 of the SEC's EDGAR database, twenty-three percent of the hospitals, with at least three consecutive years of 10-K filings of annual audited financial reports, were grouped into two different categories as either solvent hospitals or insolvent hospitals for analysis in the study.

Six independent predictor variables were investigated under the four hypotheses, including Altman Z-score_2 (ALT2) and Financial Strength Index_2 (FSI2) used as financial/cost indicators, Medicaid revenue percentage (MRP) and uninsured revenue percentage (URP) used as market/access indicators, average length of stay (ALS) used as operational/quality indicator, and interest revenue expense to net revenue ratio (INTNETREV) used as operational/cost indicator. ALT2, FSI2, and ALS were expected, given the literature, to have a positive effect on hospital financial solvency. The findings showed that these independent predictor variables were insignificantly ($p \geq .05$) negatively correlated with hospital financial solvency. INTNETREV was expected, given the literature, to have a positive effect on hospital financial solvency and findings showed that this independent predictor variable was insignificantly ($p \geq .05$) positively correlated with hospital financial solvency. MRP and URP were expected, given the literature, to have a negative effect on hospital financial solvency. The findings showed that these independent predictor variables were insignificantly ($p \geq .05$) positively correlated with hospital financial solvency.

Unexpectedly, given the literature, findings also showed that the overall predictive models for testing all four hypotheses were not statistically ($p \geq .05$) significant in predicting hospital financial solvency and all predictors individually did not significantly ($p \geq .05$) contribute to the prediction of hospital financial solvency. Thus, all four null hypotheses that the indicators were not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals were not rejected. Differences between these findings and the expectations, given the literature, may potentially be the result of the small number of hospitals used in the analysis and not necessarily because of the quality of the independent predictor variables. The use of a small sample size should not prevent this study to contribute additional value to the knowledge base in this research area (Aziz & Dar, 2006; Semritc, 2009; Vélez-González et al., 2011).

In addition to a better insight and understanding of the SEC's EDGAR database and of the U.S. publicly-traded for-profit hospital sector of the healthcare industry, the theoretical framework developed for this study is a significant contribution to the literature in the healthcare area. The research questions and related hypotheses of this study were examined through this theoretical framework for the purpose of establishing a set of reliable indicators that enhances the assessment of financial condition for predicting U.S. publicly-traded for-profit hospital financial solvency. The conceptual framework was developed by collectively relating three solvency theories - the cash flow theory, the resource dependency theory, and the organizational-environmental theory – and linking the three categories of solvency indicators - financial, market, and operational (Semritc, 2009) to the measures of the three dynamic dimensions of the "iron triangle" of health care (Federal Trade Commission & Department of Justice, 2004) – quality of care, access to care, and cost containment indicators of the "iron triangle" of healthcare.

The ultimate purpose of this study was to address the gap in the scholarly literature and to expand the knowledge base in this area. A universal metric has not been identified in the literature that is successfully applied in the healthcare industry. Research that identifies insignificant measures of financial solvency in U.S. hospitals and hospital health systems may be useful for identifying the true solvency indicators.

As the economic recession and healthcare legislation requirements continue to strain the financial condition of U.S. healthcare organizations and the trend of consolidations in the healthcare industry increases, the need for greater transparency in financial reporting increases, particularly for publicly-traded for-profit hospital systems. Investors need contextual information on important areas impacting performance, including nonfinancial performance indicators, to be included in Edgar filings with the SEC to make optimal and timely informed decisions. Disclosure of indicators of market environment and access to healthcare, of operations in providing quality healthcare, and of operations in cost containment in providing quality healthcare is imperative to the analysis of hospital system performance and solvency. The collaboration of investors, creditors, regulators, management, and other stakeholders to improve the quality, integrity, and transparency of information in addition to the traditional financial statements is suggested for the determination of the optimal level of disclosure in an enhanced reporting model for decision making. Standards of reporting disclosures of financial and nonfinancial indicators of financial solvency of U.S. publicly-traded for-profit hospitals must also be consistent within this sector in order to afford comparative analysis within and between hospital health systems by stakeholders and researchers.

