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DO PROPERTY-LIABILITY INSURERS CATER THEIR LOSS RESERVE TO INVESTOR SENTIMENT?

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ABSTRACT

We investigate the relation between investor sentiment and property-liability insurers' loss reserves. We use the Michigan Consumer Confidence Index as a proxy for sentiment, we show that during high sentiment periods, property-liability insurers intend to under-estimate loss reserves. In contrast, during periods of low sentiment, property-liability insurers intend to over-estimate loss reserves. We interpret this finding as evidence that insurers cater to investors' optimism (pessimism), driven by investor sentiment, via loss reserve claims. Further analysis indicates that insurers with loss or small profit are more sensitive to investor sentiment, in terms of adjusting loss reserves while insurers with higher earnings are less sensitive to investor sentiment in terms of adjusting loss reserves, consistent with catering theory. The findings of insurers cater their loss reserves to investor sentiment show the need for increased attention from boards of directors, auditors and regulators to earnings reported on the financial statements, especially during periods of high investor sentiment when insurers are more likely to understate loss reserves and accordingly to report optimistic earnings.

JEL: G2, L1

KEYWORDS: Insurers, Loss Reserve, Investor Sentiment

INTRODUCTION

Investor sentiment, defined as optimism or pessimism about market in general is an important part in the literature of behavioral finance (Baker and Wurgler, 2006, 2007). Previous research suggests that managers tend to make financing and investment decisions that cater to investor sentiment. For example, Baker, et al. (2003) propose a catering theory of investment and suggest that managers make investment decisions according to stock price movements. Baker and Wurgler (2004a, 2004b) develop a catering theory of dividends, finding that managers cater to investors demand for dividends when make dividend payments decisions. More recently, Rajgopal, et al. (2007) present a catering theory of earning management and find that earnings management is partially driven by the prevailing investor demand for earnings surprises. Baker, et al. (2009) proposes a catering theory of nominal stock prices and predicts that managers cater to investors valuations.

Despite the bulk of existing studies on catering theory to investor sentiment, the research in the insurance industry is rare. Our study seeks to fill this gap in the literature by examining the relation between investor sentiment and the loss reserve for a sample of property-liability (P&L) insurers. We exam the catering theory of loss reserve errors in insurance industry is due to the following reasons. First, loss reserves are collectively the largest liability on a P&L insurance company's balance sheet. They could significantly affect the reported earnings and financial strength of an insurance company. Second, loss reserves are required to be disclosed regularly in Schedule P of the NAIC's Annual Statement, which allows us to develop a relatively reliable measure of management's exercise of discretion over earnings.

Third, insurers are generally experts in risk management and follow a philosophy of prudence. Whether they actively respond to market activities would be an issue of interest to both regulators and the public. Fourth, catering theories have important implications on corporate governance and financial policy choices, which allegedly played an important role in the recent financial crisis of 2007 to 2009. Although less involved in than banks, insurers, especially those active in risk taking, are not free of criticism. For this reason, we are interested in examining catering theory as it relates to P&L insurers. Finally, examining a single industry-insurance industry, and hence a homogeneous sample of firms, avoids the potentially confounding effects that industry-specific factors could have on research results.

In this article, we test two hypothesis of catering theory. We first test whether P&L insurers cater their loss reserves to investor sentiment. In the formulation of our hypothesis, we discuss the catering theory supported by the opportunistic view and the managerial sentiment view that could explain the association between investor sentiment and loss reserve claims. The opportunistic views and managerial sentiment view suggest that the cost-benefit trade-off of loss reserve manipulation will vary with investor sentiment. Prior research on social cognition suggests that pessimistic individuals exercise greater scrutiny and are less likely to take information at face value, compared with optimistic individuals (Taylor, 1991, Bless, et al., 1996). We therefore contend that during optimistic (pessimistic) periods, investors will evaluate loss reserve accruals less (more) rigorously and that this reduced (heightened) investor scrutiny will result in managers facing lower (higher) loss reserve related costs. This suggests that managers' likelihood to manipulate loss reserves will increase with investor sentiment.

In our second hypothesis, we test how insurers respond their loss reserves to investor sentiment differently, in terms of various earning levels. Previous papers discuss income-smoothing problem for insurers (Grace, 1990; Grace and Leverty, 2012; Beaver, et al., 2003). For example, Beaver, et al. (2003) examines the relation between P&L insurers' loss reserves and the distribution of their reported earnings. They document that P&L insurers manage loss reserves across the entire distribution of earnings. They further find that small profit insurers report the most income-increasing reserve accruals and insurers with the highest earnings report the most income-decreasing reserve accruals. Accordingly, we propose that the strategic adjustment in loss reserves of insurers with loss or small profits should be more sensitive to investor sentiment and so tend to under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. In contrast, insurers with higher profits are relatively less sensitive.

To test our first hypothesis, we regress loss reserve error on investor sentiment proxied by the Michigan Consumer Confidence Index. We find a negative and significant relation between the level of investor sentiment and loss reserve error, indicating that, during high sentiment periods, P&L insurers intend to under-estimate loss reserves. In contrast, during periods of low sentiment, P&L insurers intend to over-estimate loss reserves. We interpret this finding as evidence that insurers cater to investors' optimism (pessimism), driven by investor sentiment, via loss reserve claims. To test our second hypothesis, we incorporate the interaction item of an insurer's earning and investor sentiment and find that, insurers with loss or small profits are more sensitive to investor sentiment and so tend to under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. In contrast, insurers with higher profits are relatively less sensitive.

Taken together, our results demonstrate that P&L insurers react strategically to sentiment via the loss reserve. The findings of insurers cater their loss reserves to investor sentiment show the need for increased attention from boards of directors, auditors and regulators to earnings reported on the financial statements, especially during periods of high investor sentiment when insurers are more likely to understate loss reserves and accordingly to report optimistic earnings.The outline of the paper is as follows. Section 2 provides a background analysis on loss reserves and investor sentiments. Section 3 develops our hypotheses. Section 4 describes the data and research methodology. Section 5 presents our empirical findings. Section 6 concludes.

LITERATURE REVIEW

Loss Reserves

Under SAP accounting, which insurers are required to follow, loss reserves are insurers' estimated liability for unpaid claims on all losses that occurred prior to the balance sheet date. Loss reserves are collectively the largest liability on a P&L insurer's balance sheet. Gaver and Perterson (2004) report that loss reserves account for 53% of total liabilities. Thus, loss reserves could significantly affect the reported earnings and financial strength of an insurance company. However, estimation of loss reserves is highly subjective and difficult, because not all claims for current period losses are filed by the balance sheet date. Even for claims filed in the current period, the ultimate cash settlement could be quite different in amount or delayed for several years. The accounting matching principle requires insurers to match claim losses with related premium revenues in order to report profitability during a special time interval. Although the premiums are recognized in the year incurred, the majority claims will remain outstanding for several years. To estimate the amount an individual claim will ultimately cost, typically an insurer's actuaries generate predictions about future loss payments and expenses and make a range of recommendations to management, who then chooses the actual loss reserve levels to be reported. Therefore, a failure to correctly account for all current and future expected claims information may cause estimated loss reserve error. It is also possible that management exercises their discretion and misestimate loss reserves intentionally.

Previous literature studies loss reserve error mainly from four aspects: taxes, income smoothing, financial weakness and price regulation. For example, Grace (1990), Petroni (1992), Penalva (1998), and Nelson (2000) find that when taxable income increases, insurers overestimate future claims in an intention to postpone the tax payments until future claim costs are realized in some future periods. Weiss (1985), Grace (1990) and Beaver, et al. (2003) provide evidence that P&L insurers use reserve estimation practices to stabilize reported earnings. That is, when having unexpected high (low) earnings, an insurer will overestimate (underestimate) its reserves. Petroni (1992), Beaver, et al. (2003), and Gaver and Paterson (2004) prove that financially troubled insurers underestimate their reserves to conceal financial distress and evade regulatory intervention. Grace and Leverty (2010) reveal that insurers subject to more stringent rate regulation tend to over-reserve. The above literature mainly focuses on the potential problems of an insurer itself. Managers over- (or under-) estimate reserves, based on their own company's financial situations, and so maintain stability. In this study, we regard investor sentiment as a market view outside the company and extend the prior research by addressing the impact of investor sentiment on P&L insurers' loss reserve estimation.

Investor Sentiment

The behavioral finance literature defines investor sentiment as "a belief about future cash flows and investment risks that is not justified by the facts at hand" (Baker et. al. 2007). In the spirit of Shiller (2000), investor sentiment arises from a mix of rational and irrational cognitive and emotional bias and affects investors' expectations about firms' future performance. Therefore, investor sentiment can cause the deviation of stock prices away from the fundamental values as the standard model suggests. During low sentiment periods, it is more likely for market participants to be pessimistic and underestimate firm values. In contrast, market participants would be more optimistic during high sentiment periods and so overestimate firm values. Shleifer and Vishny (1997) emphasize that it is costly and risky to bet against sentimental investors. As a result, rational market participants would not aggressively force prices back to fundamental values. Part of prior research investigates the association of investor sentiment and different corporate decisions such as capital investment, dividend policy, acquisition and stock splits, and finds significant correlations (e.g. Shleifer and Vishny, 2003, Baker and Wurgler, 2000, Baker, et al., 2003). Some other part of the literature examines how managers respond to investor sentiment via strategic

corporate disclosure. For example, Bergman and Roychowdhury (2008) find that "managers increase their forecasts to walk up current estimates of future earnings over long horizons" during low-sentiment periods. Brown, et al. (2012) find that investors tend to evaluate managers' pro forma disclosures less rigorously and so managers are more likely to disclose adjusted earnings metric during high-sentiment periods. Following Bergman and Roychowdhury (2008), we use the Michigan Consumer Confidence Index as a proxy of investor sentiment. For robustness test, Conference Board's Consumer Confidence Index is also investigated as a proxy. The results are similar with Michigan Consumer Confidence Index. We will not report the results in this paper.

HYPOTHESES DEVELOPMENT

A catering theory has been proposed in several areas such as dividend policy, nominal share prices and earnings management. For example, Baker, et al. (2003) propose a catering theory of investment and suggest that managers make investment decisions according to stock price movements. Baker and Wurgler (2004a, 2004b) propose a catering theory of dividends. Specifically, Baker and Wurgler (2004a) indicate that "Managers rationally cater to investor demand". That is, when dividend-paying companies are traded at higher prices, managers tend to pay dividends. When nonpaying companies are preferred, managers do not pay. They conclude that investor sentiment could be a reasonable and important interpretation of the dividend decision. Baker and Wurgler (2004b) empirically show that investor sentiment changes about dividend-paying companies relative to nonpaying companies may be captured by changes in a company's dividend policy.

More recently, Rajgopal, et al. (2007) examine the relationship between earnings management and investor demand for earnings surprises. They find that, if investors react more optimistically to positive earnings surprises, then managers cater by inflating earnings in periods. Otherwise, if investors react more pessimistically to earnings news, managers may report deflated earnings. They also conclude that investor sentiment is part of a reason for earning optimism leading to earnings catering. Baker, et al. (2009) propose a catering theory of nominal stock prices. It predicts that managers respond by supply lower-price shares if investors put high valuations on low-price companies. In addition, if investors put high valuations on high-price companies, then managers respond by supply higher-price share.

Despite the bulk of existing studies on catering theory to investor sentiment, the research in the insurance industry is rare. Our study seeks to fill this gap in the literature by examining the relation between investor sentiment and the loss reserve for a sample of P&L insurers. We first test whether P&L insurers cater their loss reserves to investor sentiment and discuss four aspects to formulate our first hypotheses. First, managers may care more about current firm value, instead of long run value. Rajgopal, et al. (2007) suggest that, without the assumption of investor rationality, managers care more about current prices/values of firms. There are several reasons. Managers may not be able to stay in their companies for a long period. In short run, they may hope to maximize the current value of firm. In addition, usually managerial compensation and promotion opportunities are closely correlated with current prices. Second, the cost for managers to adjust downward loss reserve levels during high sentiment period may be relatively low. Research in social cognition finds that, when investors hold pessimistic beliefs, they process information more systematically and strictly. With optimistic belief, investors may be easier to accept information reported by companies (Taylor, 1991, Bless, et al., 1996). Therefore, investors evaluate companies' information with less scrutiny during high sentiment period.

Third, managers also have their own sentiment, which may be consistent with the whole market's sentiment. Brown, et al. (2012) investigates managerial sentiment view and states that, during high (low) sentiment periods, sentiment-driven managers may perform to reflect their own optimistic (pessimistic) perceptions. Therefore, it is easy for managers to under- (over-) estimate loss reserves to signal their

optimism (pessimism) during high (low) sentiment periods. Fourth, low sentiment periods may be a good time to managers to adjust back their previously under-estimated loss reserves. In some periods (such as high sentiment periods), managers may under-estimate loss reserves. As the development of claim losses, when reporting loss reserve errors, managers need to reverse previously undervalued loss reserves. Bergman and Roychowdhury (2008) state that analysts tend to be pessimistic in low sentiment periods. Managers can meet their forecast easily. Therefore, it is low-sentiment periods that managers can relatively easily reverse under-estimate loss reserves or "save" some extra for future high-sentiment periods. Based on above analyses, we propose our first hypothesis:

H1: During high (low) sentiment period, insurance companies under- (over-) estimate loss reserves.

In our second hypothesis, we test how insurers respond their loss reserves to investor sentiment differently, in terms of various earning levels. Previous papers discussed income-smoothing problem for insurers. For example, Grace (1990) and Grace and Leverty (2012) argue that managers may adjust loss reserve estimate to induce a rate of return in order to make it consistent with their managerial utility and be accountable to regulators. Especially, Beaver, et al. (2003) examine the relation between P&L insurers' loss reserves and the distribution of their reported earnings. They document that P&L insurers manage loss reserves across the entire distribution of earnings. Especially, small profit insurers report the most income-increasing reserve accruals and insurers with the highest earnings report the most income-decreasing reserve accruals. We propose that, insurers with loss or small profits should be more sensitive to investor sentiment and so tend to under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. In contrast, insurers with higher profits are relatively less sensitive. Thus, our second set of hypotheses is as follows.

H2a: insurers with loss or small profit are more sensitive to investor sentiment, in terms of adjusting loss reserves.

H2b: insurers with higher earnings are less sensitive to investor sentiment, in terms of adjusting loss reserves.

DATA AND RESEARCH METHODOLOGY

Loss Reserve Error

In the literature, loss reserve error is most commonly calculated as the difference between insurers' revised estimate of the cumulative claim losses outstanding disclosed in year $t+j$ and the originally reported estimate of cumulative claim loss reserves at the end of year t, e.g., Petroni (1992), Beaver, et al. (2003), Grace and Leverty (2010).

As in Kazenski, et al. (1992) and Petroni (1992), we calculate loss reserve error as follows:

$$Dev_{i,t} = \left(IncurredLosses_{i,t} - IncurredLosses_{i,t+j}\right) / TotalAssets_{i,t} \qquad (1)$$

Where $IncurredLosses_{i,t}$ is the loss reserve for insurer i reported in year t, and $IncurredLosses_{i,t+j}$ is

the revised estimate of the year t loss reserve reported in year $t+j$. In order to reduce problems of heteroscedasticity to allow cross sectional comparability, and more importantly to reflect the errors' importance relative to the financial statements taken as a while, we scale loss reserve errors by total admitted assets in year t. Generally, a positive loss reserve error means an overestimated original reported reserve, while a negative loss reserve error means the underestimated original reported reserve. Following the previous literature (e.g. Petroni, 1992; Beaver, et al., 2003; Gaver and Paterson, 2004; and Grace and

Leverty, 2012), we examine reserve error by comparing with reserves 5 years later. Therefore, *j* is set as five. That is, for a given calendar year, we examine the difference between total losses incurred and revised total losses incurred 5 years later.

Data

The primary data source is the NAIC Property-Casualty annual statement database from 1990 until 2010. Especially, the primary data source for loss reserve error is the annual statements Schedule P. Schedule P contains each insurer's gradual settlement of claims over time and records all revisions of the loss reserve estimate. Revisions, known as "development", provide an indication of whether the previously reported amount was under- or over-stated. Given a 5-year resolution period, the reserve error sample years are 1990 to 2005. To be included in the sample, firms must have positive reserves, losses incurred, net income and total assets. Each firm must have 16 years data. As a result, our sample includes 1233 companies and 19,728 firm-year observations. To be consistent with the insurance companies' data, we use the annual Michigan Consumer Sentiment Index as our proxy of investor sentiment, SENT. This index is based on a survey of five index questions and calculated from a linear combination of the relative scores for the five questions. The detailed information can be obtained from the website of University of Michigan.

Regressions

To test the relationships between investor sentiment and loss reserve adjustment, we estimate the following model:

$$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it} \qquad (2)$$

where Dev_{it} refers to reserve error scaled by total assets, $SENT_{t-1}$ is the Michigan Consumer Confidence Index during year *t-1*. X_{t-1} represents annually control variable, which is the seasonally adjusted growth rate of gross domestic product (GDP) in year *t-1*. GDP data are from the Bureau of Labor Statistics. Z_{it} represents firm characteristic variables, including firms' percentage return on asset (*ROA*), the ratio of net premium earned over total asset (*PremRate*), the natural log of firms' total assets (*Assetlog*), the product line Herfindahl Index (*Herf*) calculated as the sum of the squared percentage of premiums earned in each line of P&L insurers. We regard that there exists some time delay for firms to get data outside firms, such as the Consumer Confidence Index and GDP. Firms should be able to get information on contemporary firm characteristic variables. In order to examine whether the effect of investor sentiments on loss reserve errors depends on insurers' earning distribution, we add an interaction item in our previous model and do the following regression:

$$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + b * SENT_{t-1} * ROA_{it} + \varepsilon_{it} \qquad (3)$$

where ROA_{it} is firms' percentage return on asset, included in Z_{it}.
Equation (3) can be also rewritten as:

$$Dev_{it} = \alpha + (\beta + b * ROA_{it}) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it} \qquad (4)$$

The simple slope, $\beta + b * ROA_{it}$, shows us the regression of loss reserve errors on investor sentiments at particular values of ROA.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 summarizes for the descriptive statistics for our sample. All the variables are presented after winsorizing all the variables at the 1st and the 99th percentile to remove the effect of outliers. Consistent with prior research, the average insurer tends to overestimate reserves. The mean (median) loss reserve error is 0.009 (0.012) percent of total assets during the sample period. Since the current data of investor sentiment is in a scale of 100, we divide them by 100, to make it in the same scale with other variables. The mean (median) investor sentiment is 0.92, showing that during the sample period, investors were slightly pessimistic. The seasonally adjusted growth rate of gross domestic product (GDP) has a mean (median) of about 5 percent. In terms of firm characteristics, firms' percentage return on asset (ROA) has a mean (median) of 0.028 percent, meaning the average insurer earns small profit. The mean (median) ratio of net premiums earned over total assets (*PremRate*) is 0.37 (0.36) in the sample. The mean or median total assets (*Assetlog*) are approximately about $85 million, indicating that some particularly large insurers do not skew the size distribution of the sample. The average firm has a product line Herfindahl Index (*Herf*) of 0.46, indicating that the average firm has approximately two lines of business.

Table 1: Descriptive Statistics

Variable	Mean	Median	Std Dev
DevA	0.009	0.012	0.101
SENT	0.921	0.923	0.093
GDP	0.054	0.057	0.012
ROA	0.028	0.028	0.046
PremRate	0.374	0.357	0.219
Herf	0.458	0.363	0.297
Assetlog	18.291	18.268	2.066

This table summarizes for the descriptive statistics for our sample. All the variables are presented after winsorizing all the variables at the 1st and the 99th percentile to remove the effect of outliers. DevA refers to reserve error scaled by total assets. Positive reserve errors are associated with over-reserving and negative reserve errors with under-reserving. The average insurer tends to overestimate reserves. We divide investor sentiment (SENT) by 100 to make it in the same scale with other variables. The mean (median) investor sentiment shows that, during the sample period, investors were slightly pessimistic. GDP represents the seasonally adjusted growth rate of gross domestic product. ROA is firms' percentage return on asset. PremRate is the ratio of net premium earned over total asset. Assetlog means the natural log of firms' total assets. Herf is the product line Herfindahl Index, calculated as the sum of the squared percentage of premiums earned in each line of P&L insurers.

Table 2 presents the Pearson (above the diagonal) and Spearman (below the diagonal). The correlations display the associations between the various independent variables. There is no large correlation coefficient between independent variables. Therefore, the inclusion of all the independent variables in the multivariate models is feasible and accurate.

Regression Results

Table 3 reports the results for our first hypothesis. The coefficient on investor sentiment is negative and statistically significant at 1% level, indicating that the inverse relationship between investor sentiment and loss reserve error. Based on our definition of loss reserve error, this result supports our hypothesis. When investors are optimistic (pessimistic), reflected in high (low) investor sentiment, insurers tend to under-estimate (over-estimate) loss reserves.

Table 2: Correlation Matrix

Panel A: Annual Variables					
	SENT	GDP			
SENT		0.461*			
GDP	0.592*				
Panel B: Firm Annual Variables					
	DevA	ROA	PremRate	Herf	Assetlog
DevA		0.139*	-0.045*	0.149*	-0.093*
ROA	0.175*		-0.027*	0.131*	-0.013
PremRate	-0.013	-0.036*		-0.177*	-0.079*
Herf	0.162*	0.143*	-0.154*		-0.342*
Assetlog	-0.079*	-0.023*	-0.056*	-0.386*	

*This table presents the Pearson (above the diagonal) and Spearman (below the diagonal). Reserve error is scaled by total assets. All variables are defined in Table 1. The correlations marked with * are significant at least at the 5% level.*

Table 3: Regression of Loss Reserve Error on Investor Sentiment

Variable	**Coef.**	**T Value**	**P-Value**	
Intercept	0.279	9.510	<.0001	***
SENT	-0.184	-24.630	<.0001	***
GDP	0.736	13.110	<.0001	***
ROA	0.133	9.150	<.0001	***
PremRate	-0.071	-13.600	<.0001	***
Herf	0.033	7.730	<.0001	***
Assetlog	0.001	1.020	0.306	

*Note: Table 3 reports the results for our first hypothesis. The dependent variable is loss reserve error scaled by total assets. All remaining variables are defined in Table 1. *** indicates significance at 1% levels. The coefficient on investor sentiment is negative and statistically significant at 1% level, indicating that the inverse relationship between investor sentiment and loss reserve error. Based on our definition of loss reserve error, this result supports our hypothesis. During high (low) sentiment period, insurance companies under- (over-) estimate loss reserves.*

The coefficient on ROA is positive and statistically significant at the 1% level, meaning that insurers with high earnings report over-estimated loss reserves. This is consistent with Beaver, et al. (2003) who find that highest earning firms report the most income-decreasing reserves. Following Beaver, et al. (2003) and Grace and Leverty (2012), we also investigate whether the effect of investor sentiments on loss reserve errors depends on insurers' earning distribution. Table 4 shows regression results with interaction item, based on equation (3). The interaction item coefficient is statistically significant, meaning that the two simple slopes ($\beta + b * ROA_{it}$) are significantly different from one another for any two different values of ROA. Insurers with different ROA levels may act differently with investor sentiment. The value of the coefficient, 0.414, means that, given one unit change of ROA, the slope of loss reserve errors on investor sentiment is predicted to change by 0.414 units. The regression specification is:

$$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + b * SENT_{t-1} * ROA_{it} + \varepsilon_{it},$$

or

$$Dev_{it} = \alpha + \left(\beta + b * ROA_{it}\right) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it}$$

where ROA_{it} is firms' percentage return on asset, included in Z_{it}.

Table 4: Regression with the Interaction Item

Variable	Coef.	T Value	P-Value	
Intercept	0.291	9.840	<.0001	***
SENT	-0.194	-23.670	<.0001	***
GDP	0.738	13.150	<.0001	***
PremRate	-0.070	-13.520	<.0001	***
Herf	0.033	7.760	<.0001	***
Assetlog	0.001	0.910	0.365	
ROA	-0.249	-1.980	0.048	**
SENT*ROA	0.414	3.050	0.002	***

The regression follows the equation:

$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + b * SENT_{t-1} * ROA_{it} + \varepsilon_{it}$, Or

$Dev_{it} = \alpha + (\beta + b * ROA_{it}) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it}$

where ROA_{it} is firms' percentage return on asset, included in Z_{it}.

*Note: The dependent variable is loss reserve error scaled by total assets. All remaining variables are defined in Table 1. *** indicates significance at 1% levels. ** indicates significance at 5% levels. The coefficient on the interaction item is statistically significant, meaning that, for any two different values of ROA, the two simple slopes ($\beta + b * ROA_{it}$) are significantly different from one another. It shows that insurers with different ROA level may act differently with investor sentiment. The value of the coefficient, 0.414, means that, given one unit change of ROA, the slope of loss reserve errors on investor sentiment is predicted to change by 0.414 units.*

In order to examine how insurers with different earning levels react to investor sentiment, we follow Jaccard and Turrisi (2003) and list several values of simple slopes with different ROAs, from 10 percentile to 90 percentile in Table 5. The simple slopes of investor sentiment are all negative and the absolute values decrease with the increase of ROA. For example, with 90 percentile ROA, the simple slope of investor sentiment is -0.162, while with 10 percentile ROA, the simple slope is -0.202. It confirms our second hypotheses. If an insurer has a small profit or negative profit, it tends to be more sensitive to investor sentiment and so under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. On the contrary, when an insurer has higher profits, it tend to less sensitive and under- (over-)estimate their loss reserves in lower degree, responding to high (low) investor sentiment.

Table 5: Simple Slope of Investor Sentiment in the Regression with Interaction Item

ROA Percentile	Value of ROA	Simple Slope of Investor Sentiment
90%	0.077	-0.162
80%	0.057	-0.170
70%	0.045	-0.175
60%	0.036	-0.179
50%	0.028	-0.182
40%	0.021	-0.185
30%	0.012	-0.189
20%	0.002	-0.193
10%	-0.020	-0.202

In the equation: $Dev_{it} = \alpha + (\beta + b * ROA_{it}) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it}$,

$\beta + b * ROA_{it}$ represents the simple slope of investor sentiment.

The simple slopes of investor sentiment are all negative and the absolute values decrease with the increase of ROA. It confirms our second hypotheses. If an insurer has a small profit or negative profit, it tends to be more sensitive to investor sentiment and so under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. On the contrary, when an insurer has higher profits, it tend to less sensitive and under- (over-)estimate their loss reserves in lower degree, responding to high (low) investor sentiment.

CONCLUDING COMMENTS

In this paper, we investigate how P&L insurers adjust their loss reserve estimate, based on investor sentiment. We use the Michigan Consumer Confidence Index as a proxy for sentiment and show that during high sentiment periods, P&L insurers intend to under-estimate loss reserves. In contrast, during periods of low sentiment, P&L insurers intend to over-estimate loss reserves. We interpret this finding as evidence that insurers cater to investors' optimism (pessimism), driven by investor sentiment, via loss reserve claims. Further analysis indicates that insurers with loss or small profit are more sensitive to investor sentiment, in terms of adjusting loss reserves while insurers with higher earnings are less sensitive to investor sentiment.

Taken together, our results are consistent with catering theory, demonstrating that P&L insurers react strategically to sentiment via their loss reserves. The catering behavior has important implications for corporate governance and insurance regulation. Our results suggest the need for increased attention from boards of directors, auditors and regulators to earnings reported on the financial statements, especially during periods of high investor sentiment when insurers are more likely to understate loss reserves and accordingly to report optimistic earnings. While our research provides evidence that P&L insurers cater to the investor sentiment, there are several questions that remain, such as whether insurers pursue strategies in other aspects of their business (in addition to loss reserves) in order to cater to the investor market, and whether life-health insurers adopt the strategies of P&L insurers. It is our hope that our study can promote more research in the areas that can improve our understanding of the influence of the investor sentiment on the insurance industry.

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CAPITAL STRUCTURE POLICY: EVIDENCE FROM TAIWAN

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ABSTRACT

Capital structure literature shows that, in static tradeoff theory, a firm's target leverage is related to its size and profitability. However, it remains unclear as to whether target leverage even exists. Assuming that it does, two key questions arise. First, how does the company adjust to the target? Second, is there a contradiction between pecking order theory and static tradeoff theory? This study classifies a sample of companies listed on the Taiwan Stock Exchange into four quadrant clusters by the average method based. The classification is based on factors related to firm size and profitability to determine whether firms in these clusters engage in different financing policies. This study explores whether pecking order or static tradeoff theory are conducted through independent and conventional four-factor joint testing. Results show the target-adjustment model is more efficient than the pecking order model. In addition, I conduct robustness checks by the quartile method. The results show the large firms with low profitability and no financing gaps adhere to both the pecking order and target-adjustment models. These results provide support for the hypothesis that financing policies employed by companies listed on the Taiwan stock market vary as a function of the quadrant in which they are classified.

JEL: G32

KEYWORDS: Capital Structure, Financing Deficit, Pecking Order Theory, Static Tradeoff Theory

INTRODUCTION

Modigliani and Miller (MM) (1958) proposed their well-known arbitrage theory for the capital structure of any business. By their theory, firms can emphasize or deemphasize the financial leverage effect. According to Modigliani and Miller's (1958) theory of value, the capital structure of a single company or between companies should not vary by the life-cycle of the firm. However, this is a theory deliberately developed in an artificial setting (Smith, and Watts, 1992). For example, it does not include the cost information, personal or corporate taxes, transaction or contract costs, or fixed investment policy. Under relaxed MM assumptions, and using other major capital structure theories, taxes have the effect of encouraging firms to use debt as much as possible (Miller, 1972). Other theories (for example, Stiglitz, 1972) advocate increasing bankruptcy costs increase with debt levels and the amount of this debt ceiling may indicate the optimal capital structure of the company.

Bankruptcy cost theories evolved into the tradeoff theory, which advocates that firms try to approach a critical level of leverage. The average debt benefit reaches the optimal capital structure to maximize firm value. Static tradeoff theory argues that the debt benefit equals the marginal cost of debt that maximizes the value of the firms (Myers, 2001; Ovtchinnikov, 2010). Firms should therefore manipulate the debt tax shield of interest because internal debt has a low cost relative to external debt. When firms measure the benefits and costs of increasing the amount of debt, it will choose the target-leverage, where interest is the free cash flow after the tax deduction for interest.

This simple effect, however, can be complicated by personal taxes (Miller, 1977) and non-debt tax shields (DeAngelo and Masulis, 1980). Tradeoff theory favors increasing debt, which will generate tax shield benefits, but increase leverage-related costs and influence the optimal capital structure formation process, namely the balance between the benefits and costs. Debt also reduces the agency conflict between

managers and shareholders because debt financing limits free cash flow, which helps owners control agency problems (Jenson and Meckling, 1976). In addition, shareholders may gain wealth by exploiting regulatory authorities and the conflict of interest between them (Smith and Warner, 1979). Moreover, debt costs can resolve conflicts between shareholders and creditors (Jenson and Meckling, 1976). Pecking order theory still shows mixed results (Copeland, Weston and Shastri, 2005). Pecking order theory advocates that the financing pecking order dictates firms' preferences (Myers and Majluf, 1984). Company managers and outside investors information asymmetry issues cause the company to make financing decisions based on a preference for minimal costs. Thereby they prefer to use internal funds or retained earnings, followed by debt, and finally consider issuing new shares. Myers and Majluf (1984) believe that if the company did not issue new equity and use only retained earnings to support investment opportunities, information asymmetry can be resolved. Due to internal and external information asymmetry, issuing more equity would be expensive. Information asymmetry increases the need to issue debt and avoid selling undervalued stocks (Atiyet, 2012).

Analyzing how companies construct their capital structure is an open issue, with ongoing research during the past 20 years, though empirical research began earlier (Taggart, 1977; Marsh, 1982; Jalilvand and Harris, 1984; Titman and Wessels, 1988). Later scholars contributed significantly to research into the creation and verification of capital structure. Others caution that choosing capital structure proxy variables is difficult. Additionally, most initial research focuses on the United States. Shyam-Sunder and Myers (1999) examined 157 US-based firms for 1971 to 1989 to directly test the pecking order theory using a regression for debt. They found that if companies follow the pecking order theory, the gap in using debt financing should have a slope close to one, with results strongly supporting the pecking order theory. Frank and Goyal (2003) extended Shyam-Sunder and Myers (1999) study using a sample of 768 firms listed in the United States to investigate transaction events. They find that when considering a smaller sample of firms, the results support that large firms in the earlier years follow the pecking order model. By nest testing the two methods, the pecking order theory has increased slightly in explanatory power, but still does not overcome the conventional leverage position. Support for the pecking order theory appears in the 1980s and 1990s but not in the 1970s because there were more small companies listed and issuing equity was more important.

Rajan and Zingales (1995) found that, in determining capital structure factors (size, growth rate, profitability, and significant tangible assets) in the United States, it was important to do the same in other countries (e.g., Titman and Wessels, 1988; Rajan and Zingles, 1995; Graham, 2001; Gaud et al., 2005). Most literature supports the relationship between leverage with size, profitability, and market-to-book ratio. However, it remains unclear whether a target leverage even exists. Assuming that it does, two key questions arise. First, how does the company adjust to the target? Second, is there a contradiction between the pecking order theory and tradeoff theory? (Ovtchinnikov, 2010). The study purpose is to fill this gap in the literature. This study examines the capital structure literature through common indicators of size and profitability, and plots profitability on a chart on the horizontal axis, and size on the vertical axis. In this way they divided the sample into four quadrants and verifies whether capital structure and financing strategies vary by quadrant. The authors find that whether for the target-adjustment and the pecking order conduct, with an independent test or the conventional leverage four-factors joint test, the target-adjustment efficiency is superior to pecking order theory for the four quadrants. Only large firms with low profitability and with no financing gap follow the pecking order theory. Those with financing gaps follow the target-adjustment model. In addition, the study conducted robustness test of the leverage factors with a quartile divided method. This test shows the same empirical results with an average foregoing method. These results provide support for the hypothesis that financing policies employed by companies listed on the TWSE vary as a function of the quadrant in which they are classified on the corporate matrix.

The study claims two contributions to the literature on financing decisions. The first is a methodology or procedure to divide the sample cluster into four quadrants of a matrix for analysis. The second is an empirical contribution. Several authors studied financing decisions focusing on the pecking order theory (Shyam-Sunder and Myers, 1999; Frank and Goyal, 2003). We complement the literature by using the

quadrants of a matrix to cluster the sample to distinguish the corporate financing strategy. We also identify excellent performance of the target-adjustment model and weak performance of the pecking order model in Taiwan's stock market. The structure of the rest of this paper is as follows: section 2 presents the literature review, section 3 presents the data and methodology, section 4 describes the results and discussions, and section 5 presents the conclusions.

LITERATURE REVIEW

Bradley et al. (1984) proposed an optimal capital theory based on static tradeoff theory. This theory advocated that although increasing debt will result in a tax shield benefit, it also produces costs, called leverage cost. Formation of an optimal capital structure was by using a tradeoff between the benefits and costs arising from the use of debt. Leverage associated costs, such as the cost of financial crisis, agency problems, offset tax shield benefits. Some scholars affirm static tradeoff theory to explain the actual business capacity. For example, Myers (2001) suggested that static tradeoff theory implies that high profit enterprises have a high proportion of debt, and get substantial tax benefits from the tax shield. In reality, high-profit enterprise's debt ratios will be lower than low-profit enterprise's. Kim (1986) argued the more debt a company has, the more interest burden it bears, the weight of its financial risk is higher, and the possibility of bankruptcy is stronger. In this case, when the company's shareholders and creditors are aware of increasing risk, they would require higher remuneration as compensation thus causing the company's cost of capital to increase. Warner (1977) believes the company's cost of bankruptcy is less than the benefits of increasing debt. However, there are a number of empirical and theoretical articles that confirmed that companies construct their capital structure on largest debt ratio. The goal is to achieve the tax shield advantage wile avoiding bankruptcy costs. Kayhan and Titman (2004) suggest that in the long run, the target debt ratio is consistent with the theory. Static tradeoff theory provides business guidelines to choose their capital structure, it also provides a number of important capital structure life-cycle supports.