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MARKET-TIMING ABILITY OF LOW TRANSPARENCY THROUGH FIXED-PRICE TENDER OFFER STOCK REPURCHASE

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ABSTRACT

In this paper, I examine whether low transparency (LT) firms with more information asymmetry problems have more market-timing opportunities and are able to earn higher market-timing profits through fixed-Price tender offer stock repurchase. I find LT firms are more likely to announce larger repurchase than high transparency (HT) firms. In addition, the long-term performance shows that LT firms do earn higher market-timing profits than HT firms, because of incomplete and less immediate market reactions.

INTRODUCTION

In this paper, I examine the impact of transparency on corporate management's market-timing ability through fixed-price tend offer stock repurchase. More specifically, I examine whether low transparency (LT) can provide managers with more market-timing opportunities and profits through such stock repurchase. The study of fixed-price tender offer stock repurchase is important because the size of repurchase of fixed-price tender offer is in general much bigger than the size of other forms of stock repurchase, such as open market repurchase and Dutch auction.

Corporate advocates of higher corporate transparency have identified several advantages that are linked to high transparency;[i] however, others have found that higher transparency has significant downside effects.[ii] While the literature of corporate disclosure has been well examined in numerous studies, none of the above studies has examined whether low transparency allows managers to time stock repurchases more efficiently, even though managers' market timing intent and success have been well documented in SEO and repurchase literatures.[iii]

LT firms have more information asymmetry problems (Diamond and Verrecchia (1991)), while such information asymmetry problems can cause the market price to deviate from its intrinsic value. In addition, the adverse selection problem can also cause the less informed market to discount the stock of LT firms as a form of compensation or information discount (Beatty and Ritter (1986)). More importantly, less informed investors will be willing to sell the stock at a reservation price that is below the fair market value viewed by the manager of LT firms because of the information asymmetry problems. On the other hand, managers of LT firms with complete information will treat the price discount as undervaluation and an opportunity for timing the share repurchases if the magnitude of undervaluation is big enough to generate market timing profit. By contrast, high transparency (HT) firms have little or no information asymmetry problem.

Therefore, the stock of HT firms is more likely to be priced at or close to the intrinsic value. In addition, when the stock of HT firms is undervalued, the magnitude of the undervaluation may not be big enough to generate market timing profit. Consequently, managers of HT firms have fewer market-timing opportunities and smaller market-timing profits than managers of LT firms do.

To determine if LT firms are more successful in market timing through stock repurchase, I examine (1) whether the market reacts less immediately to repurchase announcements of LT firms because the market views the undervaluation signal of LT firms to be less credible as a result of information asymmetry problems and (2) whether LT firms outperform HT firms in the long run after the repurchase activities.

Consistent with the hypotheses, I find LT firms are more likely to announce larger repurchase and are more likely to time the stock repurchase repeatedly, indicating that they are more successful in timing the stock repurchase. Therefore, LT firms have more market-timing opportunities. In addition, I examine the market reactions at announcement and the long-term performance post the repurchase. I find LT firms to experience smaller market reactions, while such market reaction is incomplete. In the long run, LT firms earn more robust and more significant positive profits than HT firms post repurchase. My results are consistent with my hypotheses; LT firms do earn higher market-timing profits through fixed-price tender offer.

In the following sections, I will present the specific hypotheses examined in this study, the methodologies used to test the stated hypotheses, the empirical results, and the conclusions of this study.

HYPOTHESES

Both theoretical and empirical studies agree that LT firms have more information asymmetry problems and that increasing disclosure can reduce information asymmetry problems. However, the flip side of information asymmetry is that managers would have more of an information advantage than the outside investors, and such an information advantage provides more chances for opportunistic market timing behavior. Therefore, reducing information asymmetry problems by improving transparency may reduce the opportunity and size of timing gains through repurchase.

Since LT firms have more information asymmetry problems than HT firms, stock of LT firms is more likely to be traded at discount because of the higher information risk. In addition, the information asymmetry problems also predict difficulty in accurate firm valuation. Therefore, mispricing and higher price dispersion are also more likely to occur among LT firms.[iv] Such larger scale of price dispersion and deeper discount of LT firms can provide managers with more market-timing opportunities. The larger the price discount, the higher the market-timing profit, while everything else being equal. Therefore, the above mentioned market-timing opportunity and large price discount can encourage market-timing behavior and guarantee profits.

On the other hand, HT firms with fewer information asymmetry problems are more likely to find their stocks priced at or close to the fair market values. Therefore, HT firms should have a fewer market-timing opportunities and earn lower market-timing profits.