Pecking order theory results from the information asymmetry phenomenon between company managers and outside investors. When the company is making financing decisions, they prefer to use their own funds whose priority cost is minimum, then retained earnings, followed by debt, and finally they consider issuance of new shares. Myers' (1984) conclusion indicates managers use information asymmetry to explain they do not like the issuance of equity. They fear it would be a signal of overvalued stock prices. In contrast, Ross (1977) argued that companies use more debt to overcome information asymmetry in order to send a better signal of future prospects. Narayanan (1988); Heinkel and Zechner (1990) noted debt may be a project signal. Asymmetric information may result in over-investment, so some negative NPV project will be taken instead. Others such as Allen et al. (2005) and Fama and French (1988) found that, based on a finance pecking order, when income is less than financing investment, liabilities will be issued. Pecking order theory indicates that life-cycle stages have strong correlation with capital structure. The static tradeoff suggests the opposite. Pecking order theory suggests that with time passing, a high or low debt ratio was appropriate.

The formation of many operations and decision-making is based on business strategy, while the financing decision is based on financing strategy. Every policy adopted is not an isolated process. The strengthening effect of complex business interaction effects between enterprises and financing strategy. Companies will have high stickiness in enterprise risk so it will be more cautious on the use of liabilities. On the other hand, managers' education, preferences and beliefs, and other factors may affect business decisions. In addition, managers of large companies and that of small company's managers have quite a different attitude on decision-making. A number of factors are likely to affect manager's decisions (Kalicanin; Todorovic, 2014). Rajan and Zingales (1995) suggest that factors of capital structure determination (size, growth rate, profitability and significant tangible assets) in the United States are also important in other countries (Gaud et al., 2005). Among them, the impact on capital structure of size and profitability were discussed the most.

Company capital structure is often focused on size. According to the tradeoff theory, size and leverage are positively related. Large companies will not have the same bankruptcy costs in the face of financial crisis and are more able to survive it. Many empirical studies identify a positive relationship between the size and debt (e.g., Warner, 1977; Ang, 1976; Friend and Lang, 1988; Rajan and Zingales, 1995; Michaelas et al., 1999; Booth et al., 2001; Fama and French, 2002; Hall et al., 2004; Gaud et al., 2005; Maghyeren, 2005; Huang and Song, 2002; Omran and Pointon, 2009; Psilaki and Daskalakis, 2009). On the other hand, large companies have low information asymmetry problems, leading to stock issuance as the best source of loans rather than relying on debt. This argument was supported by many scholars (e.g., Kester, 1986; Kim and Sorensen, 1986; Titman and Wessels, 1988; Heshmati, 2001; Bevan and Danbolt, 2002; Chen et al.,2004; Khalid, 2011). The variable of size, based on the theory of tradeoff is accepted by many scholars (e.g., Titman and Wessels, 1988; Rajan and Zingales, 1995; Heshmati, 2001; Bauer, 2004; Keshar, 2004; Abor, 2005; Gaud et al., 2005; Psilaki and Daskalakis, 2009; Ahmad et al., 2009; Ramalho and Silva, 2009; Serrasqueiro and Rogao, 2009; Chakraborty, 2010; Noulas and Genimakis, 2011).

According to the pecking order theory, due to information asymmetry, enterprises would prefer retained earnings, followed by debt, and then issuing new shares (Myers, 1984; Myers and Majluf, 1984). Companies like to profit from retained earnings as a source of investment decision-making. Profitability and leverage was confirmed with a negative correlation (e.g., Kester,1986; Friend et al., 1988; Titman and Wessels, 1988; Rajan and Zingales, 1995; Michaelas et al., 1999; Wald, 1999; Booth et al., 2001; Chen, 2004; Gaud et al., 2005; Maghyeren, 2005; Psilaki and Daskalakis, 2009; Degryse et al., 2010; Khalid, 2011). In contrast, from the tradeoff theoretical point of view, the profitable enterprise was more leveraged. Profitable businesses were more able to survive an economic downturn. As a result, creditors are more willing to provide more loans. According to Jensen and Meckling (1976) the enterprise will make managers manipulate the specifications given in advance to ensure that the performance increases for shareholders. A positive relationship is identified between debt and profitability (e.g., Bevan and Danbolt, 2002; Keshar, 2004; Abor, 2005). Profitability ratio, defined based on tradeoff theoretical is EBITDA to total earnings and is commonly accepted by many scholars (e.g., Bevan and Danbolt, 2002; Bauer, 2004; Gaud et al., 2005; Delcoure, 2007; Ramalho and Silva, 2009; Serrasqueiro and Rogao, 2009; Degryse et al., 2010; Chakraborty, 2010).

DATA AND METHODOLOGY

This study on financing strategies extending the works of Shyam, Sunder and Myers (1999) and Frank and Goyal (2003). We study capital structure literature through common indicators of size and profitability. We plot profitability on a chart on the horizontal axis, and size on the vertical axis to divide the sample into four quadrants and verify whether capital structure and financing strategies vary by quadrant and whether the evidence supports target-adjustment or pecking order theory. This study utilizes the statistical software packages SAS and MATLAB for data analysis.

Rajan and Zingales (1995) found that structural factors determine capital according to size, growth, profitability, and tangible assets. Tangible assets had the greatest influence. In the financing strategy formulation process, different views have different temporal and spatial decision-making considerations. Corporate operations and decision-making is based on corporate strategy, which is influenced by the manager's education, preferences, beliefs, and other factors (Kalicanin; Todorovic, 2014). Since size and profitability have a significant impact on financing decisions. The horizontal axis represents profitability and the vertical axis represents size, to create four quadrants to explore the different combinations of firm size and profitability in a matrix indicating the influence on financing strategy.

Hypothesis: Conventional leverage factors in different quadrants of the corporate cluster will show differences in financing strategies

This study reports data needed to test pecking order and target-adjustment theories. The data here extends from 1995 through 2014. We examine Taiwan Stock Exchange (TWSE) listed manufacturing companies with a total of 9,783 annual firm-year observations. Variables are based on the NT$

pricing. Before 1995 and after 2014 that information is not complete. Empirical data have been obtained from the Taiwan Economic Journal database. The Taiwan Economic Journal main is the best database for this purpose. Table 1 shows the common size balance sheet from1995 to 2014. Debt to current assets decreased by 3%. Increase in fixed assets and other assets was 3%. Relative to credit. current liabilities were unchanged. Shareholders' equity increased by 2% and assets and liabilities and equity changes are considered reasonable. The accounting items of Taiwanese stocks in the Taiwan Stock Exchange went through industrial classification changes on July 2, 2007. The coding rules use in this study were for the new coding rules.

Table 1: Common Size Balance Sheet for TWSE Unit: NT$ Million

The Year Ended	**1995**	**%**	**2000**	**%**	**2005**	**%**	**2010**	**%**	**2014**	**%**
Number of observations	303		2,469		5,120		8,020		9,783	
Panel A: Debit to Assets										
Cash and cash equivalents	144	0.08	1,740	0.08	4,940	0.08	10,480	0.09	13,934	0.09
Short-term investments	31	0.02	419	0.02	1,934	0.03	3,770	0.03	4,714	0.03
Inventory	244	0.14	2,059	0.09	4,946	0.08	9,503	0.08	12,603	0.08
Other current assets	291	0.16	3,068	0.13	8,954	0.16	19,820	0.17	29,636	0.17
Total current assets	710	0.40	7,286	0.32	20,774	0.35	43,573	0.37	60,887	0.37
Long investment	705	0.40	9,179	0.42	22,209	0.37	37,967	0.32	48,442	0.30
Fixed assets	356	0.20	5,652	0.26	16,680	0.28	36,673	0.31	53,338	0.33
Total assets	1,771	1.00	22,117	1.00	59,663	1.00	118,213	1.00	162,667	1.00
Panel B: Credit to Liabilities and Equity										
Current liabilities	463	0.26	4,770	0.22	13,127	0.22	28,080	0.24	41,837	0.26
Long-term liabilities	169	0.10	2,717	0.12	7,465	0.13	13,139	0.11	17,485	0.11
Other liabilities	101	0.05	1,239	0.05	2,388	0.03	3,619	0.03	4,565	0.02
Total Liabilities	733	0.41	8,726	0.39	22,980	0.38	44,838	0.38	63,887	0.39
Shareholders' equity	1,038	0.59	13,391	0.61	36,683	0.62	73,375	0.62	98,780	0.61
Liabilities and equity	1,771	1.00	22,117	1.00	59,663	1.00	118,213	1.00	162,667	1.00

This table represents the Taiwan Economic Journal database of Taiwan stocks book value in selected sample years. The non-manufacturing and other with no inventories financial industry stock is excluded.

Capital Structure Factor

The capital structure factor is composed of size and profitability as illustrated in Figure 1. The horizontal axis represents net profitability before interest, tax, and depreciation with EBITDA as a proxy variable. The vertical axis represents size, with Ln sales as a proxy variable. The two axes constitute four quadrants. The horizontal axis to the right of the first quadrant is less than average profit. The vertical axis above the first quadrant indicates larger than average firms. The upper right corner is the so called large firms-low profitability group (LF-LP). Firms from each quadrant have different characteristics, thus financing policies should have different policy considerations.

Figure 1: Factors Structure Matrix

		PROFITABILITY	
		High	Low
SIZE	Large	Large firms- high profitability	Large firms- low profitability
	Small	Small firms- high profitability	Small firms- low profitability

The horizontal axis represents net profitability before interest, tax, and depreciation with EBITDA as a proxy variable. The vertical axis represents size, with Ln sales as a proxy variable. The two axes constitute four quadrants. The horizontal axis to the right of the first quadrant is less than average profit. The vertical axis above the first quadrant indicates larger than average firms. The upper right corner is the so called large firms-low profitability group (LF-LP).

Target-Adjustment Theory Empirical Model

Tradeoff theory argues that companies should seek an optimal capital structure, in which the marginal benefit equals the marginal cost. It allows companies to achieve maximum value, so businesses can verify the optimal capital structure by comparing the actual capital structure and the deviation rate between actual capital structure and optimal capital structure. This study uses the long-term average debt ratio of companies during the sampling period as an alternative variable to the target debt ratio. Shyam-Sunder and Myers (1999) argued that when the optimal debt ratio is stable, the intercept item should equal the mean-reverting behavior. The debt ratio change is explained by the change in flow ratio variation. The regression equation is as follows:

$$\Delta D_{it} = a + b_{ta}(D^*_{it} - D_{it-1}) + e_{it} \quad (1)$$

Where:

ΔD_{it}: Change in the debt ratio

$\mathbf{b_{ta}}$: Target-adjustment model coefficient

$\mathbf{D^*_{it}}$: Target debt ratio

$\mathbf{D_{it-1}}$: Actual debt ratio

If test result shows that if $b_{ta} > 0$, it is expected to approach the target for adjustment. If at the same time, if $b_{ta} < 1$, there will be a positive adjustment costs because the target cannot be observed. Therefore, this study referred to the Shyam-Sunder and Myers' (1999) approach and uses historical average costs as the starting level of debt. Changes in debt ratio between the target debt ratio and the actual debt ratio from the previous term should have a positive relationship, so the empirical results should be $0 < b_{ta} < 1$.

Pecking Order Theory Empirical Model

Myers (1984) and Myers and Majluf (1984) proposed the pecking order theory, which assumes that a business can take advantage of three sources of funding: retained earnings, liabilities, and equity. When internal funds exceed the demand for funds, there will be an excess of funds to repay debt. Companies will accumulate capital and the corporate debt ratio will decline. From this perspective, companies will have changing internal funding gaps and debt levels can verify whether pecking order theory exists. Shyam-Sunder and Myers (1999) stated the pecking order theory as follows:

$$\Delta D_{it} = a + b_{PO} DEF_{it} + e_{it} \quad (2)$$

Where all terms are as previously defined and:

$\mathbf{b_{po}}$: Pecking order theory coefficient

$\mathbf{DEF_{it}}$: Internal financing deficit

and,

$$DEF_{it} = DIV_{it} + I_{it} + \Delta W_{it} + R_{it} - C_{it} \quad (3)$$

Where:

$\mathbf{DIV_{it}}$: Cash dividend payment

$\mathbf{I_{it}}$: Capital expenditure

$\Delta\mathbf{W_{it}}$: Change in working capital

$\mathbf{R_{it}}$: Long-term debt maturity period of the year started

$\mathbf{C_{it}}$: Net profit after tax

If a firm complies with pecking order theory, the debt ratio variety and internal financing deficit should have a positive relationship, so the empirical results should be a= 0 and $\mathbf{b_{PO} = 1}$. This study divided the samples into groups of $\mathbf{DEF_{it}} < 0$ (with no financing gap), and $\mathbf{DEF_{it}} > 0$ (with financing gap). We observed the financing behaviors of companies in both cases. This study scales $\Delta\mathbf{D_{it}}$, $\mathbf{D^*_{it}}$, $\mathbf{D_{it-1}}$, $\mathbf{DEF_{it}}$, $\mathbf{DIV_{it}}$, $\mathbf{I_{it}}$, $\Delta\mathbf{W_{it}}$, $\mathbf{R_{it}}$, **and** $\mathbf{C_{it}}$ by the total assets of the firms to adjust for company size.

Conventional Leverage Regression

In addition to discussing whether the target-adjustment and pecking order models exist individually, Shyam-Sunder and Myers (1999) also combined the two empirical models to explore, if both exist at the same time and their abilities to explain corporate financing strategy. Their model is as follows:

$$\Delta D_{it} = a + b_{TA}(D^*_{it} - D_{it-1}) + b_{PO}DEF_{it} + e_{it} \quad (4)$$

Pecking order testing was affected by a different exogenous variable information set to observe the differences between its hypothesis and conventional regression leverage, and leverage adjustment behaviors. The main purpose of the conventional set is to explain the leverage factors. The adaptability of variables established by the regression model should be valid for long periods. Conventional empirical analysis focuses on the return to four leverage factors of the regression formula namely: the tangibility, market-to-book ratio, Ln sales, and profitability. This study is modified from Frank and Goyal's (2003) citation of Shyam-Sunder and Myers' (1999) regression formula, adding $\boldsymbol{\beta_{TA}(D^*_i - D_{i-1})}$ to measure the $\boldsymbol{\beta}$ risk and verifies whether their claims still hold true in the Taiwan stock market. The regression formula is as follows:

$$\Delta D_i = \beta_0 + \beta_t \Delta T_i + \beta_{MTB}\Delta MTB_i + \beta_{LS}\Delta LS_i + \beta_P \Delta P_i + \beta_{PO}DEF_i + +\beta_{TA}(D^*_i - D_{i-1}) + e_i \quad (5)$$

Where:

Δ: Represents the first differences between years

$\Delta\mathbf{T_i}$: Fixed assets divided by total assets ratio

$\Delta\mathbf{MTB_i}$: Enterprise assets market value divided by assets book value ratio

$\Delta\mathbf{LS_i}$: Natural logarithm of net sale divided by total assets ratio

$\Delta\mathbf{P_i}$: Operating profit divided by total assets ratio

$\mathbf{D^*_i}$: Average net debt

$\mathbf{D_{i-1}}$ **:** Net debt of the previous period

Frank and Goyal (2003) show Equation 5 is simply a conventional regression run in first differences but with financing deficit as an added factor. In the conventional regression, this term is not present. From the viewpoint of testing the pecking order, the most important of the conventional variables is tangibility. Harris and Raviv (1991) argue that if the pecking order theory holds, one might expect that firms with

few tangible assets would have greater asymmetric information problems. Therefore, companies with few tangible assets will tend to accumulate more debt over time and become more highly levered. Harris and Raviv further argue that the pecking order predicts that $\boldsymbol{\beta_t} < 0$. This is not the conventional prediction regarding the role of tangibility. A more common idea is based on the hypothesis that collateral supports debt. It is often argued that tangible assets naturally serve as collateral. Therefore, collateral is associated with increased leverage. The usual prediction is that $\boldsymbol{\beta_t} > 0$. Companies with high market-to-book ratios are often thought to have more future growth opportunities. As in Myers (1977), there may be concern that debt could limit a firm's ability to seize opportunities when they appear. Barclay et al. (2001) present a model showing that debt capacity of growth options can be negative. The common prediction is that $\boldsymbol{\beta_{MTB}} < 0$.

Large firms are usually more diversified, have better reputations in debt markets and face lower information costs when borrowing. Thus, large firms are predicted to have more debt in their capital structures. The prediction is tha $\boldsymbol{\beta_{LS}}t > 0$. The profit forecast is ambiguous. The tradeoff theory predicts that profitable firms should be more highly levered to offset corporate taxes. Also, in many asymmetric information models, such as Ross (1977), corporate earnings are expected to have higher leverage. But Titman and Wessels (1988) and Fama and French (2002) show that this is not a common finding. In contrast, the literature finds profits and leverage to be negatively correlated. While MacKay and Phillips (2001) challenge this common finding, we expect to find that $\boldsymbol{\beta_P} < 0$.

Anticipated vs. Actual Deficits

Shyam-Sunder and Myers (1999) discussed whether the actual internal financing deficit of firms can explain the behavior of corporate financing more effectively than the expected internal financing deficit. This study also examines the financing deficit and conducts a robustness checks. If the expected internal financing deficit exists, the current internal financing deficit of the firm can be expressed as:

$$\mathrm{DEF_t} + \mathrm{E_{t-1}}|\mathrm{DEF_t}| + \mathrm{Z_t} \qquad (6)$$

$\boldsymbol{\mathrm{E_{t-1}}|\mathrm{DEF_t}|}$ is the expected current internal financing deficit estimated at the end of the previous period, and $\boldsymbol{\mathrm{Z_t}}$ is the current, non-expected, net cash flows. We use the internal financing deficit from the previous term as the alternative variable to the expected internal financing deficit. We then substitute the above empirical model. However, in the regression equation, $\boldsymbol{\mathrm{DEF_t}}$ is the adjustment seasoned equity offerings and treasury shares. We then compare the results with those from the aforementioned empirical models and test to see which offers better explanations and thus can act as a reference for financing decisions.

$$\Delta \mathrm{D_i} = \beta_0 + \beta_t \Delta \mathrm{T_i} + \beta_{\mathrm{MTB}} \Delta \mathrm{MTB_i} + \beta_{\mathrm{LS}} \Delta \mathrm{LS_i} + \beta_{\mathrm{P}} \Delta \mathrm{P_i} + \beta_{\mathrm{PO}}^{\mathrm{ADJ}} \mathrm{DEF_i} + \beta_{\mathrm{TA}}^{\mathrm{ADJ}} (\mathrm{D_i^*} - \mathrm{D_{i-1}}) + \mathrm{e_i} \qquad (7)$$

Where all terms are as previously defined and:

$\boldsymbol{\mathrm{D_i^*} - \mathrm{D_{i-1}}}$: As the internal financing deficit adjusted seasoned equity offerings and treasury shares.

Conventional Standards of Corporate Leverage Factor Verification

The proposed approach of dividing the business matrix quadrants explores capital structure and financing policies. This study uses size, growth, and profitability as three conventional corporate leverage determining factors and tests the two-factor method for robustness. Total assets is a proxy variable for size, M/B (market-to -book ratio) is a proxy variable for growth, EBIT (net income before interest and tax) is the proxy variable for profitability. The three new matrices are thus created by size and growth, size and profitability, and profitability and growth. Large firms-low profitability (LF-LP) represents, large firms-high profitability are represented by (LF-HP) Small firms-high profitability firms and small

firms-low profitability are represented by SF-HP and SF-LP respectively. Large firms-low growth and large firms-high growth are represented by LF-LG and LF-HG respectively. Small firms-high growth and small firms-low growth are indicated by SF-HG and SF-LG respectively. high profitability-low growth with HP-LG represents, high profitability-high growth with HP-HG represents, low profitability-high growth and low profitability-low growth firms are indicated by LP-HG and LP-LG respectively. Figure 1 present the size and profitability factors. The X-axis represents the profitability factor and the Y-axis represents the size factor. Each matrix is divided into four quadrants, with each fraction of the second quartile as the cut-off point. The X-axis is greater than the second quartile for low profitability, and the Y-axis greater than the second quartile for the large firms. The two axes form the first quadrant.

RESULTS AND DISCUSSION

Shyam-Sunder and Myers (1999) study data from 1971 to 1989. Results are presented separately for their sample period (1971-1989) and for subsequent years (1990-1998) for a sample of 157 firms observations for 19 years. Frank and Goyal's (2003) follow their approach of reporting results separately for net debt issued, gross debt issued, and the change in the debt ratio. They also for attempt to match their sample selection criteria. The most significant of their criteria is the requirement that firms report continuously on the necessary variable. These criteria results include a sample with 768 firms and 19 years of data for each firm. We follow their approach of reporting results. We study data from the period 1995 to 2014, for a sample of 9,783 annual firm-year observations and 19 years of data. The regression results are not the same time period as Shyam-Sunder and Myers (1999) and Frank and Goyal's (2003).

Empirical Analysis of Target-Adjustment Model Method

Each target-adjustment policy interpretation specified in each quadrant of the matrix is based on the target-adjustment coefficient. If it is greater than zero, it indicates that the financing policy of the company is using a target-adjustment capital structure. Table 2-5 show the results. The samples are divided into two types, namely, with no financial gap and with financial gap, for testing. Dependent variables of regression are divided into three patterns: net debt issuance, gross debt issuance, and changes in the debt ratio. Frank and Goyal (2003) considered net debt issuance better equipped to measure the test effect, and this study uses the same as the main analysis item.

When net debt issuance is the dependent variable, the t-statistic in each quadrant of the matrix are significantly greater than zero, that is, 10.08, 5.42, 5.79, and 7.35 in the LF-LP, LF-HP, SF-HP, and SF-LP respectively. When net debt issuance is the dependent variable, the t-statistic in each quadrant of the matrix are significantly greater than zero, that is, 75.40, 2.74, 9.55, and 115.45 in the LF-LP, LF-HP, SF-HP, and SF-LP respectively. Most information shows the coefficient of firms with financing gap is greater than for firms with no financing gap. The LF-LP group has a coefficient for firms with a financing gap of 0.909, and the coefficient with no financing gap of 0.174. For the SF-HP with financing gap the coefficient equals 0.259, and that with no financing gap equals 0.198. In the SF-LP, the coefficient for firms with a financing gap equals 1.144, and that for firms with no financing gap equals 0.234. The exceptions are LF-HP quadrant, with the coefficient for firms with a financing gap equals 0.145, and that for firms with no financing gap equals 0.316. Our findings contradict Frank and Goyal (2003), who found the coefficient for firms with no financing gap was higher than the book value of assets in the sample with a financing gap. The fourth quadrant of the matrix follows the target-adjusted financing strategy. The financing gaps appear in the following order: LF-LP → SF-LP → SF-HP → LF-HP.

Empirical Analysis of Pecking Order Theory

Each pecking order policy interpretation quadrant of the matrix is based on the pecking order coefficient. Table 2-5 show the results with the samples divided into two types, namely, with no financing gap and with financing gap, for testing.

Table 2: Regression Results for Target Adjustment and Pecking Order Models

	LF-LP					
	Data with No Gaps Permitted in the Reporting of Flow of Funds Data			**Data with Gaps Permitted in the Reporting of Flow of Funds Data**		
	Net Debt Issued	**Gross Debt Issued**	**Change in Debt Ratio**	**Net Debt Issued**	**Gross Debt Issued**	**Change In Debt Ratio**
Panel A: Target-Adjustment Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.014***	-0.062***	-0.063***	-0.018***	-0.015	0.035***
	(3.49)	(-2.91)	(-4.76)	(-3.11)	(-0.75)	(3.43)
Target-adjustment coefficient	0.174***	0.064***	2.117***	0.909***	0.353***	-1.224***
	(10.08)	(4.97)	(34.68)	(75.40)	(27.28)	(-30.78)
N	2,364	2,,364	2,,364	1,584	1,584	1,584
R^2	0.04	0.01	0.34	0.78	0.32	0.37
Panel B: Pecking Order Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.011***	0.047**	0.056***	-0.056***	-0.081***	0.059***
	(-2.54)	(2.04)	(3.18)	(-4.87)	(-4.43)	(6.39)
Pecking order coefficient	-0.221***	0.812***	0.765***	0.260***	0.984***	-0.512***
	(-15.09)	(9.98)	(12.43)	(15.88)	(38.16)	(-39.18)
N	2,364	2,364	2,364	1,584	1,584	1,584
R^2	0.09	0.04	0.06	0.14	0.48	0.19

Group LF-LP represents large firms-low profitability. The dependent variable is the net or gross annual debt issued, scaled by the book value of assets or change in the debt-to-asset ratio. The target-adjustment equation predicts gradual adjustment to target ratios, and each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient $\boldsymbol{b_{ta}}$ *estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of* $\boldsymbol{b_{po}}$*=1. Panel A shows the results of the target-adjustment model, and panel B shows the results of the pecking order model. *** and ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 3: Regression Results for Target Adjustment and Pecking Order Models (Continued)

	LF-HP					
	Data with No Gaps Permitted in The Reporting of Flow of Funds Data			**Data with Gaps Permitted in The Reporting of Flow of Funds Data**		
	Net Debt Issued	**Gross Debt Issued**	**Change in Debt Ratio**	**Net Debt Issued**	**Gross Debt Issued**	**Change In Debt Ratio**
Panel A: Target-Adjustment Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.008	-0.079**	-0.021***	-0.046***	0.011	0.009**
	(0.92)	(-2.23)	(-3.57)	(-5.50)	(0.75)	(1.66)
Target-adjustment coefficient	0.316***	0.074	0.343***	0.145***	0.032	0.164***
	(5.42)	(1.26)	(6.44)	(2.74)	(1.27)	(2.73)
N	543	543	543	163	163	163
R^2	0.05	0.01	0.07	0.04	0.01	0.04
Panel B: Pecking Order Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.015	0.209***	0.016***	0.001	0.084***	0.016**
	(-1.63)	(7.68)	(2.67)	(0.07)	(4.47)	(2.11)
Pecking order coefficient	-0.170***	1.675***	0.185***	-0.834***	-1.190***	-0.085
	(-7.13)	(23.40)	(12.04)	(-7.08)	(-5.44)	(-0.96)
N	543	543	543	163	163	163
R^2	0.09	0.50	0.21	0.24	0.16	0.01

Group LF-HP represents large firms-high profitability. The dependent variable is the net or gross annual debt issued, scaled by the book value of assets or change in the debt-to-asset ratio. The target-adjustment equation predicts gradual adjustment to target ratios, and each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient $\boldsymbol{b_{ta}}$ *estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of* $\boldsymbol{b_{po}}$*=1. Panel A shows the results of the target-adjustment model, and panel B shows the results of the pecking order model. *** and ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 4: Regression Results for Target Adjustment and Pecking Order Models (Continued)

	SF-HP					
	Data with No Gaps Permitted in The Reporting of Flow of Funds Data			**Data with Gaps Permitted in The Reporting of Flow of Funds Data**		
	Net Debt Issued	**Gross Debt Issued**	**Change in Debt Ratio**	**Net Debt Issued**	**Gross Debt Issued**	**Change In Debt Ratio**
Panel A: Target-Adjustment Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.024***	-0.233***	-0.018***	-0.059***	0.010**	0.016***
	(4.07)	(-5.37)	(-6.80)	(-11.53)	(1.84)	(4.87)
Target-adjustment coefficient	0.198***	0.226***	0.346***	0.259***	0.342***	0.585***
	(5.79)	(7.03)	(11.01)	(9.55)	(8.82)	(11.77)
N	1,521	1,521	1,521	512	512	512
R^2	0.02	0.03	0.07	0.15	0.13	0.21
Panel B: Pecking Order Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.048***	0.042***	0.005**	-0.026***	0.025***	0.017**
	(-8.09)	(6.45)	(1.78)	(-3.68)	(3.28)	(3.37)
Pecking order coefficient	-0.018***	0.381***	0.121***	-0.622***	-0.099	0.128***
	(-23.05)	(19.44)	(13.30)	(-9.27)	(-1.35)	(2.72)
N	1,521	1,521	1,521	512	512	512
R^2	0.26	0.20	0.10	0.14	0.01	0.01

*Group SF-HP represents small firms-high profitability. The dependent variable is the net or gross annual debt issued, scaled by the book value of assets or change in the debt-to-asset ratio. The target-adjustment equation predicts gradual adjustment to target ratios, and each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient b_{ta} estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of b_{po}=1. Panel A shows the results of the target-adjustment model, and panel B shows the results of the pecking order model. *** and ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 5: Regression Results for Target Adjustment and Pecking Order Models (Continued)

	SF-LP					
	Data with No Gaps Permitted in the Reporting of Flow of Funds Data			**Data with Gaps Permitted in The Reporting of Flow of Funds Data**		
	Net Debt Issued	**Gross Debt Issued**	**Change in Debt Ratio**	**Net Debt Issued**	**Gross Debt Issued**	**Change In Debt Ratio**
Panel A: Target-Adjustment Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.016***	-0.233***	-0.018***	-0.106**	0.025	-0.104***
	(2.72)	(-5.37)	(-6.80)	(-2.08)	(0.41)	(-6.22)
Target-adjustment coefficient	0.234***	0.226***	0.346***	1.144***	0.967***	5.060***
	(7.35)	(7.03)	(11.01)	(115.45)	(10.29)	(109.81)
N	1,693	1,693	1,693	1,403	1,403	1,403
R^2	0.99	0.05	0.05	0.90	0.07	0.90
Panel B: Pecking Order Model						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.003	0.057***	0.003	0.575***	-0.297***	0.178***
	(-0.49)	(6.59)	(0.77)	(18.52)	(-16.10)	(8.80)
Pecking order coefficient	-0.015***	0.667***	0.149***	-4.906***	1.891***	-1.457***
	(-7.50)	(19.44)	(16.13)	(-195.94)	(154.70)	(-89.14)
N	1,693	1,693	1,693	1,403	1,403	1,403
R^2	0.03	0.31	0.12	0.96	0.94	0.85

*Group SF-LP represents small firms-low profitability. The dependent variable is the net or gross annual debt issued, scaled by the book value of assets or change in the debt-to-asset ratio. The target-adjustment equation predicts gradual adjustment to target ratios, and each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient b_{ta} estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of b_{po} =1. Panel A shows the results of the target-adjustment model, and panel B shows the results of the pecking order model. *** and ** indicate significance at the 1 and 5 percent levels, respectively.*

When net debt issuance is the dependent variable, the t-statistic in each group for the LF-LP, LF-HP, SF-HP, and SF-LP equals -15.09,-7.13,-23.05, and -7.50 respectively and shows negative correlations. When net debt issuance is the dependent variable, only the LF-LP group with financing gap, of 0.260, shows a positive correlation and significant t-statistic. The other three groups have negatively correlation. For LF-HP, SF-Hp, and SF-LP the t-statistics equal -7.08, -9.27, and -195.94 respectively. Enterprises in LF-LP, with financing gap, have tend to pecking order theory. The rest rejected the pecking order theory.

Target-Adjustment and Pecking Order Theory Joint Empirical Model

Table 6-7 shows the conventional regression with the target-adjustment and pecking order joint overall test results. In addition to the coefficient of market-to-book and the Ln sales of column (4) in the LF-HP, the Ln sales of column (1) in the LF-LP, the tangibility of column (10) show the SF-LP opposite sign. The rest of this article coefficient of conventional leverage regression aforementioned definition is assumed that the literature section roughly in line. Shyam-Sunder and Myers (1999) pointed out that, if the pecking order is the main driving factor, it will supplant the conventional variables affected. This study also uses Frank and Goyal's (2003) regression equation (5) to increase pecking order funds ($\mathbf{DEF_i}$), control variables, and test whether the conventional regression is still robust. The regression results show, the coefficient of Ln sales in column (8) in the SF-HP, the Ln sales in column (5) in the LF-HP, the tangibility in column (11) in the SF-LP, reverse signs equal 0.048, 0.091 and 0.541 respectively. The rest show no significant changes. The internal pecking order financing deficit of the four groups, except for the coefficient on the LF-LP is positive 0.110, with t-statistic of 8.62, which is highly significant.

Table 6: Leverage Regression with Conventional Variable and Deficit for Pecking Order and Target-Adjustment, 1995-2014

	LF-LP			LF-HP		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.002	0.006	-0.006	0.003	-0.044***	-0.045***
	(0.37)	(1.12)	(-1.58)	(0.51)	(-6.67)	(-6.99)
Tangibility	0.218***	0.211***	0.080***	0.151***	0.213***	0.203***
	(23.63)	(23.03)	(11.32)	(5.18)	(9.44)	(8.20)
Market- to-book	-0.007	-0.009	0.006	0.007	0.003	0.003
	(-1.13)	(-1.53)	(1.39)	(0.96)	(0.46)	(0.57)
Ln sales	-0.014	-0.042***	0.014	-0.045***	0.091***	0.090***
	(-0.96)	(-2.86)	(1.34)	(-2.46)	(5.08)	(6.13)
Profitability	-0.164***	-0.138***	-0.057***	-0.231**	-0.717***	-0.672***
	(-25.57)	(-19.59)	(-10.73)	(-1.98)	(-6.89)	(-6.58)
Pecking order		0.110***	-0.045***		-0.390***	-0.380***
		(8.62)	(-4.66)		(-16.08)	(-15.93)
Target-adjustment			0.700***			0.216***
			(58.66)			(5.56)
N	3,948	3,948	3,948	706	706	706
R^2	0.16	0.17	0.56	0.05	0.31	0.34

Group LF-LP represents large firms-low profitability; Group LF-HP represents large firms-high profitability. The conventional regression is $\Delta \boldsymbol{D_i} = \boldsymbol{\beta_0} + \boldsymbol{\beta_t}\Delta \boldsymbol{T_i} + \boldsymbol{\beta_{MTB}}\Delta \boldsymbol{MTB_i} + \boldsymbol{\beta_{LS}}\Delta \boldsymbol{LS_i} + \boldsymbol{\beta_P}\Delta \boldsymbol{P_i} + \boldsymbol{e_i}$. *Here; D is defined as the ratio of total debt to market capitalization. T=Tangibility is defined as the ratio of fixed assets to total assets.MTB is the market-to-book ratio defined as the ratio of the market value of assets to the book value of assets. LS are Ln sales, defined as the natural logarithm of constant sales. P is profit, defined as the ratio of operation income to the book value of assets. The sample period is 1995–2014. Financial firms and utilities are excluded. The horizontal axis represents net profitability before interest, tax, and depreciation (EBITDA) as a proxy variable; the vertical axis represents size with Ln sales as a proxy variable. The two axes constitute four quadrants. *** And ** indicate significance at the 1 and 5 percent levels, respectively.*

The rest of the coefficients have negative signs. The coefficients on LF-HP, SF-HP, and SF-LP equal -0.390, -0.600, and -4.273 respectively, with t-statistic of -16.08, -36.48, and -93.49 respectively. In addition to the LF-LP following the pecking order theory, the other three groups did not follow the theory. Tables 2-5 yield the same conclusion. Further, target-adjustment internal financing gap ($\mathbf{D_i^* - D_{i-1}}$), the coefficient of market-to-book and Ln sales in column (3) in the LF-LP, the tangibility in column (12) in the SS-PL cluster equal 0.006, 0.014, and -1.004 respectively, with no substantial changes for the rest. The coefficient on pecking order in column (2) in the LF-LP equals 0.110 and for the reversal column (3)

equals -0.045. The target-adjustment for the remaining three quadrant of the matrices are all positive with t-statistic of 58.66, 5.56, 7.34, and 172.77 respectively. These statistics are highly significant, showing that the four groups follow the target-adjustment. Tables 2-5 yield the same conclusion. The data analysis showed that target-adjustment and pecking order joint conventional regression test and individual tests lead to roughly the same conclusion. In terms of target-adjustment, the four clusters are consistent with the results of a positive correlation, contrary to Frank and Goyal's (2003) conclusion that pecking order's relative efficiency shows more differences between the Taiwan stock and American stocks. According to Shyam-Sunder and Myers (1999), if the pecking order reversal becomes negative, it has the same meaning as a target-adjustment.