H1 Low transparency firms should have more market-timing opportunities and earn higher market-timing profits through fixed-price tender offer stock repurchase than high transparency firms should.

Based on signaling theory, repurchase announcements can signal that the firm expects higher returns in the future. In addition, the signal also indicates that the firm has enough financial resources to implement the repurchase in addition to investing in all of its positive NPV projects.

Therefore, repurchase announcements often trigger positive market reactions (Spence (1973) and Stephens and Weisbach (1998)).

However, information asymmetry theory predicts that the market will perceive the announcement of LT firms to be less creditable because of the information asymmetry problem. With more information asymmetry, investors tend to react to the announcement with more caution, while such slower and less immediate market reactions may allow LT firms to more successfully purchase the stock at lower prices and therefore earn higher market-timing profits in the long run.

A few empirical results indicate that LT firms' signals may be less credible than those of HT firms. Price (1998) finds a positive relationship between the level of disclosure and responsiveness to earnings. Therefore, his result indicates that the market should respond to the announcement of HT firms more promptly. In addition, investors of LT firms are more cautious; they want to wait for other confirming information before reacting on the announcement instead of taking the undervaluation signal for granted.

H1 Signaling theory predicts that, if low transparency firms' signals are less credible than those of high transparency firms, low transparency firms should receive less immediate and less positive market reactions than high transparency firms, [v] while such less immediate market reactions will allow low transparency firms to buy back stocks at lower prices and earn higher market-timing profits in the long run. Therefore, low transparency repurchase firms should outperform high transparency repurchase firms and non-repurchase firms in the long run.[vi]

DATA

In this study, repurchase data are obtained from Security Data Corporation's Merger and Acquisition database. Repurchase firms are classified into open market repurchase, Dutch auction, and fixed-price tender offer samples. All fix-price tender offer events are then verified through Lexis-Nexis. Data on stock price, returns, and shares outstanding are obtained from CRSP, while financial data are obtained from COMPUSTAT. Corporate transparency is proxied by IBES analyst forecast dispersion.

The analyst forecast dispersion has been used to measure transparency or information asymmetry in several empirical studies.[vii] To measure analyst forecast dispersion, the standard deviation of forecast is scaled by the stock price to facilitate comparisons across firms. Industrial median is subtracted from the scaled dispersion measure to adjust for the cross-industry variation in scores due to differences in subcommittee composition and in industry characteristics. Since the forecast dispersion is used to measure transparency rather than announcement effect, I follow Lang and Lundholm (1993, 1996) by averaging the dispersion across the twelve monthly reporting periods on the IBES tape during the company's fiscal year.

While some studies only include the firms' first-time share repurchase activities in the sample to reduce noise (Wang and Johnson (2005)), I include the repeated events in the study to determine if firms with multiple repurchases behave more opportunistically. However, when the long-term performance is examined, firms that have carried out another repurchase in the past five years are excluded to avoid statistical problems.[viii] Note that all financial institutions, public utilities companies, and transportation companies are eliminated from the sample. All privately negotiated deals and privatization repurchases are eliminated. Furthermore, I exclude events that occur in the fourth quarter of 1987 because the market crash may cause time-clustering problems.[ix]

TESTS

a. Tests of repurchase announcement and actual repurchase activities

In Table 1, I first display the different firm characteristics between the LT portfolio and HT portfolio. Mean and median of firm size, market-to-book ratio, Tobin's Q, operating income, quick assets, leverage ratio, prior-year return, size of repurchase announcement measured in percentage to market value of equity prior to the announcement, and the proportion of repeated repurchase firms.

The choice of the above characteristics is determined based on the hypotheses in this paper and on previous empirical studies.[x]

b. Tests of Market Reaction to Repurchase Announcement

To examine the market reaction, I use cumulative abnormal returns, CARs, based on the market model; on size and book-to-market controlled; and on size, book-to-market, and industry controlled non-repurchase firm returns (Ikenberry, Lakonishok, and Vermaelen (1995)). Fama and French (1992, 1993) and Lakonishok, Shleifer, and Vishny (1994) suggest size and book-to-market matched firms to control for firm characteristics. I use 2 short-term event windows, [-1, 1] and [-1, end of the announcement month] to examine the market reactions. The three-day event window is commonly used to examine market reaction of announcement in case sometimes news may not be reported in the journal or new paper until the next day. The second event window is included since the long-term performance of the repurchase firms is calculated based on monthly returns starting from the month following the announcement date, while using only the [-1, 1] window in the short-term study will leave out the performance of the sample period between day 1 after the announcement and the beginning to the next month, leaving loop holes in the study. Therefore, the second short-term event window is used to provide a more complete examination.