Table 7: Leverage Regression with Conventional Variable and Deficit for Pecking Order and Target-Adjustment, 1995-2014 (Continued)

	SF-HP			SF-LP		
	(7)	(8)	(9)	(10)	(11)	(12)
Constant	0.005	-0.065***	-0.063***	-0.049	-0.198***	-0.071***
	(1.05)	(-15.94)	(-15.48)	(-1.06)	(-8.42)	(-9.82)
Tangibility	0.230***	0.495***	0471***	-0.567***	0.541***	-1.004***
	(6.34)	(16.99)	(16.30)	(-8.60)	(15.16)	(-71.06)
Market- to-book	-0.029***	-0.013***	-0.012***	-0.033	0.152***	0.030***
	(-6.98)	(-3.99)	(-9.66)	(-0.46)	(4.19)	(2.68)
Ln sales	-0.049***	0.048***	0.053***	0.166**	0.582***	0.233***
	(-3.39)	(4.18)	(4.68)	(2.24)	(15.29)	(19.69)
Profitability	0.404***	-0.440***	-0.427***	1.664***	0.398***	0.182***
	(5.28)	(-6.90)	(-6.77)	(45.33)	(17.29)	(25.33)
Pecking order		-0.600***	-0.589***		-4.273***	-0.424***
		(-36.48)	(-36.10)		(-93.49)	(-16.11)
Target-adjustment			0.150***			0.895***
			(7.34)			(172.77)
N	2,033	2,033	2,033	3,096	3,096	3,096
R^2	0.05	0.42	0.44	0.62	0.90	0.99

Group SF-HP represents small firms-high profitability; Group SF-LP represents small firms-low profitability The conventional regression is $\Delta \boldsymbol{D_i} = \boldsymbol{\beta_0} + \boldsymbol{\beta_t}\Delta \boldsymbol{T_i} + \boldsymbol{\beta_{MTB}}\Delta \boldsymbol{MTB_i} + \boldsymbol{\beta_{LS}}\Delta \boldsymbol{LS_i} + \boldsymbol{\beta_P}\Delta \boldsymbol{P_i} + \boldsymbol{e_i}$ *.Here. D is defined as the ratio of total debt to market capitalization. T=Tangibility is defined as the ratio of fixed assets to total assets. MTB is the market-to-book ratio defined as the ratio of the market value of assets to the book value of assets. LS are Ln sales, defined as the natural logarithm of constant sales. P is profit, defined as the ratio of operation income to the book value of assets. The sample period is 1995–2014. Financial firms and utilities are excluded. The horizontal axis represents net profitability before interest, tax, and depreciation (EBITDA) as a proxy variable; the vertical axis represents size with Ln sales as a proxy variable. The two axes constitute four quadrants. *** And ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 6-7 shows the coefficients for the 4 groups, with values of -0.045, -0.380, -0.589, and -0.424. Pecking order consistently shows negative results with the target-adjustment showing a positive correlation between test results. Shyam-Sunder and Myers (1999) introduced the financing order into the pecking order test and the coefficient turned from negative to positive with different conclusions. It is also different from the conclusion from Frank and Goyal (2003) who found the pecking order coefficient of large companies is more significant, and mean reversion in corporate leverage is surprisingly weak.

In this study, the R^2 in Column 1 for the LF-LP conventional regression had a result of 0.16. Column 2, adding pecking order internal financing deficit had a value of 0.17. Column 3 added target-adjustment for the internal financing deficit and had a value of 0.56, showing a monotonically increasing trend. The other 3 groups also showed the same trend, though the results in Frank and Goyal (2003) do not have this tendency. This may be because many small companies in the United States became listed after 1980. The financing deficit and increasing internal control variable improves the explanatory power and proves that target-adjustments in internal financing deficits remain for Taiwanese companies. Overall, after adding the pecking order variable, the test results for LF-LP consists of pecking order theory. After adding the target-adjustment, the four quadrants follow the target-adjustment theory and suggest that firms operating in different matrices have different capital structures and financing decision-making, which supports the hypothesis.

Robustness Checks: Anticipated vs. Actual Deficits

Table 8-9 shows that the coefficient of Ln sales in Column 7 in the SF-HP and the tangibility in Column 10 in the SF-LP were -0.057 and -0.615 respectively. This finding does not match the conventional theory, while the others did not differ much from the conventional theory. When adding the financing deficit variable, the coefficient of tangibility in Column 11 in the SF-LP group is inverted to 0.692, remaining little changed. Except the coefficient of financing deficit in Column 2 in the LF-LP group of 0.518, has a highly significant t-statistic of 23.76. The other three groups did not comply with pecking order theory.

Table 8: Leverage Regression with Anticipated Variable Vs. Actual Deficits for Small Firms, 1995-2014

	LF-LP			LF-HP		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.023**	-0.072***	-0.028***	-0.027***	0.002	0.003
	(-2.02)	(-7.28)	(-5.11)	(-3.44)	(0.25)	(0.30)
Tangibility	0.278***	0.432***	0.156***	0.429***	0.317***	0.320***
	(15.36)	(25.66)	(14.83)	(8.11)	(6.00)	(6.08)
Market- to-book	-0.062***	-0.052***	-0.029***	-0.035***	-0.044***	-0.040***
	(-3.84)	(-3.75)	(-3.74)	(-3.93)	(-5.22)	(-4.76)
Ln sales	0.028	0.017***	0.029**	-0.058**	-0.044**	-0.049**
	(0.84)	(4.18)	(1.85)	(-2.09)	(-1.71)	(-1.89)
Profitability	-0.173***	-0.440	-0.027***	-0.274**	-0.184	-0.187
	(-16.36)	(0.60)	(-4.88)	(-2.21)	(-1.60)	(-1.63)
Financing deficit		0.518***	0.122***		-0.580***	-0.557***
		(23.76)	(8.79)		(-5.40)	(-5.18)
Lagged leverage			0.830**			0.068**
			(59.12)			(1.73)
N	1,584	1,584	1,584	163	163	163
R^2	0.21	0.42	0.82	0.43	0.53	0.51

Group LF-LP represents large firms-low profitability; Group LF-HP represents large firms-high profitability The conventional regression is $\Delta \boldsymbol{D_i} = \boldsymbol{\beta_0} + \boldsymbol{\beta_t}\Delta \boldsymbol{T_i} + \boldsymbol{\beta_{MTB}}\Delta \boldsymbol{MTB_i} + \boldsymbol{\beta_{LS}}\Delta \boldsymbol{LS_i} + \boldsymbol{\beta_P}\Delta \boldsymbol{P_i} + \boldsymbol{DEF_{PQ}^{ADJ}}\boldsymbol{DEF_i} + \boldsymbol{\beta_{TA}^{ADJ}}(\boldsymbol{D_i^* - D_{i-1}}) + \boldsymbol{e_i}$. *Here D is defined as the ratio of total debt to market capitalization T=Tangibility is defined as ratio of fixed assets to total assets. MTB is the market-to-book ratio defined as the ratio of the market value of assets to the book value of assets. LS is Ln sales defined as the natural logarithm of constant sales. P is profit defined as the ratio of operation income to book value of assets. The sample period is 1995-2014. Financial firms and utilities are excluded. The horizontal axis represents net profitability before interest, tax, and depreciation (EBITDA) as a proxy variable; the vertical axis represents size, with Ln sales as a proxy variable. The two axes constitute four quadrants.* $\boldsymbol{The\ term\ of\ "D_i^* - D_{i-1}"}$ *As the internal financing deficit adjusted seasoned equity offerings and treasury shares. *** And ** indicate significance at the 1 and 5 percent levels respectively.*

When adding the lagged leverage control variable, the coefficients of tangibility, market–to-book, and Ln sales in Column 11 in the SF-LP group were inverted to -0.803, 0.018, and 0.066 respectively. The rest did not change much. The lagged leverage internal financing deficit is all positive, with a highly significant t-statistic. The further increase in lagged leverage did not significantly reduce explanatory power, contrary to the findings in Frank and Goyal (2003). The results are consistent with Fama and French (2002) who argue that mean reversion in corporate leverage is surprisingly weak. Overall, after adding the financing deficit variable, the SF-LP groups follow pecking order theory and the other three groups did not. After adding the lagged leverage, all four groups follow the target-adjustment theory. The $\mathbf{R^2}$ in Column 1 in the SF-LP of the conventional regression equals 0.21. Column 2 added the financing deficit variable value of 0.42, and Column 3 included lagged leverage with a value of 0.82, showing a monotonically increasing trend. Likewise, in the other three groups, the SF-LP group adds the internal financing gap of lagged leverage, where the coefficient of determination grew to 0.99. This result shows that changes in debt can slow the trajectory of the capital structure. The evidence shows that the robustness of the test results performed well for the actual internal financing gap and expected small sample robustness checks remained steady, with insignificant results for a separate verification and joint verification.

Table 9: Leverage Regression with Anticipated Variables. Actual Deficits for Small Firms, 1995-2014 (Continued)

	SF-HP			SF-LP		
	(7)	(8)	(9)	(10)	(11)	(12)
Constant	-0.061***	-0.024***	-0.022***	-0.113	0.643***	0.091***
	(-10.36)	(-3.35)	(-3.21)	(-1.10)	(25.02)	(8.27)
Tangibility	0.459***	0.323***	0.245***	-0.615***	0.692***	-0.803***
	(5.94)	(4.38)	(3.44)	(-6.17)	(26.52)	(-43.97)
Market- to-book	-0.019***	-0.019***	-0.014***	-0.046	-0.005	0.018
	(-3.94)	(-4.20)	(-3.26)	(-0.29)	(-0.13)	(1.26)
Ln sales	-0.057***	-0.035**	-0.023	0.182	-0.072**	0.066***
	(-2.56)	(-1.67)	(-1.16)	(1.05)	(-1.68)	(4.22)
Profitability	0.207**	0.034	0.042	1.647***	0.015	0.111***
	(2.28)	(0.39)	(0.50)	(30.02)	(0.88)	(17.26)
Financing deficit		-0.582***	-0.505***		-5.438***	-1.235***
		(-3.63)	(-7.76)		(-147.30)	(-26.92)
Lagged leverage			0.190***			0.765***
			(7.25)			(95.77)
N	512	512	512	1,403	1,403	1,403
R^2	0.10	0.21	0.29	0.62	0.98	0.99

Group SF-HP represents small firms-high profitability; Group SF-LP represents small firms-low profitability. The conventional regression is $\Delta \boldsymbol{D_i} = \boldsymbol{\beta_0} + \boldsymbol{\beta_t}\Delta \boldsymbol{T_i} + \boldsymbol{\beta_{MTB}}\Delta \boldsymbol{MTB_i} + \boldsymbol{\beta_{LS}}\Delta \boldsymbol{LS_i} + \boldsymbol{\beta_P}\Delta \boldsymbol{P_i} + \boldsymbol{DEF_{PO}^{ADJ}}\boldsymbol{DEF_i} + \boldsymbol{\beta_{TA}^{ADJ}}(\boldsymbol{D_i^*} - \boldsymbol{D_{i-1}}) + \boldsymbol{e_i}$*. Here D is defined as the ratio of total debt to market capitalization T=Tangibility is defined as ratio of fixed assets to total assets.MTB is the market-to-book ratio defined as the ratio of the market value of assets to the book value of asstes.LS is Ln sales defined as the natural logarithm of constant sales. P is profit defined as the ratio of operation income to book value of assets. The sample period is 1995-2014. Financial firms and utilities are excluded. The horizontal axis represents net profitability before interest, tax, and depreciation (EBITDA) as a proxy variable; the vertical axis represents size, with Ln sales as a proxy variable. The two axes constitute four quadrants..* **The term of** "$\boldsymbol{D_i^* - D_{i-1}}$" *As the internal financing deficit adjusted seasoned equity offerings and treasury shares. *** And ** indicate significance at the 1 and 5 percent levels respectively.*

Robustness Checks: Conventional Standards of Corporate Leverage Factor Verification

Table 10-12 shows the robustness check results, beginning with the net debt issuance variable (to save space, other gross debt issued and changes in debt issued were omitted). Columns 1-4 and Columns 9-12 show results with no financing gap. Columns 5-8 and Columns 13-16 with financing gap. The results for LF-HG, LF-LP, and HP-LG show the coefficients, except target-adjustment, were significantly positive for DEF < 0. Pecking order was also positive with t -statistic significantly greater than zero. The results of the aforementioned method using the average approach is the same. That is, each quadrant of the matrix will be a cluster using target-adjustment theory, but also with the use of pecking order theory as a financing resource. In all clusters for LF-HG, the clustering coefficient was 0.708, with a t-statistic of 56.55 and R^2 of 0.44, showing the best performance for the twelve clusters. The results using the average of the preceding methods show that the SF-HP clustering coefficient was 0.909, with a t-statistic of 75.40, and R^2 of 0.78. The data show that the average method is better than the quartile method.

Hypothesis Results

By individual test, the four quadrants of the cluster, whether DEF < 0 or DEF > 0, the t-statistics are significantly different from zero, and comply with the target-adjustment theory, Moreover, in LF-LP under with financing gap have compliance tends to pecking order theory. The rest are rejected for the pecking order theory. By joint test, after adding the pecking order variable, the test results for LF-LP consists of pecking order theory. After adding the target-adjustment, the four quadrants follow the target-adjustment theory. By anticipated vs. actual deficits test, after adding the financing deficit variable, the SF-LP groups follow pecking order theory and the other three groups did not. After adding the lagged leverage, all four groups follow the target-adjustment theory. By conventional standards of corporate leverage factor, the results of the aforementioned method using the average approach is the same. The data showing strong evidence supporting the hypothesis that clusters of firms in different quadrants will follow different financing strategies. Table 13-15 is the result of summarized.

Table 10: Testing the Determinants Factor of Traditional Standard Corporate Profitability

	Net debt Issued				Net debt Issued			
	With No Financing Gap				With Financing Gap			
	LF-LG	LF-HG	SF-HG	SF-LG	LF-LG	LF-HG	SF-HG	SF-LG
Panel A: Target-Adjustment Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.014***	0.009***	0.012**	0.017***	-0.024***	-0.030***	-0.054***	-0.042***
	(2.64)	(2.64)	(2.27)	(2.75)	(-8.88)	(-11.30)	(-18.92)	(-13.88)
Target-adjustment	0.467***	0.708***	0.434***	0.445***	-0.233***	0.313***	0.160***	0.177***
	(26.33)	(56.55)	(29.61)	(22.62)	(-20.26)	(26.69)	(15.48)	(16.44)
N	4,730	4,090	4,826	4,250	2,973	2,881	2,878	2,721
R^2	0.13	0.44	0.10	0.11	0.12	0.20	0.08	0.09
Panel B: Pecking Order Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-0.015***	0.028***	-0.024***	-0.014**	-0.001	-0.002	-0.014***	-0.006
	(-2.75)	(6.19)	(-4.13)	(-2.20)	(-0.39)	(-0.56)	(-3.96)	(-1.62)
Pecking order	-0.191***	0.307***	-0.226***	-0.177***	-0.235***	-0.298***	-0.393***	-0.359***
	(-24.75)	(22.01)	(-25.46)	(-19.63)	(-7.64)	(-12.79)	(-17.85)	(-16.66)
N	4,730	4,090	4,826	4,250	2,973	2,881	2,878	2,721
R^2	0.12	0.15	0.12	0.08	0.03	0.05	0.10	0.09

Group LF-LG indicates large firms-low growth; LF-HG indicates large firms-high growth; SF-HG indicates small firms-high growth; and SF-LG indicates small firms-low growth. The dependent variable is the net annual of debt issued, scaled by the book value of assets. The target-adjustment equation predicts the gradual adjustment to target ratios, where each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient $\boldsymbol{b_{ta}}$ *estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of* $\boldsymbol{b_{po}}$*=1. Panel A shows results of the target-adjustment model, and panel B shows results of the pecking order model. *** And ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 11: Testing the Determinants Factor of Traditional Standard Corporate Profitability (Continued).

	Net Debt Issued				Net Debt Issued			
	With No Financing Gap				With Financing Gap			
	LF-LP	LF-HP	SF-HP	SF-LP	LF-LP	LF-HP	SF-HP	SF-LP
Panel A: Target-Adjustment Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.013***	0.007***	0.009**	0.017**	-0.037***	-0.022***	-0.053***	-0.071***
	(2.90)	(2.36)	(1.92)	(2.07)	(-15.27)	(-8.35)	(-20.02)	(-18.92)
Target-adjustment	0.505***	0.696***	0.466***	0.330***	0.212***	0.436***	0.161***	0.108***
	(32.99)	(61.46)	(27.65)	(12.94)	(22.08)	(31.07)	(16.08)	(9.23)
N	5,965	3,718	5,381	3,111	3,817	2,480	3,096	1,781
R^2	0.15	0.50	0.12	0.05	0.11	0.28	0.08	0.05
Panel B: Pecking Order Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.040***	-0.011***	-0.018***	-0.036***	-0.005**	0.009**	-0.012***	-0.024***
	(9.58)	(-2.86)	(-3.48)	(-3.10)	(-1.67)	(-2.25)	(-3.75)	(-5.48)
Pecking order	0.419***	-0.232***	-0.181***	-0.196***	-0.328***	-0.180***	-0.425***	-0.440***
	(45.67)	(-29.86)	(-23.47)	(-17.15)	(-16.63)	(-6.40)	(-20.29)	(-18.25)
N	5,965	3,718	5,381	3,111	3,817	2,480	3,096	1,781
R^2	0.26	0.19	0.09	0.09	0.07	0.02	0.12	0.16

Group LF-LP indicates large firms-low profitability; LF-HP indicates large firms-high profitability; SF-HP indicates small firms-high profitability; and SF-LP indicates small firms-low profitability. The dependent variable is the net annual of debt issued, scaled by the book value of assets. The target-adjustment equation predicts the gradual adjustment to target ratios, where each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient $\boldsymbol{b_{ta}}$ *estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of* $\boldsymbol{b_{po}}$*=1. Panel A shows results of the target-adjustment model, and panel B shows results of the pecking order model. *** And ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 12: testing the Determinants Factor of Traditional Standard Corporate Profitability (Continued)

	Net Debt Issued				Net Debt Issued			
	With No Financing Gap				With Financing Gap			
	HP-LG	HP-HG	LP-HG	LP-LG	HP-LG	HP-HG	LP-HG	LP-LG
Panel A: Target-Adjustment Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.011**	0.006	0.012	0.017***	-0.035***	-0.041***	-0.054***	-0.042***
	(2.28)	(1.49)	(0.27)	(2.75)	(-13.64)	(-15.62)	(-18.92)	(-13.88)
Target-adjustme	0.414***	0.708***	0.434***	0.445***	0.223***	0.263***	0.160***	0.177***
nt	(23.99)	(53.39)	(23.61)	(22.62)	(20.25)	(21.06)	(15.48)	(16.44)
N	5,152	3,946	4,826	4,250	3,117	2,459	2,878	2,721
R^2	0.10	0.42	0.10	0.11	0.12	0.15	0.08	0.09
Panel B: Pecking Order Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.028***	-0.015***	-0.024***	-0.014**	-0.010***	-0.011***	-0.014***	-0.006
	(6.19)	(-3.13)	(-4.13)	(-2.20)	(-2.84)	(-2.78)	(-3.96)	(-1.62)
Pecking order	0.307***	-0.245***	-0.226***	-0.177**	-0.288***	-0.370***	-0.393***	-0.359***
	(22.01)	(-25.89)	(-25.66)	(-19.63)	(-12.03)	(-15.18)	(-17.85)	(-16.66)
N	5,152	3,946	4,826	4,250	3,117	2,459	2,878	2,721
R^2	0.11	0.15	0.12	0.08	0.04	0.09	0.10	0.09

Group HP-LG indicates high profitability-low growth; HP-HG indicates high profitability-high growth; LP-HG indicates low- profitability-high growth; and LP-LG indicates low profitability -low growth. The dependent variable is the net annual of debt issued, scaled by the book value of assets. The target-adjustment equation predicts the gradual adjustment to target ratios, where each firm's target is measured by its average debt ratio over 1995–2014. The target-adjustment coefficient $\boldsymbol{b_{ta}}$ *estimates a fraction of the distance between the actual and the target covered in one year. Pecking order equations predict debt issues equal to each financing deficit, implying a pecking order coefficient of* $\boldsymbol{b_{po}}$*=1. Panel A shows results of the target-adjustment model, and panel B shows results of the pecking order model. *** And ** indicate significance at the 1 and 5 percent levels, respectively.*

Table 13: Each Group of Target-adjustment and Pecking Order Test Summary

Corporate Matrix	Target-Adjustment Theory and Pecking Order Theory Test			
	Net Debt Issue DEF<0		Net Debt Issue DEF>0	
	Pecking Order Coefficient	Target-Adjustment Coefficient	Pecking Order Coefficient	Target-Adjustment Coefficient
SF-HP group	-	Target-adjustment***	-	Target -adjustment***
LF-HP group	-	Target -adjustmen***	-	Target -adjustment***
LF-LP group	Pecking order***	Target -adjustment***	-	Target -adjustment***
SF-LP group	-	Target -adjustment***	-	Target -adjustment***

*Table13 shows the results the target-adjustment model, and the pecking order model Summary of this paper. *** And ** indicate significance at the 1 and 5 percent levels, respectively.*

CONCLUSION

The goal of this study is use companies listed in the Taiwan Stock Exchange as samples to examine capital structure. We follow an approach similar to Frank and Goyal's (2003) test study of US businesses on the pecking order theory of financing methods of capital structure in 1971–1998. The study uses empirical data related to capital structure and financing decisions on listed companies in Taiwan. The empirical data in this study were obtained from the Taiwan Economic Journal database. Beginning from 1995 and ending in 2014, the sample of manufacturing companies listed at the Taiwan Stock Exchange included a total of 9,783 annual firm-year observations. The variables are based on the NT$ pricing. The study methodology is to divide the sample divided into four quadrant clusters, testing target-adjustment and the pecking order theory independently and in combination with the traditional regression joint testing. The actual and expected internal funding gap and robustness checks of the standards of traditional corporate leverage decision factors using OLS regression were used to normalize the test for the hypothesis inference.

Table14: Each Group Financing Strategies of Conventional Regression of Internal Funding Gap and Lagged Leverage Test Summary

Corporate Matrix	Each Stage Financing Strategies of Conventional Regression of Internal Funding Gap and Lagged Leverage Test Summary			
	Traditional Regression Contains Pecking Order and Target-Adjustment		Traditional Regression Contains Lagged Leverage and Target-Adjustment	
	Pecking Order Coefficient	Target-Adjustment Coefficient	Pecking Order Coefficient	Target-Adjustment Coefficient
SF-HP group	-	Target-adjustment***	-	Target-adjustment***
LF-HP group	-	Target -adjustmen***	-	Target -adjustment***
LF-LP group	Pecking order**	Target -adjustment***	-	Target -adjustment***
SF-LP group	-	Target -adjustment***	-	Target -adjustment***

*Table14 shows results of the target-adjustment model, and the pecking order model of financing strategies of conventional regression of internal funding gap and lagged leverage *** and ** indicate significance at the 1 and 5 percent levels, respectively.*

Table15: Conventional Standard Determinants of Corporate Leverage Summary

	Net Debt Issued Def<0		Net Debt Issued Def>0	
	Pecking Order Coefficient	Target-Adjustment Coefficient	Pecking Order Coefficient	Target-Adjustment Coefficient
LF-LG	- -	Target-adjustment***	-	Target-adjustment***
LF-HG	Pecking order***	Target-adjustment***	-	Target-adjustment***
SF-HG	-	Target-adjustment***	-	Target-adjustment***
SF-LG	-	Target-adjustment***	-	Target-adjustment***
LF-LP	Pecking order***	Target-adjustment***	-	Target-adjustment***
LF-HP	-	Target-adjustment***	-	Target-adjustment***
SF-HP	-	Target-adjustment***	-	Target-adjustment***
SF-LP	-	Target-adjustment***	-	Target-adjustment***
HP-LG	Pecking order***	Target-adjustment***	-	Target-adjustment***
HP-HG	-	Target-adjustment***	-	Target-adjustment***
LP-HG	-	Target-adjustment***	-	Target-adjustment***
LP-LG	-	Target-adjustment***	-	Target-adjustment***

*Table15 shows results of the target-adjustment model, and the pecking order model. of Conventional standard determinants of corporate leverage Summary. *** and ** indicate significance at the 1 and 5 percent levels, respectively.*

The main findings of this study are as follows: First, when tested independently, the target-adjustment theory proved superior to the pecking order theory. Second, a conventional regression analysis that included factors related to both the target-adjustment and pecking order theories, also produced evidence to suggest that the target-adjustment theory is superior to the pecking order theory. With the exception of the LF-LP group, t-tests of the internal financing deficit of the pecking order were significant. When factors related to the target-adjustment theory were included (all of which were significant), all pecking order theory factors became non-significant. Third, a small sample of firms for which DEF> 0, the conventional regression with pecking order and target-adjustment two variables maintain on robustness checks. These results emerge after adding the pecking order that the four quadrants of pecking order are all negative and reject the pecking order. Next, we add the target-adjustment. The four quadrant t-statistic are highly significant, following the target-adjustment.

Fourth, when two variables related to conventional regression (i.e., conventional regression aim pecking order and target-adjustment or internal financing deficit and lagged leverage) are used in a joint robustness checks, and the test procures robust results. Fifth, there is strong evidence to suggest that structural characteristics of the clusters that comprise each quadrant are correlated with a target-adjustment structure. Hovakimian and Li (2011) argued that enterprises with target leverage ratios will automatically adjust in accordance with the target structure. Sixth, although internal factors related to

pecking order and target-adjustment financing deficits for TWSE have explanatory power, the former's is a bit weaker than the latter's. Nevertheless, an increase in either factor (in any cluster) improves the model's explanatory power (R^2). This last finding may be attributable to the same factors associated with the LF-LP firms and in the mature stage of their life-cycle.

Seventh, the average foregoing results show that the average method is the optimum method for dividing firms into quartiles. The quartile classifications can be further divided in terms of their size, growth, and profitability. Overall, the data show that listed firms in the Taiwanese stock market tend to engage in target-adjustment leveraged debt financing. This may account for the majority of SMEs, but it also shows that there may exist a great deal of enterprise funds, intermediation from bank loans and credits (Berger and Dell, 1998). Pecking order theory is not the best factor to explain TWSE financing. Static tradeoff theory, by contrast, has much better explanatory power. The evidence produced here demonstrates that conventional leverage factors among firms in different quadrants will result in those firms implementing different financing strategies.

This study is limited to financial firms. Regulated public utilities are not included in the sample, and undistributed property is limited. Second, the use of variables in this study sample was observed for the financial indicators in the analysis. Managers' decision-making process was observed using subjective and objective environmental factors. The latent factors behind the decision makers are more difficult to capture. Therefore, whether the conclusion can correctly describe the whole picture of the subject of research is not completely clear. Future research might include extracting latent factors using multivariate factor analysis, second, extracting latent variables as a grouping of criterion variables, third, discussing the issues for each group by different life-cycle or characteristics, and, finally, comparing the advantages and disadvantages of its methods. This study provides a reference for researchers and policy-makers.

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U.S. PUBLIC PENSION FUNDS AND RISK SEEKING BEHAVIOR OF MONEY MANAGERS: THE PATH TO ALTERNATIVE INVESTMENTS

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ABSTRACT

State Public Pension funds have increased their portfolios into riskier alternative investments to meet their annual required contributions (ARC). Our paper uses The Public Plans Data (PPD) to analyze the differences in alternative investments for 2001 to 2013 by Democrats and Republican lawmakers. The shift in funds from traditional to alternative investments ushers in a new era for public pension fund money managers and their appetite for taking on higher levels of risk. This paper shows that the shift from traditional low risk – low return investments to alternative high risk – high return investments of state public pension funds are due to changes in governance and risk seeking investment behavior of the money managers.

JEL: H75, J38, E6, P16

KEYWORDS: Public Pensions, Funding Ratio, Alternative Investments, Democrats, Republicans, Panel Data & OLS Regression, Random Effects Model, Risk Seeking Behavior

INTRODUCTION

A recent article in a prominent newspaper headlined that New York City's pension system is in danger of 'operational failure' (Craig, 2016). Similar headlines are not an anomaly. Pensions are a popular subject in US public discourse. Public pension plans are even more so. Indeed, back in 2010, an expert noted that 20 state pension funds will run out of cash by 2025 (Lowenstein, 2010). Surprisingly, public pension funds have no federal oversight and are not insured by the Pension Benefit Guaranty Corporation (PBGC), which insures private pension plans. While the public pension accounting practices follow guidelines established by the Governmental Accounting Standards Board (GASB) (Mohan & Zhang, 2014; O'Reilly, 2014). Interestingly, the GASB requirements are less stringent than the requirements imposed on private pension plans. Newspapers regularly feature stories pertaining to public pension underfunding. Unfunded pensions are a worrisome trend not only in the United States, but also in Europe (Samuel, 2016) and not limited to governments. Matter of fact, many of the corporations have frozen their defined benefit plans at a much higher rate in 2015 than in 2009, which "stops earning benefits for workers" (Monga, 2016). This paper focuses on funding challenges faced by the biggest public pension funds in the US and subsequent allocation decisions within the context of political party affiliation. More specifically this paper analyses how investment allocations by public pension funds in alternatives (which have higher levels of risk than traditional stocks and government bonds) fared under the Democrats and Republicans regimes at the state level in the United States from 2001 to 2013. Furthermore, we also determine whether there exists any differences between the two political parties in accruing higher levels of risk in their respective pension fund allocations. At present, there is no on-point research in current literature. This paper is organized with this introduction section, followed by literature review, analysis of data and methodology, and concludes with a recommendation for further research.

Pensions have a long history and is one of few public welfare schemes consistently supported by all hues of public (Wolf et. al, 2014; Huber and Stephens, 1993). In the Unites States, pension funds began as a way to provide for those disabled in military service (Short, 2003). Moreover, management of pension funds and investment by trustees of the Navy pension funds in stock of Washington, DC banks began as far back as 1813 (ibid.). Generally major political parties take positions opposite to each other in many welfare programs, but support of pensions are supported by both major parties of the United States—the Republicans and the Democrats. Therefore, any opportunity to increase pension benefits is generally supported by the American voters. Pensions are defined as a shift in "labor costs from the present to future, which allows employees to save for retirement without the temptation of raiding their savings" (Kelley, 2014, p. 21). Generally, there are two types of pensions. One is defined benefit (DB) plan, and the other is defined contribution plans. For a DB plan, the retirement benefit is independent of investment returns of the pension fund (O'Reilly, 2014). The severity of unfunded (or low funded) public pensions have come in sharp focus since the economic recession of 2008. Mainly, the recession of 2008 led to a precipitous drop in assets of many public pension plans and exposed the low level of funding for the biggest public pension plans in the US.

A pension fund has three sources of funds: (a) contributions from employees, (b) contributions from employers, and (c) earnings from the pension investments (Lowenstein, 2010). All sources have contributed to the pension funding gap leading to DB pensions being short of funds to pay for future claims. The lack of funding is due to: (i) increased number of pensioners, (ii) decreasing number of workers who contribute to pensions versus pension seekers, (iii) no or very little contribution by employees, (iv) increased life expectancy, (v) decreasing value of stocks, (vi) low interest rates, (vi) lack of adequate staff to monitor investments, (vi) increase in pension benefits during economic growth (Martin, 2015), (vii) lawmakers not making required payments into the pension system (ibid.), (viii) boosting of retirement benefits for early retirement (Ibid.), (ix) unemployment growth (ibid.), and (X) investing in non-traditional assets such as private equity and hedge funds (ibid.).

To make up for the decline in funding of public pension plans, many of the public pensions have started to allocate their funds at an increasing rate in private equity and other alternatives. A pension is considered underfunded (or not fiscally sound), "if it is less than 70 percent" funded (Dorfman, 2014). A funding ratio below 80% puts in question the long-term viability of a pension plan (Dobra & Lubich, 2013). A pension's funding level is the ratio of the plan's current (market) assets divided by the present value of its liabilities (outflow of funds to beneficiaries) (Elder and Wagner, 2015) or simply, pension assets over pension liabilities (Mohan & Zhang, 2014). The present value of future liabilities is determined using the discount rate. A discount rate is the "future expected return on the pension fund investments [and it] controls how much money the politicians need to pay into the workers' pension funds now" (Dorfman, 2014). Thus, the higher the discount rate, the less money needs to be deposited in a pension fund. The discount rate has been traditionally around 7.75% to 8% (Biggs, 2015). In turn, the discount rate is based on the assumed interest rate made by pension fund's investments. When the stock markets are doing well, a return of 8% has been usually easy to achieve. Studies have found that rising national incomes leads to more pension expenditure and more generous pension plans (Huber and Stephens, 1993).

However, when the stock markets decline, for example the tech bubble burst of early 2000 and the recession of 2008, the returns on pension investments were much less (Walsh, 2014). Another misplaced reason for the assumed high rate of return of 8% was that GASB accounting rules allowed public pension plans to "credit themselves with higher returns on risky assets before those returns are earned, creating an artificial incentive to take risk" (Biggs, 2014). Therefore, the low returns on the pension fund investments reduce the funded ratio considerably. Also in 2010, the GASB required the pension funds to value their assets at market value and exclude the smoothing and other actuarial assumptions, which also increases the liabilities of the pension funds (Rasmus, 2012). Resulting in an increased pressure on pension administrators to seek investments that which make up the losses quickly and considerably via higher rates of return.

Traditionally, pension funds invested in mostly stocks and bonds. This combination provided a balanced return—no big losses but also no big gains. With the considerable loss in stock market returns, and other causes stated earlier, pension funds sought other investments where they could get large returns on their investments. Eventually the public pension fund trustees settled on investing in alternatives funds, i.e., private equities, hedge funds, and other high-risk high-reward financial instruments, which provided larger returns. Private Equity is generally defined as "any type of equity that is bought and sold in a privately negotiated transaction and is not traded on a public stock exchange. Private equity investors provide capital to companies when it is not possible or desirable to access the public markets, or when there are opportunities to purchase public enterprises that are seen as undervalued or poorly managed. Private equity firms establish funds that raise money and invest it on behalf of their investors in companies that they believe can achieve profitable growth" (Vanguard, 2010). Private equity firms take funds from pensions and hope to make big profits when they sell the firms they have invested in future (Martin, 2015).

Returns in alternative investments soar in value when the economy is strong and lose value very quickly when it is weak (Barro, 2014). A struggling economy compounds the negative impact on a pension fund with low returns on pension's investments while tax receipts are low for the state and local governments all the while demand for social services go up. Thus, even though the public employers want to increase funding for pensions, they are unable to do so because of funds needed for other crucial societal needs. Thereby, exacerbating the pension funding gap (Barro, 2014). Another important component of alternatives is the hedge funds. Recently, hedge funds--supposed hedge against difficult investing environment--has also not performed up to its name. In addition to the possibility of big losses by hedge funds (Walsh, 2014), hedge funds generally charge a 2% annual fee on assets they manage and 20% of any profits they make, thereby making them not only risky but also expensive (The Economist, 2015). Even worse, lately hedge funds' annual performance has been very similar to yields of a well-balanced portfolio of stocks and bonds (The Economist, 2015; Morgenson, 2015). In 2008, hedge funds lost 19% on their investments, while a balanced fund lost 22.2% (Lanhart, 2014). Therefore, these negatives have now led pension funds to reduce their estimated rate of returns (discount rate used in liability calculation) to 6.4% (Martin, 2015). Thereby, increasing the funding gap of pension plans. Generally, a reduction of 1% in the expected returns lead to an increase of pension liabilities of 12% (Martin, 2015).