When using the market model, the abnormal return is the difference between the actual return and the fitted return predicted by the market model. The parameters of the market model are calculated over a 100-day period beginning 165 days prior to the announcement and ending 65 days prior to the announcement. The CRSP equal-weighted and value-weighted index returns are used to proxy for the market returns.[xi]

To determine if the market reacts to repurchase announcement differently when the firms have different levels of transparency, I perform several tests. T-test is used to determine if the CARs from the high and LT firms are significantly different from one another. In addition, Wilcoxon ranked-sum test is used to determine if LT firms have more positive CARs than the HT firms.

c. Long-term Performance

In the long-term performance, only firms that actually carry out the announced repurchases are examined. Long-term abnormal return estimation can be very sensitive to the model choice and methodology used since small errors in the short-horizon studies can be compounded in the long term and cause significant mis-specified results. Therefore, I use several different measures such as CARs estimated based the Brown and Warner (1980) approach, BHARs based on size and book-to-market matching bootstrapping methodology (Brock, Lakonishok, and LeBaron (1992)), Calendar-time approach three-factor model (Fama and French (1993)), and Ibbotson's RATS (Returns Across Time and Securities) three-factor model (Ibbotson (1975) and Ikenberry et al. (1995)) to examine the long-term performance.

RESULTS

In this study, the final fixed-price tender offer sample consists of 89 firm year observations and 79 completed repurchases. In Table 1, I examine the firm characteristics of fixed-price tender offer firms. Consistent with Lang and Lundholm (1993), who find the level of transparency is positively correlated to firm size and firm performance, I also find LT firms to be smaller and to have lower operating income, lower growth rate, measured by Q, and higher leverage. The lower growth rate indicates less need for external capital and therefore disclosure. LT firms are less likely to issue stock when external funds are needed since stock issuance will require the LT firms to disclose information to a large number of external shareholders and potentially reduce the information advantage of the LT firms. Therefore, LT firms are more likely to have higher leverage than HT firms. Lastly, LT firms are more likely to announce larger share repurchase and more likely to repeat the stock repurchase in the future. The larger repurchase announcement is consistent with the hypothesis that LT firms have more market-timing opportunities and can earn higher market-timing profits because of the larger magnitude of mispricing caused by information asymmetry problems.

Next, I examine market reactions to repurchase announcements. Three benchmarks are used to calculate CARs. Whether the market reaction is measured based on CRSP returns; size and book-to-market matched firm returns; or size, book-to-market, and industry matched firm returns; results are similar in most cases.

Results of fixed-price tender offer firms are consistent with the hypothesis. LT firms' announcements are viewed as less credible; therefore, the market reacts less immediately and less positively in the short run.

In Table 3, I use CARs and BHARs to examine the long-term performance of repurchase firms. Only firms that actually carry out the repurchases are examined. Again, consistent with the hypothesis and my earlier findings, LT firms do earn higher CARs and BHARs in the long run. CARs provide stronger results than BHARs, while the small sample problem may explain some of the statistical insignificance in the results.

In Table 4, calendar-time approach FF factor model provides consistent yet stronger results. LT firms outperform HT firms in the three- and five-year windows post the repurchase.

For an additional robustness check, RATS procedure factor model is used in Table 5. In this case, only LT firms earn statically significant positive returns in the 36-, 48-, and 60-month period, while HT firms do not earn statistically significant profits in the long run.