While the stated reasons for investing in alternatives is higher returns, reports have also highlighted another troubling reason. Pension funds seek advice of politically connected consultants, who advise pension trustees to invest in riskier alternative funds, and then the principals of theses alternative funds provide fees to the consultants who in turn contribute to election campaigns of politicians. The state politicians generally choose many of the public pension fund trustees (Walsh, 2013; Steyer, 2014). An author argues that the current crisis in pension funds is due to state politicians and government employee unions (Dorfman, 2014). By overpromising, politicians get votes and the unions get their dues and prestige. Interestingly, one columnist argues that the reason the politicians do not adequately fund the pension is because they are busy giving corporate handouts. He states that circa 2013, public pensions faced a shortfall of around $30 billion, while they gave away $120 billion in subsidies and tax loopholes to corporations (Sirota, 2013). Others have argued that a stagnant economy suppresses upward movement of real wages and thus employees could not contribute additional funds to their pension plans, even if they wanted to (Rasmus, 2012).

Around 2008, similar to the actions taken post technology bubble of 2000-01, there was a pronounced shift by public pensions to invest in *risky* alternative assets (Barro, 2014). Moreover, the passage of the Pension Protection Act of 2006 permitted pension funds to partner with hedge funds and thus resulted in greater investments into alternatives (Rasmus, 2012). Despite the shift towards alternatives, hedge funds were only 1.3% of large public pension plans as of June 2015 (Stevenson & Corkery, 2015). Social Security trust fund also faces similar funding concerns as do the public pensions, thus back in 2003, then George W. Bush administration floated the idea that Social Security trust fund may be privatized and or the Social Security trust fund invest in the stock market (Short, 2003). The underlying reason being that the social security funds

would then see higher returns and thereby increasing the value of the Social Security trust fund. However, the Democrats (the opposition party in Congress at that time) soundly opposed this suggestion and the Social Security initiative failed in 2005 (Galston, 2007). The Democrats' reasoning was that investing in the stock market would introduce higher levels of risk than warranted and could result in catastrophic loses for social security recipients while putting the viability of social security fund at risk. Politicians on the left (i.e., Democrats) are generally seen as supporters of social programs and policies and regarded as its natural defenders (Wolf et al., 2014).

LITERATURE REVIEW

The underfunding of pensions have been thoroughly analysed in academic papers and covered extensively in national newspapers in the United States. Indeed, the underfunding has led the US government to give monies to state pension funds from the fines it collected from wrong doers such as Bank of America, JP Morgan, Citibank, Wells Fargo, Citibank, Morgan Stanley and Goldman Sachs post mortgage crisis (Rexrode and Glazer, 2016). In addition, the influence of politics and investments has also been analysed in academic papers. While discussing asset allocation decisions Dobra and Lubich (2013) concluded that in a public pension (i) the higher the percentage of board members who are retired, the higher the percentage of assets in riskier investments, (ii) the larger the size of the board, the greater the percentage of assets placed in riskier investments, and (iii) exoffcio members desire less risky portfolio than board members elected by system participants when economically targeted investments (ETS) are made. ETSs are outside the traditional risk return template. Mohan and Zhang (2014) find that public pension funds: take more risk if they are underfunded and have lower investment returns in prior years; states facing fiscal constraints allocate more assets to equity and have higher betas; and California Public Employees Retirement Systems' (CalPERS) equity allocation and beta is mimicked by other public pension plans. O'Reilly (2014) argues that it is fully possible that the federal government will be forced to bail out pensions in an event of a default and thus it is better to take the difficult steps now to make the pension funds fully funded now and that inaction will be lot more costly. Across Europe, Wolf et al. (2014) find that political parties in western democracies who are supposed to be supporters of pension benefits were able to make deeper cuts in pension benefits.

Analyzing institutions in UK, Switzerland, Sweden and Netherlands--Cumming et al. (2011) conclude that investment in listed private equity is made more commonly by smaller, private (not public) pension institutions. Kelley (2014) finds that special interest groups and median voters are the main drivers of pension funding levels. Rich and Zhang (2015) find that municipalities that permit direct citizen participation in legislative process (via petition drives) are associated with better funded DB pension plans. Bradley et al. (2016) find that pensions with higher proportion of politically affiliated trustees invest in riskier assets, and powerful politicians can impose political pressure on state pensions to invest in politically connected local firms. Finally, Wang and Mao (2015) state that many public pension fund boards are dominated by politicians (appointed or ex officio trustees) which have no direct financial interest in a fund's performance. They point out that many use pension funds to advance their political careers. States that are red (leaning Republican) and blue (leaning Democrat) and its impact on allocation in alternative assets has not been by analysed in prior literature. Our analysis adds to the literature by determining whether states considered Democratic or Republican generally influence the percentage of pension funds being allocated to alternatives. Put differently, do the democratic leaning states tend to invest to a lesser degree, public pension funds in alternatives in comparison to Republican leaning states?

DATA AND METHODOLOGY

This paper examines the relationship between political party affiliation, primarily Republicans and Democrats at the state level and behavioural changes in riskier investments by state public pension fund managers. The analytical framework applies two random effects panel econometric models. The dependent variables are average annual returns [model 1, see eq. 2], and the Sharpe Ratio [model 2, see eq. 3]. The explanatory

variables are investment in alternative assets, real estate, all bonds (domestic and international), international equities, other assets and a dummy variable for political party affiliation. The public pension plans analysed pertain to state workers, teachers and others (Public Fund Survey, 2015). Determination of whether a State is Democratic or Republican is based on US Senate election results for 2000, 2004, 2008 and 2012. The election data was retrieved from the US Federal Election Commission website (FEC.gov, 2015). A state is classified as either Democratic or Republican based on the overall total number of votes received by a senate candidate. Thus, if the voters of a state elected a Democrat senator during that election, it was determined to be democratic leaning state and if the voters of a state elected a Republican senator, it was determined to be a Republican leaning state. The Public Fund Survey (2015) is an online compendium of key characteristics of most of the nation's largest public retirement systems. Beginning with fiscal year 2001, the Survey contains data on public retirement systems that provide pension and other benefits for 12.6 million active (working) members and 8.2 million annuitants (those receiving a regular benefit, including retirees, disabilitants and beneficiaries). Equation [1] below gives the general form of the random effects panel regression model. The composite and idiosyncratic error term is uncorrelated with all past, current and future time periods for each individual unit. Y_{it} is the dependent variable observed for individual i in time t. X_{it} is the time-variant regressor, a_i is the unobserved individual effect, u_{it} is the error term.

$$y_{it} = \beta_0 + X_{it}\beta_k + \alpha_i + u_{it} \quad [1]$$

$$Avg\,\mathrm{Re}turns_{it} = \beta_0 + \beta_{i1}Alternatives + \beta_{i2}\,\mathrm{Re}alEstate + \beta_{i3}Bonds + \beta_{i4}IntEquities + \beta_{i5}OtherAssets + \beta_{i6}DemDummy + \alpha_i + u_{it} \quad [2]$$

$$SharpeRatio_{it} = \beta_0 + \beta_{i1}Alternatives + \beta_{i2}\,\mathrm{Re}alEstate + \beta_{i3}Bonds + \beta_{i4}IntEquities + \beta_{i5}OtherAssets + \beta_{i6}DemDummy + \alpha_i + u_{it} \quad [3]$$

Two random effects panel regressions were used to analyse average annual returns [see eq. 2], and the Sharpe Ratio [see eq. 3] controlling for the type of financial instruments invested in state public pension funds. A dummy variable ($\beta_{i6}DemDummy$) was created to measure the effects of state political party affiliation on dependent variables average returns and the Sharpe Ratio, respectively. This paper examines whether there is a correlation between political party affiliation and taking on higher levels of risk (i.e., investing in alternative assets rather than the traditional and safer financial instruments such as stocks and government bonds)? State public pension funds average annual returns did not perform as expected in the past decade or so (Table 1). In early 2000s, average annual returns (not taking into account political party affiliation) were negative in fiscal years 2001 (-5.9%), 2002 (-6.3%) and 2003 (-2%). While the funded ratio in 2001 (98.8%), 2002 (91.4%) and 2003 (86.2%) also declined. Average annual returns were at their lowest in 2002 (-6.3%) and the funded ratio reached its lowest mark in 2013 (68.4%). Meanwhile, the shift to alternatives and away from traditional and safer investments such as bonds and equities transpired at the cusp of the Great Recession of 2008-2009. From 2001 to 2007, investments in alternatives was between 4.2% (2001) to 6.8% (2007). By 2008, alternatives investments increased to 10.7 and reached a high of 16.7% in 2013. The increase in alternatives investments coincided with decreases in both bonds, 2001 (31.2%) and in 2013 (20.9%), and equities, 2001 (57.2%) and in 2013 (46.5%), respectively.

To measure the correlation between risk and expected returns in different types of financial assets and their associated risk levels, Sharpe Ratio is used. A positive Sharpe Ratio indicates higher expected returns relative to the risk associated with the financial instrument, while a negative Sharpe Ratio indicates lower expected returns relative to the risk associated with the financial instrument. A positive Sharpe Ratio is favourable, preferably above one because the asset earns a higher expected return relative to its associated

risk level. Stated differently, a negative Sharpe Ratio indicates that higher levels of risk did not translate into higher levels of expected returns and the asset underperformed relative to its risk level. Table 1 below, shows a negative Sharpe Ratio for fiscal years 2001 (-2.13), 2002 (-1.76) and 2003 (-.68); while being positive in 2004, even though, the value did not reach above one until 2013 (1.11). This illustrates that from 2004 to 2012 expected returns from investments in riskier assets did not come to fruition and thus could not contribute adequately to the public pension fund portfolio.

State public pension funds average annual returns did not perform as expected in the past decade or so (Table 1.). In early 2000s, average annual returns (not taking into account political party affiliation) were negative in fiscal years 2001 (-5.9%), 2002 (-6.3%) and 2003 (-2%). While the funded ratio in 2001 (98.8%), 2002 (91.4%) and 2003 (86.2%) also declined. Average annual returns were at their lowest in 2002 (-6.3%) and the funded ratio reached its lowest mark in 2013 (68.4%). Meanwhile, the shift to alternatives and away from traditional and safer investments such as bonds and equities transpired at the cusp of the Great Recession of 2008-2009.

Table 1: State Public Pension Fund Investment

Year	Average Annual Returns (%)	Funded Ratio (%)	Sharpe Ratio	Alternative Investment (%)	Bonds (%)	Equities (%)
2001	-5.9	98.8	-2.13	4.2	31.2	57.2
2002	-6.3	91.4	-1.76	4.4	32.5	55.3
2003	-2.0	86.2	-.68	4.6	30.4	57.0
2004	1.9	83.9	0.16	4.4	26.8	61.0
2005	3.6	81.2	0.13	4.5	26.5	61.8
2006	4.9	81.9	0.05	5.5	25.4	62.2
2007	6.5	83.0	0.43	6.8	24.2	61.2
2008	4.6	80.4	0.67	10.7	25.9	54.3
2009	2.3	74.6	0.48	12.6	26.8	51.4
2010	3.3	72.9	0.71	14.0	26.4	49.9
2011	4.5	70.8	0.99	15.0	24.0	51.1
2012	4.4	68.7	0.98	17.4	23.3	48.1
2013	5.0	68.4	1.11	16.7	20.9	46.5

This table shows the annual average returns, funded ratio, Sharpe Ratio, alternative investments, bonds and equities for variables under consideration over the sample period from fiscal year 2001 to 2013. Annual return is the return an investment provides over a period of 2001 to 2013, expressed as a time-weighted annual percentage. We define the funded ratio as ratio of a pension or annuity's assets to its liabilities. A funding ratio above 100 indicates that the pension or annuity is able to cover all payments it is obligated to make. The Sharpe ratio is defined as the average return earned in excess of the risk-free rate per unit of volatility or total risk. Alternative investment excludes conventional investment types, such as stocks, bonds and cash.

When analysing public pension fund money managers' investment strategies pre-post Great Recession (Table 2), their main focus was directed towards alternative investments and away from bonds and equities. There was a 169.6% increase of investment in alternatives pre-post Great Recession. The second highest increase was in real estate (31%). The largest declines were in international bonds (-81.5%), U.S. equities (-43%) and U.S. bonds (-35.1%), respectively.

Table 2: State Public Pension Fund Investment Pre-Post Great Recession

Investment in (%)	Pre-Recession (2001-2008)	Post-Recession (2009-2013)	(%) Change Pre-Post Recession	All Years (2001-2013)
All Bonds	27.7	24.3	-12.3	26.5
All Equities	58.8	49.1	-16.5	55.2
Alternatives	*5.6*	*15.1*	*169.6*	*9.3*
Cash Short Term	2.4	2.7	12.5	2.5
Intl. Bonds	0.5	0.10	-81.5	0.7
Intl. Equities	14.9	15.6	4.7	15.1
Other Assets	1.1	1.2	9.1	1.1
Real Estate	4.2	5.5	31.0	4.7
U.S. Bonds	7.7	5.0	-35.1	6.7
U.S. Equities	39.5	22.5	-43.0	33
Avg. Returns	*0.9*	*3.9*	*323*	*2.1*
Funded Ratio	86	71	-17	80
Sharpe Ratio	*-.396*	*.856*	115	*.085*

This table shows investment of state public pension funds before and after the Great Recession in percent of the overall investment for variables under consideration in this study over the sample period from fiscal year 2001 to 2013. The Great Recession was defined according to the Business Cycle Dating Committee, National Bureau of Economic Research (NBER). Prior to the Great Recession money managers followed a more conservative approach to investment in public pension after the Great Recession the data shows a significant shift to make up lost ground in investing in alternative types of financial instruments.

The public pension fund data also supports political party affiliation and changes in investment behaviour from safer assets into riskier alternatives (Table 3). Focusing on pre (2001-2008) – post (2009-2013) Great Recession, Democrats increased investments into alternatives by 97.3%, while Republicans increased it by 312.8%. This shift was due to the decline in investment in U.S. equities--Democrats (-79%) and Republicans (-75%). In the case of U.S. bonds, there was a small decline for Democrats (-17%) while a greater decline for Republicans (-61%).

Table 3: Party Affiliation Differences in State Public Pension Fund Investment

Investment in (%)	Pre-Recession (2001-2008)		Post-Recession (2009-2013)		All Years (2001-2013)	
	Dem	Rep	Dem	Rep	Dem	Rep
All Bonds	25.1	30.7	23.6	25.6	24.4	29.1
All Equities	59.9	57.7	48.9	50.4	54.9	55.5
Alternatives	7.4	3.9	14.6	16.1	10.6	7.6
Cash SR Term	2.0	2.8	2.6	3.0	2.2	2.9
Intl. Bonds	0.4	0.7	0.64	1.6	0.5	0.9
Intl. Equities	16.7	13	16.3	14.0	16.5	13.4
Other Assets	1.4	0.7	1.3	0.97	1.4	0.8
Real Estate	4.2	4.2	6.3	4.0	5.1	4.1
U.S. Bonds	4.8	10.7	4.1	6.6	4.5	9.5
U.S. Equities	40.7	38.4	22.8	21.9	32.7	33.4
Avg. Returns	1.0	0.9	4.0	3.8	2.3	1.8
Funded Ratio	84	88	71	70	78	82
Sharpe Ratio	-.389	-.403	.871	.829	.177	-.032

This table shows the average investment as a percentage of the total in the variables under consideration in the study pre-post Great Recession by Republicans and Democrats over the sample period, pre-recession (2001 to 2008), post-recession (2009 to 2013) and all years (2001 to 2013), respectively. Average returns post-recession are higher indicating greater returns from investment in alternative financial instruments. This was evident for both Republicans and Democrats alike. Average returns were modest for all years--which raises concerns about investing strategies of properly funding benefits of holders of public pensions.

Table 4 below shows that the average annual returns increased when invested in alternative (6.5%), real estate (19.5%), and other assets (15.8%) but there was a decline in the case of bonds (-17.5%). The average annual returns for Democrats and Republicans is 1.8% and 5.1% respectively. The Sharpe Ratio was 2.69 for alternatives and 6.32 in the case of real estate. In both cases, investment in alternatives and in real estate, the

expected returns were higher relative to the risk incurred by the investments. For bonds, the expected returns were lower relative to the risk levels of the investments. The Sharpe Ratio for Democrats is .571 and for Republicans 1.09. The overall R-Squared for average returns and Sharpe ratio are .089 and .112, respectively. In random effects panel regression models it is common to have a low R-Squared due to the nature of the data i.e., cross-sectional rather than primarily time series data.

Table 4: Maximum Likelihood Panel Regression Random Effects Estimation of Average Returns and Sharpe Ratio

Dependent	**Model 1 Average Returns (%) [Coef.]**	**Model 2 Sharpe Ratio (Levels) [Coef.]**
Alternatives	6.5*	2.697***
	(0.025)	*(0.589)*
Real Estate	19.5**	6.328***
	(0.068)	*(1.63)*
Bonds	-17.5***	-4.087***
	(0.029)	*(0.649)*
Equities	1.4	-.617
	(0.021)	*(0.482)*
Other Assets	15.8*	-1.859
	(0.069)	*(1.61)*
Cash Short-Term	1.09	3.574
	(0.073)	*(1.72)*
DemRepDummy	1.8**	0.571***
	(0.006)	*(0.131)*
Constant	3.3	0.572
	(091)	*(0.442)*
Sigma u	2,4	0.649***
	(0.004)	*(0.096)*
Sigma e	3.9	0.895***
	(0.001)	*(0.025)*
rho	28	0.344
	(0.072)	(0.071)
R-Squared (overall)	0.089	0.112
N. of Cases	728	728

*This table shows the estimation results of maximum likelihood panel regression models 1 and 2. The dependent variables for model 1 and model 2 are average annual returns and Sharpe Ratio, respectively. Model 1 variables are in percentage and model 2 in levels, respectively. Rho indicates the variability in investment across panels due to differences in financial instruments. Sigma u and sigma e are standard deviations of the residuals within groups and the overall estimated model, respectively. The numbers in parentheses are the standard errors and *, **, *** indicate significant levels at the 10%, 5% and 1%, respectively.*

CONCLUDING COMMENTS

State public pension funds data for fiscal years 2001 to 2013; support our claim that state public pension funds money managers shifted their focus away from safer and more traditional investment strategies to more risky investments to reap the higher levels of expected returns. The data also upholds that there are statistical differences between Democrats and Republicans investment strategies and managerial investment behaviour overseeing state public pension funds portfolios. The panel regression results show that investment in alternative assets and real estate increased average annual returns by 6.5% and 19.5%, respectively. The Sharpe Ratio is 2.967 (alternatives) and 6.328 (real estate) which illustrate that expected returns were higher relative to the risk level of the asset. Overall, during the study period (2001-2013), we found that the Democrats tend to invest more in alternative investments and accrue higher levels of risk in contrast to the Republicans. However, the data analysis of pre and post Great Recession leads to mixed results. For alternatives investments, pre Great recession, the difference between Democrats and Republicans is statistically significant but insignificant for post Great Recession.

This research is limited since many of the pension trustees and managers are appointed by the state governor. Therefore, an analysis based on the governor's political affiliation should also be completed. Although, this limits our findings, many of the state governors go on to become senators at the federal level while being

member of the same political party. Our future research will include this analysis and any recent trends such as pension funds moving away from alternatives (i.e., hedge funds) and active managers.

Ultimately, the $1 trillion gap in large public-worker retirement systems pensions is forcing the Democrats and their affiliated groups to focus toward overhauling and finding solutions to reducing the pension funding gap in the United States (Martin & Maher, 2015). The appropriate; however, unpopular solution is a combination of increased realistic contribution by employers and employees and reduction in promised benefits (The Economist, 2015). The changes are already underway. In 2015, CalPERS—the largest public retirement system in US, and considered a bellwether of large public pension plans (Lanhart, 2014)—announced that it was eliminating its investments in hedge fund holdings (Morgenson, 2015). These steps are sorely needed since the funding gap not only hurts the future beneficiaries, but the continuing funding gap leads to a State's poor credit rating (in turn leading to more expensive borrowing costs), but also siphoning off funds that could go to schools, social services (Lowenstein, 2010), infrastructural investments, and health care support. This is not a lost cause because as recently as 2000, New York City's pension funds were more than fully funded at 136% of needed contributions (Dorfman, 2014). Therefore, there is no reason to believe that with some transparent and correct decisions, pension funds will become healthy again.

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THE INCREMENTAL INFORMATION CONTENT OF SALES IN EXPLAINING STOCK RETURNS: A CROSS-INDUSTRY STUDY

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ABSTRACT

In this paper we examine the industry specific determinants of the information content of sales incremental to earnings in explaining stock returns. We find that across industries the information content of sales beyond earnings in explaining contemporaneous return is significantly associated with the timeliness of earnings and sales information to the market. We find evidence of income smoothing which can arise from firms' accounting and operating decisions. The increase in R^2 due to sales in explaining returns varies widely across industries and is with and due to adding sales in addition to earnings with mean 57% after controlling for the effects of the timeliness of sales and earnings.

JEL: M21, M40

KEYWORDS: Information Content, Stock Returns, Sales, Earnings

INTRODUCTION

Sales information is the most commonly used item next to earnings by both financial analysts and managers. Sales are the principal source of a firm's revenue and investors and managers pay a great deal of attention to how a firm's sales are generated and change over time. Changes in a firm's sales and their expectations would thus be closely related to its current and future earnings and equity price, and studies have shown that there is information content in sales and sales forecasts incremental to earnings and earnings forecasts. However, studies show that earnings is a much better summary measure than sales in explaining stock returns. The purpose of this paper is twofold. First, we reexamine if there is information content of sales incremental to earnings in explaining stock returns. Second, we investigate the factors that influence the information content of sales.

This paper is different from most other existing studies that have similar purposes in that we actively utilize cross-industry differences for both purposes of our study. We use the increase in R^2 due to adding sales in return regressions (after a monotonic transformation into a zero-one interval: see Section 2.1) as our measure of the incremental information content of sales for each industry. Using 80,698 firm-year observations from 44 industries used by Fama and French (1997), we find that the increase in R^2 due to adding sales and the earnings and sales interaction in return regressions is 30% for the full sample. Separate industry regressions show wide differences across industries and a distinctively greater increase in R^2: the mean increase in R^2 is 57% (the median is 38%) for 44 industries. This suggests that the incremental information content of sales gleaned from a return regression on a pooled sample provides insufficient information about the informational value of sales if there are significant differences across industries in how sales and earnings are related to each other and to stock returns. In a pooled regression, interesting differences across industries are averaged out and, as a result, the information content of sales seems underestimated.

Given that there is significant information content of sales incremental to earnings, we search for the factors that influence the information content of sales from cross-industry differences. The results of separate return regressions for industries on earnings, sales, and an earnings-sales interaction term show that the sales term and the earnings-sales interaction term are both significantly positively associated with returns for most industries. This implies that sales have a positive effect on returns after controlling for its effect through earnings, and this effect is greater for higher earnings. We then link the industry measure of the information content of sales to how differently sales affect future earnings in different industries. It is natural to examine future earnings because stock returns reflect the realization of current earnings and also changes in expectations of future earnings. We first investigate how current sales are associated with immediate future earnings by regressing year $t+1$ earnings on year t earnings, sales and the interaction of the two for each industry. The choice of immediate future earnings is made from our conjecture that they would be an important part of all future earnings due to their proximity and relatively low uncertainty. We find that in most industries the interaction term is positively associated with $t+1$ earnings but current sales are not significantly associated with $t+1$ earnings.

A positive coefficient on the interaction term implies that the impact of sales on immediate future earnings is more positive if current earnings are higher. This result can arise through direct income smoothing by means of accounting decisions such as discretionary cost allocation. For example, in a year when sales are strong, a firm can allocate more cost to the year, which favorably affects the next year's earnings. The result can also be obtained through purely operational decisions. For example, a firm can choose to initiate a measure related to its production, marketing, or administration that results in a reduction in earnings in the year of adoption but increases in earnings from the next year. This type of smoothing may be prevalent and even necessary for the survival of a firm.

The results show that the factors that influence the information content of sales are the timeliness of sales and earnings. The timeliness of sales (earnings) is the fraction of the sales (earnings) information that is impounded into stock price during the year when sales (earnings) are recognized in the firm's books. Timeliness affects information content because, unless the sales information is new to the market, sales would not have information content regardless of other factors. By the same token, as the timeliness of earnings decreases, current returns reflect less of the information contained in current earnings, and there is more room for sales to convey new information to the market. Adding these two timeliness measures to the regression of the information content of sales, we find that the timeliness of earnings and sales is significantly associated with the information content of sales.

We find that the mean timeliness of sales is 70% and the mean timeliness of earnings is 83%. In other words, 30% of the sales information, but only 17% of earnings information, are released to the market before the beginning of the year when the sales and earnings are recognized. This asymmetric timeliness between sales and earnings would affect our measure of the information content of sales that uses the market as the benchmark, because current returns reflect a smaller fraction of the current sales information than the current earnings information. There are two contribution of this study. First, we have shown that there is significant information content of sale incremental to earnings, which is on average 57% increase in R^2 across industries. Second, we have also shown that the information content of sales is significantly associated with the *timeliness* of current sales and earnings information.

This timeliness is the most fundamental factor that affects stock returns, but has never been considered in the sales-earnings research. Most prior research documents that earnings change supported by the sales change has more information content in explaining stock returns (for example, Hopwood and McKeown, 1985, Ghosh, Gu and Jain, 2005, Etimur, Livnat and Martikainen, 2003), or sales is more informative than earnings in explaining returns in certain industries, such as internet industries (Davis, 2002). This paper is organized as follows: we explain our research design in Section 2, describe sample and its statistics in Section 3, present and interpret our empirical results in Section 4, and conclude in Section 5.

LITERATURE REVIEW

Since Ball and Brown (1968) and Beaver (1968), voluminous literature has studied the empirical association between accounting earnings and stock returns. The most popular approach is to relate stock returns to unexpected earnings. Studies on the earnings-return relationship have later been extended to the usefulness of the non-earnings information from financial statements. For example, Penman (1992) demonstrated that financial statements provide relevant information in addition to earning changes. Some components of earnings, such as sales and expenses, are found to be correlated to stock returns. Nissim and Penman (2001) also adopted several financial ratios and analyzes equity valuation. Most of prior research on information content of sales documents that earnings change supported by the sales change has more information content in explaining stock returns. Hopwood and McKeown (1985) examined the association between quarterly returns and firms' sales and expenses, and concluded that expenses but not sales have incremental information content. Swaminathan and Weinthrop (1991) examined the same issue in a short-window event study and provide evidence that sales do have incremental information content. Kim, Lim and Park (2009) examined how sales affect earnings and in turn the stock price using a model in which sales contribute to earnings by a fixed sales margin rate and the stock price responds more sensitively to sales-induced earnings than to non-sales-induced earnings. Fairfield and Yohn (2001) documented that disaggregating the change in return on assets into the change in asset turnover and the change in profit margin is useful in forecasting future.

Studies show that forecasts of sales are also informative. Rees and Sivaramakrishnan (2007) reported that errors of financial analysts' revenue forecasts significantly affect stock returns. They documented a significant increase in the market premium to meeting earnings forecasts when the revenue forecast is also met and the market penalty to missing earnings forecasts is significantly attenuated when the revenue forecast is met. Also, Trueman, Wong and Zhang (2000 and 2001) documented the insignificant association between bottom-line net income and firms' market prices on internet firms' stocks, but gross profits are positively and significantly associated with prices when the net income is decomposed into its components (also, Penman 2001). Davis (2002) examined the relation between revenue and market value of internet firms, for which sales information is presumably very important compared to non-internet firms. Ertimur, Livnat and Martikainen (2003) also provided evidence that revenue forecast errors bear a significant association with announcement period returns. They showed that earnings surprises emanating from revenue surprises are more influential than earnings surprises resulting from expense surprises. Curtis, Lundholm and McVay (2014) modeled the relation between the firm's current period disclosures and future sales and examine how well their model works in the retail industry. They analyzed the relation between current period sales data and a logical forecast of future sales.

Etimur and Livnat (2002) showed that market reactions are generally positive and statistically different from zero for growth companies only when both earnings and revenues increase. Ghosh, Gu and Jain (2005) showed evidence that earnings growth sustained through revenue increases is valued more than earnings growth through cost reduction. They documented that firms reporting sustained increases in both earnings and revenues have higher quality earnings and larger earnings response coefficients in comparison to firms reporting sustained increases in earnings alone. This paper adopts a cross-industry analysis, by following industry classification by Fama and French (1997). Many accounting studies also performed empirical analyses by industry. For example, Biddle and Seow (1991) tested the associations between accounting earnings and stock returns by examining relationships between earnings response coefficients and industry structure characteristics. Bhojraj, Lee and Oler (2003) demonstrated that the Global Industry Classification Standard classifications are significantly better at explaining stock return co-movements and cross-sectional variations.

DATA AND METHODOLOGY

Measuring the Incremental Information Content of Sales

In this paper we examine the extent to which sales are useful in addition to earnings in explaining stock returns, and investigate factors that differently influence the degree of the usefulness of sales across industries. It is thus critical to use a measure of the incremental information content of sales for industries that is comparable across industries and efficiently captures the informational usefulness of sales. We choose a measure similar to the percentage increase in the R^2 of the regression of returns due to the use of sales as a source of extra independent variables. That is, for each industry we first regress yearly stock returns (R_t) on contemporaneous earnings changes (ΔY_t) :

$$R_t = \alpha_o + \alpha_1 \Delta Y_t + \varepsilon \quad (1)$$

We denote the R^2 of this regression by $R^2_{Y.}$ If sales change (ΔS_t) becomes available as another observable, it creates two additional independent variables:

$$R_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 \Delta S_t + \alpha_3 \Delta Y_t \Delta S_t + \varepsilon \quad (2)$$

The interaction term in the above regression becomes useful if the association between returns and sales is influence by the magnitude of earnings. Denoting the R^2 of this regression by R^2_{YS}, our measure of the incremental information content of sales, denoted by I, is defined by:

$$I \equiv \frac{R^2_{IS} - R^2_I}{R^2_{IS}} \quad (3)$$

The measure I is similar to but different from the percentage incremental R^2 of sales: in equation (3) the increase in R^2 is divided by R^2_{YS} instead of R^2_Y. While I is a monotonic transformation of the percentage increase in R^2 by adding sales to return-earnings regression, the advantage of I is that it is a normalized between 0 and 1 and is thus statistically more stable (especially when R^2_Y is very small). This measure I can be interpreted as the percentage of information recovered due to using sales as a source of information, because the market already uses the sales information in addition to earnings in forming price. The quantitative measure of the informational usefulness of sales developed above (i.e., I) provides us a well-defined dependent variable of which we investigate relevant factors. In particular, given the number of industries (44), it allows us to use the regression method in searching for factors that influence the information content of sales.

The Incremental Impact of Sales on Future Earnings

We reason that the incremental information content of sales arises mainly because sales have impact on future earnings as well as current earnings. If current sales influence current earnings and also alter the expectations of future earnings, the coefficients on sales and the earnings-sales interaction term in equation (2) are likely to be non-zero and I positive. Since the expectations of future earnings are not observable, we use the realized immediate future earnings as an imperfect but valuable surrogate for the expectations of future earnings. First, for each industry we first regress year $t+1$ earnings changes on year t earnings changes:

$$\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \varepsilon \quad (4)$$

We denote the $R^2$of this regression by $Q^2_{Y.}$ Similarly to the return regression, we then use additional

independent variables containing year *t* sales changes:

$$\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \beta_2 \Delta S_t + \beta_3 \Delta Y_t \Delta S_t + \varepsilon \quad (5)$$

Denoting the R^2 of this regression by Q^2_{YS}, we define a measure of the incremental information content of sales in explaining immediate future earnings, denoted by *H*, as:

$$H \equiv \frac{Q^2_{YS} - Q^2_Y}{Q^2_{YS}} \quad (6)$$

In equations (4) to (6), *H* would be positive if the estimates of β_2 and/or β_3 (call them b_2 and b_3, respectively) are significantly different from zero. In particular, b_2 measures the degree to which current sales influence the next year's earnings independently of current earnings. Current sales influence future earnings in many ways. Firstly, several studies in the literature point out that sales are sticky (persistent) so that current sales are a good indicator of future sales which in turn would increase future earnings. Secondly, a current sales influence future earnings through firms' decisions such as changes in product plans, production and marketing strategies, and accounting decisions. For example, a significant increase in sales prompts a firm to adopt an aggressive production plan (e.g., purchasing a more efficient machine or moving to a different plant or to a foreign country) which reduces the earnings of the immediate future periods but promote sales further or reduce costs in the long-run.

The coefficient b_3 captures the impact of current sales on the next year's earnings that depends on the magnitude of current earnings. If b_3 is positive, it implies that current sales and the next year's earnings tend to be more positively (or less negatively) associated if current earnings are higher. Income smoothing can be an explanation for this result. Suppose income smoothing occurs and smoothing changes the variance but not the ordering. That is, if unsmoothed income is higher for firm *A* than firm *B*, then smoothed income is also higher for firm *A* than firm *B*, but the two incomes are closer to each other after smoothing. Under this assumption, smoothing will cause b_3 to be positive, because if unsmoothed income shows an increase, smoothed income will also show an increase of lesser degree. Lowering current period's earnings is likely to have a positive effect on the next year's income. A negative b_3, on the other hand, is consistent with anti-smoothing such as big-baths.

That is, if there is a tendency among firms to choose the timing of big-baths when sales are low, the low sales would be associated with the higher earnings in the next period that results in the bag-baths. This can also occur for reasons unrelated to income smoothing through accounting means. For example, if firms tend to adopt a change in operations to reduce earnings in the immediate future years as the firms have high current earnings (and thus more cash, perhaps), a negative b_3 will result. Several studies in the literature (e.g., Etimur, Livnat and Martikainen, 2003) suggest that sales may be subject to manipulation to a lesser degree because it is more difficult to manipulate sales than expenses and because the penalty when detected is stiffer for sales manipulation. If firms tend to smooth earnings and sales are relatively free from these manipulations, we expect that b_3 is positive for most industries.

Factors that Influence the Information Content of Sales

Given the two sets of regressions described by equations (1) to (6), we want to understand how the incremental information content of sales measured by *I* is determined by how sales are related to future (in this case, the next year's) earnings. For this purpose, we regress *I* on the regression coefficients obtained from regressions of equation (5) and, as extra independent variables, the timeliness measures of earnings and sales. That is:

$$I = \gamma_0 + \gamma_1 b_1 + \gamma_1 b_1 + \gamma_1 b_1 + \gamma_4 TLS + \gamma_5 TLY + \varepsilon \quad (7)$$

where *TLS* and *TLY* are measures of timeliness of sales and earnings, respectively. The timeliness of sales (or earnings) is measured as the R^2 of the regression of sales (or earnings) changes on contemporaneous returns divided by the R^2 of the regression of the same on two immediate past years' returns. These measures the information contained in sales (or earnings) that becomes known to the market in the current year relative to the information that is impounded into price over three recent years including the current year. The above regression is run across the sample industries, with the number of observations being the number of industries. Assuming that b_2 and b_3 are positive for most industries, we expect that c_2 and c_3 (the estimates of γ_2 and γ_3, respectively) are also positive, because the information content of sales incremental to earnings is derived from investors' ability to infer future earnings from sales, represented here by b_2 and b_3. We also expect c_4 to be positive because the information content of sales is limited to what the market does not know at the beginning of the year. To the extent that the market already knows the year's sales figure at the beginning of the year, the sales-related information is already impounded in the stock price at the beginning the year and does not affect stock return during the year. On the contrary, we expect c_5 to be negative, because the more current returns reflect current earnings information, there is less room for sales to be incrementally informative.

Sample and Descriptive Statistics

We use firms with annual accounting and stock return information available since 1980. From the Compustat industrial and research database, we select all firms with major income statement data including sales revenue and income before extraordinary items. We include the Compustat research database to minimize any survivorship bias in our empirical tests. Also, annual stock return should be available from the CRSP database. Our data go back to 1980, but actual return tests are performed from 1983, for we use the lagged regression model to estimate industry-specific relationship between accounting variables and contemporaneous or lagged return. To avoid undue influence of extreme observations, we eliminate observations with the smallest and the largest 1% of earnings and stock returns. We adopt cross-industry empirical tests since we test whether the information content of sales on earnings and stock prices differ across industries. Sample firms are classified into 48 industries based on Fama and French (1997). Out of 48 Fama-French industries, 4 industries are excluded since those industries have less than 100 observations, and our industry-specific tests are based on the remaining 44 industries. Our final sample for the return tests consists of 80,698 observations over the period of 1983 through 2010.

Table 1 reports sample distributions. The first two columns report the industry names. Next three columns of the Table report the industry characteristics. In our sample, the banking industry has the largest number of observations (7,807). On average, 44 industry groups have $1.76 billion of market capitalization, and their average sales volume is $1.86 billion. The last column reports average earnings deflated by the beginning market value of equity. Out of 44 industries, five reported average losses during the test periods.

Table 1: Sample Statistics by Industry

Industry Name					
Short	**Long**	**Number of Observations**	**Market Value**	**Net Sales**	**Earning (%)**
Aero	Aircraft	497	3,911.7	5,273.8	4.99
Agri	Agriculture	234	796.9	703.2	2.66
Autos	Automobiles and Trucks	1,148	1,676.8	6,071.2	6.60
Banks	Banking	7,807	2,191.9	1,533.9	8.83
BldMt	Construction Materials	1,699	954.0	968.0	5.48
Books	Printing and Publishing	751	1,736.0	1,156.2	5.16
Boxes	Shipping Containers	247	1,017.2	1,851.1	5.40
BusSv	Business Services	6,481	1,882.9	876.6	0.10
Chems	Chemicals	1,583	2,159.1	2,449.0	5.72
Chips	Electronic Equipment	4,791	1,841.5	1,102.0	0.34
Clths	Apparel	1,081	659.8	778.2	5.60
Cnstr	Construction	896	609.5	1,357.4	6.58
Comps	Computers	3,022	2,227.3	1,439.5	-1.64
Drugs	Pharmaceutical Products	3,476	4,211.6	1,401.9	-4.77
ElcEq	Electrical Equipment	1,011	1,027.4	1,396.2	3.75
Enrgy	Petroleum and Natural Gas	3,332	3,954.3	5,732.3	2.35
FabPr	Fabricated Products	360	120.7	219.2	4.63
Fin	Financial Trading	4,255	1,111.4	606.1	6.36
Food	Food Products	1,376	2,387.5	3,279.5	7.60
Fun	Entertainment	982	735.0	520.2	0.21
Gold	Precious Metals	584	1,123.1	327.9	-3.05
Guns	Defense	188	2,055.6	3,482.4	3.81
Hlth	Healthcare	1,062	593.8	672.0	1.58
Hshld	Consumer Goods	1,333	2,458.1	1,679.7	4.04
Insur	Insurance	2,743	3,010.6	3,189.9	8.77
LabEq	Measuring and Control Eq	2,018	506.6	316.6	1.00
Mach	Machinery	2,938	982.7	969.8	2.24
Meals	Restaurants, Hotel, Motel	1,389	1,055.6	739.2	1.92
MedEq	Medical Equipment	2,373	935.1	350.2	-0.22
Mines	Nonmetalic Mining	420	1,087.5	1,554.1	14.73
Misc	Miscellaneous	651	8,238.0	4,356.6	-0.73
Paper	Business Supplies	1,367	1,887.4	2,203.8	6.13
PerSv	Personal Services	651	820.6	512.8	1.15
RlEst	Real Estate	799	322.1	174.1	0.52
Rtail	Retail	6,266	1,767.6	3,250.8	4.87
Rubbr	Rubber and Plastic Products	767	296.5	380.6	3.72
Ships	Shipbuilding, Railroad Eq	178	1,712.7	2,523.0	3.40
Soda	Candy and Soda	142	1,946.8	3,355.0	11.88
Steel	Steel Works, etc	1,195	1,171.8	2,012.2	6.16
Telcm	Telecommunications	1,772	5,975.4	4,718.25	7.09
Toys	Recreational Products	614	693.2	1,660.6	3.38
Trans	Transportation	1,891	1,596.5	1,919.8	6.53
Txtls	Textiles	494	309.4	591.4	4.34
Util	Utilities	3,834	1,821.6	2,008.6	9.65
	Mean	1,834	1,763.2	1,856.0	4.07

Table 1 shows descriptive statistics. Sample firms are classified into 44 industries, following the industry classification by Fama and French (1997). Last three columns of the Table show, by industry, average market capitalization at the beginning of the year, net sales amount, both at millions of dollars, and net income before extraordinary items as a percentage of beginning market value.

RESULTS AND DISCUSSION

The Incremental Information Content of Sales

For each industry, we run separate regressions described by equations (1) and (2), and additionally one on sales changes alone. Table 2 shows the results. Panel A reports the results for the full sample. The regression on earnings, sales, and the interaction, shows a 30% (I=23.1) increase in R^2 over the regression on earnings alone, though regressing on earnings shows a distinctively greater R^2 over the regression on sales alone. Panel B shows that out of 44 industries 6 exhibit more than 50% increases in R^2 due to sales. For 5 of these 6 industries the R^2 from the regression on sales alone is higher than that from the regression on earnings alone. Panel C shows results for 32 industries for which the increases in R^2 due to sales are between 10% and 50%, and 6 industries show less than 10% increases in R^2 in Panel D. Two things are notable from Table 2. First, the incremental information content of sales is significant. The median

increase in R^2 due to sales is 38% (*I*=27.7%), which is greater than the full sample figure of 30%. Second, there are significant differences in the magnitude of the information content of sales across industries as mentioned above. Panel E shows the coefficients estimates for regression (2). Among 44 industries, the estimate of α_1 is positive for all industries with mean 0.61 (median 0.58), the estimate of α_2 is positive for 43 industries with mean 0.12 (median 0.11), and the estimate of α_3 is positive for 31 industries with mean 0.06 (median 0.08). This implies that for most industries returns are positively affected by earnings and sales, and the two effects are complementary to each other.

Table 2 : Regressions of Return on Contemporaneous Sales and Income

Models:	**Income Regression Model:**	$R_t = \alpha_0 + \alpha_1 \Delta Y_t + \varepsilon$							
	Income-Sales Regression Model:	$R_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 \Delta S_t + \alpha_3 \Delta Y_t \, \Delta S_t + \varepsilon$							
	Sales Regression Model:	$R_t = \alpha_0 + \alpha_1 \Delta S_t + \varepsilon$							
Panel A: Pooled Cross-Sectional Sample									
	Income			**Income-Sales**				**Sales**	
	I	ΔY	R^2	ΔY	ΔS	ΔYΔS	R^2	ΔS	R^2
All	0.2313	0.6109	0.0452	0.5580	0.1073	0.0382	0.0588	0.1394	0.0214
Panel B: Industries with R^2 Increase by More Than 50%									
	Income			**Income-Sales**				**Sales**	
Industry	**I**	**ΔY**	**R^2**	**ΔY**	**ΔS**	**ΔYΔS**	**R^2**	**ΔS**	**R^2**
Boxes	0.8386	0.2065	0.0100	0.2795	0.1224	-0.1914	0.0617	0.1501	0.0419
PerSv	0.5874	0.4160	0.0220	0.4317	0.2381	-0.1446	0.0534	0.2320	0.0292
Mines	0.5687	0.3474	0.0267	0.1949	0.2629	-0.1239	0.0619	0.2570	0.0546
RlEst	0.5454	0.2253	0.0137	0.2021	0.0880	0.1377	0.0301	0.1121	0.0167
Fun	0.5155	0.3708	0.0148	0.3432	0.1117	0.1042	0.0305	0.1201	0.0163
Hlth	0.5007	0.5337	0.0307	0.5228	0.2152	0.0144	0.0615	0.2195	0.0319
Panel C: Industries with R^2 Increase by More Than 10%									
	Income			**Income-Sales**				**Sales**	
Industry	**I**	**ΔY**	**R^2**	**ΔY**	**ΔS**	**ΔYΔS**	**R^2**	**ΔS**	**R^2**
Aero	0.4551	0.8048	0.0730	0.7503	0.2151	0.4824	0.1339	0.2767	0.0692
Telcm	0.4452	0.3119	0.0229	0.2967	0.1564	-0.0778	0.0412	0.1686	0.0246
Toys	0.4308	0.7244	0.0754	0.7076	0.1874	0.0285	0.1325	0.2002	0.0621
Hshld	0.4265	0.7666	0.0618	0.7543	0.1942	0.2065	0.1078	0.2454	0.0514
Cnstr	0.3810	0.7553	0.0789	0.6252	0.0857	0.2527	0.1274	0.1432	0.0570
Food	0.3717	0.9792	0.0730	0.7645	0.1166	0.2525	0.1161	0.1483	0.0545
MedEq	0.3631	0.7415	0.0439	0.6490	0.2532	0.1380	0.0689	0.3287	0.0353
Rtail	0.3490	0.7074	0.0458	0.6583	0.0865	0.0968	0.0703	0.1056	0.0292
Agri	0.3318	0.7598	0.0814	0.4712	0.2023	0.3187	0.1218	0.3380	0.0727
Guns	0.3315	0.8387	0.0676	0.6539	0.1136	0.2154	0.1011	0.1955	0.0654
Util	0.3279	0.4343	0.0308	0.4427	0.0751	-0.1353	0.0458	0.0741	0.0162
Drugs	0.3269	0.5354	0.0151	0.4746	0.2265	-0.0971	0.0224	0.2470	0.0107
ElcEq	0.3234	0.6570	0.0525	0.5947	0.1566	-0.0067	0.0776	0.1858	0.0359
Books	0.3087	0.5598	0.0466	0.6244	0.1344	0.0921	0.0674	0.1402	0.0164
Comps	0.2934	0.6428	0.0501	0.5741	0.2143	0.0130	0.0709	0.2647	0.0320
FabPr	0.2905	1.1117	0.1211	1.0737	0.1146	0.5166	0.1706	0.1918	0.0556
BusSv	0.2635	0.6061	0.0388	0.5819	0.1193	0.1189	0.0526	0.1568	0.0173
Steel	0.2555	0.4960	0.0516	0.3907	0.0830	0.0875	0.0693	0.1290	0.0322
Paper	0.2548	0.5178	0.0468	0.4420	0.0843	0.0510	0.0628	0.1223	0.0282
Fin	0.2458	0.5011	0.0474	0.4235	0.1415	0.0283	0.0628	0.2026	0.0305
Txtls	0.2404	0.6711	0.0829	0.7326	0.0478	0.2477	0.1091	0.1026	0.0231
Chems	0.2344	0.5381	0.0366	0.5034	0.1101	-0.0359	0.0478	0.1244	0.0157
Autos	0.2309	0.6253	0.0470	0.5296	0.0578	0.1320	0.0611	0.1087	0.0259
Clths	0.2281	0.6038	0.0474	0.5880	0.0798	0.1262	0.0614	0.1138	0.0184
Misc	0.2147	0.5099	0.0650	0.4881	0.1060	-0.1073	0.0827	0.0977	0.0185
BldMt	0.2058	0.9607	0.0969	0.8161	0.0900	0.1133	0.1220	0.1571	0.0523
Mach	0.1907	0.6641	0.0543	0.5720	0.1031	0.0981	0.0672	0.1603	0.0273
Chips	0.1806	0.7057	0.0526	0.6148	0.1498	0.0281	0.0642	0.2272	0.0269
Trans	0.1702	0.5722	0.0481	0.5480	0.0700	0.0906	0.0579	0.0820	0.0105
LabEq	0.1668	0.9083	0.0785	0.7791	0.2073	0.1118	0.0942	0.3518	0.0402
Rubbr	0.1439	0.7975	0.1089	0.7140	0.0810	0.0699	0.1272	0.1241	0.0393
Ships	0.1059	0.7295	0.0771	0.8257	-0.0662	0.0951	0.0863	-0.0025	0.0000

Panel D: Industries with R^2 Increase by Less Than 10%									
	Income			**Income-Sales**				**Sales**	
Industry	**I**	**ΔY**	**R^2**	**ΔY**	**ΔS**	**ΔYΔS**	**R^2**	**ΔS**	**R^2**
Insur	0.0929	0.6259	0.0501	0.6163	0.0674	-0.0451	0.0552	0.0763	0.0079
Banks	0.0843	0.8265	0.0525	0.7951	0.0955	-0.0845	0.0573	0.1190	0.0086
Enrgy	0.0841	0.5252	0.0504	0.4978	0.0525	0.0484	0.0550	0.0895	0.0095
Meals	0.0808	0.6907	0.0796	0.6919	0.0821	0.0027	0.0866	0.0813	0.0068
Soda	0.0667	1.3233	0.2158	2.0742	0.0501	-0.8309	0.2313	0.1836	0.0397
Gold	0.0011	0.4952	0.0499	0.4947	0.0121	-0.0108	0.0500	0.0410	0.0005
Panel E: Summary of Industry-Specific Regressions									
	Income			**Income-Sales**				**Sales**	
	I	**ΔY**	**R^2**	**ΔY**	**ΔS**	**ΔYΔS**	**R^2**	**ΔS**	**R^2**
Mean	0.2967	0.6437	0.0576	0.6093	0.1226	0.0552	0.0804	0.1635	0.0309
Median	0.2770	0.6344	0.0502	0.5850	0.1109	0.0787	0.0673	0.1492	0.0287

Table 2 shows return regressions by industry such that $R_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 \Delta S_t + \alpha_3 \Delta Y_t \Delta S_t + \varepsilon$, where R_t is the stock return during the year t, ΔS_t is the sales change and ΔY_t is the contemporaneous income change. Panel A shows the regression results from the pooled cross sectional sample. The first two columns report industry name and I measure. I measure is computed as 1 – R^2(income model)/ R^2(income-sales model). The third and fourth columns report the estimated slope coefficient and R^2 from the income model. Next four columns (the last two columns) report results from the income-sales (sales) model. Panel B (C and D) lists industries with increase in R^2 by more than 50% (more than 10%, and less than 10% each) between the income regression and the income-sales regression

Regression of Future Earnings

Table 3 shows the results of the regressions of year $t+1$ earnings on year t earnings and sales. Panel A shows the full sample result: there is 7.48% (H=7.0%) increase in R^2 due to sales, the estimates of β_1 (b_1) and β_2 (b_2) are negative and significant, and the estimate of β_3 (b_3) is positive and significant. Panel B shows that the separate industry regressions show much greater overall incremental explanatory power of sales and again wide differences across industries. The median increase in R^2 due to sales is 19.3% (H=16.1%), which are much greater than the full sample result of 7.0%. This seems to be a result of significant heterogeneity across industries. The standard deviation of H is 0.230 which is much greater than the standard deviation 0.166 of I. The value of H ranges from 0.5% for transportation industry to 97.5% for defense industry. Panel B also shows the coefficients estimates for regression (5). Among 44 industries, the estimate of β_1 (b_1) is predominantly negative and is in general very significant with mean -0.22 (median -0.21). This is expected because it mainly reflects the negative autocorrelation of earnings changes. The estimate of β2 (b2) is positive for 20 industries and negative for 24 industries. The mean b2 is -0.008 (median -0.003). The result that the mean b2 is close to zero is disappointing but it shows the heterogeneity across industries in the association between current sales and future earnings.

Table 3: Predictions of Future Income by Industry

Model 1: $\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \varepsilon$

Model 2: $\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \beta_2 \Delta S_t + \beta_3 \Delta Y_t \Delta S_t + \varepsilon$

Panel A: Pooled Cross-Sectional Sample

			Model 1			Model 2						
	I	H	ΔYt	t-value	R2	ΔYt	t-value	ΔSt	t-value	ΔYt ΔSt	t-value	R^2
	0.231	0.070	-0.216	-58.35***	0.041	-0.218	-58.32***	-0.008	-6.01***	0.051	15.91***	0.044

Panel B: By Industry

	Model 1					Model 2						
	I	**H**	**ΔYt**	**t-value**	**R^2**	**ΔYt**	**t-value**	**ΔSt**	**t-value**	**ΔYt ΔSt**	**t-value**	**R^2**
Boxes	0.839	0.049	-0.230	-4.38***	0.073	-0.240	-4.26***	0.019	0.98	0.021	0.46	0.076
PerSv	0.587	0.160	-0.188	-4.67***	0.033	-0.198	-4.86***	-0.028	-1.40	0.061	1.66**	0.039
Mines	0.569	0.801	0.101	2.19**	0.011	-0.006	-0.11	0.036	1.10	0.159	2.81***	0.057
RlEst	0.545	0.069	-0.332	-9.46***	0.101	-0.325	-9.06***	0.003	0.18	0.095	2.52***	0.108
Fun	0.516	0.105	-0.191	-5.08***	0.026	-0.192	-5.11***	0.018	1.58	-0.032	-0.84	0.029
Hlth	0.501	0.053	-0.323	-9.61***	0.080	-0.318	-9.38***	-0.026	-1.88	-0.046	-1.06	0.085
Aero	0.455	0.179	-0.340	-6.94***	0.089	-0.297	-5.87***	-0.026	-1.48	0.189	3.04***	0.108
Telcm	0.445	0.419	-0.160	-6.58***	0.024	-0.211	-7.86***	0.057	4.24***	0.045	2.26**	0.041
Toys	0.431	0.566	-0.133	-3.4***	0.019	-0.101	-2.54***	-0.033	-2.62***	0.107	3.67***	0.043
Hshld	0.427	0.392	-0.227	-8.69***	0.054	-0.183	-6.88***	-0.059	-6.08***	0.143	5.07***	0.088
Cnstr	0.381	0.201	-0.322	-8.74***	0.079	-0.347	-9.22***	0.010	1.16	0.098	3.81***	0.099
Food	0.372	0.544	-0.121	-4.32***	0.013	-0.154	-5.28***	0.022	4.50***	0.026	1.24	0.029
MedEq	0.363	0.052	-0.257	-12.79***	0.065	-0.266	-13.11***	0.025	2.27**	0.023	0.86	0.068
Rtail	0.349	0.018	-0.257	-18.58***	0.052	-0.255	-18.33***	-0.003	-1.21	-0.017	-1.86**	0.053
Agri	0.332	0.277	-0.165	-2.19**	0.020	-0.192	-2.20**	-0.035	-0.88	0.125	1.25	0.028
Guns	0.332	0.975	-0.048	-0.54	0.002	0.087	0.87	-0.060	-2.52***	0.177	2.83***	0.061
Util	0.328	0.210	-0.164	-10.24***	0.027	-0.192	-11.47***	0.003	0.66	0.057	4.66***	0.034
Drugs	0.327	0.043	-0.185	-10.74***	0.032	-0.193	-10.96***	0.022	2.00**	0.001	0.05	0.034
ElcEq	0.323	0.015	-0.229	-7.21***	0.049	-0.240	7.01***	0.003	0.27	0.022	0.88	0.050
Books	0.309	0.715	-0.089	-2.1**	0.006	-0.148	-3.16***	-0.013	-0.68	-0.111	-2.66***	0.021
Comps	0.293	0.100	-0.287	-14.99***	0.069	-0.280	-14.45***	-0.030	-2.90***	0.092	4.72***	0.077
FabPr	0.291	0.326	-0.207	-3.62***	0.035	-0.175	-3.00***	-0.026	-1.71**	0.149	2.24**	0.052
BusSv	0.264	0.180	-0.193	-15.67***	0.037	-0.180	-14.51***	-0.030	-6.03***	0.077	5.93***	0.045
Steel	0.256	0.255	-0.138	-4.67***	0.018	-0.167	-5.29***	0.009	0.84	0.052	2.39***	0.024
Paper	0.255	0.135	-0.237	-9.25***	0.059	-0.243	-9.20***	0.029	3.39***	-0.050	-2.51***	0.068
Fin	0.246	0.204	-0.195	-11.7***	0.031	-0.210	-12.18***	-0.015	-1.59	0.095	5.88***	0.039
Txtls	0.240	0.051	-0.376	-7.85***	0.111	-0.350	-6.81***	-0.027	-1.79**	0.044	0.98	0.117
Chems	0.234	0.138	-0.133	-5.5***	0.019	-0.137	-5.63***	0.010	1.11	-0.051	-2.17**	0.022
Autos	0.231	0.248	-0.275	-7.7***	0.049	-0.267	-7.16***	-0.019	-2.13**	0.108	4.34***	0.066
Clths	0.228	0.039	-0.242	-7.86***	0.054	-0.252	-8.01***	0.009	0.92	-0.046	-1.50	0.056
	I	**H**	**ΔYt**	**t-value**	**R^2**	**ΔYt**	**t-value**	**ΔSt**	**t-value**	**ΔYt ΔSt**	**t-value**	**R^2**
Misc	0.215	0.035	-0.292	-7.27***	0.075	-0.290	-7.16***	-0.019	-1.16	0.034	1.18	0.078
BldMt	0.206	0.135	-0.312	-10.99***	0.066	-0.313	-10.62***	-0.017	-2.37***	0.078	4.27***	0.077
Mach	0.191	0.115	-0.229	-11.7***	0.045	-0.217	-10.67***	-0.024	-3.41***	0.053	2.89***	0.050
Chips	0.181	0.354	-0.196	-12.67***	0.032	-0.191	-12.01***	-0.036	-4.74***	0.140	9.24***	0.050
Trans	0.170	0.005	-0.146	-5.93***	0.018	-0.145	-5.87***	-0.003	-0.42	0.000	0.01	0.018
LabEq	0.167	0.333	-0.263	-11.19***	0.059	-0.212	-8.72***	-0.108	-7.94***	0.082	3.22***	0.088
Rubbr	0.144	0.299	-0.294	-7.32***	0.065	-0.340	-8.27***	0.016	1.51	0.141	4.40***	0.093
Ships	0.106	0.130	-0.329	-4.00***	0.083	-0.379	-4.26***	0.033	1.44	-0.057	-0.60	0.096
Insur	0.093	0.163	-0.186	-9.71***	0.033	-0.200	-10.31***	0.007	1.09	0.046	3.33***	0.040
Banks	0.084	0.112	-0.188	-13.64***	0.023	-0.185	-13.28***	-0.014	-2.74***	0.064	4.70***	0.026
Enrgy	0.084	0.089	-0.175	-9.60***	0.027	-0.185	-9.98***	0.016	2.05	0.023	1.19	0.030
Meals	0.081	0.109	-0.268	-9.71***	0.064	-0.276	-9.99***	-0.002	-0.14	-0.069	-3.11***	0.071
Soda	0.067	0.758	-0.167	-3.10***	0.064	-0.200	-1.53	0.100	6.12***	-0.069	-0.55	0.266
Gold	0.001	0.312	-0.336	-8.07***	0.101	-0.333	-8.15***	-0.155	-4.78***	0.208	2.88***	0.146
Mean	0.297	0.238	-0.217	-7.90	0.048	-0.220	-7.47	-0.008	-0.57	0.052	1.910	0.065
Median	0.277	0.161	-0.217	-7.86	0.047	-0.210	-7.94	-0.003	-0.55	0.053	2.250	0.055

*Table 3 reports results of income prediction models such as Model 1 : $\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \varepsilon$, and Model 2 : $\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \beta_2 \Delta S_t + \beta_3 \Delta Y_t \Delta S_t + \varepsilon$ where ΔY_t is the income change at period t and ΔS_t is the income change at period t. The first column lists industry, sorted by the size of I measure as in Table 2. H measure in the third column is computed similarly to the I measure, such that $H = 1 - R^2$(model 1)/ R^2(model 2). Fourth to sixth column reports estimated slope coefficient, t-value and R^2 from the model 1. Next seven columns reports results for the model 2. The significance level is not directly marked in the Table due to narrow columns. *** (**) significant at 1% (5%) confidence level*

The estimate of β_3 (b_3) is positive for 34 industries and negative for 10 industries. The mean b_3 is 0.052 (median 0.053). This shows that for a majority of industries, b_3 is positive and significant. As discussed in Section 2, this result can be interpreted as evidence of income smoothing, either though accounting means

or through operational decisions such as choosing the timing of adopting a measure in relation to current earnings.

Table 4: Timeliness of Sales and Income Information

Model: R^2's from (1) Δs_t or $\Delta y_t = \Delta_0 + \delta_1 R_t + E$ Vs. (2) Δs_t or $\Delta y_t = \Delta_0 + \delta_1 R_{t-1} + \delta_2 R_{t-2} + E$							
	R^2 from ΔS_t on				R^2 from ΔY_t on.		
Industry	**I**	**R_t**	**R_{t-1} and R_{t-2}**	**TLS**	**R_t**	**R_{t-1} and R_{t-2}**	**TLY**
Boxes	0.8386	0.0419	0.0068	0.8600	0.0100	0.0125	0.4442
PerSv	0.5874	0.0292	0.0071	0.8039	0.0220	0.0047	0.8240
Mines	0.5687	0.0546	0.0230	0.7036	0.0267	0.0103	0.7212
RlEst	0.5454	0.0167	0.0143	0.5382	0.0137	0.0001	0.9905
Fun	0.5155	0.0163	0.0049	0.7698	0.0148	0.0115	0.5631
Hlth	0.5007	0.0319	0.0019	0.9428	0.0307	0.0106	0.7432
Aero	0.4551	0.0692	0.0231	0.7501	0.0730	0.0263	0.7350
Telcm	0.4452	0.0246	0.0054	0.8190	0.0229	0.0008	0.9661
Toys	0.4308	0.0621	0.0050	0.9249	0.0754	0.0049	0.9393
Hshld	0.4265	0.0514	0.0279	0.6481	0.0618	0.0154	0.8007
Cnstr	0.3810	0.0570	0.0143	0.7996	0.0789	0.0048	0.9430
Food	0.3717	0.0545	0.0008	0.9864	0.0730	0.0125	0.8534
MedEq	0.3631	0.0353	0.0035	0.9101	0.0439	0.0124	0.7797
Rtail	0.3490	0.0292	0.0053	0.8475	0.0458	0.0034	0.9314
Agri	0.3318	0.0727	0.0030	0.9606	0.0814	0.0321	0.7172
Guns	0.3315	0.0654	0.0006	0.9903	0.0676	0.0015	0.9777
Util	0.3279	0.0162	0.0010	0.9403	0.0308	0.0002	0.9953
Drugs	0.3269	0.0107	0.0005	0.9594	0.0151	0.0044	0.7746
ElcEq	0.3234	0.0359	0.0136	0.7248	0.0525	0.0135	0.7956
Books	0.3087	0.0164	0.0135	0.5490	0.0466	0.0052	0.8995
Comps	0.2934	0.0320	0.0095	0.7711	0.0501	0.0140	0.7816
FabPr	0.2905	0.0556	0.0093	0.8565	0.1211	0.0123	0.9078
BusSv	0.2635	0.0173	0.0047	0.7864	0.0388	0.0124	0.7578
Steel	0.2555	0.0322	0.0329	0.4947	0.0516	0.0311	0.6239
Paper	0.2548	0.0282	0.0419	0.4027	0.0468	0.0038	0.9256
Fin	0.2458	0.0305	0.0052	0.8547	0.0474	0.0014	0.9713
Txtls	0.2404	0.0231	0.0463	0.3329	0.0829	0.0029	0.9660
Chems	0.2344	0.0157	0.0049	0.7634	0.0366	0.0172	0.6803
Autos	0.2309	0.0259	0.0350	0.4250	0.0470	0.0120	0.7972
Clths	0.2281	0.0184	0.0338	0.3520	0.0474	0.0129	0.7856
Misc	0.2147	0.0185	0.0041	0.8184	0.0650	0.0318	0.6717
BldMt	0.2058	0.0523	0.0201	0.7224	0.0969	0.0060	0.9413
Mach	0.1907	0.0273	0.0231	0.5420	0.0543	0.0097	0.8491
Chips	0.1806	0.0269	0.0071	0.7915	0.0526	0.0166	0.7606
Trans	0.1702	0.0105	0.0032	0.7651	0.0481	0.0066	0.8791
LabEq	0.1668	0.0402	0.0127	0.7596	0.0785	0.0038	0.9542
Rubbr	0.1439	0.0393	0.0103	0.7932	0.1089	0.0174	0.8620
Ships	0.1059	0.0000	0.0308	0.0004	0.0771	0.0122	0.8634
Insur	0.0929	0.0079	0.0070	0.5309	0.0501	0.0049	0.9115
Banks	0.0843	0.0086	0.0013	0.8728	0.0525	0.0033	0.9407
Enrgy	0.0841	0.0095	0.0113	0.4582	0.0504	0.0112	0.8175
Meals	0.0808	0.0068	0.0149	0.3127	0.0796	0.0082	0.9062
Soda	0.0667	0.0397	0.0027	0.9361	0.2158	0.0295	0.8800
Gold	0.0011	0.0005	0.0072	0.0702	0.0499	0.0084	0.8560
Mean	0.2967	0.0309	0.0126	0.7009	0.0576	0.0108	0.8338

Table 4 reports the timeliness measure by industry. The first and the second columns list industry name and I measure. The third column reports R^2 from the contemporaneous regression of $\Delta S_t = \delta_0 + \delta_1 R_t + \varepsilon$, where ΔS_t is the sales change at year t and R_t is the return of year t. The fourth column reports R^2 from the lagged regression of $\Delta S_t = \delta_0 + \delta_1 R_{t-1} + \delta_2 R_{t-2} + \varepsilon$. TLS in the next column is the timeliness measure of sales as estimated by the contemporaneous R^2 as a ratio of total of the contemporaneous R^2 and the lagged R^2. Last three columns report the timeliness measure of income changes. Similarly to TLS, R^2 is estimated from the regression models of $\Delta Y_t = \delta_0 + \delta_1 R_t + \varepsilon$ and $\Delta Y_t = \delta_0 + \delta_1 R_{t-1} + \delta_2 R_{t-2} + \varepsilon$, and TLY is the R^2 of the contemporaneous model as a ratio of total of the contemporaneous R^2 and the lagged R^2.

The Timeliness of Sales and Earnings

Table 4 shows the estimates of the timeliness of sales and earnings for industries. Our timeliness measure is the R^2 of the regression of sales (or earnings) changes on contemporaneous return R_t as a ratio the R^2 of the regression of sales (or earnings) on lagged returns, R_{t-1} and R_{t-2}. This measure represents the degree of freshness of sales (or earnings) information to the market. For example, the sales timeliness measure becomes zero if the sales number is already known to investors before the year of the earnings recognition,

and is one if sales become known only as they are realized and thus recognized in firms' books. Table 4 shows that while on average 83% of earnings information is incorporated into price in the current year, only 70% of sales information is learned by the market in the current year. In other words, 30% of the sales information is known to the market before the beginning of the year whereas only 17% of the earnings information is known in advance. This asymmetric timeliness of sales and earnings would result in a decrease in the information content of sales incremental to earnings as discussed in Section 3.

Factors That Influence the Information Content of Sales

Table 5: Correlations Among the Industry-Specific Estimates (N=44)

Variables	I	H	a_1	a_2	a_3	b_1	b_2	b_3	TLS	TLY
I		0.041	-0.437	0.552	0.097	0.162	0.152	0.088	0.414	-0.389
		0.790	0.003	0.001	0.530	0.294	0.325	0.571	0.005	0.009
H	0.039		0.306	0.136	-0.140	0.644	-0.018	0.273	0.213	0.208
	0.801		0.043	0.379	0.365	<.0001	0.900	0.073	0.166	0.177
a_1	-0.382	0.182		-0.223	-0.283	-0.056	0.166	-0.136	0.107	0.268
	0.010	0.238		0.145	0.063	0.721	0.283	0.380	0.489	0.079
a_2	0.643	0.130	-0.160		0.080	0.318	-0.110	0.240	0.591	-0.241
	<.001	0.400	0.300		0.608	0.036	0.478	0.120	<.0001	0.116
a_3	0.142	0.094	0.381	-0.016		-0.085	-0.410	0.379	-0.108	0.081
	0.357	0.543	0.011	0.920		0.584	0.006	0.011	0.484	0.601
b_1	0.137	0.429	-0.100	0.273	-0.094		0.015	0.133	0.417	-0.036
	0.374	0.004	0.519	0.073	0.545		0.923	0.388	0.005	0.816
b_2	0.051	-0.174	-0.203	-0.202	-0.286	-0.043		-0.544	0.158	-0.115
	0.740	0.260	0.186	0.191	0.060	0.784		0.001	0.307	0.460
b_3	0.152	0.483	0.041	0.231	0.302	0.05	-0.566		0.143	0.092
	0.324	0.001	0.789	0.131	0.046	0.748	<.001		0.354	0.552
TLS	0.402	0.166	0.029	0.482	-0.104	0.327	-0.021	0.111		-0.080
	0.007	0.281	0.852	0.001	0.503	0.030	0.890	0.475		0.606
TLY	-0.179	0.210	0.309	-0.324	0.117	-0.112	-0.086	0.114	0.007	
	0.244	0.171	0.042	0.032	0.449	0.468	0.578	0.461	0.964	

Table 5 reports the Pearson correlation coefficients above diagonal, and the Spearman rank correlation coefficients below diagonal, followed by p-values below. I is computed as 1 – R^2(Income Regression)/ R^2(Income-Sales Regression) from the contemporaneous return regression models as in Table 2. H is measured such that H = 1 – R^2(model 1)/ R^2(model 2) from the future income prediction models as in Table 3. a_1, a_2 and a_3 are estimated slope coefficients from the return regression model on contemporaneous income and change in Table 2: $R_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 \Delta S_t + \alpha_3 \Delta Y_t \Delta S_t + \varepsilon$ where R_t is the stock return during the year t, ΔS_t is the sales change and ΔY_t is the income change at year t. b_1, b_2 and b_3 are estimated slope coefficients from the future income prediction model of $\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \beta_2 \Delta S_t + \beta_3 \Delta Y_t \Delta S_t + \varepsilon$. TLS and TLY are the estimated timeliness measure of ΔS_t and ΔY_t.

Table 5 shows the correlations among our major variables of interest, namely, the R^2 and coefficients of the return and future earnings regressions, *I, H,* a_1, a_2, a_3, b_1, b_2, b_3 and the timeliness of sales and earnings, *TLS* and *TLY*. We are mainly interested in this paper in how our measure of the incremental information content, *I*, is associated with the way sales are related to immediate future earnings, namely, b_2 and b_3, and the timeliness of sales and earnings, *TLS* and *TLY* . We first consider b_2 and b_3. First, note from Table 2 that a_2 and a_3 are both significantly positive and from Table 5 that a_2 is significantly positively correlated with *I*. If year *t+1* earnings are related with current earnings and sales in a similar way that returns are related to current earnings and sales, *I* will be positively associated with b_2 and b_3. From Table 5 we see that a_2 and *TLS* are significantly positively correlated with each other, while a_2, b_3 and *TLY* are not significantly correlated.