TABLES

Table 1
CHARACTERISTICS OF REPURCHASE FIRMS BASED ON CORPORATE TRANSPARENCY

Target firms are classified into low transparency and high transparency target portfolios based on the industry-adjusted analyst forecast dispersion. Size of the firm is market value of common stock at the end of fiscal year before the first bid. BTM, book-to-market, is calculated as book value of equity divided by market value of equity in fiscal year t-1. Book value of equity is calculated as book value of common stock equity plus deferred taxes, plus investment tax credit. Q is calculated as market value of assets divided by book value of assets. Operating income is calculated as operating income scaled by total assets. Quick Assets are (cash + receivables + marketable securities) / market value of common stock. Leverage = long-term debt / market value of common stock. Industry-adjusted variables are calculated based on industry median. All variables are winsorized at 1% and 99%. When the firm announces more than one open market repurchase in a calendar year, only the first observation is included. Announced Repurchase Size is measured based on the % sought variable obtained from SDC. Repeat dummy is equal to 1 when the firm announces more than one open market repurchase. Mean, (median), and [p-value] are reported below.

	LT (N = 44)	**HT (N = 45)**	**LT - HT**	**p-value of t test (Wilcoxon Test)**
Size in Millions	741.36 (236.18) [0.0001]***	1568.53 (650.27) [0.0003]***	-827.17 (-414.09)	0.0164** (0.0248)**
Industry-Adjusted BTM	0.30 (0.18) [0.0044]***	-0.10 (-0.05) [0.0953]*	0.40 (0.23)	0.0009*** (0.0002)***
Industry-Adjusted Q	-0.11 (-0.07) [0.0777]*	0.53 (0.15) [0.0039]***	-0.64 (-0.22)	<.0001*** (0.0006)***
Industry-Adjusted Operating Income	0.01 (0.01) [0.4682]	0.07 (0.06) [<.0001]***	-0.06 (-0.05)	0.0011*** (<.0001)***
Industry-Adjusted Quick Assets	0.18 (0.01) [0.5038]	-0.17 (-0.12) [0.2125]	0.33 (0.13)	<.0001*** (0.0525)*
Industry-Adjusted Leverage	0.76 (0.17) [0.0398]**	0.05 (-0.01) [0.5457]	0.71 (0.18)	0.2267 (0.0171)**
Announced Repurchase Size	31.04% (21.90%) [<.0001]***	23.56% (15.50%) [<.0001]***	7.47% (6.40%)	0.2605 (0.3291)
Repeat	9.09% (0.00%) [0.0441]**	4.44% (0.00%) [0.1596]	4.65% (0.0%)	0.3898 (0.3900)

Table 2
MARKET REACTION OF REPURCHASE FIRMS

Three benchmarks are used for the CAR calculation. The first benchmark is CRSP value and equal weighted returns. In this case, the CAR is calculated based on Brown and Warner (1985) methodology. The second benchmark is the size and book-to-market matched returns, while the last benchmark is the size, book-to-market, and industry matched returns. Industry matching is done based on the 2-digit SIC codes. Only purged sample firms are used for the firm characteristic matching to avoid statistical problems.

Panel A: Market Reaction base on CRSP Returns

	Value-Weighted CAR (-1,1)	**Value-Weighted CAR (-1, End-of-the-Month)**
Overall Sample	7.96% (3.38%) [<.0001]***	7.95% (4.44%) [<.0001]***
LT targets	4.39% (3.02%) [<.0001]***	4.42% (4.44%) [<.0001]***
HT Targets	9.60% (5.07%) [<.0001]***	9.53% (4.45%) [0.0008]***
LT minus HT **(P-Value of T Test)** **[P-Value of Wilcoxon Test]**	-5.21% (0.0424)** [0.8087]	-5.11% (0.1437) [0.5853]

Panel B: Market Reaction based on Size and Book-to-Market Matched Returns

	Value-Weighted CAR (-1,1)	**Value-Weighted CAR (-1, End-of-the-Month)**
Overall Sample	8.81% (4.00%) [<.0001]***	9.42% (4.43%) [<.0001]***
LT targets	4.79% (2.63%) [0.0003]***	4.26% (4.31%) [0.0047]***
HT Targets	10.37% (5.52%) [<.0001]***	11.42% (4.43%) [0.0003]***
LT minus HT **(P-Value of T Test)** **[P-Value of Wilcoxon Test]**	-5.58% (0.0710)* [0.6002]	-7.16% (0.0799)* [0.5926]

Panel C: Market Reaction based on Size, Book-to-Market, and Industry Matched Firms

	Value-Weighted CAR (-1,1)	**Value-Weighted CAR (-1, End-of-the-Month)**
Overall Sample	9.07% (4.08%) [<.0001]***	10.92% (5.65%) [0.0001]***
LT targets	6.95% (6.06%) [<.0001]***	4.63% (7.53%) [0.0426]**
HT Targets	9.71% (3.95%) [0.0007]***	12.79% (4.40%) [0.0042]***
LT minus HT **(P-Value of T Test)** **[P-Value of Wilcoxon Test]**	-2.76% (0.4840) [0.6052]	-8.16% (0.2038) [0.5682]

Table 3
LONG-TERM CARS AND BHARS OF THE REPURCHASE FIRMS

In Panel A, cumulative abnormal returns (CARs) are estimated based on the Brown and Warner approach (1980). 12-, 36-, and 60-month CARs from the month after the original announcement date are calculated for the high transparency (HT) and low transparency (LT) repurchase, based on both CRSP value- and equal-weighted index returns. Standard errors are calculated using month -36 to +48 from the announcement. Firms are classified as completed repurchase firms when the repurchase is at least partially completed. In Panel B, Bootstrapping methodology is used to calculate the long-term buy-and-hold abnormal returns. (Brock, Lakonishok, and LeBaron (1992)). The matching firm is determined based on the size, book-to-market, and 2-digit SIC code of the repurchase firm. Matching is done each year post repurchase announcement to adjust for the change of market value of equity post stock repurchase. The matching sample is purged of any firm that announced any type of stock repurchase in the past five years. NYSE breakpoints are calculated each year. Size is the market value of firm equity as of June 30th. Book value of equity is calculated as the book value of common equity plus deferred taxes and investment tax credits for fiscal year t-1.

Panel A: cumulative abnormal returns (CARs)

	One-year Value-Weighted CAR	Three-year Value-Weighted CAR	Five-year Value-Weighted CAR
Completed Sample	2.78%	24.98%	30.38%
(median)	(3.16%)	(16.05%)	(21.55%)
[P-value]	[0.5255]	[0.0003]***	[0.0004]***
LT targets N = 39	-0.65%	26.52%	38.45%
(median)	(1.58%)	(21.56%)	(36.08%)
[P-value]	[0.9057]	[0.0040]***	[<.0001]***
HT Targets N = 40	4.15%	22.72%	22.93%
(median)	(3.16%)	(12.05%)	(7.25%)
[P-value]	[0.5344]	[0.0300]**	[0.1089]
LT Targets minus HT targets	-4.80%	3.80%	15.52%
(P-Value of T Test)	(0.5126)	(0.9634)	(0.5488)
[P-Value of Wilcoxon Test]	[0.9024]	[0.5796]	[0.5271]

Long-Term BHARs of Completed Fixed-Price Tender Offer Firms

	One-year Value-Weighted BHAR	Three-year Value-Weighted BHAR	Five-year Value-Weighted BHAR
Completed Sample	-6.26%	19.45%	26.22%
(median)	(-10.80%)	(-1.60%)	(29.58%)
[P-value]	[0.3578]	[0.0351]**	[0.0518]*
LT targets N = 39	18.50%	42.81%	33.60%
(median)	(12.10%)	(38.17%)	(3.48%)
[P-value]	[0.1006]	[0.0236[**	[0.2143]
HT Targets N = 40	-19.42%	7.04%	22.30%
(median)	(-10.80%)	(-1.60%)	(29.58%)
[P-value]	[0.0192]**	[0.3986]	[0.0988]*
LT Targets minus HT targets	37.92%	35.77%	11.30%
(P-Value of T Test)	(0.0063)***	(0.0579)*	(0.6874)
[P-Value of Wilcoxon Test]	[0.2484]	[0.4862]	[0.9804]

Table 4
CALENDAR-TIME APPROACH FACTOR ANALYSES OF COMPLETED REPURCHASE FIRMS

Long-term performance of fixed-price tender offer firms are provided. LT and HT targets are classified based on industry median-adjusted analyst forecast dispersion. $r_{it} = \alpha_i + b_i MKT_t + s_i SMB_t + h_i HML_t + e_{it}$ where i represents the LT or HT portfolio, while r_{it} represents the monthly return on the LT and HT portfolios, respectively, in excess of T-bill rate at month t, starting at t = 1, the month following the merger completion date. MKT represents the excess monthly return on the value-weighted market proxy at time t. SMB and HML represent monthly returns on value-weighted zero-investment portfolios, which are calculated as the small portfolio return minus the large portfolio return and the high book-to-market return minus low book-to-market return, respectively. The intercept reflects the average monthly abnormal return. In addition, a zero-investment portfolio is to determine if a long position in LT target portfolio and a short position in HT target portfolio will provide positive long-term abnormal returns. Again, the intercept will represent the monthly abnormal return obtained from the zero-investment portfolio.