Table 6: Multiple Regression for I Measure (N=44)

Model : $I = \Gamma_0 + \Gamma_1 b_1 + \Gamma_2 b_2 + \Gamma_3 b_3 + \Gamma_4 tls + \Gamma_5 tly + E$		
Variables	Coefficient	t-value
Intercept	0.520	2.64***
b_1	-0.037	-0.13
b_2	0.555	1.76**
b_3	0.317	0.88
TLS	0.244	2.28**
TLY	-0.497	-2.66***
Adjusted R^2	22.59%	

*Table 6 reports the regression results of I measure on several estimates. I is estimated as $1 - R^2(\Delta Y)/ R^2(\Delta Y \text{ and } \Delta S)$ from the return regressions as in Table 2. H is computed from the future income prediction model as in Table 3. b_1, b_2 and b_3 are estimated coefficients from the regression model of $\Delta Y_{t+1} = \beta_0 + \beta_1 \Delta Y_t + \beta_2 \Delta S_t + \beta_3 \Delta Y_t \Delta S_t + \varepsilon$. TLS and TLY are the estimated timeliness measure of ΔS_t and ΔY_t. *** (**) significant at 1% (5%) confidence level*

Table 6 shows the result of the multivariate regression of *I* on b_1, b_2, b_3, *TLS*, and *TLY* in equation (7). It shows that the estimate of γ_2 (the coefficient on b_2) is significantly related to the *I* measure after controlling the timeliness of sales and earnings. It also shows that b_3 is not significantly associated with *I*. This implies that the significantly positive b_3, which we interpreted as consistent with income smoothing, is not a factor of the information content of sales incremental to earnings. The coefficient on *TLS* is positive and significant at the 1% level (one-tail) as expected. It implies that the sales information adds more explanatory power on return beyond earnings when the current sales have not been known to the market during previous years. On the contrary, the coefficient on *TLY* is negative and significant at the 1% level (one-tail) as expected, implying that the more current returns reflect current earnings information, there is less room for sales to be incrementally informative.

CONCLUDING COMMENTS

The purpose of this study is to examine the industry specific determinants of the information content of sales incremental to earnings in explaining stock returns. We use firms with annual accounting and stock return information available at the Compustat since 1980. We perform cross-industry study by classifying sample firms into 48 industries following and French (1997). We show that adding sales to earnings in return regressions results in an average increase in the explanatory power of accounting variable(s) by 57% across industries. Considering the moderate explanatory power of sales alone, this suggests that the informational use of sales is intimately related to earnings. Moreover, we show evidence that the way sales are related to earnings and influence stock returns are significantly different from one industry to another. There are thus reasons to believe that research in this direction would be fruitful in learning how investors use accounting information.

Empirical results imply that when sales are strong (weak), firms make operational or accounting decisions that result in a decrease (increase) in the immediately following period's earnings relative to earnings of more remote future periods independently of current earnings. This study, among other things, provides strong evidence that the incremental power of sales in explaining return beyond the earnings information depends on the timeliness of earnings and sales. The incremental R^2 in industry specific return regressions, i.e. the *I* measure, is positively related to the timeliness of sales and negatively to the timeliness of earnings. Future studies may research industry-specific characteristics that determine the explanatory power of sales beyond earnings information.

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CROSS SECTIONAL VARIATION IN RISK ARBITRAGE

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ABSTRACT

In this study, we are interested in understanding the price formation process of bidders' and targets' shares after the merger announcement and seek to explore the impacts of liquidity risk, price pressure, and limited arbitrage theory on the cross sectional variation in risk arbitrage. Using a sample of 1046 merger offers and regression technique, we find that arbitrage spread is positively correlated with deal completion risk, positively correlated with liquidity risk in a concave way: arbitrage spread increases at a decreasing speed as the liquidity risk increases. This finding is consistent with the literature on stock returns. We also find that price pressure is significant in determining arbitrage spread. However, we fail to find evidence that is consistent with the limited arbitrage theory: limitation on the supply of arbitrage capital is not significantly correlated with the deviation of arbitrage spread, in either direction, from the efficient level. The risk factors and limits of arbitrage identified in the paper help explain the profits and cross sectional variation in risk arbitrage.

JEL: G10, G12, G34

KEYWORDS: Risk Arbitrage, Deal Completion Risk, Liquidity Risk, Price Pressure, Limited Arbitrage

INTRODUCTION

After a merger announcement, the target stock's price usually rises but not all the way to the level of the offer price. This gap creates an arbitrage opportunity, known as risk arbitrage. For cash offers, arbitrageurs simply take a long position in the target and hold it until the closing of the deal. For stock swap offers, arbitrageurs need to take a long position in the target and at the same time hedge that position by taking a short position in the bidder's shares. For stock swap offers with collars (also known as collar offers), where the exchange ratio depends on the average bidder stock's price during a pricing period, more complicated positions or option type delta hedging may be needed (see Wang and Branch 2014). When a deal succeeds according to the pre-agreed upon terms, arbitrageurs pocket the arbitrage spread, defined as the percentage difference between the bid price and the target's market price two days after the merger announcement. However, they may incur losses if a deal falls apart or is revised downward and, as a result, the initial spread fails to converge to zero.

Finance literature is almost unanimous in concluding that risk arbitrage tends to generate positive risk-adjusted returns (e.g., Mitchell and Pulvino 2001, Baker and Savasoglu 2002, Wang and Branch 2014). However, studies on what have contributed to the abnormal returns of risk arbitrage are limited. Mitchell and Pulvino (2001) suggest that transactions costs and other practical investment limits reduce the abnormal return of risk arbitrage to 4% per year. This study seeks to extend the literature by exploring factors that may help explain the cross sectional variation in risk arbitrage profits. We focus on risk arbitrage spread rather than actual risk arbitrage return because the arbitrage spread represents the expected return of risk arbitrage for each deal. We are interested in understanding the price formation process of bidders' and targets' shares after the merger announcement and hope to use existent financial theory to explain it. How are arbitrage spreads related to risk factors such as deal completion risk or liquidity risk? What are the impacts of price pressure? Does limited arbitrage theory help explain the cross sectional variation in the arbitrage spreads? We seek to answer those questions and they will help

us understand the sources for the abnormal returns of risk arbitrage. The remainder of the paper is organized as follows. The next section reviews the literature and develops hypotheses. Then, we discuss the data and methodology used in the study. The results are presented in the following section. The paper closes with some concluding comments.

Literature Review and Hypotheses Development

The relevant literature has suggested that four major categories of variables may have an impact on the magnitude of arbitrage spreads: 1. deal completion risk; 2. liquidity risk; 3. price pressure; 4. supply of arbitrage capital. We will review the literature in each category and develop our hypotheses and models related to each factor.

Deal Completion Risk

Intuitively, the risk arbitrage spread represents the present value of the expected spread at the closing of the deal and thus depends on the deal's outcome. We use three variables to measure deal completion risk: probability that a deal will succeed; probability that a deal will be revised upward; probability that a deal will be revised downward. If the market is able successfully to anticipate the outcome of the deal, we expect the arbitrage spreads for successful deals to be lower than for the failed deals. Since the outcome of a deal is not available at the time of the merger announcement, we use the estimated probability of success as a proxy for deal's outcome. Target shares tend to converge more to the offer price or even above the offer price in anticipation of a raised offer. In contrast, the target shares will converge less in anticipation of a revised downward offer. Therefore, our first three hypotheses are as follows.

H1: Risk arbitrage spread is negatively correlated with the probability that a deal will succeed.

H2: Risk arbitrage spread is negatively correlated with the probability that a deal will be revised upward.

H3: Risk arbitrage spread is positively correlated with the probability that a deal will be revised downward.

Liquidity Risk

Jindra and Walkling (2004) argue that arbitrageurs' funds are tied up over the duration of the deal (the length of time from deal announcement to the closing of the deal), therefore we view duration as a proxy for liquidity risk. It is true that greater liquidity risk requires greater compensation. However, due to the 'clientele effect', Investors with longer investment horizon may be more inclined to hold less liquid assets than those with a shorter horizon (See Amihud and Mendelson (1986)). Accordingly, the increase in liquidity premium may decrease as liquidity risk increases and the exhibit a positive concave relationship. Therefore, we include both duration and the square of duration into our model and hypothesize that the arbitrage spread is positively correlated with deal duration and negatively correlated with the square of deal duration. Our hypothesis is specified as follows:

H4: Risk arbitrage spread has a positive concave relationship with the deal duration.

Price Pressure

According to Scholes (1972), Shleifer (1986), securities without perfect substitutes can have downward sloping demand curves. Lynch and Mendenhall (1997) found that share prices and trading volumes rise dramatically when firms join the S&P 500, generating a positive abnormal returns of 3% and 4% on the first trading day post the announcement. The positive abnormal return can be a result of the upward price

pressure created by a surge in demand from the institutional investors who are trying to match the S&P 500. In the case of mergers, large amounts of trading occur after the deal announcement and may result in price pressure on the target's and the bidder's prices. Target shareholders face deal completion risk and may choose to remove this risk by selling their shares to professional risk arbitrageurs. Such selling pressure may push target's price below its efficient market level and result in greater arbitrage spread. At the same time, risk arbitrageurs may start purchasing target shares and may result in buying pressure. Which force is stronger is an empirical issue. We use abnormal trading volume on the target shares after the merger announcement as a proxy for the price pressure on the target and include it in the cross sectional regression on arbitrage spread.

In contrast, for stock swap offers and collar offers, risk arbitrageurs often hedge their positions by taking a short position in the bidder's shares. Such short selling might result in selling pressure on the bidder's shares. Therefore, for stock swap offers and collar offers, we expect the short selling to have a negative impact on arbitrage spreads. Our hypothesis is:

H5: Arbitrage spread is negatively correlated with the abnormal trading on bidders' shares for stock offers and collar offers.

Limitation of Supply of Arbitrage Capital

Most professional risk arbitrageurs are institutional investors who have professional skills in merger arbitrage and access to the most complete publicly available knowledge on the merger deals. They raise money from small investor who very likely, do not have the same level of skills and information. Such agency problems and information costs may limit the amount of capital that the risk arbitrageur can raise and reduce the effectiveness of arbitrageurs in removing price discrepancies (Shleifer and Vishny (1997)). For example, if a small investor sees an arbitrageur performed poorly in the past, he or she may withhold additional capital from that arbitrageur and/or may withdraw any money that he has with that arbitrageur's fund. The arbitrageurs who encounter such behavior may be forced to liquidate some of their positions even if the expected returns for their available opportunities are positive.

In addition, with such fear in mind, arbitrageurs will be more cautious in entering initial positions and thus become less effective in achieving the return levels that help achieve market efficiency. Baker and Savasoglu (2002) find that arbitrage returns are negatively correlated with previous performance of arbitrage portfolio, and are also negatively correlated with the change in institutional ownership for the target before and after the announcement. Similarly, we hypothesize that insufficient arbitrage capital may lead the arbitrage spreads to deviate from the "efficient level". We use the merger arbitrage hedge fund index returns for the three quarters prior to the merger announcement as proxies for the supply of arbitrage capital. We use the abnormal arbitrage spread, the absolute difference between the observed spread and the predicted spread from our model, as a measure of the deviation of the arbitrage spreads from the "efficient level". We hypothesize as follows:

H6: Abnormal arbitrage spreads are negatively correlated with the lagged returns for the merger arbitrage hedge fund index.

DATA AND METHODOLOGY

Data/information sources utilized to obtain merger price and firm information include Thomson Financial SDC Platinum (SDC), CRSP, and Lexis-Nexis. The final sample includes 1,046 takeover offers from 1994 to 2004 period. Table 1 shows the frequency rates for various categorical variables in the analysis . Panel A shows deal completion rates. Overall, our sample has 928 completed (successful) deals and 118 failed deals, with the highest success rates for collar offers and lowest for cash offers. Panel B presents

the revision rates for the sample. The upward revision rates are 15.26%, 7.22% and 8.11% respectively for cash offers, stock swap offers and collar offers. The downward revision rates are 1.56%, 7.78% and 10.81% respectively for cash offers, stock swap offers and collar offers.

Table 1: Frequency Table of Categorical Variables

	Cash Offer	Stock Offer	Collar Offer	Total
Panel A Merger Completion Rate				
Success	277 (86.29%)	479 (88.70%)	172 (92.97%)	928(88.72%)
Fail	44 (13.71%)	61 (11.30%)	13 (7.03%)	118(11.28%)
Total	321 (31%)	540 (52%)	185 (17%)	1046 (100%)
Panel B Merger Revision Rate				
Revised Up	49 (15.26%)	39(7.22%)	15(8.11%)	67(6.41%)
No Revision	267(83.18%)	459(85%)	150(81.08%)	876(83.75%)
Revised Down	5(1.56%)	42(7.78%)	20(10.81%)	103(9.85%)
Total	321	540	185	1046

This table shows the frequency rates for categorical variables. Panel A of this table shows the number and percentage of deals that are completed or failed. Panel B of this table shows the number and percentage of deals that are revised upward, downward or with no revision.

Table 2 shows the descriptive statistics for continuous variables. The means for arbitrage spread, deal duration, transaction size and bid premium are 9.0%, 131 days, $1066 millions and 35% respectively.

Table 2: Descriptive Statistics – Continuous Variables

	Cash Offer	Stock Offer	Collar Offer	All Offers
Arbitrage Spreads				
Mean	0.06	0.09	0.23	0.09
Std Dev	0.09	0.11	0.28	0.13
Min	-0.15	-0.75	-0.18	-0.76
Max	0.67	1.00	1.33	1.33
Deal Duration				
Mean	108	138	146	131
Std Dev	89	79	88	85
Min	1	9	1	1
Max	581	620	557	620
Transaction Size ($millions)				
Mean	551	1398	987	1066
Std Dev	2058	5902	1995	4484
Min	2.7	1.45	9.62	1.45
Max	28971	89167	13620	89167
Bid Premium				
Mean	0.40	0.33	0.29	0.35
Std Dev	0.36	0.32	0.34	0.34
Min	-0.45	-0.86	-0.90	-0.90
Max	2.66	2.71	2.10	2.71
Abnormal Trading Volume Target				
Mean	72.37	35.26	50.75	49.31
Std Dev	79.62	39.15	50.54	58.61
Min	1.32	0.41	1.79	0.42
Max	508.07	312.04	332.94	508.07
Abnormal Trading Volume Bidder				
Mean	4.89	9.37	7.47	7.66
Std Dev	5.39	10.58	7.42	8.96
Min	0.44	0.28	1.04	0.28
Max	57.9	115.11	53.10	115.10

This Table shows the descriptive statistics for Arbitrage spreads, deal duration, transaction size, bid premium, abnormal trading volume for target companies, and abnormal trading volume for bidding companies.

We use the target's abnormal trading volume for the three day period (-1, +1) around the merger announcement date in SDC (day 0) as a proxy for selling pressure. Using Lakonishok and Vermaelen (1990) approach, we calculate the abnormal volume by taking the ratio of event volume relative to pre-announcement normal volume. The normal trading volume is the average daily trading volume for days –

50 to –20 relative to the announcement. The average abnormal trading volume for the target is 49.31 and 7.66 for the bidding company.

RESULTS AND DISCUSSION

Estimation of the Probability of Deal Success

We utilize a logistic regression model to predict the probability that a deal will succeed using only information that is available shortly after the announcement and before the position is established as equation [1].

$$\text{Prob(Success)} = \frac{1}{1+\exp(-(\beta_0 + \beta_1 * \text{TR} + \beta_2\text{TS} + \beta_3\text{HM} + \beta_4\text{BP} + \beta_5\text{AbnT} + \beta_6\text{OS} + \beta_7\text{T\_runup} + \beta_8\text{SO} + \beta_9\text{CO}))} \quad (1)$$

Where Success is dummy variable for deal's outcome (1 for completed deal, 0 for failed deal); TR is target resistance (1 for friendly offers, 0 for hostile offers); TS is target size; HM is horizontal merger (1 if the target and the bidder are in the same industry); BP is bid premium; AbnT is abnormal trading volume for the target firm; OS is percentage of outstanding equities owned by the bidding firm in the target firm prior tto announcement; T_runup is percentage change in target prices twenty trading days prior to announcement; SO is1 if the deal is a stock offer, 0 otherwise; CO is 1 if the deal is a collar offer, 0 otherwise. The dependent variable is defined as 1 for successful deals; 0 for failed deals. The predictor variables are target resistance, target size, horizontal mergers or not, bid premium, abnormal trading volume on the target stocks, ownership, target price run-up and deal structures. SDC classifies deals as hostile takeover versus friendly takeover attempts. Target resistance variable is a dummy variable that equals 1 if the deal is classified as a friendly offer by SDC and 0 otherwise.

Target size is the logarithm of the ratio of the target's market size divided by the bidder's market size as a proxy for relative target size. Both market values are calculated using prices 20 days prior to merger announcement. Horizontal merger is categorical variable that is equal to 1 if the target and the bidder are in the same industry (same two digits SIC code). Bid premium is defined as the percentage difference between the offer price and the target's market price 20 trading days prior to announcement. The greater the premium, the more attractive is the offer and the greater likelihood that a deal will succeed. The variable Stock is a dummy variable that equals 1 if the deal is a fixed ratio stock swap offer and zero otherwise. The variable Collar is a dummy variable that equals 1 if the deal is a collar offer and zero otherwise. Larker and Lys (1987) hypothesize that risk arbitrageurs are better informed than the market about the takeover's probability of success. They find that takeovers in which risk arbitrageurs are involved have a higher probability of success than the average probability inferred from market price. We use the total target's abnormal trading volume for the three day period (-1, +1) around the merger announcement as a proxy for the presence of arbitrageurs.

Other control variables include Target price run-up, defined as the percentage change in target stock prices over the period (-20, -1) around the announcement. Asquith (1989) estimates 15% run-up for successful deals while 11% for unsuccessful deals. Ownership, defined as the percentage of outstanding equities owned by the bidder in the target firms prior to merger may also have an impact on the success rate of mergers and is therefore included in the model. In an efficient capital market, the probability of success should also be estimated by market participants and thus fully incorporated in the risk arbitrage spread. To explore if risk arbitrage spread has explanatory power on merger success and see how it affects the significance of other variables, we estimate the following equation [2]

$$\text{Prob(Success)} = \frac{1}{1+\exp(-(\beta_0 + \beta_1 * \text{TR} + \beta_2 \text{TS} + \beta_3 \text{HM} + \beta_4 \text{BP} + \beta_5 \text{AbnT} + \beta_6 \text{OS} + \beta_7 \text{T\_runup} + \beta_8 \text{SO} + \beta_9 \text{CO} + \beta_{10} \text{Ann\_Spread}))} \quad (2)$$

Where Ann_Spread is percentage difference between the offer price and the target's price two trading days after the announcement; TR, RS, HM, BP, AbnT, OS, T_runup, SO and CO are defined as previously. Empirical results are presented in Table 3. Panel A shows the empirical results for equation [1] where Ann_Spread is not included in the model. Dummy variables for target resistance and target size are found to be significant in determining a deal's outcome. Friendly deals (positive coefficient) are more likely to succeed compared to hostile offers. The coefficient for target size is negative, implying that larger target reduces the probability that a deal will succeed. To investigate the economic significance of the impact of those variables on deal success, we reported odds ratios. Odds ratio is defined as P(success)/P(failure): probability of success divided by probability of failure. As the odds ratio (OR = 25.71) for the target resistance variable shows, the odds of success for a friendly deal is 25.75 times as much as the odds of success for a hostile offer. As the odds ratio (OR = 1.77) for the horizontal merger variable shows, the odds of success for a horizontal merger is 1.77 times as much as the odds of success for a non-horizontal merger. In other words, the odds for a horizontal merger are 77% (1.77 – 0.77 = 0.77) higher than the odds for a non-horizontal merger. As the odds ratio (OR = 0.49) for relative target size variable shows, for one unit increase in target size, the odds of success decrease by 51%, which is 0.49 – 1 = -0.51. Panel B shows the empirical results for equation (2) where Ann_Spread is included as a predictor variables. Consistent with market efficiency theory, the coefficient for Ann_Spread is negative and is statistically significant, indicating that the market has priced in deal completion risk. In addition, adding Ann_Spread does improve the goodness of fit of the model: P-value for goodness of fit test increases from 0.14 to 0.27. Higher P-value corresponds to better goodness of fit. Adding Ann_Spread also reduces the economic significance of the impacts of other predictor variables. For example, the odds ratios for target resistance, target size and the horizontal merger dummy variable reduce from 25.75 to 24.07; 0.49 to 0.48; and 1.77 to 1.72 respectively.

However, the coefficients for those variables are still statistically significant: 3.18 for target resistance, -0.72 for target size and 0.54 for horizontal mergers. These results have some interesting implications. Given the market's expectation of the probability of deal success, hostile mergers still reduces probability of success (or increases deal failure risk), which implies that market tends to underestimate deal completion risk for hostile offer. Similarly, market tends to underestimate deal completion risk for larger target, and overestimate deal completion risk for horizontal mergers. For future research, tests can be constructed to explore the relationship of abnormal returns of risk arbitrage with those variables (target resistance, target size and horizontal mergers)

Table 3: Predicting Probability of Success

	Panel A. Ann_Spread Not as a Predictor Variable			Panel B. Ann_Spread as a Predictor Variable		
Variables	**Parameter Estimates**	**Standard Error**	**Odds Ratio**	**Parameter Estimates**	**Standard Error**	**Odds Ratio**
Intercept	-2.68***	0.50		-2.59	0.50	
TR	3.25***	0.38	25.75	3.18***	0.39	24.07
TS	-0.71***	0.11	0.49	-0.72***	0.11	0.48
HM	0.57**	0.28	1.77	0.54*	0.28	1.72
BP	-0.04	0.39	0.96	0.34	0.43	1.40
AbnT	0.004	0.003	1.00	0.0037	0.003	1.00
OS	0.79	1.02	2.21	0.71	1.03	2.02
T_runup	0.43	0.57	1.55	0.35	0.57	1,42
Stock	0.069	0.34	1.072	0.16	0.34	1.17
Collar	0.20	0.43	1.22	0.42	0.45	1.52
Ann_Spread				-0.21**	0.81	0.13
Goodness of Fit Test						
Chi-Square	12.30			9,87		
P-Value	0.14			0.27		

*Panel A of this table shows the empirical results for estimating equation [1]Panel B of this table shows the empirical results for estimating equation [2] Success = dummy variable for deal's outcome (1 for completed deal, 0 for failed deal); TR = target resistance (1 for friendly offers, 0 for hostile offers); TS = target size ; HM = horizontal merger (1 if the target and the bidder are in the same industry); BP = bid premium; AbnT = abnormal trading volume for the target firm; OS = Percentage ownership of the bidding firm in the target firm prior to announcement; T_runup = percentage change in target prices over the announcement period (-20, -1); SO = 1 if the deal is a stock offer, 0 otherwise; CO = 1 if the deal is a collar offer, 0 otherwise. Ann_Spread = percentage difference between the offer price and the target's price two trading days after the announcement. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Estimation of Deal's Duration

After determining the probability of deal success, arbitrageurs also need to estimate how long each deal takes to complete. We use the following model to estimate the length of deal's duration.

$$\text{Duration} = \beta_0 + \beta_1 \text{TR} + \beta_2 \text{TS} + \beta_3 \text{HM} + \beta_4 \text{BP} + \beta_5 \text{SO} + \beta_6 \text{CO} \quad (3)$$

Where Duration is number of days between deal announcement and deal completion; TR is target resistance (1 for friendly offers, 0 for hostile offers); TS is target size; HM is horizontal merger (1 if the target and the bidder are in the same industry); BP is bid premium; SO is 1 if the deal is structured as a stock swap offer, 0 otherwise; CO is 1 if the deal is financed as a stock swap offer with collars, 0 otherwise. Large companies may find small companies easier to acquire than vice versa. Thus, the deal may take less time to finish if the target size is small relative to the bidder. A horizontal merger may take longer to complete since it has more antitrust issues. A hostile offer may take longer time since the target's management may reach out to other potential bidders and start a bidding war.

Similarly, a small bid premium is more likely to lead to a bidding war than a larger bid premium and thus such a bid is more likely to lengthen the merger process. Stock offers require the approval from both the target's shareholders and the bidder's shareholders and thus are expected to have greater duration. A similar argument applies to stock swap offers with collars. However, one reason that management is inclined to use collars in the initial agreement is to speed up the negotiation process. Which force is stronger is an empirical issue. Empirical results are shown in Table 4. The horizontal merger dummy variable has a significant positive coefficient of 26.04. The stock offer dummy variable has a significant positive coefficient of 24.28. Both are consistent with our expectation. The coefficients for other variables are not significant.

Table 4: Estimating Deal Duration

Variables	Parameter Estimates	Standard Errors
Intercept	125.59***	24.03
Target Resistance	2.58	10.99
Target Size	-28.04	18.45
Horizontal Merger	26.04***	6.39
Bid Premium	-8.34	7.62
Target Resistance	2.58	10.99
Stock Offer	24.28***	6.32
Collar Offer	8.57	7.11
Adjusted R Square	4.54%	

*This table shows the regression results for equation [3]. Duration = number of days between deal announcement and deal completion; TR= target resistance (1 for friendly offers, 0 for hostile offers); HM = horizontal merger (1 if the target and the bidder are in the same industry); BP = bid premium; SO = 1 if the deal is structured as a stock swap offer, 0 otherwise; CO = 1 if the deal is financed as a stock swap offer with collars, 0 otherwise.***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Estimating Future Price Revision

Third, we developed two logistic regression models, one for the probability of the deal being revised up, the other for the probability of the deal being revised down, as a function of cash offer, target resistance bid premium and market performance, specified as equations [4] and [5].

$$\text{Revise Up} = \beta_0 + \beta_1 \text{Cash} + \beta_2 \text{TR} + \beta_3 \text{BP} + \beta_4 \text{Mkt} \quad (4)$$

$$\text{Revise Down} = \beta_0 + \beta_1 \text{Cash} + \beta_2 \text{TR} + \beta_3 \text{BP} + \beta_4 \text{Mkt} \quad (5)$$

Where Revise Up is 1 if the deal is revised up, 0 otherwise; Revise Down is 1 if the deal is revised down, 0 otherwise; Cash is1 if the deal is a cash offer, 0 otherwise; TR is target resistance (1 for friendly offers, 0 for hostile offers); BP is bid premium; Mkt is the value weighted CRSP index return in the month prior to the announcement Branch and Yang (2006) find acquisition type (whether the deal is a hostile cash offer or not) is the only variable that is significant in determining whether the deal will be revised or not. In addition, we added two more variables: bid premium and market performance. A smaller bid premium is more likely to attract a competing bid, thus forcing the original bidder to raise the offer. In a declining market, the bidder is more likely to face trouble financing the deal and thus revising the deal downward. Table 5 presents the parameter estimates for price revision. We find that cash offers cash offers are more likely to be revised upward and hostile offers are more likely to be revised upward, stock swap offers and collar offers, which are non-cash offers, are more likely to be revised downward.

Table 5: Estimating Future Price Revisions

	Revise Up		**Revise Down**	
Variables	Parameter Estimates	Standard Errors	Parameter Estimates	Standard Errors
Intercept	-0.2019	0.3558	-2.0767***	0.7788
Cash	0.4262*	0.2551	-2.1124***	0.5363
TR	-2.3909***	0.3205	-0.2328	0.7701
BP	-0.4178	0.3840	0.1709	0.3718
Mkt	9.1474	13.0004	-13.0948	12.0977
Goodness of Fit Test				
Chi-Square	2.3592		6.9372	
P-Value	0.96		0.54	

*This table shows the regression results for equation [4] and [5].Revise Up = 1 if the deal is revised up, 0 otherwise; Revise Down = 1 if the deal is revised down, 0 otherwise; Cash = 1 if the deal is a cash offer, 0 otherwise; TR= target resistance (1 for friendly offers, 0 for hostile offers); BP = bid premium; Mkt = the value weighted CRSP index return in the month prior to the announcement. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Modeling Risk Arbitrage Spread

Based on the hypotheses we developed, we model risk arbitrage spreads as a function of deal completion risk and liquidity risk as equation 6.

$$\text{Arb\_Spread} = \beta_0 + \beta_1 \text{Prob} + \beta_2 \text{BP} + \beta_3 \text{Duration} + \beta_4 \text{Duration\_SQ} + \beta_5 \text{RU} + \beta_6 \text{RD} + \beta_7 \text{AbnT} + \beta_8 \text{AbnB} * \text{SO} \quad \beta_9 \text{AbnB} * \text{CO} \tag{6}$$

Where Prob is the probability that a deal will succeed Duration is number of days between the deal announcement and the deal completion; Duration_SQ is square of deal duration; RU is revise up, probability that a deal will be revised up; RD is revise down, probability that a deal will be revised down; AbnT is abnormal trading volume on target shares; AbnB*SO is abnormal trading volume on bidder's shares * stock swap offer; AbnB*CO is abnormal trading volume on bidder's shares * collar offer .

Table 6 presents the results for cross sectional arbitrage spreads. We find arbitrage spread is negatively correlated with a the probability of success, positively correlated bid premium, have a concave relationship between arbitrage spread and deal duration., positively correlated with the probability of downward revision. Those results are all consistent with our hypotheses. The coefficient for target shares' abnormal trading volume is -0.0003, significant at the level of 0.01, indicating that the buying pressure from risk arbitrageurs dominates the selling pressure from target shareholders. The variance inflation factors are also reported to check for multicollinearity. None of them is above 10 indicating that multicollinearity is not an issue.

Table 6: Cross Sectional Variation in Arbitrage Spreads

	Parameter Estimates	**Standard Errors**	**Variance Inflation**
Intercept	-0.1621	0.1609	0
Prob	-0.0937**	0.0132	3.8639
BP	0.0889***	0.0132	1.1494
Duration	0.0043*	0.0025	2.5412
Duration_SQ	-0.00002*	0.00001	3.4487
RU	-0.0907	0.0811	4.0528
RD	0.6978***	0.1922	4.4657
AbnT	-0.0003***	0.0001	1.2239
AbnB * SO	-0.0013**	0.0007	1.3640
AbnB * CO	0.0028	0.0011	1.0550
Adj- R Square	11.6%		

*This table shows the empirical results for equation [6].Prob = probability that a deal will succeed; Duration = number of days between the deal announcement and the deal completion; Duration_SQ = square of deal duration; RU= revise up, probability that a deal will be revised up; RD = revise down, probability that a deal will be revised down; AbnT = target size; AbnB*SO = abnormal trading volume bidder *stock swap offer; AbnB*CO = abnormal trading volume bidder* collar offer. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Modeling Abnormal Risk Arbitrage Spread

We model the abnormal arbitrage spread as:

$$\text{Abn\_Spread} = \beta_0 + \beta_1 \text{LR}_1 + \beta_2 \text{LR}_2 + \beta_3 \text{LR}_3 \tag{7}$$

Where Abn_Spread is abnormal arbitrage spread, calculated using the average of the absolute difference between the observed spread and the predicted spread from our model for all deals for a particular month; LR1 is Quarterly merger arbitrage hedge fund index return one quarter prior to the merger announcement; LR2 is Quarterly merger arbitrage hedge fund index return two quarters prior to the merger announcement; LR3 is Quarterly merger arbitrage hedge fund index return three quarters prior to the

merger announcement The empirical results to test the limited arbitrage theory are presented in Table 7. The coefficients for 1 quarter, 2 quarters, 3 quarters lagged risk arbitrage index fund returns are –0.0275, -0.055, -0.00289, none of which is statistically significant. Our findings are not supportive of the limited arbitrage theory: insufficient supply of risk arbitrage capital will increase the level of abnormal arbitrage spread.

Table 7: Abnormal Arbitrage Spreads

Variables	Parameter Estimates	Standard Errors	Variance Inflation
Intercept	0.0619***	0.0076	0
LR1	-0.0275	0.1037	1.2328
LR2	-0.055	0.1070	1.3133
LR3	-0.00289	0.1027	1.2209
Adjusted R Square	2.7%		

*In this table, we show the regression results for equation [7]. Abn_Spread is abnormal arbitrage spread, calculated using the average of the absolute difference between the observed spread and the predicted spread from our model for all deals for a particular month; LR1 is Quarterly merger arbitrage hedge fund index return one quarter prior to the merger announcement;LR2 is Quarterly merger arbitrage hedge fund index return two quarters prior to the merger announcement; LR3 is Quarterly merger arbitrage hedge fund index return three quarters prior to the merger announcement. *** indicate statistical significance at the 0.01 level.*

CONCLUSION

In this paper, we explore the relations between arbitrage spreads of merger offers and market's expectations of deal's outcome, liquidity risk, price pressure and supply of arbitrage capital. First, we use three variables to measure deal completion risk: probability of a deal to succeed, probability of a deal to be revised up, probability of a deal to be revised down. We find that arbitrage spreads are negatively correlated with the probability of success, probability of upward revision, and positively correlated with probability of downward revision. Second, we explore the relationship between risk arbitrage and liquidity risk and find that arbitrage spread is positively correlated with liquidity risk in a concave way: arbitrage spreads increase at a decreasing speed when liquidity risk increases. Third, we explore the influence of price pressure on arbitrage spread. We use abnormal trading volume as a proxy for selling pressure and find that the selling pressure on the bidders' stock for stock offers and buying pressure on target shares play significant roles in determining arbitrage spreads. Further, we explore whether the limitation on the supply of risk arbitrage capital may push on risk arbitrage spread to depart from the efficient level. We use abnormal arbitrage spreads to measure the disparity of arbitrage spread from the efficient level, and use lagged risk arbitrage hedge fund index performance to measure the supply of risk arbitrage. However, we fail to find a significant correlation. Moreover, we find market tends to underestimate deal completion risk for larger target, and overestimate deal completion risk for horizontal mergers. For future research, tests can be constructed to explore the relationship of abnormal returns of risk arbitrage with those variables such target resistance, target size and horizontal mergers

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HUMAN CAPITAL REPORTING AND CORPORATE EARNINGS: EVIDENCE FROM NIGERIA

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ABSTRACT

This study investigated the influence of human capital reporting on earnings of quoted manufacturing companies in Nigeria. The study used secondary data from 2007 to 2014 collected from selected Annual Report and Accounts of 50 listed manufacturing companies, and Fact Books published by the Nigeria Stock Exchange. Pooled least squares were used in the analysis. The results indicate that total earnings present a positive relationship with all the components of human capital but a significant one with salaries and wages and labour turnover. This then suggests that capitalization of corporate investment on its human resource has the aptitude of increasing the total earnings of quoted manufacturing companies in Nigeria.

JEL: M40, M41

KEYWORDS: Total Earnings, Human Capital Cost, Capitalization, Corporate Success, Nigeria

INTRODUCTION

The drive for accounting for a firm's labour force is born out of the quest to find new ways and explicit methods of recording and reporting corporate financial commitments to its personnel in the annual report. In the conventional way of accounting for corporate investments on its human resource, all expenses relating to human capital are charged against the income statement of the companies and are used to reduce the profit for the accounting period and subsequently the shareholders' fund. It is the belief that this customary accounting method is a farce, as it does not give due recognition to the organization's labour force as an invaluable asset.

Non-current assets like buildings, plants, machinery and other physical assets are considered as capital investments whose benefits to the company go into the distant future and as such capitalized in the company's statement of financial position as part of the asset base of the company. Thus the argument in favour of human capital reporting therefore is that employees in an organization are responsible for the implementation, execution and management of these physical assets. Therefore, the profitability, solvency effectiveness and efficiency, and the ultimate achievement of corporate goal and the going concern of a firm depend largely on the intellect, expertise, experience, proficiency, attitude, technical skills, education and value of such employees (Singh, 2009). The question that needs to be asked is why are investments in these physical assets of the company regarded as non-current assets which are then capitalized in the statement of financial position while corporate expenditure on the firm's labour force are treated as meager expenses?

An employer has the responsibility of ensuring retention over a long period of time. Often, in an attempt to improve the creativity and performance of employees, various career advancement programs are instituted by the management which include in-house training, on-the-job training, seminars, and continuous education of employees, among others, all of which are expected to bring about long term benefits to the establishment, just like any other non-current assets. Human capital reporting is the process of computing

and reporting investments and contributions of employees and managements in a firm to interested parties. It does not only involve measurement of all costs or investments connected with the recruitment, placement, training and development of employees, but also the quantification of the economic values of staff members in an organization (American Accounting Association's committee on Human Resource Accounting, 1973). It is not a completely new phenomenon after all, as economists regard human capital as an important factor in the production process, without which all other factors of production will remain in their natural and unprocessed state.