Abnormal Performance or Intercept of Calendar-Time Approach 3-Factor Model

	One Year	Three Year	Five Year
LT Firms	-0.49 (0.4335)	1.06 (0.0043)***	0.70 (0.0164)**
HT Firms	-0.25 (0.6858)	0.17 (<.0001)***	0.18 (<.0001)***
LT – HT	-0.04 (0.9660)	1.12 (0.0420)**	0.47 (0.2390)

Table 5
RATS Procedure Factor Analyses of Completed Repurchase Firms

The abnormal return is calculated based on the Fama-French three-factor model. Firms are classified into LT and HT portfolios. However, the returns, r_{it}, used in the regression are event-time excess returns of individual firms within the portfolio starting from the month after announcement. $r_{it} = \alpha_i + b_i MKT_t + s_i SMB_t + h_i HML_t + e_{it}$. MKT represents the excess monthly return on the value-weighted market proxy at time t. SMB and HML represent monthly returns on value-weighted zero-investment portfolios, which are calculated as the small portfolio return minus the large portfolio return and the high book-to-market return minus low book-to-market return, respectively. The intercept reflects the average abnormal return in the specified event month of the portfolio. The abnormal returns are then cumulated to calculate CARs. Panels A and B present results of completed repurchase firms, while Panel C presents results of cancelled and incomplete repurchase firms.

Abnormal Returns and Cumulative Abnormal Returns based on Analyst Forecast Dispersion

Month	AR of LT Firms	CAR of LT Firms	AR of HT Firms	CAR of HT Firms	Difference in CAR
1	0.51 (0.8394)	0.51 (0.7986)	-2.35 (0.2929)	-2.35 (0.2282)	2.86 (0.30345)
2	-1.18 (0.4335)	-0.67 (0.7950)	-3.34 (0.1591)	-5.69 (0.0696)*	5.02 (0.2138)
3	0.37 (0.7823)	-0.30 (0.9162)	2.17 (0.5326)	-3.52 (0.3860)	3.22 (0.5145)
4	-1.71 (0.1265)	-2.01 (0.5351)	-0.46 (0.7699)	-3.98 (0.4030)	1.97 (0.7302)
5	2.21 (0.2623)	0.20 (0.9596)	-1.25 (0.4614)	-5.23 (0.2489)	5.43 (0.3591)
6	0.69 (0.6451)	0.89 (0.8328)	1.39 (0.2831)	-3.84 (0.3872)	4.73 (0.4382)
12	-2.36 (0.1881)	-5.00 (0.4358)	2.87 (0.1616)	-4.14 (0.4999)	-0.86 (0.9227)
24	-1.54 (0.3090)	15.36 (0.2303)	-4.95 (0.0652)*	-3.63 (0.6785)	18.99 (0.2189)
36	3.81 (0.2267)	35.90 (0.0070)***	0.84 (0.6872)	6.44 (0.5180)	29.46 (0.0687)*
48	-2.36 (0.5864)	28.80 (0.0230)**	1.17 (0.6760)	14.07 (0.2230)	15.73 (0.3557)
60	-0.92 (0.5244)	29.55 (0.0162)**	-1.68 (0.5208)	14.81 (0.2702)	14.74 (0.4083)

CONCLUSION

Consistent with the market-timing hypothesis, I find LT firms are more successful in timing fixed-price tender offer repurchase through size of the announcement, less immediate market reactions and more positive long-term performance. Therefore, remaining lower transparency can be beneficial to the corporation.

ENDNOTES

[i] For example, higher quality disclosure can reduce the cost of debt (Sengupta (1998) and Schrand and Verrecchia (2004)), cost of equity when firms have low analyst following (Botosan (1997)), and cost of IPO (Ang and Brau (2002)); lead to higher firm valuation (Healy, Hutton, and Palepu (1999)), better firm performance (Lang and Lundholm (1993)), increased stock responsiveness to earnings (Price (1998) and Gelb and Zarowin (2002), improved capital allocation (Diamond and Verrechia (1991)), increased institutional ownership and analyst following (Healy, Hutton, and Palepu (1999)), reduced analyst forecast dispersion (Mensah et al. (2003)), reduced agency problems and perquisites (Bushman and Smith (2001)), discouraged earnings manipulation attempts (Hutton et al. (2004)), and easier detection of earnings management (Hirst and Hopkins (1998)).