The current traditional presentation of work force in the financial statement does not show the true and fair place or role of human resources vis-à-vis revenue generation, ultimate profitability and value significance to the organization. Also, the recent adoption of the international financial reporting standards (IFRS) in the disclosure of financial statements by Nigerian companies which practically encourages the consideration of an alternative means of measures and reporting, lends credence and support to the possibility that future reports may include non-conventional dimensions and recognition. Hence this gives room to redress issues bordering on the disclosure of human capital expenditure in the financial statements of Nigerian firms, especially those quoted on the stock exchange.

The Nigerian manufacturing sector is one of the mainstays of the nation's economy. It is involved in the invention, production and delivery of goods and services to various stakeholders in the economy and any tension therefore in this sector will cause serious distortion in the nation's economy. Manufacturing firms in Nigeria are also notable, among other things, for high recruitment of labour force, and in a bid to ensure an efficient and effective performance, they get the best hands to handle daily transactions and activities. They spend huge amounts on recruitment exercises. Most often this may be outsourced to other human resources consulting firms. Also, after the recruitment and selection exercise have been done, they also commit fortunes towards training and retraining of staff members. All of these are geared towards improving the technicality and efficiency of each employee so that he/she can contribute maximally towards achieving the corporate goal of the firms. Examples include Nigerian Breweries which spent over ₦700 Million on staff recruitments, training and development in year 2008 (Annual Report, 2008), and Unilever plc, which invested over ₦250Million in 2009 on the training of its employees, besides other in-house programmes and arrangements designed for the purpose of staff development (Annual Report, 2009). Also, Nestle Nigeria plc expended over ₦790 Million on staff recruitments, training and development and over ₦200 Million on Staff medical expenses (Annual Report 2012).

Despite these high costs incurred by these Nigerian manufacturing companies on human capital development in recent times, they are not recognized as elements in determining the value of a firm. Conventional accounting systems still treat investment/cost associated with the selection, recruitment and training of personnel in an organization as an expense charged against the income statement, which is also used to reduce profit, whereas the cost of acquisition of any other physical asset is capitalized in the statement of financial position, and only a depreciable amount is charged against the statement of comprehensive income every financial year. The amount of intangible/intermediate assets is also capitalized in the statement of financial position and is amortized for a respective number of years.

This problem of how firms should choose the benchmark treatment for human capital costs in the financial report has called for a great deal of attention and debate in corporate financial literature. The interest is due to the fact that human capital accounting information aims to aid decision making by giving due recognition and value to managers and employees, while a remarkable human resource practice also enhances the significance of an organization. In merger and acquisition, for instance, an important reason for purchasing a company may be its human expertise and a formidable human resource team and stunning success (Akinsulire, 2010). Human capital accounting can also be a signaling contrivance to shareholders and other key stakeholders in demonstrating corporate success and future company's prospect.

At the outset of such debates, among others issues, is the question of the relevance of firms' strategic human capital reporting decision to its own valuation and shareholders' fund. Thus effectual use of assets, value creation, capitalization of human resource investments and corporate success are all strongly linked in explaining how companies, shareholders and other investors form and modify their investment acquisition decisions through firms and capital markets and thereby influence the proportion of their income and returns on investments, whether in the form of direct earnings, dividends or capital gains.

To understand this subject matter better requires a critical look at the concept of human capital reporting and its weight on the largest possible earnings which quoted companies can make. In view of relatively scanty evidences available on the effects of human capital accounting information on earnings in listed companies in Nigeria, this study attempts to examine the effects of human capital reporting on earnings of quoted manufacturing companies in Nigeria in the context of prevailing economic reforms and conditions in Nigeria.

The rest of this paper is set out as follows: in section 2, there is a brief review of literature; section 3 describes the methodology adopted; section 4 presents the empirical results; and the final section contains the conclusions and policy implications.

LITERATURE REVIEW

Most of the empirical evidence on human capital reporting emanate from: (a) studies on the appropriate treatment and valuation method to be employed in recognizing human capital as assets e.g. Flamholtz (1971), Strauss (1976), Lau & Lau (1978), Dawson (1992 &1994), Flamholtz, Maria & Hua (2003), Theeke & Mitchel (2008), Pedro & Ana (2013); (b) studies on human capital measures and firms' decision e.g. Hendrick (1976); (c) its effect on value significance in an enterprise e.g. Md. H. Khan (2010), Adelowotan, Christo & Wingard (2013); and (d) the influence of reporting and measuring human capital on investment decisions e.g. Avazzadahtah & Raiashekar (2011).

These studies have successfully identified human capital accounting information as important determinants of economic success both at macro and enterprise levels, and as such several valuation models have been suggested in order to decipher the economic benefits of human capital. The upshot associated with profitability, quality of corporate reports, investment ratios has been found to be especially imperative.

This concept of reporting human capital investments in the annual reports of companies and its wave on corporate characteristics is based on two theories of corporate finance namely, Agency theory and Propriety theory. Agency theory provides the necessary basis for the consideration of relationship existing among stakeholders in large corporations, the divergence of interest that may arise from such relationships and possible corrective measures needed to combat such discrepancy. Agency relationship is evident in large corporations because of the divorce between ownership and control. Agency theory therefore implies that a high level of information disclosure in companies' financial reports brings about a greater benefit of reducing the cost of agency (Fernando & Clea; 2012) while, conversely, the proponents of Propriety theory are of the opinion that high level of corporate information reporting brings about an innately higher cost to be incurred by the company which may include the cost of preparation and dissemination of information (Elliot & Jacobson; 1994), cost associated with loss of competitive advantage due to the competitors' reaction drawn from the information disclosure (Wangenhofer; 1990), and cost relating to assessing earnings per share estimates (Verecchia; 1990).

Obviously, divulging information pertaining to intangible assets, especially human capital has been found to have a premeditated bearing for firms because the intrinsic strategic importance which human capital offers depicts a competitive edge for business enterprise in any economy, even though such benefits are not recorded in the annual reports and account (Fernando & Clea, 2012). Therefore, the substantial significance

which intangible asset like human capital offers to an organization is due to the defrayal that accompanies such information as increased productivity, increased market share, increased profit margin and innovations which are escape routes for intense competitiveness (Lev, 2004). Hence, human capital accounting information is beneficial to corporate organizations in the area of reducing information unevenness and minimizing agency cost as Agency theory has postulated. However, it may also spur reactions among other stakeholders of the company which may lead to loss of competitive advantages, which indicates a leaning or tendency toward propriety theory (Fernando & Clea, 2012).

Empirical studies on human capital accounting in Nigeria have been clustered around effects of human capital reporting and valuation on quality of financial reports (Abubakar, 2011; Akintoye, 2012; Ijeoma, Bilesanmi & Anonu, 2013; Oyewo B.M., 2014), its relevance to productivity (Bassey & Tapang, 2012), its effect on firms' performance and profitability (Ifurueze, Odesa & Ifurueze, 2014; Enofe, Mgbame & Ofuye, 2013) and its associated effects on stock investment decision (Okpala & Chidi; 2010). Ifurueze, Binglar, & Etyale (2013) examined the impact of human resource capital on the goodwill of Nigerian banking industry. The study revealed that human resource capital and goodwill are positively and significantly correlated, and the inclusion of human resource capital in the statement of financial position can help investors to make more rational investment decision.

METHODOLOGY

The study uses annual data of 50 manufacturing companies quoted on the Nigerian Stock Exchange for the period from 2007 to 2014. Companies with missing data and companies that are newly quoted were excluded from the study. Secondary data utilized for the study consist of selected variables from the financial statements of the sampled firms.

The estimation model uses pooled data. Pooled data econometric techniques were employed for the data covering years 2007 to 2014.

The estimation equation is as follow:

$$TE = f(HCC, TA, TL, SP, \varepsilon) \quad (1)$$

$$TE_{it} = \beta_0 + \beta_1 \sum_{it=1}^{n} HCC_{it} + \beta_2 TA_{it} + \beta_3 TL_{it} + \beta_4 SP_{it} + \varepsilon_{it} \quad (2)$$

However, the model is re-specified to examine the effect of selected variants of HCC often reported in financial statements on TE.

$$TE_{it} = \beta_0 + \beta_1 SW_{it} + \beta_2 RBC_{it} + \beta_3 OEC_{it} + \beta_4 LTR_{it} + \beta_5 TA_{it} + \beta_6 TL_{it} + \beta_7 SP_{it} + \varepsilon_{it} \quad (3)$$

Where
TE = Total Earnings,
HCC = Human Capital Cost (In Aggregate),
SW= Salaries and Wages,
RBC= Retirement benefit cost,
OEC= other employees' cost,
LTR= Labour turnover rate,
TA= Total Assets,
TL= Total Liabilities and SP= Share prices,
A priori Expectations β1 to β_7 = +/-

RESULTS AND DISCUSSION

Table 1 shows the descriptive statistics of the study variables, which provides information about the sample statistics of data series such as mean, medium, minimum and maximum value and distribution of the sample measured by skewness, Jarque-Bera, and Kurtosis. All variables are expressed in logarithm. A high level of consistency was displayed by the series in table 1, as their mean and median fall within the minimum and maximum values of the series. Also, the standard deviations are generally low, showing that the deviations of the actual data from their mean values are small.

Table1: Descriptive Statistics

	LLTR	LOEC	LRBC	LSP	LSW	LTA	LTE	LTL
Mean	-2.909	18.432	18.018	21.393	20.113	22.937	20.329	22.339
Median	-2.818	18.486	17.945	21.291	20.037	23.037	20.675	22.367
Maximum	0.9293	22.460	22.653	27.870	25.015	27.005	25.330	26.638
Minimum	-6.299	12.786	12.983	13.138	15.616	18.913	13.918	18.158
Std. Dev.	1.333	1.797	1.9551	2.760	1.760	1.835	2.234	1.828
Skewness	-0.1594	-0.2168	0.0047	-0.2653	-0.1809	-0.0788	-0.3763	-0.1144
Kurtosis	2.956	2.796	2.3392	3.340	2.777	2.095	2.764	2.368
Jarque-Bera	0.6433	1.426	2.711	2.465	1.121	5.237	3.863	2.814
Probability	0.7250	0.4903	0.2578	0.2916	0.5708	0.0730	0.1450	0.2449
Sum	-433.48	2746.4	2684.6	3187.6	2996.9	3417.6	3029.1	3328.5
Sum Sq. Dev.	262.94	478.12	565.71	1127.5	458.34	498.11	738.32	494.43
Observations	149	149	149	149	149	149	149	149

Note: LTR= Labour turnover rate, OEC= other employees' cost, , RBC= Retirement benefit cost, SP= Share prices, SW= Salaries and Wages, TA= Total Assets, TE = Total Earnings and TL= Total Liabilities .

Table 2 shows that there is a positive correlation between TE and all other variables and they are significant at 1% except the relationship between TE and LTR which is significant at 5%. However, caution should be exercised in interpreting results from correlation, because simple bivarite correlation in a conventional matrix does not consider each variable's correlation with all other independent variables. The conventional correlation matrix in table 2 only portrays the extent of the linear relationship between pairs of relationship used in this study, and caution must be exercised in interpreting results from correlation analysis, because correlation between variables does not mean causation. Thus, negative or positive correlation coefficients reported in Table 2 only depicts the extent of the linear relationship between pairs of variables used in this paper.

Table 3 presents the result of the Pooled OLS regression conducted to examine the influence of major determinants of human capital investments on total earnings of listed manufacturing companies. Each econometric methodology is used to estimate the pooled OLS for the different sectors individually and then collectively. The adjusted R2 ranges from 0.572 to 0.918. This simply suggests that the independent variables explain between 57% to 92% of the variation in the dependent variable. The results show that LSW has a significant positive effect on all the firms. However, when the firms are broken into sectors, LSW has significant positive effect on Industrial goods, conglomerates and others, but a significant negative effect on healthcare. LRBC has no significant effect on the various subsectors except for healthcare only at 10%. In the same way, LOEC has no significant effect on the various subsectors except in the consumer goods sector, where it has significant positive effect on LTE at 5%. LLTR has positive effect on the aggregate and the subsectors except in consumer goods and conglomerates subsections. In the sectors where the components of human capital reporting are positive, it could be that such costs positively affect workers'

productivity and thus, total earnings. The findings then imply that as human capital reporting increases in listed manufacturing firms, earnings will also increase.

Table 2: Correlation Matrix

Correlation								
Probability	**LLTR**	**LOEC**	**LRBC**	**LSP**	**LSW**	**LTA**	**LTE**	**LTL**
LLTR	1							

LOEC	-0.0444	1						
	0.591	-----						
LRBC	0.0993	0.7016	1					
	0.228	0.000	-----					
LSP	0.0711	0.5076	0.5865	1				
	0.389	0.000	0.000	-----				
LSW	0.0757	0.7097	0.8780	0.6150	1			
	0.359	0.000	0.000	0.000	-----			
LTA	0.0784	0.7780	0.8583	0.6695	0.8802	1		
	0.342	0.000	0.000	0.000	0.000	-----		
LTE	0.1838	0.566088	0.6832	0.5306	0.7230	0.6969	1	
	0.025	0.000	0.000	0.000	0.000	0.000	-----	
LTL	0.0782	0.7639	0.8522	0.6415	0.8684	0.9702	0.6881	1
	0.343	0.000	0.000	0.000	0.000	0.000	0.000	-----

This table shows the relationship among the variables used in the study. For most of the variables, the results showed a strong relationship.

Table 3: Relationship between Human Capital Cost (HCC) and Total Earnings

Variables	**1**	**2**	**3**	**4**	**5**	**6**
C	2.206	-2.755	-3.378	54.178***	12.205**	0.9023
	(0.5470)	(-1.4432)	(-0.8709)	(4.306)	(2.371)	(0.5449)
LSW	0.9552*	0.1684	1.144***	-1.169**	1.250**	0.3929**
	(1.861)	(0.9977)	(3.424)	(-2.331)	(2.108)	(2.321)
LRBC	0.6920	-0.0237	-0.2056	-0.8081*	0.4621	0.0777
	(1.256)	(-0.1874)	(-0.9392)	(-1.990)	(1.102)	(0.5616)
LOEC	0.4751	0.2673**	-0.0659	-0.1622	-0.0064	0.0227
	(1.2296)	(2.228)	(-0.5309)	(-0.7303)	(-0.0161)	(0.2067)
LLTR	0.2873	-0.0636	-0.0160	0.4635**	0.1421	0.1919**
	(1.221)	(-0.789)	(-0.1564)	(2.255)	(0.4076)	(2.073)
LTA	0.1383	1.245***	1.270**	-0.4452	-3.635**	-0.1785
	(0.1148)	(3.318)	(2.749)	(-1.351)	(-3.121)	(-0.7942)
LTL	-1.386	-0.7143*	-1.336***	-0.4760	2.463***	0.5224***
	(-1.386)	(-1.770)	(-3.452)	(-1.347)	(2.814)	(2.923)
LSP	0.2660	0.1081**	0.2765**	1.283***	0.2377	0.1258**
	(1.342)	(2.218)	(2.579)	(3.969)	(1.223)	(2.202)
R^{-2}	0.5822	0.8277	0.9496	0.7964	0.5921	0.5720
Adjusted R^{-2}	0.4679	0.7990	0.9176	0.6946	0.4624	0.5530
Schwarz criterion	4.487	2.698	2.349	3.198	4.839	3.897
F-statistic	6.172	28.823	29.617	7.824	4.563	30.163
Prob(F-statistics)	0.0001	0	0.0000	0.0006	0.0028	0
Akaike criterion	4.1459	2.392	1.951	2.802	4.465	3.747
Durbin Watson	0.3919	1.425	1.385	1.881	0.5893	0.4065
No. of Observation	39	50	19	22	30	166

*The figure in parenthesis indicate t-statistics ***, **, * implies significant at 1%, 5% and 10% respectively. Note that: 1=industrial goods , 2=consumer goods, 3= conglomerates, 4=healthcare, 5 = others and 6=all industries.*

CONCLUSION

This paper examined the effect of human capital reporting on earnings of quoted manufacturing companies in Nigeria. The study made use of annual data for manufacturing firms in Nigeria over the period 2007 – 2014. The data was sourced from the Annual Reports and Accounts of the firms. Findings revealed that the measure of human capital cost exerts a positive and significant impact on corporate earnings, which therefore implies that the capitalization of human resource investment in the annual reports has the propensity to increase corporate earnings.

The policy implications of the findings are as follows: manufacturing companies in Nigeria need to recognize and treat human capital as an intangible asset in their financial statement with a certain amount amortized over a certain number of years. Hence the conventional way of treating human resource costs should be dropped. Secondly, the NSE should enforce capitalization of human resource costs in the annual reports of companies since such capitalization has impetus to increase earnings and performance of companies. A limitation of this study is that it has not considered all the listed firms on the Nigerian Stock Exchange. Subsequent studies should either look at all the sectors or do a comparative study of two or more sectors.

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THE IMPACT OF RELIABILITY ELEMENTS ON PERFORMANCE INDICATORS OF JORDANIAN COMMERCIAL BANKS

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ABSTRACT

This study aims to examine the reliability of accounting information systems and its impact in improving the performance indicators of Jordanian commercial banks through the adoption and use of (Sys Trust) model. The concept of performance indicators (according to this study) includes: financial, operational, and stock performance and management of market value. The study has drawn upon qualified questionnaire sent to all the Jordanian commercial banks listed in Amman Stock Exchange to obtain the data with a response rate over 75%. A number of illustrative hypotheses have been tested statistically to examine the readiness of and the relation between accounting information systems' reliability and quality of performance. The results have indicated high level about the readiness of (SysTrust) principles in accounting information systems environment of the Jordanian Commercial Banks ;(availability (78%), security (77%), confidentiality and privacy (70%), and Processing integrity (57%)). In addition, an independent sample R2 test confirmed a positive relation between applications of (SysTrust Model) and parameters of banking performance matrix (Net profit margin and Return on assets). While the statistical tests have shown negative relation in regard to banking performance parameters (Market value-added, Return on investment, Earnings per share, and Price-earnings ratio).

JFL: M410

KEYWORDS: AIS Availability, AIS Security, AIS Confidentiality and Privacy, AIS Processing Integrity, AIS Market Value-Added, Return on Investment, Net Profit Margin, Return on Assets, Earnings Per Share, Price-Earnings Ratio

INTRODUCTION

Perhaps one of the most common business facts is that the Accounting Information System (AIS) has always formed one of the most important tools for measuring and reporting the activities and the profitability of the business organizations . These systems has a long history in such fields. Most of the beginnings of accounting goes back to the old civilizations era which adopted clay boards in the field of measuring and reporting the details of the daily bargains and deals. As it is important to clarify the stages of the transformation of designing and discovering the mechanism of the AIS, it is possible to say that the discovery of the double entry System (DES) has formed the real beginning of designing the logical AIS that is characterized of being distinguished and unique. However, most opinions consider using information technology for processing the accounting data is the real beginning of designing the contemporary AIS. The real importance of adopting and use of information technology in the structure of AIS comes from the fact that it redesigned the internal AIS financial control in the direction of promising larger operational efficiency, it aligned the company's functions to meet the needs of e-business, as well as it resulted in an

objective and trustful performance. However, this heavy reliance of today's businesses on the use of information technology makes the reliability of their AIS very critical.

In one hand, it derives their traditional accounting control concepts and tools obsolete and on the other hand, it elevates the level of risks associated with AIS and the risk associated with their functional performance of business (Zhao et al., 2004). To meet these risks and control concerns and to provide assurance regarding the reliability of a firm's AIS, the American Institute of Certified Public Accountants (AICPA) and the Canadian Institute of Chartered Accountants (CICA) were ones of the first organizations that prospected this significant fact. They formed common researching committees worked continuously to redesign the concepts and the principles of the traditional AIS control in a way to reconstruct it on technological bases taking into consideration the new identity of AIS. After great efforts, they succeeded to issue a type of assurance service called (Sys Trust) as provisional work guidance provides the possibility of testing and checking the levels of AIS reliability (Bailey, 2000). The claimed benefits for firms to use Sys Trust include reducing risk and enhancing the confidence of a broad audience (management, board of directors, customers, business partners) regarding the reliability of information systems in general and AIS in particular (AICPA/CICA, 2006; Bedard et al., 2005; Pugliese and Halse, 2000), affecting the intention of potential users (e.g. customers, business partners) to adopt and use its online application and enabling companies depend on information technology for their daily functioning maintaining their competitive position, and making key business decisions (Greenberg et al., 2012).

Notwithstanding the benefits of Sys Trust and the efforts of professional bodies (AICPA/CICA) to promote the service and to encourage the application of contemporary assurance service among firms, to date, the actual demand for the Sys Trust service has been limited and less effort is made to incorporate up-to-date assurance service process among firms (Sutton, 2006). Moreover, research in this area has also been limited (Greenberg et al., 2012). As a result, there has been a call for research to examine the issues within different contexts (Greenberg et al., 2012; Bedard et al., 2005; Sutton, 2006; Sutton and Hampton, 2003). In response to the call, the present study is taking a significant step to examine the suitability of Sys Trust in a new context. First, it examines the readiness of AIS reliability within a financial service domain and second it is exploring the effect of the reliability of AIS on the performance of banking industry, which considers one of the basic aspects in Jordan.

The remainder of this study is organized as follows. The next section describes the Literature Review and the theoretical model for the study. Hypotheses are then developed followed by a description of Data and Methodology. Subsequently, the results are presented, and the Concluding Comments and implications of the findings are discussed.

LITERATURE REVIEW

Sys Trust Service

The AICPA and CICA established the Sys Trust service in 1999 in expectation of increased need for reliable systems that results from the heavy reliance on information technology. Sys Trust is a type of assurance service performed by a certified CPA or CA to independently test an organization's system and to offer assurance on the system's reliability. In an examination engagement, there is an opinion as to whether controls over a defined system were operating effectively to meet the criteria for systems reliability. The intent is to enable those stakeholders who use or rely on the system including the company itself, its partners and customers, to gain trust and confidence in the system (AICPA/CICA, 2006; Bedard et al., 2005; Pugliese and Halse, 2000; Greenberg et al., 2012). According to the Trust Services Principles, Criteria and Illustrations (AICPA/CICA, 2006), the reliability framework in the Sys Trust includes five principles: security, availability, confidentiality and privacy, and processing integrity. These principles are used individually or in combination in order to provide the relevant parties of the work of AIS (management,

customers, suppliers, and business partners) and in levels to ensure that the system actually works objectively and mechanically to ensure less risky levels. Each principle of the above four principles consists of a management of one aspect of operating and work of the AIS aspects work both in terms of the definition of concepts or in terms of clarify operational policies to be adopted to optimize the operation of the above four principles. The importance of availability of reliability of AIS standards has become an established fact in applications of control and auditing in the United States, Canada, and some Western Europe countries. It has become imperative for the AISs operating in those countries to own strong information in light of the standards of (SysTrust). Such companies usually granted a certificate known as (SysTrust) which are often valid for a period of three years, subject to renewable after the actual assessment once again. The below sections include the definition and clarification of the operational requirements related to each standard within the business model system (SysTrust).

Availability of AIS

AIS availability is the ability of the final user 's to use the system within the system timings necessary for the implementation of the business organization work requirements. The concept of using system involves the ability of implementing data processing course activities; entry, storage, processing, and report with the greatest levels of efficiency (Romney and Steinbart, 2015). According to this description, the AIS availability considers, in reality, a function of two factors: failure of hardware and software and natural disasters which requires the AIS administrators taking adequate control measures to limit the effects of the AIS malfunction whether through the use of scheduling of operations or through the adoption of efficient maintenance systems in its two types the periodic and the emergent. In addition, the developing of recovery plans from natural disasters and hostilities plans (Disaster Recovery Plan) is important in this regard, too, especially such disasters and businesses have recently become more frequent and more destructive . It is noted that the availability of AIS is subject to the policies and plans of the administration in regard to the use and operation of the system.

AIS Security

AIS security is defined as the degree of protection entitled by the regime against the illegal access of both types (physical and logical). A good level of security considers an important tool for reducing risks and threats resulting from un ethical use of data (such as destruction, modification, and data leakage). Good AIS security level is considered a tool of reducing the risks associated with illegal physical use such as theft and deliberated destruction for some components of system (FFIEC, 2003). AIS management should , in order to strengthen the security system, design security technological infrastructure on one hand and adoption policies and procedures separation systems , especially with regard to the functions of processing data and data acquisition, use of control systems of physical and logical access, enhancement the protection of personal computers procedures, and using hardware and software system for protecting of business networks and implementation of e - commerce and business work requirements (Kalakota and Whinston, 1999; Zhao et al., 2004).

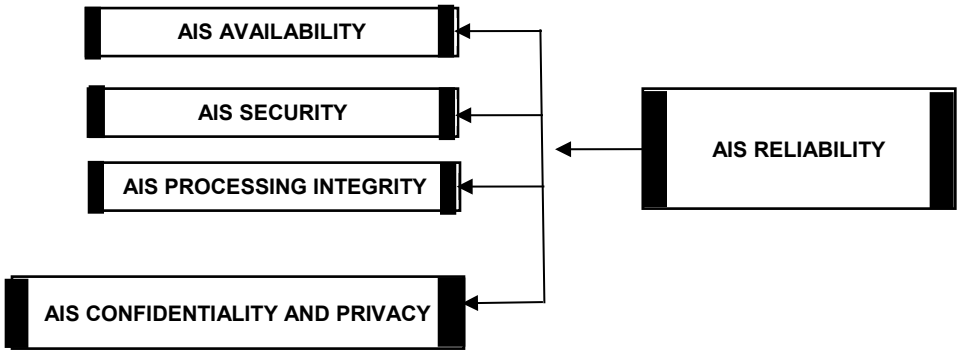
AIS Confidentiality and Privacy

AIS confidentiality and privacy is known as a set of procedures that contribute to maintaining the confidentiality and privacy of information of company and its customers whether it is at the stage of being collected, processed, classified or stored (Romney and Steinbart, 2015). There is a must to put policies and procedures that would keep the secrecy and privacy of information and its documentation, and identifying the responsible of the maintenance of the system , and the mechanism to be used, in addition to the assessment of these mechanisms periodically.

AIS Processing Integrity

It is known as the degree of being complete, accurate, temporary, and the legitimacy of data processing operations in AIS . Generally, AIS safety is described high if it is able for carrying out a series of planned processing operations within the timings tables on one hand , while ensuring that no access or illegal use of the resources of the processing operations on the other hand (AICPA & CICA, 2006). In order to ensure high safety operations, AIS administrators should adopt applications control system (Application Controls) which involves physical and logical tools to prevent, identify, and correct mistakes that may take place during the implementation of the data processing activities course. The applications include the control of sources of data entry tools and operations system as in the means of control data sources (Source Data Controls), verification tests of inputs (Input Validation Routines), An immediate injection of data and control (On -line Data Entry Controls). In addition to the means of control storage operations and data processing (Data Processing and Storage Controls), (Outputs Controls), and (Data Transmission Controls). Fiqure 1 presents the SysTrust for verifying AIS Reliability which includes AIS availability, AIS security, AIS processing integrity, and AIS confidentiality and privacy.

Figure 1: SysTrust Model for Verifying AIS Reliability



This figure shows the SysTrust for verifying AIS Reliability which includes AIS availability, AIS security, AIS processing integrity, and AIS confidentiality and privacy. Source: AICPA & CICA, 2006

Previous Studies

The adoption and use of information technology introduced a fertile field of study and research especially regarding regulatory, human, and financial effects resulting from such use. In addition, the breadth size of these effects has led many professional and academic organizations of adoption research projects for developing models work on framing the variables that has to do with the levels of use of information technology and what makes it evidence of the use and measurement environmental inequalities ranges in the employment of the means of information technology. In this regard it should be noted that the study of (COSO, 1992) that has redefined the concept of internal control on one hand and development a guide to assessing the internal control systems on the other hand. It is possible to say that the model (COSO) for internal control components summarized in: (Control Environment), (Control Activities), (Risk Assessment), (Communication Systems), (Monitoring). A (COSO) study includes five well known professional academic organizations and takes more than three years and concludes that the fact that the use of information technology expanded greatly from the concept of internal control where it is no longer an accounting pure concept but became so broad that became the important technological, administrative, and human variables . The adoption and use of information technology greatly increased the levels of risk surrounding the work of the internal control systems, which urged the need for efficient management of the variables of the internal control systems, including technological, managerial and human variables.

It also should be noted that the study of the control and audit committee study of the information systems (ISACF, 2001) , which worked on the development and framing the regulatory objectives related to the use of information technology (COBIT). The ISACF study includes three control groups: (Business Objectives), (IT Resources) and (IT Process). The most important characteristic of the study of ISACF is the collecting more than thirty-six control standard in one frame including works to provide tight regulatory guide that can be used to assess the adequacy of AIS security and control systems based on the use of information technology. Evaluating of AIS reliability and the effectiveness of its control procedures urged both (AICPA & CICA, 2006) to develop a series of control principles could be reliable to assess the objectivity of business organizations Web sites. It included the principles of privacy, security, safety of operations, transactions, availability, confidentiality, and disclosure.

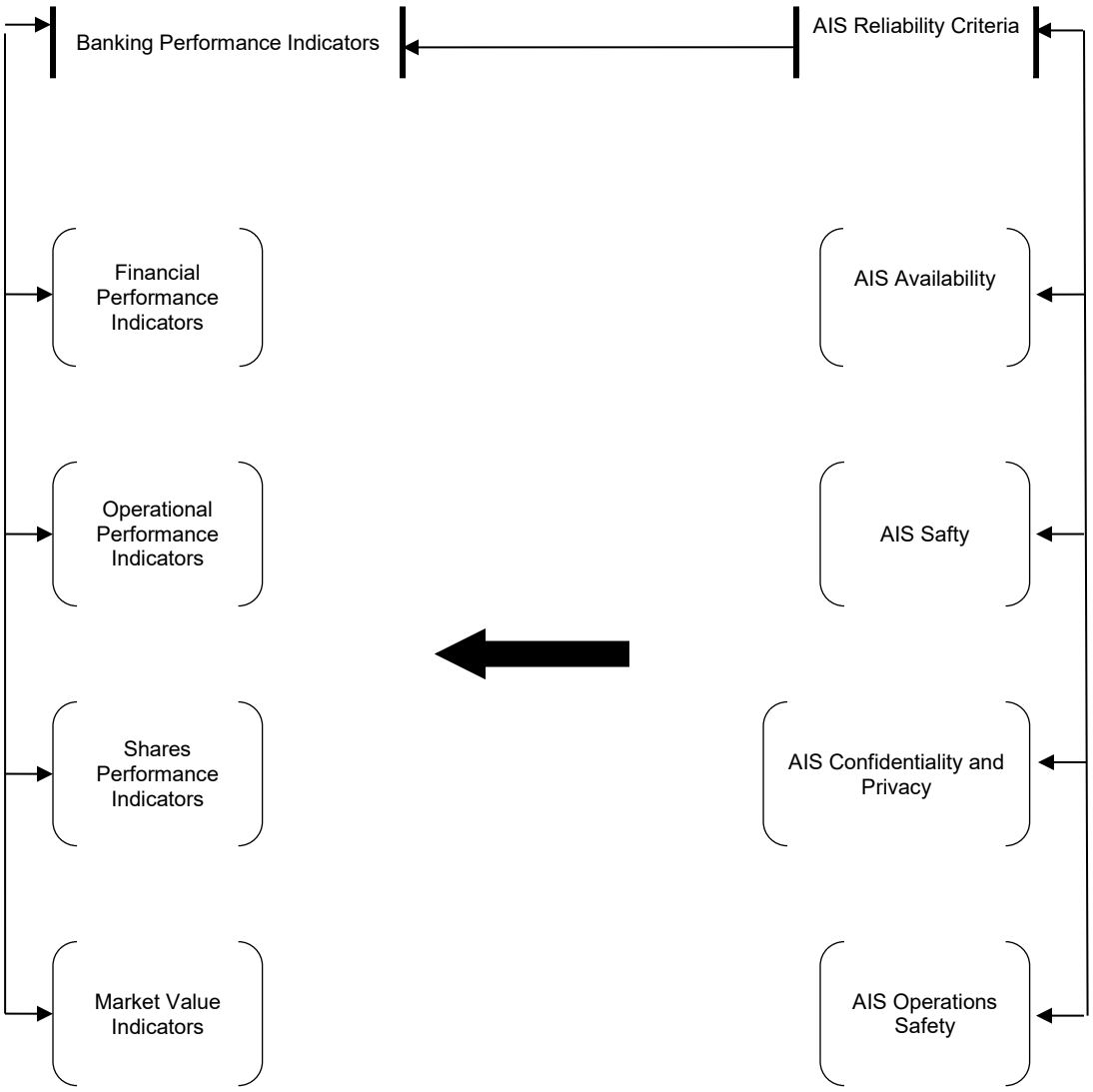
The Boritz and Hunton (2002) paper primarily addresses Information system reliability. The paper represents an important area of research and provides a valuable starting point for additional research. The paper indicates that careful thought went into designing the questionnaire and the research design in general. A variety of statistical tests was performed on the data to test for possible biases in the subsequent questionnaire responses. Casolaro and Gobbi (2004) study has represented one of the worth mentioning study in this aspect. The study aims at studying the wide effect of using IT on three operational variables: cost, productivity and profitability. The importance of their study comes from the fact that it implemented in the Italian banking industry by taking a sample of six hundred banks. It concludes that there is a statistical effect for expanding in the use of IT especially in minimizing baking cost, maximizing banking services extents and fostering the levels of baking profits.

Raupeliene and Stabingis (2003) aim to study the methods of evaluating the efficiency of computers- based AIS. They develop a model to evaluate the efficiency of computerized AIS by framing a group of social, economical and commercial criteria. It considers as an attempt to find parameters that can be used for measuring the effect of IT on AIS efficiency. It concludes that the efficiency of computers- based AIS has different statistical levels that can be expressed by quality and quantity measures. The accuracy of these measurements depends on the maturity level of AIS environment application from one hand and the degree of the development of the technological infrastructure form another hand. The excellence and uniqueness of this study compared to the previous studies and the individual attempts of measuring close criteria to study subject on the local level comes from the fact that the (Sys Trust) provides a comprehensive measuring frames distinguished by containing all the measuring parameters of computerized AIS operations from one side. In addition, the sample of this study includes all Jordanian commercial banking that can really express the Jordanian banking performance from another side.

The Model of Study

As we mentioned before; what distinguishes the current study is being based on adopting (Sys Trust) including the operational criteria considers effective variables in determining the AIS performance levels. According to the concepts of this operational relationship, the model of this study was constructed to contain AIS reliability criteria, which represented by AIS availability, AIS security, AIS confidentiality and privacy, AIS processing integrity and AIS as independent variables consider parameters that possess effects possibility in the targeted measured of reliability level. While banking performance matrix indicators represented in the financial performance levels, operational performance, shares performance and the level of the market value are classified as dependent variables. Figure 2 presents a hieratical shape for the independents and dependent variables that forms the model of study.

Figure 2: Theoretical Model of Study



The Hypotheses of Study

In the light of the theoretical model of study in Figure 2, and the problem of study mentioned above; we can summarize the most prominent hypotheses in two groups: the first group includes hypotheses verifying the availability of the operating requirements of the standards according to the model (SysTrust) in AIS work environment in the Jordanian commercial banks and at the level of each standard operation. The second group includes hypotheses verifying AIS impact of reliability on the banking performance indicators matrix that constitute the sample study. The first group: AIS level of reliability in Jordanian commercial banks:

H_{01} AIS does not provide standard of readiness requirements in Jordanian commercial banks.