[ii] Almazan, Surez, and Titman (2004) argue that since the market in general reacts more to negative news than to good news, increasing transparency may reduce firm value. Healy, Hutton, and Palepu (1999) and Verrecchia (1983) suggest that disclosure can reveal proprietary information to potential competitors and reduce the firm's competitive advantage. Botosan and Plumlee (2002) find that increase in timeliness disclosure can increase cost of equity capital. Bushee and Noe (2000) find that timely disclosure tends to attract transient investors and increase stock return volatility.

[iii] Graham and Harvey (2001) find that about two-thirds of managers admit that equity price is a very important factor when issuing equity. Baker and Wurgler (2000) find that firms are more likely to issue (repurchase) stock when their market values are relatively higher (lower) than past market value and when market-to-book is high (low). Myers and Majluf (1984) show that since managers with insider information have the incentive to issue overvalued stock, investors react negatively to SEO announcement. However, such negative market reaction is often incomplete. Ritter (1991), Loughran and Ritter (1995), and Spiess and Affleck-Graves (1995) find that IPO and SEO firms under-perform non-issuing firms in the long run.

[iv] Managers of the firm may not be concerned with the undervaluation caused by low transparency unless the firm needs to raise external capital, the insiders need to sell their shares holdings, or the insiders need to exercise their stock options. Since LT firms are more likely to be traded at discount because of the adverse selection problem and higher information risk perceived by investors, such price discount also indicates that the managers will need to signal the undervaluation to the outside investors in order to bring up the market value of the stocks before raising capital in the external market, selling their insider holdings in the market, or exercising their stock options at high prices. Billett and Xue (2004) find that repurchase announcement returns is positively related to the likelihood of the firm's need to raise equity in the future. They find that the closer the SEO is (within three months) following the repurchase, the less negative market reaction the SEO firm receives.

[vv] Note that since market reactions are very likely to be incomplete in the short term, long-term studies are provided to determine if LT firms can actually time repurchases more efficiently than HT firms can.

[vi] Note that since market reactions are very likely to be incomplete in the short term, long-term studies are provided to determine if LT firms can actually time repurchases more efficiently than HT firms can.

[vii] Lang and Lundholm (1996), Healy, Hutton, and Palepu (1999), and Finnerty and Yan (2006).

[viii] Overlapping return calculation periods can pose serious cross-sectional dependence problem (Brav (2005), Cowan and Sergeant (1996)) and cause inflated t-statistics.

[ix] Grullon and Michaely (2004) also do not use such sample elimination procedure, while Wang and Johnson (2005) find that whether including this particular sample firms will not change the results.

[x] [x]Dittmar (2000) finds that repurchase firms are in general larger, have lower market-to-book ratio (based on median MTB), higher post-announcement returns (median), higher cash flow (median), and lower leverage (median). Fama and French (2000) find that small firms are more likely to buyback a larger proportion of the outstanding stocks when doing so. Lang and Lundholm (1993) find that LT firms are more likely to be smaller than HT firms are, while Vermaelen (1981) argues that small firms are less likely to be covered by analysts; therefore, they

have more information asymmetry problems and are more likely to be mispriced as a result. Comment and Jarrell (1995), Comment et al. (1995), and Lakonishok and Vermaelen (1990) find that repurchase firms tend to have poor stock performance in the prior year. Jensen (1986) states that firms use stock repurchase to distribute excess cash. Jagannathan et al. (2000) find firms with more volatile cash flows or higher prior and post operating and non-operating income are more like to announce repurchase than dividend increase, even though Howe, He, and Kao (1992) examine fixed-price tender offers and do not find results consistent with the free cash flow theory. Bagwell and Shoven (1988) and Opler and Titman (1996) show that firms use repurchase to increase their leverage ratios and bring them closer to the optimal capital structure.

[xi] Sholes-Williams betas are used in some studies to adjust for the bias based by non-synchronous trading. However, the adjustment often provides the same results as without the adjustment.

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