H_{02} AIS does not provide the requirements of security in Jordanian commercial banks.

H_{03} AIS does not provide the standard of confidentiality and privacy in Jordanian commercial banks.

H_{04} AIS does not provide the standard of processing integrity requirements in Jordanian commercial banks.

The second group: the AIS impact of reliability in the Jordanian commercial banks on the banking performance matrix indicators:

H_{05_1} There is no effect of AIS reliability on value market added.

H_{05_2} There is no effect of AIS reliability on returns on investment.

H_{06} There is no effect of AIS reliability on operational performance levels.

H_{06_2} There is no effect of AIS reliability on net profit margin.

H_{07} There is no effect of AIS reliability on operational return on assets.

H_{08} There is no effect of AIS reliability on stock performance (EPS).

H_{08} There is no effect of AIS reliability on market value level (price-earnings ratio).

DATA AND METHODOLOGY

The objective of this study is to extend of Sys Trust within Jordanian Commercial Banks dominate. The study contains two kinds of measurement: a) Measuring and checking the availability of the reliability standards pointed out in the theoretical frame of the study as the independent variables. b) Measuring the performance indicators of Jordanian Commercial Banks as the dependent variables. To measure the readiness of the reliability standards, a questionnaire was prepared especially for this purpose that contained many questions to determine the extent of availability and optimality of (SysTrust) principles and criteria. The survey questions were selected from the AICPA Trust Services Principles, Criteria, and Illustrations for Security, Availability, Processing Integrity, Confidentiality, and Privacy guide and were modified to the practice of commercial banks context. Accordingly, the quantitative data for the study were gathered through a survey questionnaire from both the IT specialists and business managers within each bank. The survey questionnaire comprised 63 items 4-dimensions. The questionnaire consisted of three sections, which starts with a brief description of the meaning of the main concepts, and it gives the instructions on how to answer each section of the questionnaire. The second section contained basic demographic characteristics including gender, age, measures for assessing the level of SysTrust experience, etc. In the third section, the survey participants were asked to respond to questions on the four constructs of the model: Security, Availability, Processing Integrity, Confidentiality and Privacy.

For each construct, a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5), was used. The questionnaire also explores the prominent obstacles that face the achievement of reliability requirements as well as the operational problems that might come up as a result. The survey was originally written in English. However, as the survey has to be conducted in a non-English-speaking country, it was translated into Arabic. Translation of all terms has been completed at most accurate way possible so as to allow researcher to use comparatively the results of this survey with results obtained from other similar SysTrust surveys. To ensure the reliability and validity of the translated questionnaire and to provide greater objectivity of the results of study, researchers tended to verify the statistical validity of questionnaire through implementing of Validity and Reliability as shown below

Validity of Instrument

This test aims at checking the ability of questionnaire to describe and represent the variables that intended to be checked as well as to implement what this test contains. The judges' opinions and the verification of the internal content were used as tools that achieve objectivity. The well designing of questionnaire considers the comprehensive content and excludes repetition and double standards. Researchers offered and distributed the questionnaire to a number of academics, specialists and professionals to check the simplicity and easiness of understanding as well as the good research variables representing. In fact, the questionnaire has been approved and accepted by academic and professionals. Researchers tested the validity of the internal consistency of the questionnaire by the creation of Pearson correlation coefficient between each item and the general rate of the department that included that item. The results showed positive indicators regarding the validity of questionnaire and its ability to record study variables.

Reliability of Instrument

This test designed to verify access to the same data if it repeated the questionnaire more than once. We use (Cronbach Alpha) for verifying the level of reliability of instrument. Test results showed that the value of Alpha was about 84%, the value exceeds the accepted cut-off value of 0.70, as suggested by (Nunnally, 1978). This indicates that each individual item is internally consistent and highly reliable (Vaus, 2002). The study also adopted a series of steps to transform gathered data from interval scale to ratio scale to facilitate comparing reliability levels with performance level. A relative weight was given to each standard of reliability standards. These weights had been determined according to the judges and the requirements of each standard (see Table 1). Table 1 presents the AIS reliability standards, their relative weights and number of questions for the different dimensions of each standard of reliability

Table 1: (SysTrust) Principles

AIS Reliability Standard	Weighted-Average	No. of Questions
AIS Availability	%24	
AIS Security	30%	19
AIS Confidentiality and Privacy	13%	8
AIS Processing Integrity	33%	21
Total	100%	63

This table shows the AIS reliability standards, their relative weights and number of questions for the different dimensions of each standard of reliability

In addition, determining what is known as mid-point class through identifying ranges of classes to facilitate verification of the availability ratio of four reliability standards operations has been taken into consideration. It is worth mentioning here that the calculation of checking the achievement of each standard done by multiplying the value of the class in the weight of standard. Table 2 presents Interval weights for reliability levels, their classes and their classes' values

Table 2: Interval Weights for Reliability Levels

Very High	**High**	**Intermediate**	**Low**	**Very Low**	
81-100	61-80	41-60	21-40	1-20	Class
90.5	70.5	50.5	30.5	10.5	Class value

This table shows the Interval weights for reliability levels, their classes and their classes' values

Participants and Data Collection

The target population of this study is all Commercial Banks listed in Amman stock exchange as of January 1st 2006. The population size of 13 banks was selected and both the IT specialists and business managers

within each bank were used to gather data. The data collection was conducted using questionnaires that were self-administered by hand and mailed to the selected study population. The survey questionnaire comprised 63 items 4-dimensions. The response rate was 76.92 percent (a total of 10 questionnaires out of 13 after the follow-up activities were returned for statistical analysis). To measure the performance indicators of Jordanian Commercial Banks, as the dependent variables, we use annual reports for banks in 2006 to get the data (www.abj.org.jo), which reflects in a way the affection of what is known as AIS reliability perfection. For study purposes, banking performance matrix takes the conceptual map and the identification formula stated below (Mays and Shank, 2001).

Financial Performance

Market value added (MVA): it defines as the difference between the market value of shares and the capital provided by stockholders. The importance of (MAV), as a financial indicator, comes from its ability to clarify the increase in the market value of stock and the effect of this increase in maximizing the market value of business organization. Return on Investment (ROI): it defines as the total of profits coming from the use of valuable assets. Mostly, it uses as an indicator for measuring the efficiency of business organization.

Operational Performance

Net profit margin (NPM): it define as the remaining amount of each dinars of income (as a percentage) after the payment of all costs, including interest and taxes. Operating return on assets (ROA) : total profits remaining after subtracting the operational expenses only. The operational return reflects the efficiency of business organization management in creating and achieving profits from the operational resources that characterized by highly degree of periodical and frequency.

Share Performance

Earnings per share (EPS): This ratio is very important to investors because it provides an important indicator of the success of the business in achieving profitability.

Market Value

Market value reflects a part of the goodwill of the business on one hand and the success and operating policies on the other hand. This ratio provides a signal to investors and owners about the future of investment. Price-Earning ratio (P/E): This ratio represents the return required by investors in the financial markets to employ their money in shares of the business organization.

Testing Normal Distribution of Data

Kolmogorov-Smirnov (K-S) statistic is used for testing whether the data is normally distributed. Most statistical tests require normally distributed of data. For decision rule in this type of testing is based on the hypothesis of accepting the normal distribution of the data if the value of significance is more than 5% and taking null hypothesis if the significance value is less than 5% (Sekaran, 2005). In addition, we use this test for checking the problem of Autocorrelation. The problem of Autocorrelation that would affect the validity of the model. Table 3 shows the test of normal distribution for independent and dependent variables.

Table 3: Normal Distribution Test

Variables		Kolmogorov-Smirnov		Ratio of Skewness to Standard Error		
		K-S Coefficient	Sig	Skewness	Standard Error	Ratio
Independent Variables						
AIS Availability		0.195	0.194	-0.088	0.616	-0.143
AIS Security		0.183	0.200	-0.846	0.616	-1.373
AIS Confidentiality and Privacy		0.189	0.200	0.663	0.616	1.075
AIS Processing Integrity		0.283	0.006**	-1.968	0.616	-3.194
Financial Performance	MVA	0.451	0.000***	3.453	0.616	5.603
	ROI	0.406	0.000***	3.307	0.616	5.365
Operational Performance	NPM	0.291	0.004***	1.867	0.616	3.029
	ROA	0.172	0.200	1.200	0.616	1.947
Shares Performance	EPS	0.222	0.078*	0.894	0.616	1.450
Market Value	P/E	0.384	0.000***	2.896	0.616	4.701

*This table shows normal distribution test for the study variables based on Kolmogorov-Smirnov coefficient test. In addition, it shows the ratio of Skewness to Standard Error for all variables used in the study. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

The Ratio of Skewness to Standard Error

We use the above ratio as another way for testing normality distribution of data, where the data is normally distributed if the ratio is in the range of (-2 to 2). Table 3 shows that the value of Sig. for some of the assumptions is greater than 5%, indicating that the data is normally distributed. The ratio of skewness to standard error for these hypotheses within the range of (-2 to 2) which confirms the property that the current study data has normally distributed which is consistent with the results that have been reached in the test of (Kolmogorov-Smirnov), with the exception of the data of the following variables: the safety of AIS operations , the level of financial performance, the level of operating performance and the level of market value. We convert the variables that have no normal distribution in their data to the natural logarithm (LN) to overcome the problem of non-normality.

Testing the Suitability of the Study Model

As we mentioned earlier, this study aims to measure the impact of the availability of the reliability of AIS on banking matrix performance which is expressed in six functional indicators: financial performance (MVA & ROI), operating performance (NPM & ROA), performance shares (EPS), and market value (P / E). In order to facilitate the implementation of measurement processes the current research is based on the adoption of the quantitative measurement of each functional index methodology and through mathematical models as below:

$$\left|\begin{array}{l} MVA = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell_i \\ ROI = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell_i \\ NPM = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell_i \\ ROA = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell_i \\ EPS = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell_i \\ P/E = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell_i \end{array}\right| \quad (1)$$

Where: α constant, $\beta_{1\ldots4}$ coefficients . $\chi_{1\cdots4}$: the availability of AIS, security of AIS, confidentiality and privacy of AIS, processing integrity of AIS respectively, ℓ_i Random error.

Testing the Problem of Multicollinearity

We use Collinearity Diagnostics measure through the calculation of (Tolerance) for each independent variable and then finding the variance inflation factor (VIF) to achieve the objectivity of the measurement process and to assure the total independency of each independent variable and the exclusion of those variables that are suffering from the problem of (Multicollinearity). This is a model to measure the impact of the correlation between the independent variables. The value of (VIF) of 5 or more is an evidence to the existence of the Multicollinearity problem (Sekaran, 2005). As can be seen from Table 4, the VIF for all independent variables is less than 5 which is an evidence against the problem of Multicollinearity.

Testing the Problem of Autocorrelation

We use Durbin-Watson test for checking the Autocorrelation problem. Durbin-Watson test has a range of (0-4) where 0 indicating a strong negative correlation between errors while 4 implying a strong negative correlation between errors. The ideal value of Durbin-Watson is between 1.5 and 2.5, indicating no correlation between errors. As can be seen from Table 4, the Durbin-Watson value for all independent variables is between (1.5-2.5) which is an evidence against the existence the problem of Autocorrelation between errors (Sekaran, 2005). Table 4 presents the tests of Multicollinearity and Autocorrelation problems.

Table 4: Testing the Suitability of the Study Model

Independent Variable			**Dependent Variable**		
	Tolerance	VIF			Statictic D-W
AIS Availability	0.765	1.307	Financial performance level	MVA	1.569
AIS Security	0.608	1.645		ROI	1.511
AIS Confidentiality and Privacy	0.638	1.567	Operational performance level	NPM	2.452
AIS Processing Integrity	0.866	1.155		ROA	1.748
			Shares performance level	EPS	2.475
			Market value level	P|E	1.624

This table shows Durbin-Watson test for checking the Autocorrelation problem between the study dependent and independent variables. It also shows the tolerance and variance inflation factor (VIF) for all independent variables for checking the Multicollinearity problem.

Demographic Statistics of Respondents

In order to achieve integration in the methodology of this study, we use questionnaire, as an essential tool, for measuring the reliability of the application of AIS standards levels. One questionnaire was distributed to each targeted banks, specifically to the head of IT department. Table (5) presents the general and personal details of the study sample.

Table 5: Personal and General Features of Sample

Specifications		**Statistical Analysis**	
		Frequency	**Ratio**
Specialization	IT	11	85%
	Administrative & financial Sciences	1	8%
	others	1	8%
	Total	13	100%
Qualification	High studies	3	23%
	BA	9	69%
	Diploma	1	8%
	Total	13	100%
Position	Branch manager	1	8%
	Head of department	12	92%
	employee	0	0%
	Total	13	100%
Experience	Less than 3 years	3	23%
	3-5 years	7	54%
	5-10 years	1	8%
	More than 10 years	2	15%
	Total	13	100%

This table shows the general and personal features of the study respondents in terms of their Specialization, Qualification, Position, and Experience.

Table (5) shows that 85% of respondents are information-technology specialists, followed by 8% from financial and administrative sciences, 8% from various other disciplines. According to such a demographic, study sample is comprehensive on one hand and the ability of respondents to deal with the subject of study on the other hand. We also note the vast majority (69%) are bachelor's holders, while the graduate studies holders accounted for 23%. Regarding to the position of the respondents, it found that 92% are heads of departments of the middle-management of the banks. Followed by 8% of branch managers. This sample represents an advantage for the current study because the heads of departments and heads of departments of the middle-management have a lot of experience to deal with the work of the reliability of the AIS details. We also note that 23% of the sample has an experience less than three years while 54% has an experience ranging from three to five years. 8% has an experience exceeds five years and less than ten. 20% has an experience exceeds twenty years.

Summary Statistics

Table 6 presents the maximum value, minimum value, average, and standard deviations for all performance indicators that used in the study.

Table 6: Summary Statistics of Performance Indicators

Performance Indicators		**Average**	**Standard Deviation**	**Maximum**	**Minimum**
Financial performance level	MVA	989,967,002	2,524,508,704	9,281,170,000	30,906,156
	ROI%	50.50	80.10	310.8	-11.04
Operational performance level	NPM%	50.66	19.82	104.5	29.06
	ROA%	294.4	186.7	791.3	99.36
Shares performance level	EPS	0.521	0.278	1.137	0.210
Market value level	P/E	19.74	11.53	55.67	9.167

This table shows the maximum value, minimum value, average and standard deviations for all performance indicators that used in the study.

Table (6) shows the market value added (MVA) has an average of 989,967,002 JD with a standard deviation of 2,524,508,704 JD, implying a high variation among banks regarding their market value added. The return on investment (ROI) has a mean of 50.5% with a standard deviation of 0.80. Net profit margin (NPM) has a mean of 50.66% with a standard deviation of 19.82. The return on assets (ROA) has a mean of 294.4 with a standard deviation of 186.7, indicating a high variety among banks with respect to their

return on assets. The mean of earnings per share (EPS) is 0.521 with a standard deviation of 0.278. Finally, price-earnings ratio (P/E) has a mean of 19.74 with a standard deviation of 11.53

RESULTS AND DISCUSSIONS

The previous tests have demonstrated the validity of the process of study models. The positive results in terms of possessing the normal distribution on one hand and testing the appropriate regression models and their ability to interpret the relationship between the dependent and independent variables on the other hand. It should be noted that the current study includs two types of tests: the first is designed to verify the existence of the reliability of AIS in the Jordanian commercial banks. The second type of tests aims to test and verify the impact of the independent variables (the availability of reliable AIS standards) on the dependent variables (banking performance matrix).

Analysis of the Availability of Reliable AIS Standards

Having the data of the current study of normality distribution led to the availability of the possibility of adopting what is known as a series of (Parametric Tests), specifically (One Sample T-Test) in order to verify the acceptability of the assumptions related to the availability of reliable AIS standards.

Table (7) presents the results of testing the null hypothesis which states that the work of Jordanian commercial banks environment does not have the reliability of AIS standards with a test function exceeds 65% ($H_o: \mu < 65\%$) against the alternative hypothesis which states that the work of Jordanian commercial banks environment does have the reliability of AIS standards with a test function ($H_1 : \mu \geq 65\%$).

Table 7: One Sample T-Test Results for AIS Reliability Criteria

	AIS Reliability Criteria	Average	Standard Deviation	T. Test	Sig
H_1	AIS Availability	77.85%	11.54%	24.12	0.000***
H_2	AIS Security	76.54%	14.41%	18.99	0.000***
H_3	AIS Confidentiality and Privacy	69.92%	14.41%	23.69	0.000***
H_4	AIS Processing Integrity	57.00%	16.19%	12.54	0.000***

*This table shows the average, standard deviation, t-test, and the significance of AIS availability, AIS security, AIS confidentiality, and AIS processing integrity. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively. Note that the value of t tabulated at 5% significant level and a degree of freedom of 12 is1.782*

H_{01} AIS in Jordanian banks does not provide the requirements of availability standard.

As we note from Table (7) that the average of availability the requirements of achieving the AIS availability standard in Jordanian commercial banks is 77.85% with a standard deviation of 11.54%. Because the sample size is small and the variation in the population is un-known, we can use a T-Distribution as a mathematical way for determining the acceptance or rejection the alternative and null hypotheses. Accordingly,

$$T = \frac{\overline{x} - \mu}{S/\sqrt{n}} \qquad (2)$$

We accept alternative hypothesis when the average of achieving the AIS availability standard in Jordanian banks exceeds 65% (Sekaran, 2005). After doing the requirements of analysis and testing, we find that the T calculated of 24.12is greater than the T tabulated of 1.782 at a significant level of 5% and 12 degrees of freedom. P-value is another way for accepting or rejecting the null hypothesis, when the P-value is less than 5% (the significance level), we reject null hypothesis and accept alternative hypothesis and vice versa. We can see the P-value of 0.000 is too much less than 5% which is an evidence against the null hypothesis.

H_{02} AIS in Jordanian banks does not provide the requirements of security standard.

Table (7) shows that the average of availability the requirements of achieving the AIS security standard in Jordanian banks is 76.54% with a standard deviation of 14.41%. After doing the requirements of analysis and testing, we find that the T calculated of 18.99 is greater than the T tabulated of 1.782 at a significant level of 5% and 12 degrees of freedom. P-value is another way for accepting or rejecting the null hypothesis, when the P-value is less than 5% (the significance level), we reject null hypothesis and accept alternative hypothesis and vice versa. We can see the P-value of 0.000 is too much less than 5% which is an evidence against the null hypothesis.

H_{03} AIS in Jordanian banks does not provide the requirements of confidentiality and privacy standard.

Table (7) also reveals that the average of availability the requirements of achieving the AIS confidentiality and privacy standard in Jordanian banks is 69.92% with a standard deviation of 14.41%. After doing the requirements of analysis and testing, we find that the T calculated of 23.69 is greater than the T tabulated of 1.782 at a significant level of 5% and 12 degrees of freedom. P-value is another way for accepting or rejecting the null hypothesis, when the P-value is less than 5% (the significance level), we reject null hypothesis and accept alternative hypothesis and vice versa. We can see the P-value of 0.000 is too much less than 5% which is an evidence against the null hypothesis.

H_{04} AIS in Jordanian banks does not provide the requirements of Processing Integrity standard

Finally, Table (7) demonstrates that the average of availability the requirements of achieving the AIS Processing Integrity standard in Jordanian banks is 57% with a standard deviation of 16.19%. After doing the requirements of analysis and testing, we find that the T calculated of 12.54 is greater than the T tabulated of 1.782 at a significant level of 5% and 12 degrees of freedom. P-value is another way for accepting or rejecting the null hypothesis, when the P-value is less than 5% (the significance level), we reject null hypothesis and accept alternative hypothesis and vice versa. We can see the P-value of 0.000 is too much less than 5% which is an evidence against the null hypothesis. Based on the results of statistical tests and the set of the facts above, it can be said that the Jordanian commercial banks possess the requirements of reliability of AIS according to the (SysTrust)'s model with its four standards: the availability of AIS, security of AIS, Confidentiality and Privacy of AIS and Processing Integrity of AIS.

Analysis of Banking Performance Indicators

First, we analyze the impact of the reliability of the AIS on the level of market value added As we mentioned earlier, the fifth null hypothesis states that there is no effect of AIS reliability on market value added. We use the below model for accepting or rejecting that.

$$\left[MVA = \alpha \mp \beta_1 \chi_1 \mp \beta_2 \chi_2 \mp \beta_3 \chi_3 \mp \beta_4 \chi_4 + \ell\right] \quad (3)$$

MVA:market value added, α :constant, $\beta_{1\ldots4}$: the coefficients of independent variables, $\chi_1, \chi_2, \chi_3, \chi_4$: availability of AIS, security of AIS, confidentiality and privacy of AIS, processing integrity of AIS respectively, ℓ :Random Errro

The null hypothesis $\left[H_0 : \beta_1 \mp \beta_2 \mp \beta_3 \mp \beta_4 = 0\right]$

Alternative hypothesis $\left[H_a : \beta_1 \mp \beta_2 \mp \beta_3 \mp \beta_4 \succ 0\right]$

It should be noted that only the alternative hypothesis was tested from one side (the right side) against the null hypothesis which states that there is no impact of the reliability of AIS on the market value added. Coefficient of Determination (R2) is used to identify the variation in the dependent variable that can be explained by the variation in independent variables (Vaus, 2002). Table 8 presents the regression results of the effect of AIS reliability (independent variables) on the market value added (dependent variable).

Table 8: The Results of Regression of the Effect of AIS Reliability on Market Value Added

Dependent Variable	**Independent Variables**			
		β	**T**	**Sig.**
MVA	AIS Availability	128,920,178.652	1.600	0.110
	AIS Security	31,016,822.833	0.482	0.642
	AIS Confidentiality	-63,708,914.307	-0.742	0.479
	AIS Processing Integrity	41,473,209.227	0.865	0.412
R	**R^2**	**F**	**Sig.**	**α**
0.59%	0.34%	1.052	0.4388a	-9,329,202,571

*This table shows the correlation coefficient (R), the coefficient of determination (R^2), the F-calculated, the overall significance(Sig.), the coefficient for each independent variable (β), the t-calculated for each independent variable, and the significance for each independent variable (Sig.). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Table (8) shows that 0.34% of the variability in the market value added (MVA) is explained by independent variables. It also shows that the value of F calculated of 1.052 is less than the F tabulated of 5.32, implying that statistically insignificant effect of the standards of reliability of AIS on the market value added. We also note that $[P - Value = Pr.(F \leq 1.052) = 04388^{a}$ is greater than 5% which confirms the acceptance of the null hypothesis. The correlation coefficient (R) of 0.59% indicating a very week strong positive correlation between the independent variables (reliability of AIS) and the dependent variable (market value added). We also note that all independent variables are statistically insignificant.

Second: Analyzing the effect of AIS reliability on the return on investment. We use the model below to examine the effect of AIS reliability on the return on investment.

$$\left[ROI = \alpha \mp \beta_1 \chi_1 \mp \beta_2 \chi_2 \mp \beta_3 \chi_3 \mp \beta_4 \chi_4 + \ell\right] \quad (4)$$

ROI ; return on investment, α : constant, $\beta_{1...4}$: the coefficients of independent variables.

χ_1, χ_2, χ_3, χ_4: AIS availability, AIS security, confidentiality and privacy of AIS, processing

Table 9 presents the regression results of the effect of AIS reliability (independent variables) on return on investment (dependent variable).

Table (9) shows that 45.4% of the variability in the return on investment (ROI) is explained by independent variables. It also shows that the value of F calculated of 6.664 is greater than the F tabulated of 5.32, implying that statistically significant effect of the standards of reliability of AIS on the return on investment. We also note that $[P - Value = Pr.(F \leq 6.664) = 0.0408^{a}$ is less than 5% which confirms the rejecting of the null hypothesis. That means the return of investments for Jordanian commercial banks is affected by the standards of reliability of AIS. The correlation coefficient (R) of 67.4% indicating a strong positive correlation between the independent variables (reliability of AIS) and the dependent variable (return on investment). We also note that all independent variables are statistically significant.

Table 9: The Results of Regression of the Effect of AIS Reliability on Return on Investment

Dependent Variables	**Independent Variables**			
		β	**T**	**Sig.**
ROI	AIS Availability	1.944	2.455	0.021*
	AIS Security	3.467	1.862	0.040*
	AIS Confidentiality	3.901	2.363	0.006***
	AIS Processing Integrity	1.804	3.579	0.009***
R	**R^2**	**F**	**Sig**	**α**
67.40%	45.40%	6.664	0.0408*	260

*This table shows the correlation coefficient (R), the coefficient of determination (R^2), the F-calculated, the overall significance(Sig.), the coefficient for each independent variable (β), the t-calculated for each independent variable, and the significance for each independent variable (Sig.). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Third: Analyzing the effect of AIS reliability on net profit margin (NPM). We use the below model to examine the effect of AIS reliability on net profit margin.

$$\left[NPM = \alpha \mp \beta_1 \chi_1 \mp \beta_2 \chi_2 \mp \beta_3 \chi_3 \mp \beta_4 \chi_4 + \ell\right] \quad (5)$$

α constant value, $\beta_{1...4}$: coefficients of independent variables, χ_1, χ_2, χ_3, χ_4: the availability of AIS, security of AIS, confidentiality and privacy of AIS, processing integrity of AIS respectively. ℓ Random error. Table 10 presents the regression results of the effect of AIS reliability (independent variables) on net profit margin (dependent variable).

Table 10: The Results of Regression of the Effect of AIS Reliability on Net Profit Margin

Dependent Variable	Independent Variables				
		β	**T**	**Sig.**	
	AIS Availability	1.226	2.525	0.036**	
NPM	AIS Security	1.361	1.870	0.042**	
	AIS Confidentiality	0.347	1.997	0.047**	
	AISProcessing Integrity	0.014	2.043	0.007***	
	R	**R^2**	**F**	**Sig**	**α**
	71.50%	51.20%	8.600	0.003***	142

*This table shows the correlation coefficient (R), the coefficient of determination (R^2), the F-calculated, the overall significance(Sig.), the coefficient for each independent variable (β), the t-calculated for each independent variable, and the significance for each independent variable (Sig.). ***, ** and * indicate* significance at the 1, 5 and 10 percent levels respectively.

Table (10) shows that 51.20% of the variability in net profit margin (NPM) is explained by independent variables. It also shows that the value of F calculated of 8.600 is greater than the F tabulated of 5.32, implying that statistically significant effect of the standards of the reliability of AIS on net profit margin. We also note that $[P - Value = Pr.(F \leq 8.600) = 0.003^a$ is less than 5% which confirms the rejecting of the null hypothesis. That means the net profit margin for Jordanian commercial banks is affected by the standards of reliability of AIS. The correlation coefficient (R) of 71.50% indicating a strong positive correlation between the independent variables (reliability of AIS) and the dependent variable (net profit margin). We also note that all independent variables are statistically significant.

Fourth: Analyzing the effect of AIS reliability on return on assets (ROA). We use the below model to examine the effect of AIS reliability on return on assets.

$$\left[ROA = \alpha \mp \beta_1 \chi_1 \mp \beta_2 \chi_2 \mp \beta_3 \chi_3 \mp \beta_4 \chi_4 + \ell\right] \quad (6)$$

α constant value, $\beta_{1...4}$: coefficients of independent variables, χ_1, χ_2, χ_3, χ_4 :the availability of AIS, security of AIS, confidentiality and privacy of AIS, processing integrity of AIS respectively. ℓ Random error.

Table 11 presents the regression results of the effect of AIS reliability (independent variables) on return on assets (dependent variable).

Table 11: The Results of Regression of the Effect of AIS Reliability on Return on Assets

Dependent Variable	**Independent variables**				
		β	**T**	**Sig.**	
	AIS availability	1.944	2.465	0.001***	
ROA	AIS security	3.467	5.852	0.030**	
	AIS confidentiality	3.901	4.123	0.036**	
	AIS processing integrity	1.804	3.809	0.019**	
	R	**R^2**	**F**	**Sig**	**α**
	70.40%	49.56%	12.864	0.010***	260

*This table shows the correlation coefficient (R), the coefficient of determination (R^2), the F-calculated, the overall significance(Sig.), the coefficient for each independent variable (β), the t-calculated for each independent variable, and the significance for each independent variable (Sig.). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Table (11) shows that 49.56% of the variability in return on assets (ROA) is explained by independent variables. It also shows that the value of F calculated of 12.864 is greater than the F tabulated of 5.32, implying that statistically significant effect of the standards of the reliability of AIS on return on assets. We also note that $[P - Value = Pr.(F \leq 1286) = 0.010^{a}$ is less than 5% which confirms the rejecting of the null hypothesis. That means the return on assets for Jordanian commercial banks is affected by the standards of reliability of AIS. The correlation coefficient (R) of 70.40% indicating a strong positive correlation between the independent variables (reliability of AIS) and the dependent variable (return on assests). We also note that all independent variables are statistically significant.

Fifth: Analyzing the impact of AIS reliability on earnings per share (EPS). The below model is used to examine the effect of the reliability of AIS on earnings per share.

$$\left[EPS = \alpha \mp \beta_1\chi_1 \mp \beta_2\chi_2 \mp \beta_3\chi_3 \mp \beta_4\chi_4 + \ell\right] \quad (7)$$

EPS : earnings per share, α constant value, $\beta_{1...4}$: coefficients of independent variables, χ_1, χ_2, χ_3, χ_4 :the availability of AIS, security of AIS, confidentiality and privacy of AIS, processing integrity of AIS respectively. ℓ Random error. Table 12 presents the regression results of the effect of AIS reliability (independent variables) on earnings per share (dependent variable).

Table 12: Regression Results of the Effect of AIS Reliability on Earnings Per Share

Dependent Variable	**Independent Variables**				
		β	**T**	**Sig.**	
	AIS availability	0.001	0.126	0.903	
EPS	AIS security	0.009	1.148	0.284	
	AIS confidentiality	-0.011	-1.058	0.321	
	AIS processing integrity	0.000	0.058	0.955	
	R	**R^2**	**F**	**Sig**	**α**
	41.50%	17.20%	0.416	0.793[a]	0.50

*This table shows the correlation coefficient (R), the coefficient of determination (R^2), the F-calculated, the overall significance(Sig.), the coefficient for each independent variable (β), the t-calculated for each independent variable, and the significance for each independent variable (Sig.). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Table (12) shows that 17.20% of the variability in the earnings per share is explained by the independent variables. It also shows that the value of F calculated of 0.416 is less than the F tabulated of 5.32, implying that statistically insignificant effect of the standards of reliability of AIS on the earnings per share. We also note that $[P - Value = Pr.(F \leq 0.416) = 0.793^a$ is greater than 5% which confirms the acceptanceof the null hypothesis. The correlation coefficient (R) of 41.50% indicating a positive correlation between the independent variables (reliability of AIS) and the dependent variable (earnings per share). We also note that all independent variables are statistically insignificant.

Sixth : Analyze the impact of AIS reliability on price-earnings ratio (P / E). The below model is used to examine the effect of AIS reliability on price-earnings ratio.

$$\left[P/E = \alpha \mp \beta_1 \chi_1 \mp \beta_2 \chi_2 \mp \beta_3 \chi_3 \mp \beta_4 \chi_4 + \ell\right] \quad (8)$$

P/E : price-earnings ratio, α : constant, $\beta_{1...4}$: coefficients of independent variables, χ_1, χ_2, χ_3, χ_4 :the availability of AIS, security of AIS, confidentiality and privacy of AIS, processing integrity of AIS respectively. ℓ Random error. Table 13 presents the regression results of the effect of AIS reliability (independent variables) on price-earnings ratio (dependent variable).

Table 13: Regression Results of the Effect of AIS Reliability on Price-Earnings Ratio

Dependent Variable	Independent Variables				
		β	**T**	**Sig.**	
P/E	AIS availability	0.619	1.972	0.040**	
	AIS security	0.127	0.439	0.672	
	AIS confidentiality	0.212	3.550	0.036**	
	AIS processing integrity	0.194	1.830	0.044**	
	R	**R^2**	**F**	**Sig**	**α**
	60.80%	37.00%	7.174	0.793a	0.50

*This table shows the correlation coefficient (R), the coefficient of determination (R^2), the F-calculated, the overall significance(Sig.), the coefficient for each independent variable (β), the t-calculated for each independent variable, and the significance for each independent variable (Sig.). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Table (13) shows that 37% of the variability in price-earnings ratio (P/E) is explained by independent variables. It also shows that the value of F calculated of 7.174 is greater than the F tabulated of 5.32, implying that statistically significant effect of the standards of the reliability of AIS on price-earnings ratio. However, we note that $[P - Value = Pr.(F \leq 7.174) = 0.793^a$ is greater than 5% whichfail to reject the null hypothesis. The correlation coefficient (R) of 60.80% indicating a strong positive correlation between the independent variables (reliability of AIS) and the dependent variable (price-earnings ratio). We also note that all independent variables are statistically significant except AIS security.

CONCLUDING COMMENTS

The analysis process of the gathered data has taken two stages: the first stage was focused on measuring the critical availability of (SysTrust) principles and criteria in the Jordanian commercial banks. In contrast, the second stage of analysis has checked the impact of availability of (SysTrust) principles and criteria on parameters of banking performance matrix (MVA, ROI, NPM, ROA, EPS, and P/E). As for the first stage, mean values, standard deviation and T-test have been calculated to determine whether availability, security, confidentiality and privacy, and processing integrity of AIS is placed in the infrastructure of commercial Jordanian banks. The result of one-sample T-test shows that (SysTrust) principles and criteria are highly available in AIS infrastructure of the commercial Jordanian banks.

In the second stage of analysis, the results of the statistical tests have shown varied level of impact of (SysTrust) on parameters of banking performance matrix. It has been empirically proved that availability of (SysTrust) has reliable impact on profit engine and managing assets of AIS on the Jordanian Commercial Banks. The possible explanation for this difference can be assigned to the operational necessities of these banks. Redesigning AIS based on (SysTrust) criteria and principles has clearly improved the transactional engine of the sample banks in terms of integration, security, and integrity. It has been found that 51.2% of the improvement in profit rates is resulted from the style of new process and procedures. The picture was less clear about the causal link between (SysTrust) and other parameters of the banking performance matrix. Part of the reason beyond such result lays in the fact that investment in the Jordanian commercial banks needs more exploitation far from the operational aspects. Also, integrating banking customer base needs more mature technological applications which unfortunately missed on sample banks such as phone and mobile banking applications.

Recommendations and Future Research

The research presented in this paper provides an important contribution to the assurance services domain. The AICPA, CICA, and many practitioners have made significant investments in an attempt to expand the assurance services that practitioners provide. Through the application of SysTrust model and with data obtained from 10 Jordanian commercial banks and with statistical testing of these data, the present paper highlights two important matters. First, the IT infrastructure of the Jordanian commercial banks by its status qualification is mature enough to provide the operational requirements for (SysTrust) principles and criteria. Such result matches the conclusion of (Casolaro & Gobbi, 2004). Second, the IT management of these commercial banks needs to be enhanced for more mature and innovative use of IT in banking applications. By investigating the AIS design, this paper has discovered that Jordanian banking environment has acceptable rate of existence for (SysTrust) principles and criteria such as availability, security, confidentiality and privacy, and processing integrity. Due to operational focus in building and designing AIS, the impact of (SysTrust) principles and criteria on parameters of banking performance matrix is still unclear. The findings from this paper indicate the urgent need to exploit IT infrastructure for more adoption, adaptation, and integration with banking investment applications. A challenge of AIS design is not to apply (SysTrust) principles and criteria, but how to develop new ways to integrate these principles and criteria with parameters of banking performance matrix. In addition, there is a need to deepen the understanding of the reliability of AIS standards among the Jordanian banking institutions employees through the preparation and implementation of specialized training programs or through flyers and brochures.

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